Letter: USFWS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

In Reply Refer To:
FWS-OR-12B0345-14TA0069

JAN 06 2014

Mr. Ron Tippets
Planner
Orange County Planning Services
P.O. Box 4048
Santa Ana, California 92702-4048

Subject: Draft Environmental Impact Report for the Cielo Vista Project, Orange County, California

Dear Mr. Tippets:

The U.S. Fish and Wildlife Service (Service) has reviewed the Draft Environmental Impact Report (Draft EIR) for the Cielo Vista Project in unincorporated Orange County (County), California. The proposed project includes construction of approximately 112 single-family residences and associated infrastructure on 47.7 acres. A total of 36.3 acres of the site would be preserved as undeveloped open space, including fuel modification zones. The project will impact 55.23 acres of natural vegetation communities. The site was burned in the 2008 Santiago Fire and is currently in the early stages of recovery from the fire and associated post-fire vegetation management activities.

The primary concern and mandate of the Service is the protection of public fish and wildlife resources and their habitats. Specifically, the Service administers the Endangered Species Act (Act) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) and provides support to other Federal agencies in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*). Section 7 of the Act requires Federal agencies to consult with the Service should it be determined that their actions may affect federally listed threatened or endangered species or their critical habitats. Section 9 of the Act prohibits the "take" (e.g., harm, harassment, pursuit, injury, kill) of federally listed wildlife. Take incidental to otherwise lawful activities can be permitted under the provisions of section 7 (Federal consultations) and section 10 of the Act.

Our primary concerns with respect to this project are the extent of impacts to the federally endangered least Bell's vireo (*Vireo bellii pusillus*, vireo), designated critical habitat for the threatened coastal California gnatcatcher (*Polioptila californica californica*), and to other

sensitive habitat types and wildlife species. We believe that the information presented in the Draft EIR under-represents the actual impacts of the project and recommend that additional measures be incorporated to avoid, preserve, and restore native habitats. We offer the following specific comments and recommendations regarding project-associated biological impacts based on our review of the Draft EIR and our knowledge of declining habitat types and species within Orange County. These comments are provided in keeping with our agency's mission to "work with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people."

1. **Project Configuration and Indirect Impacts to Adjacent Open Space** – The Draft EIR identifies potential indirect adverse impacts on vegetation and wildlife outside the project area associated with an increase in vehicular traffic, noise, human intrusion, night lighting, pollutants, and litter. The proposed project configuration fragments remaining open spaces on the property and substantially increases project-related edge effects by including two separate development areas with separate access points. To minimize habitat fragmentation and edge effects, we strongly recommend that alternative configurations be evaluated that eliminate the northern development bubble, limiting development to the southwest portion of the property. In addition to the potential indirect impacts identified in the Draft EIR, we are concerned that regular maintenance in fuel modification zones surrounding the development will result in a spread of non-native weedy species into adjacent open space (see #5 - Fuel Modification Zone), reducing the value of habitat for species dependent on native vegetation.

2. **Impacts to Natural Vegetation Communities** – The Final EIR should include mitigation for impacts to natural vegetation communities present in the project area prior to the Santiago Fire. No mitigation is currently proposed for impacts to natural vegetation communities on the project site, with the exception of those falling within U.S. Army Corps of Engineers (Corps) or California Department of Fish and Wildlife (CDFW) jurisdictional areas (Mitigation Measure 4.3-2). If the County does not include specific compensatory mitigation measures to address impacts to native upland vegetation from projects such as the Cielo Vista Project, it will lead to a significant degradation of the extent and quality of these vegetation communities and the sensitive species they support within the region.

   The Draft EIR identifies impacts to 58.88 acres, including 30.83 acres of native vegetation communities, 3.65 acres mapped as disturbed (primarily bare ground) and 24.4 acres mapped as “ruderal” (containing native vegetation but dominated by non-native weedy species). Based on a review of vegetation mapping completed prior to the Santiago Fire (PCR 2006), it appears there has been a significant reduction in the extent of native vegetation communities mapped on the site. For example, 45.9 acres of mixed coastal sage scrub were mapped prior to the fire (PCR 2006) whereas the Draft EIR identifies 9.05 acres in the project area. Restoration of natural vegetation communities to a pre-fire condition could take several years and could be delayed by post-fire vegetation management activities. However, the temporary reduction in habitat quality associated with the fire and post-fire vegetation management activities does not reduce the long-term value of the project site to support foraging and

breeding by native wildlife species within open space contiguous with Chino Hills State Park.

3. **Sensitive Plant Species** – No sensitive plant species were observed on the project site. Because surveys were conducted in 2012, a water year with lower than normal precipitation (NOAA 2012), we are concerned that sensitive plant species may not have been detected. Service guidelines for conducting botanic inventories recommend an additional survey be conducted if adverse conditions, including drought, may preclude the presence or identification of target species in any year (enclosed). The intermediate mariposa lily (*Calochortus weedii* var. *intermedius*) was identified on the Cielo Vista project site in 2010 during surveys conducted for the adjacent Esperanza Hills Specific Plan Project (Glenn Lukos Associates 2013). The Final EIR should include mitigation for this species if it will be impacted by the project. In addition, given the adverse survey conditions in 2012 and the observed special-status plant species on the site in 2010, we recommend at least one additional special-status plant survey be conducted throughout the project site at the appropriate time of the year when target species are present and identifiable prior to the release of the Final EIR.

4. **Large Mammal Impacts** – The Final EIR should include an analysis of the extent of impacts to live-in habitat and nursery areas for large mammals. The Draft EIR focuses on potential impacts to wildlife movement and concludes the site is not conducive to the movement of large mammals due to development surrounding the site (page 4.3-23).[1] Although the project is anticipated to impact live-in habitat for wildlife and wildlife movement on a local scale (page 4.3-10), there is no discussion of how these impacts may contribute to the degradation of surrounding habitat. Large predators, in particular, play an important role in maintaining the ecological integrity of remaining open space areas in southern California (Soulé et al. 1988, Crooks and Soulé 1999). The presence of coyotes and bobcats has been shown to be negatively associated with the distribution and abundance of smaller predators (e.g., raccoons and feral cats) which often prey upon songbirds (Crooks and Soule 1999).

   We are concerned that general biological surveys conducted for the site were inadequate to evaluate the importance of natural communities on site as foraging and breeding habitat for large mammals. Only four mammals were observed during biological surveys (Draft EIR, Appendix C), including white-tailed deer (*Odocoileus virginianus*), which is not known to occur in the local area.[2] In contrast, a total of 14 mammals were recently observed on the adjacent property, including bobcat (*Felis rufus*), coyote (*Canis latrans*), grey fox (*Urocyon cinereoargenteus*), and mule deer (*Odocoileus hemionus*) (Draft EIR, Appendix C). Mountain lion (*Puma concolor*) are also known to occur in the project vicinity (Boydston and Crooks 2013). We recommend additional large mammal surveys are conducted within the project site by a biologist familiar with large mammals in the local area so that the ecological

[1] Residential development borders the site to the north, west, and south.
[2] L. Lyren, U.S. Geological Survey, personal communication to C. Medak, Service, December 19, 2013.

consequences of impacting live-in habitat and local wildlife movement paths can be analyzed and appropriately mitigated in the Final EIR.

5. **Fuel Modification Zone** – The Final EIR should clarify the extent of impacts associated with fuel management activities, relative to preserved open space (Draft EIR, Table 4.3-3, "Impacts to Natural Communities"). All fuel modification zones should be treated as permanent impact areas and mitigated as such. The regular disturbance associated with thinning native vegetation in fuel modification zones increases the extent of non-native weedy species and reduces soil moisture content, which may reduce the potential for native species to be supported in the fuel modification zone over the long term. We also recommend that fuel modification zones be planted and maintained with native vegetation that is on Orange County Fire Authority's list of approved species for fuel modification zones[3] and that maintenance be restricted to removing non-native species and species that pose an unacceptable fire risk.

6. **Federally Listed Species** – We anticipate that impacts to vireo and impacts to critical habitat for the gnatcatcher will be addressed through the section 7 consultation process between the Service and the Army Corps of Engineers since the Draft EIR acknowledges that a section 404 permit under the Clean Water Act is required. As currently proposed, the project will permanently impact the entire extent of the occupied vireo habitat within the site and approximately 48 acres of designated critical habitat for the gnatcatcher. To minimize and avoid impacts to federally listed species we recommend the Final EIR include an alternative development plan that is limited to the southern portion of the property.

We appreciate the opportunity to comment on the subject Draft EIR. If you have any questions regarding these comments, please contact Christine Medak of this office at 760-431-9440, extension 298.

Sincerely,

for Karen A. Goebel
Assistant Field Supervisor

Enclosure

cc:
Jennifer Edwards, California Department of Fish and Wildlife
Ken Kietzer, Chino Hills State Park

[3] http://www.ocfa.org/_uploads/pdf/guidec05.pdf (see Attachment 8, species with Code o: native to Orange County)

Literature cited:

Boydston, E. E. and K. R. Crooks (eds.). 2013. Movement patterns of bobcats and coyotes after widening of CA-71 near CA-91 in southern California. U. S. Geological Survey. Prepared for Caltrans.

Crooks, K. and M. Soule. 1999. Mesopredator release and avifaunal extinctions in a fragmented system. Nature 400:563-566.

Glenn Lukos Associates, Inc. 2013. Biological technical report for the 504-acre Esperanza Hills Specific Plan Property and associated offside impact areas, unincorporated Orange County, California. Prepared for Mr. Douglas Wymore, Yorba Linda Estates, LLC. Scottsdale, Arizona.

NOAA (National Oceanic and Atmospheric Administration). 2012. National Weather Service. California-Nevada River Forecast Center, Sacramento, California. accessed May 2, 2012. (http://www.cnrfc.noaa.gov/monthly_precip_2012.php)

Soulé, M. E., D. T. Bolger, A. C. Roberts, R. Sauvajot, J. Wright, M. Sorice, and S. Hill. 1988. Reconstructed dynamics of rapid extinctions of chaparral-requiring birds in urban habitat islands. Conservation Biology 2:75-92.

Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants

January, 2000

These guidelines describe protocols for conducting botanical inventories for federally listed, proposed and candidate plants, and describe minimum standards for reporting results. The Service will use, in part, the information outlined below in determining whether the project under consideration may affect any listed, proposed. or candidate plants, and in determining the direct, indirect, and cumulative effects.

Field inventories should be conducted in a manner that will locate listed, proposed, or candidate species (target species) that may be present. The entire project area requires a botanical inventory, except developed agricultural lands. The field investigator(s) should:

1. Conduct inventories at the appropriate times of year when target species are present and identifiable. Inventories will include all potential habitats. Multiple site visits during a field season may be necessary to make observations during the appropriate phenological stage of all target species.

2. If available, use a regional or local reference population to obtain a visual image of the target species and associated habitat(s). If access to reference populations(s) is not available, investigators should study specimens from local herbaria.

3. List every species observed and compile a comprehensive list of vascular plants for the entire project site. Vascular plants need to be identified to a taxonomic level which allows rarity to be determined.

4. Report results of botanical field inventories that include:

a. a description of the biological setting, including plant community, topography, soils, potential habitat of target species, and an evaluation of environmental conditions, such as timing or quantity of rainfall, which may influence the performance and expression of target species

b. a map of project location showing scale, orientation, project boundaries, parcel size, and map quadrangle name

c. survey dates and survey methodology(ies)

d. if a reference population is available, provide a written narrative describing the target species reference population(s) used, and date(s) when observations were made

e. a comprehensive list of all vascular plants occurring on the project site for each habitat type

f. current and historic land uses of the habitat(s) and degree of site alteration

g. presence of target species off-site on adjacent parcels, if known

h. an assessment of the biological significance or ecological quality of the project site in a local and regional context

5. If target species is(are) found, report results that additionally include: a. a map showing federally listed, proposed and candidate species distribution as they relate to the proposed project b. if target species is (are) associated with wetlands, a description of the direction and integrity of flow of surface hydrology. If target species is (are) affected by adjacent off-site hydrological influences, describe these factors. c. the target species phenology and microhabitat, an estimate of the number of individuals of each target species per unit area; identify areas of high, medium and low density of target species over the project site, and provide acres of occupied habitat of target species. Investigators could provide color slides, photos or color copies of photos of target species or representative habitats to support information or descriptions contained in reports. d. the degree of impact(s), if any, of the proposed project as it relates to the potential unoccupied habitat of target habitat.

6. Document findings of target species by completing California Native Species Field Survey Form(s) and submit form(s) to the Natural Diversity Data Base maintained by the Natural Heritage Division of the California Department of Fish & Game. Documentation of determinations and/or voucher specimens may be useful in cases of taxonomic ambiguities, habitat or range extensions.

7. Report as an addendum to the original survey, any change in abundance and distribution of target plants in subsequent years. Project sites with inventories older than 3 years from the current date of project proposal submission will likely need additional survey.

8. Adverse conditions may prevent investigator(s) from determining presence or identifying some target species in potential habitat(s) of target species. Disease, drought, predation, or herbivory may preclude the presence or identification of target species in any year. An additional botanical inventory(ies) in a subsequent year(s) may be required if adverse conditions occur in a potential habitat(s). Investigator(s) may need to discuss such conditions.

Letter: OPR1

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Edmund G. Brown Jr.
Governor

Ken Alex
Director

Memorandum

Date: January 6, 2014

To: All Reviewing Agencies

From: Scott Morgan, Director

Re: SCH # 2012071013
Cielo Vista Project

Pursuant to the attached letter, the Lead Agency has *extended* the review period for the above referenced project to **January 22, 2014** to accommodate the review process. All other project information remains the same.

cc: Ron Tippets
County of Orange
300 N. Flower
Santa Ana, CA 92702-4048

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
TEL (916) 445-0613 FAX (916) 323-3018 www.opr.ca.gov

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STATE CLEARING HOUSE

County of Orange
OC Planning Services
Phone: (714) 667-8856

Second (2nd) Revised
PUBLIC NOTICE OF AVAILABILITY (NOA)
DRAFT ENVIRONMENTAL IMPACT REPORT

SCH #: 2012071013

UPDATE: The public review and comment period on the Cielo Vista Project Draft Environmental Impact Report (EIR) has been extended from 60 days to 75 days. This additional 15-day extension results in the review and comment period ending on January 22, 2014, rather than January 7, 2014, as previously indicated in the revised NOA dated December 3, 2013. Thus, any written comments on the Draft EIR must be submitted no later than Wednesday, January 22, 2014. See below for additional details. This additional extension is in response to a request from the Orange County Fire Authority to allow additional time to coordinate with the Orange County Sheriff Department in the area of emergency response and evacuation.

Date: January 2, 2014

Project: Cielo Vista Project (the "Project") - Draft Environmental Impact Report (EIR No. 615)

Project Location: The approximately 84-acre site is located north of Via Del Agua and east of San Antonio Road within unincorporated Orange County and within the City of Yorba Linda Sphere of Influence (APN # 351-031-04, 351-031-05, and 351-031-17). The nearest cross streets are Yorba Linda Boulevard and Via Del Agua. The majority of the site is vacant, with the exception of several operational and abandoned oil wells and various dirt roads and trails which traverse the site.

Project Description: The Project proposes to develop a maximum of 112 single-family dwellings and associated infrastructure within two Planning Areas. Planning Area 1 would include 95 residences within 41.3 gross acres. Planning Area 2 would include 17 residences within 6.4 gross acres. Thus, the single-family dwellings and associated infrastructure would be developed on 47.7 acres of the site. The Project would preserve 36.3 acres of the site as undeveloped open space, including fuel modification zones but exclusive of private slopes, water quality basins and roadways. Open space areas would be preserved in the northern portion of the site. Also, a 1.8-acre parcel located in Planning Area 1 (referred to as the "drilling pad") is proposed that would be made available to the current on-site oil operators following the Project's construction activities for continued oil operations should they decide to reconsolidate the existing oil wells on the drilling pad. Thus, the oil drilling pad would be developed for future oil operations as a separate project should the oil operators choose to relocate to this area of the project site.

Implementation of the Project would require approval of a General Plan Amendment for 6.4 acres comprising Planning Area 2 to change the General Plan Land Use Designation for this portion of the site from Open Space (5) to Suburban Residential (1B). The Project would also require approval of a zone change for Planning Area 1 from A1(O) (General Agricultural with Oil Production Overlay) to R-1 (Single Family Residence District) and R-1(O) (Single Family Residence District

with Oil Production Overlay) and a zone change for Planning Area 2 from A1(O) to R-1. The Project would also require approval of an Area Plan to permit development of single-family detached residential dwellings on minimum 7,500 square foot lots. Further, the Project includes consideration of a vesting tentative tract map subsequent to the above.

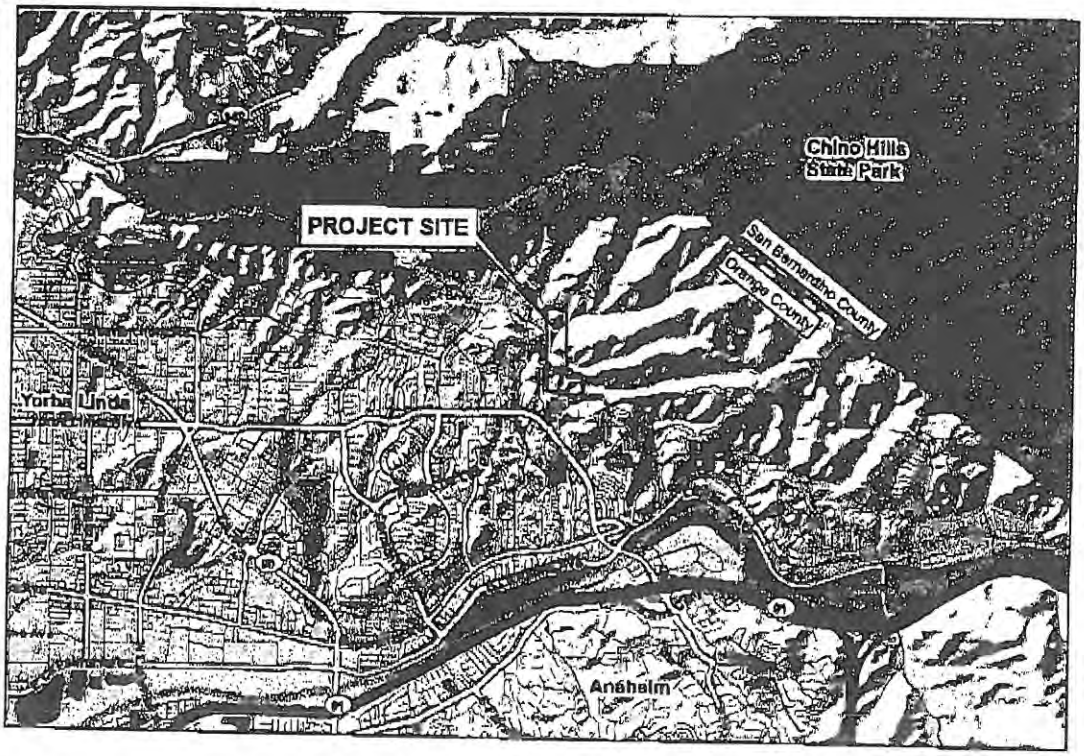
NOA Purpose: The purpose of this NOA UPDATE is to inform local residents, responsible agencies, institutions, and other interested parties that the Draft EIR is available for review and comment during the Public Comment Period (Thursday, **November 7, 2013** through Wednesday, **January 22, 2014**. Written comments to the Draft EIR must be submitted no later than Wednesday, January 22, 2014 to: Ron Tippets, Planner, Current & Environmental Planning Section, OC Planning Services, P.O. Box 4048, Santa Ana, California 92702-4048 or via email at: Ron.Tippets@ocpw.ocgov.com.

Significant Environmental Impacts: Based on the analysis contained in the Draft EIR, the Project would not result in any significant and unavoidable environmental impacts. All potential environmental impacts are insignificant or can be mitigated to a level that is less than significant.

Information Repositories: The Draft EIR is available for review at the following locations:

- OC Planning Services' website - http://ocplanning.net/planning/land/projects/cielo;
- OC Planning Services - 300 N. Flower Street, First Floor, Santa Ana, CA 92702;
- City of Yorba Linda Planning Department - 4845 Casa Loma Avenue, Yorba Linda, CA 92885;
- Yorba Linda Public Library - 18181 Imperial Highway, Yorba Linda, CA 92886; and
- East Anaheim Library - 8201 E. Santa Ana Canyon Road, Anaheim Hills, CA 92808.

How Do I Participate? Submit written comments by January 22, 2014 to: OC Planning, Attn: Ron Tippets, 300 N. Flower St., Santa Ana, California 92702-4048, RE: Cielo Vista Project. Or, comments may be e-mailed to Ron Tippets, OC Planning Contract Planner, by January 22, 2014 at: Ron.Tippets@ocpw.ocgov.com. For additional information, please contact Ron Tippets at: (714) 667-8856.



Notice of Completion & Environmental Document Transmittal

Mail to: State Clearinghouse, PO Box 3044, Sacramento, CA 95812-3044 (916) 445-0613

SCH # 2012071013

Project Title: Ciclo Vista Project

Lead Agency: County of Orange – OC Planning Contact Person: Ron Tippets – Contract Planner

Mailing Address: 300 N. Flower, P.O. Box, Santa Ana, CA 92702-4048 Phone: (714) 667-8856

City: N/A Zip: 92702 County: Orange

Project Location: The approximately 84-acre mostly undeveloped site is located north of Via Del Agua and east of San Antonio Road within unincorporated Orange County and within the City of Yorba Linda Sphere of Influence

County: Orange City/Nearest Community: City of Yorba Linda

Cross Streets: Yorba Linda Blvd. and Via Del Agua Zip Code: 92887 Total Acres: 84

Lat./Long.: 33.8977°N, 117.7589°W

Assessor's Parcel No. 351-031-04, 351-031-05, and 351-031-17. Section: N/A Twp. 3S Range: 9W Base: SBBM

Within 2 Miles: State Hw: SR-91 Waterways N/A

Airports: N/A Railways: BNSF RR Schools: Yorba Linda HS; La Entrada HS; Fairmont Elem.; Travis Ranch School; St. Francis of Assisi School; Yorba Linda/Stovenhaven Kindercare

Document Type:

CEQA: ☐ NOP ☐ Early Cons ☐ Neg Dec ☒ Draft EIR ☐ Supplement/Subsequent EIR (Prior SCH No.) ☐ Other

NEPA: ☐ NOI ☐ EA ☐ Draft EIS ☐ FONSI

Other: ☐ Joint Document ☐ Final Document ☐ Other

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Local Action Type:

☐ General Plan Update ☒ General Plan Amendment ☐ General Plan Element ☐ Community Plan ☐ Specific Plan ☐ Master Plan ☐ Planned Unit Development ☐ Site Plan ☒ Rezone ☐ Prezone ☐ Use Permit ☒ Land Division (Subdivision, etc.) ☐ Annexation ☐ Redevelopment ☐ Coastal Permit ☒ Other: Area Plan

Development Type:

☒ Residential: *Units:* 112 SF *Gross SF:* N/A
☐ Office: *Sq.ft.* ____ *Acres* ____ *Employees* ____
☐ Commercial: *Sq.ft.* ____ *Acres* ____ *Employees* ____
☐ Industrial: *Sq.ft.* ____ *Acres* ____ *Employees* ____
☐ Educational
☐ Recreational

☐ Water Facilities: *Type* ____ *MGD* ____
☐ Transportation: *Type* ____
☐ Mining: *Mineral* ____
☐ Power: *Type* ____ *Watts* ____
☐ Waste Treatment: *Type* ____
☐ Hazardous Waste: *Type* ____
☐ Other: ____

Funding (approx.): Federal $ ____ State $ ____ Total $ N/A

Project Issues Discussed in Document:

☒ Aesthetic/Visual
☒ Agricultural Land
☒ Air Quality
☒ Archeological/Historical
☒ Biological Resources
☐ Coastal Zone
☒ Drainage/Absorption
☐ Economic/Jobs
☐ Fiscal
☒ Flood Plain/Flooding
☒ Forest Land/Fire Hazard
☒ Geologic/Seismic
☐ Minerals
☒ Noise
☒ Population/Housing Balance
☒ Public Services/Facilities
☒ Recreation/Parks
☒ Schools/Universities
☐ Septic Systems
☒ Sewer Capacity
☒ Soil Erosion/Compaction/Grading
☒ Solid Waste
☒ Toxic/Hazardous
☒ Traffic/Circulation
☒ Vegetation
☒ Water Quality
☒ Water Supply/Groundwater
☒ Wetland/Riparian
☒ Wildlife
☒ Growth Inducing
☒ Land Use
☒ Cumulative Effects

Present Land Use/Zoning/General Plan Designation: Suburban Residential and Open Space

Project Description: The project would include a maximum of 112 single-family detached residential dwellings on approximately 48 acres and would preserve approximately 36 acres as permanent open space. Access to the site would occur from existing public roadways and within existing dedicated right of way in the City of Yorba Linda. The project site is vacant, with the exception of several operational and abandoned oil wells and various dirt access roads and trails which traverse the site.

Reviewing Agencies Checklist

Lead Agencies may recommend State Clearinghouse distribution by marking agencies below with an "X." If you have already sent your document to the agency please denote that with an "S."

- X Air Resources Board
- ___ Boating & Waterways, Department of
- X California Highway Patrol
- X Caltrans District # 12
- ___ Caltrans Division of Aeronautics
- ___ Caltrans Planning (headquarters)
- ___ Coachella Valley Mountains Conservancy
- ___ Coastal Commission
- ___ Colorado River Board
- X Conservation, Department of
- ___ Corrections, Department of
- ___ Delta protection Commission
- ___ Education, Department of
- ___ Energy Commission
- X Fish and Game Region # 5
- ___ Food & Agriculture, Department of
- ___ Forestry and Fire Protection
- ___ General Services, Department of
- ___ Health Services, Department of
- ___ Housing & Community Development
- ___ Integrated Waste Management Board
- X Native American Heritage Commission
- ___ Office of Emergency Services
- ___ Office of Historic Preservation
- ___ Office of Public Schools Construction
- X Parks & Recreation
- ___ Pesticide Regulation, Department of
- ___ Public Utilities Commission
- ___ Reclamation Board
- X Regional WQCB # 8
- X Resources Agency
- ___ S.F. Bay Conservation & Development Commission
- ___ Sand Gabriel & Lower L.A. Rivers and Mtns. Conservancy
- ___ San Joaquin River Conservancy
- ___ Santa Monica Mountains Conservancy
- ___ State Lands Commission
- ___ SWRCB: Clean Water Grants
- ___ SWRCB: Water Quality
- ___ SWRCB: Water Rights
- ___ Tahoe Regional Planning Agency
- X Toxic Substances Control, Department of
- X Water Resources, Department of
- X Other Army Corps of Engineers
- X Other Calfire
- X Other LAFCO
- X Other Orange County Fire Authority
- X Other South Coast Air Quality Management District

Local Public Review Period (to be filled in by lead agency)

Starting Date: November 7, 2013 Ending Date: December 23, 2013

Lead Agency : County of Orange
Consulting Firm: PCR Services Corporation
Address: One Venture, Suite 150
City/State/Zip: Irvine, CA 92618
Contact: Mike Harden, Principal Planner
Phone: (949) 753-7001

Applicant: North County BRS Project, LLC.
Address: 3 Corporate Plaza, Suite 102
City/State/Zip/: Newport Beach, CA 92660
Phone: (949) 644-3514

Signature of Lead Agency Representative: _____ **Date:** 11/4/2013

Authority Cited: Section 21083, Public Resources Code. Reference: Section 21161, Public Resources Code

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Mail to: State Clearinghouse, PO Box 3044, Sacramento, CA 95812-3044 (916) 445-0613

SCH # 2012071013

Project Title: Cielo Vista Project

Lead Agency: County of Orange – OC Planning Contact Person: Ron Tippets – Contract Planner

Mailing Address: 300 N. Flower, P.O. Box, Santa Ana, CA 92702-4048 Phone: (714) 667-8856

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Within 2 Miles: State Hwy: SR-91 Waterways: N/A

Airports: N/A Railways: BNSF RR Schools: Yorba Linda HS; La Entrada HS; Fairmont Elem.; Travis Ranch School; St. Francis of Assisi School; Yorba Linda/Stonehaven Kindercare

Document Type:

CEQA: ☐ NOP ☐ Early Cons ☐ Neg Dec ☒ Draft EIR ☐ Supplement/Subsequent (Prior SCH No.) ☐ Other

NEPA: ☐ NOI ☐ EA ☐ Draft EIS ☐ FONSI

Other: ☐ Joint Document ☐ Final Document ☐ Other

RECEIVED NOV 06 2013 STATE CLEARINGHOUSE

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☐ General Plan Update ☒ General Plan Amendment ☐ General Plan Element ☐ Community Plan ☐ Specific Plan ☐ Master Plan ☐ Planned Unit Development ☐ Site Plan ☒ Rezone ☐ Prezone ☐ Use Permit ☒ Land Division (Subdivision, etc.) ☐ Annexation ☐ Redevelopment ☐ Coastal Permit ☒ Other: Area Plan

Development Type:

☒ Residential: *Units:* 112 SF *Gross SF:* N/A
☐ Office: *Sq ft.* ____ *Acres* ____ *Employees* ____
☐ Commercial: *Sq ft* ____ *Acres* ____ *Employees* ____
☐ Industrial: *Sq ft* ____ *Acres* ____ *Employees* ____
☐ Educational ____
☐ Recreational ____
☐ Water Facilities: *Type* ____ *MGD* ____
☐ Transportation: *Type* ____
☐ Mining: *Mineral* ____
☐ Power: *Type* ____ *Watts* ____
☐ Waste Treatment: *Type* ____
☐ Hazardous Waste: *Type* ____
☐ Other: ____

Funding (approx.): Federal $ ____ State $ ____ Total $ N/A

Project Issues Discussed in Document:

☒ Aesthetic/Visual ☒ Agricultural Land ☒ Air Quality ☒ Archeological/Historical ☒ Biological Resources ☐ Coastal Zone ☒ Drainage/Absorption ☐ Economic/Jobs
☐ Fiscal ☒ Flood Plain/Flooding ☒ Forest Land/Fire Hazard ☒ Geologic/Seismic ☐ Minerals ☒ Noise ☒ Population/Housing Balance ☒ Public Services/Facilities
☒ Recreation/Parks ☒ Schools/Universities ☐ Septic Systems ☒ Sewer Capacity ☒ Soil Erosion/Compaction/Grading ☒ Solid Waste ☒ Toxic/Hazardous ☒ Traffic/Circulation
☒ Vegetation ☒ Water Quality ☒ Water Supply/Groundwater ☒ Wetland/Riparian ☒ Wildlife ☒ Growth Inducing ☒ Land Use ☒ Cumulative Effects

Present Land Use/Zoning/General Plan Designation: Suburban Residential and Open Space

Project Description: The project would include a maximum of 112 single-family detached residential dwellings on approximately 48 acres and would preserve approximately 36 acres as permanent open space. Access to the site would occur from existing public roadways and within existing dedicated right of way in the City of Yorba Linda. The project site is vacant, with the exception of several operational and abandoned oil wells and various dirt access roads and trails which traverse the site.

State Clearinghouse Contact: (916) 445-0613

State Review Began: 11-16-2013 ~~22~~ 01-07-2014

SCH COMPLIANCE 12-23-2013 Extended

Note: Revised Per Lead

Please note State Clearinghouse Number (SCH#) on all Comments

SCH#: ____

Please forward late comments directly to the Lead Agency

AQMD/APCD 83

(Resources: 11/09)

Project Sent to the following State Agencies

X Resources
____ Boating & Waterways
____ Coastal Comm
____ Colorado Rvr Bd
____ Conservation
X CDFW # 5
____ Delta Protection Comm
____ Cal Fire
____ Historic Preservation
X Parks & Rec
____ Central Valley Flood Prot.
____ Bay Cons & Dev Comm.
X DWR
____ Cal EMA
____ Resources, Recycling and Recovery

Bus Transp Hous
____ Aeronautics
X CHP
X Caltrans # 12
____ Trans Planning
____ Housing & Com Dev
____ Food & Agriculture
____ Public Health

State/Consumer Svcs
____ General Services

Cal EPA
X ARB: ALL Projects
____ ARB: Transportation Projects
____ ARB: Major Industrial Projects
____ SWRCB: Div. Financial Assist.
____ SWRCB: Wtr Quality
____ SWRCB: Wtr Rights
X Reg. WQCB # 8
____ Toxic Sub Ctrl-CTC

Yth/Adlt Corrections
____ Corrections

Independent Comm
____ Energy Commission
X NAHC
X Public Utilities Comm
____ State Lands Comm
____ Tahoe Rgl Plan Agency
____ Conservancy
____ Other: ____

Letter: OPR 2

STATE OF CALIFORNIA

GOVERNOR'S OFFICE *of* PLANNING AND RESEARCH

STATE CLEARINGHOUSE AND PLANNING UNIT

EDMUND G. BROWN JR.
GOVERNOR

KEN ALEX
DIRECTOR

January 23, 2014

Ron Tippets
Orange County - OC Planning
300 N. Flower Street
Santa Ana, CA 92702

Subject: Cielo Vista Project
SCH#: 2012071013

Dear Ron Tippets:

The State Clearinghouse submitted the above named Draft EIR to selected state agencies for review. On the enclosed Document Details Report please note that the Clearinghouse has listed the state agencies that reviewed your document. The review period closed on January 22, 2014, and the comments from the responding agency (ies) is (are) enclosed. If this comment package is not in order, please notify the State Clearinghouse immediately. Please refer to the project's ten-digit State Clearinghouse number in future correspondence so that we may respond promptly.

Please note that Section 21104(c) of the California Public Resources Code states that:

> "A responsible or other public agency shall only make substantive comments regarding those activities involved in a project which are within an area of expertise of the agency or which are required to be carried out or approved by the agency. Those comments shall be supported by specific documentation."

These comments are forwarded for use in preparing your final environmental document. Should you need more information or clarification of the enclosed comments, we recommend that you contact the commenting agency directly.

This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act. Please contact the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process.

Sincerely,

Scott Morgan
Director, State Clearinghouse

Enclosures
cc: Resources Agency

1400 10th Street P.O. Box 3044 Sacramento, California 95812-3044
(916) 445-0613 FAX (916) 323-3018 www.opr.ca.gov

Document Details Report
State Clearinghouse Data Base

SCH# 2012071013
Project Title Cielo Vista Project
Lead Agency Orange County

Type EIR Draft EIR

Description Note: Extended Review

The project would include a maximum of 112 single-family detached residential dwellings on approximately 48 acres and would preserve approximately 36 acres as permanent open space. Access to the site would occur from existing public roadways and within existing dedicated right of way in the City of Yorba Linda. The project site is vacant, with the exception of several operational and abandoned oil wells and various dirt access roads and trails which traverse the site.

Lead Agency Contact

Name Ron Tippets
Agency Orange County - OC Planning
Phone 714 667 8856 **Fax**
email
Address 300 N. Flower Street
City Santa Ana **State** CA **Zip** 92702

Project Location

County Orange
City Yorba Linda
Region
Lat / Long 33.8977° N / 117.7589° W
Cross Streets Yorba Linda Blvd. and Via Del Agua
Parcel No. 351-031-05, -04, -017
Township 3S **Range** 9W **Section** **Base** SBB&M

Proximity to:

Highways SR-91
Airports
Railways BNSF
Waterways
Schools Yes
Land Use Suburban Residential and Open Space

Project Issues Agricultural Land; Air Quality; Archaeologic-Historic; Biological Resources; Drainage/Absorption; Flood Plain/Flooding; Forest Land/Fire Hazard; Geologic/Seismic; Noise; Population/Housing Balance; Public Services; Recreation/Parks; Schools/Universities; Sewer Capacity; Soil Erosion/Compaction/Grading; Solid Waste; Toxic/Hazardous; Traffic/Circulation; Vegetation; Water Quality; Wetland/Riparian; Wildlife; Growth Inducing; Landuse; Cumulative Effects; Aesthetic/Visual

---

Reviewing Agencies Resources Agency; Department of Fish and Wildlife, Region 5; Department of Parks and Recreation; Department of Water Resources; California Highway Patrol; Caltrans, District 12; Air Resources Board; Regional Water Quality Control Board, Region 8; Native American Heritage Commission; Public Utilities Commission

---

Date Received 11/06/2013 **Start of Review** 11/06/2013 **End of Review** 01/22/2014

DEPARTMENT OF TRANSPORTATION
DISTRICT 12
3347 MICHELSON DRIVE, SUITE 100
IRVINE, CA 92612-8894
PHONE (949) 724-2000
FAX (949) 724-2019
TTY 711
www.dot.ca.gov

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December 11, 2013

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Mr. Ron Tippets
County of Orange
Planning Division
300 N. Flower
Santa Ana, CA. 92702

File: IGR/CEQA
SCH#: 2012071013
Log #: 3538
SR-91

Dear Mr. Tippets:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Report for the Cielo Vista Project. The Project proposes to develop a maximum of 112 single-family dwellings and associated infrastructure on an 84-acre site, within two Planning Areas. Planning Area 1 would include 95 residences within 41.3 gross acres. Planning Area 2 would include 17 residences within 6.4 gross acres.

The Department of Transportation (Department) is a commenting agency on this project and Caltrans only comment is:

We recommend a valid registered Civil Engineer in the state of California sign the Traffic Impact Study. Please see Appendix L front page.

Please continue to keep us informed of this project and any future developments that could potentially impact State transportation facilities. If you have any questions or need to contact us, please do not hesitate to call Aileen Kennedy at (949) 724-2239.

Sincerely,

Maureen El Harake

MAUREEN EL HARAKE
Branch Chief, Regional-Community-Transit Planning
District 12

State of California • Natural Resources Agency
Edmund G. Brown Jr., *Governor*
DEPARTMENT OF PARKS AND RECREATION
Major General Anthony L. Jackson, USMC (Ret), *Director*
Inland Empire District
17801 Lake Perris Drive
Perris, CA 92571
ph (951) 443-2423
fax (951) 657-2736

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January 8, 2014

Ron Tippets
Planner
OC Planning Services
PO Box 4048
Santa Ana, CA 92702-4048

Subject: Comments on the Draft Environmental Impact Report for the Cielo Vista Project, SCH #2012071013

Dear Mr. Tippets:

The Inland Empire District of the Department of Parks and Recreation (State Parks) appreciates the opportunity to comment on the Draft Environmental Impact Report (Draft EIR) for the Cielo Vista Project.

State Parks is a trustee agency as defined by the California Environmental Quality Act (CEQA). State Parks' mission in part is to provide for the health, inspiration, and education of the people of California by preserving the state's extraordinary biodiversity and creating opportunities for high quality outdoor recreation. As the office responsible for the stewardship of Chino Hills State Park (Chino Hills SP), we have an interest and concern about contemplated alterations of land use adjacent to the park. The long-term health of Chino Hills SP is dependent on the health of the regional ecosystems because the biotic boundaries of the park extend beyond its jurisdictional boundaries.

Recreation

As shown on Figure 4.13-2 and in other parts of the document, the Draft EIR identifies a trail connection into Chino Hills SP in an area that presently does not have a permitted access point. The Draft EIR does not consider any potential impacts to the park's resources resulting from a new trail in this area. Any new trail established in Chino Hills SP will require approval from our agency. We recommend working with us at an early stage to ensure that any potential linkage to the park matches our vision for providing access to the park.

Sensitive Species – Golden Eagle

State Parks disagrees that the project would have a less that significant impact to the golden eagles. The Draft EIR indicates that known golden eagle nest sites are 3 or more miles away within Chino Hills SP. There is at least one known nest site which was occupied within the past 10 years less than 1 mile from the project site. State Park

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
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EDMUND G. BROWN JR., Governor
CHARLTON H. BONHAM, Director

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January 6, 2014

Mr. Ron Tippets
Orange County Planning
300 N. Flower Street
Santa Ana, CA 97202
ron.tippets@ocpw.ocgov.com

Subject: Comments on the Draft Environmental Impact Report (DEIR) for the Cielo Vista Project, Orange County, CA (SCH#2012071013)

Dear Mr. Tippets:

The California Department of Fish and Wildlife (Department) has reviewed the above-referenced Cielo Vista Project Draft Environmental Impact Report (DEIR). The following statements and comments have been prepared pursuant to the Department's authority as Trustee Agency with jurisdiction over natural resources affected by the project (California Environmental Quality Act, [CEQA] Guidelines §15386) and pursuant to our authority as a Responsible Agency under CEQA Guidelines section 15381 over those aspects of the proposed project that come under the purview of the California Endangered Species Act (CESA; Fish and Game Code §2050 *et seq.*) and Fish and Game Code section 1600 *et seq.* The Department also administers the Natural Community Conservation Planning (NCCP) program. While the County of Orange participates in the NCCP program by implementing its approved Implementation Agreement, the Cielo Vista project site is not part of the NCCP.

The approximately 84-acre project site is located north of Via Del Agua and east of San Antonio Road within unincorporated Orange County (County) and within the City of Yorba Linda Sphere of Influence. The nearest cross streets are Yorba Lina Boulevard and Via Del Agua. The majority of the site is vacant, with the exception of several operational and abandoned oil wells and various dirt roads and trails which traverse the site. Chino Hills State Park is located to the north and east of the proposed project footprint and occupies 12,452 acres. This open space contains similar habitat types as the proposed project footprint (Biological Resources, 4.3-6). Seventeen natural vegetation communities are located within the proposed project area with ruderal vegetation associations dominant in seven communities and occupying 36.1 acres of the project site. No special status plant species were recorded at the time of the general flora surveys, however four special status wildlife species were observed on site during fauna surveys including California Species of Special Concern yellow-breasted chat (*Icteria virens*), yellow warbler (*Setophaga petechia*), red-diamond rattlesnake (*Crotalus ruber*) and the CESA- and Endangered Species Act-listed least Bell's vireo (*Vireo bellii pusillus*).

The proposed project would develop a maximum of 112 single-family dwellings and associated infrastructure. Planning Area (PA) 1 would include 95 residences within 41.3 gross acres and PA 2 would include 17 residences within 6.4 gross acres of the site. The project would preserve 36.3 acres of the site as undeveloped open space, including fuel modification zones but

exclusive of private slopes, water quality basins, and roadways. The open space would be preserved in the northern portion of the project site. Additionally, a 1.8-acre parcel in PA 1 is proposed to be made available to the current on-site oil operators following the project's construction activities for continued oil operations.

Implementation of the project would require approval of a General Plan Amendment for PA 2 to change the General Plan Land Use Designation for this area from Open Space (5) to Suburban Residential (1B). The project would also require approval of a zone change for PA 1 from A1 (O) (General Agricultural with Oil Production Overlay) to R-1 (Single Family Residence District) and a zone change for PA 2 from A1(O) to R-1. The project would also require approval of an Area Plan to permit development of single-family detached residential dwellings on minimum 7,500 square foot lots. The project includes consideration of a vesting tentative tract map subsequent to the above.

The Department offers the following comments and recommendations to assist Orange County Planning in avoiding or minimizing potential project impacts on biological resources.

1. The Department believes that potential exists for indirect and cumulative impacts to raptor foraging habitat in ruderal areas identified within the project footprint (CEQA Guidelines, §15064(d)). According to the Biological Resources section of the DEIR, "ruderal vegetation associations occupy nearly half (42%) of the 84.60-acre site and are dominate in seven of the 17 communities observed in the project study area (4.3-7), and that, "the project study area does provide suitable foraging habitat for [Golden eagles (*Aquila chrysaetos*); (4.3-31)]. Ruderal areas and non-native grasslands in the County provide important foraging areas for raptors and, primarily due to development, raptor foraging areas are disappearing throughout the County. While we concur that ruderal areas will not provide suitable raptor nesting, it provides a significant area for raptor foraging. The Department concludes that it is a reasonable assumption that common raptors (i.e., red tail hawk) and golden eagles (a State Fully Protected Species, pursuant to §3511 of the Fish and Game Code) could exist on-site or within a 5-mile radius of the project area, as well as important raptor prey species (i.e., California ground squirrel). Cumulatively, loss of raptor foraging habitat may be significant and warrant further analysis (including mitigating for loss of foraging habitat). This issue should be further explored in the final EIR.

2. The proposed project expansion is adjacent to Chino Hills State Park. Based on information provided in the project design, it is unclear if long-term indirect impacts to wildlife inhabiting this adjacent open space could occur due to artificial lighting. Furthermore, it is not specified in the DEIR whether or not night work is anticipated during construction, which could create temporary indirect impacts to adjacent habitat. Because lighting impacts are potentially substantial and could alter wildlife patterns and behavior within the surrounding habitat, the final EIR should include further discussion of exterior lighting features associated with the project (CEQA Guidelines §15064(d)). The final EIR should require that all project-related temporary (e.g., night construction) and permanent lighting adjacent to native habitat consist of the lowest illumination necessary for human safety, selectively placed, and shielded/directed away from adjacent natural habitats.

3. While the DEIR discusses noise impacts, it is unclear whether noise was considered as a potential significant impact to biological resources, particularly with regard to nesting birds. Given the project footprint's proximity to open space and wildlife corridors, and the duration of construction activities, the Department is concerned that nesting birds and other wildlife could be significantly impacted by construction activities. Generally, average hourly noise levels above 60 decibels are considered to negatively impact nesting birds and other wildlife. The Department requests that anticipated noise levels at the project site be discussed in relationship to biological resources in the final EIR along with pertinent mitigation measures. In addition, a discussion of indirect impacts to biological resources from noise resulting from the completed development should also be included.

4. Construction staging areas for the proposed project are not described in size, function, or location. Depending on the locations of staging areas, there is potential for direct and/or indirect impacts to biological resources (e.g., clearing of vegetation, noise and lighting effects) that would require commensurate mitigation. A discussion on this requirement should be provided in the final EIR, including corresponding figures of staging locations, and whether construction staging would be confined to the project area. Similarly, the location of staging areas should be provided for components of construction occurring off-site.

5. The proposed project would impact 1.62 acres of Department jurisdictional streambed and associated riparian habitat (4.3-36). Mitigation Measure 4.3-2 states that the project applicant shall be required to obtain a 1602 Streambed Alteration Agreement. It further states that on- and/or off-site replacement of habitat will be at a ratio no less than 2:1 for permanent impacts and temporary impacts would mitigate by restoring the impacted area to pre-impact conditions. For the Department, final mitigation requirements for these impacts will be determined through the Streambed Alteration process, and may be greater than those proposed in the DEIR.

6. Because the proposed project would create a significant amount of ground disturbance, concern exists over the impacts the project will have on storm water quality and general hydrology in the surrounding area. The final EIR should analyze the efficacy of Low Impact Development (LID) options to minimize storm water impacts, including:

   a. Site layout with regard to sensitive resources, including off site native habitat.

   b. The use of pervious surfaces (crushed aggregate, turf block, unit pavers, pervious concrete and asphalt) as alternatives to impervious surfaces.

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We appreciate the opportunity to comment on the DEIR for this project and to assist Orange County Planning in further minimizing and mitigating project impacts to biological resources. If you have any questions or comments regarding this letter please contact Jennifer Edwards at (858)467-2717 or via email at Jennifer.Edwards@wildlife.ca.gov.

Sincerely,

Betty J. Courtney

Betty J. Courtney
Environmental Program Manager I
South Coast Region

ec: M. Fluharty, CDFW, San Diego
J. Edwards, CDFW, San Diego
K. Hupf, CDFW, San Diego
Scott Morgan, State Clearinghouse, Sacramento
Chris Medak, USFWS, Carlsbad

Letter: CDFW

State of California – Natural Resources Agency
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San Diego, CA 92123
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www.wildlife.ca.gov

EDMUND G. BROWN JR., Governor
CHARLTON H. BONHAM, Director

January 6, 2014

Mr. Ron Tippets
Orange County Planning
300 N. Flower Street
Santa Ana, CA 97202
ron.tippets@ocpw.ocgov.com

Subject: Comments on the Draft Environmental Impact Report (DEIR) for the Cielo Vista Project, Orange County, CA (SCH#2012071013)

Dear Mr. Tippets:

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Sincerely,

Betty J. Courtney

Betty J. Courtney
Environmental Program Manager I
South Coast Region

ec: M. Fluharty, CDFW, San Diego
J. Edwards, CDFW, San Diego
K. Hupf, CDFW, San Diego
Scott Morgan, State Clearinghouse, Sacramento
Chris Medak, USFWS, Carlsbad

Letter: CDPR

State of California • Natural Resources Agency
Edmund G. Brown Jr., *Governor*

DEPARTMENT OF PARKS AND RECREATION
Major General Anthony L. Jackson, USMC (Ret), *Director*

Inland Empire District
17801 Lake Perris Drive
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ph (951) 443-2423
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January 8, 2014

Ron Tippets
Planner
OC Planning Services
PO Box 4048
Santa Ana, CA 92702-4048

Subject: Comments on the Draft Environmental Impact Report for the Cielo Vista Project, SCH #2012071013

Dear Mr. Tippets:

The Inland Empire District of the Department of Parks and Recreation (State Parks) appreciates the opportunity to comment on the Draft Environmental Impact Report (Draft EIR) for the Cielo Vista Project.

State Parks is a trustee agency as defined by the California Environmental Quality Act (CEQA). State Parks' mission in part is to provide for the health, inspiration, and education of the people of California by preserving the state's extraordinary biodiversity and creating opportunities for high quality outdoor recreation. As the office responsible for the stewardship of Chino Hills State Park (Chino Hills SP), we have an interest and concern about contemplated alterations of land use adjacent to the park. The long-term health of Chino Hills SP is dependent on the health of the regional ecosystems because the biotic boundaries of the park extend beyond its jurisdictional boundaries.

Recreation

As shown on Figure 4.13-2 and in other parts of the document, the Draft EIR identifies a trail connection into Chino Hills SP in an area that presently does not have a permitted access point. The Draft EIR does not consider any potential impacts to the park's resources resulting from a new trail in this area. Any new trail established in Chino Hills SP will require approval from our agency. We recommend working with us at an early stage to ensure that any potential linkage to the park matches our vision for providing access to the park.

Sensitive Species – Golden Eagle

State Parks disagrees that the project would have a less that significant impact to the golden eagles. The Draft EIR indicates that known golden eagle nest sites are 3 or more miles away within Chino Hills SP. There is at least one known nest site which was occupied within the past 10 years less than 1 mile from the project site. State Park

Environmental Scientists routinely observe golden eagles foraging in the open space south of Chino Hills SP and north of the 91 Freeway. This state and federal fully protected species is in steep decline over much of its range and especially in Southern California. Any disturbance this close to a historic nest site and or reduction of available foraging habitat should be considered a significant impact to the species and avoidance and mitigation measures should be adopted so that the project does not contribute to the further decline of the species.

Cumulative Impacts

State Parks disagrees that impacts from this project are not cumulatively significant. The Draft EIR fails to include in its evaluation the extensive bank armoring and flood control projects occurring within the Santa Ana River below Prado Basin, the relocation of the Santa Ana River Interceptor, and the State Route 91 Corridor Improvement Project. In addition, while much of the project area is currently identified as ruderal, it is open space with potential for recovery and restoration. Furthermore, even as ruderal habitat, it continues to provide habitat for many common species which are important to maintaining a functioning ecosystem. As available habitat for even the most common species is removed from the ecosystem, the ecosystem begins to break down. If the project is implemented as described it will reduce the valuable buffer between developments and preserved open space as well as further fragmenting an already fragmented and fragile near-island of habitat which many sensitive species depend on. State Parks suggests that the project proponent further evaluate its finding of non-significance and incorporate avoidance and mitigation measures to further reduce the project's impacts to the landscape of the Puente-Chino Hills.

Thank you again for the opportunity to comment and for your serious consideration. We look forward to reviewing the draft EIR. For further discussion, please contact me or Enrique Arroyo at (951) 453-6848.

Sincerely,

Kelly Elliott

Kelly Elliott
District Superintendent
Inland Empire District

cc: State Clearinghouse
Christine Medak, US Fish and Wildlife Service
Matt Chirdon, State Department of Fish and Wildlife
Judi Tamasi, WCCA
Claire Schlotterbeck, Hills For Everyone

Letter: Caltrans1

DEPARTMENT OF TRANSPORTATION
DISTRICT 12
3347 MICHELSON DRIVE, SUITE 100
IRVINE, CA 92612-8894
PHONE (949) 724-2000
FAX (949) 724-2019
TTY 711
www.dot.ca.gov

Flex your power!
Be energy efficient!

December 11, 2013

Mr. Ron Tippets
County of Orange
Planning Division
300 N. Flower
Santa Ana, CA. 92702

File: IGR/CEQA
SCH#: 2012071013
Log #: 3538
SR-91

Dear Mr. Tippets:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Report for the Cielo Vista Project. The Project proposes to develop a maximum of 112 single-family dwellings and associated infrastructure on an 84-acre site, within two Planning Areas. Planning Area 1 would include 95 residences within 41.3 gross acres. Planning Area 2 would include 17 residences within 6.4 gross acres.

The Department of Transportation (Department) is a commenting agency on this project and Caltrans only comment is:

We recommend a valid registered Civil Engineer in the state of California sign the Traffic Impact Study. Please see Appendix L front page.

Please continue to keep us informed of this project and any future developments that could potentially impact State transportation facilities. If you have any questions or need to contact us, please do not hesitate to call Aileen Kennedy at (949) 724-2239.

Sincerely,

MAUREEN EL HARAKE
Branch Chief, Regional-Community-Transit Planning
District 12

Letter: Caltrans2

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Edmund G. Brown Jr.
Governor

Ken Alex
Director

RECEIVED
FEB 14 2014
COUNTY OF ORANGE

February 11, 2014

Ron Tippets
Orange County - OC Planning
300 N. Flower Street
Santa Ana, CA 92702

Subject: Cielo Vista Project
SCH#: 2012071013

Dear Ron Tippets:

The enclosed comment (s) on your Draft EIR was (were) received by the State Clearinghouse after the end of the state review period, which closed on January 22, 2014. We are forwarding these comments to you because they provide information or raise issues that should be addressed in your final environmental document.

The California Environmental Quality Act does not require Lead Agencies to respond to late comments. However, we encourage you to incorporate these additional comments into your final environmental document and to consider them prior to taking final action on the proposed project.

Please contact the State Clearinghouse at (916) 445-0613 if you have any questions concerning the environmental review process. If you have a question regarding the above-named project, please refer to the ten-digit State Clearinghouse number (2012071013) when contacting this office.

Sincerely,

Scott Morgan
Director, State Clearinghouse

Enclosures
cc: Resources Agency

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
TEL (916) 445-0613 FAX (916) 323-3018 www.opr.ca.gov

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LATE
01/22/14
E

January 17, 2014

Mr. Ron Tippets
County of Orange
Planning Division
300 N. Flower
Santa Ana, CA. 92702

File: IGR/CEQA
SCH#: 2012071013
Log #: 3538
SR-91

Dear Mr. Tippets:

Thank you for the opportunity to review and comment on the **Draft Environmental Impact Report for the Cielo Vista Project.** The Project proposes to develop a maximum of 112 single-family dwellings and associated infrastructure on an 84-acre site, within tow Planning Areas. Planning Area 1 would include 95 residences within 41.3 gross acres. Planning Area 2 would include 17 residences within 6.4 gross acres.

The Department of Transportation (Department) is a commenting agency on this project and has the flowing comments for your consideration.

1. The impact on the State highways or freeways including ramps should be analyzed using the Highway Capacity Manual (HCM) method especially impacts at SR-91 at Weir Canyon Road. The use of HCM is preferred by Caltrans because it is an operational analysis as opposed to the Intersection Capacity Utilization (ICU) method, which is a planning analysis. In the case of projects that have direct impacts on the state's facilities Caltrans recommends that the traffic impact analysis be based on HCM method. All input sheets, assumptions, and volumes on State Facilities including ramps and intersection analysis should be submitted to Caltrans for review and approval. If applicable, appropriate mitigation measures are to be proposed and submitted for our review and comment.

2. A traffic impact analysis should be prepared to evaluate any potential impacts from the proposed project and the nearby Esperanza Hills Project to state facilities, including mitigation measures.

3. Please coordinate with Department to meet requirements for any work within or near State right-of-way. All entities other than the Department working within the Department's right-of-way must obtain and Encroachment Permit prior to

commencement of work. Allow 2 to 4 weeks for a complete submittal to be reviewed and for a permit to be issued.

4. We recommend a valid registered Civil Engineer in the State of California sign the Traffic Impact Study. Please see Appendix L front page.

Please continue to keep us informed of this project and any future developments that could potentially impact State transportation facilities. If you have any questions or need to contact us, please do not hesitate to call Aileen Kennedy at (949) 724-2239.

Sincerely,

MAUREEN EL HARAKE
Branch Chief, Regional-Community-Transit Planning
District 12

c: Scott Morgan, Office of Planning and Research

Letter: LAFCO

LOCAL AGENCY FORMATION COMMISSION

ORANGE COUNTY

CHAIR
SUSAN WILSON
Representative of
General Public

VICE CHAIR
JOE CARCHIO
Councilmember
City of Huntington Beach

PAT BATES
Supervisor
5th District

JOHN MOORLACH
Supervisor
2nd District

CHARLEY WILSON
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Water District

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Irvine Ranch Water District

VACANT
Councilmember

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CHERYL BROTHERS
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City of Fountain Valley

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JAMES FISLER
Director
Mesa Consolidated
Water District

ALTERNATE
DEREK J. MCGREGOR
Representative of
General Public

ALTERNATE
TODD SPITZER
Supervisor
3rd District

CAROLYN EMERY
Executive Officer

December 12, 2013

Mr. Ron Tippets
OC Planning
300 N. Flower Street, First Floor
Santa Ana, CA 92702

SUBJECT: OC LAFCO Comments to Draft EIR No. 615 – Cielo Vista Project

Dear Mr. Tippets:

Thank you for the opportunity to comment on the County of Orange's Draft EIR No. 615 for the proposed Cielo Vista project. OC LAFCO initially submitted comments on the *Response to the Notice of Preparation of the Draft Environmental Report* to the County of Orange on August 1, 2012 (***Attachment A***). Based on the information contained within the Draft Environmental Report and our initial concerns, Orange County LAFCO's interest in this project as it relates to CEQA is two-fold:

1. OC LAFCO is a responsible agency under CEQA for any future annexation of the Cielo Vista Project to the City of Yorba Linda.

2. The proposed development of the Cielo Vista project in unincorporated Orange County without a definite plan and process in place for the long-term delivery of reliable and efficient public services to future residents raises substantive issues and should be addressed in the environmental report.

OC LAFCO AS RESPONSIBLE AGENCY

The Orange County Local Agency Formation Commission (OC LAFCO) is governed by the Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000 ("Act." Govt. Code Section 56000 *et seq.*). Under the Act, OC LAFCO is required to make determinations regarding a proposal for changes of organization or reorganization (Govt. Code Section 56880). In making these determinations, The Act also prescribes the factors, which OC LAFCO must consider in making its determinations, including any policies adopted by OC LAFCO to create

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planned, orderly and efficient patterns of development (Govt. Code Section 56668).

Because of this role and pursuant to Section 21069 of the Public Resources Code, OC LAFCO is a responsible agency for the future annexation of the Cielo Vista project to the City of Yorba Linda. Additionally, and pursuant to Section 15086 of the California Environmental Quality Act (CEQA) Guidelines, OC LAFCO is responsible for reviewing and providing comments on this Draft Environmental Impact Report.

OC LAFCO COMMENTS

OC LAFCO has reviewed the draft document and offers the following comments on DEIR No. 615:

2.0 Project Summary

Annexation - Whole of the Project

CEQA Guidelines Section 15378 states that a "project" means the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change to the environment.

In this case, the anticipated development of Cielo Vista and the adjacent Esperanza Hills project together would result in direct physical changes to the environment. While there are separate Draft EIRs in circulation for both projects, OC LAFCO restates that both projects are inextricably tied and should be considered part of the "whole of the action." The Draft EIR for the adjacent Esperanza Hills project (proposing 340 single family homes directly east of Cielo Vista) was distributed for comment on December 2, 2013, and is being reviewed by the public, responsible agencies, and decision makers simultaneously with the subject document.

It is difficult to fully comprehend the combined impacts of both projects when reviewing two separate EIRs. CEQA notes "that environmental considerations do not become submerged by chopping large projects into many little ones, each with a potential impact on the environment which cumulatively may have disastrous consequences." (Burbank-Glendale-Pasadena Airport v. Hensler (1991) 233 CA3rd577).

4.11 Population and Housing

The Regional Housing Needs Assessment (RHNA), described on Page 4.11-1, incorrectly states that the most recently adopted Regional Housing Needs Assessment (RHNA) by the Southern California Association of Governments (SCAG) Regional Council was on July 12, 2007. The current RHNA Allocation Plan (2013-2021) was adopted by SCAG on October 4, 2012. This section (and related Table 4.11-1) requires

updating and revision to reflect the current RHNA allocations for the County of Orange.

4.12 Public Services

Fire Protection and Emergency Response Services
The Draft EIR assumes that the project will be annexed into the City of Yorba Linda. If annexation does not occur, the EIR should discuss and compare the impacts for the project area that result from fire and emergency response (1) provided through the City's contract (Yorba Linda contracts with OCFA for fire protection), and (2) provided directly through the Orange County Fire Authority if the project remains unincorporated.

Police Protection and Law Enforcement Services
The Draft EIR assumes that the project will be annexed into the City of Yorba Linda. If annexation does not occur, the EIR should discuss and compare the impacts for the project area that result from law enforcement (1) provided through the City contract which specifies a level of service and staffing for protection of City residents, and (2) provided directly through the Orange County Sheriff's Department if the project remains unincorporated.

4.14 Transportation and Traffic

In the Esperanza Hills Draft EIR No. 616, currently out for comment, there are two traffic alternatives discussed to serve the proposed project – Options 1 and 2. The "Option 2 Project Analysis" states that the Esperanza Hills site will be provided access "...via an extension of the existing terminus of Aspen Way which will traverse the southerly edge of a future potential residential development (Cielo Vista) located immediately east of the Project Site."[1]

The *Traffic/Transportation Section* in the Cielo Vista DEIR does not reference the "Option 2 Project Analysis" provided in the Esperanza Hills DEIR. The "Access" section discussion in the Cielo Vista DEIR (Pages 4.14-16 and 4.14-17), states that Aspen Way is planned to extend "...easterly from San Antonio Road with the paved improvements terminating at the westerly boundary of the proposed project." If Option 2 is ultimately implemented as the access plan for the adjacent Esperanza Hills project, any traffic-related impacts resulting from the extension of Aspen Way across the Cielo Vista project should be fully analyzed in the DEIR.

[1] Esperanza Hills DEIR 616, Section 5-14, Page 5-593

This is one example of a potential impact that is difficult to analyze when there are two separate environmental documents under preparation at the same time for two projects inextricably linked. These projects should not be viewed in isolation and should be analyzed in a single environmental document.

The EIR should address any conflict with applicable environmental plans or policies of agencies with jurisdiction over the project including, but not limited to, the effort described below:

Creation of a Developed, Inhabited Unincorporated County Island

As part of its post-bankruptcy external restructuring program, the County has implemented changes in policy direction to:

- Decrease the County's responsibility of the delivery of municipal services;
- Focus on the provision of regional services; and
- Work with Orange County cities to annex adjacent unincorporated areas.

Over the past 15 years, the County has worked with OC LAFCO and local cities to implement the transition of unincorporated areas to adjacent cities. Development of the Cielo Vista project in unincorporated territory would create a developed, inhabited unincorporated area adjacent to the City of Yorba Linda, and could create significant environmental consequences with respect to how municipal services will be provided to future residents.

The Draft and Final EIRs should address any potential significant impacts to the future residents of the Cielo Vista project and adjacent City residents, as a result of developing the proposed 112 single-family residences in unincorporated County territory. Specifically, the Final EIR should address: (1) the ability and the capacity of the County to adequately provide the above mentioned municipal-level services to the Project and (2) the potentially significant environmental impacts to the City's residents resulting from County service providers traveling through the City's adjacent residential neighborhoods to serve the Cielo Vista project.

The County, as lead agency for the Cielo Vista project, should address any inconsistency in the development standards as currently proposed in County jurisdiction with those of the City of Yorba Linda to ensure the project can be annexed to the City without impacting future residents of the project or the City. Additionally, the EIR should explore the concept of municipal service agreements as discussed in the attached documents as an alternative to services provided by the County and should assess the comparative impacts to the environment.

5.0 Alternatives

The State CEQA Guidelines cite the importance of various alternatives in the EIR as critical for informed decision making: *"An EIR need not consider every conceivable alternative to a project. Rather, it must consider a reasonable range of potentially feasible alternatives that will foster informed decision making and public participation."* (CEQA Guidelines 15126.6)

As previously stated in OC LAFCO's August 1, 2012 comments on the NOP, OC LAFCO is requesting the EIR include a discussion of an "Annexation" alternative and adequately address the following significant impacts under the alternative:

- The development of a 112-unit residential project that is not in compliance with City standards.
- The potential impacts to the developer and/or residents that would result from having to upgrade or otherwise improve street widths, sidewalks, and other infrastructure to be consistent with City standards for annexation.

OC LAFCO is also requesting that the EIR include a discussion of a "No Annexation" alternative and adequately address the following significant impacts under the alternative:

- The creation of a large, developed, and inhabited unincorporated County island consisting of a 112-unit residential development project.
- Potential reduced levels of services to Cielo Vista residents for: law enforcement, fire protection and emergency response services, roads (maintenance, street lighting, sweeping) and code enforcement, and local representation and government accountability.
- The short-term and long-term fiscal impacts to the County of Orange of assuming responsibility of and service costs for providing the following municipal services to a 112-unit residential project in unincorporated County territory:
    - Law enforcement
    - Fire protection and emergency response services
    - Roads (maintenance, street lighting, landscaping, sweeping)
    - Code enforcement
    - Local representation and government accountability

- The impacts to the City and its residents resulting from County service providers traveling through the City to adjacent residential neighborhoods to serve the Cielo Vista project.
- The application of a municipal services agreement between the County and the City for the City to provide services to the Cielo Vista project.

Thank you for this opportunity to comment on the DEIR. If you have any questions or concerns regarding this response, please contact me either by email at cemery@oclafco.org or by phone at (714) 834-2556.

Sincerely,

Carolyn Emery
Executive Officer

Attachment

A. OC LAFCO Response to NOP for Rancho Cielo Project – August 1, 2012

ATTACHMENT A

LOCAL AGENCY FORMATION COMMISSION

ORANGE COUNTY

CHAIR
CHARLEY WILSON
Director
Santa Margarita
Water District

VICE CHAIR
SUSAN WILSON
Representative of
General Public

PAT BATES
Supervisor
5th District

JOE CARCHIO
Councilmember
City of Huntington Beach

PETER HERZOG
Councilmember
City of Lake Forest

JOHN MOORLACH
Supervisor
2nd District

JOHN WITHERS
Director
Irvine Ranch Water District

ALTERNATE
BILL CAMPBELL
Supervisor
3rd District

ALTERNATE
JAMES FISLER
Director
Mesa Consolidated
Water District

ALTERNATE
DEREK J. MCGREGOR
Representative of
General Public

ALTERNATE
BOB RING
Councilmember
City of Laguna Woods

JOYCE CROSTHWAITE
Executive Officer

August 1, 2012

Ms. Channary Leng
OC Public Works/OC Planning
300 N. Flower Street
Santa Ana, CA 92702-4048

SUBJECT: Notice of Preparation of an Environmental Impact Report

Dear Ms. Leng,

The Orange County Local Agency Formation Commission (LAFCO) has reviewed the County's Notice of Preparation of an Environmental Impact Report for the Cielo Vista project. The project raises several concerns and as a responsible agency, we appreciate this opportunity to comment on the project as described in the Notice of Preparation.

LAFCO's interest in the Cielo Vista project as it relates to CEQA is as follows:

1. LAFCO is a responsible agency under CEQA for the future annexation of the Cielo Vista project to the City of Yorba Linda.
2. The project raises a number of substantive issues that have significant implications to LAFCO, the City of Yorba Linda, and the County of Orange.

In summary, the proposed development of the Cielo Vista project in unincorporated Orange County without a definitive plan and process in place for annexation to the City of Yorba Linda raises issues about:

- Consistency with existing County policies for spheres of influence (SOI) and the creation of developed, inhabited unincorporated islands.
- The long-term delivery of reliable and efficient public services to future residents.
- The impacts to the City and its residents resulting from County service providers travelling through the City and adjacent residential neighborhoods to serve the Cielo Vista project.

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LAFCO AS RESPONSIBLE AGENCY

The Orange County Local Agency Formation Commission (LAFCO) is governed by the Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000 ("Act," Govt. Code Section 56000 *et seq.*). Under the Act, LAFCO is required to make determinations regarding a proposal for changes of organization or reorganization (Govt. Code Section 56880). The Act also established the factors which LAFCO must consider in making its determinations, including any policies adopted by LAFCO to create planned, orderly and efficient patterns of development (Govt. Code Section 56668). Because of this role and pursuant to Section 21069 of the Public Resources Code, LAFCO is a responsible agency for the future annexation of the Cielo Vista project (also known as the Sage Property) to the City of Yorba Linda. Additionally and pursuant to Section 15086 of the California Environmental Quality Act (CEQA) Guidelines, LAFCO is responsible for reviewing and providing comments on this Notice of Preparation (NOP) and the subsequent Environmental Impact Report (EIR).

LAFCO has reviewed the NOP and provide the comments contained within this letter as the County begins preparation of the EIR.

LAFCO COMMENTS

The EIR should address the impacts and any necessary mitigation, including but not limited to the annexation process. In particular, the EIR should address the factors as identified in Government Code Section 56668. These factors include, but are not limited to, the following considerations:

1. ***Project Summary***

Annexation – Project Description

The "Project Description" in the Notice of Preparation references "the project is within the City of Yorba Linda Sphere of Influence (SOI)." The EIR should clearly identify the potential annexation of the Project area as part of the "whole of the project" and discuss the timing of annexation relative to the timing of the proposed development plans.

Annexation – Whole of the Project

CEQA Guidelines section 15378 states that a "project" means the whole of an action, which has a potential for resulting in either a direct physical changes in the environment, or a reasonably foreseeable indirect physical change in the environment."

In this case, the current development proposals of the Cielo Vista and the anticipated development of the Murdock properties together would result in direct physical changes in the environment. Actions that are part of one project and that are reasonably necessary to effectuate a single project (e.g. access through the Cielo Vista project to the Murdock property) are considered part of the "whole of the action." Accordingly, all aspects of both projects should be considered in one environmental document prepared

by the County. In performing its analysis of the project and the potential impacts of future applications for annexation, LAFCO requests that the County prepare a combined analysis of the environmental impacts of both projects (Cielo Vista and the Murdoch property). CEQA notes "that environmental considerations do not become submerged by chopping large projects into many little ones, each with a potential impact on the environment, which cumulatively may have disastrous consequences." (Burbank-Glendale-Pasadena Airport v. Hensler (1991) 233 CA3d 577.)

2. ***Public Services and Utilities***

Section 56653 of the Act requires that each application for a change of organization include a "plan for providing services within the affected territory." Among other things, the plan for services must indicate "when those services can feasibly be extended to the affected territory." (Govt. Code Section 56653(b)(3))

Although the focus of Subsection 56653(b)(3) is on the timing of the *initiation* of services, the point of this subsection, especially when considered with the remaining requirements of Section 56653, is on continuous, reliable service provision to the affected area. The EIR's discussion of impacts in the area of public services should be made with reference to and consistent with the plan for services submitted under the Act, in particular, Section 56668, containing the criteria for approval of the annexation. Similar discussion and references should be made in the analysis of Land Use/Planning and Population/Housing.

In addition to the services and utilities identified in the NOP, LAFCO is requesting the EIR include analysis and discussion of the environmental impacts of the following municipal services:

Water Availability
This section should include a discussion of water supplies as required under Subsection 56668(k) of the Act, including a discussion of the Project's consistency with relevant Urban Water Management Plans. The Cielo Vista project is within the boundary of the Yorba Linda Water District (YLWD) which is identified as the retail water service provider to the proposed Project territory, but the NOP omits discussion of the Orange County Water District (OCWD).

OCWD is responsible for maintaining the quality and availability of the groundwater for groundwater producers such as the YLWD. As the ground water "manager" OCWD restricts pumping by retail water providers to those within the boundary of OCWD. YLWD has proposed annexation of approximately 6,100 acres in the eastern portion of the District to OCWD. The Cielo Vista project is within the proposed annexation area. OCWD submitted a Notice of Preparation for an Environmental Impact Report in July, 2011. The agency is currently preparing the EIR and discussion

of the long-term availability of local groundwater supplies should be assessed and discussed in the EIR prepared for the Cielo Vista project. As lead agency, the County should consult with OCWD to determine the adequacy of groundwater supplies for the Cielo Vista project.

Additionally, the project alternatives should include consideration and discussion of the effects of annexation and no annexation to OCWD on the Cielo Vista project.

Water Quality
The EIR should address storm water permitting requirements, including the preparation of a Storm Water Pollution Prevention Plan, change in surface imperviousness due to the project, drainage basins, emergency response to spills, and general compliance with the regional storm water permit.

Fire Protection and Emergency Response Services
The EIR should discuss and potentially evaluate whether there are significant environmental impacts for the project area that result from fire and emergency response being provided through the City's contract (Yorba Linda contracts with OCFA for fire protection) or the County's contract.

Law Enforcement
The EIR should discuss and potentially evaluate whether there are significant environmental impacts for the project area that result from law enforcement being provided through the City's contract (Yorba Linda contracts for law enforcement with the Orange County Sheriff's Department) or directly from the Sheriff's Department.

Sewer
The EIR should identify and evaluate both local and regional wastewater service providers and the impacts the project may have on their system. This section should include discussion of local sewer service by the Yorba Linda Water District and regional collection and treatment of wastewater from the project area by the Orange County Sanitation District.

Solid Waste Disposal
The City of Yorba Linda is the logical provider of solid waste disposal to the project area. Orange County Waste Recycling currently administers contracts for solid waste disposal within unincorporated islands, such as the one proposed to be created by development of the Cielo Vista project. The Draft EIR should identify and evaluate the service levels and potential impacts to the environment by both of the public agencies capable of administering contracts for solid waste disposal services to the project area.

Street sweeping
The City of Yorba Linda is the logical provider of street sweeping services to the project area. The Draft EIR should identify and evaluate the provision of this service to the project area and identify any potential environmental impacts.

3. Local Policies: Land Use & Planning

The EIR should address any conflict with applicable environmental plans or policies of agencies with jurisdiction over the project including, but not limited to, the policies described below:

County, League, and LAFCO Sphere of Influence Policy Guidelines
The Cielo Vista project is located in unincorporated territory within the sphere of influence of the City of Yorba Linda. The Draft EIR should adequately discuss the County's adopted *Sphere of influence Policy Guidelines* (***Attachment A***) and the timing of the Cielo Vista project relative to the future or concurrent annexation of the project site to the City of Yorba Linda.

On July 27, 1999, the Orange County Board of Supervisors adopted the *Sphere of Influence Policy Guidelines*. These *Policy Guidelines* were also adopted by the Orange County Division of the League of Cities and by LAFCO. Pages 3 and 4 of the *Policy Guidelines* list a number of policy guidelines for development within spheres of influence, including the following policy statement:

> *"Urban development should occur within existing cities, Spheres of Influence, or planned cities. Initiation of annexation to the city should occur at the earliest time in the planning process consistent with these Policies. Initiation of annexation to a city should occur prior to the issuance of building permits."*

Creation of a Developed, Inhabited Unincorporated County Island
As part of its post-bankruptcy external restructuring program, the County has implemented changes in policy direction to:

- Shift the County away from the delivery of municipal services;
- Focus on the provision of regional services; and
- Work with Orange County cities to annex adjacent unincorporated areas and shift the responsibility of delivering municipal services to the cities.

As part of this change in policy direction, the County works with LAFCO and local cities to implement the Unincorporated County Islands Annexation Strategy (***Attachment B***). Development of the Cielo Vista project in unincorporated territory would create a developed, inhabited unincorporated area located adjacent to the City of Yorba Linda, and could create significant environmental consequences with respect to

how municipal services will be provided to future residents. The Draft and Final EIRs should address any potential significant impacts to the future residents of the Cielo Vista project and adjacent City residents, as a result of developing the proposed 112 single-family residences in unincorporated County territory. Specifically, the Final EIR should address: (1) the ability and the capacity of the County to adequately provide the above mentioned municipal-level services to the Project and (2) the potentially significant environmental impacts to the City's residents resulting from County service providers travelling through the City's adjacent residential neighborhoods to serve the Cielo Vista project.

LAFCO Island Annexation Policy

Since 2000, LAFCO has worked with the County and cities to develop an islands strategy of aligning policies and practices. The LAFCO Island Annexation Policy (***Attachment C***) represents the current form of LAFCO's effort to align the interests and processes (e.g. municipal service alignment process) to ensure that unincorporated developments are built to city standards facilitating the eventual annexation of these areas to their adjacent city jurisdictions.

The County, as lead agency for the Cielo Vista project, should address any inconsistency in the development standards as currently proposed in County jurisdiction with those of the City of Yorba Linda to ensure the project can be annexed to the City without impacting future residents of the project or the City. Additionally, the EIR should explore the concept of municipal service agreements as discussed in the attached documents as an alternative to services provided by the County and should assess the comparative impacts to the environment.

City of Yorba Linda General Plan

In December 1993, the City of Yorba Linda adopted its current General Plan including the Land Use Element. The City identified a number of goals and policy statements as part of the 1993 General Plan. The County, as lead agency for the Cielo Vista project, should also address any inconsistencies with the policies identified by the City of Yorba Linda in the Final EIR. The policies that should be addressed include, but are not limited to, the following:

- Policy 7.1: *"Seek the annexation of Shell, Murdock and other undeveloped properties within the northern sphere of influence based upon development plans that ensure access, infrastructure and land use concepts which are acceptable to the City."*

- Policy 7.2: *"Require developers of undeveloped properties to complete improvements for required infrastructure and/or provide funds for required infrastructure (both on-site and related improvements) in accord with City determined service levels.*

4. Mitigation Measures

As a responsible agency, LAFCO can also raise issues for potential mitigation for discussion in the Draft and Final Environmental Impact Reports (CEQA Guidelines 15126.4). As currently proposed all municipal services by the County would have to travel to through the City to serve the project. Additionally, all traffic to and from the project would impact adjacent City streets. The County, as lead agency, should address the cumulative impacts of the actions in the EIR and includes appropriate mitigation measures. LAFCO is requesting the following impacts to City services be considered and mitigation measures are included in the EIR:

- Traffic impacts to the City, specifically impacts to San Antonio Road and Yorba Linda Boulevard.
- The City, as the logical provider of municipal services may be impacted by the proposed development and should be addressed in the EIR.

5. Alternatives

The State CEQA Guidelines cite the importance of various alternatives in the EIR as critical for informed decision making: *"An EIR need not consider every conceivable alternative to a project. Rather it must consider a reasonable range of potentially feasible alternative that will foster informed decision making and public participation."* (CEQA Guidelines 15126.6)

LAFCO is requesting the EIR include a discussion of an "Annexation" alternative and adequately address the following significant impacts under the alternative:

- The development of a 112-unit residential project that is NOT in compliance with City standards.
- The potential impacts to the developer and/or the residents that would result from having to upgrade or otherwise improve street widths, sidewalks, and other infrastructure to bring up to City standards for annexation.

LAFCO is requesting the EIR include discussion of a "No Annexation" alternative and adequately address the following significant impacts under the alternative:

- The creation of a large, developed, and inhabited unincorporated County Island consisting of a 112-unit residential development project.
- Reduced levels of services to Cielo Vista residents for:
    - Law enforcement.
    - Fire protection and emergency response services.
    - Roads (maintenance, street lighting, landscaping, sweeping).
    - Code enforcement.

  - Local representation and government accountability.
- The short-term and long-term fiscal impacts to the County of Orange of assuming responsibility of and service costs for providing the following municipal services to a 112-unit residential project in unincorporated County territory:
  - Law enforcement.
  - Fire protection and emergency response services.
  - Roads (maintenance, street lighting, landscaping, sweeping).
  - Code enforcement.
  - Local representation and government accountability.
- The impacts to the City and its residents resulting from County serviced providers travelling through the City and adjacent residential neighborhoods to serve the Cielo Vista project.
- The application of a municipal services agreement between the County and City for the City to provide services to the Cielo Vista project.

In summary, the Draft EIR should address *Orange County's Sphere of Influence Policy Guidelines* and the timing of the unincorporated development relative to future or concurrent annexation of the Cielo Vista project to the City of Yorba Linda.

The EIR should also describe the County's plan for public services (e.g. law enforcement, fire, water, sewer, parks, street sweeping, code enforcement, etc.) in the project area and identify and evaluate the alternative service providers for the project upon development and annexation of the Cielo Vista planned community to the City of Yorba Linda.

Thank you for this opportunity to respond to the Notice of Preparation. Please send one copy of the Draft EIR to me via email (jcrosthwaite@oclafco.org) or by mail at 12 Civic Center Plaza, Room 235, Santa Ana, CA 92701. If you have any questions or concerns regarding this response, please contact me or Ben Legbandt, Policy Analyst, either by email at blegbandt@oclafco.org or by phone at (714) 834-2556.

Sincerely,

Joyce Crosthwaite

Joyce Crosthwaite
Executive Officer

ATTACHMENT A

ORANGE COUNTY BOARD OF SUPERVISORS

MINUTE ORDER

July 27, 1999

Submitting Agency/Department: EXTERNAL RESTRUCTURING PROGRAM FOR THE COUNTY OF ORANGE

At this time Members of the Board of Supervisors may report on and discuss activities related to the External Restructuring Program for the County of Orange, including approval of the following:
1. Recommendations from Board City/County Subcommittee regarding proposed Sphere of Influence Policy Guidelines - All Districts (Continued from 6/2/99, Item 125)

The following is action taken by the Board of Supervisors:

APPROVED AS RECOMMENDED ☒ OTHER ☐

Unanimous ☒ (1) SMITH: Y (2) SILVA: Y (3) SPITZER: Y (4) COAD: Y (5) WILSON: Y

Vote Key: Y=Yes; N=No; A=Abstain; X=Excused; B.O.=Board Order

Documents accompanying this matter:

☒ Resolution(s) 99-301
☐ Ordinances(s)
☐ Contract(s)

Item No. 32
File 20883
Special Notes:

Copies sent to:
CEO
Board Offices
Auditor

I certify that the foregoing is a true and correct copy of the Minute Order adopted by the Board of Supervisors, Orange County, State of California.
DARLENE J. BLOOM, Clerk of the Board

By:_____
Deputy

COUNTY OF ORANGE
BOARD OF SUPERVISORS
ROBERT E. THOMAS HALL OF ADMINISTRATION
10 CIVIC CENTER PLAZA
P. O. BOX 687
SANTA ANA, CA 92702-0687

99 JUL 23 AM 11:23

Agenda Item No. 32
July 27, 1999 Meeting

Board of Supervisors
County of Orange
10 Civic Center Plaza
Santa Ana, CA 92701

Subject: Proposed Sphere of Influence Policy Guidelines

Fellow Board Members:

On June 29, 1999 the Board requested that the City/County Subcommittee return with recommendations regarding the proposed Sphere of Influence Policy Guidelines. Since then we have met with representatives of the League of Cities, Orange County Division and the Building Industry Association (BIA) in an effort to reach consensus on the Policy Guidelines.

Based upon our meetings the past few weeks, we are pleased to present a document which can be supported by the League of Cities, Orange County Division, and BIA, and which meets the goals of our overall long-term annexation strategy. In summary, the proposed Draft Resolution and Policy Guidelines reflect a careful balance between the need to respect the many months of effort spent developing Policy Guidelines which were unanimously approved by the League of Cities, while ensuring that the Board Resolution contained the necessary provisions with regard to our desire to not impact the timing associated with the processing of development applications. This balance has been achieved and we are jointly recommending full Board support of this item.

The enclosed Draft Resolution also contains additional language which recognizes that the Sphere of Influence Policy Guidelines are the first step toward our overall annexation strategy which includes County Islands. We feel it is important to stress the importance of County Islands to the full Board, and to support Supervisor Coad's efforts on behalf of this Board to develop specific strategies and programs for our County Islands. It should be noted here that both parties – the League of Cities representatives and the BIA – recognize the need to address the County Island issue.

CEO and County Counsel representatives will be available prior to or at the Board Meeting to address any technical or legal questions regarding the proposal.

RECOMMENDED ACTION

Adopt Draft Resolution approving Sphere of Influence Policy Guidelines.

Respectfully,

Thomas W. Wilson
Vice-Chairman

James W. Silva
Supervisor, Second District

RESOLUTION OF THE BOARD OF SUPERVISORS OF

ORANGE COUNTY, CALIFORNIA

July 27, 1999

On motion of Supervisor Wilson, duly seconded and carried, the following Resolution was adopted:

WHEREAS, representatives of the County, the cities and the Building Industry Association of Orange County have met to attempt to reach consensus on policy guidelines to guide private development and the provision of municipal services in city spheres of influence; and

WHEREAS, the proposed policy guidelines have been submitted to this Board for review and approval;

NOW, THEREFORE, BE IT RESOLVED THAT THIS BOARD HEREBY FINDS AND DETERMINES AS FOLLOWS:

1. Approval of these policy guidelines is not a project for purposes of the California Environmental Quality Act because the guidelines are not intended to direct or influence development, rather they serve solely as a framework for cooperation among affected agencies and landowners and only become a formal policy with regard to individual city spheres of influence when this Board and the City Council reach agreement on their adoption and implementation; and

2. This Board will consider application of these policy guidelines to individual city spheres of influence upon approval of these guidelines by the affected city, and

3. The guidelines will be considered in conjunction with future General Plan amendments within city sphere of influence areas, and

4. These guidelines are not intended to impact County regional facilities as they are applicable only to private development projects and the County has an adopted policy to oppose annexation and incorporation proposals that impact County regional facilities necessary for the County's core business functions, and

5. The County is the local agency with ultimate responsibility for review and approval of development projects in unincorporated territory whether or not they are located in city spheres of influence, and

6. This action does not confer any authority to delay or cause an increase in development application processing time, and

7. Private property rights shall not be abrogated as a result of interpretation or implementation of the Policy Guidelines as development applications are processed.

BE IT FURTHER RESOLVED that this Board hereby approves use of the proposed Sphere of Influence Policy Guidelines submitted by the County Executive Office subject to the matters set forth in this resolution.

BE IT FURTHER RESOLVED that this Board recognizes that the proposed Sphere of Influence Policy Guidelines are the first step toward an overall County Annexation Strategy which will also address County Islands. The CEO is directed to immediately undertake the necessary actions to complete a County Annexation Strategy in conjunction with LAFCO and the cities. This Board will review the progress of this work effort in ninety days in conjunction with a status report on the implementation of the Sphere of Influence Policy Guidelines.

BE IT FURTHER RESOLVED that this Board hereby directs:

1. The County Executive Office to work with affected cities towards the application of the policy guidelines in individual city spheres of influence for developing areas and report back within ninety days.

2. The Planning and Development Services Department to develop protocols and procedures for the processing of development applications within developing sphere of influence areas to implement the applicable policy guidelines. The procedures will be reviewed by affected parties, including the Development Processing Review Committee prior to approval by the Director of Planning and Development Services Department.

3. The County Executive Office and the Planning and Development Services Department to develop a report and recommendations regarding the long-term planning and governance assumptions

for unincorporated areas outside of existing spheres of influence and General Plan open space areas within existing spheres for consideration by LAFCO as part of its update of spheres of influence.

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The foregoing was passed and adopted by the following vote of the Orange County Board of Supervisors on July 27, 1999, to wit:

AYES: Supervisors: THOMAS W. WILSON, JAMES W. SILVA, TODD SPITZER
CYNTHIA P. COAD, CHARLES V. SMITH

NOES:
EXCUSED:
ABSTAINED:

Charles V. Smith

CHAIRMAN

STATE OF CALIFORNIA)
)
COUNTY OF ORANGE)

I, DARLENE J. BLOOM, Clerk of the Board of Orange County, California, hereby certify that a copy of this document has been delivered to the Chairman of the Board and that the above and foregoing Resolution was duly and regularly adopted by the Orange County Board of Supervisors.

IN WITNESS WHEREOF, I have hereto set my hand and seal.

Darlene J. Bloom

DARLENE J. BLOOM
Clerk of the Board
County of Orange, State of California

Resolution No: 93-301

Agenda Date: 07/27/1999

Item No: 32

I certify that the foregoing is a true and correct copy of the Resolution adopted by the Board of Supervisors, Orange County, State of California

DARLENE J. BLOOM, Clerk of the Board of Supervisors

By: _____
Deputy

Sphere of Influence Policy Guidelines
(adopted July 27, 1999 by Board of Supervisors Resolution 99-)

Mission Statement

These policy guidelines are the product of a facilitated dialogue between the League of California Cities-Orange County Division, the County of Orange, the Local Agency Formation Commission (LAFCO), and the Building Industry Association of Orange County to address projected growth and the provision of municipal and regional services in developing areas, hereinafter Developing Spheres of Influence.

The intent of these policy guidelines is to clarify the relationship between cities and the County with respect to urban planning, to promote the efficient, effective, and equitable delivery of local and regional services for existing and future residents, and to define a collaborative process with respect to development standard determinations for Developing Spheres of Influence. These guidelines also recognize that urban development should occur within existing cities, Spheres of Influence, or new communities.

Nothing in these policy guidelines shall be interpreted to affect or change pre-existing approved entitlements or development agreements, nor does it apply to county islands, which will be subject to future policy development. These policies also are not intended to establish countywide development standards. Rather, they reflect recognition that each Sphere of Influence is unique and requires site specific planning and flexibility.

Definitions

"**Design Standards**" shall mean regulations pertaining to the location, height, bulk, density, intensity, setback and size of buildings and structures and local street widths.

"**Developing Spheres of Influence**" shall mean the Spheres of Influence to be established by LAFCO based on the considerations set forth in the Sphere of Influence Policy Guidelines for the following cities and, in the future, to existing cities where LAFCO establishes a new SOI boundary, and any newly incorporating cities:

Anaheim (Santa Ana Canyon)
Brea
Newport Beach (Newport Coast and Banning Ranch)
Huntington Beach
Irvine
Lake Forest
Orange (East Orange)
San Clemente
Yorba Linda (Chino Hills)

"**Development Standards**" shall mean standards for Infrastructure. Public Safety Regulations and Design Standards. Design Standards are not applicable to: 1) interim uses such as agriculture; or 2) public utilities.

"**Infrastructure**" shall mean standards for street alignments and grades and arterial and primary widths, drainage and sanitary facilities, public utilities, parks, public easements and other public facilities, or fees in lieu thereof, which will be operated and maintained by a city upon annexation.

"**New Communities**" shall mean areas designated as potential new cities through a joint LAFCO/County process.

"**Public Safety Regulations**" shall mean building codes and regulations adopted pursuant to the provisions of Health and Safety Code.

"**Sphere of Influence**" shall have the meaning as set forth in Government Code Section 56076.

"**Urban Level Municipal Services**" may include, but are not necessarily limited to, water, sewer, streets, street lighting, park and recreation services, building and zoning enforcement, animal control, law enforcement, fire protection, libraries, and crossing guards.

Policy Guideline Objectives

These Policy Guidelines will facilitate the orderly planning and development of Orange County by:

- Providing a framework for cooperative relations among cities, the County, and landowners by minimizing project by project controversy through advanced agreement on Sphere of Influence policy.
- Providing for urban development in a manner that results in annexations and new cities that are efficient, effective, and equitable to existing and new residents, landowners, and service providers.
- Conserving the resources of service providers within Orange County while recognizing the legitimate rights and interests of property owners.
- Assisting the general public in understanding the planning and service responsibilities of local governments providing urban municipal and regional services within Orange County.
- Assisting LAFCO to establish Spheres of Influence based upon a city's demonstrated ability to plan and serve the area.

- Furthering a successful and cooperative framework to promote flexibility, options, and incentives in the implementation of these policies.

- Discouraging the creations of new "unincorporated islands" within Developing Spheres of Influence.

Policy Guidelines

Spheres of Influence are established by the Local Agency Formation Commission, as required by state law, to identify the physical boundaries and service areas of cities and special districts. Current LAFCO policy calls for territory to be included within a Sphere of Influence if that area will need urban services within the next ten to fifteen years. Spheres of Influence are amended periodically and as conditions warrant.

The following policy guidelines concern development proposals within Developing Spheres of Influence. They do not apply to land covered by a pre-annexation agreement between a city and landowner.

1. Cities should have the option to provide Urban Level Municipal Services to areas within Spheres of Influence where the city has a demonstrated willingness and ability to provide Urban Level Municipal Services. This guideline is not intended to address the provision of services by independent special districts, which topic is subject to LAFCO jurisdiction.

2. Urban development should occur within existing cities, Spheres of Influence, or planned cities. Initiation of annexation to the city should occur at the earliest time in the planning process consistent with these policies. Initiation of annexation to a city should occur prior to the issuance of building permits.

3. Spheres of Influence reflect a city's demonstrated willingness and on-going ability to provide land use planning and to plan for and extend public services. This policy guideline acknowledges that LAFCO has the sole authority to determine spheres of influence, and LAFCO concurrence is necessary for implementation of this guideline.

   a) In conjunction with LAFCO review of a city's Sphere of Influence, the city must develop a plan of service consistent with the level of detail commonly found in General Plans for the proposed sphere area. The plan will include:

      1. Land Use Designations
      2. Location of existing services and infrastructure
      3. Capital improvement and funding plans
      4. Level and range of services proposed for the area

b) It is anticipated that LAFCO would reevaluate a city's Sphere of Influence on a priority basis and determine if the sphere shall be maintained, revised or eliminated consistent with these policy guidelines if a city's actions significantly alter the need for urban services, or the provision of urban services within the sphere area.

4. The cities, the County, and LAFCO will periodically coordinate and complete Sphere of Influence updates so that responsible agencies can develop general plans, ordinances, and procedures consistent with these policy guidelines.

5. The public interest is served when the County acts to provide compatibility in land use planning and development standards in developing spheres areas. Development Standards applicable within Developing Spheres of Influence should allow consideration of the following:

   a) City standards for Infrastructure improvements, including public parks, and Public Safety Regulations should be utilized.

   b) City Design Standards will be the starting point of discussions between the city and the landowner for a development proposal. Cities and landowners will work cooperatively to achieve consensus by using flexibility, incentives, and other options to achieve agreement on the applicable Design Standards. In the event the city and landowner cannot agree on appropriate Design Standards, the County will make the final determination on the Design Standards which will apply based upon an evaluation of the legitimate objectives of the city and the landowner. Factors to be considered by the County shall include, but not be limited to, balancing the landowner's need for responsiveness to the marketplace with the city's need for consistency with the city's Design Standards.

Sections 5(a) and (b) are intended to recognize that while the County will have ultimate responsibility for the application of Development Standards within a Developing Sphere of Influence area, compatibility with City Infrastructure and Public Safety Regulations facilitates the ultimate annexation of the development to the city. It is anticipated that each City will identify development standards to be addressed at the time formal policies are considered for individual Sphere of Influence areas.

Guidelines for Annexation Incentives

The following incentives are permissive options to address permit process time and cost and shall not be construed to apply to Development Standards and Design Standards, or negate a landowner's option to process all aspects of a development through the city or County.

1. Flexible Processing Options

   The County and the city may each submit a development processing time and cost proposal for landowner consideration. Should the landowner wish a development proposal to be processed through the city, the County and city will pursue a cooperative agreement allowing city processing prior to the effective date of annexation.

2. Pre-annexation agreements, which eliminate the need for the extension of Urban Level Municipal Services by the County will be considered a public benefit for the purposes of County development agreements.

3. To promote early annexation, the city will consider offering incentives, including but not limited to, the following:

   a) Pre-annexation planning and zoning
   b) Pre-annexation subdivisions
   c) Creative public financing opportunities
   d) Pre-annexation agreements
   e) Pre-annexation development agreements
   f) Financial incentives
   g) Phased annexations

Implementation

The Board of Supervisors directs:

1) the CEO to work with affected cities towards the application of the policy guidelines in individual city spheres of influence for developing areas and report back within ninety days.

2) the Planning and Development Services Department to develop protocols and procedures for the processing of development applications within developing sphere of influence areas to implement the applicable policy guidelines. The procedures will be reviewed by affected parties, including the Development Processing Review Committee prior to approval by the Director, Planning and Development Services Department, and

3) CEO and Planning and Development Services Department to develop a report and recommendations regarding the long-term planning and governance assumptions for unincorporated areas outside of existing spheres of influence or general plan open space areas within existing spheres of consideration by LAFCO as part of its update of spheres of influence.

ATTACHMENT B

WHITE PAPER

ORANGE COUNTY LOCAL AGENCY FORMATION COMMISSION (LAFCO)
COUNTY OF ORANGE AND
LEAGUE OF CALIFORNIA CITIES, ORANGE COUNTY DIVISION

UNINCORPORATED COUNTY ISLAND ANNEXATION STRATEGY

January, 2000

INTRODUCTION

The County of Orange recently completed an intensive restructuring of county government and an assessment of the regional, public services provided by the County. As a result of the assessment, the leaders of Orange County determined that the provision of municipal, city-level services to unincorporated islands is not a core county business. Therefore, a concentrated effort to identify, assess, revitalize and annex the unincorporated islands throughout Orange County has become a major priority for the County Executive Office, Strategic and Intergovernmental Affairs Department (CEO/SIA).

Thus began the coordinated effort with the County, the Orange County Local Agency Formation Commission (LAFCO), and the League of California Cities, Orange County Division to develop a comprehensive strategy to facilitate the annexation of the unincorporated islands throughout the county. The following is a description of previous actions taken in regard to County islands, the current status of the County islands, strategies to facilitate annexation to the adjacent city, an implementation strategy and the next steps required to reach the overall goal of transitioning municipal services from the County to cities.

The County Executive Office developed a comprehensive inventory of the County's unincorporated islands in August 1999. The Inventory is divided into the following three categories of unincorporated areas: small islands, redevelopment areas, and major unincorporated communities. Seventy-eight unincorporated areas are mapped and cataloged, and demographic, land use, and service data is provided for each area. The *Inventory of Unincorporated Areas* was distributed to County agencies, cities, special districts and interested parties and will serve as the baseline data for this unincorporated island annexation strategy.

On September 14, 1999 the Board of Supervisors approved the *Community Revitalization Program for Unincorporated Islands*. The purpose of the revitalization program is to coordinate Orange County agencies to revitalize unincorporated neighborhoods through community policing, community code enforcement and community based programs. The Board of Supervisors allocated $500,000 as part of the Fiscal Year 99/00 budget to implement the revitalization program in both small islands and major unincorporated communities.

Fourth District Supervisor, Cynthia Coad has taken the lead on the revitalization strategy and recently implemented an ongoing revitalization plan for the major unincorporated community in the El Modena area. The County's Probation Department, in coordination with the County Executive Office will continue to implement the revitalization strategy at up to seven additional sites that can include major unincorporated communities and small unincorporated island areas. A description of the revitalization program as an annexation strategy will be further defined in this report.

ANNEXATION STRATEGY

The following are annexation strategies that can be used to assist cities and/or provide incentives to annex the unincorporated areas within the city's sphere of influence. All the following strategies will not be applicable to every unincorporated area and should be considered on a case-by-case basis to meet the needs of the annexing city and the unincorporated community residents.

New Legislation – AB 1555/Longville Bill

On October 9, 1999 the Governor approved and signed AB 1555, a bill authored by Assemblyman John Longville, to promote the annexation and elimination of unincorporated county islands. The bill authorizes the Local Agency Formation Commission (LAFCO) to approve, without an election, the annexation or reorganization of an unincorporated island or unincorporated islands within city limits under specified conditions depending on whether the proceeding is initiated on or after January 1, 2000, or January 1, 2007. In summary, the conditions require that the island(s) can not exceed 75 acres, the annexation is proposed by resolution of the annexing city, the territory will benefit from annexation, or is already receiving benefits from the city and that the island was not created after January 1, 2000. A comprehensive description of AB 1555 and the conditions are described in the attached bill text.

LAFCO Fee Waivers for Small Islands

On November 2, 1999 the Orange County Board of Supervisors approved the *County of Orange FY 1999-2000 First Quarter Budget Report* which included the allocation of $50,000 to LAFCO to facilitate the annexation of small county islands. This net County cost item would offset the cost of processing small island annexations sponsored by the County or that have been determined to require a fee waiver by LAFCO.

Pre-Annexation Agreements

A pre-annexation agreement between the County and the annexing city will allow an opportunity to collectively define gaps between County and city standards and service levels to facilitate the

ultimate annexation of the island to the city. Ideally, the County and city will commit money and/or resources to respond to the specific, identified needs to bring the island to compatible city standards and service levels. The pre-annexation agreement will assure the city and island residents that certain needs will be met and/or land use uniqueness will be preserved, and will assure the County that the city will annex the island now or at some specified time in the future.

Pre-Annexation Development Agreements

Currently undeveloped islands are subject to the development standards established by the Orange County Planning & Development Services Department, which may be more, or less restrictive than the development standards of the annexing city. A Pre-Annexation Development Agreement between the County, the city and the landowner/developer will ensure that the development standards will not change when the property is annexed to the city. The County and the annexing city will agree to allow the landowner/developer the option of developing the property through the County process or the city process. On the condition that the County process is used, the County, the landowner/developer and the city will negotiate agreeable development standards that are the same, or comparable to the city's building codes and regulations.

Phased Annexation Strategy

The *Orange County Inventory of Unincorporated Areas* is a complete inventory of the developed unincorporated areas throughout the County. Several Orange County cities have multiple unincorporated islands within the city's sphere of influence which could be cost prohibitive to the city to annex them all in one annexation process. Therefore, the County will negotiate a pre-annexation agreement with a city that provides for phased annexations. Essentially, the city will have the option to annex portions of the unincorporated areas within the city's sphere of influence over a negotiated time period. The property tax transfer percentage between the city and the County will be proportional to the annexed areas. The full percentage as defined in the city/county property tax exchange agreement will be available to the city when the last

unincorporated area is annexed to the city. The city may choose to annex all the unincorporated islands within the city in one complete annexation process.

City/County Contract Service Agreements

Currently, the Board of Supervisors serves as the "city council" to the residents of unincorporated islands. It is the County's responsibility to provide municipal and regional services to the unincorporated island areas. However, due to the fragmentation of islands throughout the County, municipal service delivery is often uneconomical for the County and could be provided more efficiently by the adjacent city. In many cases cities already provide the first response for emergency services such as police and fire. Service contracts with adjacent cities to provide city-level services such as police, planning and street maintenance would address this inefficiency and contribute to an overall plan to ultimately annex the unincorporated island to the adjacent city.

First, where County service levels in an unincorporated island do not match those of the adjacent city, and thus need to be increased to facilitate annexation, service contacts with cities would preclude the need for temporarily increasing County staffing and resources to service the islands at a level commensurate to the services provided by the adjacent city. An example of this is street sweeping on neighborhood streets which is currently not done by the County, but may be done by the adjacent city in its neighborhoods. Second, the residents would have a local contact point for services such as building permits, code enforcement, public safety, etc. This creates an image for the island residents of belonging to the city (in turn improving community support for annexation), and allows the city to begin to have an influence on the character of the island.

In other words, until annexation, the County would operate under contract with the city as though the island is already annexed to the city. The County would give control of the islands to the city which would provide all of the needed services, including land-use decisions that comply with the city's general plan overlay for the island. Any deviations from the County's general plan overlay will require County approval. Where County and city land use restrictions deviate,

and residents prefer to retain the County land use, it may be appropriate to grandfather in certain land uses (e.g. density levels or existence of sidewalks).

Until annexation occurs, the County will continue to receive the revenue (sales and property taxes, etc.) which is generated from the County island property/uses unless the County agreed that the revenue could go to the city as full payment for the contract services provided by the city to the island. This would need to be studied on an island-by-island basis.

Revitalization Strategy

It has recently been brought to the forefront, by Supervisor Coad, that it is time to begin giving more attention to all County islands, some of which have become a haven for crime, gangs, blight, and an overall disengagement from the surrounding city whose sphere of influence they are within. Not only is there a variance in the size of these islands, but also the type of special attention they may need to have addressed. However, each island does have one thing in common with the others: they have not received the overall attention necessary to deal with their pressing needs.

Some of these islands have a distinct difference in appearance than that of the surrounding city whose sphere of influence it is within. It may be the type of land use, infrastructure needs, lack of services such as street sweeping, abandoned cars left on the streets, lack of code enforcement, undergrounding of utilities and other matters which tend to distinguish the island from the surrounding city. It is as much, and maybe more, in the city's interest to get the island cleaned-up and compatible with surrounding uses and image, as it is to the County.

At the direction of Supervisor Coad, the County Executive Office and the Orange County Probation Department are coordinating a comprehensive revitalization strategy that includes the participation of the following County departments: Sheriff-Coroner, Planning & Development Services, Health Care Agency, District Attorney, Social Services Agency, and Housing & Community Development. The purpose for the revitalization strategy is to demonstrate the County's interest in revitalizing unincorporated neighborhoods through community policing,

community code enforcement and community programs. The specific components of the Revitalization Strategy are defined in a separate report. The County and city can use the strategy to improve qualifying unincorporated islands as a condition of annexation.

IMPLEMENTATION STRATEGY

There are several components necessary to facilitate the annexation of the unincorporated islands throughout Orange County. The components defined in this strategy include developing a partnership between the annexing cities, the County and LAFCO as a first step. The partners will then identify specific islands for annexation, define a timeline to annex the islands, prepare a comprehensive fiscal and service level analysis, prepare a community outreach plan, and coordinate with affected agencies. As a final step, the partners will jointly notify the affected agencies and departments regarding the completed annexation(s).

1. *City/County Partnership*

The success of an annexation strategy and policy is contingent on the partnership between the cities and the County of Orange. It is important to create a partnership between each city and the County so that we are all going in the same direction, and know what each of the partners is responsible to provide/contribute. The League of California Cities, Orange County Division recently convened an Annexation Task Force comprised of elected leaders and city managers to coordinate with the County of Orange and LAFCO to develop an annexation policy for Orange County. Upon approval of a final annexation policy the partnership will continue to promote and market annexations to cities, implement the annexation policy, convene community outreach forums, and offer technical assistance on annexation issues on a countywide basis.

2. *Schedule & Timeline for Annexation*

The *Inventory of Unincorporated Areas* is the most comprehensive study of the unincorporated islands throughout the County. The City/County/LAFCO partnership will proactively coordinate a list of small islands from the Inventory that are considered non-controversial and can use one or more of the strategies defined in the previous section. The partners will focus on uninhabited islands first, followed by the smallest islands that are currently considered part of the adjacent city and will not be subject to resident opposition. The partners will also reactively identify the islands that have been requested by cities for

annexation and assist with the annexation of those areas by obtaining the information listed in the following section. *Inventory of Unincorporated Areas*.

3. *Inventory of Unincorporated Areas*

Expand the data in the *Inventory of Unincorporated Areas* to include the following information for the islands identified by the partners. The data will assist with the facilitation of annexations by providing a comprehensive analysis of the economic impact of the unincorporated island to the annexing city: (not listed in order or priority of importance)

1. Cost to Provide Services
2. Current Service Levels
   - Street sweeping
3. Code Enforcement
   - Abandoned vehicle removal
4. Public Protection/Safety
   - Crime statistics
   - Gang related activity & gang prevention programs
   - Service calls
   - Current staffing levels
   - Community-based policing program
5. Infrastructure & Roads
   - Maintenance schedule
   - Future capital improvement projects
   - Age of infrastructure
   - Sidewalks, curbs, gutters, etc. consistent with City standards
6. Demographic and housing data
7. Number of registered voters
8. Number of commercial establishments and annual sales tax revenue generated
9. Annual turnover/resale rate of existing property (commercial and residential)

10. Parcel tax or assessments – County Service Areas, street lighting districts, special purpose taxes
11. Service level unit of measurements
12. Current allocation of CDBG funds for projects within the subject County islands.
13. Actual and projected property tax increment generated in the island that is currently within a County redevelopment project area (RDA). Projects currently funding by RDA funds.
14. Sewer/septic
15. Land use planning and zoning information
16. School Districts

4. *Community Outreach*

It is important to create city/county partnerships to collectively develop community outreach programs in coordination with LAFCO. The unincorporated island residents are integral to the overall annexation process. Therefore, public community forums in the affected unincorporated island areas will be convened to discuss proposed annexations, respond to residents' concerns regarding annexation, and solidify the united approach between the city and the County regarding the annexation of the area.

Historically, one of the formidable barriers to annexation, has been that the residents of the island do not want to change the status quo. There is a fear, whether real or perceived, that annexing to a city will result in a different lifestyle imposed through the city's general plan, zoning, restrictive building/other codes, costly sewer connection fees or possibly a difference in the amount of taxes they will be required to pay (utility user fees, special taxes, annual sewer fees and assessments, etc.).

Furthermore, it is important to understand, that even though the city and County would like to facilitate the annexation of the County islands, the residents will continually resist if they think they will lose these perceived benefits/independence as a result of annexation. The residents must be educated regarding any differences in services, including direct benefits

that would result from annexation such as increased city-level services, increased public safety, lower taxes, access to city facilities, and the potential to "grandfather" land use standards in some cases.

5. *Sanitation District Coordination*

The data gathering process for the inventory will identify the number of properties that are currently on septic systems within the island. The annexing city will determine if the property must be converted to sewer as a condition of the annexation. However, in light of the environmental impacts of septic systems, it is doubtful that any city, or the County for that matter should continue to allow septic systems. There may need to be both city and county policies providing for the sunsetting of septic systems. If so, the city and county representatives will coordinate with the Sanitation District to transition the property from septic to sewer, determine the costs and payment for services.

6. *Orange County Fire Authority Coordination*

The unincorporated islands/areas currently are serviced by the Orange County Fire Authority, and to pay for those services a portion of the property taxes which are paid by the property owners in the unincorporated island/area goes into the County Structural Fire Fund to pay for these services. When a County island is annexed into a city, the portion of the property tax that historically went into the County Structural Fire Fund needs to be addressed.

If the Orange County Fire Authority is the service provider to the annexing city, then OCFA will thereafter continue to be the service provider to the service provider and the share of the property taxes which goes into the County Structural Fire Fund should continue unchanged. However, if the annexing city has its own fire department or is a contract city with OCFA or another city, then it seems that the portion of the property taxes which historically have gone into the Structural Fire Fund should then go directly to the city.

This is a matter which the Board of Supervisors and OCFA need to address. The Structural Fire Fund is under the jurisdiction and control of the Board of Supervisors, but pursuant to the terms of the Joint Powers Agreement, which established the OCFA, all Structural Fire Fund revenue was pledged to OCFA to cover operational costs for the unincorporated areas.

7. *Notification of Annexation to Affected Departments*

The LAFCO process currently provides notification to the County, Assessor, Auditor and Surveyor when an annexation is complete. The implementation strategy will also require a final notification of annexation to all impacted departments and agencies to include, but not limited to the following:

- Orange County Board of Supervisors
- Affected City Council
- League of Cities Task Force Members
- County of Orange Departments:
  - CEO/Budget Department
  - Health Care Agency
  - Housing & Community Development
  - Planning & Development Services Department
  - Public Facilities & Resources Department
  - Registrar of Voters
  - Sheriff-Coroner

NEXT STEPS

The *Unincorporated County Island Annexation Strategy* is the first step in a comprehensive approach to annex the unincorporated islands throughout Orange County to the adjacent cities. Transitioning the provision of municipal services to the cities will allow the County to begin focusing on core County businesses at a regional level. However, as a follow-up to the annexation strategy, addressing the following issues will move the County towards completing the overall goal.

Revitalization Strategy

Expand the Revitalization Strategy and develop a comprehensive approach to reinvest County resources into the unincorporated areas. The revitalization will include all unincorporated areas of the County, and will not be limited to islands.

Fiscal & Service Level Analysis

Expand the analysis to all unincorporated areas identified in the Inventory. The analysis is currently limited to those islands or unincorporated communities that have been identified for annexation by the League/County/LAFCO partnership or the annexing city.

Service Contracts

Facilitate contracts with cities adjacent to unincorporated communities to provide municipal services. Contract with the city to provide land use services, permits, code enforcement, etc. to begin eliminating the County's responsibility to provide city-level services on an on-going basis in unincorporated islands.

ATTACHMENT C

Policy & Procedural Guidelines for Annexation of Small Islands (Gov't Code 56375.3)

IV. SMALL ISLAND ANNEXATION PROCEDURAL GUIDELINES

The following shall serve as procedural guidelines for processing small island annexations pursuant to Government Code §56375.3.

The Commission may approve small island annexations, and order the annexation of territory without protest or an election, if it determines that all of the following conditions apply:

A. The annexation is initiated on or after January 1, 2000 and before January 1, 2014.

B. The annexation is proposed by resolution adopted by the affected city.

C. The annexation does not exceed 150 acres in area, and that area constitutes the entire island.

D. The territory is surrounded in either of the following ways: surrounded, or substantially surrounded, by the city to which annexation is proposed or by the city and a county boundary or the Pacific Ocean, or surrounded by a city to which annexation is proposed and adjacent cities. An unincorporated island is "substantially surrounded" if: (1) more than 50 percent of the island's boundary is contiguous to the annexing city, or (2) more than 50 percent of the island's boundary is contiguous to the annexing city and the Pacific Ocean.

E. The territory is not located within a gated community where services are currently provided by a community services district.

F. The territory is substantially developed or developing based upon one or more factors, including, but not limited to, the following:

- The availability of public utilities
- The presence of public improvements
- The presence of physical improvements upon the parcel or parcels in the area

G. It is not prime agricultural land.

H. The territory will benefit from the annexing city.

I. The Commission may offer incentives such as reduced fees for cities annexing small islands.

ATTACHMENT C

Original Adoption Date: 11/19/2001
Date of Last Review: 2/9/2011
Date of Last Revision: 3/11/2005, 2/9/2005

ITF Guiding Principles, Best Practices and Municipal Services Alignment Process

- ITF Purpose: To develop island annexation and alternative service guiding principles and best practices.

- Guiding Principles
  1. The purpose of cities and the County unincorporated islands within their sphere of influence is the same - to provide "community" for the residents.
  2. Communities need to be whole and healthy from a municipal service perspective.
  3. It is the role of government to provide municipal services in a manner that makes communities whole and healthy.
  4. Annexation and Municipal Service Agreements are different from one another and both are tools for government to make communities whole and healthy from a municipal service perspective.
  5. Currently there are disparities of municipal services and their associated costs among cities and County unincorporated islands.
  6. The goal for County and City government is to align cities and the unincorporated islands within their spheres of influence from a municipal service, capital improvement investments, and associated costs perspective in order to foster healthy and whole communities.
     [Note 1: The above guiding principles shift LAFCO's focus away from securing annexations and onto aligning government leadership, municipal services and associated costs
     [Note 2: "Alignment" is defined as "matching the city's existing codes and standards unless otherwise agreed upon by County and city."]

- Best Practices
  1. Inventories
     - County inventory of costs associated with unincorporated islands
       - Identify methodology
       - Conduct inventory

     - City Island infrastructure inventory
       - Conduct inventory
       - Each city on a case-by-case basis identifies a "reasonable" and specific timeframe (or lifespan, e.g. number of projected years) for costs associated with the infrastructure improvements and maintenance required to achieve infrastructure alignment.

       - INVENTORIES ARE A BEST PRACTICE BECAUSE THEY:

- Provide objective data for decision-making for both the county and cities
- Provide data that is viewed as credible because it is gathered by the county and cities
- Align the county and city financial interests in defining a "fair," equitable cost-sharing burden

2. Alignment practices
   - Specific plans to bring land use and planning among islands and cities into alignment
   - Municipal service agreements for police, fire and code enforcement alignment to eliminate disparity in services and associated costs
   - Affordable housing alignment agreements, including development, parking and traffic standards to address affordable housing issues and impacts
   - Annexation as a tool for achieving alignment is possible at any point that the city and county agree on annexation
     - ALIGNMENT IS A BEST PRACTICE BECAUSE:
     - It reduces the disparity of municipal services offered among communities in islands and communities in cities; thus making them whole from a municipal services perspective
     - It eliminates the need for island residents to choose between disparate county and city standards and levels of service
     - It eliminates city residents paying for portions of island resident services
     - It ensures island residents pay their fair share for the municipal service they receive
     - It provides factual data for island residents that is not manipulated or distorted by outside interests
     - It eliminates the major issues contributing to resident opposition to annexation without the disruption of proposing annexation. [e.g. police, fire, code enforcement, land use]
     - It eliminates city government issues associated with land use planning compatibility and code enforcement.
     - It [through Municipal Service Agreements] is a financial incentive for cities to engage with the county to align municipal services

3. Pilot Projects
   - Conduct pilot projects.
     - PILOT PROJECTS ARE A BEST PRACTICE BECAUSE:
     - They provide a "safer" environment and opportunity for all parties to test, refine and learn from the alignment process

- They provide an opportunity to demonstrate the effectiveness of the alignment process
- The project and the respective cities and players participating in the pilot project can be used to educate and promote the process to other cities

4. Fiscal Model Template
   - Use the Fiscal Model Template as the basis for fiscal impact studies
     - THE FISCAL MODEL TEMPLATE IS A BEST PRACTICE BECAUSE:
     - It generates and results in fiscal impact studies that are viewed as more "credible" because they identify and represent the fiscal perspectives of the County, city, and residents (ALL THAT ARE IMPACTED)
     - It identifies available funding.
     - It clearly defines and standardizes the data and information required for the study analysis which helps simplify the time and work effort required to produce the data; i.e. It increases data collection efficiency.
     - It has the support of City Manager and the County CEO to ensure that accurate, timely data collection is a priority.
     - It generates "credible" fiscal impact studies that all parties – County, cities, residents – can rely upon for decision-making
     - [Note 3: For Fiscal Model Template see Attachment A]

- Island/City Alignment Process
  1. Supervisor affirms that he/she wants the island communities in their respective districts to be aligned from a municipal service and associated cost perspective. [Comment: These alignment messages may be much easier for supervisors to deliver to constituents than messages trying to justify annexation.]
  2. Supervisors that want their communities aligned identify and prioritize the islands that will be aligned
     - 2a: LAFCO notifies the cities with the prioritized islands in their Sphere of Influence that the Supervisor is interested in aligning municipal services, explains the process, answers questions and factors any city concerns into the process going forward.
  3. Supervisors that want their communities aligned initiate alignment best practices
     - CEO's Office initiates cost inventory for priority islands
     - Specific plans initiated for priority islands
     - MSA discussions initiated
  4. LAFCO invites city managers associated with priority islands to conduct infrastructure inventory; informs city that county is inventorying costs of serving the island; informs city that specific plan is being completed

5. LAFCO convenes meeting with county and city to review/discuss cost inventory to serve islands and island infrastructure inventory
6. City Manager determines if city is "comfortable" engaging in informal talks about aligning municipal services among the city and island
7. City Manager recommends to city council that informal discussions commence
8. City Council agrees to informal discussions [Comment: Similar to the Supervisors, the alignment messages may be much easier for City Council members to deliver to their constituents than messages justifying annexation.]
9. City Manager, County CEO and LAFCO design a plan to align MS and associated costs using MSA's for police, fire, and code enforcement. . Plans designed on a case-by-case basis and may include:
    - Any all or a combination of the alignment practices [e.g. MSA's, affordable housing agreements, redevelopment agreements, community outreach and education agreements.]
10. City Council and County agree on plan to align municipal services and associated costs.
11. Alignment plan implemented and completed.
12. Alignment Process Outcomes:
    - Cities and islands aligned from municipal service and associated cost perspective; aligned in a manner that is agreeable to county and city; City-County cost burden equally shared; residents not asked to make a decision about municipal services and level of service;
    - Islands are as aligned as much as possible and thus optimally positioned for eventual annexation
    - Most reasons for residents to oppose annexation are "address" and/or cost of municipal services and possibly police/sheriff service.
    - The only decisions for residents are the cost they <u>want</u> to pay for municipal services and how much they want to pay to maintain "address."
    - County and city positioned to jointly communicate to island residents the costs of their municipal services and to offer them the choice of annexing for a specified cost and address change or to maintain their island status. [This is a much simpler communication task; reduces and defines the issues for residents to consider or oppose; less resources required...dollars and staff...to implement the communication plan; achieves healthy and whole communities from the municipal service perspective either way...through alignment best practices or annexation.]

Letter: WCCA

WILDLIFE CORRIDOR CONSERVATION AUTHORITY

570 WEST AVENUE 26, SUITE 100, LOS ANGELES, CALIFORNIA 90065
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CALIFORNIA STATE PARKS

CHRISTINE MARICK
CITY OF BREA

SANTA MONICA MOUNTAINS CONSERVANCY

DICKIE SIMMONS
LOS ANGELES COUNTY BOARD OF SUPERVISORS

JACK TANAKA
CITY OF DIAMOND BAR

JANE L. WILLIAMS
CITY OF LA HABRA HEIGHTS

January 21, 2014

Ron Tippets
Planner, Current & Environmental Planning Section
Orange County Planning Services
300 North Flower Street
Santa Ana, California 92702-4048

Draft Environmental Impact Report for Cielo Vista Project

Dear Mr. Tippets:

The Wildlife Corridor Conservation Authority (WCCA) was created to provide for the proper planning, conservation, environmental protection and maintenance of the habitat and wildlife corridor between the Whittier-Puente Hills, Chino Hills, and the Cleveland National Forest in the Santa Ana Mountains. WCCA has reviewed the Draft Environmental Impact Report (DEIR) for the proposed Cielo Vista Project and provides the following comments.

The conclusions regarding project-related and cumulative impacts to biological resources are not supported. The DEIR does not adequately avoid, minimize, and/or mitigate the potentially significant impacts related to loss of habitat occupied by the bird species, least Bell's vireo (*Vireo bellii pusillus*), considered threatened by the State and Federal governments; the loss of 14 acres of sensitive native plant communities (and loss of over 30 acres total of native plant communities); and the loss of habitat for other sensitive wildlife species. For example, deferring mitigation for impacts to the least Bell's vireo (i.e., obtaining other permits) is not adequate for the California Environmental Quality Act (CEQA). There should be an emphasis on avoidance of potentially significant impacts to biological resources.

The Esperanza Hills Project, adjacent to and east of the Cielo Vista Project, includes a proposal for 340 single-family residential units on 468.9 acres. Under both project options of the Esperanza Hills project, the street access and some grading would overlap with the Cielo Vista Project site. The design, grading, and construction of the two projects would need to be coordinated. The Cielo Vista and Esperanza Hills projects should be analyzed together due to their adjacency to, and dependency on, each other. That approach would align better with the intent of CEQA and Guidelines (e.g., section 15378). That approach would also allow for an up-front quantitative analysis of total impacts to biological resources. It would also provide a better mechanism for evaluating project modifications

and alternatives in order to more effectively avoid and minimize environmental impacts for both projects combined.

Although the Cielo Vista project proposes to preserve 36.3 acres as undeveloped open space, the DEIR does not adequately address the long-term protection and conservation of the open space. The Final Environmental Impact report (FEIR) and Conditions of Approval should address long-term protection of open space, for whichever alternative is ultimately approved. The FEIR mitigation measures and Conditions of Approval should specify that the remaining open space shall be protected in perpetuity through a fee title dedication and/or grant of a conservation easement(s) to a conservation and land management agency acceptable to the County of Orange and the California Department of Fish and Wildlife. An appropriate entity to accept this dedication could be California State Parks, WCCA, or the Mountains Recreation and Conservation Authority (dependent on said agency's concurrence at that time). The timing of the land transfer or recordation of the conservation easement should be specified (e.g., prior to the issuance of a grading or other permit, map recordation, vegetation removal, or issuance of a certificate of occupancy).

Adequate funding for long-term maintenance and/or management of the remaining open space (for whichever alternative is approved) should also be included as a mitigation measure in the FEIR mitigation measures and in the Conditions of Approval. The timing of the establishment of said funding should also be specified. For example, this condition could require placing the funding in an escrow account, or finalizing a Landscape Maintenance District, prior to the issuance of a grading or other permit, map recordation, vegetation removal, or issuance of a certificate of occupancy. These conditions would provide the necessary assurances for preserving the sensitive plant communities and wildlife species in the remaining open space.

The argument against implementing the less damaging alternative (Planning Area 1 Only) is not adequate. We recommend that the County adopt the Planning Area 1 Only Alternative. This alternative increases the amount of open space preservation to 42.7 acres. This alternative would substantially reduce impacts to sensitive plant communities and sensitive wildlife species (e.g., least Bell's vireo) found in Planning Area 2.

We appreciate your consideration of these comments. Please continue to maintain our agency on your email/mailing list for this project. If you have any questions, please contact Judi Tamasi of our staff by phone at (310) 589-3230, ext. 121, or by email at judi.tamasi@mrca.ca.gov.

Sincerely,

Glenn Parker
Chairperson

Letter: SCAQMD

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

E-Mailed: January 22, 2014 January 22, 2014
Ron.Tippets@ocpw.ocgov.com

Mr. Ron Tippets
Current and Environmental Planning Section
OC Planning Services
P.O. Box 4048
Santa Ana, CA 92702-4048

Review of the Draft Environmental Impact Report (Draft EIR)
for the Proposed Cielo Vista Project

The South Coast Air Quality Management District (SCAQMD) staff appreciates the opportunity to comment on the above-mentioned document. The following comments are meant as guidance for the Lead Agency and should be incorporated into the final environmental impact report (Final EIR) as appropriate.

Health Risk Impacts and Odor Impacts from Future Oil Drilling Operations
The SCAQMD staff is concerned about the project's proposed mix of sensitive land uses[1] and industrial land uses. Specifically, as depicted by Figure 2-4 and Figure 2-5 of the Draft EIR the proposed project will place single family residential units adjacent to a future potentially active oil drilling operation. As a result, the SCAQMD staff is concerned about potential health risk impacts and odor impacts to nearby residents from oil drilling operations that could occur at the project site. Based on past land use decisions in the region that have placed oil drilling operations next to residential land uses both health risk impacts and odor impacts have proved to be critical public concerns. Therefore, the SCAQMD staff recommends that the Lead Agency conduct a Health Risk Assessment (HRA) to determine the potential health risk impacts to surrounding residents (i.e., existing and future on-site residents) and an odor impact analysis to determine potential odor impacts from potential oil drilling activity that may occur at the project site prior to approving the proposed land use designations for this project.

[1] California Air Resources Board. April 2005. "Air Quality and Land Use Handbook: A Community Health Perspective." Accessed at: http://www.arb.ca.gov/ch/landuse.htm

Construction Emissions Analysis

Based on the project description (see page 2-14 of the Draft EIR) the project requires 660,000 cubic yards of cut and fill during construction, however, it does not appear that the Draft EIR accounted for the potential air quality impacts resulting from this significant amount of activity. Specifically, it appears that the Draft EIR relies on the default construction values in CalEEMod for the project's grading phase including the equipment fleet mix, number of equipment pieces and hours of operation. However, the default CalEEmod values are based on grading activity that occurred primarily on flat terrain and not on sloped terrain that required a significant volume of cut and fill. Therefore, the SCAQMD staff recommends that the Lead Agency revise the air quality analysis to ensure that the air quality analysis accounts for the substantial cut and fill activity necessary to construct the proposed project.

Minimize Potential Localized Air Quality Impacts

Based on Chapter 3.0 (Basis for Cumulative Analysis) of the Draft EIR construction of the proposed project may occur simultaneously with the construction of the Esperanza Hills Project that is adjacent to the project site. Given that both projects require substantial grading activity that could result in up to 946,700 cubic yards of cut and fill (i.e., combined) the SCAQMD staff recommends that the lead agency coordinate the construction phases of both projects to minimize any potential localized air quality impacts to residents surrounding the project sites.

Mitigation Measures

In the event that the Lead Agency determines the project will have significant health risk impacts or air quality impacts the SCAQMD staff recommends that the Lead Agency provide additional mitigation measures to minimize such impacts pursuant to Section 15126.4 of the California Environmental Quality Act (CEQA) Guidelines. A list of potential construction-related air quality mitigation measures is available at: http://www.aqmd.gov/ceqa/handbook/mitigation/MM_intro.html

SCAQMD Contact Information

Pursuant to Public Resources Code Section 21092.5, SCAQMD staff requests that the Lead Agency provide the SCAQMD with written responses to all comments contained herein prior to the adoption of the Final EIR. Further, staff is available to work with the Lead Agency to address these issues and any other questions that may arise. Please

contact Dan Garcia, Air Quality Specialist CEQA Section, at (909) 396-3304, if you have any questions regarding the enclosed comments.

Sincerely,

Ian MacMillan
Program Supervisor, CEQA Inter-Governmental Review
Planning, Rule Development & Area Sources

IM:DG

ORC131108-05
Control Number

Letter: SARWQCB

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

Santa Ana Regional Water Quality Control Board

January 28, 2014

Ron Tippets
Orange County Planning Services
P.O. Box 4048
Santa Ana, CA 92702-4048

DRAFT ENVIRONMENTAL IMPACT REPORT FOR CIELO VISTA PROJECT, CHINO HILLS IN YORBA LINDA, UNINCORPORATED ORANGE COUNTY – ORANGE COUNTY PLANNING SERVICES, SCH #2012071013

Dear Mr. Tippets:

Staff of the Regional Water Quality Control Board, Santa Ana Region (Regional Board) has reviewed the Draft Environmental Impact Report (DEIR) for the Cielo Vista Project (Project) proposed in the City of Yorba Linda's unincorporated Sphere of Influence, in the Chino Hills adjacent to the City's eastern urbanized margin. The 84-acre, L-shaped north-south trending site is located north and east of Via Del Agua, Dorinda Road, San Antonio Road, and Aspen Way. The concurrently proposed Esperanza Hills project site, which has the same landowner as the Project, Murdock Properties (Executive Summary, DEIR p.ES-1; 2-1), is immediately east of the Cielo Vista Project site's eastern border.

Proposed Project
A total of 112 houses and associated infrastructure would be built on the site, as discussed below. The western portion of a lengthy ravine (Drainage A3 of Fig. 4.3-4 and Table 4.3-2; Biological Resources and Jurisdictional Delineation), bisects and separates the site into:

- Planning Area 1 (PA1; 41.3 acres, DEIR p. 4.8-9) in the southern part of the site, and,
- Planning Area 2 (PA2; 42.7 acres) that includes Drainage A3 in the northern part of the site.

PA1 (adjacent to the urbanized area to the south; to be accessed from Via Del Agua)

Most of the 41.3 acres would be cut and filled for the construction of 95 building pads. Three vegetated minor drainages would be eliminated (Drainages B, B1, and B2; Figs. 2-11 and 4.3-4). The periphery of PA1 would be managed and maintained as a fuel modification zone, which would extend to the southern slopes of the ravine shown as Drainage A3 in the Jurisdictional Delineation (Fig. 2-4, 2-5, and 2-11). The development design would leave a 1.8-acre strip of remnant oilfield for continued operations. Other hydrocarbon production facilities would be abandoned, and remediation conducted in accordance with county and state standards (California Division of Oil, Gas, and Geothermal Resources) (DEIR p.2-28 and Section 4.7).

PA2 (adjacent to the urbanized area to the west; to be accessed from Aspen Way)

Of the 42.7 acres, 17 building pads would be constructed on 6.4 acres. Aspen Way would be extended across two more drainages (designated A1 and A in the Jurisdictional Delineation) that drain each side of a southwest-trending ridge. The Project would flatten the ridge separating these drainages and fill all of Drainages A1 (a perennial stream) and A (Figs 2-11, 4.3-4); the upstream, undisturbed reaches of Drainages A1 and A would terminate at headwalls and storm drain inlets (Hydrology Map Fig. 4.8-1).

PA2 is located immediately upstream from the confluence of Drainages A and Drainage A3 (near an offset of Drainage A3 by the Whittier Fault). The remaining 36.3 acres of PA2, including upstream segments shown as drainage features A2, and A1.1, would be preserved as habitat and fuel modification open space (DEIR p.2-1) to be maintained by a public agency, land conservation, trust, or Homeowner's Association (HOA; DEIR p.2-10).

Comments

We request that the following comments be incorporated into the final EIR, in order to protect water quality standards (i.e., water quality objectives and beneficial uses) identified in the Water Quality Control Plan for the Santa Ana River Basin, 1995, as amended (Region 8 Basin Plan):

1. Protection of Beneficial Uses

According to the "tributary rule" of the Basin Plan, tributaries that are not specifically listed in the Basin Plan have the same beneficial uses as the surface waters and groundwater basins and management zones to which they are tributary. Regional Board staff finds that all natural watercourses and drainages associated with the Project, whether those located within the Project boundaries or that drain to the Project site, are unnamed tributaries of the Santa Ana River, Reach 2, and the Orange County Groundwater Management Zone (GMZ) (Basin Plan p.3-5).

The beneficial uses of the Santa Ana River, Reach 2 are:

- Rare, Threatened, or Endangered Species habitat (RARE),
- Wildlife Habitat (WILD),
- Warm Freshwater Habitat (WARM),
- Water Contact Recreation (REC1),
- Non-Contact Water Recreation (REC2),
- Groundwater Recharge (GWR), and
- Agricultural Supply (AGR).

The Orange County GMZ beneficial uses are Agricultural Supply (AGR), Municipal Supply (MUN), Industrial Service Supply (IND), and Industrial Process Supply (PROC).

The parts of the tributaries that will be filled to construct the Project will be significantly impacted, since they will no longer support the water quality standards (water quality objectives and beneficial uses) that apply to them.

In both Planning Areas, the RARE beneficial use is represented by occupied habitat of the Least Bell's vireo, which is listed as endangered according to both state and federal law. This habitat is located at the west-central edge of the site along Drainage A1 and lower Drainage A (where habitat is stated to be largely supported by urban runoff), and at the southeast corner of the site along Drainage B (Figs. 4.3-3,4). Mitigation Measure 4.3-1 calls for mitigating the permanent loss of this habitat by purchasing off-site credits at a minimum ratio of 2:1, subject to wildlife agency approval of a mitigation plan. Board staff believes that ratio is inadequate and a minimum ratio of 3:1 should be projected, because loss of hydrologically supported habitat for an endangered species, i.e., loss of RARE, is a violation of the water quality standards of Drainage A1 and a significant impact to the riparian ecosystem of this portion of the Chino Hills.

Further, two California Species of Special Concern that are native to riparian thickets, the yellow-breasted chat and yellow warbler, are also found on site (DEIR p. 4.3-44). However, the DEIR states that the "cumulative projects" impacting the site's 1.25 acres of southern willow habitat and 0.60 acres of mule fat scrub that supports these two species, representing the WILD and WARM beneficial use of the site, would not create cumulatively considerable loss. Disturbances of these habitats that affect their ability to support the WILD and WARM beneficial uses constitute a violation of the water quality standards of the watercourse where this habitat is found.

First and foremost, Board staff believes avoidance of the drainages, and the habitat they support, by the Project would most clearly and effectively maintain the water quality standards noted above. By filling Drainages A and A1, the eastern portion of PA2 will effectively cut off a wildlife movement corridor in a system of ephemeral drainages, which Board staff considers to be a permanent impact to the WILD and WARM beneficial uses. Contrary to the finding of insignificance (DEIR p.4.3-40), Board staff do not believe that a drainage must constitute a connecting regional corridor in order to provide significant, necessary range for wildlife movement. In the area of the Project, all water courses provide important wildlife movement functions, particularly those that lead to intermittent or perennial water supplies. Whether within or outside of the Project boundaries, all these drainages and their water resources directly support the WILD, WARM, and RARE beneficial uses, and constitute a vital portion of the remaining regional block of Puente-Chino Hills wildlife habitat and species ranges.

The Project area's contribution to the Chino Hills wildlife movement linkage with the Puente Hills is well documented, and should not be dismissed (p. 4.3-45). Numerous studies of this subject conducted by naturalists (Board staff included) point to the necessity for wildlife to be able to circulate away from the primary conduit through the regional corridor, to nearby forage and water sources, which are provided by waters designated WILD and WARM. The waters on the Project site support these beneficial uses (Fig. 4.8-1). Altering these waters so

that the beneficial uses no longer exist is a violation of their water quality standards and a significant impact, requiring mitigation.

The DEIR does not adequately account for all the above cumulative impacts to WARM, WILD, and RARE (Cumulative Impacts, p.4.3-43-45), particularly if the adjacent, larger Esperanza Hills Project were also built. For example, a habitat requirement such as wildlife movement between ridges and water sources in ravines is relegated to what "foraging and nesting habitat" may be available in Chino Hills State Park. Board staff believes that for such losses to WARM, WILD, and RARE as proposed, at least a 3:1 mitigation ratio should be proposed, with much of that mitigation taking place onsite as habitat restoration on lands proposed for dedication to open space.

2. Jurisdictional Water Bodies

DEIR p. 4.3-36 states that a Clean Water Act (CWA) Section 404 Permit from the U.S. Army Corps of Engineers (Corps), a prerequisite CWA Section 401 Water Quality Standards Certification from the Regional Board, and a Streambed Alteration Agreement from the California Department of Fish and Wildlife (CDFW) would be necessary for Project impacts to wetlands and streams. The Jurisdictional Delineation (p.4.3-36; Tables 4.3-2, 4.3-4) identifies anticipated impacts to 4,842 linear feet and 0.42 acre of federal waters, and to an additional 0.24 acre of wetlands in Drainages A and A1, for a total of 0.66 acre of impact to waters of the U.S.

Of 1.62 acres of impacted CDFW-jurisdictional waters, 1.38 acres would constitute streambed impact and again, 0.24 acre would constitute the wetlands.

Where impacts to federal waters cannot be avoided, the Regional Board's Certification program conditions measures for the protection of water quality standards, including mitigation to compensate for unavoidable permanent and temporary impacts to waters of the state, which include federal jurisdictional waters. At a minimum, mitigation conducted for this program must replace the full range of water quality functions and ecological services of the water body, i.e., the water body's beneficial uses that existed prior to impact, and must result in no net loss of wetlands. Mitigation measures should be programmed to be implemented before, or concurrently, with impacts, and mitigation sites must be protected from other uses by conservation easements or other appropriate restrictive land use instruments.

As with Mitigation Measure 4.3-1 referenced above, Mitigation Measure 4.3-2 directs a minimum 2:1 ratio of off-site replacement for permanent impacts to waters, and restores areas subject to temporary impacts to pre-project conditions (DEIR p. 4.3-39). Board staff disagree that the proposed mitigation measures would adequately compensate for the permanent impacts to streambed habitat in the Chino Hills. Conceptually, mitigation measures should be implemented in what remains of the drainage courses on the site, or in tributaries to the site as close to the impacted drainages as possible. The Final EIR should identify candidate sites on which the necessary mitigation can be carried out, and the attributes of the sites that make them suitable as mitigation for the Project. Board staff

believes the Lead Agency should not finalize its CEQA process for the Project until mitigation for all impacts to water quality standards can be incorporated.

3. Project Alternatives

Board staff believes that Drainages A and A1 should be protected from development to avoid the permanent loss of their beneficial uses, and that Planning Area 2 should not be developed as proposed, but instead be dedicated as permanent open space. By removing PA2 from the Project, the surface water beneficial uses that can be attributed to Drainages A and A1 (WILD, WARM, RARE, and REC2) would be preserved. Furthermore, enhancement of these drainages could be used to offset impacts to waters elsewhere on the Project site. No clear reasons are provided in the DEIR, particularly in Section 5.0, Alternatives, as to why the Project must include PA2.

Alternative 2, the "Planning Area 1 Only Alternative" (DEIR p.5-9), would preserve the 42.7 acres of Planning Area 2 and eliminate its 17 proposed houses. The County General Plan currently designates Planning Area 2 as open space. However, Alternative 2 would compensate by replacing the planned 95 houses in the southern site (1.3 units per acre) with 165 dwelling units (2 units per acre) within the same footprint. This Alternative would impact 0.27 ac of federal jurisdictional waters and 0.98 acre of CDFW-jurisdictional waters, and approximately half of the occupied Least Bell's vireo habitat (Drainage B) noted earlier. Board staff believes that Alternative 2, the "Planning Area 1 Only Alternative," is a more supportable design, because it results in fewer impacts to waters. Water quality effects of its greater density can be resolved by meeting the standards of Low-Impact Development, required by the Regional Board's Order No. R8-2009-0030[1] (amended by R8-2010-0062), discussed in the Hydrology and Water Quality Section (DEIR p.4.8-5,6,7). Further, Board staff believe that Alternative 2, or an alternative avoiding Drainage B, would constitute the Environmentally Superior Alternative under CEQA instead of the "Large Lot/Reduced Grading Alternative" (Alternative 3, p.5-37).

DEIR p.5-4 rejects the exchange of the entire Project site for development on a site with fewer environmental resources to be impacted, although Regional Board staff support this concept. The Final EIR should note that Orange County can also assert any conservation elements of its own General Plan that arrange for acquisition and protection of the property and its open-space resources, including natural drainages (Resources and Land Use Elements of the County General Plan (DEIR p.4.3-6)).

Finally, while the DEIR does discuss some cumulative impacts that include those of the adjacent Esperanza Hills Project, it does not explore the possibility of whether it would ever be linked to the Cielo Vista Project through transportation infrastructure or other physical connections, thereby creating the need for environmental analysis of the cumulative effects of two projects under one CEQA document. The Cielo Vista and Esperanza Hills Projects

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1 "Waste Discharge Requirements for the County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County within the Santa Ana Region, Areawide Urban Storm Water Runoff," NPDES Permit No. CAS618030 (Orange County Municipal Separate Storm Sewer (MS4) urban stormwater runoff permit). These WDRs incorporate requirements of the Orange County Drainage Area Management Plan (DAMP).

would have impacts on the same environmental resources, including drainage courses that cross both project sites, with permanent and temporary impacts to WARM, WILD (including habitat linkages), RARE, and REC2.

If you have any questions, please contact Glenn Robertson at (951) 782-3259 or Glenn.Robertson@waterboards.ca.gov, or me at (951) 782-3234 or Mark.Adelson@waterboards.ca.gov

Sincerely,

Glenn Robertson, for

Mark G. Adelson, Chief
Regional Planning Programs Section

Cc: State Clearinghouse
U.S. Army Corps of Engineers, Los Angeles –Veronica Chan
U.S. Fish and Wildlife Service – Jonathan Snyder
California Dept. of Fish and Wildlife, Los Alamitos – Valerie Taylor/Mary Larson
Orange County Resources and Development Management Dept., Watersheds - Mary Ann Skorpanich
Wildlife Corridor Conservation Authority, Los Angeles – Judy Tamasi

X:Groberts on Magnolia/Data/CEQA/CEQA Responses/DEIR- Orange County Planning Services – Cielo Vista Project – Yorba Linda.doc

Yorba Linda Water District

Reliable and Trusted Service for More Than 100 Years

Letter: YLWD

January 13, 2014

Ron Tippets, Planner
Current & Environmental Planning Section/OC Planning
P.O. Box 4048
Santa Ana, CA 92702-4048

Subject: Comments regarding the Draft Environmental Impact Report (DEIR) for Proposed Cielo Vista Project (Project) - SCH# 2012071013

Yorba Linda Water District (District) as the water and sewer collection service provider for the proposed Project offers the following DEIR comments:

- As previously noted in the District response to the Project NOP, water and sewer infrastructure for this Project shall be constructed with the proposed adjacent Esperanza Hills Estates (EHE) Development. Representatives for each of the two projects were advised by District staff that water and sewer services and facilities for the two projects must be planned and designed in concert to serve the combined area. In summary, separate or piece-meal development of water and sewer services is not acceptable. Therefore, for purposes of the Final EIR, please remove the following language from page 4.15-18:

  "Pursuant to this mitigation measure, the Project Applicant would work with the YLWD to prepare an implementation level project site service plan by further defining the conceptual service system proposed in the YLWD's Northeast Area Planning Study. This study covers the project area as well as other properties both in the City and in the City's sphere of influence. The Study proposes a preliminary alternative for addressing water supply needs for the Project, a system that is dependent on simultaneous development of the adjacent property. However, because final planning, buildout, and timing of either property cannot be accurately ascertained at this time, the Project Applicant would work with the YLWD, as required by Mitigation Measure 4.15-1, to further define the study alternative, another alternative that can serve both projects, or a separate system for the Project using a combination of new and/or existing water connections, storage tanks, and a method for conveyance as needed to ensure an adequate supply for the area's future residents and for fire safety purposes."

1717 E. Miraloma Avenue Placentia, CA 92870 714-701-3000 714-701-3058 Fax

- The word "as" must replace the words "that are" in Mitigation Measure 4.15-1 in order to make it clear that the mitigation will only work if the improvements that are built are the ones identified in the Northeast Area Planning Study.

- The Northeast Area Planning Study did not propose a "preliminary" alternative for serving the Project. The Northeast Area Planning Study provides a detailed plan.

- Two points of connection from the existing to the proposed potable water system will be required.

- Regarding sewer services for the projects, the representatives for the two projects were each advised that the District will require gravity-sewer service from the EHE Development, extending southerly and westerly downward to and through the Project to connect to existing District sewers. Engineering studies by the project developers will be required to confirm the size of the sewer lines throughout the projects, and to confirm that the existing downstream sewers have adequate existing capacity for the additional flow.

- As stated in the Conditional Will Serve letter, "the applicant must satisfy certain conditions specified by the District and agreed to by the applicant before service will be available to supply the project. Any future, binding commitment by the District to service this project will be subject to the availability of water and sewer facilities and the planning, design, and construction of adequate facilities to meet the demands of the project in accordance with (1) the terms and conditions of a Pre-annexation Agreement to be executed by the applicant and the District; and (2) the terms and conditions of an Application to an Agreement with the Yorba Linda Water District for Water and Sewer Service executed by the applicant and the District; both in accordance with the District's policies existing at the time such agreements are executed."

Yorba Linda Water District

- Additional detailed DEIR comments are listed as follows:

Page	Section	Comment
ES-39	ES-1	Water Infrastructure Issues section: change "could require new offsite water infrastructure" to "will require new offsite water infrastructure."
2-22	2.0 5e	Please delete waterline size call-outs. Sizing will be determined during the design stage, and with hydraulic modeling.
2-22	2.0 5e	Onsite Water and Sewer facilities shall be designed and constructed by the Developer and not YLWD.
4.9-7	4.9 2c	For "Yorba Linda Water District (YLWD) Connections," please add "Connection to sewer (wastewater) systems."
4.12	4.12 2d	Fire Hydrant spacing shall be 300-feet for residential areas, per YLWD std. 00500 (typ. all sections).

Should you have any questions regarding this letter, please contact Anthony Manzano, Sr. Project Manager, at (714) 701-3106, or contact me at (714) 701-3102.

Sincerely,

Steve Conklin, P.E.
Acting General Manager

CC: Kris Concepcion, OCFA
Pete Bonano, OCFA

Letter: PYLUSD

Placentia-Yorba Linda Unified School District

Doug Domene, Ed.D.
Superintendent

1301 E. Orangethorpe Avenue, Placentia, California 92870
Telephone (714) 986-7000 Fax (714) 524-3034

Board of Education
Carrie Buck
Judi Carmona
Carol Downey
Karin Freeman
Eric Padget

January 22, 2014

Via email: Ron.Tippets@ocpw.ocgov.com

Ron Tippets
Orange County Planning
300 N. Flower St.,
Santa Ana, California 92702-4048

Re: Comments on the Draft EIR for the Cielo Vista Project

Dear Mr. Tippets,

The Placentia Yorba Linda Unified School District (PYLUSD or District) welcomes this opportunity to comment on the Draft Environmental Impact Report (DEIR) for the Cielo Vista Project (the "Project") being considered by Orange County Planning/Public Works (County).

GENERAL COMMENTS

The District is committed to working cooperatively with the County for this Project. However, it is imperative that the County identify, analyze, and – if necessary - mitigate the potential environmental impacts that will occur with this expansion of capacity. In particular, we request further review of the potential impacts from wildfire evacuation events and associated hazards due to related traffic congestion. The District urges the County to seek additional review of these issues and delay approval of the DEIR until a sufficient environmental analysis is prepared, appropriate fire evacuation and contingency planning is completed, and appropriate mitigation is identified. The District is willing to work with the County to develop a comprehensive emergency plan to solve these critical issues.

The DEIR does not adequately evaluate the Project's potential traffic congestion impacts from wildfire evacuation events, including how those impacts would affect school children and staff. The DEIR[1] for the adjacent Esperanza Hills project, for example, includes a Fire Protection and Emergency Evacuation Plan (FPP) and calls for a Community Evacuation Plan (CEP) to address wildfire evacuation traffic induced hazards to the project and surrounding community. The Cielo Vista DEIR also should include a FPF and call for a CEP to be submitted prior to project approval. This would provide a mechanism (process) by which to adequately evaluate and, if appropriate, mitigate the Project's incremental impacts to the community – including schoolchildren

[1] Orange County Planning/Public Works, 2013, Esperanza Hills DEIR, November 27, 2013

and school staff -- during wildfire evacuation events and associated traffic gridlock. See the attached exhibit showing four schools in close proximity to the Project. Recent fire history in the area shows that fire evacuation traffic congestion at and around our schools can be significant. In the absence of an adequate assessment of impacts, the DEIR does not allow for the identification of appropriate mitigation measures for these fire evacuation impacts. In addition, the DEIR does not comprehensively assess and mitigate impacts to all of the schools affected by construction traffic.

SPECIFIC COMMENTS

Evaluation of Incremental Fire Evacuation Traffic Impacts

The Orange County Fire Authority[2] (OCFA) and others previously commented regarding the impacts the project will have on fire safety and rescue services, particularly in the event of wildfire evacuation and related traffic congestion and gridlock. The DEIR should fully evaluate the OCFA's "significant concerns in the development of the project within historical wildfire areas." In addition, we request that the County work with OCFA and the District to develop a methodology for assessing the Project impacts to students at the District's schools that could occur in the event of a wildfire evacuation.

The DEIR notes that the Project site is located in an area susceptible to wildfire hazards and is designated a Very High Fire Hazard Severity Zone (VHFHSZ) and Special Fire Protection Area (SFPA). Based on an analysis of fire history in the area by Dudek, Inc.(2013), it is estimated that portions of the Chino Hills will be subject to wildfire at least every 5 to 6 years.[3]

On November 15, 2008, the Project site was burned in what ultimately became one of the largest wildland fires ever to strike Orange County -- The Freeway Complex Fire (FCF). This fire started in the City of Corona on the border of Riverside and Orange Counties, and was driven by fierce Santa Ana winds as it spread quickly on a massive fire front, causing widespread damage in the cities of Yorba Linda, Anaheim, and Corona, as well as to Chino Hills State Park.

The DEIR notes that OCFA released an "after action" report[4] on the FCF in April 2009, "which provided insight into the factors that were related to fire damage" from the fire. The DEIR also noted that some of the issues of concern during the Freeway Fire, such as inadequate fuel modification zones and homes constructed with outdated fire protection standards, "are being addressed by the OCFA." However, the DEIR does not adequately address the significant traffic congestion impacts that occurred in the neighborhoods of the proposed Project – including around our schools -- as a result of the evacuation efforts during the FCF. Though not highlighted in the DEIR, the evacuation gridlock impacts associated with the FCF were critical aspects of the OCFA's after action report.

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[2] Orange County Fire Authority (OCFA), 2012, Comment letter on Cielo Vista NOP, August 8, 2012.
[3] Dudek, 2013, Fire Protection and Emergency Response Plan, Esperanza Hill DEIR, Appendix J, June, 2013.
[4] OCFA, 2009, Freeway Complex Fire After Action Report, April 23, 2009.

The FCF After Action Report indicated that within minutes of the fire reaching Yorba Linda, the first of hundreds of homes lost in Yorba Linda burned. The report estimated that 9,000 homes and 24,000 people were evacuated during the fire. The report also stated "*Traffic gridlocked as evacuating residents and incoming emergency apparatus tried to access the same neighborhood streets.*" In addition, the OCFA recounts that "*Because the fire had moved into the area so quickly and without warning, residents in these areas were trying to evacuate while firefighting resources were attempting to gain access.*" Also, the report notes "*extensive evacuation demands put a strain on local law enforcement, requiring mutual aid resources from agencies across the County to assist with evacuation needs.*"

The proposed Cielo Vista project (as well as the adjacent proposed Esperanza Hills development) would result in an increase in the number of residential units in an area that is historically known to be at risk of wildland fires. If a major fire event or another type of emergency were to occur, the additional residents associated with these developments would increase the number of vehicles on the roadways during an evacuation. As previously noted, when such an evacuation occurred during the 2008 FCF, the combination of vehicles evacuating the area and the emergency vehicles attempting to access the area resulted in extreme congestion and delays for the evacuees as well as the emergency vehicles.

There are numerous accounts of the gridlock in the close vicinity of several of our school immediately following the Freeway Fire. One account[5] follows: *Anecdotal accounts from Yorba Linda residents describe the chaos of trying to evacuate during the firestorm. One resident stated, "people can't get out on San Antonio... [it was] a huge, huge traffic jam." When exiting their neighborhoods they also hit gridlock on the major arterial of Yorba Linda Boulevard. One resident who lost his home had no time to even drive his cars out of the driveway. With no car to drive, he ended up directing traffic at Via Del Agua and Yorba Linda Boulevard. Evacuees from his neighborhood couldn't leave because there was no traffic signal to stop the flow of traffic.*

The proposed residential developments (Cielo Vista, Esperanza Hills, etc.) potentially would aggravate this type of situation by increasing the number of vehicles evacuating the area and adding to the congestion. Traffic evacuating the Cielo Vista Project, for example, would use the three roads mentioned in the above account of traffic gridlock caused by the FCF: Yorba Linda Blvd, San Antonio Road, and Via Del Agua. This Project thus could incrementally impact several of the schools in the Placentia – Yorba Linda Unified School District because the increased levels of congestion during an evacuation could result in increased delays for vehicles traveling to and from the schools to assist the students during an emergency. The District requests that the DEIR analyze the potential incremental impacts of the Project on traffic congestion during a fire evacuation event.

This analysis would be particularly applicable to Travis Ranch K-8 School and Fairmont Elementary School, which are located adjacent to Yorba Linda Boulevard, which is a

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[5] Hills for Everyone, 2012, "A 100 Year History of Wildfires Near Chino Hills State Park," August 2012.

key evacuation route. Travis Ranch School, for example, is on Yorba Linda Blvd., less than 0.5 mile from San Antonio Rd. and Via Del Agua. Impacts would also be applicable to Yorba Linda High School, which is located on Fairmont Boulevard (which intersects with Yorba Linda Boulevard).

The DEIR addresses Emergency Response impacts and Wildland Fires impacts in the Hazards section (beginning on p. 4.7-25). The evaluation in the DEIR relies on the Fire Master Plan for the project, reviewed and approved by the OCFA. The resulting conclusion of the DEIR is that Emergency Response impacts (Impact 4.7-4) are less than significant. While the DEIR determined that Wildland Fires impacts (Impact 4.7-5) are potentially significant, it concluded they are reduced to less than significant with project design features and mitigation measures -- which largely consist of fuel modification and building features required by applicable codes for developments in VHFHSZ. It is the District's opinion that the DEIR does not adequately evaluate or mitigate the Project's potential incremental impacts from fire evacuation traffic congestion and gridlock, and its associated risks to the safety of our students and staff. We request that the DEIR be revised to address this potential impact.

Consideration of Evacuation and Contingency Planning for Schools

The District requests that the DEIR consider in its analysis of Project impacts the need to evacuate or otherwise protect many hundreds of school children concentrated at each of several individual school sites during a fire evacuation event. Each school will have its own transportation needs and concerns. However, all will involve large numbers of vulnerable school children concentrated in relatively small areas (e.g., staging areas and buses).

On the third and fourth day of the FCF, Community Education Specialists affiliated with the OCFA conducted school programs for the entire school population of two of the elementary schools in Yorba Linda. The programs educated the children on the disaster in their community and helped to allay their fears. The school programs reportedly were very well received by the students and faculty.

The District requests that the DEIR pay similar attention to schools, hopefully *prior* to the next wildfire event, by including a Fire Protection and Evacuation Plan, and calling for a Community Evacuation Plan (CEP) to be submitted to the OCFA for review and approval prior to project approval. In particular, we request that the evaluation of evacuation routes address each of the four schools identified on the attached map (Travis Ranch MS, Yorba Linda HS, Fairmont ES, and Bryant Ranch ES). The evaluations should address, as appropriate, bus storage/staging areas, travel time to and from schools, ingress and egress routes, and potential impacts and mitigation measures for each school.

The evacuation planning efforts also should include a contingency plan should unforeseen circumstances interfere with the preferred option of early evacuation. This contingency plan should consider the safety of school students and staff as well as that of neighboring communities.

The District reiterates its request that the County seek revisions to its environmental analyses to specifically address the Project's potential incremental impacts to students and school staff during a wildfire evacuation. Once the County has appropriately analyzed these Project impacts, the District can work with the County to identify and implement appropriate mitigation measures to reduce these impacts to the greatest extent possible.

Construction Traffic Impacts

The construction activities generated by the proposed project would result in trucks and heavy equipment traveling adjacent to schools in the area, particularly Travis Ranch K-8 School and Fairmont Elementary School, both of which abut Yorba Linda Boulevard. The DEIR anticipates heavy equipment (such as dozers and scrapers on flatbed trucks) will be delivered to the project site intermittently throughout the construction phase based on need, but likely not on a daily basis.

Construction vehicles travelling to and from the project site would generally travel along Yorba Linda Blvd., to Via Del Agua (to access Planning Area 1) and along Yorba Linda Blvd., to San Antonio Road to Aspen Way (to access Planning Area 2). These construction-related vehicles would have an adverse impact on pedestrian safety, pedestrian circulation, and vehicular access to the schools. The project applicant and/or the construction contractors should be *required* to avoid the movement of construction traffic adjacent to these schools except when school is not in session, and/or avoid student arrival and departure times. Further, the project applicant should contact each school to determine the appropriate time periods to avoid construction traffic past each school.

The DEIR identifies as potentially significant the impacts from construction traffic on school pedestrian routes and school access. The DEIR Traffic section (4.14) includes one mitigation measure (MM 4.14-1) and references four other mitigation measures in the DEIR's Public Services section (MMs 4.12-4; 4.12-5; 4.12-6; and 4.12-7) to address this significant impact. The DEIR states that implementation of these five mitigation measures would reduce the potentially significant construction related traffic impacts regarding school routes and access to a less than significant level. The DEIR (p. 4.14-22) further states these five "mitigation measures include on-going communication with school administration; presence of crossing guards and usage of temporary traffic control, signage, and/or flaggers; and avoidance of construction vehicles hauling past the schools, except when school is not in session."

The District appreciates the proposed mitigation measures and is optimistic they will be effective, if implemented and enforced appropriately. However, the only schools mentioned in the referenced mitigation measures are Travis Ranch School and Yorba Linda High School. Fairmont Elementary School also abuts Yorba Linda Boulevard and will be subject to potentially significant construction traffic impacts. Therefore, we request that Fairmont Elementary School be specifically identified and included in the mitigation measures.

In summary, the District requests that the County extend the EIR process, work with the District and the OCFA to address these concerns, then recirculate the revised document. The District restates its commitment to work with the County to solve these issues in a constructive and cooperative manner.

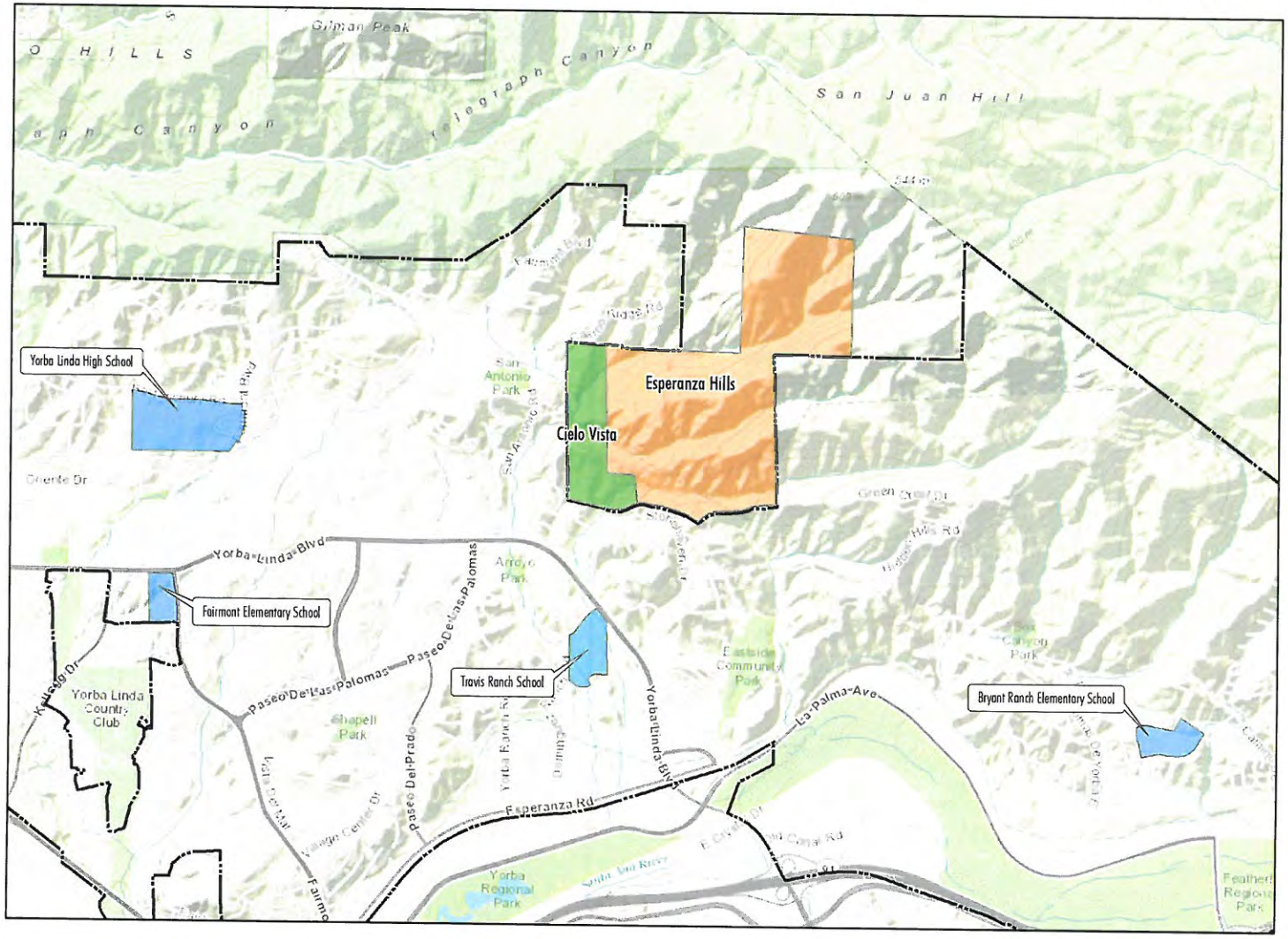
Sincerely,

Rick Guaderrama
Director, Maintenance and Facilities
Placentia-Yorba Linda Unified School District
1301 E. Orangethorpe
Placentia, CA 92870

cc: Doug Domene, PYLUSD Superintendent of Schools
File

Enclosures:
Exhibit A – Four PYUSD Schools Near the Proposed Cielo Vista Project

Exhibit A – Four PYUSD Schools Near the Proposed Cielo Vista Project



0 1
Scale (Miles)

Source: The Planning Center|DC&E, 2014; ESRI, 2014.

ORANGE COUNTY SHERIFF'S DEPARTMENT
INTERNAL MEMO

TO: Ron Tippets
FROM: Lt. R. Wren
DATE: January 2, 2014
RE: Cielo Vista Project

General Plan Amendment from 5 to 1B to subdivide and develop 112 single family lots within the unincorporated Yorba Linda Area. This area is north of Yorba Linda Blvd and east of San Antonio Road. Access to this development will be via Aspen Way and Via Del Agua. Planned Area #1 will have 95 homes and is closest to the Via Del Agua entrance. Planned area #2 is closest to the Aspen Way entrance and will have 17 homes.

4.12 PUBLIC SERVICES

4.12(2) Police Protection and Law Enforcement Services

Pages 4.12-6 and 4.12-7 quotes from the City of Yorba Linda Staff Report on the law enforcement contract between the City of Yorba Linda and the Orange County Sheriff's Department (July 17,2012) and identifies Yorba Linda Police Services as the law enforcement provider for The Project.

No Response

4.12 (2) Police Protection and Law Enforcement Services

Pages 4.12-13 states that The Project would generate a population of 358 persons which represents a 0.5% increase in the population served by Yorba Linda Police Services and would not substantially change demand for service and its effect would be, "less than significant."

No Response

Pages 4.12-23 and 24 state that The Project would generate taxes and fees and therefore would avoid potentially significant cumulative adverse impacts on law enforcement services.

As part of the law enforcement services contract, the County of Orange and the City of Yorba Linda currently share the cost of six deputy sheriffs. Adding additional unincorporated patrol area would affect the terms of that contract and that change would have to be addressed by the City of Yorba Linda and the County and should be discussed and evaluated in the EIR document.

4-14 TRAFFIC/TRANSPORTATION

4-14-14 The Highway Capacity Manual (HCM) rates the level of service at intersections by the length of the delay at each intersection during peak hours. Intersections are rated "A" through "F." Via Del Agua and Yorba Linda Blvd is the only street with an "F" rating. Imperial Highway and Yorba Linda Blvd

received a "C" rating. All other intersections in the study received an "A" rating. The study predicts that putting a traffic signal at Via Del Agua and Yorba Linda Blvd would improve that intersection from an "F" to an "A."

According to the study, The Project will not adversely affect any intersections other than Via Del Agua and Yorba Linda Blvd and that adverse impact can be remedied. There is no indication of The Project's impact on traffic during an emergency evacuation of the areas that were evacuated during the Freeway Complex Fire and should be discussed and evaluated in the EIR document.

Pages 4-14-69 and 70 state that The Project would create less than significant traffic impacts and there would be available capacity to accommodate the projected traffic volumes, in addition to emergency vehicles. On page 70, AlertOC and CERT are cited as programs that would assist during an emergency evacuation.

According to the EIR, the Project's impact on traffic volumes during non-emergency periods will be less than significant. There is no indication in the report of The Project's impact on traffic during an emergency evacuation of the areas that were evacuated during the Freeway Complex Fire and this should be discussed and evaluated in the EIR document.

AlertOC has proven to be a valuable tool for the purposes cited in the report. However, there is no indication as to how many of the residences are registered to receive AlertOC messages or if there are any plans to ensure the residents of The Project will be encouraged to sign up and this information should be provided and evaluated in the EIR document.

CERT is listed as a resource that would be utilized during emergency evacuations. CERT is a valuable program for the purpose of preparing people for emergencies but CERT personnel would not assist with evacuations or traffic control during an evacuation and this information should be clarified in the EIR document.

The EIR states that, "the goal of the evacuation plan Lt. Bob Wren unveiled in October 2013 is to prevent the same kind of gridlock that occurred on Imperial Highway, Yorba Linda Blvd., and La Palma Avenue during the 2008 freeway complex fire." Residents would be diverted by deputies southbound from the main east/west streets away from the evacuation zone which will allow other residents to evacuate efficiently and provide access for emergency vehicles.

There is no indication in the report how many additional vehicles could reasonably be anticipated during an evacuation as a result of The Project or how that increased volume or the changes to the roadway as a result of The Project could affect the evacuation of the existing residents in that area.

There is no indication of The Project's impact on traffic during an emergency evacuation of the areas that were evacuated during the Freeway Complex Fire. This should be provided and evaluated in the EIR document.

Cumulative Impacts

The project area not only includes the Cielo Vista project, but it also included the 340 home Esperanza Hills project. Together, the projects present significant evacuation issues. The most significant issue is the limited number of entrance and exit points. There are only four potential entrance and exit points and they all need to be built. In addition, all of the homes from both of the developments need to be able to access all four exits during an emergency evacuation. Both access and egress points on Via Del Agua and both access points onto San Antonio Road (via the easement and via Aspen Way) must be developed.

Letter: OCFA

ORANGE COUNTY FIRE AUTHORITY

P.O. Box 57115, Irvine CA 92619-7115 • 1 Fire Authority Rd., Irvine, CA 92602

Keith Richter, Fire Chief *(714) 573-6000* *www.ocfa.org*

January 6, 2014

Ron Tippets
Orange County Planning
PO Box 4048
Santa Ana, CA 92702-4048

Re: **Cielo Vista DEIR**

Dear Sir,

OCFA previously responded to the DEIR on 12/17/13. The mitigations requested by OCFA have been incorporated into the document; however, it has come to our attention that the Evacuation Plan has not been jointly approved by both the OC Sheriff's Department and OCFA. Please add the following condition to the project:

> Prior to grading, the development emergency evacuation plan shall be submitted and approved by the Orange County Sheriff's Department and the Orange County Fire Authority.

All standard conditions and guidelines will be applied to the project during the normal plan review process.

If you have any additional questions, please contact me at (714) 573-6199.

Sincerely,

Michele Hernandez
Management Analyst/Strategic Services Section

Serving:
Anaheim
Brea
Buena Park
Cypress
Fountain Valley
Fullerton
Garden Grove
Huntington Beach
Irvine
La Habra
La Palma
Los Alamitos
Newport Beach
Orange
Placentia
Santa Ana
Seal Beach
Stanton
Tustin
Villa Park
Yorba Linda
County of Orange
Costa Mesa Sanitary District
Midway City Sanitary District
Irvine Ranch Water District

Orange County Sanitation District

10844 Ellis Avenue, Fountain Valley, CA 92708
(714) 962-2411 www.ocsewers.com

Letter: OCSD

January 21, 2014

OC Planning
Attn: Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702

SUBJECT: Draft Environmental Impact Report for the County of Orange Cielo Vista Project

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This letter is in response to the above referenced Draft Environmental Impact Report (DEIR) in the unincorporated area of the County of Orange (County). The County is within the jurisdiction of the Orange County Sanitation District (OCSD).

As mentioned, OCSD has several regional sewers in the project area. The Sewer Study included in DEIR provides flow projections; however, the numbers used to calculate the flow are inaccurate and as such reflect a much lower number that is potentially expected from the proposed development.

OCSD requests that the following flow factors be used to accurately reflect the projected flow so OCSD can determine if the regional sewers in the area have the flow capacity to serve the proposed project.

- 727 gpd/acre for estate density residential (0-3 d.u. /acre)
- 1488 gpd/acre for low density residential (4-7d.u. /acre)
- 3451 gpd/acre for medium density residential (8-16 d.u./acre)
- 5474 gpd/acre for medium-high density residential (17-25 d.u./acre)
- 7516 gpd/acre for high density residential (26-35 d.u./acre)

Also, please note that any construction dewatering within the County (public or private) that involve discharges to the local or regional sanitary sewer system must be permitted by OCSD prior to discharges. OCSD staff will need to review/approve the water quality of any discharges and the measures necessary to eliminate materials like sands, silts, and other regulated compounds prior to discharge to the sanitary sewer system.

Thank you for the opportunity to comment on the proposed Cielo Vista Project. If you have any questions, please contact me at 714-593-7119.

Daisy Covarrubias

Daisy Covarrubias, MPA
Senior Staff Analyst

DC:sa
EDMS:003982800/1.8g

Letter: Gas Co

1919 S. State College Blvd.
Anaheim, CA 92806-6114

February 4, 2014

Orange County Public Works Planning Services
300 N. Flower St
Santa Ana, CA 92702

Attn: Ron Tippets

Subject: Environmental Impact Report for Cielo Vista Project Residential Development

Thank you for providing the opportunity to respond to this E.I.R. Document. We are pleased to inform you that Southern California Gas Company has facilities in the area where the aforementioned project is proposed. Gas service to the project can be provided from an existing gas main located in various locations. The service will be in accordance with the Company's policies and extension rules on file with the California Public Utilities Commission when the contractual arrangements are made.

This letter is not a contractual commitment to serve the proposed project but is only provided as an informational service. The availability of natural gas service is based upon conditions of gas supply and regulatory agencies. As a Public Utility, Southern California Gas Company is under the jurisdiction of the California Public Utilities Commission. Our ability to serve can also be affected by actions of federal regulatory agencies. Should these agencies take any action, which affect gas supply or the conditions under which service is available, gas service will be provided in accordance with the revised conditions.

This letter is also provided without considering any conditions or non-utility laws and regulations (such as environmental regulations), which could affect construction of a main and/or service line extension (i.e., if hazardous wastes were encountered in the process of installing the line). The regulations can only be determined around the time contractual arrangements are made and construction has begun.

Estimates of gas usage for residential and non-residential projects are developed on an individual basis and are obtained from the Commercial-Industrial/Residential Market Services Staff by calling (800) 427-2000 (Commercial/Industrial Customers) (800) 427-2200 (Residential Customers). We have developed several programs, which are available upon request to provide assistance in selecting the most energy efficient appliances or systems for a particular project. If you desire further information on any of our energy conservation programs, please contact this office for assistance.

Sincerely,

Armando Torrez
Technical Services Supervisor
Orange Coast Region- Anaheim

AT/ps
EIR.doc

Letter: City1

CITY OF YORBA LINDA

P. O. BOX 87014 CALIFORNIA 92686-8714 (714) 961-7130
FAX 961-7101

COMMUNITY DEVELOPMENT

November 12, 2013

Mr. Richard J. Sandzimier
Deputy Director, OC Public Works
Director, OC Planning Services
300 N. Flower Street
Santa Ana, CA 92703

SUBJECT: CIELO VISTA PROJECT – DRAFT ENVIRONMENTAL IMPACT REPORT (EIR NO. 615)

Dear Mr. Sandzimier:

Please consider this correspondence as the City of Yorba Linda's formal request to extend the Public Comment Period for the Cielo Vista Project Draft EIR (SCH #2012071013) to a minimum of 60 days as provided for in Section 15105(a) of the CEQA Guidelines. The City is requesting that the Comment Period be extended due to the public's need to be given adequate opportunity to review and comment on the Draft EIR. As originally cited in the Notice of Availability (NOA), the Public Comment Period is to run from November 7, 2013 through December 23, 2013. The City of Yorba Linda respectfully requests, that due to the number of legal holidays that fall within this period, that an extension is warranted.

Thank you for your consideration in this matter.

Respectfully submitted,

Steven K. Harris, AICP
Director of Community Development

Cc: Supervisor Todd Spitzer, Third District
Members of the Yorba Linda City Council
Mark A. Pulone, City Manager
Todd Litfin, City Attorney
Ron Tippets, Planner, OC Planning Services

Letter: City2

CITY OF YORBA LINDA

P. O. BOX 87014 CALIFORNIA 92885-8714 (714) 961-7110
FAX 993-7530

OFFICE OF THE CITY MANAGER

January 22, 2014

Mr. Ron Tippets, Planner
Current & Environmental Planning Section
COUNTY OF ORANGE
OC Planning Services
P.O. Box 4048
Santa Ana, California 92702-4048

Subject: Comments on the November 2013 Draft Environmental Impact Report for the Cielo Vista Project

Dear Mr. Tippets:

The City of Yorba Linda has reviewed the County's November 2013 Draft Environmental Impact Report (EIR) prepared for the Cielo Vista Project. Given the proximity of the project site to the City and the potential for the project to affect our communities, residents, and infrastructure, we have identified concerns related to the adequacy of the analysis under the California Environmental Quality Act (CEQA). Several of these concerns were identified within the City's comment letter regarding the Notice of Preparation (NOP) and have not been properly addressed.

The City's comments on the Draft EIR are attached for your consideration and review. The City requests that the County revise the Draft EIR to fully address the attached comments and recirculate the document for public review to ensure compliance with CEQA.

We appreciate the opportunity to review the Draft EIR for the Cielo Vista Project, and request to be included on any future CEQA distribution pertaining to the proposed project. Should you have any questions, please do not hesitate to contact Steve Harris, Director of Community Development at 714.961.7131 or at sharris@yorba-linda.org.

Sincerely,

Mark A. Pulone
City Manager
City of Yorba Linda

GENERAL COMMENTS ON THE DRAFT EIR

1. The Draft EIR concludes that no significant unavoidable impacts would occur as part of the proposed project. The EIR"s methodology, particularly in regards to air quality and aesthetics, appear to utilize aggressive assumptions to reach less than significant conclusions. For a project that includes 660,000 cubic yards of grading and substantial landform alteration, it is typical to see a significant impact related to short-term construction pollutant emissions and significant impacts related to scenic vistas and/or visual character.

2. Access for the adjacent Esperanza Hills project is not properly addressed within the Cielo Vista Project Draft EIR. The Esperanza Hills Draft EIR identifies two options for site access, both of which include a primary or emergency access across the Cielo Vista site. A potential access across the Cielo site is addressed in the Alternatives section but nowhere else within the Draft EIR. Consistency between these two EIRs (both of which are within their EIR public review periods) is required.

3. The project"s preliminary Fire Master Plan and Fuel Modification Plan are documents that are critical to the Draft EIR and support the project"s conclusions regarding wildfire hazards and public safety. These documents are not included in the appendices to the EIR, and as such, the reader cannot verify the methodology, assumptions, and results that are integral to the environmental analysis.

4. All project design features and mitigation measures should use the terminology "shall" when describing verification of enforcement.

5. Each EIR impact section that has a subsection entitled "Cumulative Impacts" should include a "Threshold Statement" that precedes the statement of significance.

6. References to the City of Yorba Linda Community Services should be changed to City of Yorba Linda Parks and Recreation Department.

7. As noted within the City"s NOP comment letter regarding the project, the City of Yorba Linda will have discretionary approval authority over the proposed project. As such, the City should be considered a responsible agency for the project under CEQA Guidelines Section 15381.

EXECUTIVE SUMMARY

Page/Section - Specific Comments

1. Page ES-1, Section 1a, Project Location: The location discussion should clarify that the property is situated in the County of Orange, is to be processed through the County and is within the City"s Sphere of Influence. The subsection which follows (b. Land Uses) does indicate the site is within the City"s Sphere of Influence but the location section should also reference this.

2. Page ES-2, Section 2, Issues Raised During NOP Process: The section summarizes the NOP process but does not reference the NOP scoping meeting on July 19, 2012 (although it is referenced on page 1-2).

3. Page ES-5, Recreation: Impacts on existing and planned "equestrian facilities" gives the impression that equestrian arenas and amenities may be built. Please update to say "planned" equestrian trails."

4. Page ES-5, Transportation/Traffic: The City of Yorba Linda provided an NOP comment letter that expressed concern regarding the provision of access to the Murdock property (Esperanza Hills) through the project site. This NOP comment should be included in this section.

5. Page ES-7, Last sentence of first paragraph: The word "achieved" should be changed to "achieve."

6. Page ES-9, Environmentally Superior Alternative, First Sentence: The apostrophe after "No Project" should be deleted.

7. Page ES-10, Table ES-1: The Executive Summary table cites mitigation measures applicable to each impact issue area but does not cite PDFs. If PDFs are being utilized by the County to minimize impacts and are to be incorporated into the Mitigation Monitoring Program for the project, they should also be included in the Executive Summary table. Otherwise, the reader cannot discern how these PDFs minimize impacts relative to the impact conclusions under CEQA.

8. Page ES-30, Water Quality: Add implementation of Low Impact Development and Green Street design features to the Issue column. Revise project impact from Less than Significant Impact to Potentially Significant Impact and identify the proposed water quality mitigation measures and BMPs.

1.0 INTRODUCTION

General Comments

1. This section does not clearly describe the County's public disclosure process. Subheadings clearly describing scoping/solicitation activities during the NOP review and EIR review should be provided. A subheading describing "Responsible/Trustee Agencies" should also be included, as should an "Incorporation by Reference" section, which should acknowledge the primary reference materials and purpose for use in the Draft EIR.

Page/Section Specific Comments

1. Page 1-3, Third Paragraph: The description of the public review period should be revised in the Final EIR to reflect the extended 75-day public review and adjusted end date of January 22, 2014.

2.0 PROJECT DESCRIPTION

General Comments

1. All roadway sections or street improvements that are not of a public agency standard shall be deemed private streets and privately maintained.

Page/Section - Specific Comments

1. Page 2-2, Paragraph 2: Statements in this paragraph are incorrect. Based on Figure 4.5-1 in the Geology and Soils (Section 4.5), residential lots are overlayed into the fault hazard zone and not just the open space area. The graphic and text require resolution.

2. Page 2-9, Section 4, Project Objectives: The project objectives are overly-specific in that they do not allow for the consideration of a reasonable range of alternatives. For instance, the objectives cite the provision of 36 acres of open space, the construction of single-family residences, and creation of two planning areas. The objectives should allow flexibility to analyze varying alternatives that have the potential to reduce the impacts of the proposed project.

3. Page 2-9, Objective #4: Add drainage and water quality objectives that address protection of drainage facilities, sustainable/low impact development, and the Clean Water Act.

4. Page 2-10, Section b. Access and Circulation: This section should provide a description or discussion of fire/emergency access.

5. Page 2-13, Item 2, Local Streets: Address 11" travel lanes required per Standard 1107, Note 6 for Streets D, E, F. Parking on both sides of the street.

6. Page 2-13, Item 2(a), Streets A and B: Add that Street "A" shall not allow parking and will be signed "No Stopping at Any Time".

7. Page 2-14, c. Grading: The grading discussion specifies 660,000 cubic yards of grading balanced on the site. The discussion also states that export of contaminated soils due to oil operations may be required. The analysis in the EIR should be based on the conservative assumption that the export of contaminated soil will be required (i.e., utilization of a conservative worst-case assumption rather than a best-case assumption). The short-term construction air quality analysis should also reflect this assumption.

8. Page 2-14, Section d. Fire Protection Plan: The paragraph states that the Orange County Fire Authority (OCFA) has approved the Project's preliminary Fire Master Plan and Fuel Modification Plan. This statement should be footnoted and the Plan should be provided as a reference in the EIR Appendices.

9. Figure 2-6, Master Circulation Plan: Traffic calming features shall be considered for all downhill streets.

10. Figures 2-7 and 2-8: Revise references to OCEMA to OCPWD.

11. Figure 2-7 and 2-12: Add the 10‟ earthen multipurpose trail and enhanced parkway to the Street „A‟ roadway section. Fencing shall be provided consistent with surrounding improvements.

12. Figure 2-8: Add a street section for Aspen Way that indicates the 10‟ wide earthen multipurpose trail and enhanced parkway. Fencing shall be provided consistent with surrounding improvements.

13. Page 2-22, Section e. Utilities and Infrastructure: The description of potable water facilities is limited to a brief discussion of on-site mains within the boundaries of the site. The discussion of off-site facilities defers to future YLWD improvements. Unless the project can operate independently of any future YLWD improvements, the project description should (at a minimum) identify what off-site improvements are required in order to provide adequate potable water and fire flow to the project site.

14. Page 2-23, Off-Site Improvements: The discussion references "minor improvements within the right-of-way of Via Del Agua and Aspen Roads near the Project entrances to provide access to the project site." The EIR should specify exactly what these "minor improvements" consist of as the reader cannot ascertain what impacts may result.

15. Figure 2-12, Primary Entry at Via Del Agua: A landscape plan has been provided for the primary entry at Via Del Agua. A similar plan for the entry to Planning Area 2 at Aspen Way should be provided for the reader‟s reference.

16. Page 2-28, Section i. Oil Operations: The discussion of oil operations states that the project does not propose the drilling of new oil wells. However, Project Design Feature 7-4 provides regulations for "all new wells drilled in the 1.8-acre oil drilling pad". This discrepancy should be rectified in the project description, and the hazards associated with the drilling of new oil wells must be fully analyzed in the EIR. If the project does not include the drilling of any new wells, a PDF regulating such activities should not be required.

17. Page 2-31, Section 6, Project Design Features: The introductory paragraph should clarify whether Project Design Features will also constitute Project Conditions for Approval.

18. Page 2-37, Section 7, Construction Schedule: The project construction schedule shows a 2.5 to 3 year timeline, commencing in early 2014. The paragraph concludes that the project would be fully occupied in 2015. Please update the construction schedule.

19. Page 2-37, Section 8, Approvals and Permits: This section should include certification of the EIR under the County of Orange.

20. Page 2-38, Section 8, Approvals and Permits: The description of approvals required for YLWD should also cite required sewer connection(s).

21. Page 2-38, Section 8, Approvals and Permits: This section cites a potential pre-annexation agreement with the City in the event annexation occurs. As such, potential LAFCO approvals should also be included.

3.0 BASIS FOR CUMULATIVE ANALYSIS

Page/Section - Specific Comments

1. Page 3-2, Table 3-1: Please verify whether water infrastructure improvements proposed by YLWD under the Northeast Area Planning Study should be included in the list of cumulative projects and associated analysis within the EIR. Since the project relies on such improvements for adequate water service, it appears a listing and analysis is appropriate.

2. Page 3-5, Figure 3-1: Project #1 is labeled "Yorba Linda Estates (Murdock Property)". This does not match Table 3-1, where it is labeled "Esperanza Hills".

4.1 AESTHETICS

General Comments

1. The Draft EIR does not explain the project"s viewshed very clearly. The proposed project is a hillside residential project located at higher elevations compared to the larger area. The project site is situated along the urban fringe, as viewed from distant locations toward the San Juan Hills. The Draft EIR should more clearly define the project"s anticipated overall viewshed.

2. The proposed project appears to potentially be visible from the eastbound travel lanes of State Route 91 between the State Route 55 Interchange and the Lakeview Avenue Interchange. As this portion of State Route 91 is designated as a State Scenic Highway and a Scenic Viewshed Highway per the County"s General Plan, the project"s visual impacts to this view corridor must be discussed in the Draft EIR. If this is not the case, the Draft EIR should better clarify why the project is not visible from this location.

3. Confirm that there are no views to the project from Shapell Park and/or San Antonio Park (in the City of Yorba Linda), as well as trails located in the City (see Exhibit RR-2 of the City of Yorba Linda General Plan).

4. Photosimulations appear to use an excessive amount of vegetation growth at maturity. Plant maturity should be considered 10 to 15 years of growth.

5. The cumulative analysis should also consider view impacts as a result of new water facilities (including water tanks) that may be required as a result of future development in the area by the YLWD.

Page/Section - Specific Comments

1. Page 4.1-1, Introduction: The paragraph references site surveys and photographs in the spring and summer of 2012. Given the time that has elapsed, the photographs should be updated to depict current conditions.

2. Page 4.1-1, 2nd Paragraph, 3rd Sentence: Update this sentence based on the general viewshed comments made above.

3. Page 4.1-1, 2nd Paragraph, 4th Sentence: Update this sentence based on the general viewshed comments made above. Further, if Section 2(a) of Section 4.1 the Draft EIR discusses County scenic highways, although they are claimed to be not visible, then Section 1 should also discuss the State Scenic Highway Program.

4. Page 4.1-1, 3rd Paragraph: Update this paragraph based on the general viewshed comments made above.

5. Page 4.1-1, 4th Paragraph: This discussion should mention what scenic resources are called out by the County"s General Plan. The analysis cannot determine whether or not scenic vistas are present and encompass the project site without clarifying this information.

6. Page 4.1-1, Last Paragraph: This discussion should mention what scenic resources are called out by the City"s General Plan. The analysis cannot determine whether or not scenic vistas are present and encompass the project site without clarifying this information.

7. Page 4.1-2, 1st Paragraph: This discussion should summarize what types of regulations/standards that would be imposed on the Project should the Project be annexed into the City of Yorba Linda.

8. Page 4.1-3, 1st Paragraph, 1st Sentence: This discussion mentions a visually prominent scenic ridgeline. However, the regulatory framework does not outline what this is and how it is regulated. If this is not specific terminology that triggers regulatory action, then it should be defined via a footnote here.

9. Page 4.1-3, 2nd Paragraph: This paragraph suggests that since the hillsides are not unique, they are not visual resources. However, if these hillsides are part of a larger ridgeline that is enjoyed by the public, the uniformity of those vast ridgelines may be considered the scenic resource. Further, as the City of Yorba Linda does have a Hillside Development Ordinance, although other residential developments are present, this suggests that preservation of the hillsides is important for visual resource protection purposes for the City of Yorba Linda. Please revise this discussion accordingly.

10. Page 4.1-3, 3rd Paragraph, 3rd Sentence: Update this sentence based on the general viewshed comments made above. This analysis of existing conditions needs to have a better explanation of the Project"s viewshed. Further, as the Project is located along the hillsides and the City of Yorba Linda has a Hillside Development Ordinance, it is anticipated that any public views, particularly from parks, trails, and/or scenic highways, could be considered scenic vistas and more detailed information needs to be included in the Draft EIR in order to come to conclusions regarding impacts to scenic vistas.

11. Page 4.1-3, 4th Paragraph: This discussion should include a methodology for view selection. Due to the nature of the proposed project (hillside development). Longer views encompassing the project site should have been included (specifically from parks and/or scenic highways) in order to better illustrate the degree of visibility the project site offers. Further, the “after” project conditions should not be presented in the existing conditions.

12. Page 4.1-3, 5th Paragraph: This discussion mentions local trails. The Draft EIR fails to clearly identify where the existing trails in the area are (particularly in the City of Yorba Linda) and where the proposed trails could be. This information is key to identifying potential scenic vistas as well as impacts to the character/quality of the site and surrounding community.

13. Page 4.1-5, 3rd Paragraph: This paragraph discusses the methodology used to analyze scenic views. The Draft EIR states that this analysis is based on the evaluation of visual simulations. However, no information is provided on how the locations for photosimulation were selected or how the photosimulations were prepared are provided. Further, this methodology notes that an analysis of whether or not scenic resources are afforded are mentioned; however, as discussed above, the Draft EIR fails to discuss scenic resources in both the regulatory framework and existing conditions of this section.

14. Page 4.1-6, 1st Paragraph: This discussion should include consideration of light spillover onto adjoining properties.

15. Page 4.1-7, PDF 1-9: This PDF references the Codified Ordinances of the County of Orange Section 7-9-55.8 requirements for exterior lighting. However, this ordinance is not identified in the regulatory framework of this section.

16. Page 4.1-8, Scenic Vista/Visual Character and Visual Quality: These thresholds have been combined in this analysis. However, based on the methodology discussed on page 4.1-4 (section a), these analysis use different criteria to determine significance. Since the scenic vistas analysis only considers public views and the degradation of character/quality analysis considers a change in the overall landscape, these analyses should be broken up for clarification purposes.

17. Page 4.1-9, (1) Construction: This analysis should clearly define who would have views to construction activities. Would views only be afforded from residential uses, roads, and trails in the immediate vicinity, or would views include more distant views from Scenic Highways, parks (in the City of Yorba Linda), roads, and/or trails?

18. Page 4.1-9, 3rd Paragraph: This analysis does not specify what the construction duration would be, thus it is not clear how this reduces the impact. Further, the conclusion states that construction disturbance activities are commonplace nature in its interruption to surrounding views to and across the site and character/quality of this site. It is not clear what this means. If this is referring to the existing disturbance activities on-site this information needs to be provided. The existing site disturbance is for minimal oil disturbance activities that do not significantly alter the existing character of the site. However, major earthmoving activities and vegetation removal would appear significantly different than the existing condition. The Draft EIR should be revised to clarify this conclusion statement.

19. Page 4.1-9, Section (2) Operation: A comparative analysis of the project density, when compared to adjacent residential areas should be presented.

20. Page 4.1-11, 1st Paragraph, 1st Sentence: A reference to an Area Plan is made. However, neither the Regulatory Framework, nor the PDFs, mention an Area Plan, what it is, or what it requires or suggests. Please clarify this information.

21. Page 4.1-9 through 4.1-11, Aesthetic Character: This analysis does not describe the existing character of the site and then compare it to the resultant character of the site upon project completion (as described in the methodology section on page 4.1-5). This analysis fails to include a discussion of the project"s consistency with the City of Yorba Linda"s Hillside Development Ordinance, which is intended to protect views toward the hillsides. Further, this analysis does not adequately describe the character of the surrounding residential neighborhoods and whether or not the project would result in a similar character as the surrounding community. Further, this analysis does not explain any of the required retaining walls as part of the Project, where they are located, how high they would be, and what type of wall would be required. For hillside residential projects, these walls can be as high as 30 feet or higher. Thus, these hardscape features would be highly visible and would impact the character/quality of the site.

22. Page 4.1-11, Last Paragraph: Update this discussion based on the general viewshed comments made above.

23. Page 4.1-11, (3) Scenic Views: If the scenic vistas analysis is conducted based on photosimulations (per the methodology discussed on page 4.1-4 and 4.1-5) and photosimulations have been prepared, this suggests that scenic vistas are afforded. However, if they are not, this section should be revised accordingly and the analysis of photosimulations should be moved to the character/quality analysis. Further, this analysis needs to be updated per the comments submitted above with regards to visual resources.

24. Figure 4.1-2: The existing view has equestrian trail fence, but in the proposed view the fencing is eliminated. Please verify whether the trail fence would be removed as part of the proposed project.

25. Page 4.1-25, Scenic Resources: This analysis is incorrect in assuming that no scenic resources are on-site. The project site is located in the hillsides, which are considered scenic by the City of Yorba Linda, County of Orange, as well as the State of California (via the designated State Scenic Route, which calls out a view corridor toward the hills). This analysis needs to be updated to take into account the general viewshed and visual resources comments provided above.

26. Page 4.1-25, Light and Glare: County Ordinances related to construction and lighting are presented but there is no reference to City standards, codes and requirements, which should also be presented in this analysis.

27. Page 4.1-26, 2nd Paragraph, 2nd Sentence: This sentence needs to be updated to include the proposed traffic signals as well. Further, this analysis needs to be updated to take these project features into consideration.

28. Page 4.1-27, Mitigation Measure 4.1-1: This mitigation measure requires clarification. Please clarify the definition of what Manager of Permit Services (County?), and the statement “confined to the premises”. These terms are unclear as presented in the text.

29. Page 4.1-27, (1) County of Orange General Plan: This discussion should be updated based on the general viewshed comments made above.

30. Page 4.1-27, Consistency with County Of Orange and City of Yorba Linda Plans and Policies: Each consistency review section should be set up consistent with other EIR subsections, including a statement of the threshold, an impact statement and a conclusion at the end of the subsection with regard to the finding of significance/mitigation.

31. Page 4.1-27, Policy 6: This discussion should be updated to reflect the character/quality comments provided above. The specific character of the surrounding community should be considered to determine if the project"s character is compatible.

32. Page 4.1-28, Policy 5: This discussion should be updated to include the project"s consistency with the City of Yorba Linda"s Hillside Grading Ordinance in order to demonstrate that the proposed grading activities would be maintaining the County"s hillside views.

33. Page 4.1-29, Goal 1 and Policies 1.2 and 1.3: This discussion should be updated to include the project"s consistency with the City of Yorba Linda"s Hillside Grading Ordinance in order to demonstrate that the project is preserving/protecting the visual quality of the hillside areas.

34. Page 4.1-30, Policy 7.5: This discussion needs to specify how steep slopes and important natural resources have been properly delineated.

35. Page 4.1-30, Policy 8.2: This discussion should be updated to include the project"s consistency with the City of Yorba Linda"s Hillside Grading Ordinance.

36. Page 4.1-30, Policy 8.6: This consistency analysis states that generally, visual quality impacts are not considered significant because implementation of the proposed residential development would not result in a significant loss of an important view and/or would not significantly impact designated unique or important aesthetic elements. This statement is incorrect. This is true for scenic vistas analysis; however, not for an analysis of the degradation of character/quality. The Draft EIR must determine if a project degrades the quality of the site and its surroundings. This analysis must be updated accordingly.

37. Page 4.1-30, Goals 8 and 9, and Policies 8.1, 9.1, and 9.2: This discussion should be updated to include the project"s consistency with the City of Yorba Linda"s Hillside Grading Ordinance.

38. Page 4.1-31, Table 4.1-3: This consistency analysis should be updated to specifically discuss what grading techniques are proposed to achieve compliance with the ordinance. This analysis should also specify what types of retaining walls will be required as part of the proposed project and how those new walls would be compliant with this ordinance.

39. Page 4.1-32, Table 4.1-3, Yorba Linda Hillside Development Zoning Code Regulations D-4 through D-7: The regulations pertaining to PDFs, house styles, heights, roof elements, colors, and construction materials should be considered in the project analysis pertaining to character/quality in order to aid in a determination of whether or not the proposed Project is consistent with the surrounding hillside communities.

40. Page 4.1-33 through 4.1-34, 3rd and 4th Paragraphs and 1st Paragraph: This viewshed analysis should be updated based on the general viewshed comments above. The overall cumulative visual impact of these projects with the proposed Project, as seen from distant views (such as parks located in Yorba Linda) and those afforded along SR-91 should be fully disclosed in the Draft EIR.

41. Page 4.1-34, 3rd Paragraph, 3rd Sentence: Refer to comment above regarding an Area Plan noted, but not referenced in the regulatory framework or project design features discussions.

42. Page 4.1-35, References: All references used throughout the impact section should be cited.

4.2 AIR QUALITY

General Comments

1. The Air Quality Assessment uses an outdated version of the CalEEMod model. The analysis should be updated with the latest version (version 2013.2.2).

2. Pursuant to guidance issued by the Office of Planning and Research, the construction analysis should address Naturally Occurring Asbestos. Refer to: http://opr.ca.gov/planning/publications/asbestos_advisory.pdf.

Page/Section - Specific Comments

1. Table 4.2-1, Ambient Air Quality Standards: Please update the Ambient Air Quality Standards table. CARB posted an updated version on June 4, 2013.

2. Page 4.2-9, Wind Patterns and Project Location: This section should include a discussion of the local meteorological conditions and should include a wind rose map.

3. Page 4.2-13, Last Paragraph: This table references the incorrect name for Table 4.2-3.

4. Table 4.2-3, Project Area Air Quality Monitoring Summary 2009-2011 Monitoring Data: This table should include the monitoring data for year 2012.

5. Page 4.2-16: OFFROAD2001 is referenced instead of OFFROAD2011.

6. Page 4.2-18, Second to Last Paragraph: The Traffic Study is referenced as being available in Appendix K. The reference should be changed to Appendix L.

7. Page 2-14 and Figure 2-10: Indicate that the project would require 560,000 cubic yards of cut and fill for PA-1 and 100,000 cubic yards of cut and fill in PA-2. However, the volume of earthwork is not referenced in Draft EIR Section 4.2 (Air Quality) or Appendix B (Air Quality Study). Please confirm that the CalEEMod run conducted for the project incorporates a sufficient number of equipment and vehicle trips for this volume of earthwork. It should be noted that CalEEMod does not include specific input categories for cut and fill that is balanced on-site. Therefore, it is necessary to include cut and fill in the material imported and/or exported categories and set the hauling trip length to an appropriate distance for moving material across the site.

8. Page 4.2-24, Localized Construction Emissions Impacts: To ensure that localized particulate matter emissions are below thresholds, the following details should be added to Mitigation Measure 4.2-1:

- Apply water and/or approved nontoxic chemical soil stabilizers according to manufacturer"s specification to all inactive construction areas (previously graded areas that have been inactive for 10 or more days).
- Replace ground cover in disturbed areas as quickly as possible.
- Enclose, cover, water three times daily, or apply approved chemical soil binders to exposed piles with 5 percent or greater silt content.
- Suspend all excavating and grading operations when wind speeds (as instantaneous gusts) exceed 25 miles per hour over a 30-minute period.
- All trucks hauling dirt, sand, soil, or other loose materials are to be covered or should maintain at least two feet of freeboard (i.e., minimum vertical distance between top of the load and the top of the trailer), in accordance with Section 23114 of the California Vehicle Code.
- Sweep streets at the end of the day.
- Install wheel washers where vehicles enter and exit unpaved roads onto paved roads, or wash off trucks and any equipment leaving the site each trip on a gravel surface to prevent dirt and dust from impacting the surrounding areas.
- Apply water three times daily or chemical soil stabilizers according to manufacturers" specifications to all unpaved parking or staging areas or unpaved road surfaces.
- Post and enforce traffic speed limits of 15 miles per hour or less on all unpaved roads.
- All on-site roads shall be paved as soon as feasible or watered periodically or chemically stabilized.
- All delivery truck tires shall be watered down and scraped down prior to departing the job site.
- Visible dust beyond the property line which emanates from the project shall be minimized to the extent feasible.

4.3 BIOLOGICAL RESOURCES

Page/Section - Specific Comments

1. Page 4.3-6, Section b. Existing Conditions: The first paragraph of this section indicates that the biological survey and mapping for the site was conducted in May 2012. The typical standard for reviewing agencies, such as State Fish and Wildlife, is for surveys

and mapping within one year of the Draft EIR public review. In this case the information is over a year and updates to the baseline information on conditions should be provided.

2. Page 4.3-31, Mitigation Measure 4.3-1: The measure references FESA and CESA permitting and on/offsite replacement and/or enhancement of least bell"s vireo habitat. The measure goes on to list the possibilities for the off-site mitigation. The mitigation has an element of deferment to the permitting process and there should be more specific information on the possible actions, where offsite replacement/enhancement would occur. Otherwise the mitigation cannot be considered viable without further validation.

3. Page 4.3-39, Mitigation Measure 4.3-2: Similar to Mitigation Measure 4.3-1, the emphasis is to the permitting process and an element of deferral.

4. Page 4.3-43, Cumulative Impacts, Paragraph 3: The reference in paragraph 3 is to "Related Project No. 1". It is recommended that the cumulative section be consistent with other references and call out the cumulative project by name, and in this case, this would be the Esperanza Hills project.

5. Page 4.3-45, Paragraph 4: First sentence refers to the "Missing Linkages report". It is unclear what this report entails as it is not referenced or footnoted and no details are provided.

4.4 CULTURAL RESOURCES

Page/Section - Specific Comments

1. Page 4.4-8, Section (d) Pedestrian Survey: This section does not provide details on the pedestrian survey methodology, including extent of transects. Please provide these details.

2. Page 4.4-11, Mitigation Measure 4.4-1: Please clarify what is meant by "spot check observations".

3. Page 4.4-12, Mitigation Measure 4.4-4: How does this mitigation measure work? Who takes responsibility if archaeological resources are encountered when the monitor is not present?

4. Page 4.4-13, Mitigation Measure 4.4-5: The measure refers to a "qualified paleontologist". Qualified by whom?

4.5 GEOLOGY AND SOILS

Page/Section - Specific Comments

1. Page 4.5-6, Figure 4.5-1: Graphic entitled Preliminary Geologic Map overlays residential lots within the Whittier Fault Zone/Fault Rupture Hazard Zone. The zone has been noted for rupture, liquefaction, seismic settlement, slides and moderate soil expansion potential.

2. Page 4.5-13, Section c. Project Design Features: The section states that "There are no specific Project Design Features (PDFs) that relate to potential geology and soils impacts".

3. Page 4, 5-14, Section (1) Fault Rupture: The section acknowledges that the Alquist Priolo Earthquake Fault Zone Act prohibits the construction of buildings for human occupation across the fault trace and a minimum 50 foot setback is required. The section further acknowledges that the site plan shows some residential lots proposed within the hazard zone. The section further states that potential residential structures would be located at a distance of greater than 100 feet from the Fault Trace however the specific location of the fault trace has not been determined. Thus there has not been any level of geotechnical review, subsurface investigations and analysis to support the viability of the plan, in consideration of geologic conditions.

   The section relies on mitigation measure 4.5-1 requiring design level geotechnical review and subsurface investigations to identify the trace location. The section concludes that with mitigation measure 4.5-1, impacts are reduced to less than significant levels. This analysis is deficient as a proper subsurface analysis has not been conducted at this time and is a deferment to a later date. It remains unclear with regard to significance and if the analysis is inadequate. It is not clear how it can be concluded that there is the ability to implement a project of this type without verification of geologic conditions, especially in terms of safety consideration. The referenced mitigation should occur as a part of the draft EIR and not deferred to a later time.

4. Page 4.5-21, Table 4.5-2, Policy 1.1: The consistency review for policy 1.1 in Table 4.5-2 references the potential for liquefaction and states design level parameters to address liquefaction can include over-excavating/recompacting and other measures. The discussion goes on to refer to replacement fill and other "engineering solutions." The problem again here is deferring and not having complete information presented in the Draft EIR. For example, if there is the determination substantial earthwork beyond what has been identified in the EIR is required, then the resulting construction air emissions may be higher than analyzed. Thus, further CEQA review may be required, based on the deferred subsurface analysis and pending final site specific design level geotechnical investigation referenced in mitigation 4.5-1.

4.6 GREENHOUSE GAS EMISSIONS

General Comments

1. The Greenhouse Gas Assessment uses an outdated version of the CalEEMod model. The analysis should be updated with the latest version (version 2013.2.2).

Page/Section - Specific Comments

1. Page 4.6-22, Mobile Sources: This paragraph references the incorrect Appendix (references Appendix K) and date (references July 2012) for the Traffic Study.

4.7 HAZARDS AND HAZARDOUS MATERIALS

General Comments

1. Throughout the analysis of this section, chemicals of concern (COCs) are discussed, analyzed, and mitigated. It is noted that petroleum-related hydrocarbons (PHCs) are not COCs, as these are not regulated by the EPA, pertaining to CERCLA. This analysis should be revised/updated to note whether or not PHCs are also a concern.

Page/Section - Specific Comments

1. Page 4.7-5, (3) Regional/Local: The Air Quality Management District"s Rule 1166 needs to be added to this analysis as it pertains to regulations of methane gas in soil during construction activities, which are later discussed in the analysis.

2. Page 4.7-11, 2nd Paragraph, Last Sentence: The ASTM standard should reference "E 1527-00" not "E1528-05". Please note that as ASTM no longer recognizes E 1527-00 as a current standard, this standard has been replaced with E 1527-13 Standard Practice for Environmental Site Assessments as of November 2013.

3. Page 4.7-17, 3rd Paragraph, 2nd Sentence: Replace the word "including" with "included".

4. Page 4.7-17, 3rd Paragraph, Last Sentence: Delete the word "Please" at the beginning of the sentence.

5. Page 4.7-19,1st Paragraph following PDFs: Delete the word "Please".

6. Page 4.7-19, d. Analysis of Project Impacts, Hazardous Materials: This analysis needs to include a discussion of long term operation impacts associated with oil drilling activities continuing on-site. What types of hazardous materials used as part of these operations, if any, need to be disclosed. Use, storage, and/or transport activities associated with these materials/waste need to be included. Potential impacts of exposure of these materials to new on-site residence should be discussed.

7. Page 4.7-20, Risk of Upset, 1st Paragraph: This discussion was already included in the previous Hazardous Materials analysis and should be deleted from this discussion.

8. Page 4.7-21, 2nd Paragraph: This discussion needs to be updated to reflect impacts to both future residents as well as construction workers.

9. Page 4.7-24, Mitigation Measure 4.7-4, 2nd to Last Sentence: Reword text to state, "Also, DOGGR shall be contacted to perform a „Construction Site Review" of the abandoned wells on the subject site to determine whether the wells have been abandoned to current standards, as well as verify that adequate distances of wells to proposed structures is proposed. If these distances and not adequate, the siting of proposed structures and/or proper measures to well features shall be conducted to the satisfaction of DOGGR."

10. Page 4.7-25, Existing On-Site Hazards: This heading should be renamed to "Existing Cortese Listings", as this is what this threshold is addressing. This analysis should be rewritten to just identify if the project site is listed on the existing Cortese regulatory database, which it is not. This information is provided in existing conditions and should just be re-stated accordingly.

11. Page 4.7-26, 2nd Paragraph: This discussion should clearly identify whether or not the OCFA has reviewed the proposed site access plans and confirmed that the proposed emergency site access is adequate for the OCFA to adequately serve the site. This information should also be cited via footnote.

12. Page 4.7-27, 1st Paragraph: This discussion needs to be updated to reflect the fact that the 2008 fire did not have enough fire flow (based on the existing conditions discussion of the Draft EIR) and that new water facilities will be required to serve the project site, including adequate fire flow. This discussion should also cross reference the cumulative analysis, where the future water facilities to serve the project site and surrounding proposed development needs to be added.

13. Page 4.7-27, 3rd Paragraph: This discussion needs to also note that the proposed project will be a gated community. The analysis needs to mention how the OCFA will access the gated community during an emergency.

14. Page 4.7-27, 3rd Paragraph, Last Sentence: This statement needs to be footnoted with a source.

15. Figure 4.7-1: Indicate the potential emergency ingress/egress location for the Esperanza Hills development on the Fire Master Plan.

16. Page 4.7-33,1st Paragraph, 3rd Sentence: The Mitigation Measure 4.7-7 requires the construction of six-foot high block walls/radiant heat walls at the bottom of a portion of the fuel modification zone. These required wall features are omitted from the aesthetics section of the Draft EIR. Per CEQA Guidelines, secondary impacts resulting from required mitigation measures must be considered in the Draft EIR. Further, the Draft EIR needs to include these wall features in the photosimulations, if visible. If not, this needs to be stated.

17. Page 4.7-33, 3rd Paragraph, 6th Sentence: The Aesthetics Section of the Draft EIR needs to confirm that the plant palette used for the photosimulations includes that required for the fuel modification zones, as statement claims that the entire project site will be re-vegetated, which would require a substantial amount of vegetation disturbance.

18. Page 4.7-34, 2nd Paragraph: This discussion needs to be updated to include the existing fire flow deficiency for the project area and anticipated water facility infrastructure needed, then this discussion should cross reference the cumulative analysis for further information. The cumulative analysis needs to be updated accordingly. The Aesthetics Section needs to be updated to reflect potential water facilities (including water tanks).

19. Page 4.7-35, Mitigation Measure 4.7-10: This mitigation measure should be discussed in the construction analysis presented above.

20. Page 4.7-36, Policy 3: The project consistency response does not clarify what rating the project achieves.

21. Page 4.7-38, Policy 3.3: The document references should cross reference the appropriate appendix.

22. Page 4.7-38, Goal 4 and Policy 4.3: The document references should cross reference the appropriate appendix.

23. Page 4.7-40, 2nd Paragraph: This discussion needs to include the anticipated water infrastructure project needed to serve the project site and surrounding area.

Comments on Appendix G, Hazardous Materials Assessment:

1. Confirm that potential contamination from the four former aboveground storage tanks utilized for storage of crude oil was considered.

2. The Avanti ESA states that the contaminants noted were consistent with that of a typical oilfield setting, but whether or not this is adequate for residential uses is not discussed.

3. The Phase I and Phase II Investigations, conducted by Phase One Inc., were prepared consistent with ASTM E 1527-00 and per Section 1.4 on page 1-4, the only exceptions to the rule were identified as accessibility of the site and interview questionnaires. However, it is noted that the terminology used to define a minor, medium, and major environmental concern for RECs is a deviation to the rule. The rule does not include these definitions.

4. The Phase I and Phase II Investigations, conducted by Phase One Inc., makes note of the on-site aboveground storage tanks, but does not provide any findings or opinions as to their conclusion that the tanks have not resulted in a REC. These tanks have been present since at least 1981. Further information regarding potential contamination from on-site tanks should be included.

5. It is unclear if on-site sampling events including consideration of on-site tanks.

4.8 HYDROLOGY AND WATER QUALITY

General Comments

1. The maps provided do not accurately show the proposed or existing streets (they are referenced in the text) and there is no graphic that shows the Planning Areas on the hydrology map.

Page/Section - Specific Comments

1. Page 4.8-9 last paragraph, 1st Sentence: Refers to a large natural area west of the project site, which is apparently named Wire Springs Canyon (also not noted on the hydrology map), however the area appears to be east of the development, not west of the development.

2. Page 4.8-9, Last 2 Paragraphs: Discuss that the increases in flow to the channel adjacent to San Antonio Road and the existing Storm Drain in Stonehaven Drive can accept the flow increases without significant impacts; however, the CEQA drainage Study only discusses the impacts to the existing storm drain in Stonehaven. The impacts to the channel along San Antonio also need to be addressed.

3. Page 4.8-14, 1st Paragraph, refers to the Drainage Study and Technical Memorandum conforming to Section B.4 of Orange County Hydrology Manual: The hydrology presented in the two studies follows the high confidence methodology for the analysis of the 2- and 10- year events. For mitigation and impact purposes, the study should be comparing the 2 and100-year expected value events in accordance with the 1995 Orange County Hydrology Manual Addendum No. 1.

4. Page 4.8-17, Item 2, WQMP Features: Provide Green Street design BMPs and Low Impact Development design BMPs throughout the project site. The project shall implement the Low Impact Development design process to the project to arrive at the appropriate BMPs. Preferred site treatment options shall be applied to the maximum extent possible.

5. Page 4.8-22, PDF 8-4: Please show the streets in an exhibit within this section of the document.

6. Page 4.8-22, PDF 8-5: The document should refer to a water surface from a specific storm event.

7. Page 4.8-32, Policy 3.2: The document needs to address the potential for downstream erosional impacts associated with Debris Basins on Existing Creek C in the north area. The reduction in sediment due to development and the debris basins has the potential to significantly impact the stability of the downstream channel.

Comments on Appendix H, Conceptual WQMP/Hydrology Analysis

1. Note that Subarea S-4 appears to drain to a separate drainage not directly tributary to Creek A based on topography and google earth imagery. Please provide a clear discussion as to how the area in the existing conditions drains east to the existing storm drain in Stonehaven.

2. Justify the use of TR-55 and hand hydrograph calculations. Why are two different models used? The document should clearly state the purpose of both of the calculations.

3. Note that onsite rational method calculations were performed but not used in the CEQA documentation. What is the purpose of the calculation? The calculations were made using AES version 14.3. The current version of AES is 18.1. Justify the use of older software.

4. The WQMP shows calculations for the hydromodification basin and the LID volume requirements for the north area and add them together, note that only the larger of the two volumes is required.

5. Hydrograph calculations for both the 2 and the 100-year events should before the expected value events as noted above.

6. The documents mention preparing the hydrographs is conformance with the Orange County Hydrology Manual Section B.4. Section B.4 discusses the development of the precipitation for the hydrograph analysis. While hand calculation methods are accepted by the County, the AES Unit Hydrograph Model is the County"s preferred method of calculating mitigation hydrographs. It appears that the hand calculations utilized the Intensity data from the rational method procedure rather than the depth data in Table B.2 or for expected value calculation in Tables 1 and 2 of the Hydrology Addendum. If the hand calculations are used, they should conform to the example show in Section E of the Orange County Hydrology Manual.

7. While the Orange County Hydrology Manual mentions the use of the lag imperial formula, it clearly states in Section E.3 Item 2, that the formula Lag=0.8Tc (based on the rational method Tc) is the preferred method. Therefore, justification for the use of the empirical formula and concurrence from the County on its acceptability should be provided.

8. Justify the use of the Foothill S-graph in the hydrograph development.

4.9 LAND USE AND PLANNING

Page/Section - Specific Comments

1. Table 4.9-1, Project Consistency with Orange County General Plan: Policy 1 Balanced Land Use – The consistency statement states the project proposes single family homes in an area designated for suburban residential land uses. It does not account for the proposed GPA and how the project will maintain balanced land use.

2. Table 4.9-2, Project Consistency with Yorba Linda General Plan: Policy 1.1 – The consistency statement does not consider that by introducing a greater density than anticipated by the City"s General Plan for this specific site, it could contribute to an increase in the overall average density in the City. This should also be addressed in the Cumulative Impacts discussion.

3. Table 4.9-2, Project Consistency with Yorba Linda General Plan: Policy 1.2 – The consistency statement relies on the overall acreage for the Murdock/Travis Property in stating the number of units proposed would be potentially consistent; however, the proposed project (the topic of this Draft EIR) does not involve development of the remaining portions of the property and specific development within the remaining portion of the Murdock/Travis Property (other than Esperanza Hills) is not currently known/proposed. The consistency statement should consider the amount of acreage specific to the proposed project to determine density, which is not consistent with the average density of 1.0 dwelling units per acre identified by the City"s General Plan. The combined development of the proposed project site and Murdock/Travis Property (specifically, Esperanza Hills) should be addressed in the Cumulative Impacts discussion, as Esperanza Hills is identified as a cumulative project.

4. Table 4.9-2, Project Consistency with Yorba Linda General Plan: Policy 7.4 – Refer to comment regarding Policy 1.2, above.

5. Page 4.9-2: Under Safety Element subheading, second sentence – remove "are" after "other hazards".

6. Page 4.9-3: Under Growth Management Element subheading, first sentence – replace "is" with "are" after "the natural environment".

7. Page 4.9-4: Second full paragraph beginning with "The City"s General Plan…" – capitalize "Resources" in reference to the Recreation and Resources Element of the City"s General Plan.

8. Page 4.9-8: Last paragraph – capitalize "Amendment" in reference to "General Plan Amendment".

9. Page 4.9-19 and 4.9-20, Cumulative Impacts: The project"s individual cumulative contribution to the City"s overall average density along with the other cumulative project"s should be addressed.

10. Page 4.9-20: Sentence beginning with "In the case of the Esperanza Hills Project…" – replace "requires" with "require".

11. Page 4.9-20: Sentence beginning with "That project would be at a density…" – remove "the" before "Murdock/Travis Property".

4.10 NOISE

General Comments

1. No noise measurements were conducted to quantify the existing on- and off-site acoustical environment. These measurements should be performed to provide the reader with background regarding existing ambient conditions.

Page/Section - Specific Comments

1. Page 4.10-9, Stationary Noise Sources: The existing on-site oil wells are not included in the discussion of existing stationary noise sources.

2. Page 4.10-11, Methodology: The "Off-Site Traffic Noise Impacts" is under the "Construction Noise Impacts" heading. This discussion should be separated.

3. Page 4.10-17, Mitigation Measures: In order to further reduce construction related noise impacts, the following measures should be incorporated as mitigation:

    - Construction noise reduction methods such as shutting off idling equipment, maximizing the distance between construction equipment staging areas and occupied residential areas, and use of electric air compressors and similar power tools, rather than diesel equipment, shall be used where feasible. Unattended construction vehicles shall not idle for more than 5 minutes when located within 500 feet from residential properties.

- Noise attenuation measures, which may include, but are not limited to, temporary noise barriers or noise blankets around stationary construction noise sources, are implemented where feasible.

- Construction hours, allowable workdays, and the phone number of the job superintendent shall be clearly posted at all construction entrances to allow surrounding property owners and residents to contact the job superintendent if necessary. In the event the County receives a complaint, appropriate corrective actions shall be implemented.

- Two weeks prior to the commencement of construction, notification must be provided to surrounding land uses within 500 feet of a project site disclosing the construction schedule, including the various types of activities that would be occurring throughout the duration of the construction period. This notification shall give a contact phone number for any questions or complaints. All complaints shall be responded to in a method deemed satisfactory by the County of Orange.

4. Page 4.10-24, On-Site Traffic Noise Impacts: The FHWA Traffic Noise Model (TNM) 2.5 should be used to calculate eon-site traffic noise levels. It is far more accurate than the FHWA-RD-77-108 model that was used and takes topography, background noise, and the site plan into account.

5. Page 4.10-27, Groundborne Vibration and Noise: Based on the level of construction activities that are planned, the qualitative vibration analysis is insufficient to demonstrate that a vibration related impact would not occur doing construction. The anticipated vibration levels should be quantified from the nearest grading activities to the closest off-site structures. A suitable threshold could be the Federal Transit Administration architectural damage criterion for continuous vibrations (i.e., 0.2 inch/second Peak Particle Velocity).

4.11 POPULATION AND HOUSING

Page/Section - Specific Comments

1. Page 4.11-1, Subsection 3, Regional Housing Needs Assessment (RHNA): Delete "A Regional Hosing Needs Assessment" and remove the brackets from RHNA.

2. Page 4.11-2, First Sentence beginning with "According to …" and Table 4.11-1: Should be moved to "b. Existing Conditions."

3. Page 4.11-3, Table 4.11-2: Table should note increases and percentages for clarification with the text description.

4. Page 4.11-3, Table 4.11-3: Table information needs to be clarified with the paragraph below, percentages in paragraph do not directly translate to the percentages in table.

5. Page 4.11-3, 2nd to Last Paragraph: Replace 34 percent with 35 percent.

6. Page 4.11-4, Table 4.11-4: The table should note increases and percentages for clarification.

7. Page 4.11-4, Subheading a. Methodology, Last Sentence: This discussion should also clarify that this would be similar to that for the City of Yorba Linda per footnote 6 on page 4.11-8.

8. Page 4.11-5, Subheading Population Growth: The Threshold Statement wording differs from Section b on page 4.11-4.

9. Page 4.11-5, 1st Paragraph, 2nd Sentence: This sentence needs to clarify which criteria is relevant (the calculation that is lowest or highest), as the lowest maximum allowable density would be 1,912, which would result in a worst case increase of population on-site by 304 persons (18 dwelling units [du] * 41 acres * 2.59 persons per du). Revise this discussion accordingly. Update footnote 4 accordingly.

10. Page 4.11-5, Subheading Population Growth, 2nd Paragraph: This discussion states that the project helps the County meet their RHNA housing allocations, but does not clearly state what the County"s existing deficiencies are and what categories the Project fills. Thus, it is not clear how the Project meets the RHNA allocations. Based on the surrounding community, the general area appears to adequately supply moderate and above moderate income levels, the Project does not appear to supply a variety of housing opportunities in the area.

11. Page 4.11-6, Table 4.11-5, Policy 3 Housing Densities: Refer to comment above regarding the RHNA allocations.

12. Page 4.11-7, Table 4.11-6, Goal 3 and Policy 3.1: Refer to comment above regarding the RHNA allocations.

13. Page 4.11-8, 1st Paragraph, Last Sentence: Refer to comment above regarding the RHNA allocations, as it pertains to cumulative impacts as well.

14. Page 4.11-9, Subheading 4. References: California Department of Finance. There is now 2013 data available in order to have current estimates.

4.12 PUBLIC SERVICES

Page/Section - Specific Comments

1. Page 4.12-5, Last Paragraph: Please clarify that the four service calls per day on average is calculated per station.

2. Page 4.12-8, Paragraph 2: What is the existing libraries service ratio that serves the project site, and is the current condition adequate to serve the area?

3. Page 4.12-10, Subheading Fire Protection and Emergency Medical Services: The 1,460 calls annually should match with existing conditions. This comment also applies to footnote 13.

4. Page 4.12-10, 7th Sentence: Should cite a source (such as the OCFA) for this statement.

5. Page 4.12-10, Last Sentence: Should this read 7 minutes and 20 sec (like existing conditions) or 5 minutes? Please clarify.

6. Page 4.12-11, 1st Paragraph, Last Sentence: This analysis suggests that improvements and equipment are necessary to serve the project site, but do not generally discuss what those needs are.

7. Page 4.12-11, 2nd Paragraph, 3rd Sentence: This discussion suggests that the fire flow water requirements in the area not being met as a result of the existing demand. Based on Page 4.15-21, Mitigation Measure 4.15-1, of the Draft EIR, future improvements associated with the Northeast Area Planning Study are required prior to construction of the project. The Draft EIR should clearly identify if the proposed project is reliant on some or all of these project components for development. If so, considerations of whether or not this is CEQA "piecemealing" must be included. If this is a separate project, then cumulative considerations throughout the Draft EIR (such as aesthetics [view impacts to new water tank features], wildfire, and fire protection services) should be included.

8. Page 4.12-12, Last 3 Sentences of 2nd Paragraph: This discussion should provide more detail regarding whether or not there are adequate site access for fire services to adequately serve the project site, particularly in the event of a fire. This analysis should cite a specific source from OCFA confirming that the site would be served by adequate fire access.

9. Page 4.12-13, Sentence 2: It states that service response timeframes can be met but is the equipment and facilities adequate to meet the timeframe?

10. Page 4.12-13, Mitigation Measure 4.12-1: Revise the last sentence to state, "This Agreement shall specify the developer"s pro-rata fair share funding of capital improvements and equipment, which shall be limited to that required to serve the Project, to the satisfaction of the Fire Chief."

11. Page 4.12-13, Mitigation Measure 4.12-2: This mitigation measure references electric operating gates which were not discussed anywhere in the analysis. Please include this project information in the emergency fire access analysis provided in this section.

12. Page 4.12-13, Subheading Police Protection and Law Enforcement Services, Sentence 4: Please add the word "Project" before the word "site". Delete the word "Department"s" and replace with "OCSD"s". Further, clarify how much of a "substantial" change there will be in response time objectives.

13. Page 4.12-14, Subheading (3) Schools, (a) Operation: Add the word "School" after "Travis Ranch." Also, this is over-enrolled already and the project exacerbates this condition. This section needs to better disclose to what extent the project would be exacerbating this impact prior to discussing the mitigation measure.

14. Page 4.12-15, Subheading Mitigation Measures: Delete the word "Please" before "refer."

15. Page 4.12-14, Mitigation Measure 4.12-4: The Draft EIR should cross-reference this Mitigation Measure with the Traffic Management Plan mitigation measure to ensure consistency.

16. Page 4.12-19, Table 4.12-4, Policy 3: None of this discussion specifies exactly how the project is achieving consistency with this policy and the ISO standard.

17. Page 4.12-19, Table 4.12-4, Goal 1: Delete "Orange County Sheriff"s Department" and replace with "OCSD."

18. Page 4.12-19, Table 4.12-4, Objective 1.1: Delete the word "Please."

19. Page 4.12-19, Table 4.12-4, Policy 1 Land Use Review: Replace "…as discussed in Section 4.12, Public Services," with the terminology, "this EIR Section,".

20. Page 4.12-20, Table 4.12-4, Orange County Public Library, Goal 1: What is the existing libraries service ratio that serves the project site and is the current condition adequate to serve the area?

21. Page 4.12-21, Table 4.12-5, Goal 10: What are the standards of the school district that this policy is referring to? This consistency analysis does not clearly discuss how the project is achieving this policy.

22. Page 4.12-21, Table 4.12-5, Policy 10.1: Delete the word "please" in the last sentence.

23. Page 4.12-21, Table 4.12-5, Goal 10.2: Delete the word "please."

24. Page 4.12-21, Table 4.12-5, Goal 10.2: Incorporate more information regarding to what extent the project would be exacerbating impacts to schools prior to discussing the mitigation measure.

25. Page 4.12-22, Table 4.12-5, Policies 5.2 and 5.3: The Draft EIR should also provide this in the impact analysis that discusses police protection services earlier in the Section.

26. Page 4.12-23, Subheading (1) Fire Protection and Emergency Medical Services: This analysis should also consider the potential cumulative impacts of providing water services to this area.

27. Page 4.12-23, Subheading (1) Fire Protection and Emergency Medical Services, 3rd Paragraph: This section should include correspondence information with the OCFA discussing their opinion on whether or not their anticipated facilities can accommodate this growth.

28. Page 4.12-24, Subheading (3) Schools, 1st Paragraph: There is no mention of overcrowding of the elementary school and to what extent the cumulative impacts would exacerbate this impact prior to discussing the payment of school fees. This section should also specify how many students the cumulative growth would result in since the increased number of persons is known.

29. Page 4.12-25, Subheading (4) Libraries, 1st Paragraph: This section should include specific impacts to library service performance criteria since the increased number of persons is known.

4.13 RECREATION

General Comments

1. Please refer to the City"s Parks and Recreation Master Plan Update as "The City of Yorba Linda DRAFT Parks and Recreation Master Plan Update". Since the March 21, 2013 reference and posting of the document it has been revised numerous times. Significant changes have been made in particular to the Park In-lieu requirements and parkland inventory. Please view the Council Meeting and Staff Report from January 7, 2014 in regards to the Park In-lieu updates. The next posting and review of the DRAFT Parks and Recreation Master Plan Update will be at the Parks and Recreation Commission Meeting on February 20, 2014. The entire document will be presented at this time, not just Chapter 3 and Chapter 6.

2. To clarify, there is reference throughout the document about making accommodations for the planned trails in the "project" and dedication of easements for these sections. However, who should be building or improving these trails? Will the developer also provide money to complete or improve the trails? If so, will the money go to the County and then to the City? Ultimately who will build these trails in the project and potentially the connector trails just outside the project? For example, see Mitigation Measures 4.13-1 and 4.13-2 and page 4.1-3, fifth paragraph.

3. Can any of the 36 acres of undeveloped open space be graded for a neighborhood park and dedicated to the City in order to assist with the City of Yorba Linda"s Neighborhood/Community Park deficiency? Refer to PDF 1-4, and page 4.1-29, Table 4.1-2.

Page/Section - Specific Comments

1. Page 4.13-1: First paragraph, first sentence – "vicinity of the project site" should be revised to say "City of Yorba Linda."

2. Page 4.13-1, (1) Quimby Act: Add final sentence to this paragraph referencing the County"s parkland acreages goal and state the City"s parkland acreage goal of 4 acres per 1,000. This is mentioned later in the section but would also be useful here.

3. Page 4.13-2, OC Parks Strategic Plan (2007): How is the Strategic Plan relevant to the regulatory framework of the project if there is no plan associated with the project to implement require components (e.g., trails, bikeways)?

4. Page 4.13-2, County of Orange Code of Ordinances, Title 7: Note that the City"s Municipal Code Title 17 and Park in-lieu fees have been updated as of January 7, 2014 and will go into effect February 20, 2014.

5. Page 4.13-4: First paragraph, third sentence – "…the City"s recommended parkland standard if 15 acres…" replace "if" with "is".

6. Page 4.13-4, fourth paragraph: This paragraph will require revision within the Final EIR as the Draft Parks and Recreation Master Plan Update will be presented to the Parks and Recreation Commission at the February 20, 2014 meeting.

7. Page 4.13-6, last paragraph: Revise reference to Figure 4.13-1 to Figure 4.13-2.

8. Table 4.13-1: This table will require revision within the Final EIR as the Draft Parks and Recreation Master Plan Update will be presented to the Parks and Recreation Commission at the February 20, 2014 meeting.

9. Page 4.13-11, first paragraph: The discussion of trails should identify who will be responsible for construction of the trails and potential connectors.

10. Page 4.13-11, (a) Methodology: It is unclear if this methodology accounts for City of Yorba Linda requirements. There is a reference to a "Local Parks Code" but it is unclear what agency"s code this is.

11. Page 4.13-11, Threshold 2: The word "requires" should be replaced with "require".

12. Page 4.13-11: Last sentence – add "to" between "applicable" and "parks".

13. Page 4.13-12, Item 2(d): Provide a figure that indicates the alternative routes for the continuation of Trail 35a across Planning Area 2 and Trail 36 through Planning Area 2 to the existing City trail staging facility at Casino Ridge Road.

14. Page 4.13-12, Item 2(d), first paragraph, second to last sentence: This sentence should be revised to clarify that the Level 2 demand for San Antonio Park was only in relation to adding parking (and not physical expansion, which is not possible).

15. Page 4.13-12: First full paragraph, first sentence – add "by" between "operated" and OC Parks".

16. Page 4.13-12: Last paragraph, first sentence – move "park" to after "neighborhood".

17. Page 4.13-12: Last paragraph: This paragraph will require revision within the Final EIR as the Draft Parks and Recreation Master Plan Update will be presented to the Parks and Recreation Commission at the February 20, 2014 meeting.

18. Pages 4.13-12 through 4.13-16, Analysis of Project Impacts: The analysis acknowledges potentially significant impacts to City of Yorba Linda park facilities and states that Mitigation Measure 4.13-1 would reduce the impact to a less than significant level. It is unclear how payment of fees to the County will reduce the potential impact to City of Yorba Linda park facilities, which the analysis acknowledges could be significantly impacted by the proposed project. The nearest neighborhood park, San Antonio Park, is located within the City and would most likely be used by residents of the proposed project. This park has been identified as having a current demand for expansion or improvements to the park in the City"s CIP. The mitigation measure should demonstrate how the payment of park fees will specifically be used to provide neighborhood parkland that will serve the proposed project area or make improvements to existing neighborhood parkland, within the City of Yorba Linda.

19. Page 4.13-16, Mitigation Measures 4.13-1 and 4.13-2: These measures indicate that the developer would provide fee for parkland acquisition as a means to adhere to the Quimby Act. However, there is a need to: 1) obtain additional land; and 2) enact an impact fee that would then also require the construction of the park that would help with the City"s Neighborhood/Community Park deficit. The EIR should specify whether the City would receive these fees directly or as a pass-through through the County.

20. Table 4.13-3, Project Consistency with Yorba Linda General Plan: Goal 3, Policy 3.1, Goal 4, Policy 4.1, and Policy 1.5: Refer to the comment on Pages 4.13 through 4.16, above.

21. Page 4.13-19, Cumulative Impacts, 2nd Paragraph: The reference to in-lieu fees should be further defined as it is unclear whose standards would be utilized.

22. Page 4.13-19, Cumulative Impacts: Refer to the comment on Pages 4.13-12 through 4.13-16, above.

4.14 TRAFFIC/TRANSPORTATION

General Comments

1. Peak hour factors (PHF) were not applied in the ICU analysis of the study intersections under any of the analysis scenarios. Therefore, the reported ICU calculations are reflecting a better LOS than what existing and future peak hour operations should reflect. Peak hour factors are usually applied in the ICU 2000 and HCM 2000 methods of intersection analysis to take into account the peaking characteristics of traffic within the peak hour. It is usually based on the peak 15-minute period. The application of peak hour factors in ICU analysis is discussed in the Federal Highway Administration (FHWA) *Signalized Intersections: Informational Guide* (August 2004).

2. Peak (95th percentile) queue lengths should be evaluated at the southbound approaches of the intersections of Yorba Linda Blvd./San Antonio Way and Yorba Linda Blvd./Via Del Agua to determine if peak queuing will potentially block access to and from side streets immediately north of the intersections. A queuing analysis should also be provided for the westbound approach of Aspen Way to San Antonio Road. There are two residential units on the north side of Aspen Way and a nearby cul-de-sac (Willow Tree Lane) that may have access blocked during the morning peak periods.

3. The estimated Opening Year date of 2015 may be outdated; the consultant should work with project applicant to obtain a revised project completion date. The revised project Opening Year date would need to be revised throughout report where referenced.

4. The Peak Hour Intersection Level of Service analysis tables should show the change in the ICU ratio and HCM delay between the “without project” and “with project” scenarios. Furthermore, the “with project” analysis tables should include columns indicating whether or not the change in ICU ratio or HCM delay is significant.

5. The project applicant shall be responsible for installing a traffic signal at the intersection of Yorba Linda Blvd. and Via del Aqua in compliance with the City of Yorba Linda standards.

6. The existing eastbound left turn lane at the intersection of Yorba Linda Blvd. and Via del Agua may not be able to accommodate the projected future left turn traffic. Further analysis must be conducted to address this issue. The intersection of Yorba Linda Boulevard and San Antonio eastbound left turn capacity needs to be reviewed for the Esperanza Hills Development Option 2 alternative as well.

7. The Project must provide justification that it has the legal right to require third parties to extend Aspen Way or Via Del Agua to connect to the Project.

8. The City"s existing traffic signal system is running on time-of-day plans and it is not capable of handling special signal timing required for fire emergency evacuation. The Cielo Vista Project should contribute fair-share funding towards the cost to upgrade the City"s current traffic signal system to a traffic responsive system.

Page/Section - Specific Comments

1. Page 4.13-12, Item 2(d): Provide a figure that indicates the proposed routes for the continuation of Trail 35b through Planning Area 1 of the project site. Show the Street "A" crossing at the open space and north/south route along Street "A" crossing Stonehaven Drive and joining the existing earthen multipurpose trail. Fencing shall be provided consistent with surrounding improvements.

2. Comments on Appendix L, Traffic Study, are provided below. These comments also apply to Section 4.14, Traffic/Transportation of the Draft EIR and should be updated accordingly.

Comments on Appendix L, Traffic Study

1. Page 8, Paragraph 1: Unacceptable LOS F at the intersection of Yorba Linda Boulevard/Via Agua occurs during the AM peak hour, not PM peak hour, under Existing conditions. In third sentence, "as measure" should read "as measured."

2. Page 18, Exhibit 3-1: Defacto right-turn lanes should not be designated at the northbound and westbound intersection approaches of San Antonio Road/Aspen Way. Curb parking is allowed along both approaches and therefore the defacto lane may occasionally be blocked by parked vehicles. In addition, the westbound lane width is 18 feet, which is less than the minimum required width of 20 feet to include a defacto lane. This intersection should be re-evaluated for each scenario without the defacto right-turn lanes.

3. Page 21, Section 3.2 – Congestion Management Program Compliance: Please correct typo in second sentence of first paragraph from "…element f the CMP…" to "…element of the CMP…".

4. Page 22, Section 3.4 – Transit Service: It should be stated that transit service will not be provided within a reasonable walking distance of the project site (1/4 mile or less).

5. Page 31, Section 3.6 – Existing (2012) Traffic Volumes: Traffic counts for this analysis were collected over 18 months ago and may no longer be valid for reflecting current traffic conditions. Please provide justification for using older counts, or collect new counts to update the traffic analysis and EIR.

6. Page 35, Exhibit 3-12: The intersection of Yorba Linda Boulevard/Via Del Agua should show an acceptable LOS (LOS D) during the p.m. peak hour under existing conditions.

7. Page 36, Table 3-1: Remove defacto right-turn lane designation at Intersection #7 (San Antonio Road / Aspen Way). Also remove from all tables in report and in traffic analysis model.

8. Page 39, Section 4.0 – Projected Future Traffic: In the last sentence of Paragraph Two, the assumption that the proposed project would be constructed and fully occupied by 2015. The year 2015 was the anticipated completion date in early 2012 when the traffic study was initiated but is now outdated. The traffic consultant should obtain a revised completion date for the proposed project from the project applicant.

9. Page 43, Exhibit 4-1: The exhibit should show trip distribution percentage for eastbound trips between Paseo De Las Palmas and San Antonio Road.

10. Page 47, Sub-Section 4.4.1 – Employee Trips: First paragraph states that employee trips were estimated on the number of employees, but no trip estimates are provided. The second paragraph states that the impacts of construction-related employee trips are less than significant, but based on what? Please provide some basis for why the employee trips would not result in significant traffic impacts.

11. Page 47, Sub-Section 4.4.2 – Heavy Equipment: Last paragraph states that if heavy equipment delivery and removal occurs outside of peak traffic hours, then impacts are less than significant. This paragraph should be revised to state that if the recommended delivery/removal of heavy equipment outside of peak hours is not implemented, then the impacts may be significant. This recommendation should also be stated as a project mitigation measure during the construction phase of the project.

12. Page 48, Section 4.5 – Background Traffic: The estimated Opening Year date of 2015 may be outdated; the consultant should work with project applicant to obtain a revised project completion date.

13. Page 48, Section 4.6 – Cumulative Development Traffic: The cumulative projects list and analysis may need to be updated to account for other projects that may be completed by the revised Opening Year date of the proposed project.

14. Page 49, Table 4-3: The occupancy percentages of the cumulative developments may need to be revised to reflect an updated Opening Year date of the proposed project.

15. Page 53, Section 4.8 – Opening Year 2015 Conditions: Opening Year date and analysis may need to be revised to reflect updated project completion date.

16. Page 56, Section 4.9 – Horizon Year 2035 Conditions: Horizon Year 2035 peak hour turning movement volumes may need to be revised to reflect any adjustments to the Opening Year volumes based on a revised project completion date under Opening Year conditions. In addition, if justification for using outdated 2012 traffic counts cannot be provided and new counts need to be collected, the post-processing of 2035 turning movement volumes will need to be revised to reflect updated existing conditions.

17. Page 65, Section 5.4 – Project Mitigation Measures: Last sentence of first paragraph should be revised; instead of stating that project traffic "has the potential....potentially resulting…", this sentence should clearly state that the addition of project traffic WILL result in a significant impact at the intersection of Via del Agua / Yorba Linda Boulevard.

18. Page 65, Section 5.4 – Project Mitigation Measures: In second paragraph, first sentence, "as measure" should read "as measured".

19. Page 67, Section 6.0 – Opening Year 2015 Traffic Analysis: As indicated in previous comments, the Opening Year date and analysis may need to be revised to reflect an updated project completion date.

20. Page 78 (Section 6.5 – Project Mitigation Measures): Last sentence of first paragraph should be revised; instead of stating that project traffic "has the potential....potentially resulting…", this sentence should clearly state that the addition of project traffic WILL result in a significant impact at the intersection of Via del Agua/Yorba Linda Boulevard.

21. Page 78, Section 6.5 – Project Mitigation Measures: In second paragraph, first sentence, "as measure" should read "as measured".

22. Page 80, Subsection 6.6.1 – Opening Year 2015 Traffic Volume Forecasts: In last sentence of paragraph, please provide space between "6.14" and "show".

23. Page 93, Section 7.3 – Intersection Operations Analysis: Horizon Year 2035 forecast peak hour turning movement volumes may need to be revised to reflect any adjustments to the Opening Year volumes based on a revised project completion date under Opening Year conditions. In addition, if justification for using outdated 2012 traffic counts cannot be provided and new counts need to be collected, the post-processing of 2035 turning movement volumes will need to be revised to reflect updated existing conditions. As a result, there may be new project-related impacts that are currently not identified in this section.

24. Page 118, Section 8.2 – Access for Emergency Response Vehicles: There is no discussion of how the project will impact emergency evacuation time for the surrounding areas that will share access. Also, under the scenario where the Esperanza Hills Project (378 DU"s) will share access with Cielo Vista via Aspen Way, the combined dwelling unit count will exceed the 150-unit threshold for only one fire apparatus access road. Where will the additional fire access road(s) be provided?

25. Page 118, Sub-Section 8.3.1 – Sight Distance Criteria: In first sentence of first paragraph, "County of Orange" should be replaced with "Caltrans". This section appears to provide conflicting information. The first paragraph states that only the minimum stopping distance was evaluated for Street "A" / Via Del Agua, yet the second paragraph describes the criteria used to evaluate intersection corner sight distance.

26. Page 119, Sub-Section 8.3.3 – Sight Distance Assessment at Street "A" at Via Del Agua: The sight distance analysis should indicate whether the minimum sight distance required (280 feet) is based on the minimum corner or stopping sight distance. The prevailing or posted speed used in determining the minimum sight distance required should also be stated in this section. Please include the County"s *Standard Plan No. 1117* in the technical appendix of the report.

5.0 ALTERNATIVES

General Comments

1. It is difficult to discern the reason(s) the selected alternatives were carried forward for analysis. This issue is further complicated by the fact the Draft EIR determined that no significant unavoidable impacts are expected to occur. Each selected alternative should include a statement regarding why it was selected and what impacts it is intended to eliminate or reduce.

2. The Draft EIR analyzes an alternative with a reduced impact area but with a higher unit count, in addition to an alternative with a reduced density but with a larger impact area. A true "reduced density" alternative (one that analyzes a reduced unit count with an equal or smaller impact area) should be included within the EIR.

Page/Section - Specific Comments

1. Page 5-4, Alternative Location: The Draft EIR dismisses an alternative location on the grounds that the selection of another parcel in the site vicinity would likely result in similar or greater impacts than the project. This statement is unsubstantiated – for instance, one of the City"s primary concerns regarding the proposed project is limitations on site access for the project site and adjacent Esperanza Hills property. An alternative site may provide for multiple points of access that reduce impacts related to daily and emergency use. An Alternative Location should be further analyzed and substantiation should be provided for the rejection of any such alternative.

2. Page 5-8, (n) Transportation/Traffic: The conclusion that the No Project/No Development Alternative would result in greater impacts than the proposed project is misleading. This conclusion is based upon a single study intersection rather than the traffic impacts of the project as a whole. Other study intersections would be adversely affected by project traffic, and such impacts would not occur under the No Project/No Development Alternative.

3. Page 5-9, Alternative 2 (Planning Area 1 Only Alternative): This alternative assumes development within Planning Area 1 only. While the County"s existing development standards allow between 0.5 to 18 dwelling units per acre, this Alternative arbitrarily assumes 2 dwelling units per acre (which is higher than the project"s density of 1.3 dwelling units per acre). A substantiation for the selection of 2 dwelling units per acre should be provided, and how this density is appropriate in regards to the intent under CEQA to analyze a range of alternatives that eliminate or reduce the impacts of the project.

4. Page 5-10, (b) Air Quality, Third to Last Sentence: Insert "to" between the words "Due" and "the."

5. Page 5-14, (f) Global Climate Change, Second to Last Sentence: Insert "with" between the words "inconsistent" and "the."

6. Page 5-16, First Paragraph: The Draft EIR concludes that impacts related to land use and planning would be significant and unavoidable for the Planning Area 1 Only Alternative. Additional substantiation is required to support this conclusion. This

alternative would require fewer land use entitlements than the proposed project so it is unclear how this significance conclusion was reached.

7. Page 5-20, (b) Air Quality: The Large Lot/Reduced Grading Alternative would result in less overall grading.

8. Page 5-29, Contested Easement Alternative: It is unclear why the EIR includes analysis of the "Contested Easement" Alternative. From a CEQA perspective, this Alternative has no potential to reduce any environmental impacts associated with the proposed project.

6.0 OTHER MANDATORY CEQA CONSIDERATIONS

Page/Section - Specific Comments

1. Page 6-7, (i), Recreation: As within comments on Section 4.13, clarification and/or negotiations are required in regards to parkland quantity and quality in order to have an outcome that best meets the needs of the community and the surrounding residents. Again, there are limited park improvements available, therefore adequate parkland dedication and construction would be beneficial.

Letter: CCRPA

CCRPA

California Cultural Resource Preservation Alliance, Inc.

P.O. Box 54132
Irvine, CA 92619-4132

An alliance of American Indian and scientific communities working for the preservation of archaeological sites and other cultural resources.

December 14, 2013

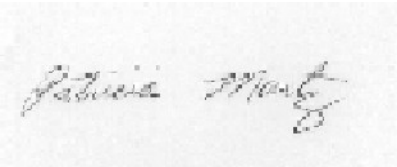
Ron Tippets
OC Planning Contract Planner

RE: Cielo Vista Project Draft Environmental Impact Report (EIR)

Upon review of Cultural Resources 4.4, we concur with the determination that the project has low archaeological sensitivity based on the hilltop terrain, lack of water, and lack of recorded cultural resources and surface expression based on a pedestrian archaeological survey. However, we also concur with the determination that it is possible that previously undiscovered buried archaeological resources exist within the project area at locations consisting of younger Quaternary Alluvium and support Mitigation Measure 4.4-1 archaeological monitoring.

Archaeological sites that are significant because they contain important scientific data are also significant and important to Native American descendants because they contain religious and cultural values. Unlike scientific data, religious and cultural values cannot be mitigated to a less than significant level with the implementation of data recovery excavations. Therefore we request that in the event significant buried archaeological resources are discovered, Mitigation Measure 4.4-2 be revised to focus on avoidance and preservation. This is consistent with the United Nations Declaration on the Rights of Indigenous Peoples which was adopted by the United States in 2010 (See www.achp.gov/undeclaration.html.

Sincerely,



Patricia Martz, PhD.
President

Letter: FHBP1

November 18, 2013

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Audubon, Sea & Sage Chapter
Bolsa Chica Conservancy
Caspers Wilderness Park Volunteers
Earth Resource Foundation
Equestrian Coalition of O.C.
Environmental Nature Center
Great Park Environmental Coalition
Huntington Beach Wetlands Conservancy & Wildlife Care Center
Laguna Canyon Conservancy
Laguna Canyon Foundation
Laguna Greenbelt, Inc.
Newport Bay Conservancy
Sierra Club, Orange County
Surfrider Foundation, Newport Beach Chapter
Stop Polluting Our Newport
St. Mark Presbyterian Church Ecophilians

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www.FHBP.org

Via E-Mail and U.S. Mail

Orange County Planning
Attn: Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:

Friends of Harbors, Beaches and Parks is writing to request an extension of the public comment period for the Cielo Vista Draft Environmental Impact Report (EIR). There are complex legal and technical issues surrounding the Cielo Vista Project and adequate time is needed to review the document. Almost concurrently, the County is also in process of releasing the proposed Esperanza Hills project on adjacent parcels directly east of the proposed Cielo Vista site. Because the Esperanza Hills development is a consequence of the Cielo Vista Project and both projects will share access easements and utilities connections, the two projects should be evaluated together. The near simultaneous release of these projects expands and complicates the scope of issues raised by the Cielo Vista Draft EIR.

A six-week comment period is insufficient for a thorough review by the public that the California Environmental Quality Act proscribes. In addition, the public comment period runs through and closes within the winter holiday season, which precludes the public from making an effective response on the Cielo Vista Draft EIR. If not extended, the current comment period would result in minimal public response and participation. As the lead agency in this development process, at the doorstep of the City of Yorba Linda, the County should advocate for achieving maximum public participation in the important environmental review phase of both this and the Esperanza Hills Draft EIR process.

In view of both the complexity of technical data to be reviewed and the burden to the public to review such voluminous data during the holiday season, we respectfully request that the County lengthen the public comment period by 30 days which would extend responses to January 22, 2014. Thank you in advance for your consideration of this request.

Sincerely,

Jean W. Watt

Jean Watt
President
Friends of Harbors, Beaches and Parks

cc: The Honorable Todd Spitzer

Letter: FHBP2

January 17, 2014

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Caspers Wilderness Park Volunteers
Earth Resource Foundation
Equestrian Coalition of O.C.
Environmental Nature Center
Great Park Environmental Coalition
Huntington Beach Wetlands Conservancy & Wildlife Care Center
Laguna Canyon Conservancy
Laguna Canyon Foundation
Laguna Greenbelt, Inc.
Newport Bay Conservancy
Sierra Club, Orange County
Surfrider Foundation, Newport Beach Chapter
Stop Polluting Our Newport
St. Mark Presbyterian Church Ecophilians

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Via E-Mail

Orange County Planning
Attn: Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:

Friends of Harbors, Beaches and Parks (FHBP) provides the following comments on the Cielo Vista Draft Environmental Impact Report (DEIR). We would like to first express our support for preservation of the entire property as opposed to its development. Additionally, the project's DEIR must recirculated to provide more complete data and analysis especially as it relates to the following sections: GHGs, Hazards and Hazardous Waste, Traffic and Transportation, and Recreation.

Our specific comments are as follows:

Section 4.6 – GHGs
As you know, the state has passed two important laws related to greenhouse gas emissions—AB 32 (The Global Warming Solutions Act of 2006) and SB 375 (The Sustainable Communities Planning Act of 2008). AB 32 requires that we reduce our greenhouse gas (GHG) emissions to 1990 levels by 2020. SB 375 requires each region to create a Sustainable Communities Strategy (SCS) that reduces vehicle miles travelled (VMT) and meets the target of an 8% reduction in those VMT by 2020 and 13% reduction by 2035.

Currently, the site is sequestering carbon through vegetation and soil. If the development is approved it will generate carbon and GHG emissions as well as VMT. As noted in the DEIR, it will generate 2,283 metric tons per year of CO_2e. In June of 2011 the Orange County Council of Governments (OCCOG) adopted a sub-regional SCS. This document was incorporated into the Southern California Association of Governments (SCAG) SCS in April 2012. To actually meet the aforementioned targets, decision makers can no longer approve developments in the "business as usual" model. Instead they must consider how proposed developments, on the urban edge especially, will increase the number of VMT due to their distance from major roadways, freeways, transit opportunities, and amenities (grocery stores, office stores, cleaners, etc.); increase the need for and maintenance of new services (water, trash, sewer, roads, etc.); increase the risk of loss of life and property due to wildland fires by continuing to build in fire prone hills of Orange County; and decrease the quality of life for the existing community members due to increased traffic, larger classroom sizes in schools, etc.

Consequently, we disagree with the DEIR's statement 4.6-2. This project is in direct conflict with the SCS approved by the OCCOG and SCAG, and adds to the regional VMT instead of reducing it.

Further, OCCOG adopted the state's first carbon avoidance and sequestration strategy in the SCS, we believe under the circumstances, given these approved plans and standards the appropriate and logical mitigation measure is to transfer the rights to develop the property to a site located in a more urban setting adjacent to transportation corridors and transit. This would have multiple benefits, including: reducing VMT, creating vibrant communities in our urban areas through the use of infill development, and reducing the requisite additional, ongoing and permanent services the development proposal would have required.

Continued development at the wildland-urban interface does not align with the legislation nor either SCS (OCCOG and SCAG) and clearly does not meet the regional targets set to reduce VMT by the California Air Resources Board. These hard facts must be squarely addressed in the DEIR.

As a side note, Cielo Vista property has been included on the FHBP Green Vision Map as a property conservation groups' support for permanent preservation. The Map has been in existence since 2000 and is supported our 80+ member coalition.

Section 4.7 – Hazards and Hazardous Waste

FHBP works closely with a coalition of conservation organizations that each provides their own unique perspective on varying land use related conditions. As it relates to this section one partner; Hills For Everyone (HFE) recently completed a comprehensive Fire Study, which included the Cielo Vista site, in a scientific report called: "A 100 Year History of Wildfires Near Chino Hills State Park" (Fire Study) (**See Attachment 1**) and the other partner, the California Chaparral Institute similarly provides scientific information about chaparral ecosystems and wildfire. Based on the inaccurate information about the Wildlife Fire Hazards (page 4.7-16 of DEIR), the DEIR must be revised and recirculated with more accurate and complete information.

Specifically, the DEIR contends that lightning is a main source of wildfires in the region. While it is accurate that wildfires can be caused by lightning, it is not accurate to state that lightning is a main source of wildfire in this region. The HFE Fire Study, which documented 103 wildfires between 1914 and 2011, methodically demonstrates that only two (2) wildfires were caused lightning (**See Attachment 2**). The remainder (101 fires) was caused by humans—both intentionally and unintentionally. Further as additional roads were built, highways expanded or homes constructed at the wildland-urban interface the wildfires burning the hills tripled since the early 1980s.

The Chaparral Institute's research indicates that scrub and chaparral ecosystems should burn every 30 to 150 years (Halsey, Rick. Fire, Chaparral, and Survival in Southern California, pg. 3) (**See Attachment 3**). Further, based on the HFE Fire Study, this region is suffering from an increased, and therefore unnatural, fire frequency (**See Attachment 4**). The Study shows the area's ecosystems are actually burning every year. This increased fire frequency is actually type converting the scrub and chaparral habitats to non-native grasses (**See Attachment 5**). These grasses dry out earlier in the season, ignite easier, and spread fire faster especially in Santa Ana wind conditions. Therefore the greater risk, not addressed in the DEIR's assessment is the fine fuel load created by non-native grasses on the project site as opposed to the excess plant fuel.

Additionally, the HFE Fire Study is available online, as is the majority of the associated fire data in kmz format. The Fire Study is attached to this letter for your convenience (see again, Attachment 1). This Fire Study is a repository of fires from many different agencies, including CalFire. In addition to the two fires indicated in the DEIR that burned the Cielo Vista site, the property was also burned, in its entirety, by the November 8, 1943 Santa Ana Canyon fire, which burned 9,375 acres (**See Attachment 6**). Also, the cause of the Freeway Complex Fire, the first of the two fires that eventually merged together to form the complex fire, did NOT start in the riverbed of the Santa Ana River. There is no access to the Santa Ana River at that location (in Corona) for vehicles. The Orange County Fire Authority's (OCFA) After Action Report indicates the fire started on the westbound side of the 91 Freeway at the Green River exit (OCFA After Action Report, p. 6).

Research by fire scientists, including United States Geological Survey expert Jon Keeley, indicates that land use planning has largely been absent from the debate about home loss by wildfire. Keeley contends that the location of houses and their arrangement contribute to the likelihood of the homes being lost during a wildfire. His research indicates where fires have burned before they will burn again (**See Attachment 7**). Keeley states, "We're losing homes in fires because homes are being put into hazardous conditions" … "The important thing is not to blame it on the fire event, but instead to think about planning and reduce putting people at risk" (**See Attachment 8**). The DEIR should address these facts.

The Freeway Complex Fire damaged or destroyed over 230 houses in Yorba Linda alone (more than 300 when looking at the region) (**See Attachment 9**). The homes that burned in the 2008 Freeway Fire are in the same type

of steep hillside communities as would be built by the developers of the Cielo Vista project. There is no defense against ember attacks during Santa Ana wind conditions, as witnessed in the Freeway Complex Fire where houses miles from the flame front burned down. Seventy six (76) houses were damaged or destroyed within ½ mile of the Cielo Vista project site (**See Attachment 10**). Had homes already been on the Cielo Vista property when the Freeway Complex Fire occurred many of those homes would likely have also been engulfed in flames, through exposure to radiant heat or ember attacks. CJ Fotheringham, a colleague of Keeley's notes, "There's really two types of fires: the ones we plan for, and the ones that do the damage" (quote from Attachment 8). The Freeway Complex Fire was the latter type of fire.

Based on this current research, wind-drive fire events and fire history, the Cielo Vista site is not a site that should have houses on it. This project should be denied due to its public safety risks to both life and property.

Section 4.14 – Traffic and Circulation
The DEIR's transportation section underestimates traffic impacts for the proposed project. The projected total of only 84 weekday A.M. peak hour trips from the proposed 112 residential units (DU's) is unusually low for the type of project and remote location proposed. The DEIR must be revised and recirculated to demonstrate more realistic traffic projections.

The DEIR does not address existing-future and with-without project intersection analysis for Yorba Linda Boulevard at Esperanza Road and at the 91 freeway. Given the well-known congestion challenges for these locations as reported by Yorba Linda residents during the Cielo Vista NOP hearing, the project proponent should have included impact analysis and mitigation measures, as appropriate, for them. The DEIR must be revised and recirculated to demonstrate this more comprehensive analysis.

The DEIR proposes no alternative transportation measures, despite locating new residential development at an urban fringe location. Such planning would reduce travel options for the new residents and demonstrates a conflict with the County's SCS to pursue reductions in VMT. The DEIR must be revised and recirculated to detail more appropriate options for its future residents.

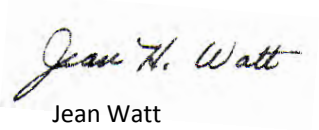
We also note that the existing intersection of Via del Agua at Yorba Linda Boulevard currently operates at LOS "F" during the A.M. peak hour (Cielo Vista Traffic Impact Analysis, pg. 8). The DEIR asserts the Project (112 DU's) is anticipated to generate a total of approximately 84 weekday A.M. peak hour trips and 113 weekday P.M. peak hour trips. We have serious questions about these figures being understated. The intersections are already operating at unacceptable levels. Therefore, the DEIR must be revised and recirculated to detail more appropriate options for its future residents.

Section 4.13 – Recreation
There are inconsistencies throughout the DEIR when reporting the acreage of Chino Hills State Park. According to the California Department of Parks and Recreation website, Chino Hills State Park is 14,102 acres (**See Attachment 11**). Additionally, the nearest accessible entrance to the State Park from the project site is not on Carbon Canyon Road as mentioned in the DEIR, it is the Quarter Horse/Rim Crest entrance in Yorba Linda (roughly 1.4 direct miles from the project site). However, due to the close proximity of this project to the State Park (roughly two-thirds of a mile) there are numerous impacts to the Park and its resources. These impacts, which must be studied in the DEIR, include edge effect, potential for fire ignition, loss of foraging habitat for golden eagles and other raptors, loss of habitat for the mountain lion, etc.

Additionally, Figure 4.13-1 and 4.13-2 on page 7 and 13 respectively of this section's PDF inaccurately shows the State Park boundaries. In 2006, 1,262 acres were added to the State Park in the hills of Yorba Linda (**See Attachment 12**). By excluding this parkland acreage, the project impacts are reduced because the State Park seems farther away than it actually is. The DEIR ignores impacts to State Park's natural resources which must be addressed in the DEIR.

To conclude, we find the DEIR for the Cielo Vista project is lacking in its analysis of GHGs, Hazards and Hazardous Waste, Traffic and Transportation, and Recreation and request the DEIR be at a minimum recirculated and revised for additional public comments.

Sincerely,



Jean Watt
President
Friends of Harbors, Beaches and Parks

cc: The Honorable Todd Spitzer

Attachments:

1 – HFE Report: "A 100 Year History of Wildfires Near Chino Hills State Park"
2 – HFE Fire Causes Map
3 – Halsey's Excerpt from Fire, Chaparral, and Survival in Southern California
4 – HFE Fire Frequency Map
5 – HFE Type Conversion Photo
6 – HFE Map of the 1943 Santa Ana Canyon Fire
7 – Keeley, Jon, et al. "Housing Arrangement and Location Determine the Likelihood of Housing Loss Due to Wildfire" March 2012, Volume 7, Issue 3
8 – Oskin, Becky. "Fighting Fires: You're Doing it Wrong." LiveScience. 12 Jan 2013
9 – HFE Properties Damaged or Destroyed in the Freeway Complex Fire Map
10 – HFE Map of Properties Damaged or Destroyed within ½ Mile of the Cielo Vista Project Site
11 – California Department of Parks and Recreation webpage for Chino Hills State Park
12 – The Official Chino Hills State Park Map

Attachment 1

A 100 Year History of Wildfires

Near Chino Hills State Park

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ABSTRACT

After witnessing the devastation of the Freeway Complex Fire, the regional conservation non-profit Hills For Everyone undertook a study of fires in the region. Though fires are a natural part of the ecosystem, there is nothing natural about the size and frequency of the fires destroying our wildlands year after year. Data, mainly from fire agencies, the California Department of Parks and Recreation, and newspapers, have provided details on fire perimeters, points of origin, and fire causes. This paper is the culmination of research that documents a near 100-year fire history (1914-2011) in and around Chino Hills State Park. This paper articulates the problem months, weather conditions, and "hot spots" of fire ignition. Recommendations are included for residents, jurisdictions, and fire, transportation, and natural resource agencies to implement that would reduce the number of fires to a more natural fire regime. We will continue to work with fire and natural resource agencies to bring the necessary resources to this area.

INTRODUCTION

Fires are a natural part of the ecosystem. Many factors influence the natural fire regime: weather conditions, vegetation (fuel) types, vegetation moisture, and plant distribution, etc. The natural fire regime, however, has been drastically altered by humans who have caused many more fires than would have occurred naturally. "New" factors influencing this increased fire regime include the introduction and proliferation of flammable non-native vegetation (e.g., palm trees, pampas grass, *Arundo donax*, exotic annual grasslands, etc.), increased Wildland-Urban Interface (WUI), and roadways to name a few.

An article on global warming on the website of the State of California's Attorney General cites higher temperatures and decreased moisture in the vegetation will result in increased fires.[1] In fact, statistics show that the western United States now has a longer fire season (starting earlier and ending later) that is more intense than in previous decades.[2] A nearby example of a California landscape modified by wildfires is Chino Hills State Park in Southern California, where the dominant coastal sage scrub and chaparral vegetation is converting to highly flammable non-native annual grasses.[3]

Claire Schlotterbeck, Hayashi (1999)

Type conversion as seen after one fire.

Claire Schlotterbeck, Hayashi (2012)

In 2003 Southern California experienced 13 major wildland fires that swept through the region at an alarming rate.[4] The Cedar Fire (San Diego) was called the state's most devastating as it burned down entire communities, including historic buildings in Cuyamaca, and killed 15 people.[5] In 2007 the Santiago Fire (Orange County) burned 28,517 acres in the foothills of the Santa Ana Mountains, which damaged or destroyed 22 homes.[6] Just a year later, in 2008, two fires ignited at opposite ends of the hills and merged to create the Freeway Complex Fire which burned down 187 homes, damaged another 131 homes and other structures, burned 95% of Chino Hills State Park, and scorched a four-county region.[7]

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1 Department of Justice. "Global Warming Impacts in California." Retrieved 28 Dec 2011 from the California Attorney General's website: *http://www.ag.ca.gov/globalwarming/impact.php*.

2 Ibid.

3 Ing, Alissa. Environmental Scientist, Department of Parks and Recreation. Personal communication approximately June 2010.

4 CNN. "California Wildfires Burn Through 600,000 Acres." Retrieved 28 Dec 2011 from the CNN website: *http://articles.cnn.com/2003-10-28/us/california.wildfire_1_blazes-cuyamaca-and-julian-firefighters?_s=PM:US*.

5 Ibid.

6 Orange County Fire Authority. After Action Report: Santiago Fire. Retrieved 3 Aug 2012, from the OCFA website: *http://www.ocfa.org/_uploads/pdf/aar_3-27-08.pdf*.

7 Fire Department Network News. "Orange County Fire Authority Declares Full Containment Today of Triangle Complex Fire." Retrieved 3 Aug 2012 from the Fire Department Network News website: *http://www.fdnntv.com/news.asp_Q_articleID_E_3868_A_title_E_Orange_County_Fire_Authority_Declares_Full_Containment_Today_of_Triangle_Complex_Fire*.

After completing a lengthy review of the fires throughout the Chino Hills area, it is now known that the State Park and neighboring hillsides have experienced more than 100 fires in just as many years, though most of the fires have occurred since 1977. As a result of this information, conservation advocates are working with fire, transportation, and natural resource agencies to protect the landscape from continued wildfire assaults. Together through protective mitigation measures that can reduce the fire frequency toward a more natural fire regime, this approach will protect life and property, and ensure our human and natural communities are safer.

Chino Hills State Park — The Setting

The State Park sits at the juncture of four of Southern California's most urbanized counties: Los Angeles, Orange, Riverside, and San Bernardino. The Park has been assembled through more than 30 different acquisitions to grow to more than 14,100 acres. The Park's first acquisition was in 1981 and even 30 years later the Park continues to expand. Chino Hills State Park was secured to protect its many rare natural resources. Its gently rolling hills are covered in grasslands and dotted with oak and walnut trees. In the steep canyons of the interior, sycamore-lined streams and walnut woodlands abound.

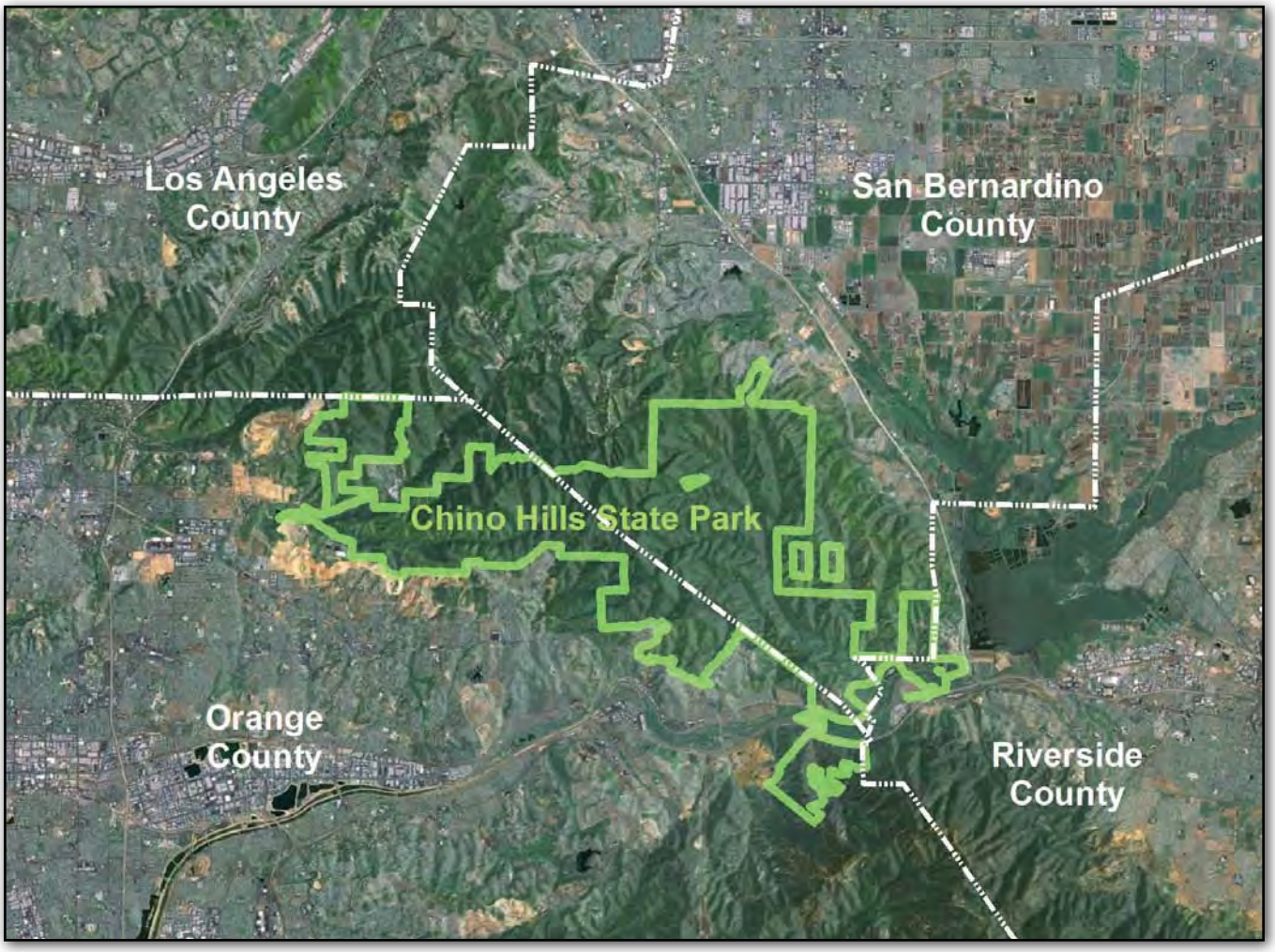

Figure 1. *Chino Hills State Park is located at the juncture of four Southern California counties.*

In 1771 the area was used for extensive grazing operations and by the early 1870s individuals began purchasing the land and using it for sheep and cattle ranching.[8] This grazing damaged the native plants and allowed opportunistic non-natives to spread. Now that the land is protected as a State Park, the grazing has been stopped and habitat restoration is underway.

The Park protects five main plant communities: southern oak woodland (11%), native and non-native grasslands (70%), coastal sage scrub (13%), mixed chaparral (5%), and cottonwood riparian woodland and riparian zones (1%).[9] In fact, the Park "supports 14 different vegetation series defined in the California Native Plant Society's classification,"[10] and 10 are considered unique or significant in Southern California because of their importance as habitat and because they are rapidly disappearing due to development.[11] The State Park contains some of the best remaining stands of walnut woodlands in Southern California. Similarly, the northern most stand of the rare tecate cypress tree is found in Coal Canyon in the State Park and neighboring Ecological Reserve.

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[8] Department of Parks and Recreation. Chino Hills State Park General Plan. February 1999.

[9] Department of Parks and Recreation. Chino Hills State Park General Plan. August 1986. p. 21.

[10] Department of Parks and Recreation. Chino Hills State Park General Plan. (1999). p. 21.

[11] Ibid.

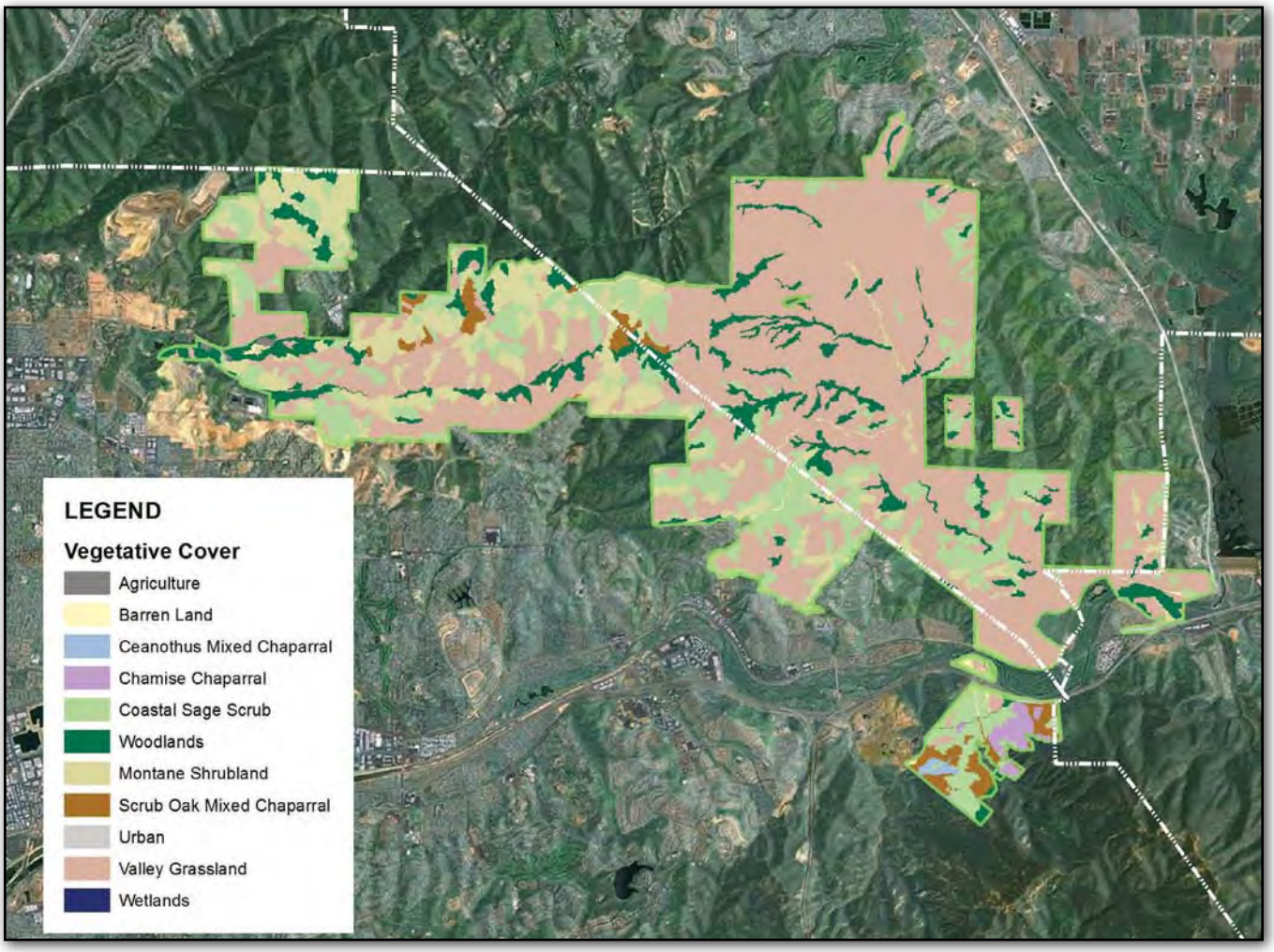

Figure 2. *Chino Hills State Park's vegetative cover provided by USDA Forest Service (EVEG Data) from 2002-2003.*

A wide variety of wildlife depend on the vegetative cover. Deer, bobcats, foxes, coyotes, raccoons, and the occasional mountain lion live in the hills. Falcons, hawks, owls, songbirds, and even golden eagles are protected in the Park. Several endangered birds are making a comeback as well.

Bicyclists, hikers, equestrians, photographers, campers, and other park enthusiasts frequent this natural area.

Ron Krueper, Coal Canyon Underpass (2003)

Hills For Everyone (HFE), a regional non-profit conservation organization, founded Chino Hills State Park in the early 1980s and has been working over the last 30 years to connect and protect this anchor parcel with protected lands in the Puente-Chino Hills Wildlife Corridor. Due to the work of HFE and State Parks, along with many other non-profits, agencies, and jurisdictions, a permanent connection at Coal Canyon was secured in 2001. Coal Canyon links the Trabuco District of the Cleveland National Forest in the Santa Ana Mountains with Chino Hills State Park and the greater Puente-Chino Hills ecosystem. This linkage provides a critical connection that allows wildlife to move freely between the Santa Ana Mountains and the Puente-Chino Hills. It also provides a source to repopulate natural areas should a catastrophic event, like a fire or disease outbreak, occur.

THE STUDY

After three decades of witnessing fires race through the hills and, in the aftermath of the 2008 Freeway Complex Fire which devastated the State Park, HFE launched a study to try to understand why so many fires burned in or adjacent to the State Park and to see if any actions could be taken to reduce the number of fires, resulting in the protection of both houses and natural resources. The study has resulted in the digital history of more than 100 fires that have burned between 1914 and 2011.

The Study Area includes lands generally bounded on the west by the 57 Freeway, Grand Avenue to the north, the 71 Freeway to the east, and the 91 Freeway to the south. The region studied includes all of Chino Hills State Park, but due to the proximity of other protected natural lands, portions of the northern section of the Cleveland National Forest's Trabuco District, the northern portion of the Irvine Ranch Lands (OC Parks), and the Prado Wetlands were also reviewed. Numerous private ownerships in Orange, Riverside, San Bernardino, and Los Angeles Counties that abut these protected lands were also included due to proximity.

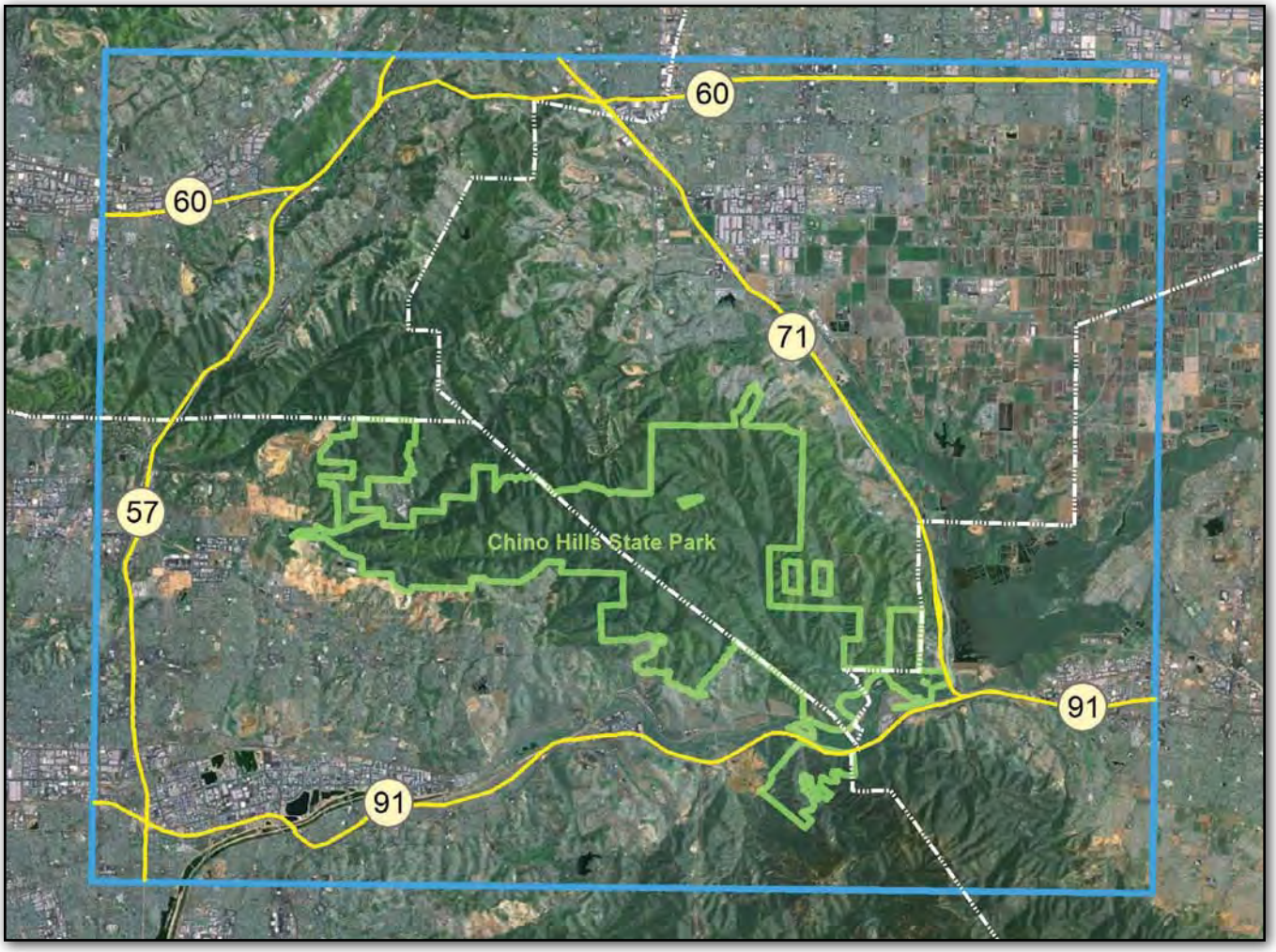

Figure 3. *The Study Area, shown in blue, includes Chino Hills State Park and surrounding hillsides.*

HFE had three main objectives in carrying out this study:

1. Using the data available document the fire perimeters, points of origin, causes, and weather conditions for each fire that burned in, adjacent to, or near Chino Hills State Park;
2. Analyze the results of the research and determine any fire-prone areas that needed particular attention; and
3. Provide general recommendations for residents and agencies to reduce the number of fires and impacts associated with wildland fires, and concurrently protect homes, people, and parkland from unnaturally frequent fires.

There are important terms used throughout this study and their meaning is useful to understand:

Cause: The confirmed or unconfirmed source of the wildland fire's ignition.

Fire Perimeter: The farthest geographical extent, also known as the outer boundary, of a fire. Note: Not all areas within the perimeter necessarily burned.

Fire Frequency: The number of times a specific geographic region has burned. This is similar to how population density is displayed, the darker the color the more frequent the area has burned.

Natural Fire Regime: The general classification of the role fire would play in the natural environment in the absence of modern human intervention.

Point of Origin: The approximate or exact location where the wildland fire ignited within the Study Area.

Study Area: Chino Hills State Park and environs.

Wildland-Urban Interface (WUI): The boundary between developed regions and the natural wildland areas.

Nancy Clifton Hawkes, Freeway Complex Fire (11/08)

Information Sources and GIS Analysis

HFE secured the shapefiles (digital data sets) of fire perimeters and points of origin from the California Department of Forestry and Fire Protection (CalFire), the Orange County Fire Authority (OCFA), and Chino Valley Independent Fire District (CVFD). Where appropriate, newspaper articles/maps, State Park Wildland Fire Reports, and personal accounts were used to digitally create a fire perimeter and/or point of origin. HFE used the ArcMap 10.1, a geographic information system (GIS) program, to assimilate the fire data. To enable wide distribution, the files were exported from ArcMap for use in Google Earth.

Through this research, HFE was able to piece together a digital dataset that outlines where known fires burned and where, and in some cases why, the fires started. Unfortunately, not all fires that burned in the Study Area were formally documented or no details about the perimeter or point of origin were complete enough to include in the study. Consequently, there are actually many additional fires that were not included in the study due to lack of adequate data. Historic record keeping for wildland fires wasn't as complete as it is now.

Fire Regime

HFE analyzed the fire regime (both natural and human-caused) of all documented fires that burned in, adjacent to, or had the potential to burn into Chino Hills State Park from 1914 – 2011. It seems in that 97 year history only two fires occurred naturally due to lightning strikes. This means the natural fire regime was one fire every 50 years. The balance of the fires (101) was caused by humans, either intentionally or unintentionally.

Fire Perimeters

HFE accumulated 71 separate fire perimeters in this study with 37 of those fires having known points of origin. The smallest fire is less than one acre, while the largest is over 41,000 acres.

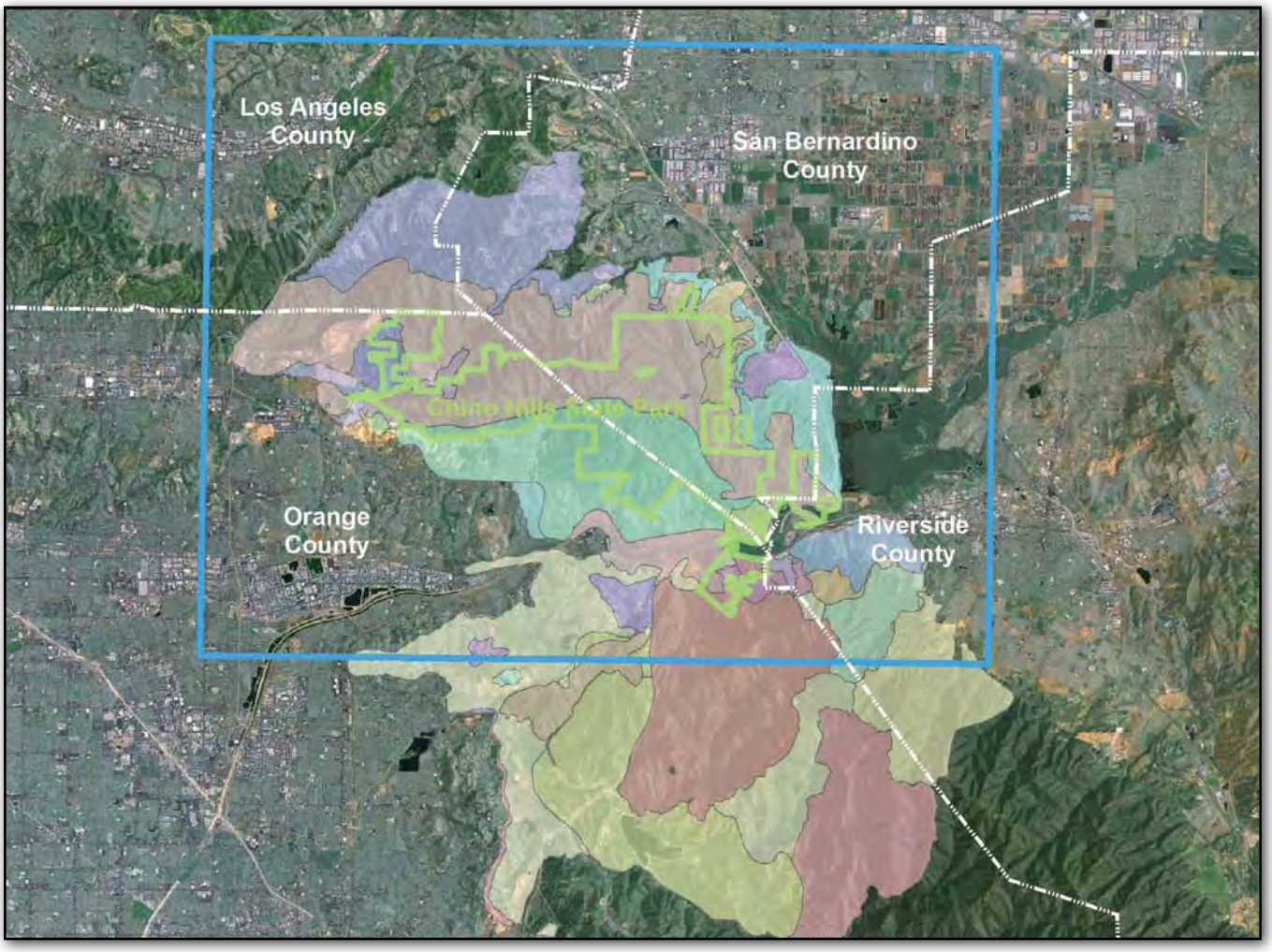

Figure 4. *The Study Area included 71 fire perimeters between 1914 - 2011.*

The three largest fires from the study include:

- Green River Fire - 41,285 acres
  November 1948
- Paseo Grande Fire - 39,872 acres
  October 1967
- Freeway Complex Fire - 30,306 acres
  November 2008

The first acquisition of parkland occurred in 1981 and since that date there has been increased pressure from residential development and road creation or expansions that have increased access to the undeveloped hills and the Park. It appears that the added housing developments at the WUI surrounding the Park have increased threefold the number of fires burning the Park. There were 26 fires between 1914-1980 and 76 fires between 1981-2011.

Claire Schlotterbeck, Freeway Complex Fire (11/08)

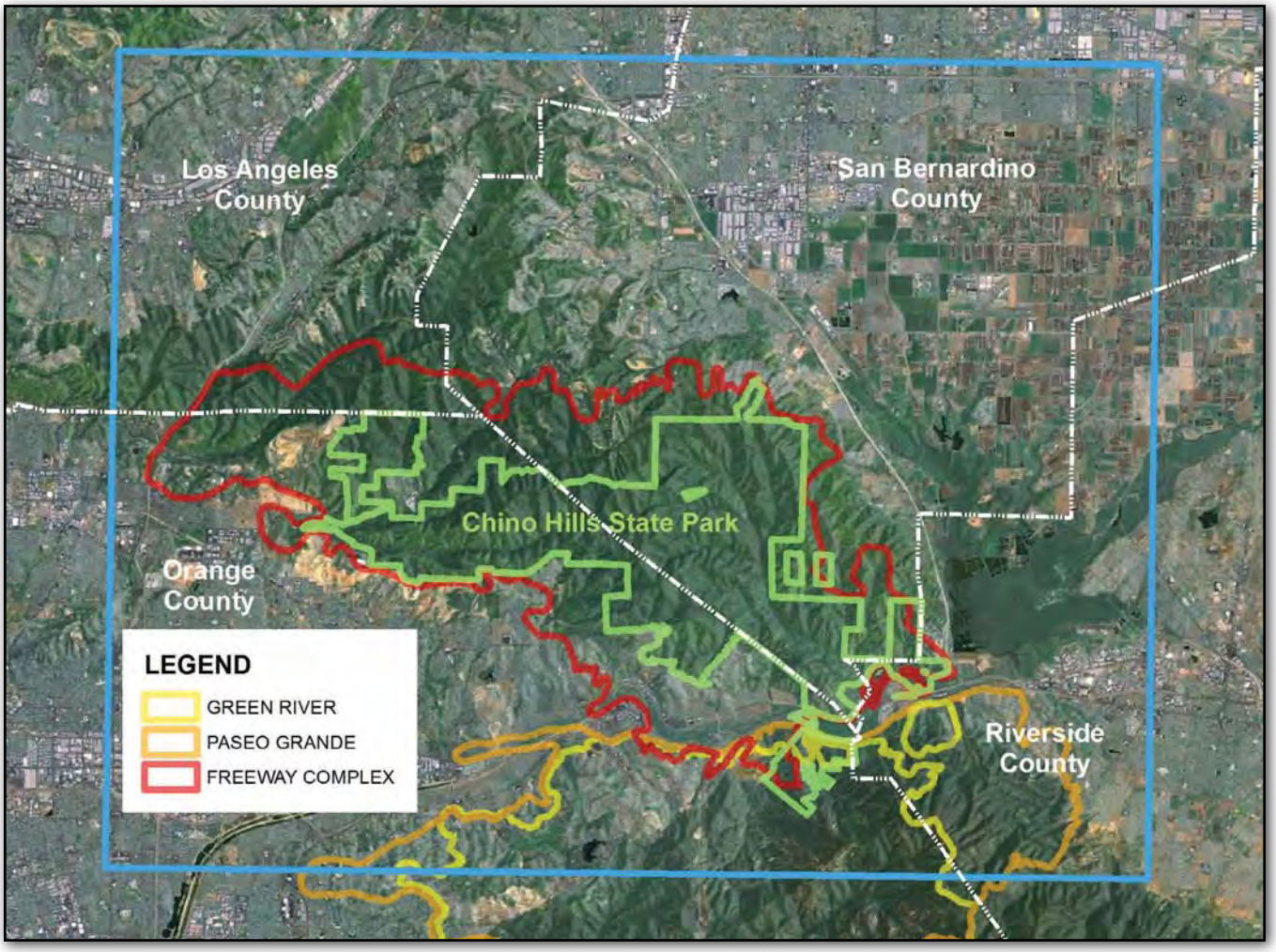

Figure 5. *The Study Area's three largest fires included the Green River, Paseo Grande, and Freeway Complex Fires.*

Fire Points of Origin

HFE documented 70 separate fire points of origin in this study, with 37 of the fires having known perimeters. The smallest fires are less than one acre in size, while the largest with a known point of origin is over 38,000 acres.

Claire Schlotterbeck, Green Fire (2/02)

Claire Schlotterbeck, Carbon Canyon Fire (9/90)

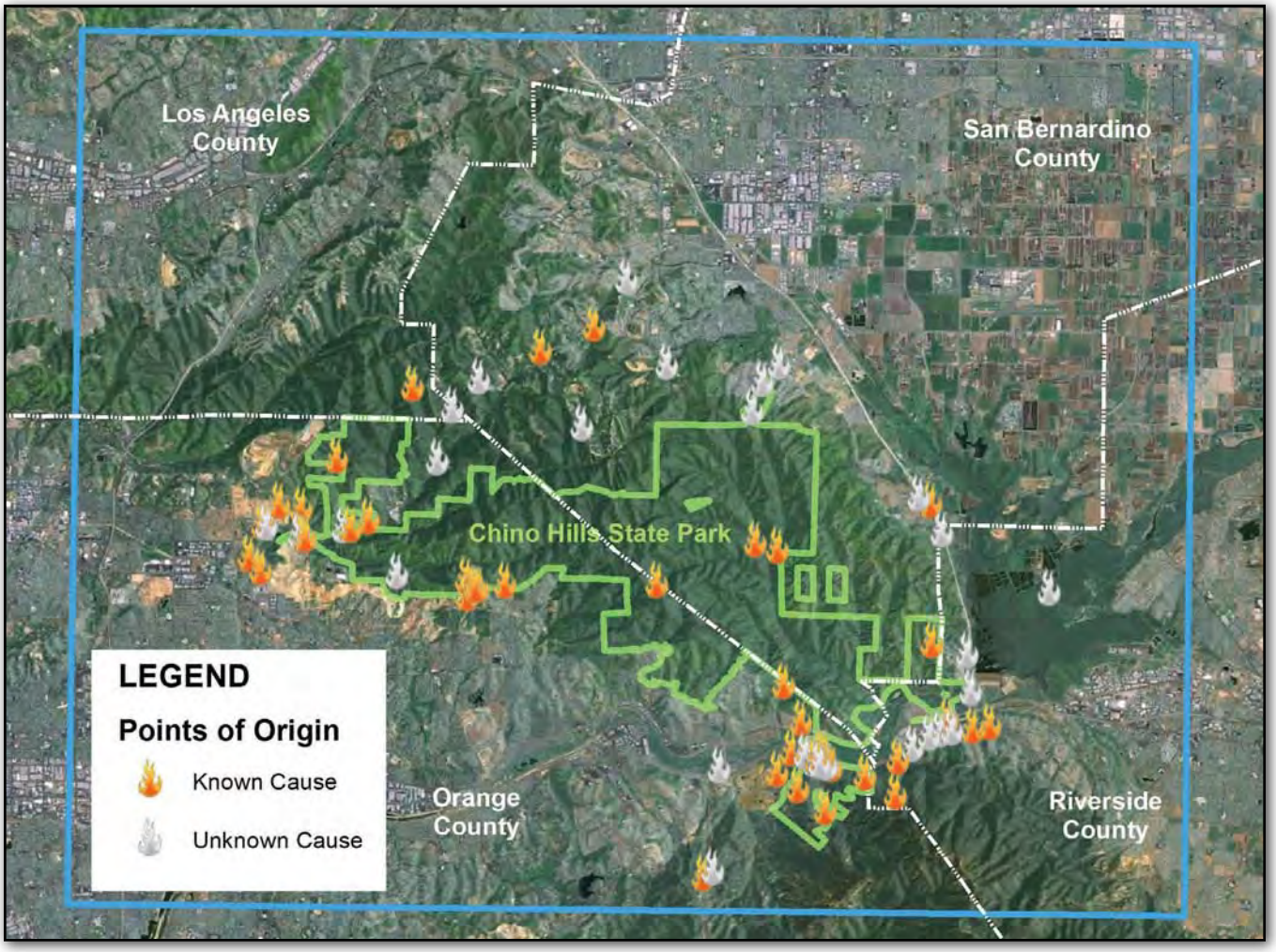

Figure 6. *The Study Area included 70 points of origin between 1914 - 2011, with some known causes and some unknown.*

The points of origin data indicate fires started due to a variety of causes. They are broken down as follows:

Table 1. *Fire causes, quantities, and total acreage burned.*

Cause	Number of Fires	Total Acreage Burned
Unknown	29	83,405*
Arson	9	9,349*
Power lines	7	53,048
Automobile	7	30,357*
Fireworks	5	10,316
Plane Crashes	5	829*
Machinery	4	393
Fire Agency**	2	14,150
Lightning	2	734
Total:	**70**	**202,599***

* indicates some acreages are unknown and therefore the number is actually higher than shown.
** indicates a re-ignited prescribed burn.

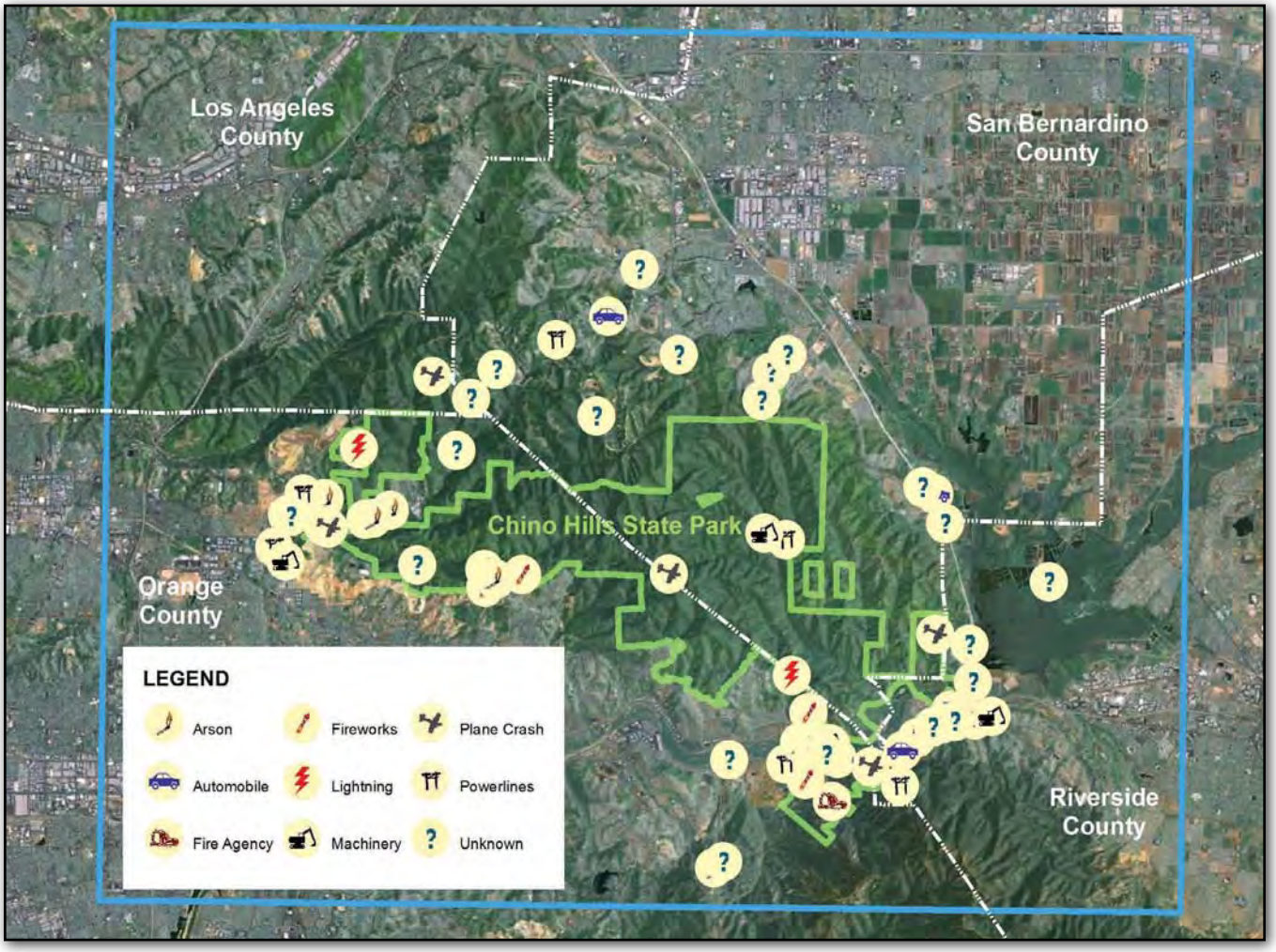

Figure 7. *The fire causes have been broken down into different categories with arson, power lines, and automobiles as the three main causes.*

Obtaining historic fire records was an issue during this study as 29 of the fires researched did not have a known or confirmed cause. The top three most identifiable causes of wildland fires in the Study Area are: arson, power lines, and automobiles.

Fire Frequency

By overlapping all the fire perimeters, HFE was able to determine the fire frequency in the Study Area. The lightest color on the map indicates that area only burned once. Whereas the darkest color on the map, a maroon color, indicates the area burned six or more times.

When one looks at the fire frequency and the points of origin there are obvious locations that have burned repeatedly. The data show the 91 Freeway Corridor (Santa Ana Canyon) between Anaheim and Corona, Carbon Canyon in Brea, and the Rim Crest entrance to Chino Hills State Park in Yorba Linda have burned the most. Later in this report, HFE will provide general recommendations for potential proactive steps to reduce the fire frequency at these known "hotspots."

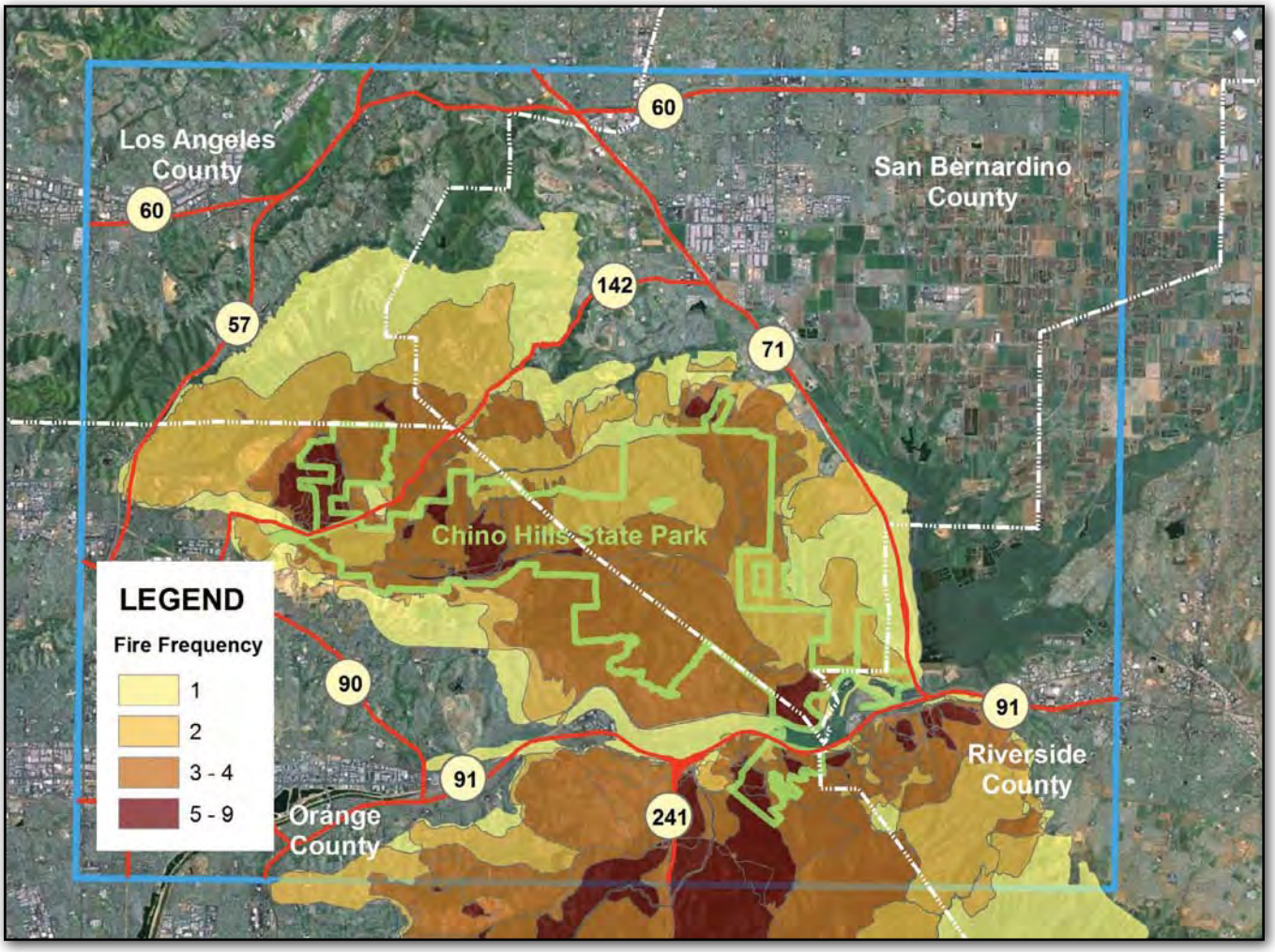

Figure 8. *The fire frequency shows three "hotspots:" the 91 Freeway Corridor, Carbon Canyon, and Rim Crest.*

Fires and Weather Patterns

The prevailing wind for this region is a westerly onshore flow and the majority of the fires occur during those normal conditions. The Santa Ana Winds (which come from the east/northeast) are the exception and as these winds tend to be hot and dry, fires that start under these extreme conditions have a tendency to get out of hand. The relative humidity and temperature play a significant role in reducing the fuel moisture in the vegetation, especially the fine dead fuel (such as annual grasses and mustard). It was noted in the After Action Report for the Freeway Complex Fire that due to the winds (gusts above 60 mph) and heat, "over 10,000 acres were consumed in the first 12 hours—roughly 14 acres per minute. That's nearly the length of 14 football fields every 60 seconds."[12] Consequently, Santa Ana Wind events are known for helping spread the fires and therefore require expanded and rapid fire protection presence.

Briefly, the feohn winds, known locally as Santa Ana Winds, are caused when high pressure systems sit inland and a low pressure system sits off the coast. In our area, the foehn/Santa Ana Winds are generated when the high pressure system is positioned over the high desert (Mojave and Great Basin). The winds blow from the southern side of the high pressure system toward the low pressure system over the Pacific Ocean. Typically they are hot and dry with a very low relative humidity (10-20%).[13] This is due to the compression of the wind after going up and over the mountains. Relative humidity indicates the ratio between the moisture in the air and the amount of moisture needed to saturate the air—it is a function of both moisture and temperature. Moisture in vegetation can be rapidly depleted in Santa Ana Wind conditions. Generally the finer the vegetation (grass) the quicker it dries out compared to a mature oak tree with a thick bark and a thick trunk.

Also researched were the weather patterns from the fires included in the study. Weather Underground and The Weather Channel websites were used to collect the data, using Chino Hills as the location. HFE was unable to obtain weather data before 1977.

Table 2. *Weather features during fire events.*

Weather Features on Fire Days		
Average Temperature was: (Data was available for 58 fires)	90°F	
Average Relative Humidity was: (Data was available for 34 fires)	51%	
Average Wind Speed was: (Data was available for 78 fires)	6 mph	
Average Wind Gusts were: (Data was available for 26 fires)	28 mph	
Wind Direction was: (The direction the wind originates from) (Data was available for 78 fires)	North (N, NE, NW)	11 fires
	East (E, ENE, ESE)	6 fires
	South (S, SE, SW)	16 fires
	West (W, WNW, WSW)	45 fires

[12] Orange County Fire Authority. After Action Report: Freeway Complex Fire. November 15, 2008. Retrieved 3 Aug 2012 from the OCFA website: *http://www.ocfa.org/_uploads/pdf/aar1_freeway.pdf*.

[13] National Oceanic and Atmospheric Administration. "Santa Ana Conditions – Southern California." Retrieved 20 June 2012 from the National Oceanic and Atmospheric Administration website: *http://www.noaawatch.gov/2008/santa_ana.php*.

Melanie Schlotterbeck, 91 Freeway Fire (6/10)

Duane Thompson, Carbon Canyon Fire (7/11)

Fires and Seasonal Patterns

It is not surprising that in the hotter, drier months between May and November there are more fires than in the moister winter months between December and April. There is a clear correlation between fire frequency and the summer months as seen in the table below. The majority of fires occur in July. However, October and November have the largest average acres burned. This is likely due to the fact that this is the end of the dry season and these months are prone to Santa Ana Wind conditions.

Table 3. *Fires by month, acreage burned, and average acreage burned.*

Month	Known Fires	Total Acreage Burned	Average Acreage Burned
Unknown	10	18,526*	2,058** (9 fires)
January	2	175*	175** (1 fire)
February	2	12,740	6,370
March	3	1,628*	814** (2 fires)
April	3	926	309
May	7	188	27
June	10	8,958	896
July	22	18,386*	919** (20 fires)
August	10	2,685*	298** (9 fires)
September	11	5,529*	614** (9 fires)
October	11	85,407*	8,541** (10 fires)
November	10	97,526	9,753
December	2	4*	4** (1 fire)
Total:	**103**	**252,678***	**2,717** (93 fires)**

* indicates some acreages are unknown and therefore the number is actually higher than shown.
** indicates acreages were averaged only where known fire acreages existed; if a fire acreage was unknown the fire was left out of the average.

CASE STUDY - THE 2008 FREEWAY COMPLEX FIRE

The power of zoning carries with it the responsibility for consequences.

Claire Schlotterbeck, Freeway Complex Fire (11/08)

The City of Yorba Linda has developed rapidly over the last 40 years. The data shows that Yorba Linda's population of 29,847 in 1980[14] had grown to 64,234 by 2011.[15] Despite the fact that many of the homes are relatively new and include fuel modification zones and other "ignition resistant" construction for the WUI, there was a tremendous loss of property in the 2008 Freeway Complex Fire. This case study outlines some of the fire statistics, anecdotes from Yorba Linda residents, and summarizes key points from the OCFA After Action Report.

The Freeway Complex Fire

On November 15, 2008 two fires started on opposite ends of the hills about two hours apart. The first fire ignited near the 91 Freeway on the eastern side of the hills in Corona by an automobile exhaust catching dry brush on fire, while the second fire began nearly 11 miles away to the northwest, in Brea, due to an unmaintained power line that also ignited dry brush.[16]

The weather conditions were ideal for a fire: 91°F, 4% relative humidity, sustained wind gusts at 35 mph (OCFA reports 43 mph with gusts at 60+ mph) coming from the northeast (a Santa Ana Wind event).[17] Due to the extreme weather conditions OCFA had ramped up its crews in the days preceding the fire.[18]

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[14] City Data. "Yorba Linda, California." Retrieved 31 Jul 2012 from the City Data website: *http://www.city-data.com/city/Yorba-Linda-California.html*.

[15] United States Census Bureau. "State and County Quick Facts." Retrieved 31 Jul 2012 from the U.S. Census Bureau website: *http://quickfacts.census.gov/qfd/states/06/0686832.html*.

[16] Orange County Fire Authority. Freeway Complex Fire - After Action Report.

[17] Weather Underground. "Fullerton Weather Station." Retrieved 1 Aug 2012 from the Weather Underground website: *http://www.wunderground.com/history/airport/KFUL/2008/11/15/DailyHistory.html?req_city=NA&req_state=NA&req_statename=NA*.

[18] Orange County Fire Authority. Freeway Complex Fire - After Action Report.

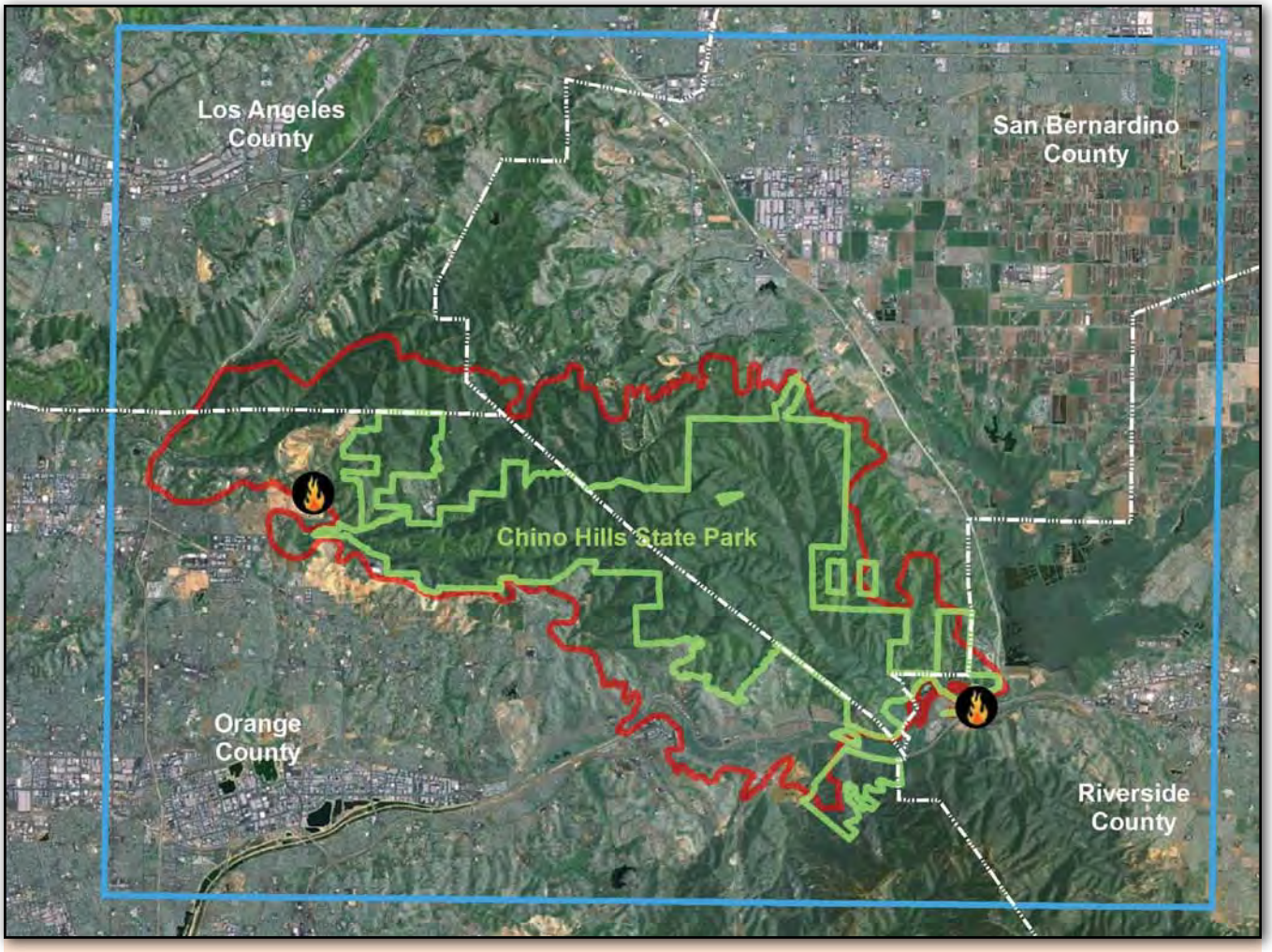

Figure 9. *The red outline indicates the fire perimeter for the Freeway Complex Fire of 2008 with its two points of origin.*

The Initial Timeline

The Corona Fire was reported at 9:01 AM. The first Orange County strike team arrived at 9:23 AM, and the first air assaults began at 10:10 AM. By 10:20 AM, OCFA reported the fire would reach the City of Yorba Linda within 30 minutes. The first 911 call to report the Brea fire arrived at 10:43 AM.[19] A personal account from a 911 caller revealed the dispatcher dismissed the notion that a new fire had started in Brea, stating the smoke the caller was seeing was from the Corona blaze. The caller relayed that flames could be seen from Carbon Canyon Road (in Brea), which is no where near the Corona blaze.

Nicholas Staddon, Freeway Complex Fire (11/08)

[19] Ibid.

Firefighting crews arrived on scene for the Olinda Landfill Fire by 10:55 AM.[20] The presence of this second fire, which immediately threatened homes, shifted the firefighting strategy. By 10:58 AM Yorba Linda's first home had already been destroyed.[21]

Yorba Linda on Fire

With many residents at home on a Saturday morning, they were witness to the quick moving Corona Fire. Residents began self evacuating and quickly clogged traffic on the major thoroughfares. Evacuees streamed down from the higher elevations making it harder for those closest to the thoroughfares to enter the traffic flow. The flood of cars brought the main east-west traffic corridors of Imperial Highway and Yorba Linda Boulevard to a standstill. In addition, due to the Corona fire, traffic was stopped on the other east-west corridor, the 91 Freeway. Fire trucks struggled to get to the fire as residents struggled to leave from the oncoming flames.[22]

> *"The fire moved through residential neighborhoods from Brush Canyon to the San Antonio neighborhood—a 5.5 mile span in less than five hours."*
> *— OCFA After Action Report, p. 36*

Bob Kanne, Freeway Complex Fire (11/08)

Anecdotal accounts from Yorba Linda residents describe the chaos of trying to evacuate during the firestorm. One resident stated, "people can't get out on San Antonio... [it was] a huge, huge traffic jam."[23] When exiting their neighborhoods they also hit gridlock on the major arterial of Yorba Linda Boulevard. One resident who lost his home had no time to even drive his cars out of the driveway. With no car to drive, he ended up directing traffic at Via Del Agua and Yorba Linda Boulevard. Evacuees from his neighborhood couldn't leave because there was no traffic signal to stop the flow of traffic.

A Predictable Disaster

This disaster was predictable since large fires on Santa Ana Wind days on east-west trending terrain have occurred over and over again. Land use decisions in the City of Yorba Linda may have contributed to placing residents, their homes, and businesses at risk. In late 2002 the City of Yorba Linda approved the Shapell project which allowed a threefold increase over the General Plan density.[24] It is uncertain whether mitigations for traffic impacts on major thoroughfares, in times of emergency, were adequate.

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[20] Ibid.

[21] Ibid.

[22] Ibid.

[23] The Weather Channel (Producer). Weathering Disaster: "Yorba Linda Fires" (Episode). (24 Sep 2011). Yorba Linda, CA: The Weather Channel.

[24] Los Angeles Times. "Yorba Linda Seeks to Rescind Development Vote." 5 Dec 2002. Retrieved 2 Aug 2012 from the Los Angeles Times website: http://articles.latimes.com/2002/dec/05/local/me-yorba5.

Melanie Schlotterbeck, Yorba Linda Flight (2008)

The Freeway Complex Fire burned down 187 homes, damaged another 131 homes and other structures[25] and burned 95% of Chino Hills State Park. According to the OCFA After Action Report: The Freeway Complex Fire burned "30,305 acres of watershed ... across six cities and four counties. [Fire] [s]uppression costs exceeded $16.1 million, and property loss has been estimated at nearly $150 million."[26]

Lessons Learned

If there are lessons to be learned, it seems there are opportunities for jurisdictions to revisit how their communities grow and where the most appropriate place for housing developments should be located. Cities and homeowners' associations must maintain defensible space at the WUI, buffering the homes from the edge of the WUI. When cities increase the density of a housing development but do not adequately increase the road capacity on arterials, evacuations during a fire storm are difficult, dangerous, and potentially disastrous.

Bob Kanne, Freeway Complex (11/08)

Even with more stringent building codes and relatively new houses, hundreds of homes were lost or damaged. According to Kris Concepcion of OCFA, "embers were getting into the attics of homes."[27] It seems there is still work to be done to harden homes from both flame fronts and ember storms. Most importantly, fleeing residents need to be able to evacuate safely.

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[25] Fire Department Network News. "Orange County Fire Authority Declares Full Containment Today of Triangle Complex Fire."

[26] Orange County Fire Authority. Freeway Complex Fire - After Action Report. p. 28.

[27] The Weather Channel. Weathering Disaster: "Yorba Linda Fires" (Episode).

Freeway Complex Fire Photos (11/08)

Dr. Jeff Hansen (Yorba Linda)

Bob Kanne (Yorba Linda)

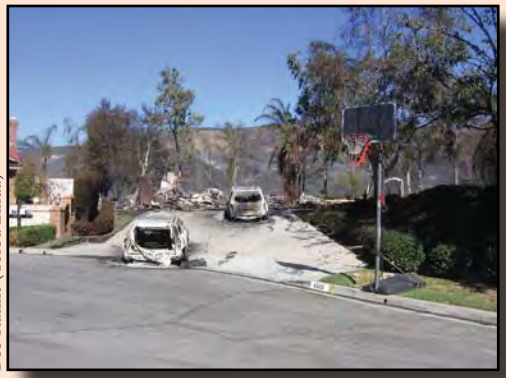
Bob Kanne (Yorba Linda)

© Lee Paulson (Diamond Bar) *used with permission*

Nicholas Staddon (Brea)

Nicholas Staddon (Brea)

Jeff Garvin (Chino Hills)



Bob Kanne (Yorba Linda)

RECOMMENDATIONS

The data demonstrate that there are three "hotspots" in the Study Area that show a propensity to burn: Santa Ana Canyon, Carbon Canyon, and Rim Crest. With that in mind HFE developed several suggestions for possible adoption by transportation and fire agencies, State Parks, cities, and homeowners. We recognize that these recommendations require appropriate staffing and reliable funding. HFE is willing to help develop the political will and partner on implementing these recommendations.

Melanie Schlotterbeck, Yorba Linda (8/12)

General Recommendations

- Enforcement of fire rules and regulations is essential if fires in this region are to be reduced. Develop an effective and funded mechanism for fining violators to improve safety.
- OCFA and citizens of Yorba Linda should organize and work together to increase fire safety as the neighboring Carbon Canyon Fire Safe Council has done.
- Communities around the hills should create volunteer Fire Watch programs that patrol streets on high wind days, like the Santiago Canyon area residents have implemented.
- Individual residents should take personal responsibility to improve the fire safety of their own homes.
- Jurisdictions should require the highest standard and state-of-the-art construction for fire prevention (e.g., installing passive closure attic vents, which close without human intervention).
- When planning for future development at the WUI, developers and lead agencies should involve fire agencies at the earliest planning stages.

Santa Ana Canyon Recommendations

- Harden the edges of the 91 Freeway that abut natural lands using K-rails or similar structures.
- Incorporate and enforce an appropriately frequent maintenance program for the power lines owned or operated by Edison and any other utility providers.
- The steep terrain and the wind tunnel effect of this east-west trending canyon heighten the threat of fire in this location. It seems prudent to add a new fire station at either Green River or Gypsum Canyon to improve response time to Santa Ana Canyon fires especially given that the 91 Freeway is often congested which reduces response time.
- Continue to increase fire patrols or fire agency presence on high wind/high heat/low humidity days on the 91 Freeway and neighboring streets/communities.
- Include Caltrans-type flashing signage on high fire hazard days alerting commuters to be cautious and report suspicious behavior.
- Improve safety by enforcing violations caused by agencies, contractors, and businesses that work along the Santa Ana Canyon. For example, agencies should requiring spotters and water trucks when working in or next to natural lands.

Carbon Canyon Recommendations

- Caltrans should continue to improve consistency on fuel clearance in a more timely fashion along Carbon Canyon Road (Highway 142). Spraying of the plants in the Caltrans right-of-way should occur early in the growing season, when the plants are small making handcrew removal easier and more economical.
- Consider reducing the participation for fire agency mutual aid for cities with a WUI and a history of fires. For example, the fire agencies serving Brea, Yorba Linda, and Chino Hills should be "at the bottom of the list" for sending mutual aid to other areas on high fire hazard days since they may have their own fire to respond to. Requests for mutual aid should first be made to more urbanized communities with no WUIs.
- Continue to increase fire agency presence and patrols during high wind/high heat/low humidity days.

Rim Crest Recommendations

- Include a door-to-door homeowner education program before fire season begins each year.
- Incorporate proactive steps by OCFA and the City of Yorba Linda for retrofitting homes with hardening techniques e.g., boxed eaves, automatic attic vent closures, roofs cleared of leaf debris, no ladder fuels near the house, etc.
- Remove non-native highly flammable vegetation (such as palm trees and pampas grass).
- Give fire risk the highest consideration in approving housing projects on the WUI.
- Continue fire agency presence and patrols during high wind/high heat/low humidity days.
- Require new developments to use native, fire resistance landscape to reduce ignition at the WUI and incorporate defensible space within the development.

CONCLUSION

This study shows that Chino Hills State Park and environs have endured significantly more fires, 101 to be exact, than would have naturally occurred by lightning strikes (2). Instead of a fire burning every 50 years in the natural fire regime, humans have increased the ratio essentially to a fire a year. HFE recognizes that a sample size of two fires is not enough to draw firm conclusions. However, our local examples of natural fires indicate fewer acres burn (367 acres) on average than fires ignited by humans or human error (2,494 acres). Natural fires tend to ignite on ridge tops with a lightning strike. The fire then generally spreads downhill and does so more slowly allowing firefighters more time to attack the blaze. Human-caused fires tend to start at a canyon bottom, where roads usually are, and race uphill.

As communities arose and developments were built, opportunities for fires to ignite at the WUI increased. It is clear from this research that humans have changed the natural fire regime—both intentionally and unintentionally. Some of the causes, like machinery hitting a rock igniting dry brush could be prevented. Risk could be reduced with the incorporation of fire spotters, restrictions on work during certain weather conditions, and the presence of water trucks. Other fires ignited by power lines seem to indicate the region would benefit from an improved maintenance schedule before the fire season begins.

Claire Schlotterbeck, Soquel Fire (10/78)

It is clear there are many more fires occurring here than would have occurred naturally and there are many consequences to having a fire a year burn in the region. First, there is an increased risk of loss of life, property, and natural resources, which all translate to a huge economic loss, not to mention personal losses, for a region each time it burns. Second, increased fires mean a shift in the type and location of vegetation that normally could have recovered in a natural fire regime. When burned too frequently the native vegetation does not have enough time, and in some cases stored energy, to regenerate or become mature enough to produce seeds. This stress on the native vegetation allows non-native plants to dominate the landscape. Finally, given the $150+ million investment made by private and public agencies in protecting and restoring the hills, it challenges the sensibilities to think of the State Park merely as fuel load. In the short-term, reducing the fuel load exacerbates the long-term problem of type conversion to highly flammable non-native fuels, which generally dry earlier, ignite easier, and spread fire faster than native plants. It was reported during the Freeway Complex Fire (2008) that the non-native 30 foot tall water-loving *Arundo donax* spread the flames up Carbon Canyon Creek toward the community of Sleepy Hollow. Riparian corridors are natural buffers to flames, but not when they are choked by non-native, highly flammable plants.

The responsibility for protection of the community from wildland fires lies first with the developer during the planning phase of the development. Governmental jurisdictions also share in this responsibility because decision makers have the power to approve or deny inappropriate developments at the WUI. Finally, private homeowners have the responsibility to learn the vulnerabilities of their home and take proactive steps to remedy them where possible. Additionally, the city and homeowners' associations must ensure proper maintenance of the defensible space within the community.

To reduce the unnatural frequency of fires to a more natural pace: education, outreach, planning, and a shift in approach is needed. HFE is committed to working with planners, natural resource, transportation, and fire agencies to reduce the fire frequency to a more natural fire regime in the Study Area.

Suggestions for Further Study

Due to capacity and time limitations, HFE was only able to report on the wildland fires (perimeters and points of origin), however HFE believes there are additional areas of study that would benefit fire prevention, resource protection, and planning efforts at the WUI. These include:

- An analysis of the effect of repeated wildfires on wildlife habitat and its effect on wildlife
- A historical analysis documenting the loss of valuable vegetation types and type conversion
- The effects wildfires have on wildlife movement, foraging, reproduction, and survival
- Whether enforcement measures for fire prevention are adequate
- The expansion of the WUI and its impacts on the Park

ACKNOWLEDGEMENTS

About the Authors

Claire and Melanie Schlotterbeck are conservation advocates specializing in the Puente-Chino Hills Wildlife Corridor. This mother-daughter team both work as long time consultants to HFE. Melanie is a technical consultant and works on GIS mapping, land acquisition, research projects, and outreach efforts. More recently, her efforts have resulted in acquisition and restoration projects that benefit the State Park. She earned her bachelor's degree in Environmental Geography and her Master of Science in Environmental Science from Cal State Fullerton. Claire Schlotterbeck is the Executive Director of HFE and has been involved in preservation of the Puente-Chino Hills for over three decades. She played a key role in the formation of the 14,100-acre Chino Hills State Park. Claire earned her bachelor's degree in Political Science from UCLA and a Master of Science from Purdue University.

HFE also gratefully recognizes the contributions of:

- CalFire, Orange County Fire Authority, and Chino Valley Independent Fire District for providing digital data for analysis and inclusion in this study.
- Chino Hills State Park staff, Ron Krueper, Kelly Elliott, Ken Kietzer and Alissa Ing, for providing important reports, expertise, critiques, and personal accounts that led to a more complete study.
- Scott Carpenter of the National Weather Service for assisting HFE accumulate weather statistics on the wildland fires.
- GreenInfo Network for providing the initial mapping for this project.
- Dan Nove for his expertise in converting the GIS data to Google Earth and refinement of the maps for this project.
- Carbon Canyon Fire Safe Council, for its support of this project and efforts to educate canyon residents through its outreach and annual Wildfire Awareness Fair.
- The City of Brea, California Fire Safe Council, and the Santa Ana Watershed Association for their funding and work in restoring Carbon Creek through the *Arundo* removal project post Freeway Complex Fire.
- Drs. Rod and Carol McKenzie for their able editorial assistance.

APPENDIX A

Fire Perimeter Data

Fire Name	Fire Date	Acreage Burned	Cause	Point of Origin
Fuel Break (Historical)	—	132	—	—
Irvine Ranch	1914	14,830	Unknown	Unknown
Fresno Canyon*	1928	1,007	Unknown	Unknown
Gypsum*	1929	1,085	Unknown	Unknown
Carbon Canyon*	1930	733	Unknown	Unknown
Santa Ana Canyon	Nov. 8, 1943	9,375	Unknown	Unknown
Gaines	Sep. 22, 1944	270	Unknown	Unknown
Shell	July 2, 1947	118	Unknown	Unknown
Green River	Nov. 4, 1948	41,285	Unknown	Unknown
Nohl	June 21, 1951	176	Unknown	Unknown
Santiago	Oct. 15 ,1958	110	Unknown	Unknown
La Vida	Nov. 29, 1959	611	Unknown	Unknown
91 Freeway*	1962	139	Unknown	Unknown
Paseo Grande	Oct. 29, 1967	39,872	Unknown	Known
Firestone	Oct. 30, 1967	236	Unknown	Known
Tonner Canyon	June 13, 1971	9	Unknown	Unknown
Serranos	Sep. 9, 1973	304	Unknown	Known
Mine	July 28, 1977	4,956	Unknown	Unknown
Soquel	Oct. 23, 1978	5,428	Unknown	Known
Soquel Canyon*	Oct. 25, 1978	251	Unknown	Unknown
Los Sarranos [Serranos]	June 19, 1979	172	Unknown	Known
Paseo	Sep. 15, 1979	3,644	Smoldering Sleeper Fire	Known
Corona	1980	116	Unknown	Unknown
Green River	July 13, 1980	379	Unknown	Known
Owl	Oct. 28, 1980	18,332	Unknown	Known
Carbon Canyon	Nov. 16, 1980	14,613	Unknown	Known
Euclid	Oct. 30, 1981	714	Unknown	Known
Fresno Canyon*	Oct. 1982	211	Unknown	Unknown
Gypsum	Oct. 9, 1982	19,986	Power lines	Known

* indicates the fire name was assigned by Hills For Everyone.

Fire Perimeter Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Point of Origin
Santa Ana Canyon*	Fall 1983	443	Unknown	Unknown
Fresno*	July 12, 1983	642	Unknown	Unknown
91 Freeway*	July 13, 1983	1,618	Unknown	Unknown
Bane Canyon*	Sep. 14, 1983	581	Unknown	Unknown
Wardlow Wash*	July 8, 1984	114	Unknown	Unknown
Coal Canyon	July 9, 1984	450	Fireworks (Bottle Rocket)	Known
Coal Canyon	July 2, 1985	540	Plane Crash into Power lines	Known
Shell	Aug. 11, 1985	1,635	Unknown	Known
Green River	Oct. 6, 1985	Less than 1	Unattended Children	Known
Fresno Canyon*	Aug. 2, 1986	95	Unknown	Unknown
Bane Canyon*	June 24, 1988	820	Unknown	Unknown
South Ridge	May 24, 1989	5	Mower hit rock, ignited brush	Known
Aliso Canyon	June 29, 1989	44	Unknown	Unknown
Carbon Canyon	June 27, 1990	6,664	Arson	Known
Yorba	July 12, 1990	7,884	Model Rocket	Known
91 Freeway	July 5, 1991	50	Machinery	Known
San Juan Hill	June 10, 1992	249	Plane Crash	Known
Stagecoach	Oct. 26, 1993	581	Unknown	Unknown
91 Freeway*	1994	41	Unknown	Unknown
Carbon Canyon [Wagon]	June 25, 1994	757	Unknown	Known
91 Freeway*	Aug. 5, 1994	28	Unknown	Known
Highway 91	Aug. 26, 1995	177	Unknown	Unknown
Carbon Canyon	Aug. 31, 1998	733	Lightning	Known
Green	Feb. 9, 2002	2,234	Downed Power lines	Known
Evening	Apr. 21, 2002	893	Fireworks	Known
Blue Gum	Nov. 20, 2002	497	Arson	Known
Coal Canyon	July 12, 2003	2	Arson	Known
Green River	July 24, 2004	16	Car Crash	Known
Carbon Canyon	Sep. 25, 2004	18	Car Fire	Known

* indicates the fire name was assigned by Hills For Everyone.

Fire Perimeter Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Point of Origin
Yorba Linda	July 5, 2005	1,079	Fireworks	Known
Carbon Canyon	Aug. 4, 2005	1	Arson	Unknown
Sierra Peak	Feb. 6, 2006	10,506	Backfire	Known
Brush Canyon	July 11, 2006	1	Unknown	Unknown
Blue Gum	Aug. 2, 2006	3	Illegal Campfire	Unknown
241 Incident	Aug. 22, 2006	Less than 1	Unknown	Unknown
Windy Ridge [241 Incident]	Mar. 11, 2007	1,618	Burning Car (Arson)	Known
Rose	Apr. 12, 2007	8	Machinery	Known
Freeway Complex	Nov. 15, 2008	30,306	Auto Exhaust & Power lines	Known
241 Incident	Sep. 25, 2009	Less than 1	Unknown	Unknown
91 Freeway Incident	June 16, 2010	47	Unknown	Known
Carbon Canyon	July 11, 2011	518	Arson	Known
Rose Drive*	Nov. 2, 2011	5	Power lines	Known

* indicates the fire name was assigned by Hills For Everyone.

APPENDIX B

Fire Causes and Points of Origin Data

Fire Name	Fire Date	Acreage Burned	Cause	Perimeter
Sonome Canyon	Unknown	Unknown	Plane Crash	Unknown
Paseo Grande	Oct. 29, 1967	39,872	Unknown	Known
Firestone	Oct. 30, 1967	236	Unknown	Known
Serranos	Sep. 9, 1973	304	Unknown	Known
Soquel	Oct. 23, 1978	5,428	Unknown	Known
Los Sarranos [Serranos]	June 19, 1979	172	Unknown	Known
Paseo	Sep. 15, 1979	3,644	Smoldering Sleeper Fire	Known
Green River	July 13, 1980	379	Unknown	Known
Owl	Oct. 28, 1980	18,332	Unknown	Known
Carbon Canyon	Nov. 16, 1980	14,613	Unknown	Known
Euclid	Oct. 31, 1981	714	Unknown	Unknown
Gypsum Canyon	Oct. 9, 1982	19,986	Electric Lines	Known
Coal Canyon	July 9, 1984	450	Fireworks (Bottle Rocket)	Known
Coal Canyon	July 2, 1985	540	Plane Crash into Power lines	Known
Shell	Aug. 11, 1985	1,635	Unknown	Known
Green River	Oct. 6, 1985	Unknown	Unattended Children	Known
Coal Canyon	Apr. 21, 1987	25	Vehicle Fire	Unknown
Gypsum Canyon	May 12, 1987	20	Incendiary Device	Unknown
Coal Canyon	July 7, 1987	5	Unknown	Unknown
Coal Canyon	July 28, 1987	10	Unknown	Unknown
Rim Crest	Mar. 13, 1988	10	Kids with Matches	Unknown
Coal Canyon	May 13, 1988	3	Unknown	Unknown
La Vida	Dec. 4, 1988	Unknown	Unknown	Unknown
South Ridge	May 24, 1989	5	Mower hit rock, ignites brush	Known
Carbon Canyon	July 5, 1989	Unknown	Unknown	Unknown
Featherly Regional Park	July 14, 1989	Unknown	Unknown	Unknown

Fire Causes and Points of Origin Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Perimeter
Chino Hills State Park	Oct. 10, 1989	400	Unknown	Unknown
Carbon Canyon	June 27, 1990	6,664	Arson	Known
Yorba	July 12, 1990	7,884	Model Rocket	Known
Carbon Canyon	July 22, 1990	1	Unknown	Unknown
Carbon Canyon	July 27, 1990	2	Downed Power line	Unknown
91 Freeway	July 5, 1991	245	Machinery	Known
Coal Canyon	May 10, 1992	3	Unknown	Unknown
San Juan Hill	June 10, 1992	249	Plane Crash	Known
Chino Hills State Park	Sep. 8, 1992	500	Power lines	Unknown
Carbon Canyon	Nov. 15, 1993	40	Plane Crash	Unknown
Carbon Canyon [Wagon]	June 25, 1994	757	Unknown	Known
91 Freeway	Aug. 5, 1994	28	Unknown	Known
71 Freeway	Dec. 19, 1994	4	Unknown	Unknown
Carbon Canyon	June 24, 1998	20	Road Flare (Arson)	Unknown
Carbon Canyon	Aug. 31, 1998	733	Lightning	Known
Chino Hills State Park	Jan. 19, 1999	Unknown	Plane Crash	Unknown
Woodview	Sep. 12, 2000	200	Unknown	Unknown
Chino Hills Parkway	Sep. 18, 2000	2	Unknown	Unknown
Green	Feb. 9, 2002	2,234	Downed Power lines	Known
Evening	Apr. 21, 2002	893	Fireworks	Known
71 Freeway	Aug. 3, 2002	10	Car Exhaust Pipe	Unknown
Blue Gum	Nov. 20, 2002	497	Arson	Known
Coal Canyon	July 12, 2003	2	Arson	Known
71 Freeway	Aug. 19, 2003	3	Unknown	Unknown
Coal Canyon	May 30, 2004	2	Unknown	Unknown
Green River	July 24, 2004	16	Car Crash	Known
Carbon Canyon	Sep. 25, 2004	18	Car Fire	Known

Fire Causes and Points of Origin Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Perimeter
Yorba Linda	July 5, 2005	1,079	Illegal Fireworks	Known
Sierra Peak	Feb. 6, 2006	10,506	Back Fire	Known
Brush Canyon	July 23, 2006	1	Lightning	Unknown
Feldspar	Sep. 26, 2006	Unknown	Car Crash	Unknown
Red Star	Jan. 7, 2007	175	Unknown	Unknown
Windy Ridge [241 Incident]	Mar. 11, 2007	1,618	Burning Car (Arson)	Known
Rose	Apr. 12, 2007	3	Machinery	Known
Coal Canyon	May 7, 2007	140	Caltrans Machinery	Unknown
Western Hills	May 16, 2008	15	Downed Power lines	Unknown
Freeway Complex	Nov. 15, 2008	30,306	Auto Exhaust Power lines	Known
Windy Ridge	Nov. 25, 2009	80	Unknown	Unknown
Coal Canyon	Mar. 16, 2010	Unknown	Car Accident	Unknown
91 Freeway Incident	June 16, 2010	47	Unknown	Known
Quarter Horse	Sep. 4, 2010	10	Fireworks	Unknown
Carbon Canyon	July 11, 2011	518	Arson	Known
Rose Drive	Nov. 2, 2011	5	Power lines	Known

APPENDIX C

All Fires Combined (Perimeters and Points of Origin) Data

Fire Name	Fire Date	Acreage Burned	Cause	Data Type
Fuel Break (Historical)	—	132	—	Perimeter
Sonome Canyon	Unknown	Unknown	Plane Crash	Point of Origin
Irvine Ranch	1914	14,830	Unknown	Perimeter
Fresno Canyon*	1928	1,007	Unknown	Perimeter
Gypsum*	1929	1,085	Unknown	Perimeter
Carbon Canyon*	1930	733	Unknown	Perimeter
Santa Ana Canyon	Nov. 8, 1943	9,375	Unknown	Perimeter
Gaines	Sep. 22, 1944	270	Unknown	Perimeter
Shell	July 2, 1947	118	Unknown	Perimeter
Green River	Nov. 4, 1948	41,285	Unknown	Both
Nohl	June 21, 1951	176	Unknown	Perimeter
Santiago	Oct. 15, 1958	110	Unknown	Perimeter
La Vida	Nov. 29, 1959	611	Unknown	Perimeter
91 Freeway*	1962	139	Unknown	Perimeter
Paseo Grande	Oct. 29, 1967	39,872	Unknown	Both
Firestone	Oct. 30, 1967	236	Unknown	Both
Tonner Canyon	June 13, 1971	9	Unknown	Perimeter
Serranos	Sep. 9, 1973	304	Unknown	Both
Mine	July 28, 1977	4,956	Unknown	Perimeter
Soquel	Oct. 23, 1978	5,428	Unknown	Both
Soquel Canyon*	Oct. 25, 1978	251	Unknown	Perimeter
Los Serranos [Serranos]	June 19, 1979	172	Unknown	Both
Paseo	Sept. 15, 1979	3,644	Smoldering Sleeper Fire	Both

* indicates the fire name was assigned by Hills For Everyone.

All Fires Combined (Perimeters and Points of Origin) Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Data Type
Corona	1980	116	Unknown	Perimeter
Green River	July 13, 1980	379	Unknown	Both
Owl	Oct. 28, 1980	18,332	Unknown	Both
Carbon Canyon	Nov. 16, 1980	14,613	Unknown	Both
Euclid	Oct. 30, 1981	714	Unknown	Both
Fresno Canyon*	Oct. 1982	211	Unknown	Perimeter
Gypsum	Oct. 9, 1982	19,986	Power lines	Both
Santa Ana Canyon*	Fall 1983	443	Unknown	Perimeter
Fresno*	July 12, 1983	642	Unknown	Perimeter
91 Freeway*	July 13, 1983	1,618	Unknown	Perimeter
Bane Canyon*	Sep. 14, 1983	581	Unknown	Perimeter
Wardlow Wash*	July 8, 1984	114	Unknown	Perimeter
Coal Canyon	July 9, 1984	450	Fireworks (Bottle Rocket)	Both
Coal Canyon	July 2, 1985	540	Plane Crash into Power lines	Both
Shell	Aug. 11, 1985	1,635	Unknown	Both
Green River	Oct. 6, 1985	Less than 1	Unattended Children	Both
Fresno Canyon*	Aug. 2, 1986	95	Unknown	Perimeter
Coal Canyon	Apr. 21, 1987	25	Vehicle Fire	Point of Origin
Gypsum Canyon	May 12, 1987	20	Incendiary Device	Point of Origin
Coal Canyon	July 7, 1987	5	Unknown	Point of Origin
Coal Canyon	July 28, 1987	10	Unknown	Point of Origin
Rim Crest	Mar. 13, 1988	10	Kids with Matches	Point of Origin
Coal Canyon	May 13, 1988	3	Unknown	Point of Origin
Bane Canyon*	June 24, 1988	820	Unknown	Perimeter
La Vida	Dec. 4, 1988	Unknown	Unknown	Point of Origin
South Ridge	May 24, 1989	5	Mower hit rock, ignited brush	Both
Aliso Canyon	June 29, 1989	44	Unknown	Perimeter
Carbon Canyon	July 5, 1989	Unknown	Unknown	Point of Origin
Featherly Regional Park	July 14, 1989	Unknown	Unknown	Point of Origin

* indicates the fire name was assigned by Hills For Everyone.

All Fires Combined (Perimeters and Points of Origin) Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Data Type
Chino Hills State Park	Oct. 10, 1989	400	Unknown	Point of Origin
Carbon Canyon	June 27, 1990	6,664	Arson	Both
Yorba	July 12, 1990	7,884	Model Rocket	Both
Carbon Canyon	July 22, 1990	1	Unknown	Point of Origin
Carbon Canyon	July 27, 1990	2	Downed Power lines	Point of Origin
91 Freeway	July 5, 1991	50	Machinery	Both
Coal Canyon	May 10, 1992	3	Unknown	Point of Origin
San Juan Hill	June 10, 1992	249	Plane Crash	Both
Chino Hills State Park	Sep. 8, 1992	500	Power lines	Point of Origin
Stagecoach	Oct. 26, 1993	581	Unknown	Perimeter
Carbon Canyon	Nov. 15, 1993	40	Plane Crash	Point of Origin
91 Freeway*	1994	41	Unknown	Perimeter
Carbon Canyon [Wagon]	June 25, 1994	757	Unknown	Both
91 Freeway*	Aug. 5, 1994	28	Unknown	Both
71 Freeway	Dec. 19, 1994	4	Unknown	Point of Origin
Highway 91	Aug. 26, 1995	177	Unknown	Perimeter
Carbon Canyon	June 24, 1998	20	Road Flare (Arson)	Point of Origin
Carbon Canyon	Aug. 31, 1998	733	Lightning	Both
Chino Hills State Park	Jan. 19, 1999	Unknown	Plane Crash	Point of Origin
Woodview	Sep. 12, 2000	200	Unknown	Point of Origin
Chino Hills Parkway	Sep. 18, 2000	2	Unknown	Point of Origin
Green	Feb. 9, 2002	2,234	Downed Power lines	Both
Evening	Apr. 21, 2002	893	Fireworks	Both
71 Freeway	Aug. 3, 2002	10	Car Exhaust Pipe	Point of Origin
Blue Gum	Nov. 20, 2002	497	Arson	Both
Coal Canyon	July 12, 2003	2	Arson	Both
71 Freeway	Aug. 19, 2003	3	Unknown	Point of Origin

* indicates the fire name was assigned by Hills For Everyone.

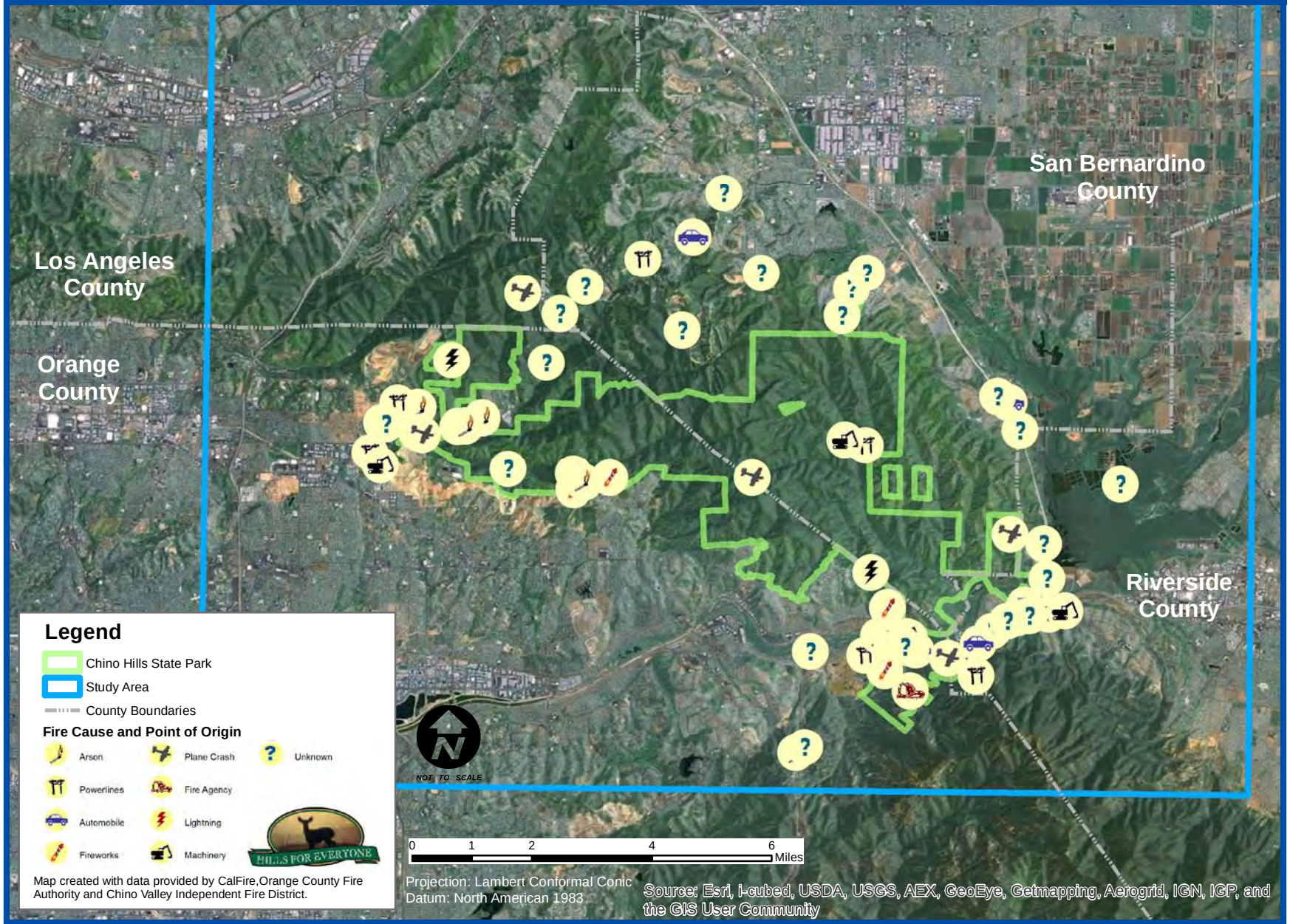
All Fires Combined (Perimeters and Points of Origin) Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Data Type
Coal Canyon	May 30, 2004	2	Unknown	Point of Origin
Green River	July 24, 2004	16	Car Crash	Both
Carbon Canyon	Sep. 25, 2004	18	Car Fire	Both
Yorba Linda	July 5, 2005	1,079	Fireworks	Both
Carbon Canyon	Aug. 4, 2005	1	Arson	Perimeter
Sierra Peak	Feb. 6, 2006	10,506	Backfire	Both
Brush Canyon	July 11, 2006	1	Unknown	Perimeter
Brush Canyon	July 23, 2006	1	Lightning	Point of Origin
Blue Gum	Aug. 2, 2006	3	Illegal Campfire	Perimeter
241 Incident	Aug. 22, 2006	Less than 1	Unknown	Perimeter
Feldspar	Sep. 26, 2006	Unknown	Car Crash	Point of Origin
Red Star	Jan. 7, 2007	175	Unknown	Point of Origin
Windy Ridge [241 Incident]	Mar. 11, 2007	1,618	Burning Car (Arson)	Both
Rose	Apr. 12, 2007	8	Machinery	Both
Coal Canyon	May 7, 2007	140	Caltrans Machinery	Point of Origin
Western Hills	May 16, 2008	15	Downed Power lines	Point of Origin
Freeway Complex	Nov. 15, 2008	30,306	Auto Exhaust & Power lines	Both
241 Incident	Sep. 25, 2009	Less than 1	Unknown	Perimeter
Windy Ridge	Nov. 25, 2009	80	Unknown	Point of Origin
Coal Canyon	Mar. 16, 2010	Unknown	Car Accident	Point of Origin
91 Freeway Incident	June 16, 2010	47	Unknown	Both
Quarter Horse	Sep. 4, 2010	10	Fireworks	Point of Origin
Carbon Canyon	July 11, 2011	518	Arson	Both
Rose Drive*	Nov. 2, 2011	5	Power lines	Both

* indicates the fire name was assigned by Hills For Everyone.

P.O. Box 9835 • Brea, CA 92822 • *www.HillsForEveryone.org*

Fire Causes Near Chino Hills State Park (1914-2011)



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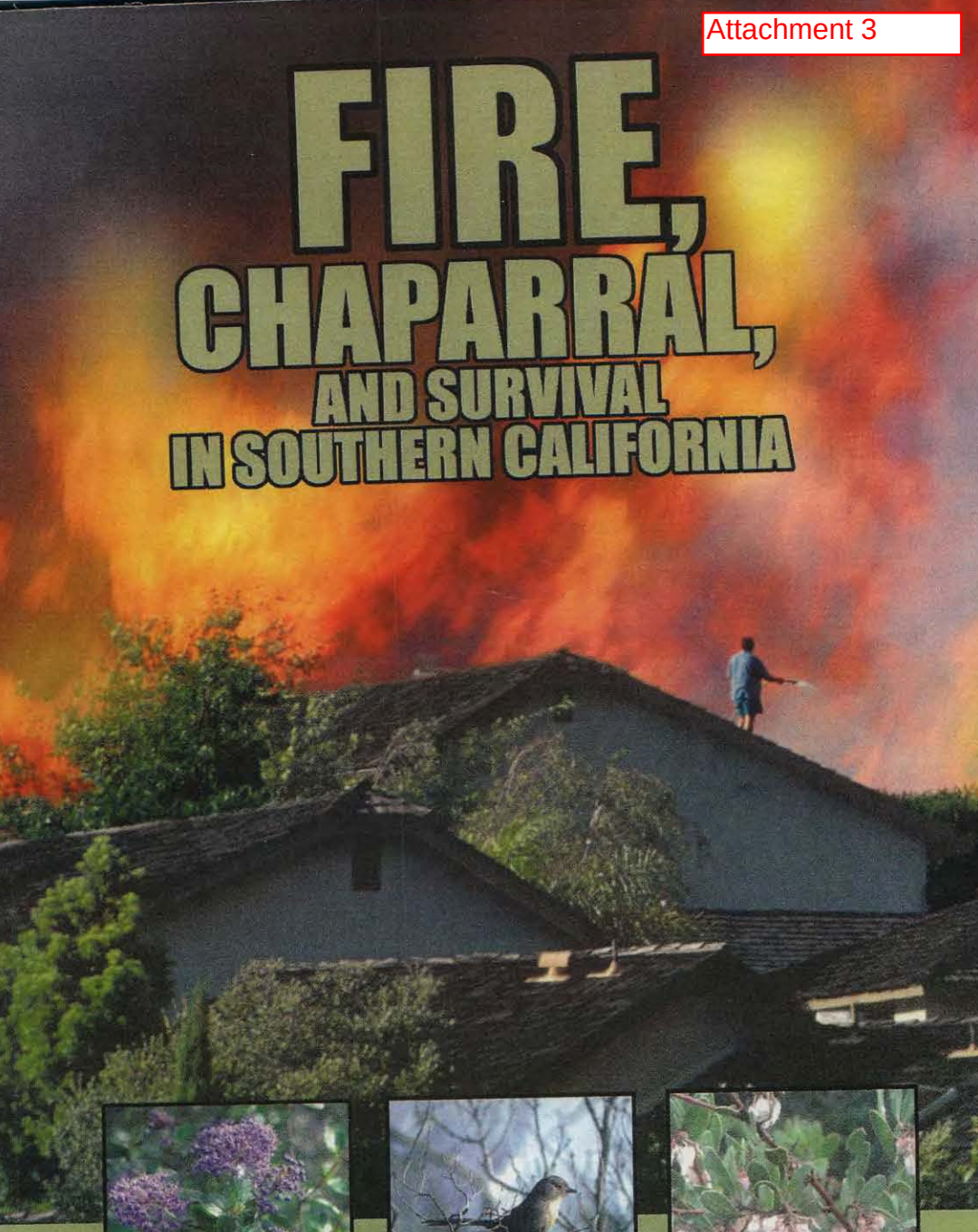
Attachment 3

FIRE, CHAPARRAL, AND SURVIVAL IN SOUTHERN CALIFORNIA



Richard W. Halsey

quiet. Soon the ears become acclimated, and sounds begin to emerge. Off in the distance, hidden deep in the shrubbery, a secretive little bird with a long tail introduces itself. Its call, recognized by those who consider wild southern California their home, is known as "the voice of the chaparral." Of all the interesting life forms found there, it is the sparrow-sized wrentit that best characterizes this shrubby habitat; ubiquitous, yet hidden, its secrets revealed only to those with patience and a willingness to listen (fig. 1-3).

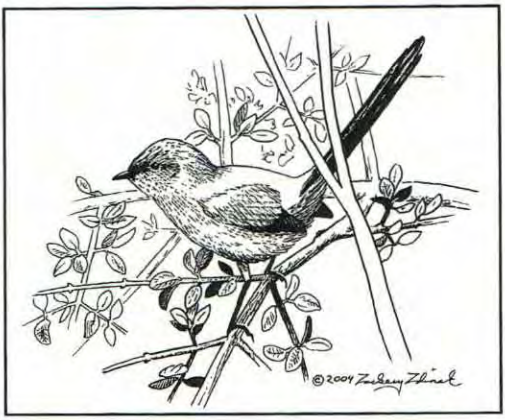


Fig. 1-3 Wrentit. *Artist: Zackery Zidinak*

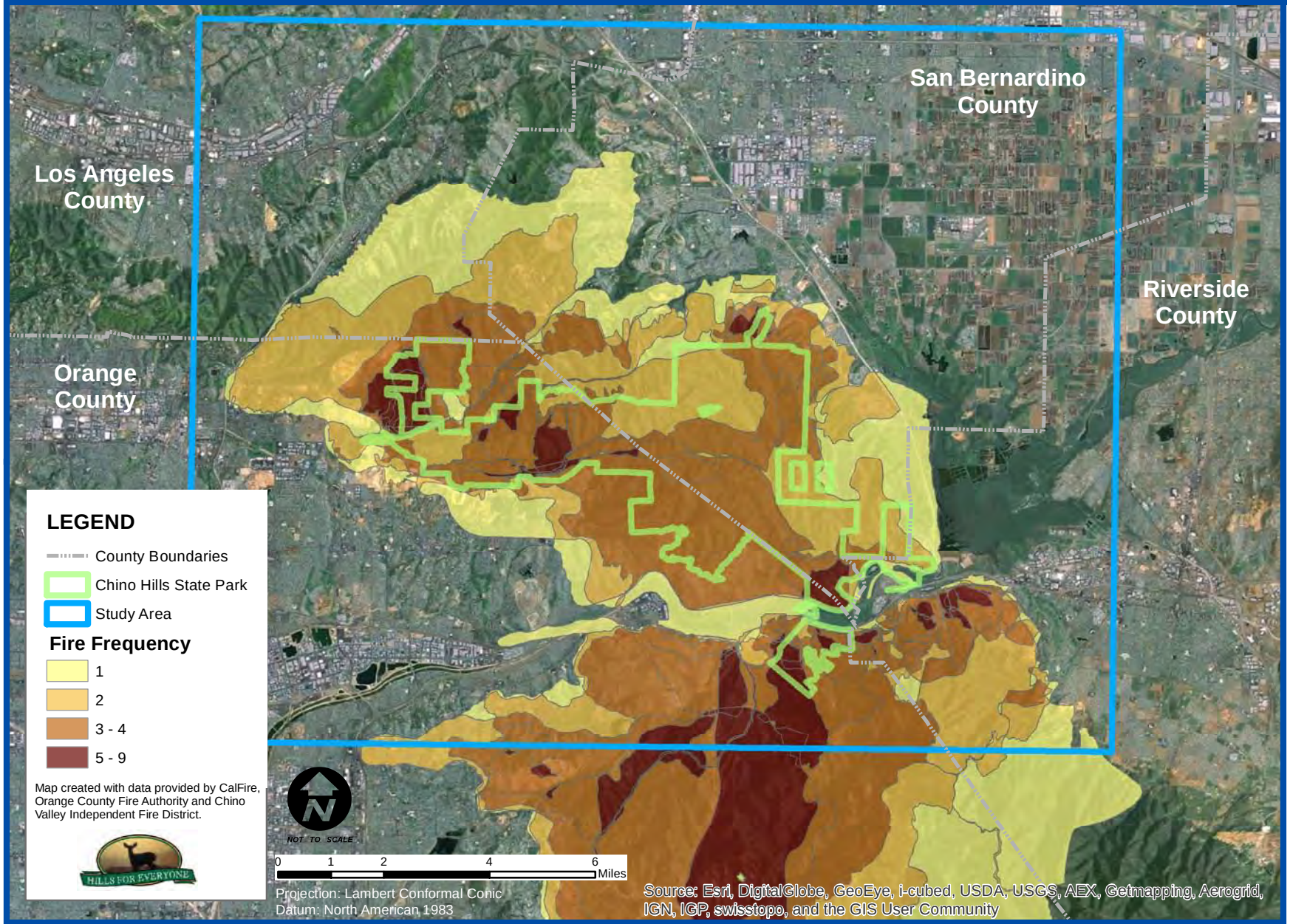
Properly defined, chaparral is a semi-arid, shrub dominated association of *sclerophyllous* woody plants shaped by summer drought, mild, wet winters, and naturally recurring fires every 30 to 150 years plus. *Sclerophyllous* is a term coined by German botanist, Andreas F. W. Schimper in 1898. Referring to Mediterranean climatic regions in his classic 844 page *Plant Geography Upon a Physiological Basis* he said, "The mild temperate districts with winter-rain and prolonged summer-drought are the home of evergreen xerophilous (dry-loving) woody plants, which, owing to the stiffness of their thick, leathery leaves, may be termed *sclerophyllous* woody plants."

Meaning "hard-leaved" in Greek, *sclerophyllous* leaves are advantageous in a semi-arid climate because they reduce evaporation through a variety of traits including waxy coatings, thicker cell layers, and recessed "stomata," the pores in leaves permitting evaporation and the exchange of oxygen and carbon dioxide. Chaparral is primarily a California phenomenon, although a type of "mock chaparral" exists in parts of Arizona, the central Rocky Mountains, and Northeastern Mexico.

As direct connections to the land have slowly disappeared for most Californians, so too has familiarity with chaparral. We pay a heavy toll for this alienation; homes burn, lives are lost, and we forget the value of retaining informed contact with wild space. Reconnecting with our natural surroundings is no longer just a casual pastime for bird-watchers or wilderness enthusiasts; it is a matter of survival for all of us. This chapter is designed to assist you to reconnect, providing a quick familiarity with the chaparral ecosystem. Although the species described are primarily from California's southwestern most counties (San Diego, Riverside, and Orange), most can be found throughout the

Attachment 4

Fire Frequency Near Chino Hills State Park (1914-2011)



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Attachment 5

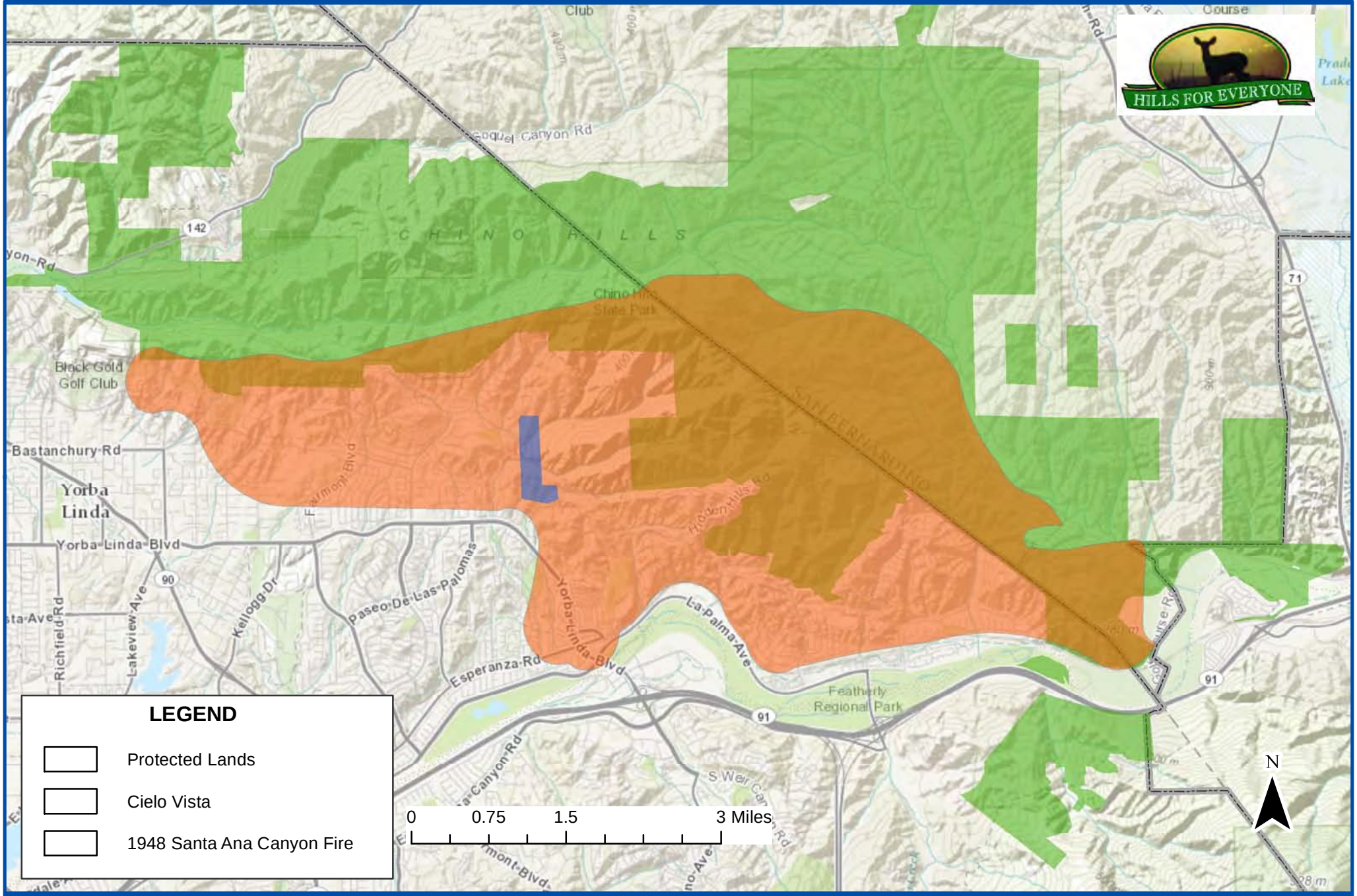
Type Conversion

Freeway Complex Fire

Type Conversion

Attachment 6

Santa Ana Canyon Fire of 1948



January 17, 2014

Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Scale: 1: 84,000

Attachment 7

USGS science for a changing world

Western Ecological Research Center http://www.werc.usgs.gov

Publication Brief

Release:	Contacts:	Email:	Phone:
April 2012	Jon E. Keeley	jon_keeley@usgs.gov	559-565-3170
	Alexandra Syphard	asyphard@consbio.org	619-865-9457

USGS Western Ecological Research Center | Sequoia and Kings Canyon Field Station | 47050 Generals Hwy #4, Three Rivers, CA 93271

Housing Location Factors Determine Risk of Housing Loss from Wildfires in Southern California

Wildfire risk reduction efforts in southern California focus primarily on fuel reduction and less so on house characteristics and homeowner responsibility. However, the extent to which land use planning could alleviate wildfire risk has been largely missing from the debate, despite large numbers of homes being placed in the most hazardous parts of the landscape.

A *PLoS ONE* study authored by Conservation Biology Institute ecologist Alexandra Syphard, USGS fire ecologist Jon Keeley and colleagues from the University of Wisconsin examined how housing location and arrangement affects the likelihood that a home will be lost when a wildfire occurs. Researchers developed an extensive geographic dataset of structure locations, including more than 5,500 structures in the San Diego region and Santa Monica Mountains region that were destroyed or damaged by wildfire since 2001, and identified the main contributors to property loss.

The arrangement and location of structures strongly affected their susceptibility to wildfire. Property losses were greatest in areas with a history of frequent fire. Losses also were higher when structures were surrounded by wildland vegetation, and were higher in herbaceous fuel types than in higher fuel-volume woody types. Housing arrangement was also important, as destruction was most likely at low to intermediate structure densities.

Researchers also tested fire hazard maps developed using housing pattern and location against traditional maps based on the assumption that fuel distribution is the primary determinant of hazard. The fuel-based maps correctly identified general patterns of fire hazard across the state. However, at the regional scale, fuel-based maps did not predict property loss as well as maps developed using a combination of factors that included housing arrangement and location.

Management Implications

- Land use planning and housing development policies should be important components of fire risk management plans for southern California's wildland-urban interface.
- Housing location factors, such as surrounding vegetation type and history of frequent fire, highlight the need to reexamine existing policies on fuel load reduction. Woody fuel clearing may increase highly ignitable and flashy herbaceous fuels, which were correlated with property loss in Ventura and Los Angeles counties.
- Traditional fire hazard maps based primarily on fuel distribution do not predict property loss at the regional scale compared to fire hazard maps that incorporate multiple variables, including housing arrangement and location.

THIS BRIEF REFERS TO:
Syphard, AD, JE Keeley, A Bar Massada, TJ Brennan, VC Radeloff. Housing arragement and location determine the likelihood of housing loss due to wildfire. PLoS ONE 7(3): e33954. doi: 10.1371/journal.pone.0033954

http://www.werc.usgs.gov/seki
http://www.werc.usgs.gov/ProductDetails.aspx?ID=4692

The strong importance of housing arrangement and location indicate that land use planning may be a critical tool for reducing fire risk, but it will require reliable delineations of the most hazardous locations.

Housing location can determine the likelihood of property loss due to wildfire.

Attachment 8

Fighting Fires: You're Doing It Wrong

Becky Oskin, OurAmazingPlanet Staff Writer | January 14, 2013 05:08pm ET

in cooperation with ourAmazingplanet

A bushfire in Australia.

Credit: Australia bushfire image via Shutterstock View full size image

Australia is burning. Extreme heat and drought during the country's summer wildfire season have helped fierce winds spark about 100 bushfires across southeastern Australia.

Sound familiar?

2012 was America's hottest year on record. Those soaring temperatures (along wit persistent drought) pushed more than 9.2 million acres to burn in the West. The damages will top $1 billion dollar and fires consumed mor than 2,100 homes, according to the National Oceanic and Atmospheric Administration.

Parts of both the United States and Australia share a combustible mix of fire hazards, such as an ecology adapted to fire-prone conditions and a climate conducive to wildfires. And every year, more people choose to live in some of the most beautiful and hazardous country around — the wildland's edge.

The destruction will only escalate, scientists predict, until we stop fighting fires in the forests and brush. Instead, the focus should shift to securing homes and structures, as well as applying new research that overturns long-standing conventional wisdom about fire defense, experts say.

"We're losing homes in fires because homes are being put into hazardous conditions," said Jon Keeley, a fire ecologist with the U.S Geological Survey (USGS). "The important thing is not to blame it on the fire event, but instead to think about planning and reduce putting people at risk."

Thanks to work by Keeley and his colleagues, researchers now know techniques that work for firefighters in the Colorado mountains won't help Californians battling wind-driven wildfires in the chaparral. [Images: Southwestern Wildfires Seen from Space]

Don't burn chaparral

In California, as the population sprawls, the fires grow. The loss of lives and property increased every decade in the past century, according to a 2001 study in the journal Conservation Biology by Keeley and USGS ecologist C.J.

Fotheringham.

One hundred years of fire suppression is partly to blame. To protect homes, local fire managers frequently set California's chaparral-covered hills ablaze. But the decades spent earnestly "masticating" (mechanically removing potential fire fuel) devil-red manzanitas with trunks as thick as thighs, and the repeated prescribed burns, replaced native chaparral with incendiary invasive species like cheatgrass, according to the USGS.

The decades of effort were for naught, finds a series of recent studies from the USGS and colleagues at the Conservation Biology Institute and several research universities.

Prescribed burning, intended to remove dead wood and fuel before fire season, does help control fires in Western conifer forests, like the tall giants of Sequoia National Park in Northern California. But chaparral isn't forest. It's a dense carpet of woody shrubs: chamise, ceonothus and other plants that cling to steep canyons and ridges.

"I work in Sequoia National Park, and we've had a prescription burning program for the last 40 years, and it's extremely necessary," Keeley told OurAmazingPlanet. "In most of Southern California, it is completely irrelevant. There is overwhelming evidence we've never come anywhere close to excluding fire on this landscape," through prescribed burns, he said.

In Southern California, 29 years of prescribed burns had no effect on reducing the area burned by future fires, a 2012 study Keeley co-authored found. The study was published in the Journal of Environmental Management.

"It's wrongheaded to think there's just one fire story out there," Keeley said. "There's lots of fire stories. There's what's going on in forests, and what's going on in chaparral landscapes, and they're very different in terms of how to solve them."

And when scientists dug up carbon from past wildfires — those that took place before Europeans arrived — they made a startling discovery. Unlike Western forests, coastal chaparral and sage scrub may burn only once every 100 years, and the inland ridges every 30 years. Further tests revealed the shrubs are slow to regrow, taking five, 10 or even 20 years to flower and set new seed. Frequent prescribed burns, combined with the rising numbers of human-sparked conflagrations, weakens the ecosystem. When chaparral erupts in flames every few years, native species burn through their energy stores and seed stock trying to recover, said Rick Halsey, director of the nonprofit

California Chaparral Institute, which advocates for preserving chaparral. As a result of the burns, non-natives take over.

"We're accelerating the environmental destruction of California's most characteristic ecosystem," Halsey told OurAmazingPlanet.

Changing minds

But changing decades of calcified wisdom will be difficult. "There was this mindset that this beautiful ecosystem is unnatural and we need to burn it up because it doesn't belong," Halsey said. "Finally the science got up to speed and said the natural fire regime in chaparral is anywhere from 50 to 150 years, not 10 to 15 years."

The USGS has had success with the National Park Service, which was forced to rethink their approach to fire management in 2001, after losing control of a prescribed burn and nearly torching Los Alamos National Laboratory, one of the nation's nuclear testing labs. The Santa Monica Mountains National Recreation Area had their last prescribed burn in 2005, said Marti Witter, a fire ecologist with the park. The park lowers its fire risk by mowing open grassland, and leaves chaparral alone.

"The mindset that's out there is so pervasive, and you come up against it all the time," Witter told OurAmazingPlanet. "Anytime we're in a public meeting, there's always someone who will stand up and say, 'if we just did prescribed burning, that will solve our problem.'"

To help spread news of the findings, the USGS Western Ecological Research Center in Sacramento, Calif., will launch a public outreach program this spring, and has already been meeting with local and state fire managers.

Fighting fires with fuel

Clearing chaparral for firebreaks, a gap meant to slow spreading flames, also does little to help fire fighters battle the chaotic infernos driven by California's Santa Ana winds, Fotheringham told OurAmazingPlanet.

"There's really two types of fires:the ones we plan for, and the ones that do the damage," Fotheringham said.

In the fall, fierce winds called the Santa Anas rush down from the California mountains. The winds can be of tropical storm strength (winds less than 74 mph, or 119 kph) at lower elevations and hurricane-strength (74 mph or greater) above 1,000 feet (305 meters). [Amazing Video: Speed of Wildfire]

It's fire season in the West when the winds blow.

Firebreaks can help fire fighters battle small burns in chaparral. Without fire fighters at the breaks, however, flames skip past the gaps, found a study led by ecologist Alexandra Syphard of the Conservation Biology Institute in the June 2011 issue of the journal Forest Ecology and Management.

The non-native species that eagerly occupy open space on fire breaks and in cleared chaparral act as kindling for flying embers, said Fotheringham. The whirling winds carry embers as far as a mile in front of the actual wildfire.

Defending your space

In California, when houses burn, blown embers are at fault, not trees or chaparral.

Prescribed fires in central and southern California do not reduce future area burned, as they might in other ecosystems.

Credit: Jon Keeley/USGSView full size image

"The primary spread of fire where we lose houses under wind-driven conditions is from embers," Fotheringham said

In October 2007, more than 2,000 homes burned in Southern California during Santa Ana-driven firestorms. None of the homes ignited from direct contact with flames. Instead, embers blown by the wind — up to a mile ahead of th flame front — landed on flammable materials near houses, according to several studies conducted after the fires.

Researchers with the Western Ecological Research Center analyzed homes in the Santa Monica Mountains and part of San Diego County that burned between 2001 and 2010, during several devastating wildfires in the region. The study, which had some surprising findings, was published March 28, 2012, in the journal PLoS One.

"What really threw me off was the trees don't burn," said Fotheringham, who was not involved in the study but analyzed the data for another research project. "With green vegetation, you have to drive off the moisture before it will ignite. I got to looking around my yard, and I saw all the leaves accumulating everywhere. A lot of what we have for urban vegetation is deciduous, so in the fall, the Santa Ana wind-driven fires coincide with leaf drop. It's a perfec storm."

To really save homes, Fotheringham wants Californians to spend their fall weekends cleaning the nooks and crannies around their homes. Find the fire starters, she said: dryer lint, pine needles and leaves hiding in roof shingles, foundation cracks, decorative shrubs and underneath decks. "I get so fanatic that sometimes I go out and Shop-Vac my yard, trying to get the leaves all up," Fotheringham said.

California law requires all homeowners to clear a "defensible" space. The guidelines call for trimming branches, keeping tall plants and shrubs away from buildings, and spacing remaining trees and bushes to prevent fire from spreading. Some residents scrape a moonscape around their homes, removing all plants and clearing the land to the

dirt.

But time after time, in infernos created by Santa Ana winds, thousands of homes with defensible barriers burst into flames. In the July 2006 Sawtooth Fire north of Palm Springs, homes with more than 100 feet (30 m) of bare dirt clearance burst into flames. In fact, the burning homes set their own shrubs and trees on fire. [Raging Western Wildfires in Photos]

That's because clearing land encourages the growth of weeds, "flashy fuels" that easily ignite from embers. Instead o aggressive clearing, a green fire barrier of irrigated, wisely chosen shrubs and trees can help absorb heat and deflect embers, Halsey said. For the most up-to-date advice, visit http://firecenter.berkeley.edu/toolkit.

"Bring a little of the natural environment into your yard," recommended Halsey, who trained as a firefighter to better understand the challenges California must overcome to solve its fire mess. "The quick fix has been to pour more money into the fire agencies, instead of doing the difficult thing, which is planning," he said. "We can do more around communities."

Fotheringham agreed. "It's the planning that's a problem."

Living on the edge

Urban planning makes a huge difference in fire risk, research shows. In Southern California, homes are most likely t burn if they were located off by themselves, or in small clusters, according to the PLoS One study. Building in a win corridor, where the Santa Anas are fiercest, is also more likely to lead to destruction.

"We know the hazardous fires are driven by Santa Ana winds that follow canyon systems," Keeley explained. For example, Topanga Canyon near Los Angeles burns every other decade because it funnels Santa Anas through its steep slopes, he said.

While the USGS specifically looked at California, many of the results apply to other Western states, where land use planning is critical for limiting the effects of wildfires in the future.

Housing location can determine the likelihood of structure loss due to wildfire.

Credit: Jon Keeley/USGSView full size image

In Colorado, the 2012 Waldo Canyon Fire was the state's most destructive fire in history, causing $15 million in damage, destroying 346 homes and killing two people.

But Waldo Canyon was an average fire for Colorado, Keeley said. "The Rocky Mountains have fires 10 times that size. What was unusual is Colorado usually doesn't lose homes. But because of urban sprawl, and development moving out into the forest, now when we get a perfectly normal fire, homes burn," he said.

Keeley and other researchers say a major shift in thinking is needed on the part on planners and developers.

Changes in land planning (where people put homes), building more fireproof homes, and landscaping with fire-resistant vegetation will go a long way toward reducing future fire damage, he said. "We see the potential for improvements that can have as much impact as what the Forest Service does out in the wildlands," Keeley said.

"What I want to see change is people stop depending on the Forest Service to put out all the fires," Keeley said. "I want to see homeowners and communities take greater responsibility for solving the problem. It's just wrongheaded to think the Forest Service is the only people who can solve the problem."

Reach Becky Oskin at boskin@techmedianetwork.com. *Follow her on Twitter* @beckyoskin. *Follow OurAmazingPlanet on Twitter* @OAPlanet. *We're also on* Facebook *and* Google+.

Editor's Recommendations

- Natural Disasters: Top 10 U.S. Threats
- Natural Disasters: Top 10 U.S. Threats
- World Set a Flame: 2002 - 2011 Visualized
- Video: World Set Aflame:2002-2011 Visualized
- 7 Most Dangerous Places on Earth
- 7 Most Dangerous Places on Earth

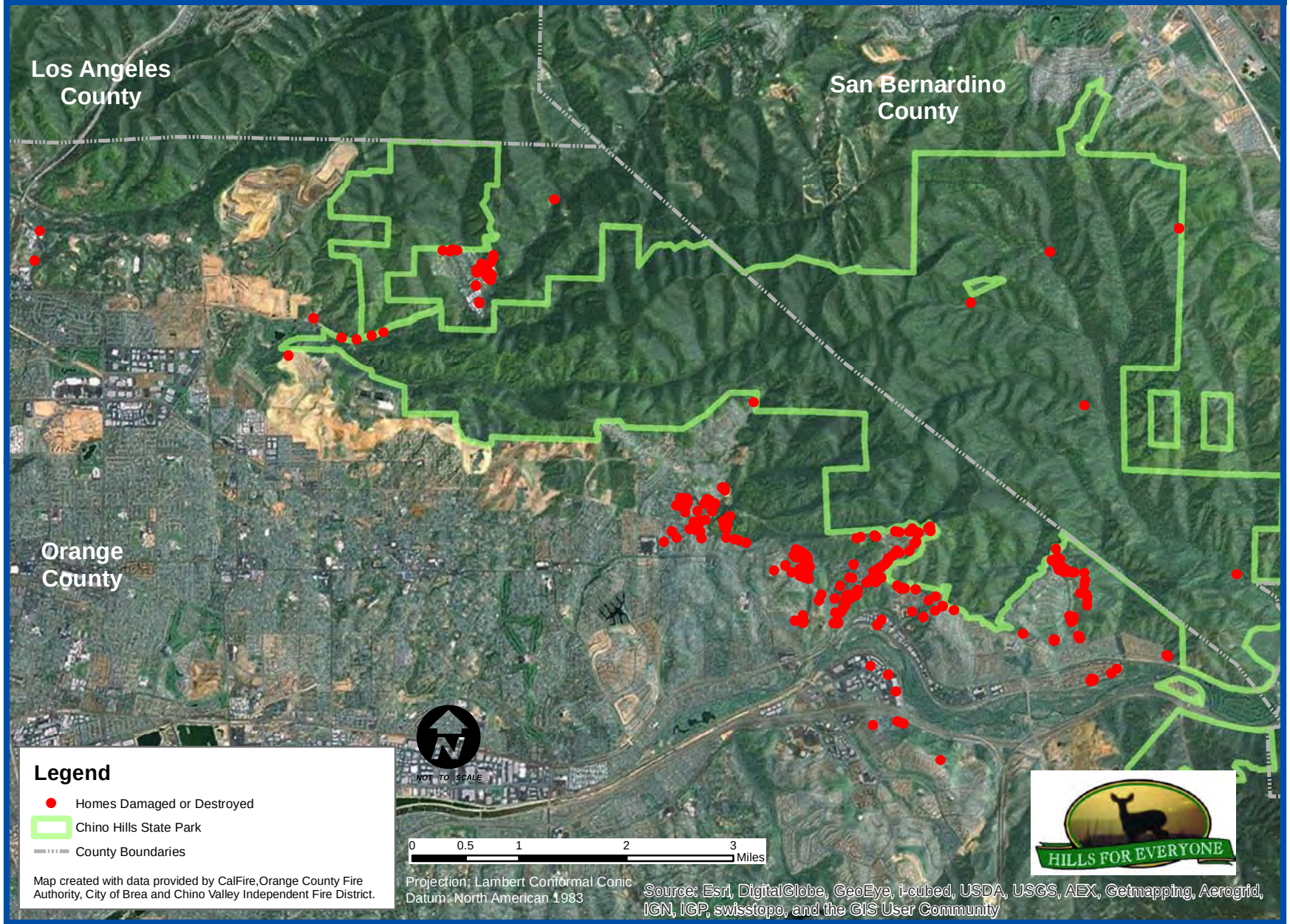
More from LiveScience

Growing California Colby Wildfire Seen from Space

Giant Surprise: Old Trees Grow Fastest

Attachment 9

Properties Damaged or Destroyed in the Freeway Complex Fire



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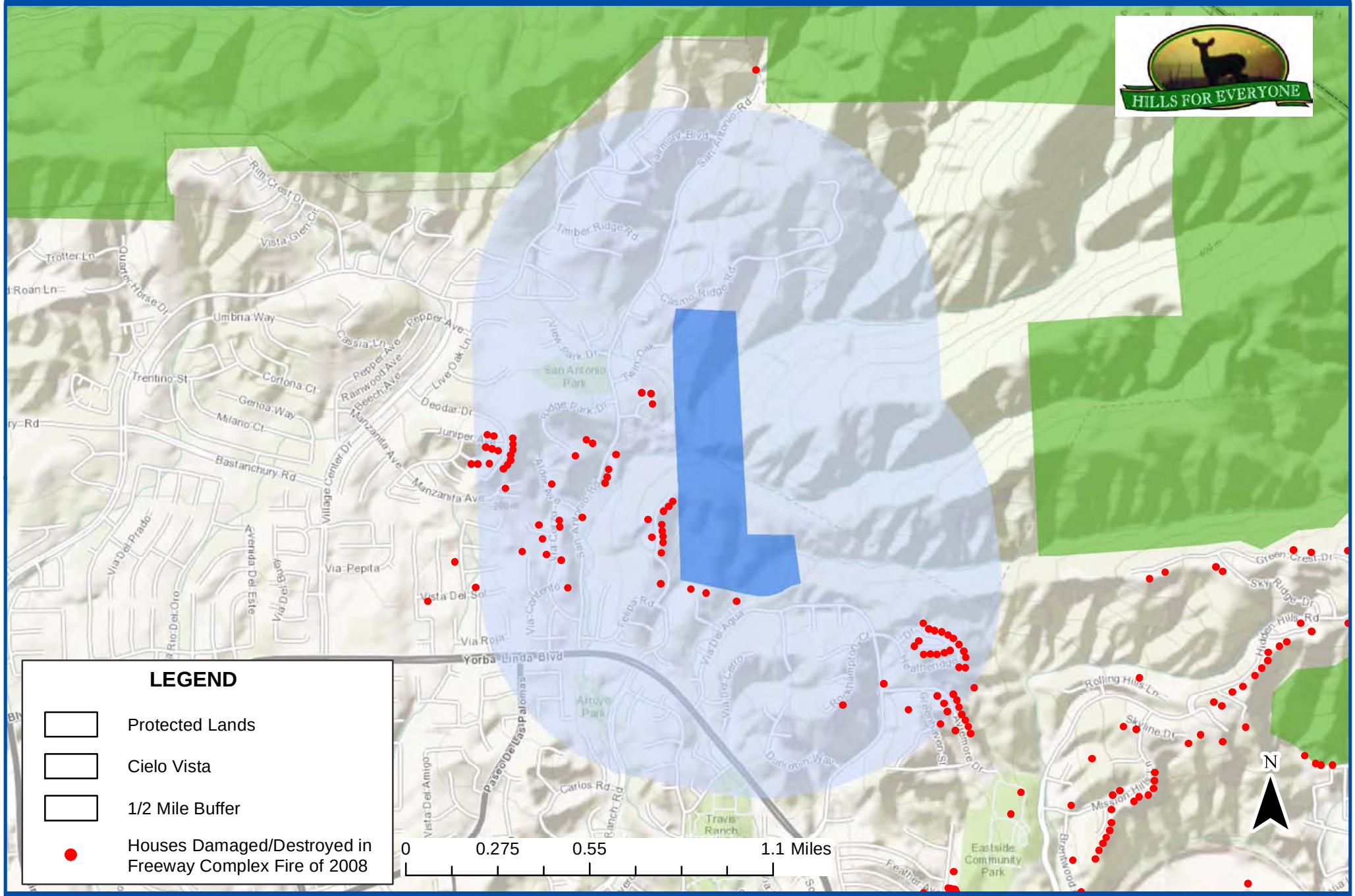
Attachment 10

Houses Damaged or Destroyed Near Cielo Vista



January 17, 2014

Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Scale: 1: 84,000

Attachment 11

Chino Hills SP

State Park

Bane Canyon Road Construction - ROAD CLOSED - Monday, January 6, 2014.

Road construction on Bane Canyon Road will restart on Monday, January 6, 2014. The road will be closed to the public and access will not be available from the Chino Hills side of the park. For access into the park you can go to the Chino Hills State Park Discovery Center at 4500 Carbon Canyon Road, Brea, CA, 92823 or the parking and equestrian staging area located in the city of Yorba Linda at Quarterhorse Drive (near the intersection of Fairmont Blvd. and Quarterhorse Drive).

TRAILS UPDATE: Monday, December 23th, 2013: TRAILS ARE OPEN.

Chino Hills State Park is open daily - 8:00 AM to 5:00 PM.

The Rolling M Campground and the Group Camp facilities are closed.

Visit the new Discovery Center!

Located at 4500 Carbon Canyon Road in Brea, CA

Park Information

HOURS OF OPERATION:

October - March
8am-5pm 7 Days a Week

April - September
8am-7pm 7 Days a Week

PARK OFFICE TELEPHONE:

(951) 780-6222

REGION

Inland Empire

COUNTY

Orange

MAX CAMPER LENGTH:

28 Feet

MAX TRAILER LENGTH

28 Feet

Related Pages

Campground Map
Community - Scouting Service Projects
Meeting Room and Amphitheater Rental Information
Volunteer Events
Volunteer Opportunities
Park History
Building the Chino Hills Bio-Link
Geography
Wildlife
Plant Communities

Offering visitor parking, restrooms, a meeting room and outdoor amphitheater with an upcoming interpretive trail and Exhibit Hall

Park fees are now only $5.00 for day use!

Chino Hills State Park is unique in that it provides refuge for both biodiversity and solitude to the visitors who enjoy their outdoor experiences. There is no other location in the LA Basin were people can drive a short distance and be swept away with scenic vistas, hike, bike or ride a horse on over 90 miles of trails. At 14,102 acres the park is managed as an open space habitat where all plant and animal life are protected.

For more information and updates please call: 951-780-6222

Chino Hills State Park, a premier natural open-space area in the hills of Santa Ana Canyon near Riverside, is a critical link in the Puente-Chino Hills biological corridor. It encompasses stands of oaks, sycamores and rolling, grassy hills that stretch nearly 31 miles, from the Santa Ana Mountains to the Whittier Hills. Chino Hills is vitally important as a refuge to many species of plants, and as a link between natural areas essential to the survival of many animal species.

Chino Hills is also a place where people can escape the pressures of urban life and find peace and solitude in a natural setting. Visitors can camp for a few days or simply enjoy a walk, horseback or bicycle ride over trails that meander through valleys and along ridge tops through woodlands, sage scrub and grasslands. Sixty miles of trails and fire roads also offer excellent opportunities for viewing wildlife and native plants. Facilities consist of a picnic area, equestrian staging area, pipe corrals, a historic barn, water spigots and restrooms. Most of the trails accept multiple use. However, a few trails are designated for hiking only, because of safety issues or the potential for damage to habitat.

Location - Directions

Chino Hills State Park is nestled in the foothills surrounded by the communities of Corona, Chino Hills, Yorba Linda, and Brea. The State Routes 57, 71, 91, and 142 border or are the near the park for easy travelling and accessibility from almost anywhere in Southern California.

You can access the park and the trails from the Chino Hills State Park Discovery Center located at 4500 Carbon Canyon Road in the city of Brea or from the Quarter Horse Drive Trailhead in the city of Yorba Linda. The Sapphire Road (Elinvar Road) entrance in Chino Hills is temporarily reopened for hikers, bikes and horses only due to construction on Bane Canyon Road inside the park. Due to construction the Rolling M Campground, the equestrian staging area, and group campsites within the park are closed.

Chino Hills State Park Discovery Center - Brea
4500 Carbon Canyon Road (State Route 142)
Brea, California 92823

Quarter Horse Drive Trailhead - Yorba Linda
Quarter Horse Drive is located off of Fairmont Blvd. in the city of Yorba Linda.
Fairmont Blvd. intersects Yorba Linda Blvd. between Imperial Highway and the 91 freeway.

Sapphire Road - Chino Hills (Temporarily re-opened, will close on January 6, 2014)
The park entrance located off Sapphire Road (Elinvar Road) in Chino Hills is temporarily re-opened but will close again once construction resumes.
4721 Sapphire Road
Chino Hills, California 91709

Please Remember

Fees - Day-use: $5.00
Camping fees: Campground currently closed due to road construction.
Additional Vehicle (camping): Campground currently closed due to construction.

Park Closure - The park will close for 48 hours following rain of more than one quarter inch. High clay content in the soil causes “greased” trails and roads. Use during this time makes hiking, bicycling and equestrian activities hazardous and causes severe rutting of trail and road surfaces. The park is also closed during times of extreme fire danger.

Trails - For safety’s sake, stay on designated trails and don’t hike alone. Be aware of wildlife, especially rattlesnakes.

Dogs - Dogs are not allowed at Chino Hills State Park except at Bane Canyon Road, McLean Overlook, the Rolling M Ranch and in the campgrounds. They must be on leash at all times and are not allowed in the backcountry or on trails. Pets must not be left alone at any time. Dogs are not allowed at any other location.

Speed Limit - 15 mph for all vehicles and bicycles.

Vehicles off road - Motor vehicles may not be driven off road or in the back country.

Drinking Water - Available at the Chino Hills State Park Discovery Center, the Rolling M Ranch area,

Park Opportunities

Hills-for-Everyone Trail

Images Directions
Videos Maps/Brochures
Events Accessibility

Please be advised some trails are in temporary closure due to erosion.

Hills For Everyone Trail is currently closed

Park Hours:
8:00 AM to 5:00 PM Daily

Camping:
Campground closed due to road construction

Campground Map

Group Camp and Equestrian Camp Information

Wedding Information

Special Event Permit Application and Supplemental Form

Telephone

Sector Office
951-780-6222

Discovery Center
714-524-2471

Physical Address

Bane Canyon Entrance (temporarily re-opened)
4721 Sapphire Road
Chino Hills, CA 91709

Discovery Center
4500 Carbon Canyon Road
Brea, CA 92823

Mailing Address

1879 Jackson St.
Riverside, CA 92504

Get Involved!
Chino Hills SP Interpretive Association

Chino Hills, CA

83° F
Fair

View Forecast »

and the Equestrian Staging area.

Smoking - Smoking is allowed in the campground only when campfires are also permitted.

Campfires - *ARE NOT PERMITTED As of May 21, 2012*

Trash - Pack it in, pack it out!

Weapons - Weapons of any kind are prohibited.

Collecting - Animals, plants, rocks, dirt and artifacts are protected by law and may not be disturbed or collected.

Nearby State Parks
California Citrus State Historic Park
9400 Dufferin Avenue
Riverside, California 92504
951-780-6222

Lake Perris State Recreation Area
11 miles south of Riverside
17801 Lake Perris Drive
Perris, California 92571
951-940-5600

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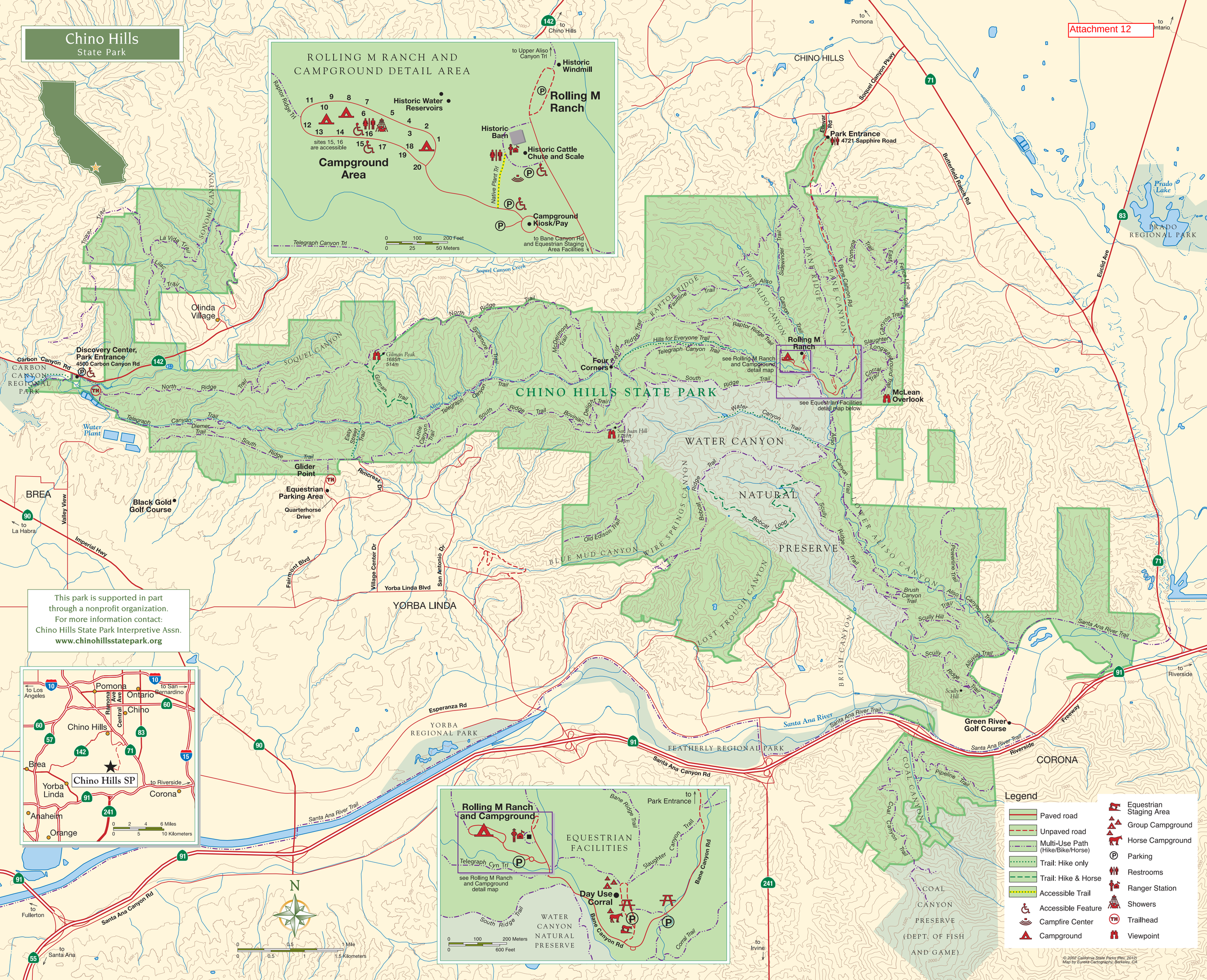
Attachment 12

Chino Hills State Park



This park is supported in part through a nonprofit organization.
For more information contact:
Chino Hills State Park Interpretive Assn.
www.chinohillsstatepark.org

Letter: OCCNPS

California Native Plant Society
ORANGE COUNTY CHAPTER

P.O. Box 54891
Irvine, CA 92619-4891
occnps.org

January 21, 2014

The California Native Plant Society is a statewide non-profit organization. Its membership is open to all.

CNPS is dedicated to the preservation and enjoyment of California's native plants and their habitats.

The Orange County Chapter of CNPS focuses that dedication on the native plants and natural vegetation of Orange County and adjacent Southern California.

Ron Tippets, Planner
Current and Environmental Planning Section
OC Planning Services
P.O. Box 4048
Santa Ana, CA 92702-4048

RE: Cielo Vista Project Draft Environmental Impact Report (EIR No. 615)

Dear Mr. Tippets:

The Orange County Chapter of the California Native Plant Society has long had an interest in preservation of the Chino-Puente Hills as natural open space. They are a refuge for native plants, which in turn provide habitat for wildlife that passes along the corridor sheltered by the Hills. The corridor in turn is essential to maintaining healthy native plant and animal populations throughout the greater Los Angeles area. The Cielo Vista Project would remove approximately 50 acres from that natural open space and correspondingly impact the corridor's functioning.

GENERAL COMMENTS:

A regional-level map that locates the project site in relation to Chino Hills State Park boundaries, with the Park labeled, should be included in Chapter 1, *Introduction*, and/or Chapter 2, *Project Description*. Figures 2-1 and 2-2 don't include that information. Figure 4.13-1 does, but isn't regional in scope.

The DEIR often mentions the "region" in which the Cielo Vista Project is located, in discussions of impacts and mitigations. But the "region" seems to have rather elastic boundaries. Sometimes it appears to be the area covered by Figure 3-1, or a smaller area. Elsewhere, the "region" appears to be much larger, perhaps including much of northern Orange County and adjacent portions of Riverside and San Bernardino Counties. OCCNPS finds that the "region" boundaries should be defined and be constant throughout, so that discussions of the Project's various impacts and proposed mitigations are all referring to the same place.

COMMENTS ON CHAPTER 4.3: BIOLOGICAL RESOURCES

Chapter 4.3 should include a map that shows the cumulative study area, including both the existing open space conservation reserves and the18 proposed projects within the study area. The study area itself should be enlarged to include other current (e.g. Brea's Madroña Project) and long-

term (e.g. the Aera property) threats to the Puente-Chino Hills. The map should clearly show reserve, project, city and county boundaries--which Figure 3-1 does not.

On p. 4.3-6 it is stated: "The Chino Hills State Park is a broad swath of open space that provides the same variety of habitat and wildlife found on the project study area but in less disturbed conditions due to the effect of the 2008 Freeway Complex fire that affected the property and the protected nature of the park." This is a confusing sentence. It seems to say that the Park's habitat is less disturbed due to the 2008 fire? Suggested rewording: "... Park ... is in less disturbed condition due to its protected status. The 2008 Freeway Complex Fire burned across the entire Cielo Vista property and 95% of the Park."

Figure 4.3-2 shows that most of the project site's Sensitive Natural Communities occur in Drainage A2. Figure 4.3-3 shows occupied Least Bell's Vireo habitat in the willow woodland there. Figure 4.3-4 shows that Drainage A2 is a Jurisdictional Wetland. Figures 4.3-5 through 4.3-8 show that almost all of Drainage A2's Sensitive Natural Communities, and the vireo habitat--i.e. all the best natural habitat and vegetation on the project site--will be removed to develop the 17 dwelling units of Planning Area #2.

Mitigation Measures 4.3-1 and 4.3-2 call for replacement of the willow woodland and the jurisdictional wetland at 2:1, at some other location, and/or the purchase of mitigation credits at an agency-approved off-site mitigation bank. The loss of 14.56 acres of the site's 19.69 acres of Sensitive Natural Communities "is not considered cumulatively significant and does not warrant mitigation due to the wide spread distribution of these natural communities within the cumulative impacts study area." (p. 4.3-45).

The Cumulative Impacts discussion (pp. 4.3-43 to -44) sees the Cielo Vista Project as a small bite out of the Puente-Chino Hills' natural open space, and that the Cielo Vista and "Related Project No. 1" together are a somewhat larger bite. The Cumulative Impacts analysis further sees that: "Common plant species present within the project study area occur in large numbers throughout the region, *particularly within the preserved open space areas of Chino Hills State Park*, (emphasis added) and their removal, in addition to their removal as a result of related projects would not be cumulatively considerable due to the abundance and wide spread distribution of such species in the region."

OCCNPS finds that the removal of common plant species by this and related projects would in fact be cumulatively considerable. We see that Chino Hills State Park is being increasingly surrounded by development, while at the same time the Park is being assumed to be the mitigation site for all the natural habitat that's being removed by the development. If that assumption and practice continues, eventually Chino Hills State Park will be the only place in or near northern Orange County where "common plant species" grow, which would be a considerable impact indeed to Southern California's native habitat.

COMMENTS ON CHAPTER 2: LANDSCAPE PLAN AND OPEN SPACE:

P. 2-10: "The Project would preserve 36.3 acres of the site as undeveloped open space, including fuel modification zones ... in the northern portion of the site. Environmental stewardship of the permanent open space would be provided for through offering dedication of open space areas to a public agency or an appropriate land conservation/trust organization. As an alternative, the open space would be owned and maintained by the Project Homeowner's Association (HOA)."

- OCCNPS recommends that the fuel modification zones be (re)vegetated with native plants, under OCFA guidelines. Native plants in the zones would provide home for native animals, in effect increasing the overall habitat area; non-native plants would not offer the same kind of complete wildlife habitat. Table B, attached, lists the many local native species that OCFA considers acceptable in fuel modification zones.
- OCCNPS recommends that environmental stewardship of the preserved area be settled before the Project is finalized. Otherwise, we fear that the area will become an orphan, to the detriment of its existing habitat value.

P. 2-22: "Private Homeowner Side Yard Slopes: Planting Plans for the private homeowner side yard slopes ... would be devoid of eucalyptus, juniper, cedar, cypress, *Washingtonia robusta* (mexican fan palm), *Acacia* (except for *Acacia* 'Desert Carpet') and pine trees, California sagebrush, chamise, buckwheat and black and white sage (*Salvia* spp.*).* ..." These species are all on OCFA's "Target List": plants considered to be highly fire-susceptible and that must be removed from (or not planted in) fuel modification zones. Thus it is puzzling that pines are included in the *Conceptual Plant Palette,* Table 2-2; see Table A, attached. Pines are fire-susceptible wherever they are: yard, street or common area. OCCNPS recommends that pines be removed from the plant palette of any place that's in a fire corridor--which Cielo Vista is.

COMMENTS ON CHAPTER 2: THE PLANT PALETTE, See Table A, attached

PDF 1-5: "As shown in the *Conceptual Landscape Plan* (Figure 2−11 and Table 2−2) ... The plant palette would include native and appropriate non−native drought tolerant trees, groundcovers and shrubs that would be compatible with the existing native plant communities ...."
OCCNPS comment: Table 2-2 includes just three native species (and 2 genera that have some native species) out of 43. This is not what is implied by the above sentence: that the landscaping would use more natives than non-natives. We'd like to see all-native landscaping. See Table B; many of the OCFA-approved native plants therein are good landscaping subjects.

PDF 1-5: "... The landscape design would emphasize the planting of long−lived plant species that are native to the region or well adapted to the climatic and soil conditions of the area."
OCCNPS comment: Table B lists about 40 native shrubs and 6 trees, mostly long-lived, all native to the region, and all well-adapted to our climate and soils. All would fulfill this PDF at least as well as the non-natives in Table 2-2, and add habitat value as well.

PDF 1-6: "... planting plan for streets shall include shrubs, grasses, and stands of native and non−native trees."
OCCNPS comment: Table 2-2 contains no native trees, only three native shrubs and no grasses at all. Table B lists about 6 native trees, 40 native shrubs and 4 native grasses, all OCFA-approved for fuel modification zones and many appropriate for street-landscape use.

PDF 1-7: "Landscape treatment of all areas shall emphasize the planting of shade trees along streets to contrast with open space. ..."
OCCNPS comment: Seeking to contrast "landscape" with "open space" leads to landscaping that pretends it's someplace else, not right here in OC, in a Mediterranean-climate, next to real native plants. That pretending requires use of water imported from someplace else to keep alive plants from someplace else, with long-term negative effects on both our scarce water supply and our native plants and habitats.

PDF 7-13: "... plant palette consisting of fire resistant plants, native and appropriate non−native drought tolerant species in accordance with OCFA guidelines."
OCCNPS comment: See Table B for fire-resistant, drought-tolerant native plants that fulfill OCFA guidelines.

COMMENTS ON CHAPTER 4.7: FIRE PROTECTION FEATURES

Chapter 4.7 includes specific requirements for long-term continuance and maintenance of the OCFA-required fuel modification measures. It's not clear whose responsibility it will be to see that these requirements are met in perpetuity.

The OCFA Guidelines (Figure 4.7-2b and p. 4.7-28) call for "undesirable species" to be removed from the fuel modification zones and replaced with OCFA-approved species. But doing such vegetation

modification doesn't take into account that native plants grow where they grow due to a synergy of soil chemistry and texture, ground water availability, slope, aspect, mycorrhizal flora, herbivory, and more. If the plants best adapted to a site are removed, the replacement plants may not be as well-adapted and the planting may fail. That leaves the site open to invasion by non-native weeds--which are apt to be more of a fire hazard than the original "undesirable" plants.

Much of the specified fuel modifications' continuing effectiveness appears to rely on regular irrigation of the Fuel Modification Zones and especially the Special Maintenance Areas. In these days of drought and climate change, how can it be certain that water will be available to continue such irrigation into the perpetuity that seems implied? The DEIR does not appear to include any provision for bringing recycled water to the Zones that are mandated to be regularly irrigated. OCCNPS recommends that this lack be remedied.

Thank you for the opportunity to comment on the Cielo Vista Project DEIR.

Respectfully,

Celia Kutcher
Conservation Chair

attachments:
- Table A: Annotations On DEIR Table 2-2, Cielo Vista Conceptual Plant Palette
- Table B: OC Native Plants that are OCFA-Approved for Fuel Mod Zones

TABLE A

ANNOTATIONS ON DEIR TABLE 2-2, CIELO VISTA CONCEPTUAL PLANT PALETTE

(DEIR Table 2.2 contains the same palette as Cielo Vista Area Plan Table 6.1)

"OC Native?" and "Invasive in OC?" information from F.M. Roberts Jr., 2008,
The Vascular Plants of Orange County, California, an Annotated Checklist

botanical name	common name	oc native?	invasive in oc?	occnps comments
TREES				
Agonis flexuosa	Peppermint Tree			
Arbutus 'Marina'	Arbutus			
Geijera parviflora	Australian Willow			
Lagerstroemia indica	Crape Myrtle (mildew-resistant selections)			
Lophostemon confertus	Brisbane Box			
Melaleuca (= Callistemon) viminalis	Weeping Bottlebrush		Y	uncommon, persisting escape from cultivation
Melaleuca spp.	Melaleuca		Y	uncommon, persisting escape from cultivation
Olea europaea 'Wilsonii'	Fruitless Olive		Y	known to occasionally fruit; bird-dispersed; Cal-IPC: limited
Pinus spp.	Pine	some	some	OCFA: prohibited in fuel-mod zones
Quercus ilex	Holly Oak		Y	uncommon, persisting escape from cultivation
Rhus lancea	African Sumac		Y	uncommon, persisting escape from cultivation
Schinus molle	"California" Pepper Tree		Y	bird-dispersed; Cal-IPC: limited
GROUNDCOVERS				
Acacia redolens 'Lowboy'	Acacia		?	animal-dispersed

botanical name	common name	oc native?	invasive in oc?	occnps comments
Aptenia cordifolia 'Red Apple'	Aptenia		Y	Cal-IPC Watch List OCFA: prohibited in fuel mod zones adjacent to reserve lands
Bougainvillea spp. & cvs.	Bougainvillea		Y	uncommon, persisting escape from cultivation
Carissa macrocarpa	Natal Plum			
Coprosma x *kirkii*	Coprosma		?	*C. repens* is on Cal-IPC Watch List
Lantana montevidensis & cvs	Lantana		Y	uncommon, persisting escape from cultivation
Myoporum parvifolium	Myoporum		?	
SHRUBS				
Agapanthus africanus & cvs	Lily of the Nile			
Agave spp.	Agave		Y	uncommon, persisting escape from cultivation
Aloe spp.	Aloe		Y	uncommon, persisting escape from cultivation
Alyogyne huegelii	Blue Hibiscus			
Coreopsis verticillata	Coreopsis			
Cotoneaster spp.	Cotoneaster			Cal-IPC: moderate
Dodonaea viscosa	Hop Bush		Y	uncommon, persisting escape from cultivation
Echium fastuosum (= E. candicans)	Pride of Madeira		Y	Cal-IPC: limited
Eleagnus x *ebbingei*	Silverberry			
Euryops pectinatus 'Viridis'	Euryops			
Hemerocallis hybrids.	Daylily		Y	animal-dispersed
Heteromeles arbutifolia	Toyon	Y		

botanical name	common name	oc native?	invasive in oc?	occnps comments
Kniphofia spp.	Red-Hot Poker			Cal-IPC Watch List
Leptospermum spp.	Tea Tree			Cal-IPC: *L. laevigatum* is invasive
Leucophyllum frutescens	Texas Ranger			
Myrtus communis “Compacta’	Myrtle			
Phormium spp.	Flax			
Pyracantha spp.	Fire Thorn		Y	uncommon, persisting escape from cultivation; Cal-IPC: limited
Rhamnus californica (= Frangula c.)	Coffeeberry	Y		
Rhus ovata	Sugar Bush	Y		
Rosmarinus officinalis ‘Huntington Carpet’	Dwarf Rosemary		Y	uncommon, persisting escape from cultivation
Salvia spp.	Sage	some		
Senna spp.	Cassia		Y	Cal-IPC Watch List
Teucrium spp.	Germander			

TABLE B

OC NATIVE PLANTS THAT ARE OCFA-APPROVED FOR FUEL-MOD ZONES, p. 1 of 3

common name	botanical name	type
Big Leaf Maple	Acer macrophyllum	tree
Southern Woolly Lotus	Acmispon [=Lotus] heermannii	perennial
Deerweed	Acmispon [=Lotus] scoparius	shrub
White Alder	Alnus rhombifolia	tree
Sand Bur	Ambrosia chamissonis	perennial
False Indigobush	Amorpha fruticosa	shrub
Nuttall's Snapdragon	Antirrhinum nuttalianum ssp. nuttallianum	subshrub
Eastwood Manzanita	Arctostaphylos glandulosa ssp. glandulosa	shrub
Mulefat	Baccharis salicifolia	shrub
Willow Baccharis	Baccharis salicina [= B. emoryi]	shrub
Coyote Bush	Bacharis pilularis ssp. consanguinea	shrub
California Brickellbush	Brickellia californica	shrub
California Brome Grass	Bromus carinatus	bunch grass
Beach Evening Primrose	Camissoniopsis [=Camissonia] cheiranthifolia	ground cover
Big Pod Ceanothus	Ceanothus megacarpus	shrub
Greenbark Ceanothus	Ceanothus spinosus	shrub
Punchbowl Clarkia	Clarkia bottae	annual
Bushrue	Cneoridium dumosum	shrub
Chinese Houses	Collinsia heterophylla	annual
Summer Holly	Comarostaphylis diversifolia	shrub
California Coreopsis	Coreopsis californica	annual
California Croton	Croton californicus	perennial
Bush Poppy	Dendromecon rigida	shrub
Blue Dicks	Dichelostemma capitatum	bulb
Lance-leaved Dudleya	Dudleya lanceolata	succulent
Chalk Dudleya	Dudleya pulverulenta	succulent
Giant Wild Rye	Elymus [=Leymus] condensatus	bunch grass
Coast Sunflower	Encelia californica	shrubby perennial
Hoary California Fuchsia	Epilobium [=Zauschneria] canum	perennial
Sapphire Woolly Star	Eriastrum sapphirinum	annual

TABLE B: OC NATIVE PLANTS THAT ARE OCFA-APPROVED FOR FUEL-MOD ZONES, p. 2 of 3

common name	botanical name	type
Yerba Santa	Eriodictycon trichocalyx	shrub
Thickleaf Yerba Santa	Eriodictyon crassifolium	shrub
Golden Yarrow	Eriophyllum confertiflorum	shrub
California Poppy	Eschscholzia californica	perennial
California Coffee Berry	Frangula [=Rhamnus] californica	shrub
Alkali Heath	Frankenia salina	ground cover
Globe Gilia	Gilia capitata	annual
Gum Plant	Grindelia stricta	ground cover
Rush Rose	Helianthemum scoparium	perennial
Salt Heliotrope	Heliotropium curassavicum	ground cover
Chaparral Yucca	Hesperoyucca [=Yucca] whipplei	shrub
Toyon	Heteromeles arbutifolia	shrub
Coastal Goldenbush	Isocoma menziesii	shrub
Bladderpod	Isomeris arborea	shrub
California Black Walnut	Juglans californica	tree
Spiny Rush	Juncus acutus	perennial
Yellow Bush Penstemon	Keckiella antirrhinoides	shrub
Heart Leaved Penstemon	Keckiella cordifolia	viny shrub
Blue Stemmed Bush Penstemon	Keckiella ternata	shrub
Coastal Goldfields	Lasthenia gracilis [=L. californica]	annual
Chaparral Honeysuckle	Lonicera subspicata	vining shrub
Miniature Lupine	Lupinus bicolor	annual
Coulter's Lupine	Lupinus sparsiflorus	annual
Chaparral Mallow	Malacothamnus fasciculatus	shrub
Monkeyflower	Mimulus species	perennial
Wishbone Bush	Mirabilis californica	perennial
Baby Blue Eyes	Nemophila menziesii	annual
Chaparral Nolina	Nolina cismontana	shrub
Yellow Evening Primrose	Oenothera elata ssp. californica [=O. hookeri]	perennial
Prickly Pear	Opuntia littoralis	cactus
Oracle Cactus	Opuntia oricola	cactus
Coastal Cholla	Opuntia prolifera	cactus

common name	botanical name	type
California Plantain	Plantago erecta	annual
California Sycamore	Platanus racemosa	tree
Western Cottonwood	Populus fremontii	tree
Sticky Cinquefoil	Potentilla glandulosa	perennial
Holly Leafed Cherry	Prunus ilicifolia ssp. ilicifolia	shrub
California Everlasting	Pseudognaphalium [=Gnaphalium] californicum	short-lived perennial
Coast Live Oak	Quercus agrifolia	tree
Scrub Oak	Quercus berberidifolia	shrub/tree
Nuttall's Scrub Oak	Quercus dumosa	shrub
Spiny Redberry	Rhamnus crocea	shrub
Hollyleaf Redberry	Rhamnus ilicifolia	shrub
Lemonade Berry	Rhus integrifolia	shrub
Sugarbush	Rhus ovata	shrub
Golden Currant	Ribes aureum	shrub
White Flowered Currant	Ribes indecorum	shrub
Fuchsia Flowered Gooseberry	Ribes speciosum	shrub
Coulter's Matilija Poppy	Romneya coulteri	perennial
Mexican Elderberry	Sambucus mexicana	shrub/tree
San Miguel Savory	Satureja chandleri	perennial
Common Tule	Schoenoplectus [=Scirpus] acutus	perennial
California Bulrush	Schoenoplectus [=Scirpus] californicus	perennial
Blue Eyed Grass	Sisyrinchium bellum	perennial
White Nightshade	Solanum douglasii	shrub
Purple Nightshade	Solanum xantii	shrub
Foothill Needlegrass	Stipa [=Nassella] lepida	bunch grass
Purple Needlegrass	Stipa [=Nassella] pulchra	bunch grass
Creeping Snowberry	Symphoricarpos mollis	shrub
Woolly Blue Curls	Trichostema lanatum	shrub
California Bay Laurel	Umbellularia californica	shrub/tree
Western Verbena	Verbena lasiostachys	perennial
Desert Wild Grape	Vitis girdiana	vine

Letter: OCC

ORANGE COUNTY COASTKEEPER®

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January 22, 2014

Ron Tippets
OC Planning Services
300 N. Flower Street
Santa Ana, CA 92702-4048
Phone: (714) 667-8856
Email: Ron.Tippets@ocpw.ocgov.com

RE: Draft Environmental Impact Report (EIR No. 615) - Cielo Vista Project (the "Project")

Dear Mr. Tippets,

Orange County Coastkeeper ("Coastkeeper") is an environmental organization with the mission to protect and promote sustainable water resources that are swimmable, drinkable, and fishable. As concerned Orange County residents and strong supporters of environmental quality and public health, we respectfully submit the following comments on behalf of our collective membership to express our reservations regarding the Draft Environmental Impact Report (DEIR) issued for the Cielo Vista Project by OC Planning Services. As we will discuss in detail below, the DEIR fails to provide adequate protections for water quality and subjects the general public, as well as both marine and freshwater ecosystems, to serious risk of harm. The DEIR is legally inadequate under the California Environmental Quality Act ("CEQA") as it fails to provide adequate analysis and appropriate mitigation with respect to Project impacts on water quality, endangered species and habitat.

We urge for OC Planning Services to require that DEIR be modified in accordance with our comments submitted below.

I. INTRODUCTION - APPLICABLE LAW

An EIR must disclose all potentially significant adverse environmental impacts of a project. (Pub. Res. Code, § 21100(b)(1); CEQA Guidelines, § 15126(a); *Berkeley Keep Jets Over The Bay Committee v. Board of Port Commissioners of the City of Oakland*, 91 Cal. App. 4th 1344, 1354.) CEQA requires that an EIR must not only identify the impacts, but must also provide "information about how adverse the impacts will be." (*Santiago County Water Dist. v. County of Orange* (1981) 118 Cal.App.3d 818, 831). The lead agency may deem a particular impact to be insignificant only if it produces rigorous analysis and concrete substantial evidence justifying the finding. (*Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692.) CEQA requires public agencies to avoid or reduce environmental damage when "feasible" by requiring mitigation measures. (CEQA Guidelines, § 15002(a)(2) and (3); *Berkeley Keep Jets Over the Bay Committee*, supra, 91 Cal. App. 4th at p. 1354; *Citizens of Goleta Valley*, supra, 52 Cal.3d at p.564.) The EIR serves to provide agencies and the public with information about the environmental impacts of a proposed project and to "identify ways that environmental damage can be avoided or significantly reduced." (CEQA Guidelines,

§15002(a)(2).) If the project will have a significant effect on the environment, the agency may approve the project only if it finds that it has "eliminated or substantially lessened all significant effects on the environment where feasible" and that any unavoidable significant effects on the environment are "acceptable due to overriding concerns." (Pub. Res. Code, § 21081; CEQA Guidelines, § 15092(b)(2)(A) & (B).)

In general, mitigation measures must be designed to minimize, reduce, or avoid an identified environmental impact or to rectify or compensate for that impact. (CEQA Guidelines, § 15370.) Where several mitigation measures are available to mitigate an impact, each should be discussed and the basis for selecting a particular measure should be identified. (Id., at § 15126.4(a)(1)(B).) A lead agency may not make the required CEQA findings unless the administrative record clearly shows that all uncertainties regarding the mitigation of significant environmental impacts have been resolved. CEQA requires the lead agency to adopt feasible mitigation measures that will
substantially lessen or avoid the Project's potentially significant environmental impacts (Pub. Res. Code, §§ 21002, 21081(a)), and describe those mitigation measures in the CEQA document. (Pub. Res. Code, § 21100(b)(3); CEQA Guidelines, § 15126.4.)

A public agency may not rely on mitigation measures of uncertain efficacy or feasibility. (*Kings County*, supra, 221 Cal.App.3d at p. 727.) "Feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social and technological factors. (CEQA Guidelines, § 15364.) To demonstrate economic infeasibility, "evidence must show that the additional costs or lost profitability are sufficiently severe as to render it impractical to proceed with the project." (*Citizens of Goleta Valley v. Board of Supervisors* (1988) 197 Cal.App.3d 1167, 1181.) This requires not just cost data, but also data showing insufficient income and profitability. (See *Burger v. County of Mendocino* (1975) 45 Cal.App.3d 322, 327.); *San Franciscans Upholding the Downtown Plan v. City and County of San* Francisco (2002) 102 Cal.App.4th 656, 694.) Mitigation measures must be fully enforceable through permit conditions, agreements, or other legally binding instruments. (CEQA Guidelines, § 15126.4, subd. (a)(2).)

II. THE DEIR FAILS TO ANALYZE AND MITIGATE ALL POTENTIALLY SIGNIFICANT IMPACTS TO BIOLOGICAL RESOURCES.

A. The DEIR Fails to Adequately Analyze Project Impacts on Sensitive Biological Resources.

The Project May Result in Serious Harm to Wildlife and fails to apply appropriate measures to mitigate this harm.

The Threshold applied to the analysis of project impacts for these sensitive and special status species is as follows:

> Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Wildlife Service?

During biological surveys conducted from April to July of 2012, four special status wildlife species were observed on-site: (1) the least Bell's vireo, a species listed as Endangered under both the California and Federal Endangered Species Acts, (2) the yellow-breasted chat, (3) the yellow warbler, and (4) the red-diamond rattlesnake, all three of which are classified as California Department of Fish and Wildlife (CDFW) Species of Special Concern. Additionally, the golden eagle, a State Fully Protected Species, utilizes identical habitat to that of the project area. The Project will directly and adversely impact habitat supporting all of five of these sensitive species and these on-site impacts to habitat are potentially significant.

DEIR Mitigation Measure 4.3-1 is the only mitigation measure that mitigates impacts to wildlife and calls for the Project Applicant, "to obtain regulatory permits by way of an authorization pursuant to FESA and CESA. On- and/or off-site replacement and/or enhancement of ***least Bell's vireo habitat*** shall be provided by the Project Applicant at a ratio no less than 2:1, in coordination with the regulatory permitting processes of the United States Fish and Wildlife Service (USFWS) and CDFW. Off-site replacement may include, but is not limited to, the purchase of mitigation credits in an agency-approved off-site mitigation bank supporting ***least Bell's vireo***. A Mitigation Plan for the least Bell's vireo will be approved by the USFWS and/or CDFW shall be provided to the Manager, OC Planning prior to issuance of a grading permit.

The DEIR goes on to explains that given the small amount of acreage that would be impacted by the Project in relation to the "regional habitat available in the immediately adjacent open space," any loss of individuals or habitat, as a result of Project impacts would not be expected to reduce regional population numbers, thereby making impacts to these wildlife species less than significant. This analysis is inadequate as it is conclusory given that the DEIR gives no indication of how large the on-site habitat area is for these species. If there is a large substantial amount of native habitat for these species on-site, the Project will result in significant impacts to the habitat of all five of the above listed sensitive species thereby having a substantial adverse effect on those species. The DEIR should recognize the impacts to these species as significant or provide an analyses supported by facts that show the impacts on habitat to not substantially adversely affect these sensitive species.

Therefore, the DEIR fails to properly analyze impacts under the applicable threshold mandated by CEQA in that it does not recognize significant impacts the Project will have on the sensitive species observed at the Project site, other than the least Bell's vireo, as well as those with the great potential to utilize the Project site as its habitat.

B. The DEIR Fails to Adequately Analyze Mitigation Measures for Substantially Adverse Project Impacts on Sensitive Biological Resources.

The DEIR concludes that only a mitigation measure specifically for the least Bell's vireo and its habitat but fails to afford any other species classified as sensitive or special any mitigation despite substantial adverse impacts to their on-site habitat. While Mitigation Measure 4.3-1 could be considered adequate insofar as the least Bell's vireo, given the four additional sensitive wildlife species observed onsite, aside from the least Bell's, on-site prone to forage and nest in the Project's habitat, a mitigation measure addressing significant impacts to these sensitive species should be established for the DEIR as required under CEQA. These sensitive species will be affected by Project impact the same as the least Bell viero, depending on the amount of native habitat there is on-site, and, while not being listed as Endangered, are classified as special

status sensitive species under by CDFW. An additional mitigation measure should be added to a revised DEIR given the potential for additional sensitive species other than the least Bell vireo to be nesting or foraing on-site.

This same mitigation measure could also protect any additional sensitive or protected species are found in the project area when the project is further along. The DEIR is deficient in that it fails to establish a mitigation measure to guard against Project impacts that have a substantially adverse effect on a sensitive species observed during recent on-site biological surveys. Furthermore, the DEIR does not seek to establish that such a measure would be infeasible. Therefore, additional mitigation measures for Project impacts on Biological Resources should be required as mandated by CEQA.

Furthermore, additional mitigation measures should be set for any additional sensitive wildlife species with moderate potential to occur on-site but not observed during field surveys; such species include the coast patch-nosed snake, two-striped garter snake, coast horned lizard, orange-throated whiptail, western mastiff bat, white-tailed kite, long-eared owl, pallid bat, western yellow bat, northwestern San Diego pocket mouse, and San Diego desert woodrat. This measure should be established by the DEIR to deal with any of these additional species in case any are impacted by the Project once it commences.

These mitigation measures should be established in a revised DEIR to ensure that all applicable and feasible measures will be implemented to reduce the Project's impacts to classified sensitive wildlife species.

C. The Project May Result in Serious Harm to Sensitive Natural Communities and the DEIR Fails to Apply Appropriate Measures to Mitigate this Harm.

The Threshold applied to the analysis of project impacts on riparian habitat or other sensitive natural communities is as follows:

> Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U. S. Fish and Wildlife Service?

The project study area supports sensitive natural communities that are considered to be sensitive by the CDFW Natural Heritage Division. The Project would impact 4.60 acres of Blue elderberry woodland, 1.25 acres of southern willow scrub, 0.51 acre of blue elderberry woodland/laurel sumac chaparral, 2.57 acres of blue elderberry woodland/laurel sumac chaparral/mixed coastal sage scrub, and 5.63 acres of encelia scrub which are each considered sensitive natural communities by CDFW. Yet, the DEIR concludes that impacts on the on-site sensitive natural communities will be less than significant because they have "diminished functions and values as habitat and the relative abundance of these vegetation throughout the region." The DEIR goes on the claim that due to the relative abundance of these species in the area outside the project site, the impacts will be less than significant. For these reasons, the DEIR concludes that no mitigation measures are required.

The DEIR fails to adequately analyze Projects impacts to the aforementioned on-site sensitive natural communities under the threshold as mandated by CEQA. The fact that the function and value of the habitat is claimed to have been diminished, or the fact that these species have "relative abundance of these

vegetative communities throughout the region" is irrelevant given the threshold of the analysis to be conducted under CEQA. Furthermore, these sensitive natural communities function as cover for the least Bell's vireo, an Endangered Species, as well as two other sensitive species classified by CDFW: the yellow breasted chat, and the yellow warbler; therefore, the DEIR's claim that these sensitive natural have diminished functions is unfounded and without merit.

Furthermore, additional mitigation measures should be required in a revised DEIR for any additional sensitive natural communities that are found once, and if, the Project begins. This measure should be established by the DEIR to address any unanticipated impacts to species that were not observed during the biological surveys if any of these species are indeed impacted by the Project's construction or operation.

Mitigation measures should be required in a revised DEIR to ensure that all applicable and feasible measures will be implemented to reduce the Project's impacts to species classified as sensitive natural species by CDFW.

III. THE DEIR FAILS TO ADEQUATELY ANALYZE THE PROJECTS IMPACT TO HYDROLOGY AND WATER QUALITY.

A. Hydrology And Water Quality May Be Seriously Affected By The Impacts Resulting From Project Construction.

Project construction will require extensive grading, vegetation removal, and excavation. Use of heavy equipment and construction-related chemicals, such as fuels, oils, grease, solvents and paints will be used and stored on-site throughout the construction process. These construction activities could result in accidental spills or disposal of potentially harmful materials used during construction that could wash into and pollute surface or ground waters. During construction activities, stormwater runoff and ground-disturbing activities such as grading that lead to erosion facilitating the transportation of trace metals such as zinc, copper, lead, cadmium, iron and other pollutants into adjacent waterways.

Receiving waters from drainage within the project area include the Santa Ana River (Orange County channel E-06 to E-01.) The DEIR identifies that the Santa Ana River is listed under the California Regional Water Quality Control Board's 303(d) List of Impaired Water Bodies for excessive heavy metals and pathogen pollution. If rainfall washes over disturbed soil stockpiled on site during Project construction, contaminated sediment and runoff can eventually drain to the Santa Ana, further degrading water quality. Given the Santa Ana River already polluted with heavy metals and pathogens, the Project will negatively affect water quality in Santa Ana harming not only the river but biological resources and recreation opportunities for the watershed.

The DEIR states that a SWPPP will be prepared and identifies measures that will be implemented to reduce impacts from soil erosion. The DEIR does lists best management practices (BMPs) that will be implemented to reduce water quality impacts; however, no measures or BMPs are provided that specifically identify that pollutants which may exist from previous uses of the site, including oil production. To ensure that Project construction will not result in significant impacts to hydrological resources, the SWPPP should be prepared prior to Project construction to include BMPs such as erosion control and treatment measures specifically designed to address specific site issues.

B. The DEIR Fails to Adequately Analyze and Mitigate Cumulative Impacts to Hydrology and Water Quality.

The DEIR fails to provide any analysis on how the Project, in combination with all relevant past, present and potential future projects, can cause cumulative impacts to biological resources.
A DEIR must discuss significant cumulative impacts. (CEQA Guidelines, § 15130(a). *Friends of Eel River v. Sonoma County Water Agency,* (2003) 108 Cal. App. 4th 859). This requirement flows from Pub. Res. Code section 21083, which requires a finding that a project may have a significant effect on the environment if "the possible effects of a project are individually limited but cumulatively considerable… 'Cumulatively considerable' means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects."

"Cumulative impacts" are defined as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." (CEQA Guidelines, § 15355(a).) "[I]ndividual effects may be changes resulting from a single project or a number of separate projects." (CEQA Guidelines, § 15355(a).) "The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time." (*CBE v. CRA, supra*, 103 Cal.App.4th at p. 117.) A legally adequate cumulative impacts analysis views a particular project over time and in conjunction with other related past, present, and reasonably foreseeable probable future projects whose impacts might compound or interrelate with those of the project at hand; "cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time." (CEQA Guidelines, § 15355(b).)

In sum, an EIR's cumulative impacts analyses are critical in taking a project out of its artificial vacuum. By evaluating the true extent of a project's environmental impacts, taking into consideration all relevant past, present, and probable future projects in the project's vicinity, the EIR could serve its informational purpose adequately.

The DEIR provides virtually no analysis of the Project's contribution to cumulative impacts to sensitive biological resources. It states:

> Similar to the Project, per applicable regulatory requirements, Related Project No. 1 would be required to ensure that it does not increase flows or alter the drainage pattern such that substantial erosion or flooding would not occur on- and off-site. As part of the site-specific hydrology analysis for the Esperanza Hills project, runoff quantities would also need to be within the capacity of the storm drain system serving that site and if not, appropriate infrastructure upgrades would need to be provided by that Project. As Esperanza Hills would be required to comply with the same hydrology-related regulatory requirements as the Project, the cumulative impact of these projects on downstream drainage facilities, flooding and erosion would be less than significant.

The DEIR's cumulative impacts analysis fails to consider other related present and reasonably foreseeable future projects. Furthermore, it fails to adequately analyze the cumulative impacts of other past and

present projects because it does not consider the incremental effects of each individual project when viewed in connection with the effects. As explained in the section above, an increase in pathogens and pesticides has the potential to substantially harm not only the Santa Ana River, a body of water that is already polluted with heavy metals and pathogens, but harming biological resources and recreation opportunities for the watershed as well.

Proper cumulative impacts analysis is absolutely critical to meaningful environmental review. The DEIR's cumulative impact analyses for hydration and water quality are inadequate in their entirety because they do not take into account the environmental impacts of other past, present and reasonably foreseeable projects in the Project's vicinity. As a result, the cumulative impacts analyses are underinclusive and misleading. The DEIR must revise its cumulative impacts analyses for each and every environmental issue using updated and accurate growth projections or a list-of-projects approach, or a combination of both. (CEQA Guidelines, § 15130(b))

III. THE DEIR FAILS TO ACCURATELY IMPLEMENT LOW IMPACT DEVELOPMENT PRIORITIZATION FOR PRIORITY PROJECTS IN THE NORTH ORANGE COUNTY MS4 PERMIT

Project proponents are required to incorporate Low Impact Design (LID) principles to reduce runoff to the maximum extent practicable during each phase of the development process for this priority project. Order No. R8-2009-0030, § XII.C.3. LID principles are prioritized so that the highest priority are preventative measures and then, if necessary, mitigation. Order No. R8-2009-0030, § XII.C.4. Mitigation or structural site design measures are further prioritized, from highest to lowest priority, as follows: "(1) Infiltration; (2) Harvesting and Re-use (cisterns and rain barrels); and (3) Bio-treatment such as bio-filtration/bio-retention." Id. Only after a feasibility analysis can a project proponent shift from Infiltration to Harvesting and Re-use to Bio-treatment BMPs and then, if necessary, to regional or sub-regional alternative. Said another way, "[a] properly engineered and maintained bio-treatment system may be considered only if infiltration, harvesting and resue and evaportranspiration cannot be feasibly implemented at the project site." Order No. R8-2009-0030, § XII.C.2 fn 56.

Assuming, arguendo, that Infiltration is infeasible at the Cielo Vista location, then the next LID mitigation principle would be Harvesting and Reuse. The DEIR failed to adequately conduct a feasibility analysis justifying the DEIR's classification of this LID BMP principle as "not feasible." Currently, the DEIR's analysis is based on the assertion that the "California Plumbing Code does not currently provide standards for the stormwater harvesting systems for indoor residential use." DEIR, Section IV.3.3. Additionally, the DEIR states that "reclaimed water is not available onsite." Id. This conclusion is the result of a selective and unreasonably narrow interpretation of criteria found in the Technical Guidance Document. Cisterns and underground storage tanks act as storage to reduce runoff volume and rate and can be used as a component of a treatment train. Technical Guidance Document, Appendix XIV-50. This system is described as a BMP utilized prior to stormwater discharge into biotreatment BMPs. Id. Project proponents must perform an analysis of the Project's water demand to determine draw down, which may require additional consideration of irrigated landscaping choices. If Harvesting and Reuse is feasible to capture a portion of the Design Capture Volume (DCV), then the utilization of targeted Harvesting and Reuse BMPs could benefit the thirty three proposed Filterra units and the Contech Stormfilter which may be required to treat the remaining DCV. Storage of stormwater, especially first flow events, would allow stormwater discharges to be adequately treated before discharge. Underground storage could result in fewer Contech Stormfilter and Filterra bypass events where stormwater would be discharged into the MS4

system untreated. In sum, additional analysis by the Project proponents must be conducted before Harvesting and Reuse LID BMPs can be found to be infeasible.

IV. THE DEIR INCORRECTLY CLAIMS THE CIELO VISTA DEVELOPMENT IN NOT LOCATED IN A FIRE ZONE.

The location of the Cielo Vista development is a known wildfire zone with a recent history of activity necessitating effective planning to mitigate fire risk. The DEIR states that firescaping will not be incorporated into the Vegetative Protection, Selective Revegetation, and Soil Stockpiling after the conclusion of the Project's construction because "the Project is not located in a high risk wildfire zone." The Project is located on and near the site of the 2008 Freeway Complex Fire, also known as the Triangle Complex Fire, which burned over 30,000 acres and destroyed nearly 200 residential structures. Coastkeeper strongly believes the use of appropriate landscaping, perhaps firescaping, should be considered for the Project. The containment of water from underground or above ground cisterns that collect and retain stormwater could be a component of fire suppression that could be considered when addressing cistern draw down or capacity.

CONCLUSION

In conclusion, after a thorough review of the Project DEIR, Coastkeeper is concerned that the Project fails to adequately implement the requirements of LID BMPs in the development of their Conceptual WQMP, that the DEIR fails to adequately analyze and mitigate for the Project's cumulative impacts to hydrology and water quality, that the DEIR fails to analyze and mitigate for all of the Project's potentially significant impacts to biological resources, and that the project incorrectly minimizes fire threats posed by and to this development by its location.

Coastkeeper thanks OC Planning Services for its consideration of our comments on the Cielo Vista development. If you have any questions regarding our comments please feel free to call me directly at 714-850-1965 ext. 307 or email me at colin@coastkeeper.org.

Regards,

Colin Kelly
Staff Attorney
Orange County Coastkeeper

Letter: HFE1

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November 8, 2013

Via E-Mail and U.S. Mail

Orange County Planning
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Re: Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:

On behalf of Hills For Everyone, we write to request an extension of the public comment period for the Cielo Vista Project Draft Environmental Impacts Report. Hills For Everyone is a non-profit organization that strives to protect, preserve, and restore the environmental resources and natural environs of the Puente-Chino Hills and surrounding areas for the enjoyment of current and succeeding generations, and is closely following the County's processing of the proposed Cielo Vista Project and the associated Esperanza Hills Project.

Complex legal and technical issues surround the Cielo Vista Project and the County's Draft EIR. At the same time, the County is also in the process of evaluating the proposed Esperanza Hills Project on the parcels directly east of the proposed Cielo Vista site. Cielo Vista and Esperanza Hills will share access corridors and utility connections. Development of Esperanza Hills is therefore reasonably foreseeable consequence of the Cielo Vista Project, and must be evaluated as part of the Cielo Vista Project. Alternately, the two projects should be evaluated together. In any event, the interaction between these projects significantly expands and complicates the scope of the issues raised by the Cielo Vista Draft EIR.

The offered six-week comment period is therefore insufficient for the thorough public review that CEQA mandates. Furthermore, the Public Comment Period is slated to close in the midst of the winter holiday season, placing additional pressure on members of the public that wish to comment on the Cielo Vista Draft EIR and potentially

reducing public engagement in these important issues. The County should strive to maximize public participation in the environmental review process.

In light of the complexity of technical and legal issues surrounding the Cielo Vista Project, and the upcoming holiday season, Hills For Everyone respectfully requests that the County lengthen the public comment period by 30 days, extending it to January 22, 2014. Thank you for considering this request.

Very truly yours,

SHUTE, MIHALY & WEINBERGER LLP

Gabriel M.B. Ross

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Letter: HFE2

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January 22, 2014

Via E-Mail and FedEx

OC Planning
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Santa Ana, CA 92702-4048
E-Mail: Ron.Tippets@ocpw.ocgov.com

Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:

On behalf of Hills For Everyone, we write to comment on the Cielo Vista Project Draft Environmental Impact Report ("DEIR"). Hills For Everyone is a non-profit organization that strives to protect, preserve, and restore the environmental resources and natural environs of the Puente-Chino Hills and surrounding areas for the enjoyment of current and succeeding generations, and is closely following the County's processing of the proposed Cielo Vista Project and the associated Esperanza Hills Project.

As detailed below, the County has failed to comply with the California Environmental Quality Act, Public Resources Code sections 21000, et. seq. ("CEQA") and California Code of Regulations § 15000 et seq. ("Guidelines") in its review of the environmental impacts of the proposed Project. Further, approval of the Project would violate state Planning and Zoning Law, Government Code sections 65000 et seq. The County may not approve the Project until (1) it is revised to comply with state Planning and Zoning law, and (2) environmental review of the revised project fully complies with CEQA.

I. The DEIR Fails to Satisfy CEQA's Requirements.

The EIR is "the heart of CEQA." *Laurel Heights Improvement Ass'n v. Regents of Univ. of Cal.*, 47 Cal. 3d 376, 392 (1988) (citations omitted). It is

> an environmental 'alarm bell' whose purpose it is to alert the public and its responsible officials to environmental changes before they have reached ecological points of no return. The EIR is also intended 'to demonstrate to an apprehensive citizenry that the agency has, in fact, analyzed and considered the ecological implications of its action.' Because the EIR must be certified or rejected by public officials, it is a document of accountability.

Id. (citations omitted).

Where, as here, the DEIR fails to fully and accurately inform decisionmakers and the public of the environmental consequences of proposed actions, it does not satisfy the basic goals of the statute. *See* Pub. Res. Code § 21061 ("The purpose of an environmental impact report is to provide public agencies and the public in general with detailed information about the effect that a proposed project is likely to have on the environment . . .")

As a result of the DEIR's numerous and serious inadequacies, there can be no meaningful public review of the Project. The County must revise and recirculate the DEIR in order to permit an adequate understanding of the environmental issues at stake.

II. The DEIR's Flawed Project Description Does Not Permit Meaningful Public Review of the Project.

In order for an EIR to adequately evaluate the environmental ramifications of a project, it must first provide a comprehensive description of the project itself. "An accurate, stable and finite project description is the sine qua non of an informative and legally sufficient EIR." *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus*, 27 Cal. App. 4th 713, 730 (1994) (quoting *County of Inyo v. City of Los Angeles*, 71 Cal. App. 3d 185, 193 (1977)). As a result, courts have found that even if an EIR is adequate in all other respects, the use of a "truncated project concept" violates CEQA and mandates the conclusion that the lead agency did not proceed in the manner required by law. *San Joaquin Raptor*, 27 Cal. App. 4th at 729–30. Furthermore, "[a]n accurate project description is necessary for an intelligent evaluation of the potential environmental effects of a proposed activity." *Id.* at 730 (citation omitted). Thus, an inaccurate or incomplete project description renders the analysis of significant environmental impacts inherently unreliable.

Here, the DEIR does not come close to meeting these established legal standards. The DEIR fails to describe four of the most critical components of the proposed Project: (1) the adjacent Esperanza Hills development; (2) the nearby Bridal Hills and Yorba

Linda Land developments; and (3) new oil drilling operations on the Project site. Environmental review of Cielo Vista in isolation from these four components of the Project would represent improper segmentation of environmental review under CEQA.

A. The Esperanza Hills Development is a Component of the Project.

The Esperanza Hills Project, a significant residential development, is proposed for the area located directly east of the proposed Cielo Vista Project site. DEIR at 2-1. The County released the Draft Environmental Impact Report for Esperanza Hills ("Esperanza Hills DEIR," attached hereto as Exhibit A) on December 2, 2013. Esperanza Hills would include the construction of 340 dwelling units and major grading activities on a 469-acre parcel adjacent to the Cielo Vista Project site. Cielo Vista and Esperanza Hills will share water and sewer facilities, and at least one of the access corridors to the Esperanza Hills site may be constructed as part of Cielo Vista.

CEQA prohibits piecemealed review of two developments that are truly a single project. The statute defines a "project" as "the whole of an action, which has a potential for resulting in either a direct physical change" or "a reasonably foreseeable indirect change in the environment." CEQA Guidelines § 15378(a); *see also* CEQA Guidelines § 15378(c) (term "project" means the whole of the "activity which is being approved"). Thus, an agency must take an expansive view of any particular project as it conducts the environmental review for that project. *See McQueen v. Bd. of Directors*, 202 Cal. App. 3d 1136, 1143 (1988) (term "project" is interpreted so as to "maximize protection of the environment").

An "EIR must include an analysis of the environmental effects of future expansion or other action if: (1) it is a reasonably foreseeable consequence of the initial project; and (2) the future expansion or action will be significant in that it will likely change the scope or nature of the initial project or its environmental effect." *Laurel Heights*, 47 Cal. 3d at 394–96. *Laurel Heights* requires a project proponent to analyze future expansion and other such action in an EIR if there is "telling evidence" that the agency has either made decisions or formulated reasonably definite proposals as to future uses of a project in the future. *Id.* at 396–97.

Here, there is ample evidence that the Esperanza Hills project is a foreseeable consequence of Cielo Vista, and that the two are, under CEQA's definition, the same project. Most obviously, the Cielo Vista Project will provide Esperanza Hills with required access corridors and water and sewer connections. They are, in effect, a single project building houses on two adjacent and closely-related sites. Access to the Esperanza Hills site may be provided by access corridors to be constructed as part of the Cielo Vista Project. DEIR at 4.10-11. The Yorba Linda Water District has advised

representatives of both development projects that water and sewer services and facilities must be planned and designed together. *See* Yorba Linda Water District, Comments Regarding the Notice of Preparation (NOP) of EIR for Proposed Cielo Vista Project (Project No. PA100004), August 2, 2012 (attached hereto as Exhibit B). Even if Cielo Vista and Esperanza Hills were separate projects, CEQA would still require the County to consider their environmental impacts together. Construction of the Cielo Vista access corridors and utility connections are the first steps toward development of Esperanza Hills.

Established CEQA case law holds that the analysis of environmental effects must occur at the earliest discretionary approval, even if later approvals will take place. *See, e.g.*, *Bozung v. Local Agency Formation Comm.*, 13 Cal. 3d 263, 282 (1975) (expressing the importance of environmental review "at the earliest possible stage"). The environmental impacts associated with this additional development must be analyzed with those of the Cielo Vista Project. The Orange County Local Agency Formation Commission ("LAFCO") has also requested that the County prepare a combined analysis of the environmental impacts of the Cielo Vista and Esperanza Hills projects. *See* Orange County LAFCO, Response to NOP for Cielo Vista Project, August 1, 2012 (attached hereto as Exhibit C).

In any event, because the two developments are so closely related, a single EIR would provide the most efficient and effective environmental review. A single EIR will provide a more comprehensive evaluation of environmental impacts and will also assist the County in crystallizing its analysis of alternatives to the development of widely dispersed, single-family homes in this portion of the Puente-Chino Hills-.

1. Segmenting Review of Cielo Vista and Esperanza Hills Conceals the Magnitude and Significance of the Project's Impacts.

By artificially segmenting its environmental review of the Cielo Vista and Esperanza Hills developments, the County has concealed the magnitude and significance of the Project's environmental impacts. Certain impacts caused by Cielo Vista that are deemed less than significant under the EIR's standards would be significant when combined with the impacts of Esperanza Hills.

For example, the Project's greenhouse gas emissions and impacts on global climate change would be significant according to the threshold in the DEIR if the DEIR also accounted for the greenhouse gas emissions from Esperanza Hills. The DEIR estimates that Cielo Vista will generate 2,283 metric tons of carbon dioxide equivalent ("$MTCO_2e$") per year. DEIR at 4.6-24. The County's threshold for determining whether a Project would result in a significant impact is 3,000 $MTCO_2e$ per year. *Id.* Because

Cielo Vista would not exceed the County's threshold, the DEIR concludes that the Project would result in a less than significant impact with respect to greenhouse gas emissions. *Id.* The Esperanza Hills DEIR estimates that Esperanza Hills will generate nearly 7,000 $MTCO_2e$ per year. Esperanza Hills DEIR at 5-272. Together, these two developments greatly exceed the County's significance threshold.

But according to the DEIR's current analysis, the greenhouse gas emissions and impacts on global climate change from Cielo Vista are not even cumulatively considerable. DEIR at 4.6-27. Yet the Esperanza Hills DEIR admits that the greenhouse gas emissions and impacts on global climate change, as well as noise impacts, from that development alone are significant and unavoidable. Esperanza Hills DEIR at 10-1. The DEIR's claims that these categories of impacts are less than significant for Cielo Vista create a misleading portrayal of the environmental impacts of the whole Project. Only a single EIR would provide the complete environmental review that CEQA requires.

B. The Bridal Hills and Yorba Linda Land Developments Are Components of the Project.

Any developments planned for the Bridal Hills, LLC parcel and the Yorba Linda Land, LLC parcel are also reasonably foreseeable consequences of the Cielo Vista Project, and therefore must be considered part of the Cielo Vista Project. These two parcels—located north and east of the Cielo Vista Project site—are currently undeveloped, but it appears that significant development activity is planned for at least one of these areas. In the Esperanza Hills DEIR, the County admits that the Bridal Hills, LLC parcel "is a reasonably foreseeable development" and includes it in that document's analysis. Esperanza Hills DEIR at 4-2.

The Notice of Preparation for the Esperanza Hills Project explains that access to both the Bridal Hills and Yorba Linda Land parcels will be provided for in the proposed Esperanza Hills lot layout and street design. Esperanza Hills NOP at 1. The Esperanza Hills DEIR also admits that the Esperanza Hills development will provide the access corridor for the Bridal Hills development. Esperanza Hills DEIR at 4-2. In fact, the Esperanza Hills NOP contains a Vegetation/Biological Resources Map for the "Esperanza Hills Specific Plan Area" that includes the Bridal Hills and Yorba Linda Land parcels within the project boundary. Esperanza Hills NOP at 11, Exh. 5.

Development of the Bridal Hills and Yorba Linda Land parcels therefore constitutes a reasonably foreseeable consequence of the Cielo Vista Project, and must be considered part of the Cielo Vista Project. *Laurel Heights*, 47 Cal. 3d at 394–96. The environmental effects of all of these developments, along with those of Cielo Vista, should be collectively evaluated in a single EIR.

C. Oil Drilling on the Project Site is a Component of the Project.

As part of the Project, a 1.8-acre parcel located in Planning Area 1 (the "drilling pad") is proposed to be zoned R-1(O) and may be the site of new and continued oil operations—including consolidation of oil wells relocated from the rest of the project site and slant drilling of new wells below ground. DEIR at 2-28. These new and continued oil operations constitute a reasonably foreseeable consequence of the Cielo Vista Project, and therefore must be considered part of the Cielo Vista Project. An operating well is currently located within the drilling pad area, DEIR at 2-29, and the Project maintains access to the drilling pad.

Nevertheless, the DEIR fails to adequately evaluate the impacts of these continued operations. Instead, the County declines to analyze the impacts of these continued oil operations because "permitting and site planning [will] be pursued by the oil operators" and "the oil drilling pad would be developed for future oil operations as a separate project should the oil operators choose to relocate to this area of the project site." DEIR at 2-29. But CEQA requires the County to analyze impacts at the earliest discretionary approval, even if later approvals will take place. *See Bozung*, 13 Cal. 3d at 282. The County must evaluate the environmental impacts associated with new and continued oil operations as part of the Cielo Vista Project.

III. The DEIR Fails to Adequately Analyze the Project's Environmental Impacts.

A. The DEIR Fails to Accurately Analyze the Project's Geology and Soils Impacts.

The DEIR fails to adequately analyze the Project's significant earthquake safety risks. The DEIR's proposed mitigation measures are vague and incapable of reducing these significant impacts to a less than significant level. The DEIR also fails to acknowledge that the Project is inconsistent with policies of the Orange County General Plan ("OCGP") and the City of Yorba Linda General Plan ("YLGP") regarding geologic hazards. These plan inconsistencies constitute significant and unavoidable impacts.

1. The Project Creates Significant Geologic Safety Hazards.

The Whittier Fault—an active fault with a Fault-Rupture Hazard Zone that is approximately 1,000 feet wide—bisects the Project site. DEIR at 4.5-10. Residential lots are proposed within the fault rupture hazard zone. DEIR at 4.5-14. There is potential for significant ground shaking at the Project site during a strong seismic event on the Whittier Fault, as well as fault rupture, liquefaction, landslides, slope instability, dangerous soil expansion, and severe damage to nearby buildings. DEIR at 4.5-9 to -11.

The DEIR explains that these impacts would be significant if the Project would expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death, involving fault rupture, strong seismic ground shaking, seismic-related ground failure, and landslides. DEIR at 4.5-13. The hazards associated with the Whittier Fault clearly exceed this threshold.

Indeed, the DEIR admits that the Project could expose people or structures to such adverse effects. *Id.* The DEIR concedes that the Whittier Fault could generate an earthquake of Mw6.0 to 7.2 on the moment magnitude scale. DEIR at 4.5-10. An earthquake of that magnitude can lead to "Major" earthquake effects, including "damage to most buildings, some to partially or completely collapse or receive severe damage." Even "[w]ell-designed structures are likely to receive damage." *Id.*

According to the 2013 Geotechnical Feasibility Study[1], a seismic event at the Project site could result in "severe" shaking and could lead to "moderate to heavy" damage. DEIR at 4.5-10.

Moreover, ground surface rupture could occur along the Whittier Fault trace. DEIR at 4.5-9. But the DEIR admits that the precise location of the Whittier Fault trace is unknown. DEIR at 4.5-14. The 2006 Geotechnical Evaluation estimates that the Whittier Fault trace is located along the mid-point of the Whittier Fault Zone, but concedes that a previous investigation determined that multiple branches of the fault exist in the Project area. 2006 Geotechnical Evaluation 4. Active fault splays could occur outside of the "likely" location of the main fault trace. *Id.*

Liquefaction, as well as other ground failure hazards can lead to ground failure that can result in property damage and structural failure. DEIR at 4.5-15. The DEIR determines that a potentially significant impact would occur if any structures are located in areas potentially susceptible to ground failure hazards. *Id.* The DEIR admits that a portion of the Project site clearly has the potential for liquefaction, and that other areas may also be susceptible to liquefaction and seismic settlement. *Id.*

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[1] Appendix E to the DEIR includes two preliminary geotechnical reports to support its conclusions: (1) Pacific Soils Engineering, Inc., Geologic and Geotechnical Evaluation (2006) ("2006 Geotechnical Evaluation"); and (2) LGC Geotechnical, Inc., Geotechnical Feasibility Study, Proposed Development of Tentative Tract Map No. 17341, County of Orange, California (2013) ("2013 Geotechnical Feasibility Study").

The DEIR further admits that available information indicates the presence of landslides and other gross slope instability conditions on a portion of the Project site. DEIR at 4.5-15. The proposed grading for the Project is avoids "most areas suspected to be underlain by landslides or susceptible to slope stability hazards," but not all of those areas *Id.* In any event, the 2013 Geotechnical Feasibility Study admits that landslides and other slope instability issues at the Project site have only been subject to a "cursory review." 2013 Geotechnical Feasibility Study at 5. No site-specific investigation has been performed to determine the existence, depth, geometry and other characteristic of landsliding. 2006 Geotechnical Evaluation at 10.

Overall, then, the EIR explains that the Whittier Fault creates a serious potential hazard for the Project. CEQA thus demands a thorough investigation of these environmental impacts. *Berkeley Keep Jets Over the Bay v. Bd. of Port Comrs.* (2001) 91 Cal. App. 4th 1344, 1370 (lead agency must use best efforts to analyze potentially significant impacts).

2. The DEIR's "Mitigation" of the Project's Geologic Hazards Actually Represents Impermissible Deferral of the Analysis of These Hazards.

In an attempt to mitigate these significant seismic impacts, the DEIR proposes Mitigation Measure 4.5-1, which requires the Project Applicant to prepare an additional geotechnical report and receive further County approval prior to the issuance of grading permits, but after Project approval. *Id.* The DEIR claims that the prescribed mitigation measure, and compliance with applicable regulatory requirements, such as the California Building Code, would reduce geologic hazards to less than significance. DEIR at 4.5-13. But the DEIR provides no actual evidence to support this conclusion. The DEIR, and its two supporting geotechnical reports, contain only bare assertions that these geologic hazards will be mitigated.

For example, regarding seismic ground shaking, the future geotechnical report would "determine structural design requirements as prescribed by the most current version of the California Building Code . . . to ensure that structures and infrastructure can withstand ground accelerations expected from known active faults." DEIR at 4.5-18. The DEIR states that the Project would implement these design recommendations to reduce the potential for structural damage and exposure to potential substantial adverse effects, including the risk of loss, injury, or death, but only "to the maximum extent practical." DEIR at 4.5-15. The DEIR asserts that this would reduce potentially significant seismic-related impacts to a less than significant level. Similarly, the 2006 Geotechnical Evaluation states:

> Southern California, in general, is a seismically active region and the proposed improvements are likely to be subjected to significant ground motion during the design life of the project. Remedial grading in conjunction with the design of structures in accordance with prevailing seismic codes is held to be an appropriate mitigation for this condition.

2006 Geotechnical Evaluation at 8. But the document provides no further analysis or evidence to support the conclusion these risks will be mitigated.

In fact, the 2013 Geotechnical Feasibility Study plainly contradicts this conclusion. That later analysis concludes:

> New improvements will need to be designed for seismic forces in accordance with current building codes and regulations. ***However, there is still a risk that the proposed residential structure could be damaged as a result of an earthquake***.

Geotechnical Feasibility Study at 9 (emphasis added). The analysis thus makes clear that compliance with applicable building codes, regulations, and ordinances, alone, are not sufficient to reduce seismic ground shaking impacts to less than significant levels. These measures cannot correct for the Project's unwise and uninformed placement of residential buildings in an area of significant seismic hazards.

Regarding risks from fault rupture, the DEIR proposes that residential structures would be located at a distance of greater than approximately 100 feet from the Whittier Fault trace, in order to be consistent with the 50-foot setback requirement of the Alquist Priolo Earthquake Fault Zoning Act. DEIR at 4.15-14. However, as discussed, above, the DEIR admits that the specific location of the fault trace has not even been determined yet. Instead of performing this essential investigation before the County considers the Project, the DEIR would only require the future geotechnical report to later identify the location of the Whittier Fault trace. The Project Applicant would then alter the Project site plan so that proposed residences would be set back from the fault trace. ***Id.*** But until these hazards are determined, the DEIR has simply failed to undertake the analysis required to support its claim that risks related to surface ruptures are not significant. The County must insist that the Project Applicant prepare the site-specific geotechnical report and locate the fault trace ***before*** Project approval.

The DEIR also proposes to defer meaningful analysis of ground failure hazards until after Project approval. The DEIR explains that the Project would implement a complex set of design recommendations identified in the future geotechnical report. DEIR at 4.5-15 (Mitigation Measure 4.5-1). Together with compliance with California

Geological Survey Guidelines and applicable building codes, the DEIR claims that the Project would reduce the potential for significant liquefaction and other ground failure hazard impacts "to the maximum extent feasible." *Id.*

The DEIR also defers investigation of the stability of the Project's existing and proposed slopes until completion of the geotechnical report required by Mitigation Measure 4.5-1. DEIR at 4.5-16. That Mitigation Measure requires an engineering analysis to determine any necessary stabilization measures, and requires the developer to remediate the project site pursuant to the County Grading Code. *Id.* The developer must also design foundations and structures to meet Building Code requirements "to ensure the safety of the physical site and structures for future residents." *Id.* The DEIR concludes that potentially significant impacts regarding landslides and slope stability would be reduced to a less than significant level. *Id.*

But until the additional geotechnical report is completed, the DEIR has simply failed to analyze the full range of geologic hazards facing the Project. The DEIR therefore has not provided substantial evidence to support its determination that risks related to fault rupture, seismic ground shaking, ground failure, and landslides are less than significant. The County cannot rely on this "mitigation measure" to reduce significant impacts regarding fault rupture and other geologic hazards to a less than significant level, because the County cannot even be sure of the nature of those hazards until the additional analysis is completed. The County must insist that the Project Applicant prepare the site-specific geotechnical report and locate the fault trace *before* Project approval. *See Sundstrom v. Cnty. of Mendocino*, 202 Cal. App. 3d 296 (1988) (deferral of environmental analysis until after project approval violates CEQA's policy that impacts must be identified before project momentum reduces or eliminates the agency's flexibility to change its course of action). Fully disclosing this type of hazard is not only a core purpose of CEQA, but it is the plainly the responsible approach: the County cannot reasonably approve a project without a complete understanding of the hazards its residents may face.

Moreover, the geotechnical report will provide essential information regarding the risk of geologic hazards on the Project site that could significantly alter the Project site design. Significantly altered to address these unknown geologic hazards, the Project could create a host of new environmental impacts that the County has not yet analyzed.

3. The DEIR Fails to Adequately Analyze the Project's Consistency with the Orange County General Plan and Yorba Linda General Plan Regarding Geologic Hazards.

The Project is inconsistent with the Goals, Objectives, and Policies of the OCGP and YLGP regarding geologic hazards. These plan inconsistencies constitute significant and unavoidable impacts.

OCGP Public Safety Goal 1 is to "Provide for a safe living and working environment consistent with available resources." OCGP Public Safety Objective 1.1 is "To identify natural hazards and determine the relative threat to people and property in Orange County." The Project is inconsistent with both of these requirements. The Project would not create a safe living environment because it would expose people and structures to the risk of loss, injury or death, involving fault rupture, strong seismic ground shaking, seismic-related ground failure, and landslides. The DEIR also acknowledges that an additional geotechnical report must be prepared simply to understand the geologic risks facing residents in the Project area. At the very least, the County has not identified the relevant natural hazards or threats until this report is completed.

The Project is also inconsistent with OCGP Public Safety Goal 2, to "Minimize the effects of natural safety hazards through implementation of appropriate regulations and standards which maximize protection of life and property." The County cannot possibly know how the information from the additional geotechnical report will change the Project or affect the implementation of relevant safety standards. Nor does the DEIR "create and maintain plans and programs which mitigate the effects of natural hazards," as required by OCGP Objective 2.1.

The Project is also inconsistent with the YLGP Safety Element Goal 1, to "Protect the community from hazards associated with geologic instability, seismic hazards." The DEIR does not even identify the full scope of hazards associated with geologic instability and seismic events, much less protect the community from them. YLGP Policy 1.1 is to "[r]equire "review of soil and geologic conditions to determine stability and relate to development decisions, especially in regard to type of use, size of facility, and ease of evacuation of occupants," but the Project Applicant has not undertaken the required investigation.

The County has not performed a complete "review of soil and geologic conditions" until it has completed the additional geotechnical report discussed in part III.A.2. above. The County does not yet know how the information from the geotechnical report will change the Project or affect the implementation of relevant safety

standards. It therefore cannot accurately evaluate decisions regarding the Project's "type of use, size of facility, and ease of evacuation of occupants." Until it completes the geologic analysis that the YLGP requires, the County cannot support the claim that geologic hazards to the Project are less than significant.

B. The DEIR Fails to Accurately Analyze the Project's Wildland Fire Hazards.

The DEIR fails to adequately analyze the Project's significant wildland fire hazards. The DEIR's proposed mitigation measures—particularly its unsubstantiated reliance on an untested emergency evacuation plan—do not reduce these significant impacts to a less than significant level. The DEIR also fails to acknowledge that the Project is inconsistent with the OCGP and YLGP policies regarding fire hazards. These plan inconsistencies constitute significant and unavoidable impacts. *See* CEQA Guidelines, Appendix G.

1. The Project Would Create Significant Wildland Fire Hazards.

The fire hazards caused by and affecting development in the Puente-Chino Hills area cannot be overstated, a fact made abundantly clear by the devastation of the 2008 Freeway Complex Fire. *See* Orange County Fire Authority, Freeway Complex Fire After Action Report (2009) (attached hereto as Exhibit D). The Project site is located in a Very High Fire Hazard Severity Zone and has burned regularly: in addition to the Freeway Complex Fire, it was subject to fires in 1943 and 1980. *Id.* at 15. The Project will increase the size of the area's wildland-urban interface.

Contrary to the DEIR's conclusions, the Project would clearly expose current and future residents and structures in the area to a significant risk of loss, injury or death involving wildland fires. DEIR at 4.7-26. The DEIR nonetheless claims that wildland fire risks will be less than significant. DEIR at 4.7-26 (finding that "compliance with applicable regulatory requirements and implementation of the project features and prescribed mitigation measures would reduce potentially significant impacts in these regards to a less than significant level").

The evidence, however, does not support the DEIR's conclusion. The Project's proposed residences would clearly be threatened by fire. They would be adjacent to and intermixed with wildlands that have burned regularly. Despite the Project's location in an area of severe fire hazards, the Project has been designed so that certain areas of the Project will not benefit from the typical 170-foot fuel modification zone. DEIR at 4.7-33.

In fact, the DEIR implies that the Project, a residential development located in the urban-wildland interface, will actually *reduce* wildland fire risk. The DEIR argues that the existing Project site provides no fuel modification benefits, which exposes the existing single-family residential uses to the west and south of the Project to substantial risks of wildland fires. The DEIR claims that the Project's fuel modification features would substantially reduce the risk of wildland fires to these existing single-family residences. DEIR at 4.7-34; 4.14-70 to -73.

This argument is misleading. Even if the Project reduced the risk of fire to nearby residences, the Project is adding 112 new residences to an area of severe fire risks. All residences, new and old, are potential ignition sources. The DEIR also fails to evaluate the impacts of increased risk of fire originating in the Project to the surrounding environment, specifically the adjacent Chino Hills State Park. Such risk constitutes a potentially significant impact to the park's recreational and biological resources; the EIR must analyze, disclose, and, if necessary, mitigate these additional impacts.

2. The DEIR Does Not Adequately Mitigate the Wildland Fire Hazards.

The DEIR does not ensure that current and future residents of the Project and surrounding developments will be able to safely evacuate the area in the event of a fire emergency. The DEIR claims that in the event of a fire emergency, "the function of the street system would remain and there would be available capacity to accommodate the projected traffic volumes, in addition to emergency service vehicles." DEIR at 4.7-26. As discussed below, however, the DEIR does not demonstrate that the Project will have an effective emergency evacuation plan. The Project's wildland fire hazards therefore remain significant.

The DEIR admits that during the 2008 Freeway Complex Fire, residents experienced gridlock on major streets when they attempted to evacuate the area. DEIR at 4.14-70. The Project, combined with other proposed developments nearby, will only exacerbate this problem. Yet the DEIR does not adequately discuss cumulative impacts associated with emergency evacuation requirements. Rather, the DEIR explains that the County will evaluate all other developments "on a project-by-project basis" to determine consistency with applicable emergency response and evacuation plans. DEIR at 4.7-39 to -40.

The DEIR relies on Yorba Linda's October 2013 evacuation plan to prevent the evacuation gridlock that has occurred during past emergencies. DEIR at 4.14-70. But the DEIR provides no traffic analysis or modeling to support the argument that Yorba Linda's evacuation plan will somehow allow residents of the Project and the surrounding

areas to escape from a fire emergency. Past evidence points to the opposite conclusion. The DEIR even notes that during an evacuation, residents would be diverted by deputies and barricades from some main streets so that law enforcement and firefighting vehicles could use them. *Id.* If this is the case, it would only reduce the road capacity that evacuees could use.

The DEIR also fails to ensure that local and state fire and emergency service providers will be able to access the Project during a wildland fire emergency. The DEIR claims that "the function of the street system would remain and there would be available capacity to accommodate the projected traffic volumes, in addition to emergency service vehicles." DEIR at 4.12-11. But the DEIR provides no traffic analysis or modeling to support that claim. Therefore, the DEIR does not provide substantial evidence supporting its conclusion that the street system would provide available capacity to accommodate traffic volumes during a fire emergency. The Project's fire-related impacts remain significant.

The DEIR's failure to include an effective emergency evacuation plan also threatens the safety of Project and nearby residents in the case of an emergency related to oil production facilities on site. The DEIR simply does not ensure that current and future residents of the Project and surrounding developments will be able to safely evacuate the area in the event of an emergency related to on site oil facilities.

The DEIR admits that new and continued oil drilling operations, including consolidation of oil wells relocated from the rest of the project site and slant drilling of new wells below ground, may occur on the Project site. DEIR at 2-28. But the DEIR concludes that with compliance with applicable regulatory requirements and implementation of certain Project Design Features ("PDFs"), operation of oil facilities would not create a significant hazard to the public or the environment. DEIR at 4.7-23.

The DEIR relies on PDFs 7-2 to 7-7 to support this conclusion. But these PDFs do not remove the risk that Project and nearby residents will need to evacuate the area in the event of an oil-related emergency. PDFs -2 and 7-3 simply require buffer zones between wells and new residences. PDF 7-4 restates the requirements that all new wells must comply with applicable law and regulations. PDF 7-5 prohibits public access to the oil drilling pad, and PDF 7-6 prohibits new service roadways through open space areas. PDF 7-7 requires the Project developer to notify homeowners regarding the previous use of the site as an oilfield and the extent of continued oil production activities in the area.

An oil-related emergency, such as a fire or spill, could still occur, despite implementation of these PDFs. Despite this fact, the DEIR provides no traffic analysis or modeling to support any claim that the street system would provide available capacity to

accommodate traffic volumes during an oil-related emergency. The DEIR therefore provides no substantial evidence to support its claim that operation of oil facilities would not create a significant hazard to the public or the environment and that a less than significant impact would occur with regards to future oil operations.

3. The DEIR Fails to Adequately Analyze the Project's Consistency with the Orange County General Plan and Yorba Linda General Plan Regarding Public Safety and Fire Hazards.

Because the Project would expose current and future residents and structures in the area to a significant risk of loss, injury or death involving wildland fires, the Project is inconsistent with the Goals, Objectives, and Policies of the OCGP and YLGP regarding public safety and fire hazards. These plan inconsistencies constitute significant and unavoidable impacts that the DEIR has failed to recognize.

As described above, the Project's wildland fire hazards remain significant even with the identified mitigation. The Project is therefore inconsistent with OCGP Public Services and Facilities Element - Orange County Fire Authority Goal 1, to "Provide a safe living environment ensuring adequate fire protection facilities and resources to prevent and minimize the loss of life and property from structural and wildland fire damages."

For the same reasons, the Project is inconsistent with YLGP Safety Element Goal 4, to "Protect people and property from brush fire hazards." In the absence of a proven emergency evacuation plan, the Project is also inconsistent with OCGP Public Services and Facilities Element - Orange County Fire Authority Goal 2, to "Minimize the effects of natural safety hazards through implementation of appropriate regulations and standards which maximize protection of life and property," and OCGP Public Services and Facilities Element - Orange County Fire Authority Objective 2.1, "To create and maintain plans and programs which mitigate the effects of public hazards." The EIR must acknowledge that the Project's wildland fire hazards remain significant and grapple with the fact that Project is inconsistent with the OCGP and YLGP. Until it includes this analysis, the EIR's analysis of land use impacts is incomplete and invalid.

C. The DEIR Fails to Accurately Analyze the Project's Water Supply Impacts.

The DEIR fails to accurately analyze the Project's water supply impacts because it does not determine the extent of new water infrastructure facilities required for the Project nor analyze the impacts of those facilities.

1. The DEIR Fails to Ensure That the Project Will Have Sufficient Water Supplies and Wastewater Treatment Facilities.

The DEIR makes unsupported assumptions about the availability of water facilities for the Project. CEQA requires the County to perform a thorough analysis of the Project's planned water supply. The DEIR must determine whether the proposed water source is adequate to meet the Project's needs and whether tapping it will cause adverse environmental impacts. *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova*, 40 Cal. 4th 412, 432 (2007). If a project's proposed water supply is uncertain or unreliable, the DEIR must identify an alternative water source and consider the environmental impacts of using that source. *Id.*

The Yorba Linda Water District ("YLWD") completed the Northeast Area Planning Study in March 2013 to evaluate the capacity of existing distribution system facilities and describe new infrastructure required to provide water services to the Project. The Planning Study identified improvements that will be necessary to meet the anticipated water service and infrastructure demands within the YLWD's northeast area, including both the Cielo Vista and Esperanza Hills developments. DEIR at 4.15-17 to -18. Among these needed improvements, the Planning Study identified new pump stations, a pressure reducing station, pipeline upgrades, an increase in the capacity of existing pump stations, and other potential improvements. DEIR at 4.15-18.

But the DEIR fails to ensure construction of the necessary water facilities for the Project. The DEIR concludes that "final planning, buildout, and timing" of Cielo Vista and Esperanza Hills "cannot be accurately ascertained at this time." DEIR at 4.15-18. So the DEIR simply proposes a mitigation measure that would require the Project Applicant to work with the Yorba Linda Water District to ensure an adequate water supply for the area's future residents and for fire safety purposes. *Id.* (Mitigation Measure 4.15-1). This mitigation measure is simply too vague to ensure that existing and proposed infrastructure will accommodate the Project's estimated water demand, wastewater generation, and solid waste generation. The DEIR's analysis of the Project's water supplies is therefore inadequate. In fact, during the Freeway Complex Fire, YLWD facilities did not provide adequate firefighting water flow to effectively combat the spreading blaze. Freeway Complex Fire After Action Report, Exh. D, at 64-65. Until the County provides a detailed description of the water facilities that will serve the Project, neither the County nor the public can evaluate whether this infrastructure will be sufficient during a fire emergency. The DEIR therefore lacks the substantial evidence necessary to supports its claim that there will be an adequate water supply for the area's residents and for fire safety purposes.

2. The DEIR Fails to Adequately Analyze the Impacts of New Water Infrastructure That Must Be Built to Serve the Project.

The DEIR also fails to adequately describe or mitigate the impacts of new water infrastructure that must be built to serve the Project. Under CEQA, the "ultimate question" is whether an EIR adequately addresses the reasonably foreseeable impacts of supplying water to the project. *Vineyard Area Citizens*, 40 Cal. 4th at 434. The EIR must give decision makers sufficient facts to evaluate the pros and cons of supplying the amount of water that the Project will need. *Id.* at 430–31. This must include a description of the environmental impacts of necessary water facilities. *Id.* at 432.

The DEIR includes no analysis of the potential environmental impacts of the improvements necessary to meet the Project's anticipated water service and infrastructure demands This is impermissible. Construction and operation of the improvements necessary to meet the Project's anticipated water service and infrastructure demands would cause potentially significant environmental impacts. The DEIR must address the impacts of likely future water facilities. Unless and until it does so, it will remain incomplete and invalid. *See id.*

D. The DEIR Fails to Adequately Analyze the Project's Traffic and Transportation Impacts.

The DEIR fails to adequately analyze the Project's traffic and transportation impacts because it does not include the required analysis of transportation system management and demand management for the Project, and because it interferes with implementation of the Orange County Transportation Authority Commuter Bikeways Strategic Plan (2009) ("Bikeways Strategic Plan"). The DEIR also fails to acknowledge that the Project is inconsistent with the policies of the Orange County General Plan, Yorba Linda General Plan, and Bikeways Strategic Plan regarding transportation management and alternative transportation. These plan inconsistencies constitute significant and unavoidable impacts.

1. The DEIR Interferes With Implementation of the Bikeways Strategic Plan.

The DEIR mentions the Bikeways Strategic Plan, but at the same time prevents implementation of that plan. The Bikeways Strategic Plan includes an "Action Plan" that identifies the tasks that the Orange County Transportation Authority ("OCTA") will undertake to ensure the implementation of the Bikeways Strategic Plan." OCTA Bikeways Plan at 15. These tasks include:

- Promote that local jurisdictions to emphasize [sic] their consideration of bicyclists within environmental and planning documents;

- Facilitate bikeway planning coordination efforts between jurisdictions and other involved entities;

- Ensure that the needs for bicyclists and bikeways are considered in the development of projects and programs within OCTA; and

- Review development plans and environmental documents and provide comments, 1) to ensure that developers and local jurisdictions are complying with the [Plan]], and 2) to encourage these entities to add local supplemental routes that may not be on the regional bikeways plan, but would enhance the overall connectivity of the bikeway system.

The DEIR does nothing to facilitate these tasks. The Project does not include the addition of supplemental cycling routes to serve the Project or enhance the overall connectivity of the bikeway system. There is no evidence in the record to suggest that the County has encouraged the Project developers to do so. The DEIR even notes that no bicycling facilities are currently located or proposed adjacent to the Project site, but fails to encourage their incorporation into the Project. DEIR at 4.14-16. By failing to even discuss these elements of the Bikeways Strategic Plan, the DEIR gives OCTA nothing to work with as it seeks to represent the needs of cyclists and bikeways as part of the Project. Without more information about opportunities for cycling infrastructure and demand for such alternative transportation, the OCTA cannot fulfill its task of ensuring that the needs of bicyclists and bikeways are considered in the development of projects.

The County is required to ensure that OCTA can undertake the tasks included in the Action Plan discussed above. OCGP Transportation Element Policy 2.4 requires the County to "[a]pply conditions to development projects to ensure compliance with OCTA's transit goals and policies." Unless the County does more to assist the OCTA to implement the Bikeways Strategic Plan, the Project will be inconsistent with this policy.

2. The DEIR Fails to Adequately Analyze the Project's Consistency with the Orange County General Plan and Yorba Linda General Plan Regarding Traffic and Transportation.

The DEIR fails to provide the required analysis of transportation system management and demand management for the Project. OCGP Transportation Element Objective 6.7 requires developers of more than 100 dwelling units to submit a Transportation System Management/Transportation Demand Management plan that

"includes strategies, implementation programs and an annual monitoring mechanism to ensure a reduction of single occupant automobile travel associated with development." DEIR at 4.14-76.

The Yorba Linda General Plan also requires analysis of transportation system management and demand management for the Project. YLGP Circulation Element Goal 3 is to "Maximize the efficiency of the City's circulation system through the use of transportation system management and demand management strategies." YLGP Circulation Element Policy 3.7 requires "that new developments provide Transportation Demand Management Plans, with mitigation monitoring and enforcement plans, as part of required Traffic Studies, and as a standard requirement for development processing." The DEIR does not provide this analysis, and without it, the Project is inconsistent with these YLGP requirements.

E. The DEIR Fails to Accurately Analyze the Project's Noise Impacts.

The DEIR fails to accurately analyze the Project's noise impacts because it employs an impermissible standard of significance that conceals significant noise impacts. The DEIR acknowledges that there are three appropriate standards by which to judge the significance of noise impacts from the Project:

> - Would the project result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?
>
> - Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?
>
> - Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

DEIR at 4.10-14. Appendix G of the CEQA Guidelines echoes these standards. But the DEIR later states repeatedly that the Project would result in a significant noise impact only if the noise level exceeds the 65 dBA CNEL limit in the Orange County Noise Ordinance ***and*** the Project generates a noise level increase of greater than 3.0 dBA. DEIR at 4.10-18. This actually represents a combination of the multiple separate thresholds of significance that conceals significant noise impacts.

Many of the Project's noise impacts would clearly exceed one of the three relevant significance thresholds. For example, the Project would increase the off-site traffic noise levels by 3.5 dBA CNEL on the segment of Via Del Agua south of "A" Street. DEIR at

4.10-18. And Project-related traffic noise impacts would exceed the Orange County Noise Ordinance's 65 dBA CNEL limit in numerous places. *See* DEIR at Table 4.10-6 and 4.10-7.

But by evaluating noise impacts using a combination of these separate thresholds of significance, the DEIR concludes that these impacts are not significant. According to the DEIR, the 3.5 dBA noise increase on Via Del Agua south of "A" Street is not significant because the ultimate noise level will not exceed 65 dBA. DEIR at 4.10-19. And noise levels that exceed 65dBA are not significant because they do not involve increases of 3.0 dBA. *See, e.g.*, DEIR at 4.10-19 ("since the noise levels would not be increased by greater than 3.0 dBA, off-site traffic noise impacts under Opening Year (2015) traffic conditions would be less than significant").

The amalgamated significance threshold paints a misleading picture of noise impacts. As shown above, many of the Project's noise impacts would be significant under the separate thresholds provided in Appendix G and articulated in the DEIR itself. This combined standard appears to have been invented solely to ensure that these impacts appear to be less than significant. Notably, the Esperanza Hills DEIR, also prepared by the County, uses separate thresholds as Appendix G intends. *See* Esperanza Hills DEIR at 5-470. It determines that certain noise impacts are significant solely because they result in an increase greater than 3.0 dBA CNEL. *Id.* at 5-482. The present Project's impacts would be significant, and would require mitigation, under the Esperanza Hills standards. The Cielo Vista DEIR has no explanation for the difference between the two documents' treatment of noise impacts. It is apparent that the DEIR's noise impact thresholds are not supported, or supportable, by substantial evidence. The Supreme Court recently emphasized that, although agencies have some discretion in choosing how to measure the significance of a project's impacts, they must select an approach "that will give the public and decision makers the most accurate picture practically possible of the project's likely impacts." *Neighbors for Smart Rail v. Exposition Metro Line*, 57 Cal. 4th 439, 449 (2013). An agency may not use compliance with a threshold as a shield to foreclose consideration of substantial evidence of an impact's significance. *See Protect the Historic Amador Waterways v. Amador Water Agency*, 116 Cal. App. 4th 1099, 1109 (2004); *see also Mejia v. City of Los Angeles*, 130 Cal. App. 4th 322, 342 (2005). The County must use the thresholds of significance contained in the Esperanza Hills DEIR to evaluate Cielo Vista's noise impacts.

F. The DEIR Fails to Accurately Analyze the Project's Consistency with the Orange County General Plan and the Yorba Linda General Plan.

The Project is inconsistent with applicable City of Yorba Linda General Plan land use designation for the site. As discussed above, the Project is also inconsistent with

applicable OCGP and YLGP goals, objectives, and policies regarding geologic hazards, public safety, fire hazards, and traffic and transportation.

Contrary to the claims made in the DEIR, and despite implementation of the prescribed mitigation measures, the Project would result in significant physical impacts on the environment. Therefore, significant impacts would occur due to inconsistencies with applicable land use plans and policies.

1. The DEIR Violates CEQA Because the Project is Inconsistent with the Orange County General Plan and the Yorba Linda General Plan and Would Result in Significant Physical Impacts on the Environment.

The DEIR explains that the Project would have a significant impact if it would conflict with applicable land use plans, policies, or regulations of an agency with jurisdiction over the project . . . adopted for the purpose of avoiding or mitigating an environmental effect." DEIR at 4.9-7. As discussed above, the Project is inconsistent with applicable OCGP and YLGP goals, objectives, and policies regarding geologic hazards, public safety, fire hazards, and traffic and transportation. The impacts in these substantive categories remain significant despite the DEIR's proposed mitigation measures.

The DEIR evaluates the Project's consistency with the YLGP because the Project may be annexed by the City of Yorba Linda. DEIR at 4.9-16. The annexation process would require the City to make certain discretionary approvals, including changes to the City's zoning designation for the Project area. The County's EIR would serve as the foundation for the City's required analysis of environmental project impacts resulting from such changes. *Id.* Even without the potential annexation, the Project is within the City's Sphere of Influence. The YLGP is thus an applicable land use plan, and the EIR must evaluate the Project's consistency with the plan.

The Project's proposed density is greater than the maximum density allowed for the Project site under Policies 1.2 and 7.4 of the Yorba Linda General Plan Land Use Element. The YLGP Land Use Element designation for the project site is Low Density residential with a range of 0-1.0 dwelling unit per acre. DEIR at 4.9-4. Including both Planning Areas, the Project's residential land uses would occur at a density of 1.3 dwelling units per acre. The gross density of the Project exceeds the City's permissible density range.

Because the Project conflicts with applicable land use plans and policies adopted for the purpose of avoiding or mitigating an environmental effect, the Project's

inconsistency with the General Plans is itself a significant and unavoidable impact. *See* Pub. Resources Code § 21100(b)(2)(A); CEQA Guidelines § 15126(b) (describing consequences of significant and unavoidable impacts). No amount of mitigation can change the fact that the Project is inconsistent with the Orange County and Yorba Linda General Plans. As discussed below, this inconsistency means that the Project also violates state planning and zoning law.

2. The Project Violates State Planning and Zoning Law Because it is Inconsistent with the Orange County General Plan.

The California Supreme Court has described the General Plan as "the constitution for all future developments within the city or county." *Citizens of Goleta Valley v. Board of Supervisors*, 52 Cal. 3d 553, 570–71 (1990). To effectively guide development, state law requires that general plans must "comprise an integrated, internally consistent and compatible statement of policies . . . ." Gov. Code § 65300.5. It also mandates that all subordinate land use decisions, including specific plans, must be consistent with the general plan. This requirement is known as the "consistency doctrine." *FUTURE v. El Dorado County*, 62 Cal. App. 4th 1332, 1336 (1998). It has been described as "the linchpin of California's land use and development laws" and "the principle which infuses[s] the concept of planned growth with the force of law." *Napa Citizens for Honest Government v. Napa County*, 91 Cal. App. 4th 342, 355 (2001); *Garat v. City of Riverside*, 2 Cal. App. 4th 259, 285 (1991) (disapproved on other grounds by *Morehart v. County of Santa Barbara*, 7 Cal. 4th 725, 743 fn. 11 (1994)) (general plan must be internally consistent).

A project cannot be found consistent with a general plan if it conflicts with a plan policy that is fundamental, mandatory, and clear, regardless of whether the project is consistent with other general plan policies. *FUTURE*, 62 Cal. App. 4th at 1341–42. Even in the absence of a direct conflict, a local agency may not approve a development project if it frustrates the general plan's policies and objectives. *Napa Citizens*, 91 Cal. App. 4th at 378–79. Amendments to the General Plan must maintain its internal consistency. Gov't. Code § 65300.5.

The Project violates these state law requirements because it conflicts with and frustrates clear policies within the Orange County General Plan regarding public safety, fire hazards, geologic hazards, and transportation.

The Project conflicts with clear, fundamental general plan directives regarding public safety. Section III.A. of this letter discuss these inconsistencies in detail. OCGP Public Safety Goal 1 is to "Provide for a safe living and working environment consistent with available resources." OCGP Public Safety Objective 1.1 is "To identify natural

hazards and determine the relative threat to people and property in Orange County." The Project is also inconsistent with OCGP Public Safety Goal 2, to "Minimize the effects of natural safety hazards through implementation of appropriate regulations and standards which maximize protection of life and property." These core principles of the County's General Plan articulate the County's fundamental duty to promote the safety of its residents during the land use planning process.

The Project is also inconsistent with important OCGP goals and objectives regarding public safety and fire hazards. Section III.B. of this letter discuss these inconsistencies in detail. OCGP Public Services and Facilities Element - Orange County Fire Authority Goal 1 requires the County to ensure adequate fire protection facilities to prevent and minimize the loss of life and property from structural and wildland fire damages. OCGP Public Services and Facilities Element - Orange County Fire Authority Goal 2 and Objective 2.1 require the County to minimize natural safety hazards and mitigate the effects of those hazards. These are clear, basic directives to protect the public from natural hazards, including fires.

Finally, the Project is also inconsistent with OCGP objectives regarding transportation system management and demand management. Section III.D. of this letter discuss these inconsistencies in detail. OCGP Transportation Element Objective 6.7 requires the Project Applicant to analyze transportation system management and demand management for the Project. This requirement is unambiguous and clearly applicable to the Project. It also represents an essential component of land use planning in a County that suffers from some of the worst traffic congestion in the country. But the DEIR simply fails to provide this analysis.

IV. The DEIR's Analysis of Project Alternatives is Inadequate.

The DEIR does not comply with the requirements of CEQA because it fails to undertake a legally sufficient study of alternatives to the Project. CEQA provides that "public agencies should not approve projects as proposed if there are feasible alternatives . . . which would substantially lessen the significant environmental effects of such projects." Pub. Resources Code § 21002. As such, a major function of the EIR "is to ensure that all reasonable alternatives to proposed projects are thoroughly assessed by the responsible official." To fulfill this function, an EIR must consider a "reasonable range" of alternatives "that will foster informed decision making and public participation." CEQA Guidelines § 15126.6(a). "An EIR which does not produce adequate information regarding alternatives cannot achieve the dual purpose served by the EIR . . . ." *Kings County Farm Bureau v. City of Hanford*, 221 Cal. App. 3d 692, 733 (1990).

As discussed above, the DEIR fails to adequately analyze the Project's environmental impacts. Had the County performed an adequate analysis, there is no doubt that the document would have determined that the Project would result in numerous significant environmental impacts, including impacts related to geologic hazards, public safety and fire hazards, traffic and transportation, and land use incompatibility. In light of the Project's extensive significant impacts, it is incumbent on the County to carefully consider a range of feasible alternatives to the Project. The DEIR fails to do so. In fact, it analyzes only two meaningful alternatives—a Planning Area 1 Only Alternative and a Large Lot/Reduced Grading Alternative—in addition to the No Project Alternative.

The Contested Easement Alternative is not a meaningful alternative because it is virtually identical to the proposed Project. The only differences between this Alternative and the Project would be the addition of a narrow access easement in Planning Area 1 and a slight change to the lot configurations in Planning Area 1. DEIR at 5-29. All other aspects of this Alternative would be the same as the Project. *Id.* The DEIR admits that all of the impacts of the Contested Easement Alternative would be the same as those of the Project, or closely similar. DEIR at 5-29 to -37. Therefore, it would not reduce or avoid any of the Project's significant impacts and is not an effective alternative. *See, e.g.*, *Watsonville Pilots Ass'n v. City of Watsonville*, 183 Cal. App. 4th 1059, 1089–90 (2010) (EIR was deficient for failing to include alternative that would avoid or lessen the project's primary growth-related significant impacts); s*ee also Citizens of Goleta Valley v. Bd. of Supervisors*, 52 Cal. 3d 553, 566 (1990) ("[A]n EIR for any project subject to CEQA review must consider a reasonable range of alternatives to the project . . . [that] offer substantial environmental advantages over the project proposal.").

To ensure that the public and decisionmakers have adequate information to consider the effects of the proposed Project, the County must prepare and recirculate a revised EIR that considers additional meaningful alternatives to the Project.

1. The DEIR's Failure to Adequately Describe the Project and Analyze Project Impacts Results in an Inadequate Range of Alternatives.

As a preliminary matter, the DEIR's failure to disclose the severity of the Project's wide-ranging impacts or to accurately describe the Project necessarily distorts the document's analysis of Project alternatives. As a result, the alternatives are evaluated against an inaccurate representation of the Project's impacts. The County may have identified additional or different alternatives if the Project impacts had been fully disclosed and Project setting had been accurately described.

The DEIR fails to adequately evaluate the severity and extent of impacts related to geologic hazards, public safety, noise, fire hazards, traffic and transportation, and land use incompatibility at the Project site. The DEIR's conclusions that the Project's impacts on these resources would be less than significant are erroneous. Proper analysis would have revealed that far more impacts were significant and unavoidable. The DEIR also fails to describe three of the most critical components of the proposed Project, including the adjacent Esperanza Hills development. An accurate accounting of the Project's impacts could significantly alter the substance and conclusions of the DEIR's alternatives analysis.

For example, a more accurate representation of the Project's impacts could change the DEIR's conclusion that the Large Lot/Reduced Grading Alternative is the environmentally superior alternative. Further geotechnical analyses could determine that construction in Planning Area 2 will lead to significant and unavoidable geologic hazards. The EIR could then determine, in light of these impacts, that the a Planning Area 1 Only Alternative, rather than the Large Lot/Reduced Grading Alternative, is actually environmentally superior. This revision could be necessary if additional analysis shows that Planning Area 2 will suffer from greater impacts related to fire hazards or obstacles to emergency evacuation.

The DEIR's failure to adequately describe the Project and its impacts also necessitates consideration of additional alternatives. Accounting for the various aspects of the Project left out of the EIR's consideration, a reasonable range of alternatives plainly includes an alternative that does not allow new oil drilling or one that does not provide access to the Esperanza Hills site. The EIR must be revised to analyze such alternatives.

Moreover, without sufficient analysis of the underlying environmental impacts of the entire Project, the EIR's comparison of this Project to the identified alternatives is utterly meaningless and fails CEQA's requirements. If, for example, the DEIR concluded that the Project resulted in significant wildland fire hazards, as it should have, the DEIR would be required to evaluate additional alternatives that did not pose these risks. These additional alternatives would necessarily be off-site locations away from the urban-wildland interface.

2. The DEIR's Narrow Project Objectives Prevent Consideration of Reasonable Alternatives.

The first step in conducting an alternatives analysis under CEQA is to define the project's objectives. This step is crucial because project objectives "will help the Lead Agency develop a reasonable range of alternatives to evaluate in the EIR." CEQA

Guidelines § 15124(b). Here, the County has identified eleven Project objectives. DEIR at 5-3.

The County may not define the Project's objectives so narrowly as to preclude a reasonable alternatives analysis. *Watsonville Pilots Ass'n*, 183 Cal. App. 4th at 1089. The "key to the selection of the range of alternatives is to identify alternatives that meet most of the project's objectives but have a reduced level of environmental impacts," rather than to identity alternatives that meet few of the project's objectives so that they can be "readily eliminated." *Id.*

The Project objectives listed in the DEIR violate this core CEQA principle. The DEIR states that one of the Project's objectives is to "[p]rovide a single family residential project with a sufficient number of units allowing for necessary infrastructure and open space in separate but related planning areas so that the property cannot be further subdivided." DEIR at 5-3. Another objective is to "[c]reate two planning areas that are responsive to the site's topography and that are consistent with adjacent single family neighborhoods." *Id.* Still another objective is to "[p]rovide for 36 acres of contiguous open space which can be offered for dedication to a public agency or to be maintained as private open space." *Id.* These objectives echo the design of the proposed Project so closely that the objectives of the Project are essentially *the Project itself*. CEQA forbids the use of this sort of circular logic to justify a project. *Watsonville Pilots Ass'n.*, 183 Cal. App. 4th at 1089.

Additionally, the Project objectives specify criteria that are essentially unique to the Project site. In this way, the DEIR ensures that only a limited range of alternatives could possibly satisfy all Project objectives. The DEIR's pursuit of these objectives is impermissible because it foreordains approval of the Project, or possibly the Planning Area 1 Only Alternative. This is because the Large Lot/Reduced Grading Alternative would fail to meet two of the Project's basic objectives and would only partially fulfill two others. DEIR at 5-28.

This one alternative alone does not constitute the "reasonable range" of alternatives that CEQA requires. By designing its objectives to make selection of the Project's site a foregone conclusion, the DEIR fails to proceed according to law.

3. The DEIR's Range of Alternatives is Not Reasonable Because None of the Alternatives Would Actually Reduce the Project's Impacts Overall.

The alternatives analyzed in the DEIR represent a false choice, because none reduces a majority of the Project's significant environmental impacts. In addition to the

No Project alternative, the DEIR offers only two meaningful alternatives: the Planning Area 1 Only Alternative and the Large Lot/Reduced Grading Alternative.

The DEIR itself concedes that both the Planning Area 1 Only Alternative and the Large Lot/Reduced Grading Alternative would have environmental impacts similar to, or even greater than, those of the Project. The Planning Area 1 Only Alternative would actually result in *greater* impacts than the Project in several areas, including air quality, geologic hazards, greenhouse gas emission, fire hazards, water quality, plan consistency, public services, traffic, and utilities. Many other environmental impacts would be the same under the Project and the Planning Area 1 Only Alternative.

The Large Lot/Reduced Grading Alternative might potentially reduce some impacts relative to the Project due to a decreased number of dwelling units. But the Large Lot/Reduced Grading Alternative would result in *greater* impacts than the Project in several areas, including aesthetics, biological resources, land use and planning, and wildland fire hazards. This Alternative would also result in less dedicated public open space on the Project site. In fact, paradoxically, the Large Lot/Reduced Grading Alternative would actually result in more extensive grading than the Project. DEIR at 5-23. The Large Lot/Reduced Grading Alternative would result in impacts that are similar to the Project's air quality, hazards and hazardous materials, hydrology, noise, and traffic impacts.

The DEIR thus requires County decisionmakers to choose between alternatives that, according to the DEIR, largely share the Project's environmental impacts. The County claims that the Large Lot/Reduced Grading Alternative is environmentally superior, but this option still yields similar or greater impacts in many impact issue areas. DEIR at 5-37 to -38. CEQA requires that "the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project . . . ." CEQA Guidelines § 15126.6(b). None of the DEIR's alternatives meet this requirement.

Given the truly extensive impacts that this Project would have on the environment, the DEIR must include a rigorous, honest assessment of additional, less impactful, alternatives. Without this opportunity, the DEIR asks the public to accept on "blind trust" that the proposed Project is the best alternative. This approach is unlawful "in light of CEQA's fundamental goal that the public be fully informed as to the consequences of action by their public officials." *Laurel Heights*, 47 Cal. 3d at 494. Other feasible alternatives are discussed below.

4. Other Feasible Alternatives are Available and Must be Included in a Reasonable Range.

The DEIR's analysis of alternatives is inadequate, and necessitates development of additional alternatives for the Project. As discussed above, these alternatives must actually reduce or eliminate the bulk of the Project's significant environmental impacts. For instance, the DEIR should identify and evaluate an off-site alternative, as well as alternatives that reduce a majority of the Project's significant impacts.

The Notice of Preparation explicitly identified an "Alternative Location" as one of the alternatives to the Project, NOP at 13, but the DEIR does not include this alternative. The DEIR's reasons for determining that an alternative location is not a feasible alternative are unconvincing. The CEQA Guidelines advise that "only locations that would avoid or substantially lessen any of the significant effects of the project need be considered for inclusion in the EIR." CEQA Guidelines §15126.6(f)(2)(A). The DEIR contends that:

> "Selection of another parcel in the general vicinity of the project site would likely result in similar or greater impacts than the Project . . . . [b]ecause it is likely that another site would not substantially reduce significant environmental effects, this alternative was rejected from further consideration."

The EIR, however, is perfectly willing to consider other alternatives that do not substantially reduce significant environmental effects—the Planning Area 1 Only Alternative and the Large Lot/Reduced Grading Alternative. The EIR's dismissal of the concept of an alternative site effectively dismisses these alternatives as well, reducing its range well beyond the point of reasonableness.

Furthermore, the DEIR's basis for its dismissal is based on a faulty premise: contrary to the DEIR's implication, it need not limit its consideration to alternative locations "in the general vicinity of the project site." In fact, the County should not restrict its identification and evaluation of alternative sites to Orange County itself; it must assess alternative locations across the state. The revised alternatives analysis must also evaluate various other options for meeting housing demands, looking beyond the large-lot subdivision model presented by the Project. Infill sites and other non-sprawling solutions must be considered as alternatives.

The DEIR also justifies its failure to consider alternative locations because "the Project proponent does not own any other properties in the nearby local vicinity." The CEQA Guidelines do not support this reasoning. CEQA Guidelines section 15126.6

(f)(1) lists many factors that may be considered when addressing the feasibility of alternatives, including "whether the proponent can reasonably acquire, control or otherwise have access to the alternative site (or the site is already owned by the proponent)." The DEIR does not discuss whether or not the Project Applicant can reasonably acquire an alternative site, leaving its dismissal without the support of substantial evidence. And importantly, "[n]o one of these factors establishes a fixed limit on the scope of reasonable alternatives." *Id.* The Project Applicant's property portfolio, alone, cannot justify the DEIR's failure to consider alternative locations for the Project.

V. The DEIR Fails to Accurately Analyze the Project's Growth-Inducing Impacts.

CEQA requires an EIR to include a "detailed statement" setting forth the growth-inducing impacts of a proposed project. Pub. Res. Code § 21100(b)(5); *City of Antioch v. City Council of Pittsburg*, 187 Cal. App. 3d 1325, 1337 (1986). The statement must "[d]iscuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment." CEQA Guidelines § 15126.2(d). It must also discuss how projects "may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively." *Id.* The DEIR here does not meet these requirements in analyzing the impacts of the Project.

To the extent that the Bridal Hills and Yorba Linda Land parcels are not already planned for development and the County does not consider them part of the Project, the Project will induce growth on these parcels. Access to these parcels will be provided through Cielo Vista and Esperanza Hills. Development of these two parcels will undoubtedly utilize infrastructure improvements, such as water treatment and delivery facilities, that are planned to accommodate Cielo Vista and Esperanza Hills. The DEIR completely fails to analyze the extent or environmental impacts of such growth-inducing impacts.

At a minimum, the DEIR must analyze the additional population growth, new residential units, and other development that the Project would facilitate on the Bridal Hills and Yorba Linda Land parcels, as well as any other nearby development areas. The DEIR should identify the location and intensity of any such new development, and the environmental impacts resulting from that development.

VI. Conclusion.

The DEIR for the Project fails to satisfy CEQA's requirements, and the Project violates state Planning and Zoning law. For these reasons, the County must not consider

the Cielo Vista Project further. The County must substantially revise the DEIR and incorporate the Esperanza Hills development, along with the other omitted aspects of the Project, into the Project and its environmental analysis. The County must then recirculate the DEIR for public review.

Very truly yours,

SHUTE, MIHALY & WEINBERGER LLP

Gabriel M.B. Ross

cc: Claire Schlotterbeck, Hills For Everyone
Todd Spitzer, Orange County Board of Supervisors
Steve Harris, Community Development Director, City of Yorba Linda

List of Exhibits:

Exhibit A: Esperanza Hills Draft Environmental Impact Report (December 2013)

Exhibit B: Yorba Linda Water District, Comments Regarding the Notice of Preparation (NOP) of EIR for Proposed Cielo Vista Project (Project No. PA100004), August 2, 2012

Exhibit C: Orange County LAFCO, Response to NOP for Cielo Vista Project, August 1, 2012

Exhibit D: Orange County Fire Authority, Freeway Complex Fire After Action Report (2009)

553228.5

EXHIBIT B

Yorba Linda
Water District

Reliable and Trusted Service
for More Than 100 Years

August 2, 2012

Ms. Channary Leng
OC Public Works/OC Planning
300 N. Flower Street
Santa Ana, CA 92702-4048

Subject: Comments regarding the Notice of Preparation (NOP) of EIR
For Proposed Cielo Vista Project (Project No. PA100004)

This is in response to the NOP for the subject project, dated July 5, 2012. Yorba Linda Water District (District) is the water service provider and sewer collection service provider for the proposed project area. On February 10, 2010 and June 6, 2012, the District provided Conditional Will-Serve Letters for water and sewer services, respectively, for the subject project. In those letters the following conditions were noted:

This letter is issued at the request of the developer for the entitlement process. Accordingly, this Conditional Will-Serve Letter is not a contractual offer or commitment to provide service, but a representation that the proposed development area is in, or may be annexed to the Yorba Linda Water District. The applicant must satisfy certain conditions specified by the District and agreed to by the applicant before service will be available to supply the project. Any future, binding commitment by the District to service this project will be subject to the availability of water and sewer facilities and the planning, design, and construction of adequate facilities to meet the demands of the project in accordance with (1) the terms and conditions of a Pre-annexation Agreement to be executed by the applicant and the District; and (2) the terms and conditions of an Application to an Agreement with the Yorba Linda Water District for Water and Sewer Service executed by the applicant and the District; both in accordance with the District's policies existing at the time such agreements are executed.

In addition to the conditions noted above, District staff has had recent meetings with representatives for the proposed Cielo Vista Project. Meetings have also taken place with representatives for another proposed single-family residential project referred to as the Yorba Linda Estates Project. This latter project would be located northeasterly of the Cielo Vista Project. These two proposed projects would develop the last major undeveloped parcels in the District's service area. The representatives for each of the two projects were advised that water and sewer services and facilities for the two projects must be planned and designed in concert to serve the combined area. That is, separate or piece-meal development of water and sewer services is not acceptable.

1717 E. Miraloma Avenue Placentia, CA 92870 714-701-3100 714-701-3108 Fax

Yorba Linda Water District

In this regard, they were advised that the District is proceeding with a project called the Northeast Area Water Service Planning Study. The study will be based on hydraulic modeling to determine the various alternative means to service the potential new residential developments as well as to meet the ultimate needs and goals of the District for this portion of the water service area. A critical element to be factored into the study will be the fire flow requirements, which we understand will be established in the near future by the Orange County Fire Authority. The planning study is expected to begin in August 2012, and may be completed by January 2013.

In Section 6 of the Cielo Vista Project Description Summary, Utilities and Infrastructure, Potable Water, it states that "Points of connection for water utilities that would serve the project exist in Aspen Way and Via del Agua." This is an assumption that has not been validated. Connection at these points assumes that water can be made available from the existing water facilities and infrastructure near the proposed project. This is yet to be determined; additional water facilities are likely necessary, the cost of which will be proportionately borne by the proposed project.

Concerning sewer services for the projects, the representatives for the two projects were advised that the District will require gravity-sewer service from all areas of the Yorba Linda Estates Project, with such service extending southerly and westerly downward to and through the Cielo Vista Project to connect to existing District sewers. Engineering studies by the project developers will be required to confirm the size of the sewer lines throughout the projects, and to confirm that the existing downstream sewers have adequate existing capacity for the additional flow.

Should you have any questions regarding this letter, please feel free to contact me at (714) 701-3102, or via email at sconklin@ylwd.com.

Sincerely,

Steve Conklin, P.E.
Engineering Manager

Copy: Andrew Keyworth, OCFA

EXHIBIT C

LOCAL AGENCY FORMATION COMMISSION

ORANGE COUNTY

CHAIR
CHARLEY WILSON
Director
Santa Margarita
Water District

VICE CHAIR
SUSAN WILSON
Representative of
General Public

PAT BATES
Supervisor
5th District

JOE CARCHIO
Councilmember
City of Huntington Beach

PETER HERZOG
Councilmember
City of Lake Forest

JOHN MOORLACH
Supervisor
2nd District

JOHN WITHERS
Director
Irvine Ranch Water District

ALTERNATE
BILL CAMPBELL
Supervisor
3rd District

ALTERNATE
JAMES FISLER
Director
Mesa Consolidated
Water District

ALTERNATE
DEREK J. MCGREGOR
Representative of
General Public

ALTERNATE
BOB RING
Councilmember
City of Laguna Woods

JOYCE CROSTHWAITE
Executive Officer

August 1, 2012

Ms. Channary Leng
OC Public Works/OC Planning
300 N. Flower Street
Santa Ana, CA 92702-4048

SUBJECT: Notice of Preparation of an Environmental Impact Report

Dear Ms. Leng,

The Orange County Local Agency Formation Commission (LAFCO) has reviewed the County's Notice of Preparation of an Environmental Impact Report for the Cielo Vista project. The project raises several concerns and as a responsible agency, we appreciate this opportunity to comment on the project as described in the Notice of Preparation.

LAFCO's interest in the Cielo Vista project as it relates to CEQA is as follows:

1. LAFCO is a responsible agency under CEQA for the future annexation of the Cielo Vista project to the City of Yorba Linda.
2. The project raises a number of substantive issues that have significant implications to LAFCO, the City of Yorba Linda, and the County of Orange.

In summary, the proposed development of the Cielo Vista project in unincorporated Orange County without a definitive plan and process in place for annexation to the City of Yorba Linda raises issues about:

- Consistency with existing County policies for spheres of influence (SOI) and the creation of developed, inhabited unincorporated islands.
- The long-term delivery of reliable and efficient public services to future residents.
- The impacts to the City and its residents resulting from County service providers travelling through the City and adjacent residential neighborhoods to serve the Cielo Vista project.

12 Civic Center Plaza, Room 235, Santa Ana, CA 92701
(714) 834-2556 • FAX (714) 834-2643
http://www.oclafco.org

LAFCO AS RESPONSIBLE AGENCY

The Orange County Local Agency Formation Commission (LAFCO) is governed by the Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000 ("Act," Govt. Code Section 56000 *et seq.*). Under the Act, LAFCO is required to make determinations regarding a proposal for changes of organization or reorganization (Govt. Code Section 56880). The Act also established the factors which LAFCO must consider in making its determinations, including any policies adopted by LAFCO to create planned, orderly and efficient patterns of development (Govt. Code Section 56668). Because of this role and pursuant to Section 21069 of the Public Resources Code, LAFCO is a responsible agency for the future annexation of the Cielo Vista project (also known as the Sage Property) to the City of Yorba Linda. Additionally and pursuant to Section 15086 of the California Environmental Quality Act (CEQA) Guidelines, LAFCO is responsible for reviewing and providing comments on this Notice of Preparation (NOP) and the subsequent Environmental Impact Report (EIR).

LAFCO has reviewed the NOP and provide the comments contained within this letter as the County begins preparation of the EIR.

LAFCO COMMENTS

The EIR should address the impacts and any necessary mitigation, including but not limited to the annexation process. In particular, the EIR should address the factors as identified in Government Code Section 56668. These factors include, but are not limited to, the following considerations:

1. *Project Summary*

Annexation – Project Description

The "Project Description" in the Notice of Preparation references "the project is within the City of Yorba Linda Sphere of Influence (SOI)." The EIR should clearly identify the potential annexation of the Project area as part of the "whole of the project" and discuss the timing of annexation relative to the timing of the proposed development plans.

Annexation – Whole of the Project

CEQA Guidelines section 15378 states that a "project" means the whole of an action, which has a potential for resulting in either a direct physical changes in the environment, or a reasonably foreseeable indirect physical change in the environment."

In this case, the current development proposals of the Cielo Vista and the anticipated development of the Murdock properties together would result in direct physical changes in the environment. Actions that are part of one project and that are reasonably necessary to effectuate a single project (e.g. access through the Cielo Vista project to the Murdock property) are considered part of the "whole of the action." Accordingly, all aspects of both projects should be considered in one environmental document prepared

by the County. In performing its analysis of the project and the potential impacts of future applications for annexation, LAFCO requests that the County prepare a combined analysis of the environmental impacts of both projects (Cielo Vista and the Murdoch property). CEQA notes "that environmental considerations do not become submerged by chopping large projects into many little ones, each with a potential impact on the environment, which cumulatively may have disastrous consequences." (Burbank-Glendale-Pasadena Airport v. Hensler (1991) 233 CA3d 577.)

2. ***Public Services and Utilities***

Section 56653 of the Act requires that each application for a change of organization include a "plan for providing services within the affected territory." Among other things, the plan for services must indicate "when those services can feasibly be extended to the affected territory." (Govt. Code Section 56653(b)(3))

Although the focus of Subsection 56653(b)(3) is on the timing of the *initiation* of services, the point of this subsection, especially when considered with the remaining requirements of Section 56653, is on continuous, reliable service provision to the affected area. The EIR's discussion of impacts in the area of public services should be made with reference to and consistent with the plan for services submitted under the Act, in particular, Section 56668, containing the criteria for approval of the annexation. Similar discussion and references should be made in the analysis of Land Use/Planning and Population/Housing.

In addition to the services and utilities identified in the NOP, LAFCO is requesting the EIR include analysis and discussion of the environmental impacts of the following municipal services:

Water Availability
This section should include a discussion of water supplies as required under Subsection 56668(k) of the Act, including a discussion of the Project's consistency with relevant Urban Water Management Plans. The Cielo Vista project is within the boundary of the Yorba Linda Water District (YLWD) which is identified as the retail water service provider to the proposed Project territory, but the NOP omits discussion of the Orange County Water District (OCWD).

OCWD is responsible for maintaining the quality and availability of the groundwater for groundwater producers such as the YLWD. As the ground water "manager" OCWD restricts pumping by retail water providers to those within the boundary of OCWD. YLWD has proposed annexation of approximately 6,100 acres in the eastern portion of the District to OCWD. The Cielo Vista project is within the proposed annexation area. OCWD submitted a Notice of Preparation for an Environmental Impact Report in July, 2011. The agency is currently preparing the EIR and discussion

of the long-term availability of local groundwater supplies should be assessed and discussed in the EIR prepared for the Cielo Vista project. As lead agency, the County should consult with OCWD to determine the adequacy of groundwater supplies for the Cielo Vista project.

Additionally, the project alternatives should include consideration and discussion of the effects of annexation and no annexation to OCWD on the Cielo Vista project.

Water Quality
The EIR should address storm water permitting requirements, including the preparation of a Storm Water Pollution Prevention Plan, change in surface imperviousness due to the project, drainage basins, emergency response to spills, and general compliance with the regional storm water permit.

Fire Protection and Emergency Response Services
The EIR should discuss and potentially evaluate whether there are significant environmental impacts for the project area that result from fire and emergency response being provided through the City's contract (Yorba Linda contracts with OCFA for fire protection) or the County's contract.

Law Enforcement
The EIR should discuss and potentially evaluate whether there are significant environmental impacts for the project area that result from law enforcement being provided through the City's contract (Yorba Linda contracts for law enforcement with the Orange County Sheriff's Department) or directly from the Sheriff's Department.

Sewer
The EIR should identify and evaluate both local and regional wastewater service providers and the impacts the project may have on their system. This section should include discussion of local sewer service by the Yorba Linda Water District and regional collection and treatment of wastewater from the project area by the Orange County Sanitation District.

Solid Waste Disposal
The City of Yorba Linda is the logical provider of solid waste disposal to the project area. Orange County Waste Recycling currently administers contracts for solid waste disposal within unincorporated islands, such as the one proposed to be created by development of the Cielo Vista project. The Draft EIR should identify and evaluate the service levels and potential impacts to the environment by both of the public agencies capable of administering contracts for solid waste disposal services to the project area.

Street sweeping
The City of Yorba Linda is the logical provider of street sweeping services to the project area. The Draft EIR should identify and evaluate the provision of this service to the project area and identify any potential environmental impacts.

3. Local Policies: Land Use & Planning

The EIR should address any conflict with applicable environmental plans or policies of agencies with jurisdiction over the project including, but not limited to, the policies described below:

County, League, and LAFCO Sphere of Influence Policy Guidelines
The Cielo Vista project is located in unincorporated territory within the sphere of influence of the City of Yorba Linda. The Draft EIR should adequately discuss the County's adopted *Sphere of influence Policy Guidelines* (***Attachment A***) and the timing of the Cielo Vista project relative to the future or concurrent annexation of the project site to the City of Yorba Linda.

On July 27, 1999, the Orange County Board of Supervisors adopted the *Sphere of Influence Policy Guidelines*. These *Policy Guidelines* were also adopted by the Orange County Division of the League of Cities and by LAFCO. Pages 3 and 4 of the *Policy Guidelines* list a number of policy guidelines for development within spheres of influence, including the following policy statement:

> *"Urban development should occur within existing cities, Spheres of Influence, or planned cities. Initiation of annexation to the city should occur at the earliest time in the planning process consistent with these Policies. Initiation of annexation to a city should occur prior to the issuance of building permits."*

Creation of a Developed, Inhabited Unincorporated County Island
As part of its post-bankruptcy external restructuring program, the County has implemented changes in policy direction to:

- Shift the County away from the delivery of municipal services;
- Focus on the provision of regional services; and
- Work with Orange County cities to annex adjacent unincorporated areas and shift the responsibility of delivering municipal services to the cities.

As part of this change in policy direction, the County works with LAFCO and local cities to implement the Unincorporated County Islands Annexation Strategy (***Attachment B***). Development of the Cielo Vista project in unincorporated territory would create a developed, inhabited unincorporated area located adjacent to the City of Yorba Linda, and could create significant environmental consequences with respect to

how municipal services will be provided to future residents. The Draft and Final EIRs should address any potential significant impacts to the future residents of the Cielo Vista project and adjacent City residents, as a result of developing the proposed 112 single-family residences in unincorporated County territory. Specifically, the Final EIR should address: (1) the ability and the capacity of the County to adequately provide the above mentioned municipal-level services to the Project and (2) the potentially significant environmental impacts to the City's residents resulting from County service providers travelling through the City's adjacent residential neighborhoods to serve the Cielo Vista project.

LAFCO Island Annexation Policy

Since 2000, LAFCO has worked with the County and cities to develop an islands strategy of aligning policies and practices. The LAFCO Island Annexation Policy (***Attachment C***) represents the current form of LAFCO's effort to align the interests and processes (e.g. municipal service alignment process) to ensure that unincorporated developments are built to city standards facilitating the eventual annexation of these areas to their adjacent city jurisdictions.

The County, as lead agency for the Cielo Vista project, should address any inconsistency in the development standards as currently proposed in County jurisdiction with those of the City of Yorba Linda to ensure the project can be annexed to the City without impacting future residents of the project or the City. Additionally, the EIR should explore the concept of municipal service agreements as discussed in the attached documents as an alternative to services provided by the County and should assess the comparative impacts to the environment.

City of Yorba Linda General Plan

In December 1993, the City of Yorba Linda adopted its current General Plan including the Land Use Element. The City identified a number of goals and policy statements as part of the 1993 General Plan. The County, as lead agency for the Cielo Vista project, should also address any inconsistencies with the policies identified by the City of Yorba Linda in the Final EIR. The policies that should be addressed include, but are not limited to, the following:

- Policy 7.1: *"Seek the annexation of Shell, Murdock and other undeveloped properties within the northern sphere of influence based upon development plans that ensure access, infrastructure and land use concepts which are acceptable to the City."*

- Policy 7.2: *"Require developers of undeveloped properties to complete improvements for required infrastructure and/or provide funds for required infrastructure (both on-site and related improvements) in accord with City determined service levels.*

4. Mitigation Measures

As a responsible agency, LAFCO can also raise issues for potential mitigation for discussion in the Draft and Final Environmental Impact Reports (CEQA Guidelines 15126.4). As currently proposed all municipal services by the County would have to travel to through the City to serve the project. Additionally, all traffic to and from the project would impact adjacent City streets. The County, as lead agency, should address the cumulative impacts of the actions in the EIR and includes appropriate mitigation measures. LAFCO is requesting the following impacts to City services be considered and mitigation measures are included in the EIR:

- Traffic impacts to the City, specifically impacts to San Antonio Road and Yorba Linda Boulevard.
- The City, as the logical provider of municipal services may be impacted by the proposed development and should be addressed in the EIR.

5. Alternatives

The State CEQA Guidelines cite the importance of various alternatives in the EIR as critical for informed decision making: *"An EIR need not consider every conceivable alternative to a project. Rather it must consider a reasonable range of potentially feasible alternative that will foster informed decision making and public participation."* (CEQA Guidelines 15126.6)

LAFCO is requesting the EIR include a discussion of an "Annexation" alternative and adequately address the following significant impacts under the alternative:

- The development of a 112-unit residential project that is NOT in compliance with City standards.
- The potential impacts to the developer and/or the residents that would result from having to upgrade or otherwise improve street widths, sidewalks, and other infrastructure to bring up to City standards for annexation.

LAFCO is requesting the EIR include discussion of a "No Annexation" alternative and adequately address the following significant impacts under the alternative:

- The creation of a large, developed, and inhabited unincorporated County Island consisting of a 112-unit residential development project.
- Reduced levels of services to Cielo Vista residents for:
    - Law enforcement.
    - Fire protection and emergency response services.
    - Roads (maintenance, street lighting, landscaping, sweeping).
    - Code enforcement.

  - Local representation and government accountability.
- The short-term and long-term fiscal impacts to the County of Orange of assuming responsibility of and service costs for providing the following municipal services to a 112-unit residential project in unincorporated County territory:
  - Law enforcement.
  - Fire protection and emergency response services.
  - Roads (maintenance, street lighting, landscaping, sweeping).
  - Code enforcement.
  - Local representation and government accountability.
- The impacts to the City and its residents resulting from County serviced providers travelling through the City and adjacent residential neighborhoods to serve the Cielo Vista project.
- The application of a municipal services agreement between the County and City for the City to provide services to the Cielo Vista project.

In summary, the Draft EIR should address *Orange County's Sphere of Influence Policy Guidelines* and the timing of the unincorporated development relative to future or concurrent annexation of the Cielo Vista project to the City of Yorba Linda.

The EIR should also describe the County's plan for public services (e.g. law enforcement, fire, water, sewer, parks, street sweeping, code enforcement, etc.) in the project area and identify and evaluate the alternative service providers for the project upon development and annexation of the Cielo Vista planned community to the City of Yorba Linda.

Thank you for this opportunity to respond to the Notice of Preparation. Please send one copy of the Draft EIR to me via email (jcrosthwaite@oclafco.org) or by mail at 12 Civic Center Plaza, Room 235, Santa Ana, CA 92701. If you have any questions or concerns regarding this response, please contact me or Ben Legbandt, Policy Analyst, either by email at blegbandt@oclafco.org or by phone at (714) 834-2556.

Sincerely,

Joyce Crosthwaite
Executive Officer

ATTACHMENT A

ORANGE COUNTY BOARD OF SUPERVISORS

MINUTE ORDER

July 27, 1999

Submitting Agency/Department: EXTERNAL RESTRUCTURING PROGRAM FOR THE COUNTY OF ORANGE

At this time Members of the Board of Supervisors may report on and discuss activities related to the External Restructuring Program for the County of Orange, including approval of the following:
1. Recommendations from Board City/County Subcommittee regarding proposed Sphere of Influence Policy Guidelines - All Districts (Continued from 6/2/99, Item 125)

The following is action taken by the Board of Supervisors:

APPROVED AS RECOMMENDED ☒ OTHER ☐

Unanimous ☒ (1) SMITH: **Y** (2) SILVA: **Y** (3) SPITZER: **Y** (4) COAD: **Y** (5) WILSON: **Y**

Vote Key: Y=Yes; N=No; A=Abstain; X=Excused; B.O.=Board Order

Documents accompanying this matter:

☒ Resolution(s) 99-301
☐ Ordinances(s)
☐ Contract(s)

Item No. 32
File 20883
Special Notes:

Copies sent to:
CEO
Board Offices
Auditor

I certify that the foregoing is a true and correct copy of the Minute Order adopted by the Board of Supervisors, Orange County, State of California.
DARLENE J. BLOOM, Clerk of the Board

By:_____
Deputy

COUNTY OF ORANGE
BOARD OF SUPERVISORS
ROBERT E. THOMAS HALL OF ADMINISTRATION
10 CIVIC CENTER PLAZA
P. O. BOX 687
SANTA ANA, CA 92702-0687

99 JUL 23 AM 11:23
BOARD
COUNTY
SUPERVISORS

Agenda Item No. 32
July 27, 1999 Meeting

Board of Supervisors
County of Orange
10 Civic Center Plaza
Santa Ana, CA 92701

Subject: Proposed Sphere of Influence Policy Guidelines

Fellow Board Members:

On June 29, 1999 the Board requested that the City/County Subcommittee return with recommendations regarding the proposed Sphere of Influence Policy Guidelines. Since then we have met with representatives of the League of Cities, Orange County Division and the Building Industry Association (BIA) in an effort to reach consensus on the Policy Guidelines.

Based upon our meetings the past few weeks, we are pleased to present a document which can be supported by the League of Cities, Orange County Division, and BIA, and which meets the goals of our overall long-term annexation strategy. In summary, the proposed Draft Resolution and Policy Guidelines reflect a careful balance between the need to respect the many months of effort spent developing Policy Guidelines which were unanimously approved by the League of Cities, while ensuring that the Board Resolution contained the necessary provisions with regard to our desire to not impact the timing associated with the processing of development applications. This balance has been achieved and we are jointly recommending full Board support of this item.

The enclosed Draft Resolution also contains additional language which recognizes that the Sphere of Influence Policy Guidelines are the first step toward our overall annexation strategy which includes County Islands. We feel it is important to stress the importance of County Islands to the full Board, and to support Supervisor Coad's efforts on behalf of this Board to develop specific strategies and programs for our County Islands. It should be noted here that both parties – the League of Cities representatives and the BIA – recognize the need to address the County Island issue.

CEO and County Counsel representatives will be available prior to or at the Board Meeting to address any technical or legal questions regarding the proposal.

RECOMMENDED ACTION

Adopt Draft Resolution approving Sphere of Influence Policy Guidelines.

Respectfully,

Thomas W. Wilson
Vice-Chairman

James W. Silva
Supervisor, Second District

RESOLUTION OF THE BOARD OF SUPERVISORS OF

ORANGE COUNTY, CALIFORNIA

July 27, 1999

On motion of Supervisor Wilson, duly seconded and carried, the following Resolution was adopted:

WHEREAS, representatives of the County, the cities and the Building Industry Association of Orange County have met to attempt to reach consensus on policy guidelines to guide private development and the provision of municipal services in city spheres of influence; and

WHEREAS, the proposed policy guidelines have been submitted to this Board for review and approval;

NOW, THEREFORE, BE IT RESOLVED THAT THIS BOARD HEREBY FINDS AND DETERMINES AS FOLLOWS:

1. Approval of these policy guidelines is not a project for purposes of the California Environmental Quality Act because the guidelines are not intended to direct or influence development, rather they serve solely as a framework for cooperation among affected agencies and landowners and only become a formal policy with regard to individual city spheres of influence when this Board and the City Council reach agreement on their adoption and implementation; and

2. This Board will consider application of these policy guidelines to individual city spheres of influence upon approval of these guidelines by the affected city, and

3. The guidelines will be considered in conjunction with future General Plan amendments within city sphere of influence areas, and

4. These guidelines are not intended to impact County regional facilities as they are applicable only to private development projects and the County has an adopted policy to oppose annexation and incorporation proposals that impact County regional facilities necessary for the County's core business functions, and

5. The County is the local agency with ultimate responsibility for review and approval of development projects in unincorporated territory whether or not they are located in city spheres of influence, and

6. This action does not confer any authority to delay or cause an increase in development application processing time, and

7. Private property rights shall not be abrogated as a result of interpretation or implementation of the Policy Guidelines as development applications are processed.

BE IT FURTHER RESOLVED that this Board hereby approves use of the proposed Sphere of Influence Policy Guidelines submitted by the County Executive Office subject to the matters set forth in this resolution.

BE IT FURTHER RESOLVED that this Board recognizes that the proposed Sphere of Influence Policy Guidelines are the first step toward an overall County Annexation Strategy which will also address County Islands. The CEO is directed to immediately undertake the necessary actions to complete a County Annexation Strategy in conjunction with LAFCO and the cities. This Board will review the progress of this work effort in ninety days in conjunction with a status report on the implementation of the Sphere of Influence Policy Guidelines.

BE IT FURTHER RESOLVED that this Board hereby directs:

1. The County Executive Office to work with affected cities towards the application of the policy guidelines in individual city spheres of influence for developing areas and report back within ninety days.

2. The Planning and Development Services Department to develop protocols and procedures for the processing of development applications within developing sphere of influence areas to implement the applicable policy guidelines. The procedures will be reviewed by affected parties, including the Development Processing Review Committee prior to approval by the Director of Planning and Development Services Department.

3. The County Executive Office and the Planning and Development Services Department to develop a report and recommendations regarding the long-term planning and governance assumptions

for unincorporated areas outside of existing spheres of influence and General Plan open space areas within existing spheres for consideration by LAFCO as part of its update of spheres of influence.

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The foregoing was passed and adopted by the following vote of the Orange County Board of Supervisors on July 27, 1999, to wit:

AYES: Supervisors: THOMAS W. WILSON, JAMES W. SILVA, TODD SPITZER
CYNTHIA P. COAD, CHARLES V. SMITH

NOES:
EXCUSED:
ABSTAINED:

Charles V. Smith

CHAIRMAN

STATE OF CALIFORNIA)
)
COUNTY OF ORANGE)

I, DARLENE J. BLOOM, Clerk of the Board of Orange County, California, hereby certify that a copy of this document has been delivered to the Chairman of the Board and that the above and foregoing Resolution was duly and regularly adopted by the Orange County Board of Supervisors.

IN WITNESS WHEREOF, I have hereto set my hand and seal.

Darlene Bloom

DARLENE J. BLOOM
Clerk of the Board
County of Orange, State of California

Resolution No: 93-301

Agenda Date: 07/27/1999

Item No: 32

I certify that the foregoing is a true and correct copy of the Resolution adopted by the Board of Supervisors, Orange County, State of California

DARLENE J. BLOOM, Clerk of the Board of Supervisors

By: _____
Deputy

Sphere of Influence Policy Guidelines
(adopted July 27, 1999 by Board of Supervisors Resolution 99-)

Mission Statement

These policy guidelines are the product of a facilitated dialogue between the League of California Cities-Orange County Division, the County of Orange, the Local Agency Formation Commission (LAFCO), and the Building Industry Association of Orange County to address projected growth and the provision of municipal and regional services in developing areas, hereinafter Developing Spheres of Influence.

The intent of these policy guidelines is to clarify the relationship between cities and the County with respect to urban planning, to promote the efficient, effective, and equitable delivery of local and regional services for existing and future residents, and to define a collaborative process with respect to development standard determinations for Developing Spheres of Influence. These guidelines also recognize that urban development should occur within existing cities, Spheres of Influence, or new communities.

Nothing in these policy guidelines shall be interpreted to affect or change pre-existing approved entitlements or development agreements, nor does it apply to county islands, which will be subject to future policy development. These policies also are not intended to establish countywide development standards. Rather, they reflect recognition that each Sphere of Influence is unique and requires site specific planning and flexibility.

Definitions

"**Design Standards**" shall mean regulations pertaining to the location, height, bulk, density, intensity, setback and size of buildings and structures and local street widths.

"**Developing Spheres of Influence**" shall mean the Spheres of Influence to be established by LAFCO based on the considerations set forth in the Sphere of Influence Policy Guidelines for the following cities and, in the future, to existing cities where LAFCO establishes a new SOI boundary, and any newly incorporating cities:

Anaheim (Santa Ana Canyon)
Brea
Newport Beach (Newport Coast and Banning Ranch)
Huntington Beach
Irvine
Lake Forest
Orange (East Orange)
San Clemente
Yorba Linda (Chino Hills)

"**Development Standards**" shall mean standards for Infrastructure. Public Safety Regulations and Design Standards. Design Standards are not applicable to: 1) interim uses such as agriculture; or 2) public utilities.

"**Infrastructure**" shall mean standards for street alignments and grades and arterial and primary widths, drainage and sanitary facilities, public utilities, parks, public easements and other public facilities, or fees in lieu thereof, which will be operated and maintained by a city upon annexation.

"**New Communities**" shall mean areas designated as potential new cities through a joint LAFCO/County process.

"**Public Safety Regulations**" shall mean building codes and regulations adopted pursuant to the provisions of Health and Safety Code.

"**Sphere of Influence**" shall have the meaning as set forth in Government Code Section 56076.

"**Urban Level Municipal Services**" may include, but are not necessarily limited to, water, sewer, streets, street lighting, park and recreation services, building and zoning enforcement, animal control, law enforcement, fire protection, libraries, and crossing guards.

Policy Guideline Objectives

These Policy Guidelines will facilitate the orderly planning and development of Orange County by:

- Providing a framework for cooperative relations among cities, the County, and landowners by minimizing project by project controversy through advanced agreement on Sphere of Influence policy.

- Providing for urban development in a manner that results in annexations and new cities that are efficient, effective, and equitable to existing and new residents, landowners, and service providers.

- Conserving the resources of service providers within Orange County while recognizing the legitimate rights and interests of property owners.

- Assisting the general public in understanding the planning and service responsibilities of local governments providing urban municipal and regional services within Orange County.

- Assisting LAFCO to establish Spheres of Influence based upon a city's demonstrated ability to plan and serve the area.

- Furthering a successful and cooperative framework to promote flexibility, options, and incentives in the implementation of these policies.

- Discouraging the creations of new "unincorporated islands" within Developing Spheres of Influence.

Policy Guidelines

Spheres of Influence are established by the Local Agency Formation Commission, as required by state law, to identify the physical boundaries and service areas of cities and special districts. Current LAFCO policy calls for territory to be included within a Sphere of Influence if that area will need urban services within the next ten to fifteen years. Spheres of Influence are amended periodically and as conditions warrant.

The following policy guidelines concern development proposals within Developing Spheres of Influence. They do not apply to land covered by a pre-annexation agreement between a city and landowner.

1. Cities should have the option to provide Urban Level Municipal Services to areas within Spheres of Influence where the city has a demonstrated willingness and ability to provide Urban Level Municipal Services. This guideline is not intended to address the provision of services by independent special districts, which topic is subject to LAFCO jurisdiction.

2. Urban development should occur within existing cities, Spheres of Influence, or planned cities. Initiation of annexation to the city should occur at the earliest time in the planning process consistent with these policies. Initiation of annexation to a city should occur prior to the issuance of building permits.

3. Spheres of Influence reflect a city's demonstrated willingness and on-going ability to provide land use planning and to plan for and extend public services. This policy guideline acknowledges that LAFCO has the sole authority to determine spheres of influence, and LAFCO concurrence is necessary for implementation of this guideline.

   a) In conjunction with LAFCO review of a city's Sphere of Influence, the city must develop a plan of service consistent with the level of detail commonly found in General Plans for the proposed sphere area. The plan will include:

      1. Land Use Designations
      2. Location of existing services and infrastructure
      3. Capital improvement and funding plans
      4. Level and range of services proposed for the area

b) It is anticipated that LAFCO would reevaluate a city's Sphere of Influence on a priority basis and determine if the sphere shall be maintained, revised or eliminated consistent with these policy guidelines if a city's actions significantly alter the need for urban services, or the provision of urban services within the sphere area.

4. The cities, the County, and LAFCO will periodically coordinate and complete Sphere of Influence updates so that responsible agencies can develop general plans, ordinances, and procedures consistent with these policy guidelines.

5. The public interest is served when the County acts to provide compatibility in land use planning and development standards in developing spheres areas. Development Standards applicable within Developing Spheres of Influence should allow consideration of the following:

   a) City standards for Infrastructure improvements, including public parks, and Public Safety Regulations should be utilized.

   b) City Design Standards will be the starting point of discussions between the city and the landowner for a development proposal. Cities and landowners will work cooperatively to achieve consensus by using flexibility, incentives, and other options to achieve agreement on the applicable Design Standards. In the event the city and landowner cannot agree on appropriate Design Standards, the County will make the final determination on the Design Standards which will apply based upon an evaluation of the legitimate objectives of the city and the landowner. Factors to be considered by the County shall include, but not be limited to, balancing the landowner's need for responsiveness to the marketplace with the city's need for consistency with the city's Design Standards.

Sections 5(a) and (b) are intended to recognize that while the County will have ultimate responsibility for the application of Development Standards within a Developing Sphere of Influence area, compatibility with City Infrastructure and Public Safety Regulations facilitates the ultimate annexation of the development to the city. It is anticipated that each City will identify development standards to be addressed at the time formal policies are considered for individual Sphere of Influence areas.

Guidelines for Annexation Incentives

The following incentives are permissive options to address permit process time and cost and shall not be construed to apply to Development Standards and Design Standards, or negate a landowner's option to process all aspects of a development through the city or County.

1. Flexible Processing Options

   The County and the city may each submit a development processing time and cost proposal for landowner consideration. Should the landowner wish a development proposal to be processed through the city, the County and city will pursue a cooperative agreement allowing city processing prior to the effective date of annexation.

2. Pre-annexation agreements, which eliminate the need for the extension of Urban Level Municipal Services by the County will be considered a public benefit for the purposes of County development agreements.

3. To promote early annexation, the city will consider offering incentives, including but not limited to, the following:

   a) Pre-annexation planning and zoning
   b) Pre-annexation subdivisions
   c) Creative public financing opportunities
   d) Pre-annexation agreements
   e) Pre-annexation development agreements
   f) Financial incentives
   g) Phased annexations

Implementation

The Board of Supervisors directs:

1) the CEO to work with affected cities towards the application of the policy guidelines in individual city spheres of influence for developing areas and report back within ninety days.

2) the Planning and Development Services Department to develop protocols and procedures for the processing of development applications within developing sphere of influence areas to implement the applicable policy guidelines. The procedures will be reviewed by affected parties, including the Development Processing Review Committee prior to approval by the Director, Planning and Development Services Department, and

3) CEO and Planning and Development Services Department to develop a report and recommendations regarding the long-term planning and governance assumptions for unincorporated areas outside of existing spheres of influence or general plan open space areas within existing spheres of consideration by LAFCO as part of its update of spheres of influence.

ATTACHMENT B

WHITE PAPER

ORANGE COUNTY LOCAL AGENCY FORMATION COMMISSION (LAFCO)
COUNTY OF ORANGE AND
LEAGUE OF CALIFORNIA CITIES, ORANGE COUNTY DIVISION

UNINCORPORATED COUNTY ISLAND ANNEXATION STRATEGY

January, 2000

INTRODUCTION

The County of Orange recently completed an intensive restructuring of county government and an assessment of the regional, public services provided by the County. As a result of the assessment, the leaders of Orange County determined that the provision of municipal, city-level services to unincorporated islands is not a core county business. Therefore, a concentrated effort to identify, assess, revitalize and annex the unincorporated islands throughout Orange County has become a major priority for the County Executive Office, Strategic and Intergovernmental Affairs Department (CEO/SIA).

Thus began the coordinated effort with the County, the Orange County Local Agency Formation Commission (LAFCO), and the League of California Cities, Orange County Division to develop a comprehensive strategy to facilitate the annexation of the unincorporated islands throughout the county. The following is a description of previous actions taken in regard to County islands, the current status of the County islands, strategies to facilitate annexation to the adjacent city, an implementation strategy and the next steps required to reach the overall goal of transitioning municipal services from the County to cities.

The County Executive Office developed a comprehensive inventory of the County's unincorporated islands in August 1999. The Inventory is divided into the following three categories of unincorporated areas: small islands, redevelopment areas, and major unincorporated communities. Seventy-eight unincorporated areas are mapped and cataloged, and demographic, land use, and service data is provided for each area. The *Inventory of Unincorporated Areas* was distributed to County agencies, cities, special districts and interested parties and will serve as the baseline data for this unincorporated island annexation strategy.

On September 14, 1999 the Board of Supervisors approved the *Community Revitalization Program for Unincorporated Islands*. The purpose of the revitalization program is to coordinate Orange County agencies to revitalize unincorporated neighborhoods through community policing, community code enforcement and community based programs. The Board of Supervisors allocated $500,000 as part of the Fiscal Year 99/00 budget to implement the revitalization program in both small islands and major unincorporated communities.

Fourth District Supervisor, Cynthia Coad has taken the lead on the revitalization strategy and recently implemented an ongoing revitalization plan for the major unincorporated community in the El Modena area. The County's Probation Department, in coordination with the County Executive Office will continue to implement the revitalization strategy at up to seven additional sites that can include major unincorporated communities and small unincorporated island areas. A description of the revitalization program as an annexation strategy will be further defined in this report.

ANNEXATION STRATEGY

The following are annexation strategies that can be used to assist cities and/or provide incentives to annex the unincorporated areas within the city's sphere of influence. All the following strategies will not be applicable to every unincorporated area and should be considered on a case-by-case basis to meet the needs of the annexing city and the unincorporated community residents.

New Legislation – AB 1555/Longville Bill

On October 9, 1999 the Governor approved and signed AB 1555, a bill authored by Assemblyman John Longville, to promote the annexation and elimination of unincorporated county islands. The bill authorizes the Local Agency Formation Commission (LAFCO) to approve, without an election, the annexation or reorganization of an unincorporated island or unincorporated islands within city limits under specified conditions depending on whether the proceeding is initiated on or after January 1, 2000, or January 1, 2007. In summary, the conditions require that the island(s) can not exceed 75 acres, the annexation is proposed by resolution of the annexing city, the territory will benefit from annexation, or is already receiving benefits from the city and that the island was not created after January 1, 2000. A comprehensive description of AB 1555 and the conditions are described in the attached bill text.

LAFCO Fee Waivers for Small Islands

On November 2, 1999 the Orange County Board of Supervisors approved the *County of Orange FY 1999-2000 First Quarter Budget Report* which included the allocation of $50,000 to LAFCO to facilitate the annexation of small county islands. This net County cost item would offset the cost of processing small island annexations sponsored by the County or that have been determined to require a fee waiver by LAFCO.

Pre-Annexation Agreements

A pre-annexation agreement between the County and the annexing city will allow an opportunity to collectively define gaps between County and city standards and service levels to facilitate the

ultimate annexation of the island to the city. Ideally, the County and city will commit money and/or resources to respond to the specific, identified needs to bring the island to compatible city standards and service levels. The pre-annexation agreement will assure the city and island residents that certain needs will be met and/or land use uniqueness will be preserved, and will assure the County that the city will annex the island now or at some specified time in the future.

Pre-Annexation Development Agreements

Currently undeveloped islands are subject to the development standards established by the Orange County Planning & Development Services Department, which may be more, or less restrictive than the development standards of the annexing city. A Pre-Annexation Development Agreement between the County, the city and the landowner/developer will ensure that the development standards will not change when the property is annexed to the city. The County and the annexing city will agree to allow the landowner/developer the option of developing the property through the County process or the city process. On the condition that the County process is used, the County, the landowner/developer and the city will negotiate agreeable development standards that are the same, or comparable to the city's building codes and regulations.

Phased Annexation Strategy

The *Orange County Inventory of Unincorporated Areas* is a complete inventory of the developed unincorporated areas throughout the County. Several Orange County cities have multiple unincorporated islands within the city's sphere of influence which could be cost prohibitive to the city to annex them all in one annexation process. Therefore, the County will negotiate a pre-annexation agreement with a city that provides for phased annexations. Essentially, the city will have the option to annex portions of the unincorporated areas within the city's sphere of influence over a negotiated time period. The property tax transfer percentage between the city and the County will be proportional to the annexed areas. The full percentage as defined in the city/county property tax exchange agreement will be available to the city when the last

unincorporated area is annexed to the city. The city may choose to annex all the unincorporated islands within the city in one complete annexation process.

City/County Contract Service Agreements

Currently, the Board of Supervisors serves as the "city council" to the residents of unincorporated islands. It is the County's responsibility to provide municipal and regional services to the unincorporated island areas. However, due to the fragmentation of islands throughout the County, municipal service delivery is often uneconomical for the County and could be provided more efficiently by the adjacent city. In many cases cities already provide the first response for emergency services such as police and fire. Service contracts with adjacent cities to provide city-level services such as police, planning and street maintenance would address this inefficiency and contribute to an overall plan to ultimately annex the unincorporated island to the adjacent city.

First, where County service levels in an unincorporated island do not match those of the adjacent city, and thus need to be increased to facilitate annexation, service contacts with cities would preclude the need for temporarily increasing County staffing and resources to service the islands at a level commensurate to the services provided by the adjacent city. An example of this is street sweeping on neighborhood streets which is currently not done by the County, but may be done by the adjacent city in its neighborhoods. Second, the residents would have a local contact point for services such as building permits, code enforcement, public safety, etc. This creates an image for the island residents of belonging to the city (in turn improving community support for annexation), and allows the city to begin to have an influence on the character of the island.

In other words, until annexation, the County would operate under contract with the city as though the island is already annexed to the city. The County would give control of the islands to the city which would provide all of the needed services, including land-use decisions that comply with the city's general plan overlay for the island. Any deviations from the County's general plan overlay will require County approval. Where County and city land use restrictions deviate,

and residents prefer to retain the County land use, it may be appropriate to grandfather in certain land uses (e.g. density levels or existence of sidewalks).

Until annexation occurs, the County will continue to receive the revenue (sales and property taxes, etc.) which is generated from the County island property/uses unless the County agreed that the revenue could go to the city as full payment for the contract services provided by the city to the island. This would need to be studied on an island-by-island basis.

Revitalization Strategy

It has recently been brought to the forefront, by Supervisor Coad, that it is time to begin giving more attention to all County islands, some of which have become a haven for crime, gangs, blight, and an overall disengagement from the surrounding city whose sphere of influence they are within. Not only is there a variance in the size of these islands, but also the type of special attention they may need to have addressed. However, each island does have one thing in common with the others: they have not received the overall attention necessary to deal with their pressing needs.

Some of these islands have a distinct difference in appearance than that of the surrounding city whose sphere of influence it is within. It may be the type of land use, infrastructure needs, lack of services such as street sweeping, abandoned cars left on the streets, lack of code enforcement, undergrounding of utilities and other matters which tend to distinguish the island from the surrounding city. It is as much, and maybe more, in the city's interest to get the island cleaned-up and compatible with surrounding uses and image, as it is to the County.

At the direction of Supervisor Coad, the County Executive Office and the Orange County Probation Department are coordinating a comprehensive revitalization strategy that includes the participation of the following County departments: Sheriff-Coroner, Planning & Development Services, Health Care Agency, District Attorney, Social Services Agency, and Housing & Community Development. The purpose for the revitalization strategy is to demonstrate the County's interest in revitalizing unincorporated neighborhoods through community policing,

community code enforcement and community programs. The specific components of the Revitalization Strategy are defined in a separate report. The County and city can use the strategy to improve qualifying unincorporated islands as a condition of annexation.

IMPLEMENTATION STRATEGY

There are several components necessary to facilitate the annexation of the unincorporated islands throughout Orange County. The components defined in this strategy include developing a partnership between the annexing cities, the County and LAFCO as a first step. The partners will then identify specific islands for annexation, define a timeline to annex the islands, prepare a comprehensive fiscal and service level analysis, prepare a community outreach plan, and coordinate with affected agencies. As a final step, the partners will jointly notify the affected agencies and departments regarding the completed annexation(s).

1. *City/County Partnership*

   The success of an annexation strategy and policy is contingent on the partnership between the cities and the County of Orange. It is important to create a partnership between each city and the County so that we are all going in the same direction, and know what each of the partners is responsible to provide/contribute. The League of California Cities, Orange County Division recently convened an Annexation Task Force comprised of elected leaders and city managers to coordinate with the County of Orange and LAFCO to develop an annexation policy for Orange County. Upon approval of a final annexation policy the partnership will continue to promote and market annexations to cities, implement the annexation policy, convene community outreach forums, and offer technical assistance on annexation issues on a countywide basis.

2. *Schedule & Timeline for Annexation*

   The *Inventory of Unincorporated Areas* is the most comprehensive study of the unincorporated islands throughout the County. The City/County/LAFCO partnership will proactively coordinate a list of small islands from the Inventory that are considered non-controversial and can use one or more of the strategies defined in the previous section. The partners will focus on uninhabited islands first, followed by the smallest islands that are currently considered part of the adjacent city and will not be subject to resident opposition. The partners will also reactively identify the islands that have been requested by cities for

annexation and assist with the annexation of those areas by obtaining the information listed in the following section. *Inventory of Unincorporated Areas*.

3. *Inventory of Unincorporated Areas*

Expand the data in the *Inventory of Unincorporated Areas* to include the following information for the islands identified by the partners. The data will assist with the facilitation of annexations by providing a comprehensive analysis of the economic impact of the unincorporated island to the annexing city: (not listed in order or priority of importance)

1. Cost to Provide Services
2. Current Service Levels
   - Street sweeping
3. Code Enforcement
   - Abandoned vehicle removal
4. Public Protection/Safety
   - Crime statistics
   - Gang related activity & gang prevention programs
   - Service calls
   - Current staffing levels
   - Community-based policing program
5. Infrastructure & Roads
   - Maintenance schedule
   - Future capital improvement projects
   - Age of infrastructure
   - Sidewalks, curbs, gutters, etc. consistent with City standards
6. Demographic and housing data
7. Number of registered voters
8. Number of commercial establishments and annual sales tax revenue generated
9. Annual turnover/resale rate of existing property (commercial and residential)

10. Parcel tax or assessments – County Service Areas, street lighting districts, special purpose taxes
11. Service level unit of measurements
12. Current allocation of CDBG funds for projects within the subject County islands.
13. Actual and projected property tax increment generated in the island that is currently within a County redevelopment project area (RDA). Projects currently funding by RDA funds.
14. Sewer/septic
15. Land use planning and zoning information
16. School Districts

4. *Community Outreach*

It is important to create city/county partnerships to collectively develop community outreach programs in coordination with LAFCO. The unincorporated island residents are integral to the overall annexation process. Therefore, public community forums in the affected unincorporated island areas will be convened to discuss proposed annexations, respond to residents' concerns regarding annexation, and solidify the united approach between the city and the County regarding the annexation of the area.

Historically, one of the formidable barriers to annexation, has been that the residents of the island do not want to change the status quo. There is a fear, whether real or perceived, that annexing to a city will result in a different lifestyle imposed through the city's general plan, zoning, restrictive building/other codes, costly sewer connection fees or possibly a difference in the amount of taxes they will be required to pay (utility user fees, special taxes, annual sewer fees and assessments, etc.).

Furthermore, it is important to understand, that even though the city and County would like to facilitate the annexation of the County islands, the residents will continually resist if they think they will lose these perceived benefits/independence as a result of annexation. The residents must be educated regarding any differences in services, including direct benefits

that would result from annexation such as increased city-level services, increased public safety, lower taxes, access to city facilities, and the potential to "grandfather" land use standards in some cases.

5. *Sanitation District Coordination*

The data gathering process for the inventory will identify the number of properties that are currently on septic systems within the island. The annexing city will determine if the property must be converted to sewer as a condition of the annexation. However, in light of the environmental impacts of septic systems, it is doubtful that any city, or the County for that matter should continue to allow septic systems. There may need to be both city and county policies providing for the sunsetting of septic systems. If so, the city and county representatives will coordinate with the Sanitation District to transition the property from septic to sewer, determine the costs and payment for services.

6. *Orange County Fire Authority Coordination*

The unincorporated islands/areas currently are serviced by the Orange County Fire Authority, and to pay for those services a portion of the property taxes which are paid by the property owners in the unincorporated island/area goes into the County Structural Fire Fund to pay for these services. When a County island is annexed into a city, the portion of the property tax that historically went into the County Structural Fire Fund needs to be addressed.

If the Orange County Fire Authority is the service provider to the annexing city, then OCFA will thereafter continue to be the service provider to the service provider and the share of the property taxes which goes into the County Structural Fire Fund should continue unchanged. However, if the annexing city has its own fire department or is a contract city with OCFA or another city, then it seems that the portion of the property taxes which historically have gone into the Structural Fire Fund should then go directly to the city.

This is a matter which the Board of Supervisors and OCFA need to address. The Structural Fire Fund is under the jurisdiction and control of the Board of Supervisors, but pursuant to the terms of the Joint Powers Agreement, which established the OCFA, all Structural Fire Fund revenue was pledged to OCFA to cover operational costs for the unincorporated areas.

7. *Notification of Annexation to Affected Departments*

The LAFCO process currently provides notification to the County, Assessor, Auditor and Surveyor when an annexation is complete. The implementation strategy will also require a final notification of annexation to all impacted departments and agencies to include, but not limited to the following:

- Orange County Board of Supervisors
- Affected City Council
- League of Cities Task Force Members
- County of Orange Departments:
  - CEO/Budget Department
  - Health Care Agency
  - Housing & Community Development
  - Planning & Development Services Department
  - Public Facilities & Resources Department
  - Registrar of Voters
  - Sheriff-Coroner

NEXT STEPS

The *Unincorporated County Island Annexation Strategy* is the first step in a comprehensive approach to annex the unincorporated islands throughout Orange County to the adjacent cities. Transitioning the provision of municipal services to the cities will allow the County to begin focusing on core County businesses at a regional level. However, as a follow-up to the annexation strategy, addressing the following issues will move the County towards completing the overall goal.

Revitalization Strategy

Expand the Revitalization Strategy and develop a comprehensive approach to reinvest County resources into the unincorporated areas. The revitalization will include all unincorporated areas of the County, and will not be limited to islands.

Fiscal & Service Level Analysis

Expand the analysis to all unincorporated areas identified in the Inventory. The analysis is currently limited to those islands or unincorporated communities that have been identified for annexation by the League/County/LAFCO partnership or the annexing city.

Service Contracts

Facilitate contracts with cities adjacent to unincorporated communities to provide municipal services. Contract with the city to provide land use services, permits, code enforcement, etc. to begin eliminating the County's responsibility to provide city-level services on an on-going basis in unincorporated islands.

ATTACHMENT C

Policy & Procedural Guidelines for Annexation of Small Islands (Gov't Code 56375.3)

IV. SMALL ISLAND ANNEXATION PROCEDURAL GUIDELINES

The following shall serve as procedural guidelines for processing small island annexations pursuant to Government Code §56375.3.

The Commission may approve small island annexations, and order the annexation of territory without protest or an election, if it determines that all of the following conditions apply:

A. The annexation is initiated on or after January 1, 2000 and before January 1, 2014.

B. The annexation is proposed by resolution adopted by the affected city.

C. The annexation does not exceed 150 acres in area, and that area constitutes the entire island.

D. The territory is surrounded in either of the following ways: surrounded, or substantially surrounded, by the city to which annexation is proposed or by the city and a county boundary or the Pacific Ocean, or surrounded by a city to which annexation is proposed and adjacent cities. An unincorporated island is "substantially surrounded" if: (1) more than 50 percent of the island's boundary is contiguous to the annexing city, or (2) more than 50 percent of the island's boundary is contiguous to the annexing city and the Pacific Ocean.

E. The territory is not located within a gated community where services are currently provided by a community services district.

F. The territory is substantially developed or developing based upon one or more factors, including, but not limited to, the following:

- The availability of public utilities
- The presence of public improvements
- The presence of physical improvements upon the parcel or parcels in the area

G. It is not prime agricultural land.

H. The territory will benefit from the annexing city.

I. The Commission may offer incentives such as reduced fees for cities annexing small islands.

ATTACHMENT C

Original Adoption Date: 11/19/2001
Date of Last Review: 2/9/2011
Date of Last Revision: 3/11/2005, 2/9/2005

ITF Guiding Principles, Best Practices and Municipal Services Alignment Process

- ITF Purpose: To develop island annexation and alternative service guiding principles and best practices.

- Guiding Principles
  1. The purpose of cities and the County unincorporated islands within their sphere of influence is the same - to provide "community" for the residents.
  2. Communities need to be whole and healthy from a municipal service perspective.
  3. It is the role of government to provide municipal services in a manner that makes communities whole and healthy.
  4. Annexation and Municipal Service Agreements are different from one another and both are tools for government to make communities whole and healthy from a municipal service perspective.
  5. Currently there are disparities of municipal services and their associated costs among cities and County unincorporated islands.
  6. The goal for County and City government is to align cities and the unincorporated islands within their spheres of influence from a municipal service, capital improvement investments, and associated costs perspective in order to foster healthy and whole communities.
     [Note 1: The above guiding principles shift LAFCO's focus away from securing annexations and onto aligning government leadership, municipal services and associated costs
     [Note 2: "Alignment" is defined as "matching the city's existing codes and standards unless otherwise agreed upon by County and city."]

- Best Practices
  1. Inventories
     - County inventory of costs associated with unincorporated islands
       - Identify methodology
       - Conduct inventory

     - City Island infrastructure inventory
       - Conduct inventory
       - Each city on a case-by-case basis identifies a "reasonable" and specific timeframe (or lifespan, e.g. number of projected years) for costs associated with the infrastructure improvements and maintenance required to achieve infrastructure alignment.

       - INVENTORIES ARE A BEST PRACTICE BECAUSE THEY:

- Provide objective data for decision-making for both the county and cities
- Provide data that is viewed as credible because it is gathered by the county and cities
- Align the county and city financial interests in defining a "fair," equitable cost-sharing burden

2. Alignment practices
   - Specific plans to bring land use and planning among islands and cities into alignment
   - Municipal service agreements for police, fire and code enforcement alignment to eliminate disparity in services and associated costs
   - Affordable housing alignment agreements, including development, parking and traffic standards to address affordable housing issues and impacts
   - Annexation as a tool for achieving alignment is possible at any point that the city and county agree on annexation
     - ALIGNMENT IS A BEST PRACTICE BECAUSE:
     - It reduces the disparity of municipal services offered among communities in islands and communities in cities; thus making them whole from a municipal services perspective
     - It eliminates the need for island residents to choose between disparate county and city standards and levels of service
     - It eliminates city residents paying for portions of island resident services
     - It ensures island residents pay their fair share for the municipal service they receive
     - It provides factual data for island residents that is not manipulated or distorted by outside interests
     - It eliminates the major issues contributing to resident opposition to annexation without the disruption of proposing annexation. [e.g. police, fire, code enforcement, land use]
     - It eliminates city government issues associated with land use planning compatibility and code enforcement.
     - It [through Municipal Service Agreements] is a financial incentive for cities to engage with the county to align municipal services

3. Pilot Projects
   - Conduct pilot projects.
     - PILOT PROJECTS ARE A BEST PRACTICE BECAUSE:
     - They provide a "safer" environment and opportunity for all parties to test, refine and learn from the alignment process

- They provide an opportunity to demonstrate the effectiveness of the alignment process
- The project and the respective cities and players participating in the pilot project can be used to educate and promote the process to other cities

4. Fiscal Model Template
   - Use the Fiscal Model Template as the basis for fiscal impact studies
     - THE FISCAL MODEL TEMPLATE IS A BEST PRACTICE BECAUSE:
     - It generates and results in fiscal impact studies that are viewed as more "credible" because they identify and represent the fiscal perspectives of the County, city, and residents (ALL THAT ARE IMPACTED)
     - It identifies available funding.
     - It clearly defines and standardizes the data and information required for the study analysis which helps simplify the time and work effort required to produce the data; i.e. It increases data collection efficiency.
     - It has the support of City Manager and the County CEO to ensure that accurate, timely data collection is a priority.
     - It generates "credible" fiscal impact studies that all parties – County, cities, residents – can rely upon for decision-making
     - [Note 3: For Fiscal Model Template see Attachment A]

❖ Island/City Alignment Process

1. Supervisor affirms that he/she wants the island communities in their respective districts to be aligned from a municipal service and associated cost perspective. [Comment: These alignment messages may be much easier for supervisors to deliver to constituents than messages trying to justify annexation.]
2. Supervisors that want their communities aligned identify and prioritize the islands that will be aligned
   - 2a: LAFCO notifies the cities with the prioritized islands in their Sphere of Influence that the Supervisor is interested in aligning municipal services, explains the process, answers questions and factors any city concerns into the process going forward.
3. Supervisors that want their communities aligned initiate alignment best practices
   - CEO's Office initiates cost inventory for priority islands
   - Specific plans initiated for priority islands
   - MSA discussions initiated
4. LAFCO invites city managers associated with priority islands to conduct infrastructure inventory; informs city that county is inventorying costs of serving the island; informs city that specific plan is being completed

5. LAFCO convenes meeting with county and city to review/discuss cost inventory to serve islands and island infrastructure inventory
6. City Manager determines if city is "comfortable" engaging in informal talks about aligning municipal services among the city and island
7. City Manager recommends to city council that informal discussions commence
8. City Council agrees to informal discussions [Comment: Similar to the Supervisors, the alignment messages may be much easier for City Council members to deliver to their constituents than messages justifying annexation.]
9. City Manager, County CEO and LAFCO design a plan to align MS and associated costs using MSA's for police, fire, and code enforcement. . Plans designed on a case-by-case basis and may include:
    - Any all or a combination of the alignment practices [e.g. MSA's, affordable housing agreements, redevelopment agreements, community outreach and education agreements.]
10. City Council and County agree on plan to align municipal services and associated costs.
11. Alignment plan implemented and completed.
12. Alignment Process Outcomes:
    - Cities and islands aligned from municipal service and associated cost perspective; aligned in a manner that is agreeable to county and city; City-County cost burden equally shared; residents not asked to make a decision about municipal services and level of service;
    - Islands are as aligned as much as possible and thus optimally positioned for eventual annexation
    - Most reasons for residents to oppose annexation are "address" and/or cost of municipal services and possibly police/sheriff service.
    - The only decisions for residents are the cost they <u>want</u> to pay for municipal services and how much they want to pay to maintain "address."
    - County and city positioned to jointly communicate to island residents the costs of their municipal services and to offer them the choice of annexing for a specified cost and address change or to maintain their island status. [This is a much simpler communication task; reduces and defines the issues for residents to consider or oppose; less resources required...dollars and staff...to implement the communication plan; achieves healthy and whole communities from the municipal service perspective either way...through alignment best practices or annexation.]

EXHIBIT D

Orange County Fire Authority

After Action Report
Freeway Complex Fire

November 15, 2008

A Report to the
Orange County Fire Authority
Board of Directors

FREEWAY COMPLEX FIRE

AFTER ACTION REPORT

November 15, 2008

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Foreword

On November 15, 2008, our communities were impacted by what ultimately became one of the largest wildland fires ever to strike Orange County. The Freeway Fire, which started in the City of Corona on the border of Riverside and Orange Counties, was driven by fierce Santa Ana winds. It spread quickly on a massive fire front, causing widespread damage in the cities of Yorba Linda, Anaheim, and Corona, as well as to Chino Hills State Park. The fire merged with a second one-the Landfill Fire, that had started in the Carbon Canyon area. This caused further damage in the City of Brea and community of Olinda Village, ultimately threatening Chino Valley and driving into Los Angeles County, where it menaced the City of Diamond Bar. Miraculously, no lives were lost or major injuries occurred during this wildland/urban conflagration. However, 381 structures belonging to residents of all impacted jurisdictions were damaged or destroyed by these fires.

The Freeway Complex Fire tasked our fire and law enforcement personnel to extremes. They courageously fought to protect lives and as many homes as possible that were lying in the path of this fast moving firestorm. Ultimately, thousands of homes were saved. I am extremely proud of the heroic work of our fire and law enforcement personnel, the coordination among the many jurisdictions threatened by the fire, and the gallant efforts of hundreds of residents during and after this disaster.

Many of the homes saved were the result of fire-resistant construction features that had been put in place in recent years. The majority of the homes claimed by the fire were built prior to the newer wildland urban interface building requirements. In most cases, these homes succumbed to fires caused by the intrusion of embers driven by fierce winds. Like paper confetti thrown into a fan, these embers rained down on our communities well ahead of the fire.

This was not the first time a fast moving wildfire burned through these communities. In 1980, driven by Santa Ana winds, the Owl Fire (October 28, 1980) and the Carbon Fire (November 16, 1980) burned in the same areas. The difference 28 years later, with regard to structures taken by the fire, is the number of homes now located within this historic fire corridor.

As with any disaster, the lessons learned from this event will help better prepare our communities for the future as we collectively confront the all-too-frequent occurrence of these destructive "mega-fires." The Orange County Fire Authority's and my own renewed commitment is to (1) find additional measures we can implement to better protect our communities from these types of fires, (2) work continually toward enhancing our local capabilities to respond to major incidents of this type, and (3) find new ways for the residents in our communities to help.

Respectfully,

Chip Prather
Fire Chief

Executive Summary

In what has become a year-round occurrence for California firefighters, the 2008 fire season was one of the worst in the state's history—scorching roughly 1.4 million acres. It began in May when dry lightning storms in Northern California sparked over two thousand wildfires. In the fall of 2008, wildland fires threatened Southern California when the Santa Ana winds battered the region.

As the winds raised the temperature and lowered the humidity, the first of several significant wildland-urban interface fires began on October 12, 2008: the Marek Fire. Occurring in the Lakeview Terrace area of Los Angeles County, this fire consumed nearly 5,000 acres, destroyed 40 homes, and damaged 9 others. Then on October 13, the Sesnon Fire began in the Porter Ranch community of Los Angeles County. By the time it was contained, almost 15,000 acres had been scorched and 26 residences had been damaged or destroyed.

The fire siege continued in November as the Santa Ana winds returned. A moderate wind event had been forecasted for November 13–15 in the Southern California region. On the evening of November 13 at approximately 6:00 p.m., an unattended campfire sparked a blaze that was driven by 70 mph winds into the cities of Montecito and Santa Barbara. Known as the Tea Fire, it consumed nearly 2,000 acres and over 230 homes, as well as evacuating nearly 9,000 residents.

On November 14 at 10:29 p.m., only one day later, the fast-moving Sayre Fire broke out in Los Angeles County. Driven by 60 mph Santa Ana winds, it ripped through the northern San Fernando Valley burning all in its path. By the time the fire was controlled, 11,262 acres had been seared and more than 600 structures had been destroyed, including 480 mobile homes at the Oakridge Mobile Home Park. The *Los Angeles Times* called it "the worst loss of homes due to fire in the city of Los Angeles" and reported it "appeared to be the largest number of housing units lost to fire in the city of Los Angeles, surpassing the 484 residences destroyed in the 1961 Bel Air Fire."[1]

Due to extreme weather conditions and increased fire activity, the Orange County Fire Authority (OCFA) implemented an emergency staffing pattern on November 15. Additional resources—including one Type 3 strike team, a second helicopter, and increased personnel on engine companies located in the wildland interface areas—were put in place for the third day of strong Santa Ana winds.

On Saturday, November 15 at 9:01 a.m., the Corona Fire Department received the initial report of a vegetation fire at the westbound 91 Freeway and Green River: the Freeway Fire. Within minutes, the OCFA began receiving reports of the fire at its Emergency Command Center. Driven by hot Santa Ana winds in excess of 60 mph, combined with 8 percent humidity and long-range spotting of one mile or greater, this fire would cause the most catastrophic loss of homes in Orange County since the Laguna Fire in 1993.

The Freeway Fire marched quickly to the west and through the Green River Homes community, spotting far ahead of the main fire. From the onset, it was apparent this would become a rapidly

[1] Tami Abdollah and Howard Blume. November 16, 2008. *Schwarzenegger calls for review after Sylmar tragedy as blazes rage on*, Los Angeles Times. Accessed http://www.latimes.com/news/local/valley/la-me-firemain17-2008nov17,0,2305426.story on January 14, 2009.

spreading and significant conflagration. One hour after it was reported, erratic winds drove the fire in several directions, including north into the Chino Hills State Park, south across the 91 Freeway towards the City of Anaheim, and west into the hills of Yorba Linda. The fire then turned to the northwest, impacting the communities of Carbon Canyon and Diamond Bar.

At 10:43 a.m. on November 15, the OCFA Emergency Command Center received a report of a second fire: the Landfill Fire. This one was located in the area of the Olinda Alpha Landfill, near Valencia Avenue and Carbon Canyon. Fanned by the wind, it spread quickly toward the cities of Brea and Diamond Bar and the 57 Freeway. Borrowing resources from the Freeway Fire, the OCFA and the Brea Fire Department dispatched crews to fight the new threat. Around 5:30 p.m. on November 16, the decision was made to merge the Landfill Fire and the Freeway Fire into a Complex, due to their geographical proximity. By merging the two into the Freeway Complex Fire, it allowed for the sharing of incident management and logistical support and provided a single base of operations for continuity and efficiency.

The Freeway Complex Fire was contained on November 19, 2008, at 7:00 a.m. after consuming over 30,000 acres and impacting six cities in four counties. This was the largest fire in Orange County, since the Green River Fire in 1948. During the final stages of the fire, control lines were secured and aggressive restoration action and recovery efforts were initiated to protect burned areas from flooding and debris flows due to the winter rains.

The fire burned 30,305 acres and damaged or destroyed over 381 homes, commercial structures, and out-buildings. Numerous vehicles, city parks, and sensitive ecological areas in the Chino Hills State Park and the Santa Ana River riparian area were also damaged or destroyed. The impact to residents and businesses from smoke exposure or damage, as well as the economic impact, is difficult to calculate.

To date, the cost for fighting the Freeway Complex Fire is approximately $16.1 million. As a result of the Local Government Fiscal Responsibility Agreement made between OCFA, CAL FIRE, and FEMA/OES, the OCFA will be responsible for a percentage of the cost of fighting the fire on the first day. After reimbursement is received from federal and state resources, the OCFA cost share responsibility is approximately $33,000.

Thankfully, no deaths or serious injuries to residents or firefighters were attributed to the fire; however, 14 firefighters suffered minor injuries. At its height, the Freeway Complex Fire forced as many as 40,000 people from their homes across the four impacted counties: Orange, Los Angeles, Riverside, and San Bernardino.

A unified command and strong coordination between fire and law enforcement was the key to evacuating large numbers of residents and animals in the path of this rapidly burning fire. The efforts of firefighters and citizens and the existing fire prevention measures—those requiring defensible space, non-combustible roofs, fuel modification zones, and ignition resistant construction—were the major factors in saving hundreds of homes.

Ultimately, over 3,800 personnel from more than 260 fire agencies—with over 650 fire engines—were assigned to the incident. The Brea Police Department, which was tasked with large-scale evacuations over a widespread area as well as traffic and crowd control, received assistance from various Southern California law enforcement agencies. Approximately 375 officers from 19 local

police agencies, along with deputies from the Orange County Sheriff's Department, Los Angeles County Sheriff's Department, Riverside County Sheriff's Department, and the Department of Homeland Security responded to the call. The incident was managed by a unified command structure, which included the OCFA, Los Angeles County Fire Department, CAL FIRE, Corona Fire Department, Brea Fire Department, Anaheim Fire Department, Chino Valley Fire District, and the Orange County Sheriff's Department.

While the Freeway Complex Fire presented the OCFA with several difficult challenges, other factors contributed to its complexity. These included several years of drought that increased available dead fuels and lowered live fuel moistures resulting in intense fire behavior and burning conditions. The two fires—the Freeway and the Landfill—started less than two hours apart and placed a great demand on emergency response resources. The topography and the east-west alignment of the Santa Ana Canyon—together with offshore winds—resulted in extremely rapid fire spread, long-range spotting due to flying embers, large-scale evacuations, and the difficult task of deploying resources to protect lives and property over a broad and unpredictable area.

A number of the conclusions in this After Action Report point to things that went well such as OCFA's advance planning and additional staffing for the extreme weather conditions throughout the region. Additionally, OCFA's ongoing fire prevention efforts contributed directly to saving thousands of homes, by providing firefighters with defensible space to protect threatened structures. Other conclusions illustrate areas that can be improved or should be reviewed for follow-up action with the appropriate agency or policy group.

The recommendations contained in this report are intended to help the OCFA better prepare for this type of disastrous wildland fire in the future and improve local capability and surge capacity where possible. Some of these recommendations will require further study, review, and cost analysis to determine the feasibility of implementation. Others are no cost items to implement, or require follow-up action with the appropriate agency or group.

Historical Information

The Santa Ana Canyon has an extensive wildland fire history. The canyon's geographical location plays a major role in directing wildland fire into Orange County. Since 1980, the Santa Ana Canyon area has experienced 25 separate wildland fires, burning a total of 82,734 acres with the events ranging from 1 to 19,986 acres. Until the recent Freeway Complex Fire, the most notable and devastating events have been the 1980 Carbon Canyon Fire (14,613 acres), the 1980 Owl Fire (18,332 acres), the 1982 Gypsum Fire (19,986 acres), and the 2006 Sierra Peak Fire (10,506 acres).

The Santa Ana Canyon's steep topography and east-west alignment serve as a wind funnel. The geography increases the wind's speed and magnifies the effects of fire on the available fuel bed, contributing to the rapid rate of fire spread. Additionally, the encroachment of civilization into the wildland-urban interface (WUI) enhances the severity of wildland fires during Santa Ana wind conditions. The frequency of fire in this area has allowed non-native vegetation of volatile grass, weeds, and shrubs to become the dominant fuel type.

One particular fire of interest is the 1980 Owl Fire—given that several parallels can be drawn between it and the Freeway Fire. The weather, fuel conditions, and point of origin of the two were jarringly similar. Both fires began as Southern California was experiencing Santa Ana wind conditions. The forecast for the Owl Fire was for continued strong, dry winds blowing 15 to 50 mph with gusts to 60 mph. At the start of the Freeway Fire, wind speeds were sustained at 43 mph with gusts of 61 mph and extremely low humidity. The Owl Fire began on October 28, 1980, at 1:47 a.m. near Highway 71 and Prado Dam in Riverside County. The Freeway Fire started in nearly the same area on the north side of the 91 Freeway at Green River. Both fires, fanned by strong Santa Ana winds and fed by dry fuels, quickly burned into Chino Hills and marched west into Orange County.

The Santa Ana Canyon's steep topography and east-west alignment serve as a wind funnel—increasing the wind's speed and contributing to the rate of fire spread.

Initial Response

The Owl Fire After Action Report states, "The first arriving fire unit on scene reported the fire at five acres in size moving out." The fire's radio traffic was being monitored then by what was known as the Orange County Fire Department's Emergency Command Center. "Although the fire was over two miles away from the Orange County line, all who heard the report on conditions knew the potential that existed: historically, Orange County seems to be the recipient of major wildland fires that start outside its boundaries." Immediately, plans were put into effect to place resources ahead of the Owl Fire's arrival into Yorba Linda.

Familiar with the area's fire history, OCFA Battalion Chief Reeder ordered two Type 1 engine strike teams to stage at Fire Station 53 in Yorba Linda in anticipation that the Freeway Fire would eventually reach the City. However, after hearing requests for resources in Corona, the two strike teams responded to the 91 Freeway and Green River. Prior to arriving on scene, Chief Reeder also ordered fire attack aircraft.

Fire Behavior

As the 1980 Owl Fire's progress was monitored, it became obvious "this was a major fire and that it was spotting as much as a half-mile ahead of itself" and "thick volumes of smoke obscured the actual location of the fire line, further hampering firefighting efforts." Reports from the fire crews on the fire line "showed that the fire was gaining momentum and consuming at least 1,000 acres per hour. At 3:30 a.m. there was little doubt that no amount of effort would stop this blaze before it reached the highly populated areas of Orange County: this fire was going to hit the extreme eastern edge of Yorba Linda very, very hard."

This same extreme fire behavior was observed during the 2008 Freeway Complex Fire. The strong winds kept the thick column of smoke from rising. Instead, it stayed close to the ground, making it extremely difficult to see the fire's perimeter and progression. OCFA Helicopter 41 reported seeing spot fires from one to one and a half miles ahead of the fire front. These same winds pushed the Freeway Complex Fire at an incredible rate of spread. **Historical Information – Map 1** shows over 10,000 acres were consumed in the first 12 hours—roughly 14 acres per minute. That's nearly the length of 14 football fields every 60 seconds.

> The Freeway Complex Fire consumed over 10,000 acres in the first 12 hours—roughly 14 acres per minute. That's nearly the length of 14 football fields every 60 seconds.

Divided Fronts

The Owl Fire divided into two distinct fire fronts primarily due to wind and topography. One burned in a northwesterly direction into "Aliso Canyon in a largely uninhabited area, and never became a major problem." The second and main fire front continued towards Orange County, pushed by 50 mph winds.

The Freeway Fire also traveled in two different directions. One front headed in the direction of Chino Hills State Park, the cities of Yorba Linda and Chino Hills, and the community of Sleepy Hollow in Carbon Canyon. The other followed the Santa Ana River, crossed the 91 Freeway, and moved into the City of Anaheim.

Staging Areas

To prepare for the fire front's arrival, resources dispatched to the Owl Fire were staged in eastern Yorba Linda. "As the fire ate its way towards Yorba Linda, strike teams began positioning themselves along streets in the interface area … all of this complicated by smoky conditions so severe that it caused smoke detectors in many homes to activate." The fire arrived battering the area at the east end of La Palma Avenue and Esperanza Road and along the east side of Dominguez Ranch Road at about 11:00 a.m. This was nearly nine hours after the start of the fire. In 1980, these roads formed the eastern border of Yorba Linda. "Firefighters, along with residents that had elected to remain behind to hose down their roofs, were hit with a blinding gale of choking smoke and showers of burning embers."

By comparison, during the Freeway Fire, resources were ordered to stage at Station 53 located within the eastern border of Yorba Linda in anticipation of the threat. At about 10:00 a.m., the fire

was burning near the river bottom along the Green River Golf Course. At 10:08 a.m., OCFA Helicopter 41 reported a large spot fire one mile ahead of the main fire front. Immediately, additional engine strike teams, aircraft, and helicopters were ordered to augment the resources protecting the city. Additional orders were given at 10:20 a.m. to notify the Brea Police Department to begin evacuations in the area of Brush Canyon. The OCFA Emergency Command Center also telephoned the Yorba Linda City Manager. A message was left notifying him that the fire was now heading toward his city and would arrive in 30 minutes. At 10:39 a.m.—31 minutes later, the fire was threatening the communities of Big Horn and Evening Breeze. This occurred approximately 90 minutes after the start of the fire and less than 30 minutes since the report of the spot fire. The first structure fire was reported at 10:58 a.m. on Merryweather Circle—about three miles from the point of origin.

Fire Containment

The Owl Fire was 100 percent contained on October 30, 1980, at 5:00 a.m. after burning 18,832 acres and destroying 3 homes. Over 136 engines and 790 firefighters, along with 4 helicopters, battled the fire for two days to bring it under control. The Owl Fire After Action Report credits the subsiding winds for the ability of firefighters to stop the progression of the fire. Refer to the **Owl Fire After Action Report** at http://www.ocfamedia.org/_uploads/PDF/ofaar.pdf for more details.

The Freeway Complex Fire was declared under control on November 19, 2008, at 7:00 a.m. after consuming 30,305 acres and destroying 187 homes. More than 650 engines and 3,800 firefighters, with 17 helicopters and 12 air tankers, succeeded in keeping the loss of homes from being much worse.

Although the number of acres consumed is very different for each fire, what is rather striking is the final "footprint" or fire perimeter of both fires. **Historical Information – Map 2**, both followed the geographical contours as they were driven by the strong winds through the Santa Ana Canyon, resulting in nearly identical burn perimeters.

More than 650 engines and 3,800 firefighters, with 17 helicopters and 12 air tankers were assigned to the Freeway Complex Fire.

Summary

Traditionally, the fire season in Southern California has been from May through September. Over the past 15 years, a trend has emerged where Orange County—and Southern California—has experienced some of its most devastating wildfires from October through April. In fact, two major fires in Orange County in the past six years have occurred in February: the 2006 Sierra Fire and the 2002 Green Fire. Another occurred in March: the 2007 Windy Ridge Fire. Most recently, the Santiago Fire occurred in October 2007.

In the two-month period of October and November 2008, Southern California experienced several significant wind events sparking multiple wildfires. Five of these became major incidents resulting in thousands of acres burned, numerous homes destroyed, and countless people displaced. These fires shared several common denominators, including (1) Santa Ana winds; (2) competition for resources due to multiple, simultaneous fire activity throughout Southern California; and (3)

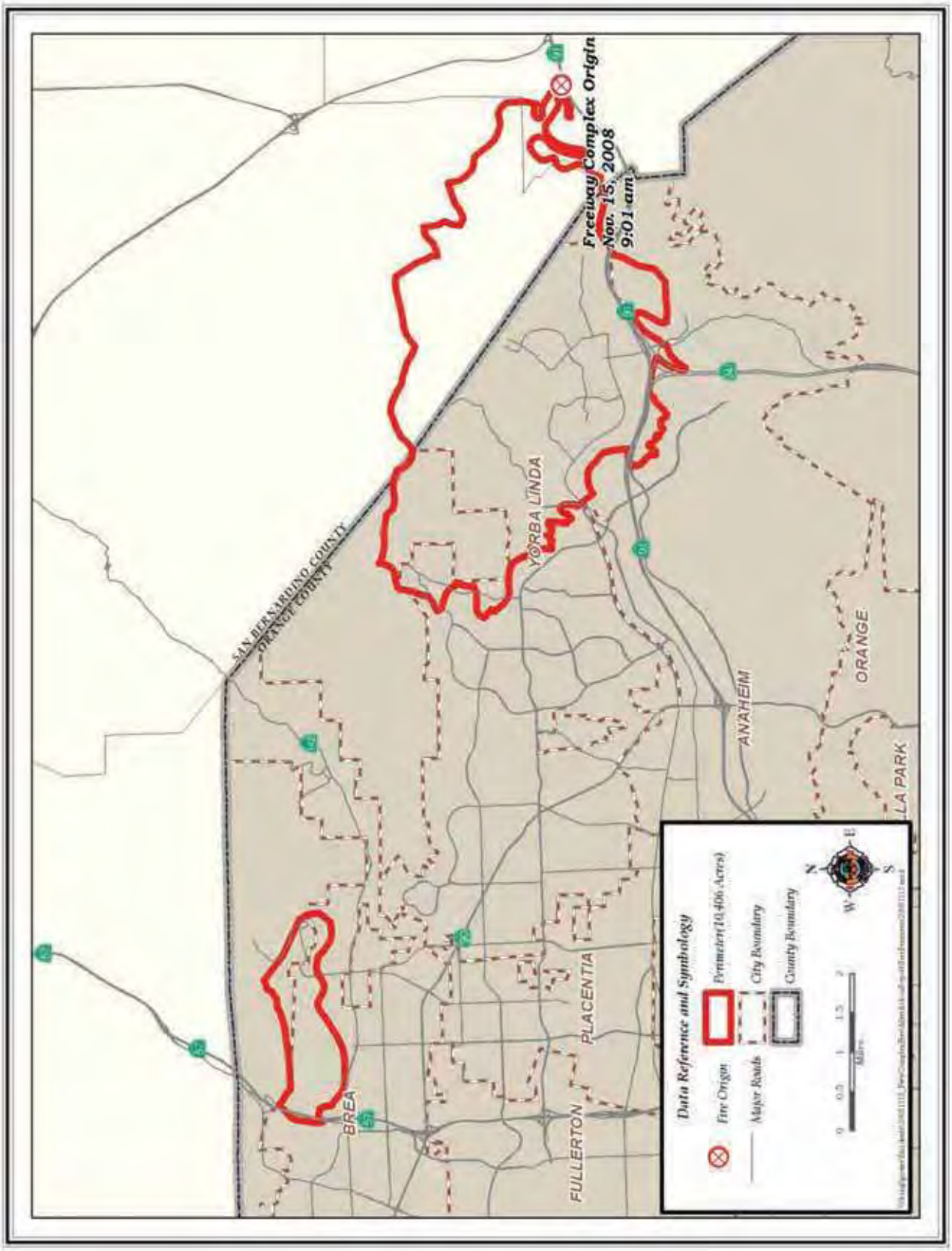
wildland fire occurrence late or outside the traditional fire season.

Over the past 60 years, Orange County has experienced a number of major wildland fire disasters. Table 1: Sixty-Year Major Fire History—Orange County, lists selected Orange County wildland fires that covered large geographic areas, burned out of control for an extended period of time, and/or resulted in extraordinary property loss—homes, businesses, and valuable watershed. The Freeway Complex Fire was the largest wildland fire in terms of acreage—over 30,305 acres—the OCFA has faced in the past 40 years. The fire was one of the most challenging and complex due to the rapid rate of spread, wildland-urban interface (WUI) encroachment, vast evacuations, and sustained Santa Ana winds.

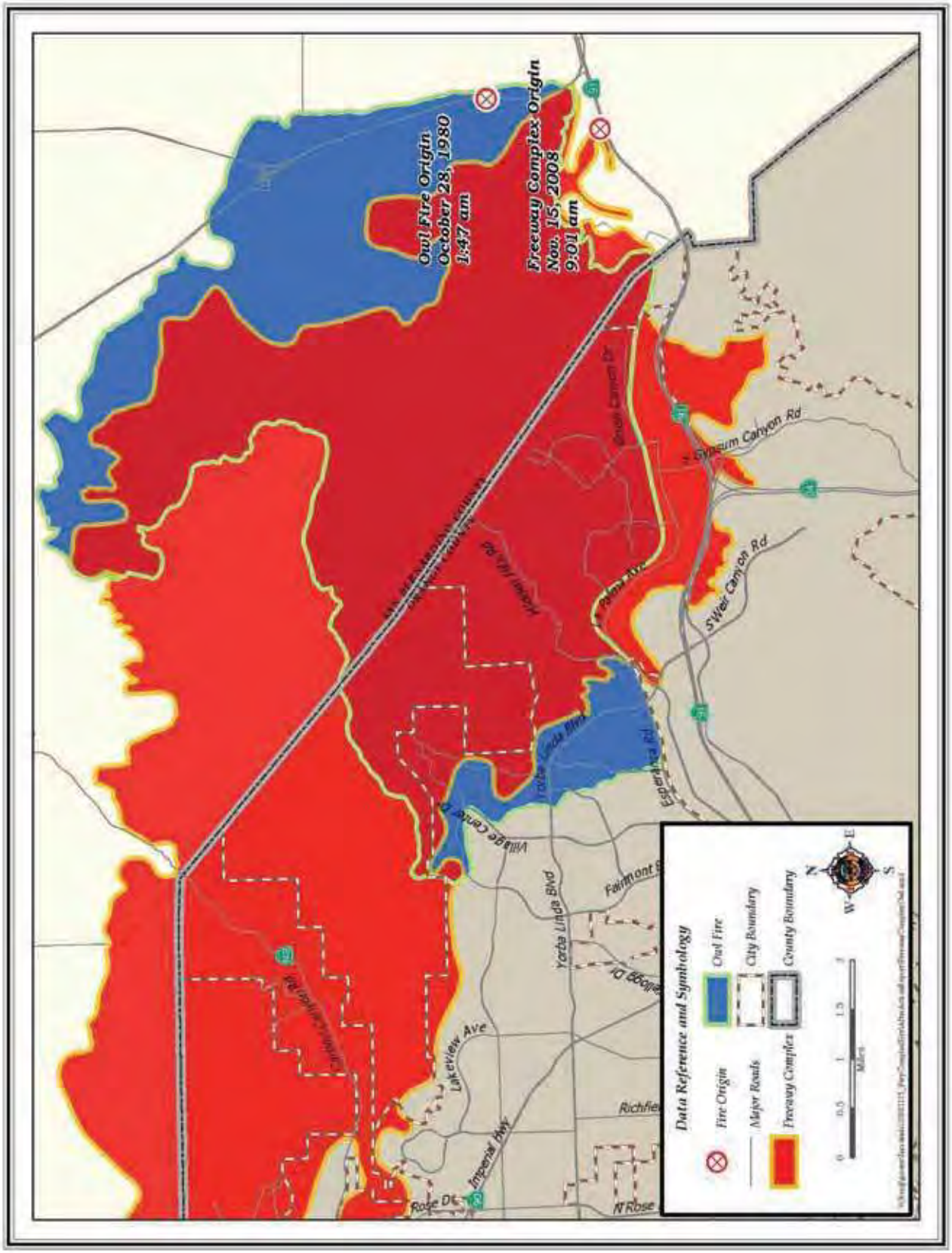
Table 1: Sixty-Year Major Fire History—Orange County

INCIDENT YEAR	INCIDENT NAME	ACRES CLAIMED	COUNTY(IES) INVOLVED
1948	Green River	53,079	Orange
1958	Steward	69,444	Orange/San Diego
1967	Paseo Grande	51,075	Orange/Riverside
1980	Indian	28,408	Orange/Riverside
1980	Owl	18,332	Orange/Riverside
1982	Gypsum	19,986	Orange
1993	Laguna	16,682	Orange
1993	Ortega	21,010	Orange
2007	Santiago	28,517	Orange
2008	Freeway	30,305	Orange/Riverside/San Bernardino/Los Angeles

Historical Information – Map 1
Freeway Complex Fire—12-Hour Perimeter 11-15-08 9:00 p.m.



Historical Information – Map 2
Owl Fire and Freeway Complex Fire—Fire Perimeter Overlay



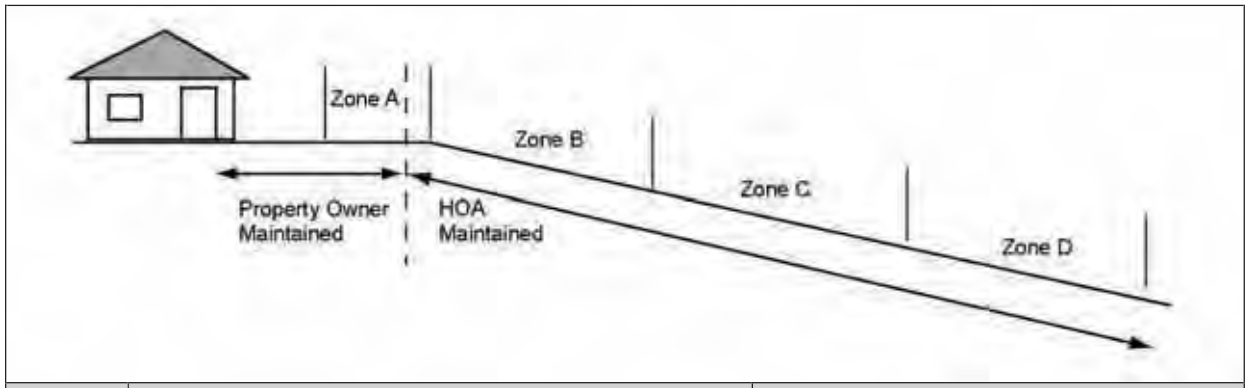
Fire Prevention

Land use planning and fire prevention play a key role in reducing the wildfire threat to communities in the wildland-urban interface (WUI). To adequately protect communities in WUI areas, a combination of brush clearance measures, ignition resistant construction of structures, and community preparedness and participation is necessary.

Brush Clearance

In 1979, Orange County adopted "fuel modification" provisions for new developments to protect homes in the WUI. The OCFA has enforced these requirements ever since. The provisions and requirements are also included in the local ordinances of the 22 cities protected by OCFA. Homes constructed in Yorba Linda since 1980 are most likely protected by a fuel modification program.

Table 2: OCFA Fuel Modification Program



ZONE	REQUIREMENTS	PURPOSE
A	• 20 feet wide and on level ground • Landscaped with approved plants • No combustible construction permitted	Limits direct flame impingement on structures and deflects radiant heat
B	• Minimum of 50 feet wide • Irrigated and landscaped with approved plants	Slows fire and reduces intensity
C/D*	• Minimum of 50 feet wide for each zone • All dead and dying materials are removed • Native vegetation thinned 50% in Zone C and 30% in Zone D	Slows fire and reduces intensity

*Some older areas may *only* have a Zone C.

The fuel modification program for OCFA communities requires the creation of a minimum of 170 feet of irrigated and non-irrigated zones and setbacks. Landscaping should include a selection of appropriate plant palettes for each zone. This is unlike State law that requires 100 feet of clearance—or to the property line if 100 feet is not available.

The OCFA fuel modification program also differs from State law by containing provisions to ensure adequate space is available to protect structures before building permits are issued. If 170

feet is not available, the landowner must either (1) obtain dedicated, legal off-site easements from the adjacent property owner or (2) mitigate the lack of defensible space with construction features that can withstand the anticipated radiant heat. Requirements for on-going maintenance are also included in the property deed and/or homeowner association by-laws.

Homes constructed in the WUI prior to 1980 are required to maintain "defensible space" between the home and the property line separating it from the WUI. Defensible space is less prescriptive than fuel modification and consists of thinning vegetation and ensuring tree branches are not within ten feet of chimneys.

Although fuel modification and defensible space provisions are typically applied at the perimeter of a development—the "edge" of the WUI, homes on or near interior slopes are also at risk. The vegetation in these areas should also be managed to reduce the risk of home loss from fires.

Arrow pointing to an overgrown interior slope prior to the Freeway Complex Fire

Arrow pointing to the same slope after the Freeway Complex Fire showing the tragic loss of homes along the ridge

The provisions for fuel modification and defensible space have evolved over the past 30 years. Although proven effective in protecting communities during wildfire incidents, the provisions are not without implementation challenges. The most significant of these is maintenance.

Maintenance of Brush Clearance

The OCFA does not have a formal WUI inspection program. As a result, if areas are not properly maintained and irrigated by the responsible landowner, overgrowth and/or plant death may occur. OCFA staff attempts to identify the worst cases and work with landowners to restore the land to an approved condition. In Yorba Linda, this is complicated since most fuel modification areas are on individual properties managed by a single homeowner. This is unlike most of Orange County where fuel modification zones are owned and maintained by a homeowners' association.

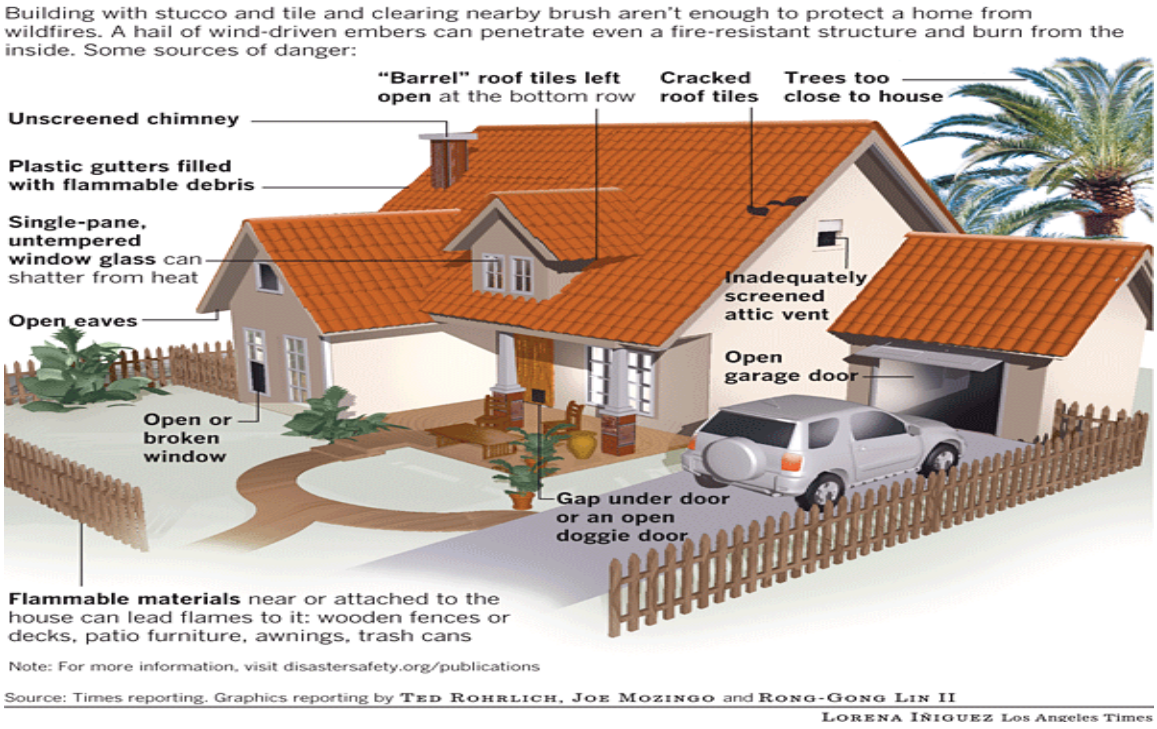
Despite the lack of a formal program, OCFA determined both the 2007 and 2008 fire seasons posed a significant enough risk to revise priorities and put efforts toward mitigation of this risk. Due to the severity of drought conditions and anticipated fire activity in 2008, the OCFA conducted inspections of all WUI properties in its jurisdiction. In Yorba Linda, the OCFA inspected the 589 parcels that are part of the defensible space program: homes/neighborhoods developed before 1979. The OCFA found only 16 out of compliance with minimum requirements

for defensible space. Additionally, 794 fuel modification parcels were inspected to ensure they were in "substantial compliance" with provisions of the post-1979 formal fuel modification program requirements. Of those inspected, 325 needed some type of corrective action. Prior to the start of the Freeway Fire, all but 25 had met the minimum requirements.

Ignition Resistant Construction

Properly established and maintained brush clearance is typically very effective in protecting homes from direct flame impingement and radiant heat. However, it does not provide additional protection from ember intrusion. Homes must be constructed to withstand ignition from embers that land on homes or enter through attics and other openings.

Illustration 1: How Fire-Resistant Homes Can Burn



The damaged or destroyed homes in Yorba Linda had many of the more traditional features that protect homes from flames and radiant heat. In some cases, these features are also effective in protecting homes from embers. However, in a wind driven fire storm, additional protection is necessary.

Following the disastrous 1993 Laguna Beach Fire, the Orange County Board of Supervisors commissioned a report to assess the damage and make recommendations to minimize the impact of future wildfires. The subsequent report, written in 1995, contained development requirements, including water supply, street design, brush clearance—current fuel modification provisions were found adequate, and construction features to "harden homes" from wildfire.

These requirements became effective January 1, 1996, as local amendments to the California building and fire codes that went into effect that date. The application of the requirements was limited to those County areas and cities that chose to adopt the Very High Fire Hazard Severity Zones mapped by CAL FIRE. Although Yorba Linda chose not to adopt the CAL FIRE maps, the

City Council did adopt and apply the local amendments in designated areas, referred to as Special Fire Protection Areas (SFPA).

Recently, the California legislature determined homes were not adequately protected since structure losses from wildfire continues to grow. Pursuant to that finding, the legislature charged the Office of the State Fire Marshal (OSFM) to take action to reduce the impact of future fires. The OSFM worked with stakeholders and University of California (UC) Berkley's fire lab to develop new "ignition resistant" building standards and material testing criteria. These standards—which dictate construction methods for roofs, eaves, vents, walls, doors, windows, and patio covers and decks—apply to all homes constructed in "Very High Fire Hazard Severity Zones" or locally designated wildland-urban interface areas, beginning in January 2008.

Homes must be constructed to withstand ignition from embers that land on homes or enter through attics and other openings.

Orange County has not received the final Very High Fire Hazard Severity Zone designation maps for adoption by the City of Yorba Linda. The County anticipates the maps will be released later in 2008. In the interim, the regulations are applicable in the SFPA adopted by the City in 1996. Many construction requirements of that 1996 ordinance are similar to the new statewide standards. Notably, improvements relative to application and protection of walls and vents were made to the new provisions. **Fire Prevention – Table 4** shows a comparison of OCFA's current requirements to the regulations adopted by the State Building Standards Commission in 2006, effective in 2008.

Access and Water for Firefighting

Brush clearance and "hardened"—ignition resistant—homes go far to increase the chances for a home's survival from a wind-driven WUI fire. However, intervention by firefighters is often necessary in saving a home determined to be defensible. Thus, emergency access and water availability play an integral part in aiding firefighters in these efforts.

OCFA's Planning and Development Services Section reviews all plans for new development to ensure adequate access and water supply is provided in accordance with the City-adopted Fire Code. Like all California jurisdictions, State law requires Yorba Linda to adopt the California Fire Code (CFC). The City adopted the 2007 edition in that same year.

Local amendments present in the CFC since 1996 require 28-foot wide roadways in high fire hazard areas, as well as a minimum of two ways into all communities with 150 or more homes.

The CFC also requires all structures to be within a specified distance to an "approved" water supply. An "approved" water supply can be defined by the adopting jurisdiction, or the jurisdiction may choose to adopt the water supply provisions found in Appendix B of the CFC. At OCFA's recommendation, Yorba Linda adopted the Appendix B provisions. One table specifies the water supply, known as "fire flow," based on the square footage of the structure and the construction type. Fire flow is comprised of the flow volume (gallons per minute [gpm]), residual pressure (pounds per square inch [psi]), and duration of flow (in hours). Another table indicates the number of fire hydrants that must supply this fire flow and their spacing relative to protected structures. (See the **OCFA Fire Master Plans for Commercial and Residential Development** at http://www.ocfa.org/_uploads/pdf/guideb09.pdf for additional CFC details.)

Using these tables, a typical street with homes not exceeding 3,600 square feet would be protected by hydrants that deliver 1,500 gpm each for a minimum of 2 hours at 20 psi residual pressure. For homes between 3,600 and 4,800 square feet, hydrants must deliver 1,750 gpm for 2 hours at 20 psi residual pressure. Locally adopted amendments require hydrant spacing of 300 feet along the street.

Getting water for structure protection

During the Freeway Fire, the demand for water by the structure protection engines exceeded the available supply. Areas of Yorba Linda, such as Hidden Hills, had loss of water pressure during which firefighters had to shuttle water from other areas. As defensible space and ignition construction have been studied over the years, so to have been the water needs in the WUI. New standards have been drafted and are available for local adoption.

Fire "Losses" and "Saves"

Although 117 homes were destroyed and another 77 were damaged—as well as 27 out-buildings and 22 vehicles, **Table 3** below shows the losses were a small percentage of the structures and vehicles threatened within the fire perimeter/evacuation zone. This was due to a combination of brush clearance, home construction, and aggressive firefighting.

Table 3: Fire Losses and Structures Saved Within the City of Yorba Linda

Category	Residential		Commercial/Industrial		Other	
	Total No.	Percentage of Total (%)	Total No.	Percentage of Total (%)	Vehicles	Out-Buildings
Threatened	9,525	100.00	126	100.00	N/A	N/A
Destroyed	117	1.22	0	0.00	45	10
Damaged	77	.80	2	1.59	22	27
Saved*	9,331	97.96	124	98.00	NA	NA
Dollar Loss	Structures: **$84,361,455** Contents: **$39,989,500** Total**: $124,350,955**					

*Does not include damaged structures considered as partial "saves." *Based on OCFA Fire Incident Reporting Data*.

An assessment of homes destroyed or damaged indicates they were victims of ember intrusion rather than direct flame impingement—suggesting brush clearance was adequate. The exceptions were instances where embers ignited one home and then burned the homes on either side in "cluster burns," which continued until firefighters stopped the spread.

Although the burned homes were somewhat "hardened" to embers, the construction was not adequate for the conditions presented with this fire. Embers entered homes—mainly through attics—as they penetrated roofs through the ends of barrel-shaped clay tiles, loose flashing at roof/wall interfaces, grooves at roof valleys, and combustible rain gutters—particularly those containing plant debris. Embers also entered attics through unprotected eaves and attic vents.

Several homes were lost to embers gathering under unprotected—exposed wood underside—balconies or wooden decks and patio covers. Once these ignited, the flames burned through walls and entered homes.

Notably, all the homes damaged or destroyed were constructed prior to 1996. Thus, they were not protected by the CFC provisions required by the City's ordinance for WUI areas. However, the homes in Casino Ridge met the requirements of the 1996 ordinance. They were also protected by a relatively new fuel modification program. Firefighters stated they were able to focus resources and efforts on other areas of the city as this community was developed to withstand a wildfire with little firefighting intervention.

Fire front approaching the Casino Ridge community

Challenges

The application of (1) ignition resistant construction requirements and (2) brush maintenance requirements are both critical to the survivability of homes subjected to intense heat and ember intrusion—even those located hundreds of feet from the interface. Although proven effective in protecting communities during wildfire incidents, these requirements are not without implementation challenges. The most significant are:

Maintenance of Fuel Modifications

Fuel modification requirements in communities developed after 1980 and brush clearance measures in those developed prior to 1980 must be maintained to be effective. Currently, OCFA does not have a formal inspection and enforcement program to ensure the over 14,000 parcels and lots are adequately maintained. As a result, areas can become overgrown and, in some instances, irrigation can be lacking due to cost or poor maintenance of water lines. OCFA staff attempts to identify the worst cases and work with landowners to restore the land to an approved condition. Due to the lack of penalties for failure to comply, sometimes several parcels/lots remain out of compliance for several years. This presents a hazard to community homes and adjoining lands.

> The most significant challenge is protecting the areas established prior to current fuel modification and construction requirements.

Application of Construction Requirements

Applying ignition resistant construction requirements is critical to the survivability of homes subjected to ember intrusion both at the interface and within a few hundred feet of the interface. Maps depicting impact areas must be locally adopted. This process is often controversial, since the development community typically expresses concern over rising costs, real estate disclosure, and insurance premiums. As a result, areas needing protection—based on topography, fuels, weather, and fire history—are often left unmapped due to local action/inaction.

Existing Communities

The most significant challenge is protecting the areas established prior to current fuel modification and construction requirements. The pre-1980 established areas lack adequate brush clearance, and

some have home lots that are too small to create adequate defensible space on the property. Homeowners often cannot obtain permission for off-site clearance from neighbors or government entities. Environmental restrictions also hinder the ability to create defensible space. State and Federal agencies have conflicting missions with the fire service relative to control of native vegetation, although this was not the case during the 2008 inspection cycle.

Casino Ridge area of Yorba Linda with current fuel modifications and construction requirements

Fire Prevention – Table 4
Comparison of Current OCFA Requirements and New State Regulations

California Building Code Requirements for "Hardening Homes" *Indicates more restrictive requirement if not equivalent.	
Former Yorba Linda Ordinance (January 1996–January 2008)	**New State Code (July 2008)**
Applies to structures located in Very High Fire Hazard Severity Zones and Special Fire Protection Areas that are within 100 feet of fuel modification zones. Most provisions apply only to structures having an exposed side. Exposed side is defined as an exterior wall of a structure within 100 feet of the fuel modification zone.	Applies to all structures located in Very High Fire Hazard Severity Zones and locally designated Wildland Fire Areas. All exterior sides—not just the exposed sides—shall meet the requirements of Chapter 7A.*
Exterior Wall: Exposed side of exterior wall shall be of non-combustible construction or 1-hour fire-resistive construction for the exterior portion.	**Exterior Wall:** Shall be of approved non-combustible or ignition resistant material or heavy timber.
Glazed Openings: Shall be multi-glazed with at least two panes.	**Glazed Openings:** Shall be tempered glass or glass block or have a fire resistive rating of not less than 20 minutes.*
Doors: Shall be minimum 1 3/8 inches thick solid core or metal non-combustible.	**Doors:** Shall be non-combustible or solid core or 20-minutes rated.
Attic Vents: Not allowed on exposed sides. Other sides must be protected by metal louvers and 1/4-inch mesh corrosion-resistant metal screen. Vents shall not exceed 144 sq. inch per opening.*	**Attic Vents**: Shall be covered with 1/4-inch corrosion-resistant metal screen; no size limit.
Eave or Cornice Vents: Not allowed on exposed sides.	**Eave or Cornice Vents**: Prohibited unless they can resist the intrusion of flame and burning embers into the attic.
Roof Valley: Flashing shall not be less than 26 gauge galvanized sheet installed over a 36-inch under layment consisting of one layer of No. 72 ASTM cap sheet running the full length of valley.	**Roof Valley**: Flashing shall not be less than 26 gauge galvanized sheet installed over a 36-inch under layment consisting of one layer of No. 72 ASTM cap sheet running the full length of valley.
Roof Gutters: Shall be provided with means to prevent accumulation of leaves and debris.	**Roof Gutters**: Shall be provided with means to prevent accumulation of leaves and debris.
Roof Assembly: New construction and reconstruction shall be fire retardant Class A roof assembly.	**Roof Assembly**: New construction and reconstruction shall be fire retardant Class A roof assembly.
Skylights: Shall have a non-combustible frame with dual glazing of heat strengthened or fully tempered glass or 3-rated assembly.*	**Skylights**: No requirements
Roof Covering: Where roof profile allows a space between roof covering and roof deck, the space shall be fire stopped with approved material or have one layer of No. 72 ASTM cap sheet installed over the combustible decking.	**Roof Covering**: Where roof profile allows a space between roof covering and roof deck the space shall be fire stopped with approved material or have one layer of No. 72 ASTM cap sheet installed over the combustible decking.
Decking: Those on exposed side to be 1-hour rated, non-combustible or heavy timber.	**Decking:** Specific requirement for decking surface shall be of ignition resistant material, heavy timber, or non-combustible material.
INTENTIONALLY LEFT BLANK	Ignition resistant material definition provided: Tested according to ASTM 84 for 30 minutes.
INTENTIONALLY LEFT BLANK	Flame spread less than 25 with evidence of no progressive combustion.

Advance Planning

Although a Red Flag Warning was not in effect for Orange County on November 15, 2008, it was in other Southern California counties. Due to these warnings, CAL FIRE requested a special staffing pattern be implemented across the region. The OCFA asked CAL FIRE to approve the staffing enhancements for implementation on November 14, 2008. The following staffing pattern was approved by CAL FIRE and in place the morning of November 15:

- One Type 3 strike team with four-person staffing—five engines and a Chief Officer
- The staffing of a second helicopter
- The increased staffing of five engine companies in the wildland interface areas—from three firefighters each to four—referred to as the "Grey Book" stations
- An additional fire dispatcher at the Emergency Command Center

A conference call with CAL FIRE, USFS, and multiple county fire agencies was conducted at 9:00 a.m., November 15. OCFA's Assistant Chief Kramer and Division Chief Fleming, the OCFA Duty Officer, attended the meeting. A briefing on the status of the Tea and Sayre fires was provided, as well as current weather for Orange and other counties. The forecast for Orange County did not include a Fire Weather Watch or Red Flag Warning. In fact, the predicted winds for the local area were supposed to be relatively light—diminishing by 2:00 p.m. that day. OCFA routinely monitors weather forecasts and takes appropriate action. When extreme winds and red-flag conditions do exist, the OCFA implements procedures established by Operations SOP 209.13, *Extreme Weather Plan Winds/Red Flag & Rain/Floods*.

As a cooperating member of the California Fire and Rescue Emergency Mutual Aid Plan, the OCFA committed three strike teams of engines out-of-county prior to the start of the Freeway Fire. The mutual aid system is founded on the principle of neighbor helping neighbor. When an emergency overwhelms an agency's ability to manage it on its own, other fire departments voluntarily provide resources, if possible. The system allows for an orderly escalation and distribution of resources.

Additionally, neighboring Orange County MetroNet fire agencies had committed four strike teams of engines to the Tea and Sayre fires, including an OES engine strike team. A total of 35 fire engines and 7 strike team leaders from the OCFA and other County fire agencies were assigned to fires outside the County at the start of the Freeway Fire.

As OCFA resources are committed on a mutual aid response, personnel are recalled to staff relief engines to ensure adequate station coverage. All OCFA stations vacated due to the deployment of units outside the County were covered either through the use of backfill (ten engines) or by the on-coming shift personnel (five engines). **Table 5** shows the commitment of strike teams on November 14, 2008, by the OCFA and MetroNet Out-of-County Strike Teams.

Table 5: OCFA and MetroNet Out-of-County Strike Teams
November 14, 2008

Fire	Strike Team	Day/Time Committed
Tea	ORC Strike Team 9328C and XOR Strike Team 1421A and 1422A	November 13, 2008
Tea	OES Strike Team 1830C, including one OCFA engine (OES-E303), as part of OES Type 1 strike team (1830C)	November 13, 2008, 11:47 p.m.
Tea	ORC Strike Team 1400A	November 14, 2008, 3:55 a.m.
Sayre	ORC Strike Team 1402A	November 15, 2008, 12:40 a.m.
Sayre	XOR Strike Team 1423A	November 15, 2008

Pre-planning for emergency events is routine for the OCFA. Operational plans exist or are under development for many high-risk areas. A few weeks prior to the Freeway Complex Fire, a tabletop exercise was conducted to bring stakeholder agencies (OCFA, LACO, Corona Fire Department, CAL FIRE RRU/BDU, San Bernardino CFD, Chino Valley IFD, Anaheim Fire Department, Orange Fire Department, USFS, and South Operations) together. The goal was to develop and review operational plans for the wildland-urban interface area along the 91 Freeway corridor. The exercise provided chief officers the opportunity to consider a variety of events to better understand fire progression and fire spread potential. Decision trigger points and a course of action were also developed for each event. This tabletop exercise proved to be highly beneficial; some of the first responding chief officers to the Freeway Fire had been exercise participants.

One trigger point and its course of action was demonstrated through by OCFA Battalion 2 while en-route to the fire. Based upon the radio traffic from the initial attack crews, Battalion 2 ordered two strike teams to report to OCFA Station 53 in east Yorba Linda. This was done to get ahead of the fire and place additional engines into Yorba Linda, which was in the direct path of the rapidly advancing fire from Corona.

When the Department Operation Center opened at 11:30 a.m., the call back of off-duty personnel was initiated to get all available relief and surge apparatus in-service.

As the request for resources at the fire increased, the OCFA needed to begin staffing uncovered fire stations, relief, and surge apparatus. When the Department Operation Center (DOC) opened at 11:30 a.m., staff was tasked to initiate the call back of off-duty personnel and to get all available relief and surge apparatus in-service as soon as possible. Battalion Manpower Coordinators were organized to handle the hundreds of telephone calls necessary to meet this goal. The majority of necessary staffing was achieved within eight hours. By 10:00 p.m. November 15, all critical staffing needs had been met.

On Sunday, November 16—with continued Santa Ana winds along with multiple fires burning in Southern California and the potential for area resource drawdown—the Duty Officer ordered all suppression personnel be held on duty. This action increased manpower available to staff emergency apparatus from normal daily staffing of 253 personnel to 462 suppression personnel. By noon on Sunday, all personnel who were not required were released.

In addition to the extra engines that were staffed by full-time firefighters, OCFA reserve firefighters staffed ten patrols, three squads, four water tenders, one helicopter support unit, and five engines. These units were assigned to stand-alone Reserve Stations 3, 11, 14, and 16 and combination Station 23. The staffing level in the Emergency Command Center (ECC) was augmented with two additional dispatchers and one additional dispatch supervisor. One Division Chief and two Staff Captains were recalled to begin staffing the DOC.

The advance planning accomplished early Friday, November 14, prior to the Freeway Fire and the following staffing actions proved to be key in OCFA's ability to engage the fire. As the fire rapidly spread into neighborhoods in east Yorba Linda and Anaheim Hills, the OCFA was still able to sustain response coverage for other portions of its service area.

Emergency crews from throughout the state respond to the request for mutual aid

Incident Narrative

Summary

The following is a chronological perspective of the firefighting efforts that took place in the cities of Corona, Yorba Linda, Anaheim, Brea, Chino Hills, and Diamond Bar on November 15 through 19, 2008. The event is now known as the Freeway Complex Fire. This report is as accurate and complete as possible. Since the specifics of this incident are complex and it occurred so rapidly, the actions of every fire company, the events that took place in every community, or the circumstances that surrounded every loss cannot be described in detail. Personnel from all ranks and assignments were interviewed, hundreds of documents were reviewed, and several hundred radio transmissions were listened to in the development of this narrative.

Though it started as a wildland urban interface fire, the Freeway Complex Fire quickly became an urban conflagration. Destroyed structures included 203 residences, 2 commercial structures (one in Yorba Linda and one in Brea), and 17 out-buildings. Damaged structures included 117 residences, 6 commercial structures, and 36 out-buildings. In total, 30,305 acres of watershed were consumed across six cities and four counties. Suppression costs exceeded $16.1 million, and property loss has been estimated at nearly $150 million.

Preplanning

The Freeway Complex Fire occurred in a designated mutual threat zone. The original vegetation fire in this jurisdictionally contiguous area received initial attack responses from multiple agencies, including the OCFA (ORC), Corona Fire (COR), Anaheim Fire (ANA), CAL FIRE, and the United States Forest Service (USFS). The high degree of coordination behind this emergency response was not accidental. Three weeks prior to the incident, a tabletop exercise scenario was conducted with these and other area responders. Predicted fire spread, values at risk, operational trigger points, communications, and other related issues were discussed and modeled. This tabletop exercise was greatly responsible for some of the quick decision making behind early resource ordering, including additional engine strike teams and aircraft.

The Freeway Complex Fire destroyed or damaged approximately 320 residences, 8 commercial structures, and 53 out-buildings.

Based upon the predicted weather patterns, which included strong Santa Ana winds and low humidity for the weekend, the OCFA had placed a special staffing pattern into effect on Friday, November 14, 2008. To prepare for the weather pattern, the OCFA had one Type 3 engine strike team (ORU 9329C), consisting of five wildland engines and a Chief Officer (Hawkins), staged at the OCFA Regional Fire Operations and Training Center (RFOTC). In addition to ORC Helicopter 41 (HC41) that was already on duty, ORC Helicopter 241 (HC241) was staffed with a pilot and crew chief. Also, five fire engines located at stations near wildland areas were up-staffed from three firefighters to four. An additional dispatcher was also added to the Emergency Command Center (ECC).

A day earlier, on November 13, ten engines from the OCFA (ORC Strike Team 1400A and ORU Strike Team 9328C) were sent to the Tea Fire in Santa Barbara County. In addition, the Office of

Emergency Services (OES) engine strike team based in Orange County was activated. It was sent to the Tea Fire along with three Type 1 engine strike teams from non-OCFA fire departments in Orange County. At 12:40 a.m. on November 15, five additional OCFA engines (ORC Strike Team 1402A) were sent to the Sayre Fire in Los Angeles County. Prior to the start of the Freeway Fire, all vacancies created within OCFA fire stations by these deployments were filled.

Day 1 - November 15, 2008

At 9:01 a.m. on November 15, the Corona Fire Department (COR) received reports of a vegetation fire on the north side of the 91 Freeway, east of Green River Drive. COR Dispatch sent units, including a Battalion Chief (COR B3 [Samuels]) and three engines (COR BR1, BR3, and E2).

At 9:03 a.m., the OCFA ECC received the first of many 911 calls reporting the same fire along the north side of the westbound 91 Freeway east of Green River Drive. The first caller reported the fire to be approximately one-half acre but building rapidly. Subsequent calls gave varying descriptions and locations, indicating to the dispatchers the fire was moving rapidly west along the freeway toward the Green River Golf Course. **Incident Narrative – Map 3** shows the point of origin of the Freeway Complex Fire

The ECC entered a *High Watershed Dispatch* into the Computer Aided Dispatch (CAD) system at 9:07 a.m., sending units to the fire's reported location. This initial dispatch was comprised of the following:

- One Division Chief (ORC D5 [Fleming])
- Three Battalion Chiefs (ORC B2 [Reeder], ORC B3 [Aubrey], and ANA B1 [Pilar])
- Seven, single increment engines (ORC E10, E15, E53, and E832 and ANA E8, E9, and E10)
- One ORU Strike Team 9329C (ORC B27 [Hawkins]; ORC E247, E250, E307, E318, and E339)
- Two hand crews (ORC Crew 1 and Reserve Crew 18)
- Three helicopters (ORC HC41 and HC241; OCSD Duke)
- Two patrols (ORC P10 and P32)
- One fire bulldozer (ORC Dozer 2)
- Three water tenders (ORC W7, W10, and W16)

In **Table 6**, Freemont Canyon RAWS indicated responding personnel had to contend with mild temperatures of 75°F, low relative humidity of 8 percent, and strong east/northeast winds sustained at 43 mph, gusting up to 61 mph. Winds were higher than expected based on the recent National Weather Service (NWS) predictions and morning briefing on statewide fire conditions.

Freemont Canyon RAWS

Table 6: Freemont Canyon RAWS—Santa Ana Mountains

Time	Temperature (°F)	Wind Speed/Gust Speed (mph)	Relative Humidity (%)
9 a.m.	75	43/61	8
3 p.m.	80	25 /45	7

ORC Battalion 2 (Reeder) was on the initial dispatch and, while responding to the fire, was monitoring the radio traffic of the COR units already on the scene. At 9:19 a.m., Battalion Chief Reeder relayed to the ECC that COR units were on scene and reporting an immediate threat to structures. Battalion Chief Reeder requested two Type 1 engine strike teams—ten engines and two Chief Officers—stage at OCFA Station 53 in Yorba Linda; this anticipated the fire's possible move into Orange County. He also requested fixed wing aircraft—air tankers—be dispatched.

The first order for air tankers was placed at 9:19 a.m. They were dispatched at 9:35 a.m. and arrived over the fire at 10:10 a.m.

The order for aircraft was placed by the OCFA ECC to the CAL FIRE Perris ECC; however, the order was not immediately filled. Shortly before 9:12 a.m., COR Dispatch contacted CAL FIRE Perris ECC and discussed the need for ground resources and a helicopter. Air tankers were not ordered by COR Battalion 3 (Samuels) when the initial equipment request was made. When Chief Reeder's order was delivered to CAL FIRE Perris ECC, there was some confusion regarding the actual need for fixed wing aircraft. More calls between COR Dispatch and CAL FIRE Perris ECC resulted in confirmation for the air tanker request only after COR E5 was reported to be surrounded by fire. The air tankers were dispatched at 9:35 a.m. out of San Bernardino Airport. The first air tanker arrived at 10:10 a.m.

Palm trees show how strong the wind blew during the fire

A minute after Battalion Chief Reeder made his requests, Anaheim Fire Engine 10 (ANA E10) reported COR was on scene. Approximately one acre of grass was burning along the north side of the 91 Freeway. At 9:21 a.m., two strike teams from OCFA were dispatched to stage at Fire Station 53. ORC Strike Team 1403A included ORC Battalion 44 (Cruz) and ORC E8, E23, E34, E35, and E53. ORC Strike Team 1404A included ORC Battalion 7 (Whitaker) and ORC E27, E31, E38, E55, and E826. While en-route to Station 53, the strike team leaders heard the requests for immediate need resources and diverted to the City of Corona with the hope to help stop the fire there. This decision left the original request unfilled—to have two strike teams stage at ORC Station 53.

COR Battalion 3 (Samuels) arrived on scene about the same time and assumed the Freeway Fire Incident Command. This information was provided to the ECC at 9:23 a.m. and was relayed to responding units. ANA Battalion 1 (Pillar) arrived a few minutes later and was assigned Structure Protection Group (SPG) responsibility. Around 9:30 a.m., Pillar placed an order to the Incident Commander for three additional engine strike teams—15 engines.

Firefighting resources arriving on scene experienced Santa Ana winds blowing between 40 to 60 mph. Homes located on Penny Royal Drive and Feather River Road in Corona were identified by ORC Battalion 2 (Reeder) as immediately threatened. Units on scene attempted to take tactical positions to best facilitate structure protection. Incident Commander Samuels faced a rapidly escalating wind-driven wildland fire that was extending into a nearby residential neighborhood. With limited resources on scene, he directed a flanking attack on the wildland fire. With assistance coming from CAL FIRE – Riverside County, the United States Forest Service (USFS), and Orange County, the opportunity for control was hopeful.

Approximately 9:27 a.m., a tragedy almost occurred when COR E5 became surrounded by fire and experienced a burn-over event. When the Freeway Fire began, COR E5 was on scene of a medical aid in a neighborhood less than a mile away. Once COR E5 cleared the medical call, it contacted COR Dispatch and was assigned to the fire. COR E5 chose to access the fire from a service road between the fire origin and the threatened homes. This decision put COR E5 in a dangerous position between the main fire and the threatened homes, with unburned vegetation between the crew and the fast moving head. Within minutes, the COR E5 Captain radioed they were being overrun by fire and were unable to escape. COR BR1, supported by multiple water drops from ORC HC41 and HC241, rescued the trapped firefighters and averted a tragedy. This event resulted in minor burns and smoke inhalation to two firefighters assigned to COR E5. **Incident Narrative – Map 4** is a map showing the near miss entrapment.

By 9:30 a.m., CAL FIRE Battalion Chief Deyo arrived on scene and briefly spoke with the Incident Commander. He also met with CAL FIRE Battalion Chief McBride, who had been sent to the fire as the CAL FIRE Agency Representative. Chief Deyo was directed to assume the role of Operations Section Chief for the Freeway Fire. Subsequently, he conducted a reconnaissance of the fire and established control objectives.

During Chief Deyo's reconnaissance, radio communication problems between agencies on two different radio systems became critical. CAL FIRE was operating on the statewide VHF frequencies, while COR, Anaheim Fire, and OCFA units were operating on their 800 MHz radios. Operating on a single compatible radio system is the safest and most preferred communication methodology. ANA Battalion 1 (Pilar) provided Chief Deyo with an 800 MHz portable radio, enabling him to communicate with other command-level personnel. Later that day, Orange County Communications (OCC) was asked to initiate a patch between the VHF and the 800 MHz systems to establish one common command frequency.

Aerial view of the fire's path along the Green River Golf Course and homes bordering the Santa Ana River riparian.

Around 9:30 a.m., the OCFA ECC became the Central Ordering Point for the fire. This was done to ensure all resource orders for personnel, supplies, and equipment were properly placed and tracked. The effectiveness of the central ordering point is crucial to the success of the fire control efforts. As the need grew, resource orders were entered into the Regional Ordering Support System (ROSS), which allowed access to firefighting and support resources from multiple regions in Southern California.

Shortly after assuming the Central Ordering Point responsibility, an order for additional aircraft was placed to South OPS. Orders for engine strike teams, hand crews, and bulldozers would soon follow. A recent change in the resource ordering rules, which was a result of lessons learned in the 2007 fire siege, allowed for 5 engine strike teams—25 engines—to be directly requested from neighboring mutual aid regions. These 25 engines from the CAL FIRE – Riverside County immediately responded without processing delays. Around 10:30 a.m., the first of these strike teams arrived at the fire. The others arrived around noon.

The first ORC fire engine arrived in Corona and moved into the fire area at 9:23 a.m. The fire was uncontrolled and unpredictable. In response, ORC Battalion 3 (Aubrey) directed ORC E27—assigned to ORC Strike Team 1404A—to take independent action upon arrival. Indicating the fire was moving rapidly, the threat to structures was such that individual company officers had to rely on their situation to dictate tactics and operational priorities. This is a departure from desired and normal command and control strategy, but it necessary when confronted with a wide and rapidly progressing fire front. For the next 30 minutes, resources responding into Corona were directed into the threatened residential areas between the fire origin and the Green River Golf Course.

OCFA helicopter makes a water drop over fire

The fire was bordered by a golf course, an active river, and a multi-lane freeway. All set up the best potential containment opportunity for the Freeway Fire. Unfortunately, at 10:00 a.m., a spot fire was reported west of the Green River Golf Course. Hand crews and bulldozers were staged nearby and quickly encircled the spot, containing it to a small area. At 10:08 a.m., while returning to the golf course to pick up a load of water, ORC HC241 noticed another spot fire west of the golf course, approximately 1.1 miles from the nearest burning structure. In less time than it took for HC241 to snorkel a load of water from the golf course pond—about 45 seconds, this spot fire, coupled with the topography and the wind, headed at high speed for the City of Yorba Linda. HC241 attempted to slow the fire by dropping its load of water, but the impact was negligible. When interviewed, a helicopter crew member described the water drop as "a thimble of water in a firestorm." **Incident Narrative – Maps 5 and 6** are maps showing the multiple spot fires caused by erratic fire behavior.

ORC Division 5 (Fleming) arrived on the scene at 10:05 a.m. and proceeded to establish a unified command with Chief Officers from COR, CAL FIRE, Anaheim Fire, and Chino Valley Independent Fire District. The location of this initial command post, established at 10:12 a.m., was at the Jack in the Box parking lot at Crest Ridge and Green River Drive, Corona.

The BNSF railcars left on tracks were not threatened by fire and did not contain any hazardous cargo.

While firefighters were working near the railroad right-of-way, Burlington Northern Santa Fe (BNSF) Railroad was requested to stop all rail traffic through the fire area as a safety precaution. The outcome of the request inadvertently resulted in several railcars being abandoned on the tracks, prompting concerns from citizens and firefighters that some railcars may have been carrying hazardous materials. OCFA Safety Officer Hutnyan was sent to the area and tasked to examine the situation. He quickly determined the railcars were not directly threatened by fire and, in fact, did not have hazardous cargo. The railcars were eventually removed from the area by BNSF employees.

At 10:10 a.m., Air Attack and the first fixed wing air tanker were reported to be flying over the fire. This began the coordinated air assault to protect homes along the wildland interface. It also began establishing perimeter control lines to help direct the fire's spread away from other inhabited areas. Air assets would prove to be critical in establishing these control lines and protecting firefighters and threatened structures. In total, 17 firefighting helicopters flew approximately 108 hours and dropped in excess of 278,357 gallons of water. Twelve fixed wing air tankers and four lead airplanes fueled and re-supplied out of Hemet Ryan and San Bernardino Air Bases, flew approximately 110 hours and dropped 308,435 gallons of retardant on the fire. This figure includes the work of Tanker 910 (DC-10 aircraft). It made ten drops—eight on November 15 and two on November 16—in the Yorba Linda/Chino Hills area for a total of 109,445 gallons of retardant.

At 10:20 a.m., ORC Battalion 2 (Reeder) reported the fire would reach the city limits of Yorba Linda within 30 minutes. Recognizing the threat to Yorba Linda, Battalion Chief Reeder placed an immediate need request for four more Type 1 engine strike teams—20 engines and 4 Chief Officers—to stage at OCFA Station 53 in the City of Yorba Linda. He also requested the Brea Police Department and the City of Yorba Linda be notified of the impending arrival of the fire. They were to start evacuations. Battalion Chief Reeder predicted the fire would impact homes located in the Brush Canyon community within map page 741 grids E4, F4, and G5 (Thomas Brothers 2009 Edition). The ECC made contact with the Brea Police Department and City staff shortly thereafter.

Although a collaborative decision, the responsibility for evacuation is statutorily a law enforcement function. This allows fire departments to focus on control efforts. The number of citizens who evacuated at any one time in any single area of the City is unknown; however, nearly 9,000 dwellings were impacted in Yorba Linda by the evacuation order as a result of the Freeway Complex Fire. At the height of the firefight, an estimated 24,000 citizens of Yorba Linda were evacuated or kept from returning to their homes due to safety concerns.

Evacuations Underway

At the onset of the evacuation, traffic gridlocked in some areas as emergency apparatus tried to enter the neighborhoods while residents tried to exit. The Brea Police Department and other assisting law

enforcement agencies took control of the traffic flow, which helped firefighters gain access to threatened homes. In any firefighting effort, rescue is the first priority. However, in this case, resident self-evacuation was in effect assuring rescue from an active fire front would be minimized. Notably, with such an expansive and escalating evacuation boundary, the residents stayed calm and followed evacuation directions. Throughout the morning, reports of orderly—but slow—evacuations were relayed to the ECC.

ORC Assistant Chief 2 (Kramer) responded to the fire at 10:23 a.m. Assistant Chief Kramer assumed the role of ORC Incident Commander as part of the unified command. The responsibility of the Operation Section Chief position for the Freeway Complex Fire was assigned to ORC Battalion 2 (Reeder). To provide strong leadership and incident management, the fire area was divided into manageable geographical and functional areas of responsibility. The highest level of these responsibilities were branches, of which two were initially established for the Freeway Complex Fire. Branch I was the Yorba Linda Branch assigned to ORC Division 5 (Fleming) and included all structure threats in Yorba Linda. Within the Branch, smaller geographical divisions and functional groups were established. Several Structure Protection Groups were tasked first to protect those homes at the greatest threat of burning and second, wherever possible, to extinguish already established fires in structures, vehicles, and vegetation. **Incident Narrative – Map 7** shows a map of the Freeway Complex Fire Branch and Division boundaries.

Branch II was assigned to CAL FIRE Battalion Chief Deyo, who initially had been assigned Operations Section Chief when the fire was in Corona. Branch II included the wildfire control efforts that eventually burned through the Chino Hills State Park. This front raced into the City of Chino Hills through Tonner and Carbon Canyons to the Los Angeles County line—burning into the city limits of Diamond Bar. Divisions Y and Z were established within Branch II. The primary objective focused on establishing perimeter control to minimize the spread of the fire. Battalion Chief Deyo also faced the challenge of ensuring firefighting efforts were continuing in Corona, while trying to release as many resources back to Orange County.

With the fire burning out of Aliso Canyon and backing into Brush Canyon, it now headed toward Big Horn Mountain Way, Blue Ridge Drive, Merryweather Circle, Evening Breeze Drive, Pine Meadow Way, Camino de Bryant, Kodiak Mountain Drive, and Brush Canyon Drive. Any available fire units were moved to these and other threatened neighborhoods. The Operation Section Chief (Reeder) placed a call to the ECC ordering 20 engine strike teams—100 engines—of various configurations. Orange City Division Chief Eichoff assumed the Yorba Linda Structure Protection Group from ORC Battalion 3 (Aubrey), who was assigned to assist Branch I. Division Chief Eichoff recognized the community of Hidden Hills was going to be overrun by the fire and instructed unassigned units to move there.

With the fire advancing into the City of Yorba Linda, the Operations Section Chief ordered an additional 20 engine strike teams—100 engines and 20 Chief Officers.

At 10:43 a.m., a 911 caller reported a second fire to the ECC. This one was burning near the Olinda Alpha Landfill, located off Valencia Avenue near Carbon Canyon. The Brea Fire Department (BRE) confirmed they were responding to a fire reported near the landfill. The OCFA sent a modified high watershed dispatch response, including:

- Two Battalion Chiefs (ORC B23 [Phillips] and B8 [Wells])

- Four engines (ORC E47, E62, E223, and E817)
- One medic unit (ORC M26)
- Two patrols (ORC P23 and P26)

The same wind that was driving the Freeway Fire into Yorba Linda was now pushing the new fire through the east through the City of Brea toward Diamond Bar and the 57 Freeway. Brea Fire units arrived on scene at 10:49 a.m. and reported a one-acre fire moving quickly. ORC Battalion 8 (Wells) arrived on scene at 10:55 a.m. He reported the fire in Brea was two to three acres adjacent to the Olinda Alpha Landfill. He also reported there was a direct threat to structures and ordered three Type 1 engine strike teams—15 engines—and air support. Battalion Chief Wells assumed the Landfill Fire Incident Command and initiated communications with BRE units.

Within minutes, Battalion Chief Wells made contact with BRE Battalion Chief Montoya. A unified command, along with three structure protection groups, was established for the Landfill Fire. Additionally, units were assigned to begin perimeter control efforts. The highest concern was the Landfill Fire would eventually cross the 57 Freeway and destroy the homes west of it. The command post was subsequently moved to Brea Fire Station 3 at the intersection of Lambert Road and Kraemer Boulevard.

About 10:50 a.m., ORC Wildland 1 (Ewan) arrived at the Freeway Fire. To gauge the direction and speed of the wildland fire, he attempted to flank it and get far enough in front to predict its path. Ewan later reported he was unable to drive fast enough to keep up with the fire spread, which at times was estimated to be over 1,000 acres per hour. Motorists driving west on the 91 Freeway reported that at speeds of 50 mph, they were unable to stay ahead of the fire's main body.

The first two strike teams into Yorba Linda, XOR ST1424A (Espinoza) and XOR ST1425A (Hirsch), arrived about 10:56 a.m. They deployed along Alpine Lane, Big Horn Mountain Way, and Blue Ridge Drive. Facing fires driven by wind gusts up to 70 mph, these two strike teams and dozens of others moved from neighborhood to neighborhood throughout the day and into the night.

The Freeway Fire crossed the city limits of Yorba Linda at 10:58 a.m., destroying its first of hundreds of homes in Orange County. After racing through Brush Canyon, the fire burned the residence at 27185 Merryweather Circle before fire crews were able to mount a defense. At the same time, ORC HC241 reported seeing small fires in the area of the Black Gold Country Club. This was several miles downwind from the main body of the Freeway Fire and upwind from the Landfill Fire. Due to the location of the fires, HC241 reported these as new fires, not spot fires from either the Freeway Fire or the Landfill Fire. With a water drop from HC241, golf course personnel were able to contain the small spots with garden hoses. **Incident Narrative – Map 8** shows a map of the first homes impacted by the Freeway Fire in Yorba Linda.

At the same time, the ECC received multiple reports of a fire on the hillside below the Robert Diemer Water Filtration Plant. ORC E9, E37, and E61 and Staff 2 were deployed to that location. ORC E61 arrived at 11:13 a.m. and reported that this appeared to be a new vegetation fire. In less than 30 minutes, the units on scene were able to get the fire under control. These units were then redeployed to the Freeway Fire.

In Branch II, CAL FIRE Division Chief Toups was assigned Division Y at 11:30 a.m. Chief Toups was tasked to determine where control lines could be established and how firing operations might

be used to provide containment. Highway 71 was to be a key holding point, wanting to keep the fire south of Aliso Canyon. By noon, the wind had pushed the fire well past Aliso Canyon, heading for Chino Hills State Park and the thousands of acres of vegetation that would subsequently be consumed before any control was attained.

The fire moved through residential neighborhoods from Brush Canyon to the San Antonio neighborhood—a 5.5 mile span in less than five hours.

As the fire progressed into Yorba Linda and grew to be a threat to more neighborhoods, the unified command also grew. The unified command for the Freeway Fire now included representatives from OCFA, CAL FIRE, Corona Fire, Chino Valley Independent Fire District, Anaheim Fire, and the Brea Police Department.

The unified incident commanders established initial control objectives, which were to hold the fire east of Aliso Canyon and Yorba Linda Boulevard, south of North Ridge Trail, and north of the 91 Freeway. Initial objectives also were to evacuate east of Yorba Linda Boulevard and La Palma Avenue and to establish a Chino Hills State Park Contingency Plan.

Ember shower in advance of flame front.

In Yorba Linda, decorative vegetation, palm trees, and even ground cover on center medians served to fuel the fire's progression. Embers were driven into attic vents, underneath roof tiles, and into any unprotected openings. Firefighters employed a firefighting tactic known as "bump and run"— moving from home to home and street to street after knocking down visible fire. Dispatchers continued to relay reported structure threats to the Operations Section Chief, and available units were deployed.

With every major incident or disaster, the OCFA Department Operations Center (DOC) is activated. The DOC supports the needs and demands of the incident, directs the recall of personnel, coordinates the backfill of apparatus, and monitors other operational needs. At 11:30 a.m., ORC Division 3 (Robinson), who had assumed the Duty Officer assignment from Chief Fleming, arrived at the ECC. The DOC was activated and staffed by noon. Once opened and staffed, incident communications and incident ordering was moved into the DOC. As soon as was possible, Fire Management Activity Grants (FMAG) were submitted to the State of California Office of Emergency Services (OES) for each fire. Both were subsequently approved, thereby establishing reimbursement criteria for the cost of fighting the fires.

A primary function of the DOC was to ensure available relief apparatus were staffed and made available for emergency response and/or station coverage. The paramedic engine reconfiguration procedure was implemented. Twelve advanced life support (ALS) paramedic engine companies were divided and then reconfigured to either (1) a basic life support (BLS) engine company or (2) a paramedic assessment engine company (PAU), plus six paramedic vans. This allowed for more engines to be deployed, while maintaining ALS medical coverage in the unaffected areas.

Department manpower coordinators (MPC) were organized and directed to hire personnel for all un-staffed apparatus. During the incident, 36 relief/surge engine companies and a truck company were staffed and placed into service. Some of these units were sent to the incident, and others were used to provide station coverage. While searching for relief apparatus, several engine companies thought to be in reserve were discovered to have been placed into service by off-duty personnel. They were self-dispatched to the Freeway Fire. This was done outside the normal command and control systems. Personnel on these units injected themselves into the firefight without checking in with fire ground commanders or notifying them where they were operating. Some units also lacked proper communication equipment. These actions created serious personnel safety and fireground accountability concerns.

Critical decisions were made by the assigned Duty Officer regarding coverage of empty OCFA fire stations. Given the continued weather and an uncertainty as to the causes of the Freeway and Landfill fires—both of which were burning in the most northern portions of Orange County and directly upwind from structures—a conservative coverage pattern was maintained for all remaining OCFA response areas. All reserve companies were staffed, dispatch criteria was modified for selected call types, and surge apparatus was outfitted for service.

As the fire moved into Yorba Linda, the Incident Command Post (ICP) was relocated to Yorba Linda Regional Park. A Logistic Section Chief, ORC Battalion 13 (Runnestrand), was dispatched to the park to begin the establishment of a formal base camp. Later, the location and size of this park was determined to not be well suited to handle the necessary long-term logistical needs of an incident this size. The base camp was relocated to Irvine Regional Park at midnight the first day. This facility, better suited to support a large incident, was within a reasonable travel distance to the fire. Branch V was considered too remote to be adequately supported from the base, so a spike camp was established.

Palm tree ignites by flying embers.

By 11:30 a.m., ORU Strike Team 9329C – Hawkins had been released from the Corona area and was fully engaged in Box Canyon. As the fire moved toward the Hidden Hills community, these engines and others protected homes along Foxtail Drive and Via Lomas de Yorba. Because the fire had moved into the area so quickly and without warning, residents in these areas were trying to evacuate while firefighting resources were attempting to gain access. It soon became evident the residents were in significant danger from the fire. The Brea Police Department was called to expedite the evacuation. Reports were also received that fire was impacting homes near Los Monteros and Los Adornos. ORC Patrol 23 reported to the Incident Commander that the Archstone Apartments located at River Bend and Cross Creek Roads were also immediately threatened. The fire continued its rapid and uncontrollable assault on multiple fronts. **Incident Narrative – Map 9** shows a map of the Freeway Fire progression into the Hidden Hills community.

At approximately 11:45 a.m., several units were deployed into the Savi Ranch commercial district. The units followed up on numerous reports of automatic fire alarms and also extinguished fires that had moved into the trees and ornamental vegetation. Flying embers found openings and combustible material at several of the businesses. These fires were extinguished as they were found. For the next several hours, units were committed to the area to ensure commercial losses were kept to a minimum.

In Brea, at the Landfill Fire, additional structure protection groups (SPG) were established. Brea Battalion 2 (Wood) was assigned the Kraemer SPG and given engine resources (XOR ST 1427A) to protect the homes surrounding Brea Fire Station 3. Brea Engine 2 reported the fire was within 200 yards of Brea-Olinda High School, and a request was made to the Brea Police Department to close Wildcat Way to all public traffic. In Brea, four homes were destroyed; six others damaged. The Brea Olinda School District sustained major damage around its high school campus, including the loss of several secondary buildings at Brea Canyon High School. **Incident Narrative – Map 10** shows a map indicating the perimeter of the Freeway and Landfill Fires.

Los Angeles County Fire Department Assistant Chief Watson and Deputy Chief Bryant arrived at the Landfill Fire command post. They discussed their concern that the north flank of the fire presented a threat to the Tonner Canyon, Diamond Bar, La Habra, and Hacienda Heights communities. With limited available resources, Battalion Chiefs Wells and Montoya asked if Los Angeles County Fire Department would be able to provide tactical support to those communities.

Battalion Chiefs Montoya and Wells reorganized the Landfill Fire firefighting effort. They created two branches and four structure protection groups. Single increment initial attack resources were formed into a strike team to better coordinate firefighting efforts and fire ground accountability (ORC Strike Team 1406A [Brice]). During this meeting, Battalion Chief Reeder contacted Battalion Chief Wells and advised of the anticipated merging of the Freeway Fire and the Landfill Fire sometime that evening. The decision would ultimately be made to manage the two fires as a Complex, and establish the Landfill Fire as Branch III of the Freeway Complex Fire.

A Yorba Linda neighborhood as the fire consumed the hills nearby.

The unified incident commanders determined an Incident Management Team (IMT) would be required to assist in this emerging disaster. CAL FIRE IMT 6 was on standby in Riverside County and was activated at noon. Team members began to arrive at 1:00 p.m., with the team ultimately assuming full command of the fire at 7:00 p.m. on November 15.

The strong Santa Ana winds did not allow smoke from this massive fire to rise—rather, it created a shearing effect. This resulted in a thick, gray blanket of smoke cutting off aerial views and lowering the ground level visibility to just a few feet in front of firefighters. ORC Battalion 15 (Boyle), responding as part of CAL FIRE IMT 6, was assigned to provide an update on the fire

location and progression. Due to the smoke conditions and continued rapid rate of fire spread, Chief Boyle was unable to provide this valuable intelligence to the command team and commented, "It seemed like the fire was everywhere."

The main body of the Freeway Fire was preceded by a broad ember shower distributed by the Santa Ana wind.

The main body of the Freeway Fire was preceded by a broad ember shower distributed by the Santa Ana winds. Embers crossed the 91 Freeway into Anaheim Hills at 12:46 p.m. The Helicopter Coordinator (HELCO) reported the fire was well established within the vegetation south of the 91 Freeway. Wind driven, the fire flashed toward several residential streets in Anaheim, including Rimwood Road, Canyon Vista Drive, Larkwood Street, South Morningstar Drive, and Laurel Tree Drive. The fire reached East Whitewater Drive and the Cascade Apartments at approximately 1 p.m. Overall, the City of Anaheim sustained loss or damage to 25 single-family homes and 60 apartment units.

MetroNet Dispatch received 911 at 12:46 p.m. as the fire jumped the 91 Freeway. First reports questioned if this was a spot fire from the Freeway Fire or a new fire within the City of Anaheim. Initial attack resources were dispatched apart from the command and control of the Freeway Complex Fire. This limited the resources available for deployment into Yorba Linda as Anaheim Fire worked to control the new threat. Eventually, this fire would be identified as Branch IV in the fire organization, but was frequently referred to as the Anaheim Branch.

The fire's potentially devastating impact on Anaheim homes and businesses required the incident command's immediate attention. This historical fire corridor was well-known. Had the fire in Anaheim escaped containment, one flank potentially could have followed the path and eventually matched the destruction of the 1967 Paseo Grande Fire. This could have extended fire through Anaheim Hills and into the cities of Villa Park, Orange, and Tustin—devastating the communities of Orange Park Acres, Santiago Hills, and Cowan Heights.

To minimize the threat, most of the helicopters operating on the Freeway Fire were directed to concentrate control efforts on the Anaheim side of the 91 Freeway. Dozens of water drops were made and—in combination with the efforts of the assigned ground units—containment was achieved. **Incident Narrative – Map 11** shows a map of the spot fire across the 91 Freeway into the City of Anaheim.

Firefighters fill a Water Tender at a lower elevation to take to engines fighting fires at higher elevations due to the lack of hydrant pressure.

By 1:00 p.m., the fire was well established in the Yorba Linda community of Hidden Hills. Fire engines (ORC Strike Team 1403A), a Patrol/CAFS task force led by ORC Battalion 22 (Antrim), along with Water Tenders 16 and 40, and engines from Anaheim engaged in the fight. Fire units encountered low or no water pressure on Hidden Hills Road, Mission Hills Lane, High Tree Circle, Fairwood Circle, Green Crest Drive, Skyridge Drive, and other streets. With homes burning on multiple streets and no

water, strike team leaders directed engine companies to move to areas that had available water. However, because the Patrol/CAFS task force was supported by the water tenders, it was able to effectively operate with less water than that required by an engine. Unfortunately, due to rapidly diminishing water pressures, even the water tenders were driven further down the hill to be refilled. These resources remained in the Hidden Hills community to protect houses that had not burned and to ensure extinguished homes did not rekindle. The availability and use of the CAFS was a direct result of recommendations made in the 2007 Santiago Fire After Action Report.
The water supply issue was reported to the Yorba Linda Water District (YLWD) through the City of Yorba Linda EOC at approximately 2:00 p.m. YLWD personnel responded to the area and were able to make adjustments to improve the water delivery in several areas. Due to the fire threat, water district personnel were unable to access the Santiago booster pump station. When YLWD personnel were initially able to make access to the pump station, they determined there had been sufficient heat to cause the pump station for the Santiago Reservoir to automatically shut down. Once this occurred, the continued water use eventually drained the Santiago Reservoir responsible for supplying water to the Hidden Hills and other nearby communities. YLWD personnel spent several hours completing repairs. They worked into the night and the next day to ensure a steady supply of water.

Daytime seems like night under extreme smoke conditions.

The water supply for this area was further impaired—unknowingly—by fire suppression units and some of their fire control tactics. Faced with multiple structures fully involved in fire, many engines resorted to the use of master streams to contain the fire spread. This meant a single fire engine could have pumped more than 1,000 gpm. On some streets, multiple master streams were used. This limited water availability for engines arriving later. Additionally, the 4-inch diameter hose lines that were laid in the street to supply engines physically blocked later arriving units' access to neighborhood streets. These tactics were modified, and the master streams were shut down. Water tenders were also deployed into the impacted areas to help mitigate the water deficit.

In Branch II, plans were also underway to contain the fast-moving brush fire. Retardant drops from air tankers were directed along South Ridge Trail. They had a minimal effect, and the wind pushed the fire into Chino Hills State Park. A contingency plan was enacted in the likely case the fire would reach the community of Chino Hills. The Chino Hills Structure Protection Group was established, but it was not staffed until later that evening when more resources were available. The immediate goal was to keep the fire within the boundaries of South Ridge Trail, Water Canyon Ridge, and Slaughter Canyon. This plan was subsequently supported with the use of engines, bulldozers, hand crews, and aircraft.

Reports of the Landfill Fire crossing the 57 Freeway at Lambert Road east of State College Avenue were received at 1:21 p.m. A request was made to the California Highway Patrol (CHP) to close the freeway due to smoke and fire conditions. The fire was actively spotting in multiple directions, and on-scene resources moved from neighborhood to neighborhood protecting structures. By this time, Los Angeles County (LACO) Fire ground and air resources had been

moved into to reinforce the Tonner Canyon flank. These resources would eventually be used to support the contingency and control objectives for Branch V. LACO helicopters were used to suppress and contain the fire north of Brea Olinda High School and the neighborhoods west of the 57 Freeway.

At 1:30 p.m., homes adjacent to the Eastside Community Park located on Heatheridge Drive and Hidden Hills Road were reported to be burning. ORC Strike Team 1404A (Whitaker) and XOR Strike Team 1425A (Hirsch) had at least five, fully involved structures on Heatheridge Drive. Fifteen minutes later and a mile away, homes in the Village Center area on Willow Tree Lane, Ridge Park Drive, Juniper Avenue, Alder Avenue, and Deodar Drive were burning.

ORC strike teams assigned to the Tea Fire in Santa Barbara County and the Sayre Fire in Los Angeles County were reassigned to the Freeway Fire. ORC Strike Team 1400A (Valenzuela) arrived around 2:00 p.m. and joined the other units already engaged in Yorba Linda. ORC Strike Team 1402A (Kinoshita) returned at 4:30 p.m. ORU Strike Team 9328C (McCoy) was released late that evening from the Tea Fire and arrived sometime around midnight, the first day.

The three Orange County MetroNet strike teams (XOR) were also released from Tea and Sayre Fires and reassigned to the Freeway Fire. XOR Strike Team 1421A (Head) arrived about 3:45 p.m. and began working in the Anaheim Hills area. XOR Strike Team 1422A (Duncan) arrived at 3:30 p.m. and was assigned to structure protection in the community of San Antonio. XOR Strike Team 1423A (Thomas) started working in the Fairmont area soon after arriving at 4:45 p.m.

Aerial view of the fire's aftermath on a neighborhood in east Yorba Linda

A critical point in time for the Freeway Complex Fire was 2:30 p.m. No less than 15 homes were simultaneously burning on Juniper Avenue, Deodar Drive, and other streets in the San Antonio community. By this time, sufficient strike teams had arrived to allow a switch from the "bump and run tactic" to a more offensive "anchor and hold strategy." This ensured damage and loss of homes would be minimized.

At 2:30 p.m., Branch II (Deyo) and Division Y (Toups) met with Branch I resources in the San Antonio community. With numerous homes threatened, strike teams were requested to provide structure protection. By this time, several out-of-county strike teams had reported to the fire. As many strike teams as possible were directed into the area between Village Center Drive and San Antonio Road. **Incident Narrative – Map 12** shows a map of the Freeway Fire impacting the San Antonio community.

By 3:00 p.m., the weather began to change in favor of the fire control efforts. The temperature remained in the mid-70s and the relative humidity at 7 percent. However, the change in sustained wind speed to below 40 mph—sometimes as low as 10 mph in some areas—began to make the greatest difference. The advancing structure loss was stopped within the San Antonio neighborhood. Although a positive sign for fire ground commanders, the threat to—and the loss of—structures did not end. Over the next several hours, dozens of new fires were reported, or fires

thought to be extinguished rekindled within communities along the Freeway Complex Fire's path. Fire crews returned hours later to streets previously thought clear of fire, only to find multiple homes burning anew. Many of these latent fires occurred from embers intruding into concealed spaces within homes and smoldering undetected.

The change in sustained wind speed to below 40 mph—sometimes as low as 10 mph in some areas—began to make the greatest difference.

A reconnaissance flight was conducted for the Landfill Fire at approximately 3:00 p.m., and a decision was made to change strategy from a defensive posture to an aggressive offensive tactic. This resulted in controlling the spread of the fire and keeping it from repeatedly jumping the 57 Freeway and spreading uncontrolled into residential neighborhoods. The Landfill Fire would ultimately result in the loss of four homes and damage to six others. The Brea Canyon and Brea Olinda High Schools also sustained fire damage and 980 acres of vegetation were burned.

Sometime between 4:00 and 4:30 p.m., the fire in Branch II that was burning down slope against the wind into Yorba Linda became realigned with the topography and wind. Numerous spot fires were reported at Condor Ridge. Control efforts with retardant drops proved unsuccessful, and at 4:45 p.m., the fire continued driving westward into Telegraph Canyon.

Around 5:00 p.m., a second spot fire was reported on the south side of the 91 Freeway at Coal Canyon. ORC Superintendent 1 (Hanson) led an aggressive ground effort with bulldozers and handcrews to contain the new threat. Containing this fire closed the back door and kept the Freeway Complex Fire from reaching Sierra Peak and making the run at Windy Ridge, which could have threatened additional communities.

By 5:30 p.m., the wildland fire was continuing to move through Upper Waterman Canyon at an incredible rate. Within minutes, another tragic outcome was narrowly avoided. Earlier in the day, CAL FIRE Crew Strike Team 9387G was assigned to this area in Branch II. The crew buses were parked in an unburned area of San Juan Hill located in Upper Waterman Canyon. As the fire burned across the canyon, the crew buses were going to be overrun. The crew bus drivers took tried to relocate their vehicles ahead of the quickly approaching front. Orders were given for all personnel to seek safety by entering the already burned area—known as "entering the black." Eight of the inmate crew members inadvertently took off through the unburned fuel—known as "the green." Two firefighters assigned to CAL FIRE Strike Team 9410C were sent to retrieve and direct them into a safe area. After the fire front passed, all personnel were accounted for. No injuries were sustained, but the two crew buses sustained minor damage from being so close to the flames.

The decision to merge the Landfill and Freeway Fires into a Complex occurred between 5:00 and 5:30 p.m. A complex is comprised of two or more fires in a geographically adjacent area. When implemented, managing an incident as a complex allows for shared incident management and logistical support with a central base of operations for continuity and efficiency. As the fire grew, the

Cityscape of Yorba Linda during the first night

branch assignments expanded to accommodate the vast boundary of the fire. The Landfill Fire was subsequently identified as Branch III and assigned to BRE Battalion 1 (Montoya) and ORC Battalion 8 (Wells). Branch IV was established when the fire subsequently jumped the 91 Freeway and moved into the City of Anaheim. This branch was also referred to as the Anaheim Branch. With the addition of LACO to the unified command, Branch V was later identified to include parts of Tonner Canyon and the City of Diamond Bar. Additional control objectives were established including keeping the fire east of the 57 Freeway and south of the City of Diamond Bar. LACO units would establish in this area to help make a stand.

At 5:50 p.m., Incident Command received a request from YLWD personnel to provide engines to assist with water supply problems. Three engines—ORG E2, STA E2, and GGVE5—were assigned and were able to sustain water availability by pumping water from one supply grid of the system to another. These engines pumped through the night until the YLWD brought in a high-volume portable pump to take over for fire engines. According to the YLWD After Action Report, the water shortage was primarily caused by fail-safe actions of pumping equipment and the high demand on the system caused by firefighting efforts. These two situations resulted in a complete emptying of the Santiago Reservoir.

By 7:00 p.m., firefighters were advancing into all neighborhoods affected by the Freeway Complex Fire. Strike teams from all over Southern California were still arriving to help. CAL FIRE IMT 6 officially took responsibility for the management of the Freeway Complex Fire. Formal briefings were taking place, and logistical needs such as food and water were supplied to personnel. Fuel as ordered for vehicles that had been at working all day. A unified communication plan was initiated resulting in significant radio communication improvement by the following morning.

At an earlier briefing for the Landfill Fire, the Freeway Fire was predicted to burn into Carbon Canyon and make a direct run at the community of Olinda Village. Olinda Village sits in a confluence of canyon sides creating a “bowl” where residents have built homes, businesses, a church, and a school. Olinda Village is heavily lined with pine, eucalyptus, and a variety of ornamental vegetation. The Hollydale Mobile Estates is a large mobile home park where many village residents live.

At 8:30 p.m. on this first day, a strike team of engines—ORC Strike Team 1405A (Brown)—was assigned to the Olinda Village area. He developed control objectives to keep the fire south of Carbon Canyon Road, east of the eastern most boundary of Olinda Village, west of Copo de Oro, and north of Verbena Lane. Tactical priorities included the protection of the Hollydale Mobile Estates and the Carbon Canyon Christian High School. A special emphasis was placed on protecting the power lines along Carbon Canyon Road—as these supplied the main power to Olinda Village and the water supply pumps for the area.

At the same time, in Branch II, the perimeter control efforts remained active. The fire continued to burn on multiple fronts through canyons aligned with the wind. The Rolling M Ranch presented a new structure protection challenge. Two crew strike teams and a Chino Hills engine were assigned to this area. Other strike teams of bulldozers and hand crews were working to build a control line at Bane Canyon. However, at 9:00 p.m., the fire was spotted one-fourth of a mile away in Slaughter Canyon. The plan was abandoned. By midnight, the Freeway Complex Fire had reached the City of Chino Hills and was burning behind homes located near Butterfield Road and the Los Serranos Golf and Country Club. **Incident Narrative – Map 13** is a map of the local canyons.

On November 16 around 2:00 a.m., the wind direction shifted from off-shore to a sustained on-shore direction. This was reported by personnel at Olinda Village and Branch II in Aliso Canyon. At 3:30 a.m., the Freeway Complex Fire had progressed through the Chino Hills State Park into Telegraph Canyon. It then had moved into the Carbon Canyon area. Highly erratic burning conditions were seen with flame heights reported up to 50 feet and visibility at near zero. **Incident Narrative – Map 14** shows a fire progression map of the Freeway Fire advancing into Olinda Village.

As the Freeway Complex Fire moved toward the Olinda Village area, an evacuation plan was implemented. Engines were moved to protect structures as the fire was burning directly into the Hollydale Mobile Estates. Largely due to the significant amount of preparation made by engine crews earlier in the day, the flame front was repelled and the community of Olinda Village was spared significant loss. One mobile home in Hollydale and a home on Olinda Drive were destroyed. By 7:00 a.m. on November 16, the threat to Olinda Village had passed.

The wind shift had an impact on fire control actions in the Chino Hills area. At 3:00 a.m., the fire burned freely near the upper end of Aliso Canyon. Branch II ordered evacuations of hundreds of homes south of Soquel Canyon and west of Highway 71. An extensive firing operation was conducted as part of the structure protection effort. Fifteen engines worked until sunrise to ensure there were no losses. Another large firing operation from Euclid to Carbon Canyon Road was completed by 9:00 a.m.

Chief Toups (Division Y) was relocating Branch II resources into the Sleepy Hollow area off Carbon Canyon Road when he encountered engines assigned to Branch V. These local government engines had just completed a firing operation around homes bordering the Saint Joseph's Hill of Hope off Carbon Canyon Road in what they called a structure protection effort. Chief Toups asked the Strike Team Leader to cease from any additional firing as the wind direction and terrain were not properly aligned for this type of operation. The reason given for the firing operation was structure protection, but the unintended consequence was to create a condition which drew the main body of the Freeway Complex Fire deeper into Tonner Canyon. Once established within the canyon, the fire would be aligned and head toward the Los Angeles County line and the city limits of Diamond Bar. **Incident Narrative – Map 15** shows a map of the Freeway Fire progressing into Tonner Canyon.

Smoke column rising through the inversion layer

Day 2 - November 16, 2008

The Freeway Complex Fire was battled through the day on November 16. Aircraft, bulldozers, hand crews, and engine companies worked throughout the day to establish a control perimeter around the fire. By midnight on that second day, the goal was achieved. Overhaul and line improvement continued over the next couple of days.

The re-population of evacuated areas was a priority for Incident Command. Residents of areas that were not under mandatory evacuation were allowed to return to their homes at their choosing. Those under a mandatory evacuation order had to wait until a determination was made that the threat was fully abated. After conducting an aerial reconnaissance of the Complex, Incident Commanders decided at 3:00 p.m. on November 16 that most areas under the evacuation order could be repopulated. OCFA Occupant Liaison personnel assisted homeowners in gaining access to homes to recover personal property and by listening to and answering questions.

Days 3-5, November 17-19, 2008

Neighborhoods that had been impacted by the fire had fire companies assigned to ensure burned homes were properly overhauled and no new fires would occur as a result of hidden or smoldering embers. Neighborhoods, homes, and cars that were not burned—but may have received a covering of fire retardant—were washed to minimize damage.

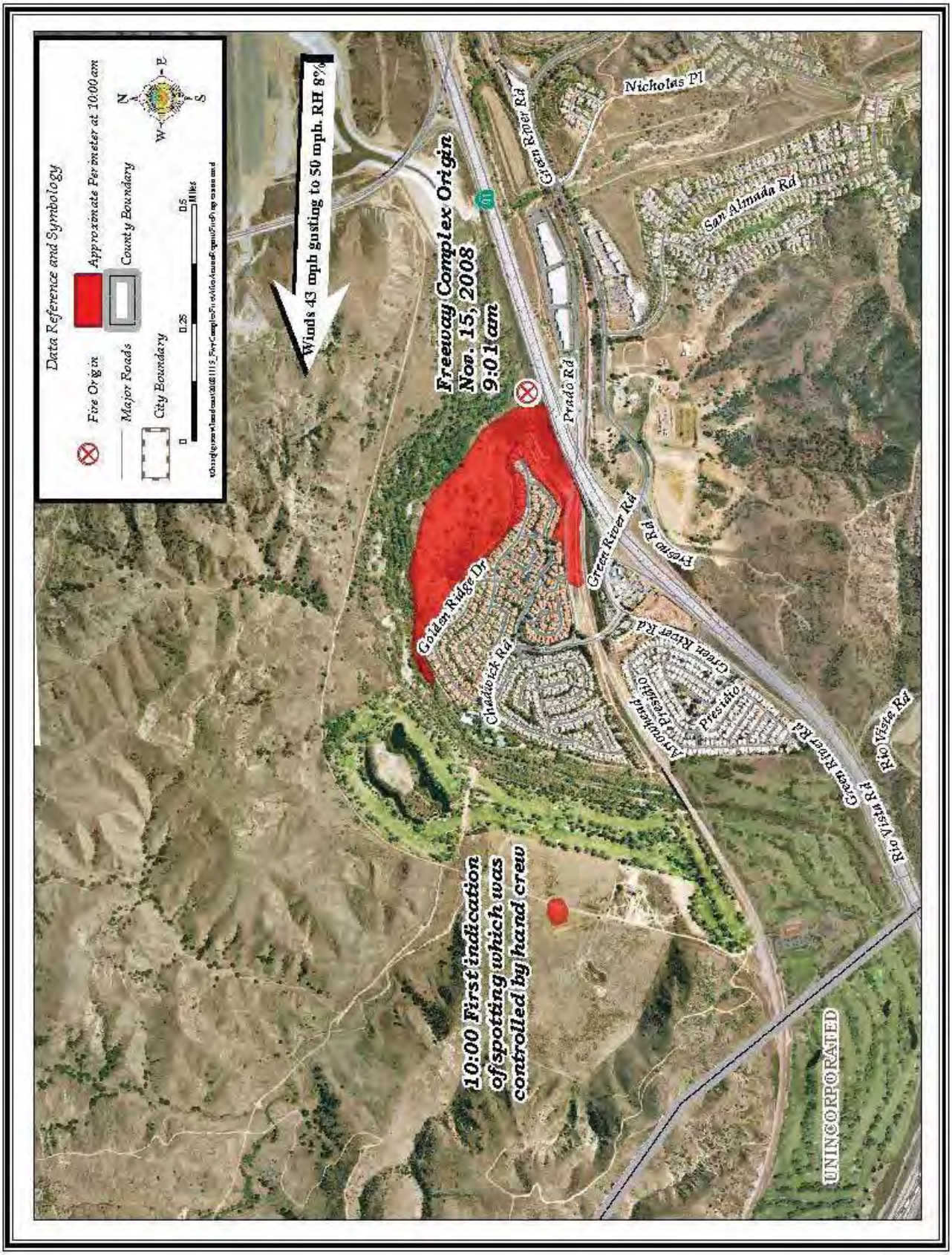
On November 19, 2008, at 7:00 a.m., the Freeway Complex Fire was declared to be fully contained. At its peak, more than 3,800 firefighting and support personnel were assigned to the incident. More than 360 structures were destroyed or damaged, and over 30,000 acres of valuable watershed were consumed. The extinguishment effort for the incident is estimated to cost $16.1 million, with property loss exceeding $150 million. Injuries were few and relatively minor. Most importantly, no lives were lost to either civilians or firefighters.

The fire contained; damage assessment begins in a Yorba Linda neighborhood

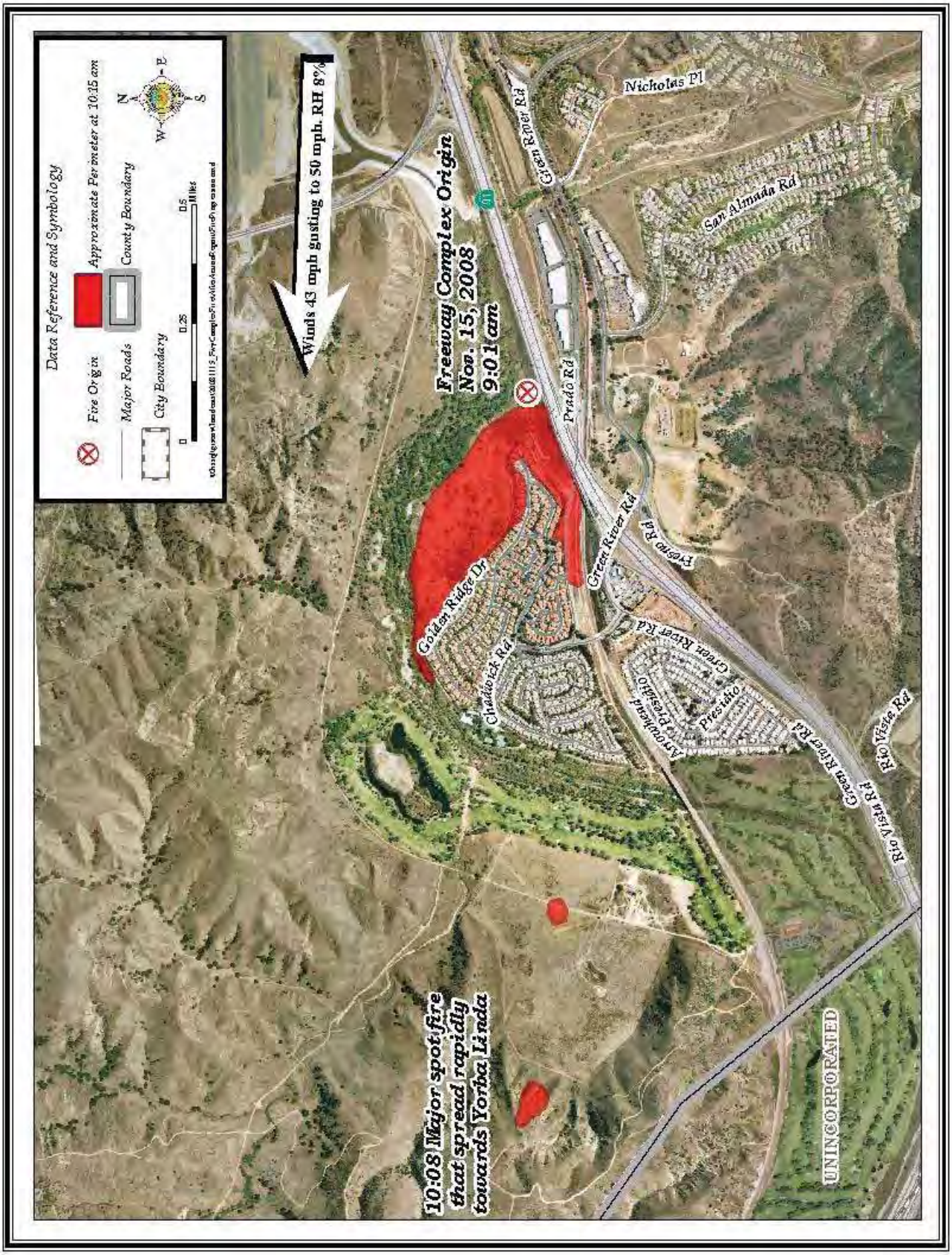
Incident Narrative – Map 3
Freeway Complex Fire—Origin 9:01 a.m.

Incident Narrative – Map 4
Corona Fire Engine 5—Near Miss Entrapment

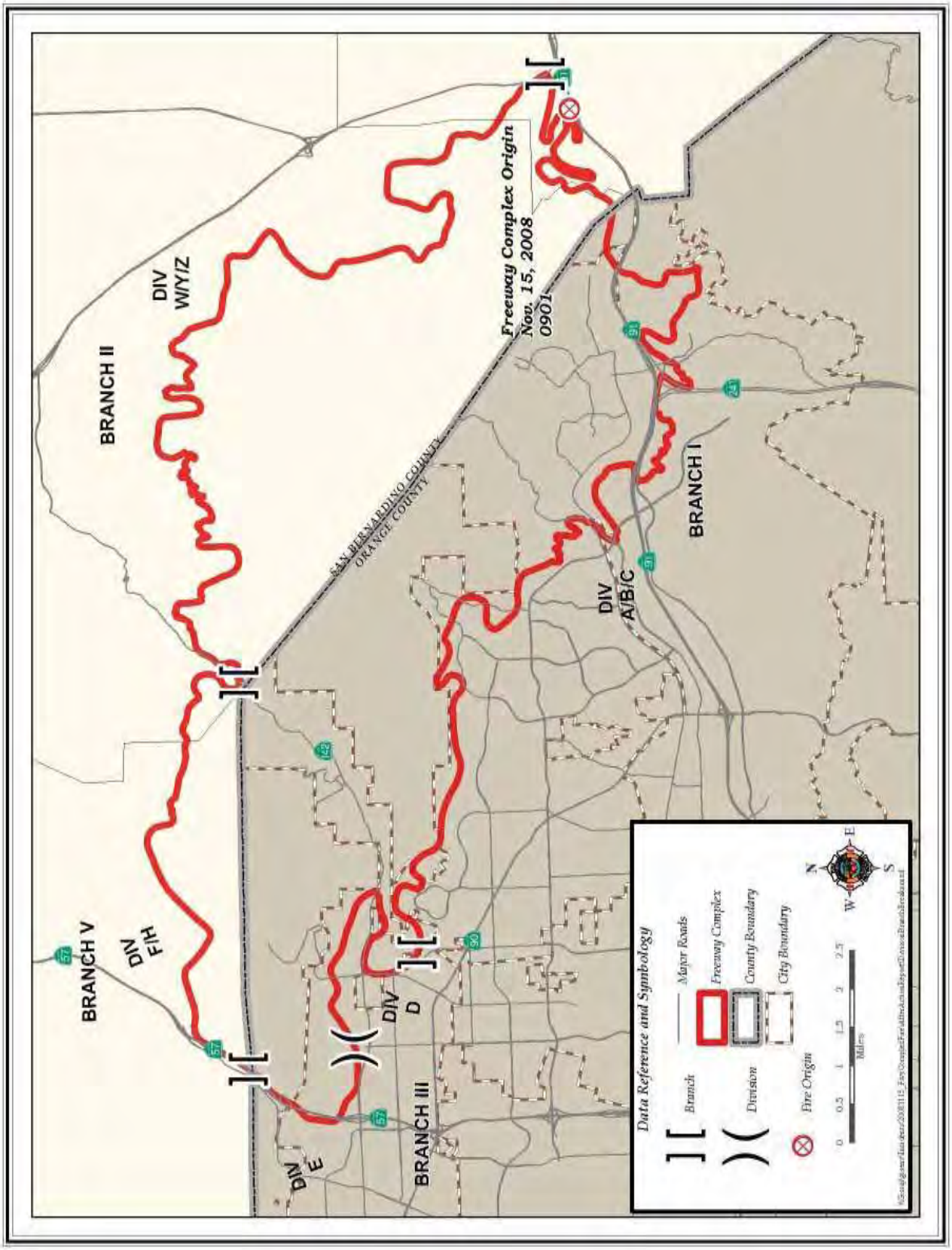
Incident Narrative – Map 5
First Indication of Spotting—10:00 a.m.



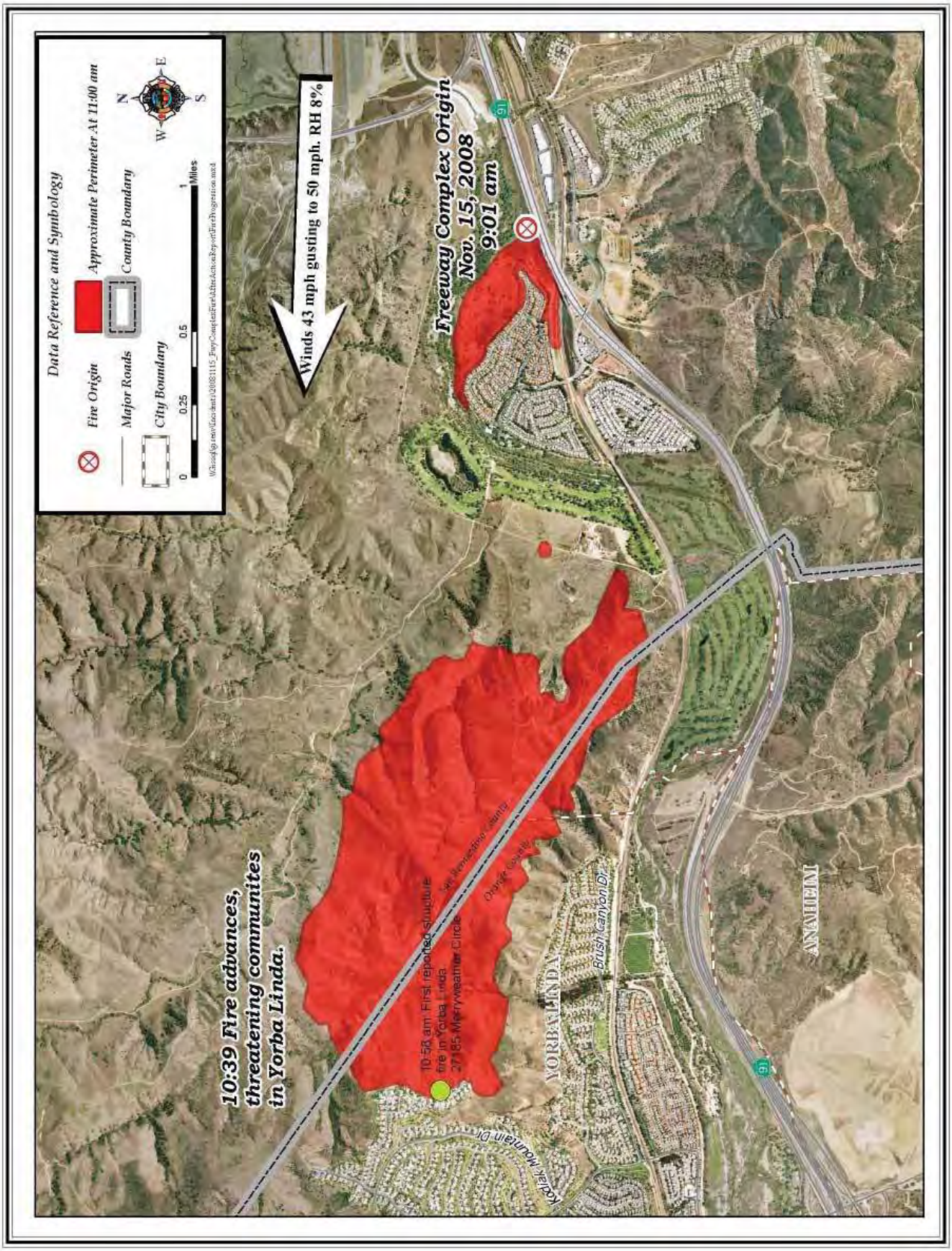
Incident Narrative – Map 6
Second Spot Sighted—10:08 a.m.



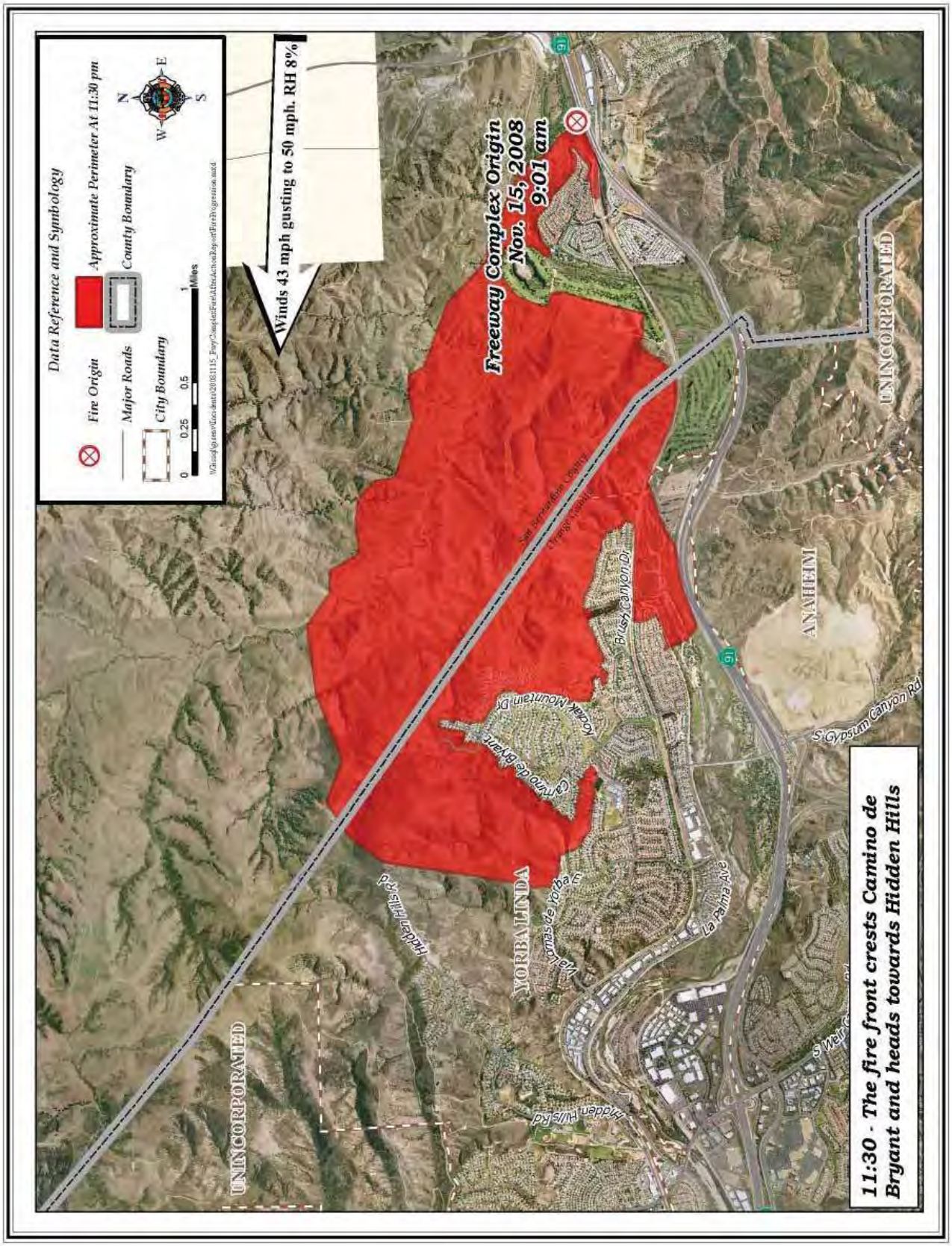
Incident Narrative – Map 7
Freeway Complex Fire—Branch and Division Map



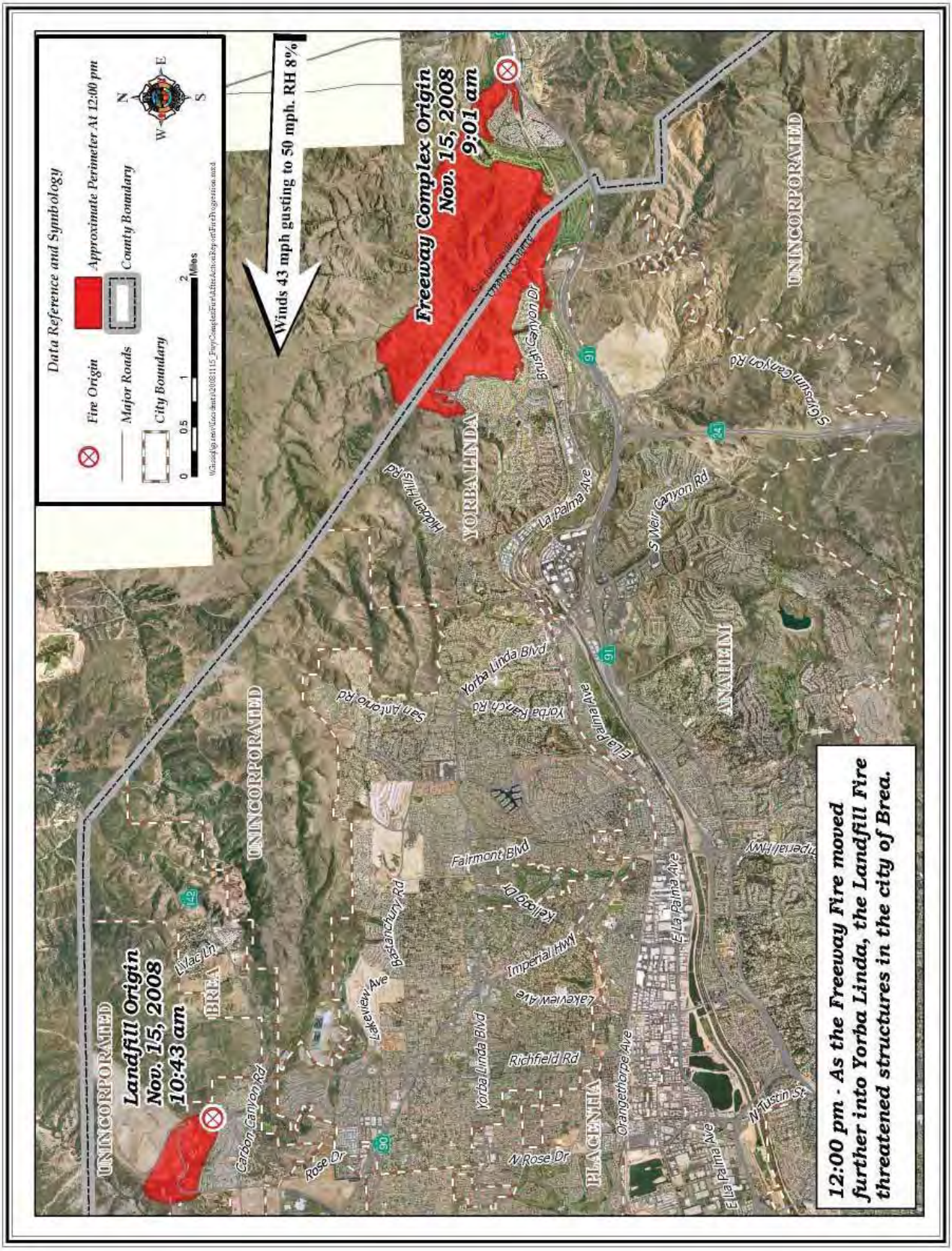
Incident Narrative – Map 8
Freeway Fire Reaches Structures in Yorba Linda—10:39 a.m.



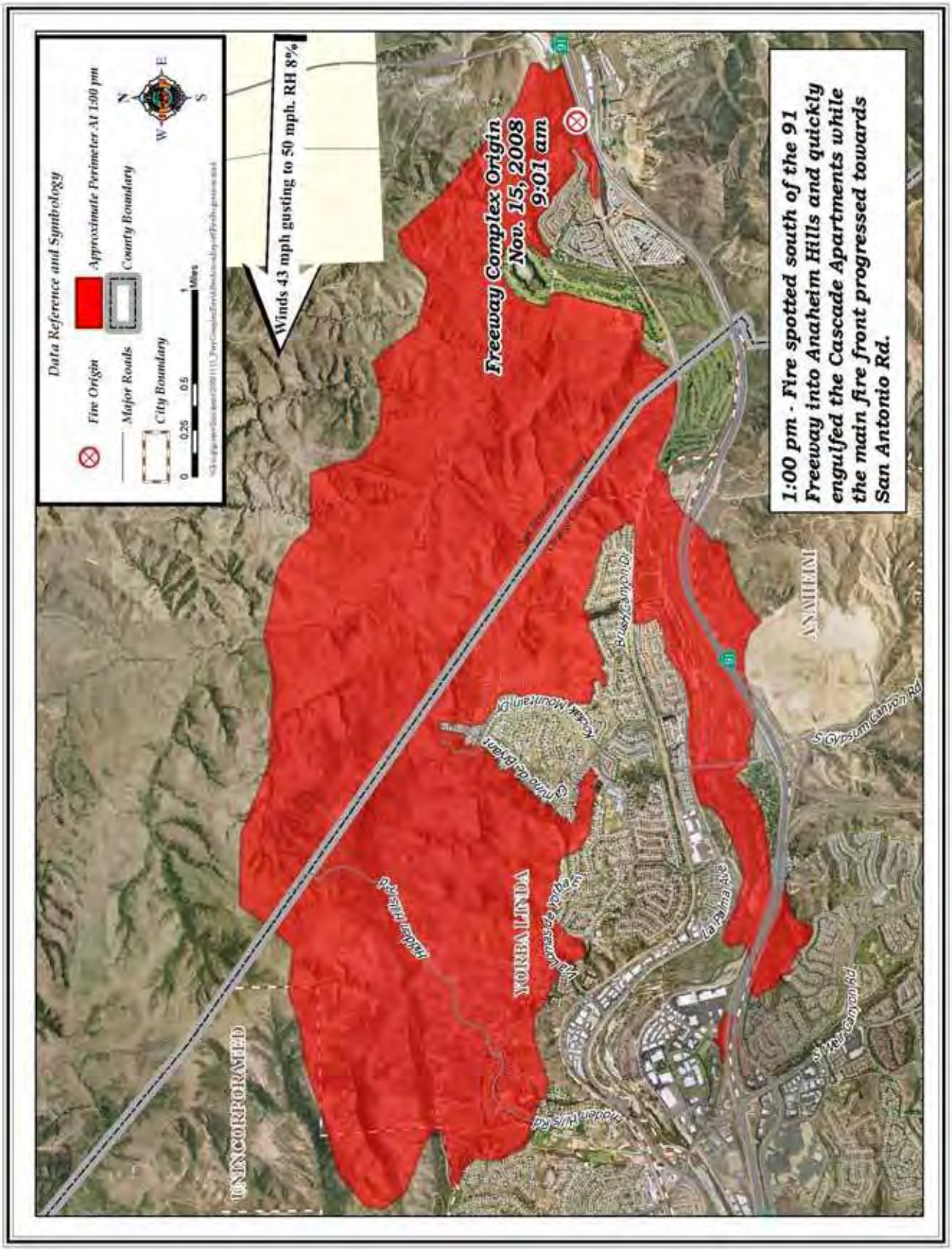
Incident Narrative – Map 9
Freeway Fire Moves Towards Hidden Hills—11:30 a.m.



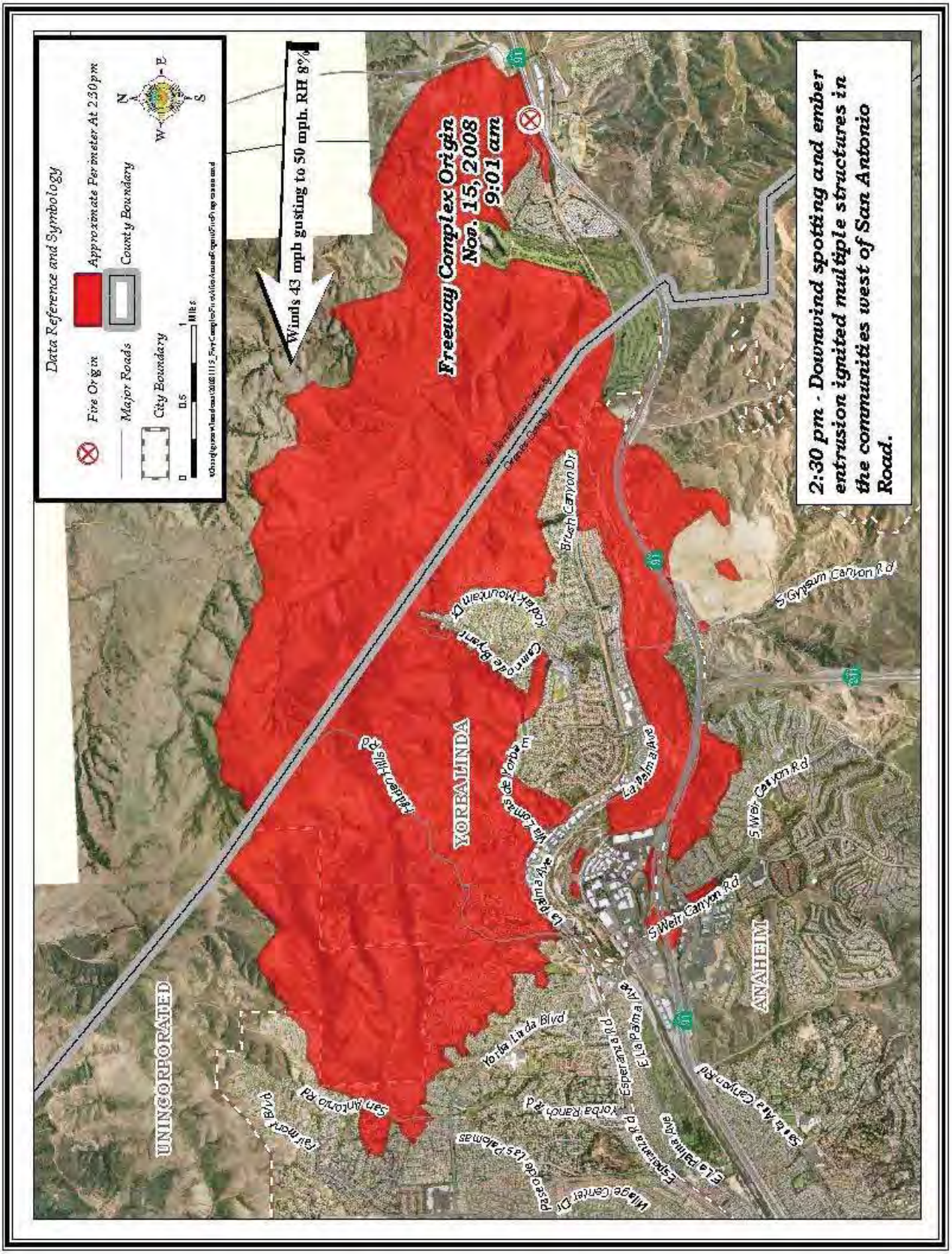
Incident Narrative – Map 10
Perimeter of the Freeway and Landfill Fires—12:00 p.m.



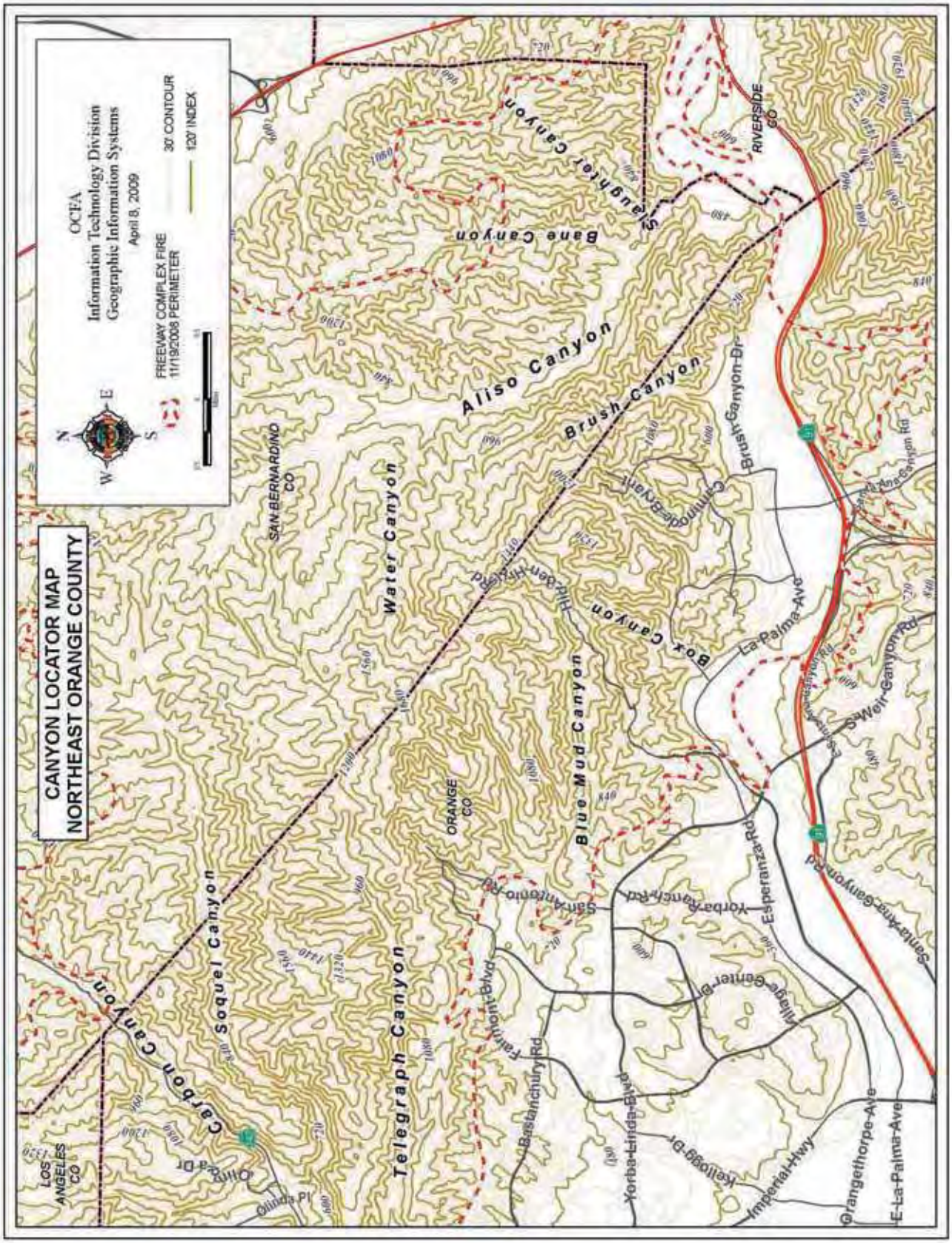
Incident Narrative – Map 11
Freeway Fire Spots Across the 91 Freeway into Anaheim—1:00 p.m.



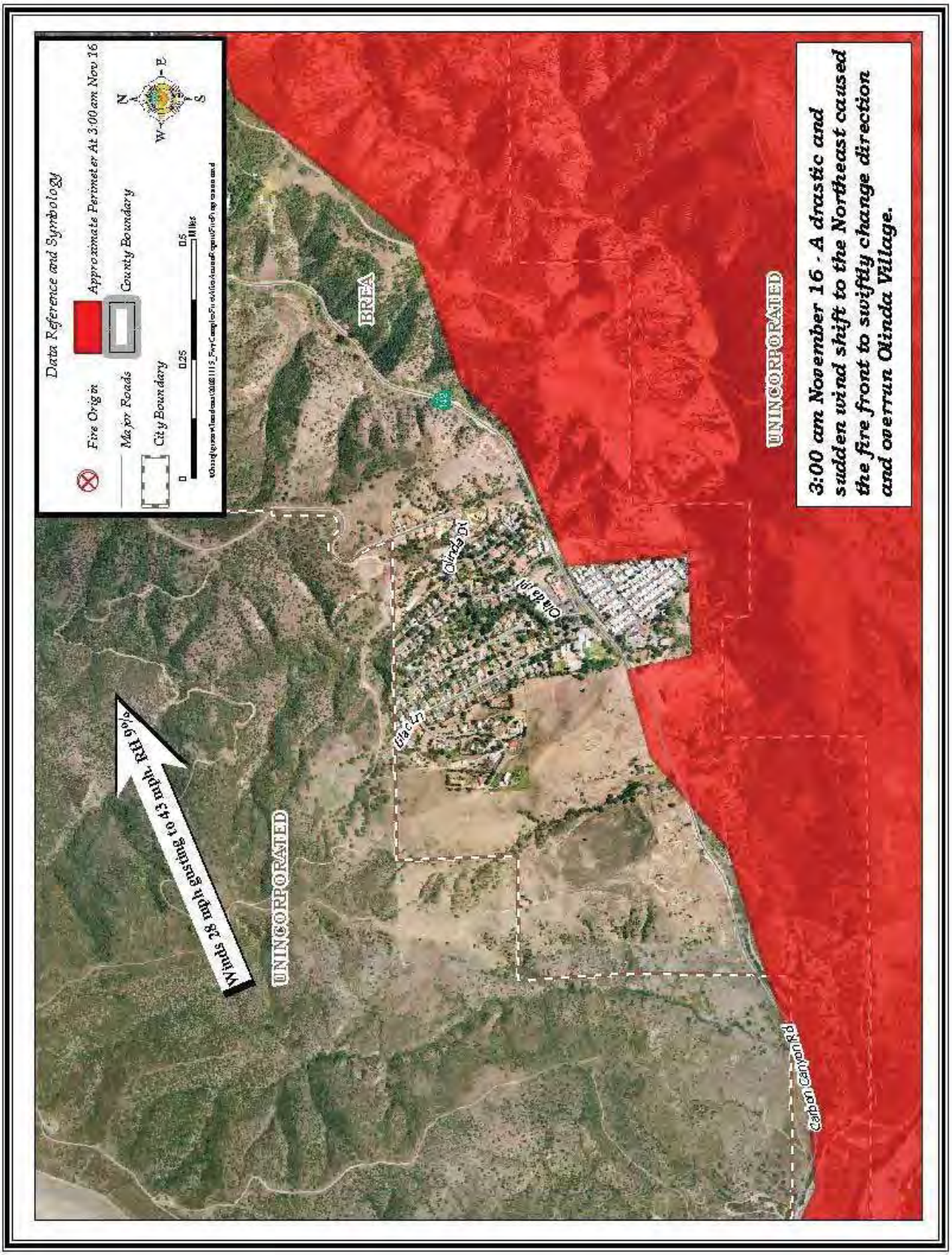
Incident Narrative – Map 12
Freeway Fire Reaches the San Antonio Community—2:30 p.m.



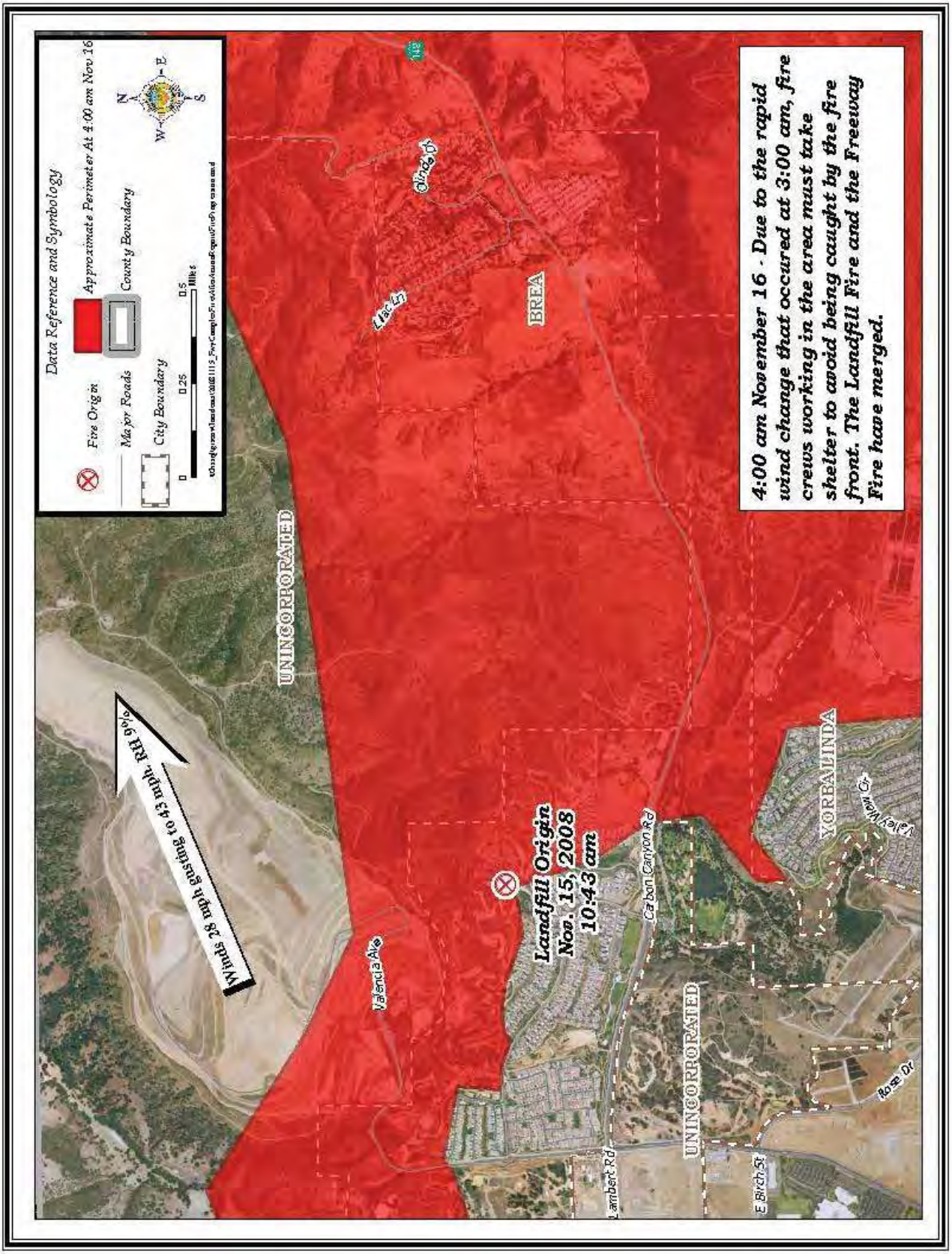
Incident Narrative – Map 13
Canyon Locator



Incident Narrative – Map 14
Freeway Fire Reaches Olinda Village—3:00 a.m.



Incident Narrative – Map 15
Freeway Fire Moves Towards Tonner Canyon—4:00 a.m.



Notification, Evacuation, and Repopulation

The first indication that residents of the City of Yorba Linda were about to be seriously threatened by the Freeway Fire came at approximately 10:20 a.m. on November 15. After estimating the fire's rate of spread, OCFA Battalion 2 Chief (Reeder) projected the fire would impact the community of Brush Canyon within 30 minutes. He directed the OCFA ECC to notify the Yorba Linda City Manager and advise the Brea Police Department to begin mandatory evacuations of the Brush Canyon area. At 10:22 a.m., Brea Police began evacuations of the eastern portion of Yorba Linda (Thomas Brothers Map page 741, grids E4, F4, and G5).

Ten minutes later, at 10:32 a.m., the Freeway Fire threatened the neighborhood of Big Horn Mountain Way in Yorba Linda. At 10:39 a.m., ORC Helicopter 41 confirmed homes on Bighorn Mountain Way, Blue Ridge Drive, and Evening Breeze Drive were under direct threat. Nineteen minutes later, the first of hundreds of homes lost in Yorba Linda burned on Merryweather Circle.

Although a collaborative decision, the responsibility for evacuation is statutorily a law enforcement function, which allows the fire department to focus on fire control efforts. Brea Police had a Supervisor assigned to the Unified Command early in the incident. One of their primary responsibilities was the rapid assembly of officers to meet the evacuation needs of this fast-moving fire. The Orange County EOC After Action Report estimates the evacuation orders impacted over 9,000 dwellings in the City of Yorba Linda. During the height of the fight, and estimated 24,000 citizens were evacuated or kept from returning to their homes in the City of Yorba Linda. The City of Anaheim began evacuations when the Freeway Fire crossed the 91 Freeway. A few miles away, the City of Brea initiated evacuations in residential areas in the path of the Landfill Fire. These extensive evacuation demands put a strain on local law enforcement, requiring mutual aid resources from agencies across the County to assist with evacuation needs. Refer to http://www.ocfamedia.org/_uploads/PDF/fcfaarybl.pdf for the **City of Yorba Linda After Action Report** for additional details.

Traffic gridlocked as evacuating residents and incoming emergency apparatus tried to access the same neighborhood streets. Officers at the various roadblocks and checkpoints took action to remedy the congestion—enabling fire apparatus to access the most impacted neighborhoods.

The weekend and mid-morning timing of the Freeway Fire were major factors complicating the evacuation. Since the Freeway Fire occurred on a Saturday—instead of a weekday—more residents were home, instead of at work or school. Notably, even with such a large and escalating evacuation boundary, the majority of residents remained calm and followed evacuation orders. Although slow, reports were received during the morning that evacuations were orderly and without incident.

Law enforcement agencies possess the legal authority to conduct evacuations of populated areas. However, even when a mandatory evacuation is declared, law enforcement does not have the legal authority to force residents from their homes. Officers may restrict the return of residents once they leave their property. Determining when and where to evacuate is often difficult since each evacuation decision brings with it a set of risks and rewards. The greatest risk to permitting residents to remain with their homes is the potential threat to safety.

Evacuation of residents is one of the challenges created by a wildland-urban interface fire. The Freeway Fire spread so rapidly emergency responders could only estimate the direction and the time of impact to a given neighborhood. Within minutes of ignition, spotting was reported one mile downwind from the main body. Although a fire's rate of spread is typically measured in acres per hour, the Freeway Fire was driven by 40 mph winds and required measurement in acres per minute. Motorists driving on the 91 Freeway reported they could not keep up with the fire as it spread through wildland areas—even while driving at speeds of 50 mph.

Simulation training conducted on October 27, 2008, for a WUI fire in the mutual threat zone along the 91 Freeway provided incident commanders some possible trigger points of when and where to call for evacuation. During the fire, these same trigger points were utilized to make the evacuation decisions. When the potential existed for the fire to escape planned, control boundaries, evacuations were ordered.

The Brea Police Department conducting evacuations.

The manner and timeliness in which residents were notified is being reviewed. After the 2007 Santiago Fire, the County of Orange led in the development and implementation of a public notification system. The AlertOC notification program has been adopted and implemented in many cities throughout the County. The City of Yorba Linda was in the beginning stages of implementing the program. Since the fire, the Alert OC program has moved into the next phase of implementation and is now capable of making public notifications.

Deciding when to repopulate an evacuated neighborhood is one of the most difficult made by law enforcement and incident commanders—given the unpredictable nature of a WUI fire. Although a frustrating ordeal for residents, evacuation orders are to prevent homeowners from entering the dangerous conditions usually present in fire-burned areas.

The OCFA uses an Occupant Liaison Program to keep homeowners informed; to assist them in retrieving items such as medication, money, or clothing left while evacuating; and to provide emotional support. When appropriate, Occupant Liaison Teams may escort residents to their property. These efforts are to prevent homeowners from independently returning to their property and into a potentially dangerous situation.

After a reconnaissance flight deemed most areas to be safe, the mandatory evacuations were lifted on November 16 at 3:00 p.m. Even then, law enforcement officers were directed to allow only verified residents or those who had legitimate business—insurance adjusters, clean-up crews, etc.—into the impacted neighborhoods.

Even though the fire was extinguished, fire crews needed to maintain a presence within the impacted neighborhoods for several days. Firefighters conducted patrols looking for new fire

starts, as well as overhauled burned structures. Fire apparatus needed to be able to move freely from street to street as crews cleaned off fire retardant that drifted onto unburned homes and vehicles. Wildland engines, handcrews, and helicopters conducted mop-up operations in the wildland and—where necessary—removed hazards adjacent to homes created by partially burned trees and vegetation.

The orderly evacuation of residents during a WUI fire can be challenging and may create delays for fire apparatus.

Water Supply

The demands of a single structure fire can tax a well functioning water system. Normal firefighting efforts often involve one fire engine connected to a fire hydrant. The water is supplied directly to the fire or to one or more fire engines. In contrast, in an urban conflagration such as the Freeway Complex Fire, multiple engines move into threatened neighborhoods to extinguish flames and defend multiple homes on numerous streets.

Water systems must incorporate "fire flow" as an element of system design and functionality. Needed fire flow is the amount of water available for providing fire protection at selected locations throughout a community. The OCFA Planning and Development Services Section reviews all plans for new development to ensure an adequate fire flow is provided according to the City's adopted Fire Code. Like all California jurisdictions, the City of Yorba Linda is required by State law to adopt the California Fire Code (CFC). The latest Fire Code edition was adopted in 2007. This newly adopted code allows for doubling of the required fire flow in areas where "conditions indicate an unusual susceptibility to group fires or conflagrations." This should be considered in all new developments within a city that is adjacent to a wildland-urban interface or within a designated High Hazard Zone.

Using the fire code tables, a typical street with homes not exceeding 3,600 square feet would be protected by fire hydrants capable of delivering 1,500 gpm for a minimum of two hours with no less than 20 pounds psi of residual pressure. For homes between 3,600 and 4,800 square feet, fire hydrants must deliver 1,750 gpm for two hours with no less than 20 pounds psi of residual pressure. Locally adopted amendments require fire hydrant spacing of 300 feet along the street. The typical fire flow demand is based on fighting a single structure fire and protecting the immediate exposures.

Faced with multiple structures, many fully involved in fire, some Company Officers resorted to the use of master streams to contain the fire spread. This meant a single fire engine may have pumped more than 1,000 gpm—affecting the available water supply. On some streets, multiple master streams were deployed. Once water demand issues were identified, tactics were modified. The master streams were shut down in favor of smaller hand lines.

Around 2:00 p.m. on November 15, several radio transmissions were received from fire companies reporting low or no water pressure in various sections of Yorba Linda. Some areas were Hidden Hills Road, Mission Hills Lane, High Tree Circle, Fairwood Circle, Green Crest Drive, and Skyridge Drive. With homes burning on multiple fronts, Strike Team Leaders had to make critical decisions. They directed fire companies to areas that had available water, thereby giving firefighters a chance to protect and save homes.

To provide structure protection and ensure rekindles were minimized, a Compressed Air Foam System (CAFS) Task Force with five Patrol units remained in the Hidden Hills area. The CAFS Task Force, under the direction of OCFA Battalion Chief Antrim, extinguished fires and laid protective foam on unburned structures for several hours. Two water tenders were ordered to the impacted area to shuttle water to the fire companies. These tenders systematically began checking fire hydrants until one was found with enough pressure to fill the tanks. Eventually, water tenders had to fall back to the hydrants at the lowest point in the system to refill.

According to the YLWD After Action Report, the water demand use for the first two days of the fire was nearly 20 million gallons above normal.

A request for service was placed to the Yorba Linda Water District (YLWD) through the Yorba Linda EOC about 2:00 p.m. YLWD personnel responded quickly and were able to make adjustments to improve the water delivery in several areas. According to the YLWD After Action Report, YLWD personnel were initially unable to access the Santiago Pump Station because of the extraordinary fire conditions. When they were able to make access, personnel determined there had been sufficient heat to cause the pump station for the Santiago Reservoir to automatically shut down. Once this occurred, the continued demand eventually drained the Santiago Reservoir, the supply for Hidden Hills and other nearby communities.

At 5:50 p.m., the YLWD requested three fire engines assist them in supplementing the water grid system at Manzanita Avenue and Smoke Tree Avenue. Additionally, two mobile water pumps were brought in from the Laguna Beach County Water District and the Santa Margarita Water District. They supplemented water supplies at the reservoirs serving the impacted areas. YLWD's efforts took several hours to complete; its personnel worked through the night and into the following day to ensure a secure water supply.

Water District Task Force

On January 20, 2009, the OCFA's Emergency Planning and Coordination Battalion Chief (Ferdig) attended the first meeting of a task force organized by the Water Emergency Response Organization of Orange County (WEROC). This organization coordinates and supports comprehensive emergency preparedness programs for the Orange County water industry.

The task force is to create a Water Utility and Fire Department Coordination Template for water agencies along the WUI. The template would include—but would not be limited to—areas such as water pressure zones, fire hydrant specifications, types of available equipment, necessary equipment, and identification of critical infrastructure in need of protection during a disaster. Some of the participating agencies on the task force are:

- Laguna Beach County Water District
- Yorba Linda Water District
- Moulton Niguel Water District
- South Coast Water District
- Irvine Ranch Water District
- City of Orange Water Department
- Orange County Fire Authority
- OC Emergency Management Bureau

The task force's goals are (1) to develop a stronger working relationship between water districts and fire agencies; (2) to develop implementation standards for use during red-flag conditions; (3) to develop a water district liaison program; and (4) to develop a standard template for providing fire agencies information about the water supply available during firefighting efforts.

The water supply template will assist each water district within the WUI to create an agency-specific plan. These plans will be tested using a tabletop exercise simulating multiple wildland fires impacting Orange County simultaneously. Refer to the **YLWD After Action Report at** http://www.ocfamedia.org/_uploads/PDF/fcfaarylwd.pdf for additional details.

Mutual Aid

The California Fire and Rescue Emergency Mutual Aid Plan is an extension of—and supportive document to—the California Emergency Plan. The plan provides for systematic mobilization, organization, and operation of necessary fire and rescue resources of the state and its political subdivisions in mitigating the effects of disasters, whether natural or man-caused.

Valley View Conservation Camp handcrew from Elk Creek, Ca

No community has the resources sufficient to cope with any and all emergencies. Thus, fire officials must preplan emergency operations to ensure the efficient use of available resources. Basic to California's emergency planning is a statewide system of fire service mutual aid. Each jurisdiction first relies upon its own resources with mutual aid resources being available from other agencies to augment local response when conditions warrant. The master Mutual Aid Plan outlines and governs what is commonly referred to as the Mutual Aid System for fire service in California.

The Mutual Aid System for fire service in California has been described by the United States Fire Administration as "unparalleled in the United States." The system is founded on the principle of fire departments providing resources to one another during times of major emergencies when a local agency is overwhelmed and does not have the ability to handle the incident on its own. The system allows resources committed to an incident to escalate from a few engines to hundreds. The State is divided into six mutual aid regions to facilitate coordination of mutual aid. Coordinators are identified at the local and national levels, under the umbrella of the Governor's Office of Emergency Services (OES) Fire and Rescue Branch.

Emergencies may reach such a magnitude as to require mutual aid resources from adjacent local, County, and State levels. Specific requests for mutual aid are processed from the local agency to the County Operational Area Coordinator. OCFA is the coordinator for the Orange County Operational Area. From the County, the request goes to the Regional Coordinator (LACO) and then to the State Coordinator (OES), if necessary. Each ascending level has access to greater numbers of firefighting resources from throughout the State.

During most wildland fires, mutual aid resources are requested and assembled in preparation for anticipated strategic actions. However, with fires that rapidly turn into WUI conflagrations—such as the Freeway Complex Fire—little time to plan for strategic actions is available, and resources are needed immediately. This is compounded further when multiple major fires occur simultaneously. Delays can be disastrous. Oftentimes, different fires are requesting the same resources.

When the Freeway Complex Fire began, only two fires of significance were blazing in Southern California: the Tea Fire in Santa Barbara County and the Sayre Fire in Los Angeles County. These fires were burning out of control, and numerous homes were already lost when the Freeway

Complex Fire began. Numerous mutual aid requests to both fires had been filled or were pending when the Freeway Complex Fire began. The OCFA had sent a Type 1 and a Type 3 strike team—10 engines—to the Tea Fire while MetroNet cities sent three Type 1 strike teams—15 engines. Additionally, the Orange County-based Office of Emergency Services (OES) strike team—5 engines—was activated and sent to Santa Barbara County. The OCFA staffs one of the OES engines with the other four being staffed by MetroNet cities. The Sayre Fire in Los Angeles County, having started after the Tea Fire, only received one Type 1 strike team from the OCFA and one Type 1 strike team from the MetroNet cities.

Riverside County fire crews protect homes in Yorba Linda

Prior to the Freeway Complex Fire being reported, all vacancies created by the deployment of OCFA fire engines to Santa Barbara and Los Angeles Counties had been filled. This was achieved by activating the OCFA relief engine fleet and "recalling" off-duty personnel or personnel reporting for normal duty at 8:00 a.m. on November 15.

At the onset of the Freeway Complex Fire, immediate resource requests were placed for Type 1 and Type 3 strike teams beyond what could be provided by the OCFA and local agencies. In total, 35 strike teams—175 engines—of various types were ordered within the first four hours of the incident. The OCFA and other Orange County cities provided seven Type 1 strike teams and one Type 3 strike team—40 engines total. By noon, six strike teams—30 engines—had arrived from Riverside County. By 1:30 p.m., a total of 19 strike teams—95 engines—and 1 task force—6 engines—were operating on the fire. This was in addition to the 58 engines, 3 trucks, 8 patrols, and 5 water tenders that responded as single increments to the Freeway and Landfill Fires. While some resources were coming from an extended distance, prior to 2:00 p.m., 159 engines were assigned to and operating on the Freeway Complex Fire.

The early ordering of resources made it possible for 159 engines, 3 trucks, 8 patrols, and 5 water tenders to be operating on the Freeway Fire by 1:30 p.m.

The availability of resources was largely due to the lack of competition for resources from other fires. A change in the resource ordering policy after the 2007 fire siege also proved to be beneficial. This change allowed for Operational Area and Regional Coordinators to directly request up to five strike teams—25 engines—across operational area boundaries based on the closest resource concept. This was in contrast to the previous rule that permitted only one strike team to be obtained outside the regional ordering system.

Air Resources

Unless owned and operated by local government, air resources—helicopters, fixed wing air tankers, lead planes, and air attack platforms—are coordinated by CAL FIRE and the United States Forestry Service (USFS). In Southern California, the Southern Region Operations Center in Riverside is the base for this joint operation.

Air resource requests are prioritized based on factors, including threat to life and property. New fire starts receive the highest priority for aircraft, because the greatest opportunity for control is during the initial attack phase. Aircraft assigned to active fires may be diverted to a new incident unless a "no divert" order has been established. No divert orders are only established when aircraft are on fires where structures are burning or immediately threatened and there are no higher priority fires in the region.

On Friday, November 14, 2008, CAL FIRE pre-positioned four air tankers, two helicopters, and two air attack aircraft in Southern California. These aircraft augmented CAL FIRE resources of two air tankers, one helicopter, and one air attack already in place at the Hemet and Ramona airbases. The net effect of the pre-positioning of Northern California-based aircraft to Southern California was to double the number of available aircraft at each airbase.

Air Tanker dropping retardant along a ridgeline

To prepare for the Red Flag Warning expected across parts of Southern California, CAL FIRE signed a one-week contract for the DC-10 Air Tanker 910 based out of the San Bernardino International Airport. The Federal airbase in San Bernardino was also up-staffed with four air tankers, two lead planes, and two air attack aircraft. On Saturday, November 15, all State and Federal aircraft were assigned an 8:00 a.m. start time. The initial attack aircraft for the Freeway Complex Fire were dispatched at 9:35 a.m. with the first aircraft arriving at 10:10 a.m.

OCFA Helicopters 41 (HC41) and 241 (HC241) were dispatched to the Freeway Complex Fire from Fullerton Airport at 9:08 a.m. on November 15. The winds at Fullerton Airport were light and blowing offshore. After lift-off, the flight crews saw the smoke column rising from the fire in Corona was building and beginning to bend. The Santa Ana wind was having a strong influence. A 30–40-knot headwind was measured by an airspeed indication of 110 knots and a ground speed reading of 70 knots. Wind turbulence, coupled with the building low level smoke, made it difficult for the helicopter pilots to maintain visual flight conditions and make effective water drops.

Orange County Sheriff's Department (OCSD) helicopter Duke 1 also responded on the initial dispatch with the ORC helicopters. Duke 1 arrived over the fire about 9:30 a.m. but had to land to

deploy its 170-gallon bucket prior to engaging in the firefight. Duke 1 and the ORC helicopters were initially using the lake and water hazards of the Green River Golf Course as their water source. The buffeting wind soon made hovering to fill the bucket and water tanks too hazardous. A ground-based water point was established, so the helicopters could land and be filled safely.

OCFA helicopter uses a snorkel to refill its water tank.

Incident commanders on the ground quickly recognized the need for additional aircraft. At 9:19 a.m., they ordered one air attack, two air tankers, and two additional Type 2 helicopters. At 10:10 a.m., these air resources arrived over the Freeway Complex Fire. The aircraft order was augmented once again at 10:10 a.m., with an order for one lead plane, three air tankers, and four Type 2 helicopters.

Helicopters may fly at sunrise and up to 30 minutes after sunset. On the first day, all initial attack aircraft flew the maximum possible hours. Around 8:30 p.m., the aircraft were released to their home bases. Mandatory work-rest cycles for pilots demand they receive eight hours of uninterrupted rest before flying again. This meant the earliest a pilot could take off to return to the fire on Sunday, November 16, was about 6:00 a.m. With the preflight inspection time, flight time to the helibase, and briefing time once there, an 8:00 a.m. start time was projected for all assigned helicopters. By 9:00 a.m., all assigned helicopters were flying over the fire.

OCFA helicopter coming in for another load of water.

By the conclusion of the Freeway Complex Fire, 17 firefighting helicopters had been assigned. These were supplied from local, state, and federal agencies, as well as helicopters from private vendors that were on a call when needed (CWN) contract basis. During the first six hours of the Freeway Complex Fire, OCFA helicopters dropped 48,400 gallons of water and foam. By the end of the second day, a total of 88,000 gallons had been dropped. During that same two-day period, 12 fixed wing air tankers with four lead planes operating from the San Bernardino and Hemet air bases dropped 208,791 gallons of retardant. The DC-10, Air Tanker 910, made a record-setting ten air drops applying a total of 109,445 gallons of retardant in the Yorba Linda and Chino Hills areas.

All aircraft orders were filled for the Freeway Complex Fire. However, one Federal helicopter was diverted to a new fire start while it was awaiting demobilization from its base. The availability of air resources greatly differed in comparison to the 2007 Santiago Fire, where much of California's airborne fire suppression resources were already actively engaged in firefighting efforts—or were grounded due to severe wind conditions.

Air tanker lays a retardant line in front of the fire to slow its forward progress.

Logistics Support

The Incident Command System (ICS) has proven itself valuable in managing emergency incidents worldwide. ICS is a flexible, scalable response framework where firefighters from various agencies, who may not routinely work together, can fight major incidents through standard response and operation procedures. A critical component of ICS is the logistical support function. This effort can be compared to establishing and maintaining a small, temporary city designed for the sole purpose of supporting all the needs of an incident. In the case of the Freeway Complex Fire, the proximity of the fire to several hundred Yorba Linda homes and the near 70 mph winds made it apparent that the logistical needs for this incident were going to be significant and challenging.

The Incident Base takes shape in Irvine Park.

The extreme weather conditions and the potential for loss of lives and structures made it clear full implementation of the Logistics Section (LOGS) would be required. ORC Battalion Chief Runnestrand was ordered as the Logistic Section Chief for the Freeway Complex Fire. Personnel from the OCFA Service Center provided much-needed logistical support with water, food, and deployment of a logistical cache that is stocked and ready for immediate use. The cache included 10,000 feet of wildland hose, foam, tools, and medical supplies. Within the first hour, an order was placed for 500 sack lunches. This order was increased to 2,000 within the next hour.

The Logistics Section from CAL FIRE Incident Command Team 6 eventually assumed all logistical needs for the Freeway Complex Fire. The Logistics Section Chief, his Deputy, and the leaders for each of the six logistics units blended effortlessly with OCFA personnel who had already begun the logistic coordination. The decision was made to keep this blended effort throughout the fire, which was another lesson learned from the 2007 Santiago Fire.

Initially, the Yorba Regional Park was designated as the incident base due to its proximity to the fire. As the fire threatened the City of Yorba Linda, and before the base had been completely established, the decision was made to move it to Irvine Regional Park. This facility had been used in previous incidents and was familiar to the OCFA logistics team. Additionally, the park's size, parking, and convenient access to major freeways better met the demands of the nearly 4,000 personnel and equipment assigned to the incident. Overall, the support needs were met in an effective and efficient manner.

The success of LOGS on the Freeway Complex Fire was largely the result of the support, cooperation, and hard work of individuals representing the Orange County Sheriff's Department, Irvine Regional Park staff, Citizens Emergency Response Teams (CERT), and numerous vendors

and businesses throughout the area, along with the exemplary training and professionalism of the firefighting personnel.

The following six units combine to make the Logistics Section for a major incident such as the Freeway Complex Fire:

The **Food Unit** set up a mobile kitchen, allowing the serving of breakfast by the second morning. Until that was established, a mobile catering vendor was used to provide hot meals. Separate contract vendors provided sack lunches to meet the demand for on-the-line feeding of suppression crews and base personnel. Due to the more than 3,800 firefighters needed for this fire, the kitchen was unable to meet the meal demands in a timely manner and was augmented by the catering vendor. This solution met the needs of the incident efficiently and effectively.

The **Medical Unit** is tasked with providing everything from basic First Aid to advanced life support for incident personnel. A Medical Plan was published in the Incident Action Plan (IAP) and was followed successfully. No deaths or major injuries were reported on this incident. Contributing to the smoothness of this operation was the proximity to urban medical facilities and the training of many firefighters as Emergency Medical Technicians or Paramedics.

The **Communication Unit** provides the radio, pager, and Internet communication needs of the incident. Because of the mix of resources from within the County and beyond, a communications radio frequency patch was established allowing for shared radio communications with those having VHF radios and those with 800 MHz radios. This greatly enhanced communications and contributed to the safety of on-the-line resources in the early portion of the incident. Once the radio cache of 200 radios from the National Interagency Fire Cache (NIFC) arrived, the communication plan was transitioned to VHF radios for the remainder of the incident. The OCFA Logistics/Communications trailer was useful as a mobile office space to secure, protect, and deploy the equipment. Later, it became the on-site dispatch facility for the incident.

The OCFA Communications trailer supports incident communications.

The **Supply Unit** orders and disburses supplies necessary for the incident. Everything from the requests for fire engines and aircraft to the purchase of sleeping bags and batteries is funneled through this unit. Staff from the OCFA Service Center was invaluable in providing early support and assistance. The wildland cache—a predetermined complement of tools, equipment, and supplies stocked by the OCFA and available for immediate use—was brought to the base. It provided needed resources until the larger cache from South Operations arrived.

The **Facilities Unit** creates and maintains the physical layout of the incident base camp. Consideration must be given to all aspects of supporting the incident. Included are the staging of operations; maintaining and repairing of apparatus; feeding and housing of assigned personnel,

including the special needs of inmate crews; providing suitable working space for the administrative and support positions including—but not limited to—the Incident Command Post (ICP); and providing showers, laundry, and other support functions for personnel assigned for extended periods.

The Facilities Unit on the Freeway Complex Fire benefited from several factors in creating an efficient base camp. A pre-existing agreement with Irvine Regional Park and the familiarity with the layout coupled with the outstanding cooperation with the park staff, made for a quick and painless setup. The close proximity to the OCFA's RFOTC allowed for a sharing of assets—especially early on—that normally would not be considered. The CERT personnel filled many roles within this unit and clearly contributed to its success. Finally, the Orange County Sheriff's Department's command vehicles (Samantha 1 and 2) were put to good use and were greatly appreciated.

The Facilities Unit on the Freeway Complex Fire created an efficient base camp to support the needs of more than 3,800 personnel.

Incident Communications

During the first 24 hours of the Freeway Complex Fire, incident radio communications were initiated using the County of Orange 800 MHz Countywide Coordinated Communications System (CCCS). The fire service in Orange County has been on the 800 MHz System for the past 20 years. Since 1999, it has been the countywide network shared by all public safety agencies in Orange County. Over 16,000 mobile, portable, and base station radios are on the system servicing fire, law, public works, and lifeguard agencies throughout the County. All mobile and portable radios have common channels for inter-agency communications.

The 800 MHz CCCS has proven to be a highly sophisticated and reliable communications system for the public agency users in Orange County. Several other fire and law agencies throughout Southern California use radios with common national 800 MHz frequencies—the same as those used on the Orange County system.

The 800 MHz radio system was well-used by all first responders. A total of 78,892 transmissions were conducted midnight-to-midnight on November 15. This represents the seventh busiest day in the history of the 800 MHz CCCS. Only one "busy" event—all channels were busy—occurred during this time. On November 16, usage dropped to about 63,000 transmissions, as fire agencies transitioned much of their radio communications to the VHF (Very High Frequency) radio channels provided by the CAL FIRE IMT. All 800 MHz radio systems remained operational, although some fire damage was sustained at two radio sites.

During the fire, the 800 MHz system was never at full capacity. Despite the intense communication needs, the 800 MHz system's design assured excess capacity was always available. The system was designed and built to handle high volume radio traffic as experienced during the 2007 Santiago Fire. **Table 7** below provides a comparison of a normal daily 800 MHz radio system number of transmissions. The comparison date of November 15, 2007, was chosen simply as the same time of year and a non-major fire day.

Table 7: Total Number of 800 MHz CCCS Transmissions
(All Disciplines Countywide)

Date – 2008	Number of Transmissions	Date – 2007	Number of Transmissions
November 15	78,892*	November 15	57,184
November 16	63,719	November 16	56,522
November 17	58,099	November 17	52,601
November 18	57,552	November 18	44,703
November 19	58,474	November 19	50,141
November 20	54,951	November 20	53,615
November 21	59,878	November 21	52,769

*This day represented the seventh busiest day in the history of the 800 MHz CCCS.

As indicated in the table above, the first 24 hours of the incident were the busiest. An approximate 38 percent increase in radio traffic occurred on the 800 MHz Radio system as compared to the

same dates in 2007. This activity level started to decrease as the CAL FIRE IMT arrived. The IMT used the VHF radio system for major incident radio communications. As the incident continued to expand, an order was placed for the National Incident Fire Cache (NIFC) to support the large number of resources responding from various agencies throughout the state.

The NIFC cache includes radios, repeaters, and common frequencies standard to all fire agencies throughout the country. All Orange County fire agencies maintain radios common to the system used with the NIFC radios on VHF spectrum. The NIFC cache maintains over 40,000 radios available for use during major incidents, such as Hurricane Katrina, earthquakes, and multiple fires as in the October 2007 fire siege. Resources responding are also required to have VHF radios as part of their mutual aid response equipment. Standard training on the operation and support of the NIFC system assigned to major incidents is provided throughout the year and throughout the country. The change in radio systems occurred on Sunday, November 16, at 7:00 a.m., the second day of the fire, during the morning shift change.

As of Sunday, November 16, 800 MHz radio transmissions were slightly higher than normal and remained at that level throughout the duration. As the fire progressed and more out-of-area resources arrived, most of fire communications had been moved to the VHF radio channels. Although, the 800 MHz radios was still being used by the OCFA and other Orange County agencies for supplementary communications.

A radio "patch" had been initiated between the VHF "Orange County Access" channel and the 800 MHz "4C" talk group on November 16. Radio patches connects two different radio systems operating on different frequency bands, allowing for seamless communication. This allowed any VHF radio being used at the incident to communicate with command staff operating on the Orange County 800 MHz system (Channel 4C). This patch remained operational on the command channel until the end of incident. Feedback from communications staff assigned to the incident indicated this worked well, including in places where the incident radio repeaters did not work.

Personnel using VHF radios made early reports indicating they were unable to make contact with those using 800 MHz radios. This was mainly due to the radio "patch" frequencies not yet being in place. The problem was corrected once the patch was established. This concern and others regarding user familiarity and training are being addressed by an After Action Communications Committee comprised of representatives from CAL FIRE and OCFA.

Additionally, a number of reports of VHF radios not being able to cover specific areas in Carbon Canyon were received by the communications staff. This problem is inherent in the area for all wireless communications, due to the deep and narrow canyons. This problem was corrected by placing a manual repeater in the Carbon Canyon area of Sleepy Hollow. Coverage and interoperability is always a safety concern when mixing radios from different systems with different users. Commanders and supervisors had to take extra precautions to ensure any emergency radio traffic would be heard and acknowledged.

Several of the 2007 Santiago Fire After Action Report communications recommendations were implemented for the Freeway Complex Fire with good success:

- A total of 32 relief engine/strike team communications kits were in place. Each kit contained the necessary radios and pagers for use by emergency crews assigned to surge fire engines activated during the incident.
- Every OCFA first responder apparatus was provided with VHF radios compatible with state and federal resources communications.
- An 800 MHz to VHF radio patch was set up on the Command Channel for interoperable communications among all agencies responding.
- Satellite data communications was set up at the incident base in the early stages of the incident.

Emergency Operations Center

The Freeway Complex Fire impacted a vast geographical area, including several cities and counties. The cities of Anaheim, Brea, Chino Hills, Diamond Bar, and Yorba Linda activated their Emergency Operations Centers (EOC) as the fire moved into their communities.

The Yorba Linda Assistant City Manager activated the EOC at approximately 12:45 p.m. on November 15. City personnel with EOC responsibilities were called back to help staff the center. The OCFA dispatched Battalion Chief Valbuena to the Yorba Linda EOC at 12:30 p.m. to serve as an Agency Representative to provide fire information and situation status in support of EOC operations. Two OCFA Fire Prevention personnel were also sent to assist the Agency Representative and help with structure damage assessment. Additionally, the Yorba Linda Water District (YLWD) sent a representative to act as liaison to the City of Yorba Linda's EOC. Both OCFA and YLWD representatives worked jointly to address the water supply problems that occurred during the fire. These jurisdictional EOCs assisted with coordinating local issues in cooperation with the County EOC, such as evacuation of residents, coordination of evacuation centers, street closures, coordination with school districts and businesses, and coordination of local government resources.

With the initial activation of the City of Yorba Linda and the City of Orange EOCs, and the predicted fire activity of the Freeway Fire, the County of Orange Operational Area EOC was activated on Saturday, November 15, 2008, at 11:00 a.m.

Early in the incident, the Operational Area EOC was activated to support the roles and responsibilities of the County of Orange. This activation requires personnel pre-identified to the policy group and other personnel trained in support functions to be contacted. The personnel responds to the EOC located at the Orange County Sheriff's Department's Loma Ridge Communications Facility near the City of Orange. Representatives from the County Executive Office, Orange County Public Works, Orange County Sheriff's Department, Probation, OCFA, Orange County Waste and Recycling, Health Care Agency, Social Services Agency, and the County Emergency Manager make up the policy group. An EOC Liaison, Public Information Manager, and various staff supported the policy group. This group was faced with several decisions during the EOC activation, including health issues related to air quality, evacuation of residents, closure of major roadways, and identification of shelter needs.

The County EOC- Policy Room

One of the first tasks completed by the Emergency Management staff was to notify the Chair of the Board of Supervisors, the Emergency Management Council, the Operational Area Executive Board, Operational Area Members, County agencies, and the State Office of Emergency Services of the incident.

The general public was kept informed through press releases, media interviews, and jurisdictional websites. This was the first test of the new Operational Area EOC website. The website served as a critical point for information distribution. Public information was actively managed via the website, including the dissemination of 25 news releases and/or media advisories and regular press briefings.

An additional method of releasing pertinent information to the public was the new County mass notification system, AlertOC. AlertOC was used during the EOC activation on behalf of the City of Yorba Linda. The request for the County to activate this system came at 3:52 p.m., and the message was issued at 4:09 p.m. The system was used to alert residents in the immediate path of the fire to evacuate the area.

The Orange County Social Services Agency, American Red Cross, and the Orange County Department of Education all collaborated and helped coordinate the opening and management of evacuation shelters for residents affected by the fire. The shelter locations included Katella High School, Valencia High School, and the Brea Community Center. Two other shelters—Travis and Esperanza—were initially opened, but they had to be closed due to the impact of smoke. Over the three days these shelters were opened, they registered over 919 individuals—with 229 evacuees staying in the shelters overnight and nearly 1,320 meals provided.

A Local Assistance Center was established near the affected population of the Freeway Complex Fire. The City of Anaheim graciously hosted the Local Assistance Center at the East Anaheim Gymnasium. This location was large enough for public, private, and non-profit agencies to come together and provide assistance to the local residents and businesses.

Orange County Community Resources, Animal Control Division, assisted with the establishment of animal shelters. The Orange County Animal Shelter was opened to accept small animals, while the Los Alamitos Race Course and the Huntington Beach Equestrian Center were opened to accept large animals.

Early on, the EOC Manager requested County counsel to create an emergency proclamation in accordance with County of Orange ordinance and the Operational Area Emergency Plan. The local proclamation was signed on Saturday, November 15, 2008. The State of California was informed of the signed emergency proclamation and that Orange County was requesting a State Gubernatorial Proclamation and Federal Declaration of Emergency. The Governor issued a State Proclamation late Saturday, November 15; however, a federal declaration was not issued until Monday, November 17.

Governor Schwarzenegger receives a briefing.

The 2008 Freeway Complex Fire challenged the County Emergency Operations Center on a different level than the 2007 Santiago Fire. During the Freeway Complex Fire, the County's main responsibility revolved around operational area coordination and mutual aid support. The lessons learned during the Freeway Complex Fire will improve the County's coordination of information

and resources during a major incident or catastrophic event. As staff to the Emergency Management Council and the Operational Area Executive Board, the Sheriff's Department Emergency Management Bureau will ensure enhancement of existing plans, procedures, training, and response.

By the end of the incident, the cities of Yorba Linda, Brea, Anaheim, and Chino Hills and the County of Orange Operational Area had all declared a local emergency. Additionally, due to fire and/or smoke conditions, the Brea Olinda Unified School District, Placentia Yorba Linda School District, Anaheim Hills Montessori, Calvary Christian School, St. Angela Merici Catholic School, St. Francis of Assisi Catholic School, Christian Preschool and Elementary School, and the St. Joseph Catholic School and Preschool were closed for one or more days.

The cost for the response to the Freeway Complex Fire for the County's EOC, Orange County Sheriff's Department field response, and Orange County Public Works Storm Center and field response along with the damages sustained to the Brea Olinda Landfill are currently estimated at $3,585,000. The Operational Area EOC was officially deactivated at 7:00 p.m. on Monday, November 17. Refer to the **Orange County Sheriff's Department After Action Report** at http://www.ocfamedia.org/_uploads/PDF/fcfaarocsd.pdf for additional details.

Media and Public Communications

The Corporate Communications Section was responsible for disseminating information and handling public relations during the Freeway Complex Fire. This included the responsibility for the activation of the Media Center, conducting the Public Information Officer (PIO) function for the incident command, updating of the OCFA website, and handling inquiries from elected officials. OCFA Board of Directors and City Managers were issued advisories via email. The advisories kept board members informed and allowed them to make inquiries to the Corporate Communications Battalion Chief. With the extreme fire behavior, rapid spread, and threat to homes, the OCFA new there would be great media interest.

The OCFA Media Center was activated soon after the start fire. Personnel were called back to duty and were answering telephone calls by 10:00 a.m. Staffed by four personnel from Community Relations and Education in the first couple of hours, additional professional staff from Finance, Fire Prevention, and Human Resources were put into service answering calls by noon the first day. The Media Center staff was further supplemented with two personnel from CAL FIRE. Their PIO experience was invaluable as they were able to assist OCFA personnel in handling media inquiries and by answering calls from the public. From the onset on November 15 until the fire was declared fully controlled on November 19, the Media Center received over 6,000 calls from the public and the media.

Communications between the OCFA Media Center and the Orange County Emergency Operations Center (EOC) was efficient throughout the incident. A total of 25 press releases and media advisories with information on evacuations and road closures were issued in a coordinated fashion between the Media Center and the EOC.

Reporting the Fire

OCFA was able to assign a Community Education Specialist to the Disaster Center established for Yorba Linda residents. The Education Specialist distributed informational fliers and was able to answer questions from the community. On the third and fourth day of the incident, the Community Education Specialists also conducted school programs for the entire school population of two of the elementary schools in Yorba Linda. The programs educated the children on the disaster in their community and helped to allay their fears. The school programs were very well received by the students and faculty.

The OCFA website (www.ocfa.org) received almost 1.4 million inquiries during the first day of the incident. Nearly 5 million inquiries were made from November 15 through November 25, 2008. Prior to November, the average number of inquiries to the website was 25,171 per day. The website was a key source of information about the fire. OCFA personnel provided updates to the website as often as possible. A fire progression map was uploaded every 12 hours. Only a small number of personnel were available to perform website updates, and the updating was a slow and cumbersome process. At times, fire and evacuation information needed updating, but qualified personnel were not available. Complaints were received about the freshness of website

information and the difficulty of navigating through the site as well as conducting information searches.

OCFA was also in the midst of a PIO transition at the time of the Freeway Complex Fire. The newly selected PIO was not scheduled to start his assignment and was on vacation at the beginning of the incident. The Corporate Communications Battalion Chief served as the initial point of contact for media inquiries. To gather information, he responded directly to the Incident Command Post that had been established at the Green River Golf Course. All media inquiries were referred to him, and the number of cell phone calls being received was overwhelming. This made it extremely difficult to communicate with the Media Center and delayed getting updated information relayed. Around noon, a Fire Prevention Specialist was assigned to answer calls and handle all communication with the Media Center—while the Battalion Chief provided media interviews.

OCFA Assistant Chief of Operations
Mark Kramer briefs news crews.

The rapid spread of the incident and the difficulty in communications between the field and the Media Center lead to some confusion. Incongruent information ended up being disseminated to the media. Additionally, the media became aware of water supply issues on the incident prior to field PIOs and the Media Center; this contributed to the confusion and inaccurate information.

The Incident Management Team PIO arrived early in the afternoon the first day. The PIO transition meeting was attended by the Chino Hills Fire District PIO, CAL FIRE – Riverside County PIO, Anaheim City PIO, and Anaheim Police Department PIO. Coordination between CAL FIRE – Riverside County, the IMT PIO, and OCFA was good throughout the incident.

The OCFA PIO returned from vacation upon learning of the Freeway Fire and arrived at the incident at around 10:00 p.m. the first day. Since the incident had already been transitioned to the IMT, the OCFA PIO was assigned to the base camp and worked with the pool of PIOs who were already assigned. The OCFA PIO worked the night shift. However, it would have been more advantageous to have the OCFA PIO work during the day because of his knowledge and familiarity with the local media. After the first day, most of the media inquiries came during the day.

Fire Investigation

The Freeway Fire originated in Riverside County near the 91 Freeway and the Green River off-ramp in the City of Corona. The area of origin is the jurisdiction of CAL FIRE; therefore, CAL FIRE investigators assumed the responsibility for the fire investigation. The preliminary fire cause is reported as accidental. The preliminary cause may be the result of a vehicle exhaust system igniting roadside vegetation. The fire investigation report is expected to be complete by the end of March 2009.

CAL FIRE arson investigators search the area of origin of the Freeway Fire for evidence.

The Landfill Fire, investigated by the Brea Police Department along with investigators from the OCFA, was determined to have been caused by inadequate maintenance of power lines supplying electricity to equipment in an oil field. The electrical lines are owned by Breit-Burn Management Company in Los Angeles. Investigators believe arcing or a discharge of current from the power lines caused the brush near the lines in the fields northeast of Valencia Avenue and Carbon Canyon Road to ignite.

The origin of the Landfill Fire is seen behind the homes in the City of Brea.

Volunteer Groups and Resources

Many volunteer groups assisted during the Freeway Complex Fire in various capacities. Major volunteer groups included:

- American Red Cross
- Salvation Army
- Community Emergency Response Team (CERT)
- OCFA Chaplains
- Trauma Intervention Program (TIP)

These volunteer groups provided invaluable assistance to a wide variety of non-suppression and incident support activities. The positive attitude, helping nature, and initiative of these groups were recognized and appreciated by OCFA staff, the Incident Command staff, and those who responsible for supervising and managing various support functions.

The American Red Cross is the lead agency responsible for establishing and staffing evacuation centers during disasters and other major emergencies requiring evacuation of large numbers of residents. During the Freeway Complex Fire, three evacuation shelters were established. The first was at Valencia High School in the City of Placentia; the second at Katella High School in the City of Anaheim; and the third at the Brea Community Center. While these shelters were in operation, 202 volunteers and staff worked, 919 people registered, and 1,320 meals were served—along with numerous snacks. All three shelters were opened Saturday, November 15 and closed Monday, November 17.

Evacuated residents are served dinner at one of the local high school evacuation centers.

The Community Emergency Response Team (CERT) Program educates people about disaster preparedness for hazards impacting their community. CERT trains people in basic disaster response skills such as fire safety, light disaster and rescue, team organization, and disaster medical operations. Using classroom and field exercise training, CERT members assist others in their neighborhood or workplace following an event when professional responders are not immediately available to help. CERT members also are encouraged to support emergency response agencies by taking a more active role in emergency preparedness projects in their community. CERT is part of the Federal Government's Citizen's Corp Program. More than 150 volunteers and 38 partner agency staff assisted with the American Red Cross response.

The CERT Mutual Aid Program (CMAP) is an organization of Orange County CERT jurisdictions and citizen volunteers. They are dedicated to collaboration and coordination of volunteer activities in a disaster response. Jurisdiction coordinators and volunteers are governed and supported by a mutual aid agreement, approved in August 2008 by the Orange County Executive Committee and

added to the County's emergency response plan. The mutual aid agreement identifies the CMAP organization and outlines the course of action to be taken to activate Orange County volunteers.

The request for the activation of CERT volunteers for the Freeway Complex Fire was based on a previous use of volunteers during the October 2007 Santiago Fire. In the early morning hours of Sunday, November 16, a request from the Orange County EOC was received to activate mutual aid volunteers to the Irvine Regional Park base camp. Calls were made to CMAP Coordinators to begin the process of volunteer and equipment activation. Agencies affected by the fires (Anaheim, Fullerton, and Placentia) activated CERT members within their own jurisdictions.

CERT volunteer assists in directing resources at the Freeway Complex Fire Incident Base.

During the Freeway Complex Fires, 254 civilian volunteers covered 168 hours of activation at the Irvine Regional Park base camp. Volunteers worked shifts ranging anywhere from 4 to 12 hours. Coordinators were present for all shifts. Support roles included traffic safety management at base camp and assisting in strike team demobilization. A request was made to fill CMAP volunteer shifts from Sunday, November 16, to Wednesday, November 19, with a possibility of expanded volunteer coverage to Friday, November 21. CMAP operational periods were selected by CERT Coordinators. The CERT Coordinators worked 12-hour shifts (4:00 p.m.–4:00 a.m. and 4:00 a.m.–4:00 p.m.), and the CMAP volunteers were assigned 12-hour shifts (5:00 p.m.–5:00 a.m. and 5:00 a.m.–5:00 p.m.), with an additional 4-hour shift in the morning and evening to assist with volunteer changeover.

CMAP representatives from Newport Beach, Seal Beach, Garden Grove, San Juan Capistrano, Huntington Beach, Costa Mesa, and Anaheim responded as Technical Specialists from November 16 to November 21. Coordinators from Newport Beach, Seal Beach, San Juan Capistrano, Huntington Beach, and Garden Grove filled the 12-hour on-site shifts. Huntington Beach and Costa Mesa representatives coordinated volunteer scheduling.

Representation of CERT members included Costa Mesa (43); Newport Beach (34); Garden Grove (60); San Juan Capistrano (22); Irvine (11); Huntington Beach (24); Dana Point (10); Santa Ana (2); Anaheim (1); and West Orange County CERT, which included the cities of Seal Beach, Westminster, Cypress, Los Alamitos, La Palma, and Buena Park (47).

The CMAP organization has worked with the Urban Area Security Initiative (UASI) Grant Program since 2005. Its goal is to create regional equipment caches to support CERT programs countywide and to respond upon request. The cities of Seal Beach, Dana Point, Fullerton, and Anaheim have dedicated supplies for CMAP response. Seal Beach provided the response equipment trailer and tow vehicle for this activation—while the Garden Grove CERT program provided a volunteer rehab vehicle and radios.

On Sunday, November 16, OCFA implemented its Occupant Liaison Program. OCFA personnel with fire department vehicles were assigned to the American Red Cross Centers and went into the fire areas to support the citizens of Yorba Linda. The Occupant Liaison Program provides customer service for information, coordination, and comfort to individuals experiencing emergency incidents such as fires, floods, mudslides, or any other type of incident resulting in the displacement of the occupants from their residences or places of business. Four Occupant Liaison Teams—comprised of an OCFA Fire Prevention Inspector, a Trauma Intervention Program (TIP) representative, and an OCFA Chaplain were available.

The Trauma Intervention Program (TIP) is a non-profit volunteer organization of specially trained citizen volunteers. They provide immediate emotional and practical support to victims and their families following a tragedy or traumatic event. TIP provided volunteers to the OCFA Occupant Liaison Teams. They were invaluable in assisting with counseling residents who had been evacuated or whose homes were damaged or destroyed.

The Salvation Army is a non-profit organization with a history of providing services and programs during times of disaster in Orange County over the last 100 years. Its community services also include transitional housing, emergency shelters, counseling, and responding to emergency disasters. Over the last couple of years, the Salvation Army has responded to many local disasters including the Santiago and Freeway Complex Fires. Through the mobilization of over 100 volunteers, the Army provided assistance to those affected by the disasters with food, clothing, and counseling, as well as services provided to first responder fire and law enforcement personnel. The Army mobilized its Emergency Disaster Canteens providing food, beverages, water, and a variety of personal items. The Salvation Army responds to emergency disaster events by providing a myriad of equipment, supplies, and volunteers.

OCFA has a long-standing and very active volunteer Chaplain Program. Members of the Chaplain Program were an important piece of the Occupant Liaison Team. They were on-hand and available to support and assist residents with their spiritual needs during this crisis. They also helped with other non-suppression support duties.

Many other accounts of individual volunteers providing assistance during the Freeway Complex Fire abound. Having trained, qualified, and eager volunteers who are capable of assisting in non-suppression activities freed up full-time firefighting personnel. In turn, they could focus solely on fire suppression efforts. Additionally, they assisted in providing human services, aid, and comfort to evacuated residents and those whose homes were damaged or destroyed. The contributions and assistance of all volunteer groups and the individual volunteers were invaluable.

Fiscal Impacts

Each year, the OCFA establishes cost reimbursement rates. They are used to bill for personnel and equipment resources requested on an assistance-by-hire basis by state, federal, and other agencies needing OCFA services. The personnel rates are based on budgeted salary and benefit costs. Also included are indirect costs such as financial services, purchasing, and human resources. Equipment rates are based on rate schedules provided by CAL FIRE and the Federal Emergency Management Agency (FEMA). These rates recover OCFA's costs when assisting other agencies or when an OCFA incident is declared a major incident subject to public assistance funding.

Public assistance funding is authorized by the Stafford Act and funded through FEMA. The Stafford Act:

- Gives the President the authority to administer federal disaster assistance.
- Defines the scope and eligibility criteria of the major disaster assistance programs.
- Authorizes grants and direct assistance to the states.
- Defines the minimum federal cost-sharing levels.

As of January 31, 2009, OCFA's costs from the Freeway Complex Fire are estimated at $2.3 million. Due to the magnitude of the fire, both FEMA and the State's Office of Emergency Services (OES) declared the Freeway Complex Fire as a major incident. They offered to provide public assistance funding to the participating agencies.

Following guidelines for federal public assistance, on November 20, 2008, a Local Government Fiscal Responsibility Agreement was made between CAL FIRE, FEMA/OES, and OCFA concerning reimbursement of resources for the Freeway Complex Fire. Based on the Local Government Fiscal Responsibility Agreement, OCFA expects reimbursement of approximately 94 percent of costs associated with the fire. **Table 8** below shows costs and the source of anticipated reimbursements.

Table 8: OCFA Cost Reimbursement

Reimbursement	FEMA	CAL FIRE	OES	Total
Claim Submitted	$527, 210.20	$1,575, 775.84	$184,670.07	$2,287,656.08
Estimated Percent of Reimbursement (%)	93.80	100	100	
Estimated Total Reimbursement	$494,523.17	$1,575,775.84	$184,670.07	$2,254,969.08
OCFA's Share	**$32,687.03**	**$0.00**	**$0.00**	**$32,687.03**

Recovery Efforts

As the Freeway Complex Fire was being controlled, efforts began to address the post-fire risk to lives and property that could arise during the coming rainy season. The combined effects of vegetation loss and the effect on soils from fire, created conditions greatly increasing the threat of floods, erosion, and debris flow in the impacted areas.

To prepare for the winter, the OCFA, along with the California State Office of Emergency Services (OES), coordinated assessments of the burned areas with Burn Area Recovery Teams (BART). These teams consisted of representatives from CAL FIRE, California Geological Survey, Department of Water Resources, Department of Fish and Game, Department of Parks and Recreation, and Regional Water Quality Control Boards. Refer to the **Burn Area Recovery Team Report** for more details— http://www.ocfamedia.org/_uploads/PDF/fcfaarbart.pdf.

The BART members conducted a rapid assessment of the fire area to identify hazards and subsequent mitigations including:

- Identifying on-site and downstream threats to public health or safety from land sliding, debris torrents, flooding, road hazards, and other fire-related problems.
- Identifying threats to watershed resources, including excessive erosion; impaired water quality; threats to wildlife, fisheries, and botanical values; and cultural resources.
- Determining measures needed to prevent or mitigate identified threats.

Sand bags in place west of Banyon Rim.

The BART report provides mitigations to reduce—but not entirely eliminate—risk from the identified hazards. Suggestions such as straw mulching and erosion control fabric or blankets, straw wattles to provide a mechanical barrier to water flow and trap sediment, hydro-mulching in selected areas, and K-rails to direct water run-off, if used properly, are very effective.

The following are some of the recommendations for specific areas from the BART report:

- Where possible, drainage basins be expanded and cleaned of all debris. Adequately sized culverts should be placed within the debris basins so flood waters will be discharged effectively. Residents are discouraged from using plastic ground covers: they cause an acceleration of water runoff within the burn area.

- The Ranch in the Olinda Village area will require a large soil berm, K-rail, or rip-rap to direct watershed discharge around the threatened property.

- In general, residences located at the base of the hills in Chino Hills, Yorba Linda, and Brea should take precautions to limit impacts of future rainfall through the use of K-rail,

sandbags, or other flood prevention barriers. Additionally, keeping existing culverts free of debris would be a priority to ensure proper drainage.

- Expect higher than normal watershed discharges with possible debris flow in all rain events for the next two or more rain seasons.

- Specific areas along the BNSF railroad were addressed: Box Canyon and Horse Shoe Bend. An early warning monitoring system with various monitoring points along the hillside above the railroad is advised. Additionally, a minimum of three debris basins should be constructed around Horse Shoe Bend. This will ensure debris is collected prior to making contact with the railroad tracks.

- Emergency evacuation plans should be implemented for all communities within the burn area.

- Any dead/fire burned trees and vegetation and live standing trees that could cause damming or choking of debris in creeks or drainage basins should be removed immediately. A plan should be developed and approved by appropriate agencies to remove problem vegetation for any remaining downstream areas.

- All county, private, and state roads and trails should be monitored for washout and debris flow during and after precipitation events.

- The Chino Hills State Park should be monitored for debris and sediment flows during and after rain events, as large amount of debris may flow into the sediment basin reservoir and cause erosion along roads, bridges, and trails.

Use of K-rail to channel future debris flow around homes.

Resident's preparation for possible mud and debris flow proved to be beneficial.

A moderate to heavy rainstorm was predicted for the Orange County area on November 26–27, 2008. Predicted rainfall amounts ranged from 1.5 inches to 2.5 inches. The OCFA began preparations for the possibility of mud and debris flows by working closely with the local communities of Yorba Linda, as well as the Santiago Fire areas. Evacuation plans were coordinated with local government and law enforcement in the areas directly impacted by fires.

The three main objectives for the OCFA were to (1) provide incident management and support if significant flooding and debris flow occurred in the burn areas, (2) coordinate weather-related calls for service with the City of Yorba Linda, and (3) assist with the timely and orderly evacuation of residential areas as necessary.

The following OCFA resources were pre-staged to reduce reaction time and get needed help to any impacted areas quickly. The augmented resources were staged at the Yorba Linda Community Center.

- An Incident Management Team
- One Bulldozer
- Two Swift Water Rescue units
- One Handcrew
- One Type 3 Strike Team
- Two Reserve Patrols: 10 and 32

Dozer clearing mud off the street following the rains that hit the fire consumed areas of Yorba Linda.

The City of Yorba Linda and its residents played a significant role in preparing for the rain event. While fire crews were continuing to overhaul the burn areas, community efforts were underway to fill, distribute, and place sandbags, straw bales, and other mitigation efforts. This effort also drew volunteer participation from across the city, as well as from other cities across the county.

Major Challenges

- Over the last decade, Southern California has experienced eight years of drought conditions, contributing to an increase in dead fuels, explosive and dryer fuels, and more intense fire behavior.[2]

- A sustained Santa Ana wind event contributed to two significant fires starting less than two hours apart in the same area of Orange County. The extreme winds, rapid fire spread, and urban interface environment created a wide fire front. This had a major impact on resource availability.

- Houses with unprotected vents and other openings became vulnerable to ember intrusion. Raging winds turned burning fuel into an "ember-storm," threatening at-risk homes in the fire's path.

- The OCFA, pursuant to a Board-adopted policy, dispatches a minimum of 18 firefighters to a single "working structure fire" (4 engines, 1 truck company, and 1 paramedic) as the necessary "Effective Firefighting Force." That ratio of firefighters to working structure fire was not possible to achieve during the Freeway Complex Fire.

- While conducting structure protection during the Freeway and Landfill Fires, interior firefighting was often needed. A Federal mandate and best practice, the "Two-in and Two-out Rule" demands that in the absence of a life safety or rescue scenario, two or more firefighters are required to conduct interior firefighting with a minimum of two additional firefighters on standby outside the occupancy ready to conduct firefighter rescue. To comply with this safety rule, four-person staffing is required on a single engine company. Since most OCFA engines are staffed with three firefighters, they were not safe nor within legal guidelines to conduct interior operations without support from a second company.

- Wind blown embers, carried aloft by the fire's thermal column, created spot fires more than a mile ahead of the main fire front. These spot fires then merged with the main flame front. This rapidly compressed the transformation time from brush fire into urban conflagration.

- The Freeway Fire and the Landfill Fire began in rapid succession and made resource tracking, command and control, and communications more difficult during the initial attack phase. Many responding agencies converged on the incident simultaneously making resource accountability extremely difficult.

- Two additional brush fires—the Landfill and Diemer Fires, in western Yorba Linda—along with the Freeway Complex Fire jumping the 91 Freeway in two places, further stretched the already taxed resources.

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[2] US Geological Survey. *Water Watch Past Stream Flow Conditions*. Accessed http://water.usgs.gov/waterwatch/?m=statesum&r=ca&w=statesum%2Cmedian on March 6, 2009.

- Two strike teams were requested by ORC Battalion Chief Reeder to stage at Station 53 in preparation of the fire's arrival to Yorba Linda. These strike teams self-diverted to Green River and the 91 Freeway.

- The incident impacted two Office of Emergency Services regions, four counties (Los Angeles, Orange, Riverside, and San Bernardino), and five emergency dispatch centers. Impacting these major geographical areas created communication, operational, and command challenges.

- The lack of common radio communications presented significant challenges. Some local agencies do not have VHF high band capability as required by FIRESCOPE. Many agencies continued to use their own radio systems or failed to follow the established communications plan. This further exacerbated the fire-ground communications problem. Additionally, the terrain in the fire area was extremely broken and mountainous--hampering radio transmissions.

- Self-dispatching of off-duty firefighters on relief apparatus to the fire presented challenges to personnel accountability and safety. In some instances, these resources were not discovered to be at the fire for 12 hours or more.

- Many mutual aid resources had difficulty navigating through unfamiliar local communities. Resources lacked a reliable mapping method of locating specific fire-impacted areas.

- The incident was run as a unified complex. It started as two fires in the same general area, and a central ordering point was established for both fires through the OCFA. The large incident culture and command structure are unfamiliar to many local agencies, creating confusion.

- An initial challenge occurred in working with law enforcement to form a unified command structure and to have a single decision maker. Prior experience on the part of the participating agencies facilitated this process.

- The conflict between state (SEMS) and national (NIMS) definitions for evacuation terminology continues to cause confusion for the media and public (mandatory vs. order/warning).

- The loss of water pressure in the Hidden Hills community and in other neighborhoods was a major challenge for the ground forces protecting threatened structures.

- More than 375 law enforcement personnel from various agencies assisted the Brea Police Department during the fire. Providing them with accurate and timely information on areas to be evacuated or repopulated was challenging.

- A rapidly developing fire that stretched over a large urban area made it difficult for the OCFA Media Center to stay current on fire conditions and information.

- Fire extinguishment efforts placed an extreme demand on the water system. Whether due to the use of master stream devices, the numerous firefighting hose lines, and/or the scores of garden hoses left running at individual homes, the demand on the system taxed the water capacity and deliverability.

- Homeowners—those remaining within the fire perimeter and those who evacuated—created traffic challenges inhibiting the movement of fire apparatus.

- The speed and unpredictability by which the fire moved through the urban interface made it challenging to stay ahead the fire and rapidly identify areas to be evacuated.

- Ornamental vegetation provided an unexpected source of fire brands the wind was able to carry deep into residential neighborhoods. Palm trees were a significant contributor to this problem.

- Wooden decks, balconies, and other unprotected structures provided an entry way for embers and flames to enter homes.

- Due to the demand to keep pace with a rapidly moving fire, a "bump and run" tactic was employed. In some cases, structures had to be left unattended after initial extinguishment, resulting in some rekindles and the loss of structures. This may not have occurred had there been sufficient units to employ an "anchor and hold" strategy.

- Fire retardant "drift" from air tankers created a major safety and post-fire clean-up challenge. Large amounts of fire retardant from aircraft was either dropped on homes or drifted far from the target due to the winds.

- The Department Operation Center (DOC) was not established until OCFA Division Chief Robinson arrived at the OCFA Emergency Command Center (ECC) at approximately 11:30 a.m. on November 15. This led to difficulty in receiving, placing, and tracking orders early in the fire.

- The presence of private fire protection services created operational challenges and a level of confusion among residents. These resources, normally sponsored by homeowners' insurance companies, currently have no operational guidelines, certification standards, and no common communications with the incident commanders.

- A Red Flag Warning or a Red Flag Fire Weather Watch had not been issued for Orange County. Wind prediction for the day was significantly different than experienced. This resulted in the OCFA not implementing its Extreme Weather Plan (SOP 209.13) or the Red Flag Alert Program (SOP 209.12). Either or both would have increased public awareness and implemented operational procedures in response to the extreme weather conditions.

- Due to the size and rapid growth of the incident, meeting all logistical needs in the early stages was challenging.

Successes

- Importantly, no loss of life occurred. Reported injuries were few and considered minor.

- Hundreds of structures were successfully protected. Low humidity and high winds made this a very dangerous time for fires in the wildland urban interface (WUI). Although structures were lost and damaged, if not for the excellent work of the firefighters and citizens who protected their homes, the losses would have been greater.

- The Unified Command Incident Management Team worked well together. Although the team was large, each agency was mindful of the others' needs. This helped create common ground on difficult issues. As challenges arose, all the agencies worked toward the common goal of meeting the incident needs.

- Coordination with law enforcement was excellent. The early integration proved to be extremely advantageous for citizen evacuation. Additionally, the placement of law enforcement personnel within Operational Branches helped reduce the lag time for evacuations.

- The advance planning and tabletop exercise given in preparation for an incident in the mutual threat zone provided for a more effective command and control.

- A smooth transition occurred from the initial attack incident commanders and the incident management team. This can be attributed to an attitude of cooperation and respect.

- Despite the radio communication problems, water supply issues, and the time required to assemble the required firefighting assets to meet the demand of this urban conflagration, personnel worked hard to contain this incident and to minimize loss.

- Interagency cooperation was effective in solving issues and obtaining necessary resources. Operationally-related activities such as traffic control, evacuation, and repopulation were easy to implement due to the close coordination between the involved agencies.

- The integration of OCFA personnel into all general staff positions provided the CAL FIRE IMT 6 with local knowledge and expertise essential to the successful conclusion. Local agency participation in strategy meetings helped obtain agency support and "buy in" for the operational plan.

- The Orange County Access Channel was used as the Incident Command Net. Thus, all ORC 800 MHz radio users, and VHF high band users, could communicate on one common channel.

- The use of OCFA's new Compressed Air Foam System (CAFS) units was highly successful. The high mobility of the units allowed for quick pick-up and redeployment. The foam lasted longer than expected and freed other resources for other assignments.

- The OCFA was able to quickly provide representatives to the County and City Emergency Operation Centers. This enabled a direct line of communication between the impacted jurisdictions and the incident command team.

- Using Community Emergency Response Team (CERT) personnel—to perform various functions within the incident base—freed fire personnel for other assignments.

- The incident was able to provide three structural engines to support the local water supply system.

Recommendations

Mitigation and Preparation

1. Continue regional planning efforts. Establish interoperable communication plans for mutual threat zones. *In Progress*

2. Develop regional operating plans (similar to Silverado Canyon Fire Plan) for high fire severity zones. *In Progress*

3. Develop a rapid attack mobilization plan that facilitates dispatch, mobilization, and situation management practices during major emergencies or Red Flag Warning conditions. *In Progress*

4. Work with local water agencies to evaluate potential threats and weaknesses to the water distribution systems and facilities housing critical infrastructure. Assist in the development of a mutual aid plan between water agencies permitting inter-agency cooperation during major emergencies. Develop contingency plans and practical exercises to test for vulnerabilities. *In Progress*

Prevention and Public Education

1. Facilitate the development and enforcement of applicable building and fire codes for fuel modification and building construction in the wildland-urban interface (WUI) environment. *In Progress*

2. Develop informational material for ornamental vegetation planting and maintenance to reduce flame spread and ember production.

3. Provide sufficient Occupant Liaison personnel to assist residents when returning to evacuated areas. Selected OCFA professional staff, when trained, may fit this role appropriately.

4. Ensure the terminology used in regard to public evacuation is commonly understood and is in conformance with SEMS/NIMS and/or FIRESCOPE to minimize confusion between public agencies.

Operations and Response

Resources

1. Complete development of a formal plan for placing "surge capacity" engines in service. The plan should address storage of the units, outfitting, communications, and staffing. *In Progress*

2. Complete the modification of five patrols to compressed air foam system (CAFS) units. Develop use and response configuration plans. *In Progress*

3. Establish a full-time fire handcrew. Handcrews are needed to meet our wildland fire suppression mission. Fire crews are consistently listed as critical resource needs during every wildland fire. *Delayed due to budget*

4. Develop and consider alternatives for staffing additional fire bulldozers when needed.

5. Develop internal staffing criteria for water tenders, patrols, and other critical resources when Reserve personnel are unable to respond. *In Progress*

6. Develop a policy pertaining to the use of privately-owned resources such as water tenders, earth moving equipment, and other support resources that may be used when offered during emergency situations.

7. Follow through with the staffing recommendations from the Santiago Fire to increase the staffing at stations with a Type III engine to four personnel. In the interim, achieve this through the use of back-fill for two months during the peak of fire season as a reasonable stopgap until this can be achieved. *In Progress*

8. Work with law enforcement to develop more effective evacuation and repopulation procedures.

Communications

1. Increase CAL FIRE Command Net radio coverage in Orange County by adding two or more additional radio repeaters. *In Progress*

2. Exercise radio interoperability in Orange County regularly. Radio users must be familiar with VHF radio operations.

3. Establish a VHF frequency group for State Responsibility Areas (SRA) in Orange County, so all responding units can operate on this group. The command and tactical nets should be established before an incident occurs. *Complete*

4. Continue efforts to equip all resources in Orange County with VHF radio capability per FIRESCOPE. *In Progress*

Incident Command/Management

1. Develop a program to increase the availability of Incident Management Team(s) for year-round response within Orange County.

2. Continue to evaluate ICS training needs and offer appropriate courses to all personnel including Command staff. *In Progress*

3. Provide periodic refresher training on the use of firing operations to all chief officers.

4. Review and consider currently available technology, such as Toughbook laptop computers, for use in all command vehicles and eventually on every fire engine. These computers

should have mapping software installed and maintained. These tools have proven to be invaluable resources on fires and provide critical information for planning and firefighting purposes.

5. Continue the development and use of ICS trainee positions to facilitate succession planning and the development of incident management teams. *In Progress*

6. Identify additional potential assignments for OCFA professional staff on major incidents. *In Progress*

7. Develop a policy for interacting with private fire protection resources.

Air Operations

1. Develop best practice staffing and deployment model for the OCFA helicopter program.

2. Develop a policy on first and best use of law enforcement helicopters. Where appropriate, assist local law enforcement agencies to obtain red-card certification for pilots, fueling operations, and helicopter use on local government fires.

3. Train and qualify additional OCFA personnel as Air Ops Branch Director (AOBD), Air Support Group Supervisor (ASGS), Helicopter Coordinator (HLCO), and Helibase Manager (HEMB).

4. Complete night vision goggle training to provide night flying capability. *In Progress*

5. Research the feasibility and local use of unmanned aerial vehicles (UAV) to facilitate mapping during smoky conditions.

6. Pre-identify helispots and water source dip sites in fire prone areas.

7. Increase mobile refueling capability for helicopters.

8. Establish a land use agreement with Corona Airport for future deployments.

9. Develop best practices for aircraft use on wildfires. Aircraft are a proven asset and, unlike ground forces, are limited by daylight flying time. Practice and policy should be developed to ensure “first light” use of all air assets.

10. Provide periodic training to Chief Officers on the use of interagency radios and communications with the aircraft command and control elements (ATGS and HLCO).

Emergency Command Center

1. Develop an operations manual for the OCFA Department Operations Center (DOC). The manual should identify critical positions within the DOC and outline critical tasks needing to be completed during a major emergency or event. *In Progress*

2. Order ECC support personnel to support incident command teams and expanded dispatch as needed. This will help with ensuring orders are placed correctly and assist the plans section on arriving resources.

3. Provide managerial support in the absence of the ECC Chief. The DOC Manager must be able to provide managerial support and operational and tactical guidance to the ECC Supervisor.

4. Empower ECC Supervisors to modify normal dispatch procedures to meet operational needs and station coverage during major emergencies.

Logistics

1. Ensure adequate fuel and equipment support is available during major emergencies.

2. Identify and pre-plan additional base camp locations for WUI fires. *In Progress*

Training

1. Provide *S-215 - Fire Operations in the Wildland/Urban Interface* course to all OCFA company officers. Include annual refresher on the use of firing operations. *In Progress*

2. Continue to train with law enforcement personnel in the complexities of extended attack incidents and unified command procedures.

3. Conduct on-site training of the Freeway Complex Fire for Chief Officers of the affected agencies.

4. Train OCFA Fire Prevention personnel to be able to function as a City EOC Agency Representative.

5. Provide training to selected professional staff to assist the Public Information section.

6. Provide WUI structure protection tactics training to all operations personnel.

7. Initiate a training program with the water districts that includes ICS/NIMS/SEMS, and with tabletop exercises.

Volunteer Groups

1. Continue the use of Community Emergency Response Teams (CERT) for logistical support. Seek additional duties they may safely perform during major emergencies.

2. Develop a policy and procedure for accepting community support and offers to help or provide resources.

Public Information

1. Improve the OCFA website so incident information is easily and readily available. The site should incorporate technology to allow for interactive maps and data search.

2. Develop procedures for initiating frequent community briefings. Topics should include incident status, evacuation information, repopulation expectations, and other relevant information of interest.

3. Conduct training with Cities regarding Emergency Operations Center activities such as evacuation and repopulation procedures, media information distribution, and public notification.

As a result of the 2007 Santiago Fire, a detailed After Action Report was written that included its own set of recommendations. Prior to the Freeway Complex Fire, many of these recommendations had been implemented and proved to be beneficial. Others are being developed and worked on by established work groups. The use of these work groups should continue, and the recommendations within this report should be distributed among them.

Glossary

AGENCY REPRESENTATIVE – Individual assigned to an incident from an assisting or cooperating agency. He/she has been delegated authority to make decisions on matters affecting that agency's participation at the incident. Agency Representatives report to the Incident Liaison Officer.

AIR ATTACK – Airplanes flying over an incident, providing tactical coordination with the incident commander on the ground, and directing air tankers and helicopters to critical areas of a fire for retardant and water drops.

ANCHOR AND HOLD STRATEGY – Structure protection tactic often used in a wildland urban interface fire. Firefighting forces engage the fire and then remain in selected areas to ensure no or limited fire starts after the passing of the fire front.

ARCING – Luminous discharge of current—formed when a strong current jumps a gap in a circuit or between two electrodes.

BASE CAMP – Location at which primary logistics functions for an incident are coordinated and administered—only one base camp per incident.

BRANCH – Organizational level having functional or geographic responsibility for major parts of incident operations. The Branch level is organizationally between Section and Division/Group in the Operations Section, and between Section and Units in the Logistics Section. Branches are identified by the use of roman numerals or by functional name (e.g., medical, security).

BUMP AND RUN STRATEGY – Structure protection tactic often used in a wildland urban interface fire where firefighting forces must keep moving ahead of the advancing fire. They attempt to control spot fires and/or provide initial knock-down of fires established within a structure.

BURN AREA RECOVERY TEAM (BART) – Team comprised of multi-agency and multi-disciplined resource specialists assembled to assess fire damage and suppression effects and to prepare mitigation measures. Upon development of a rehabilitation plan, the team makes recommendations on hazard mitigation.

BURN OVER – Wildfire situation where—because of wind-shift, topography, and/or poor planning—a person (firefighter) is caught in an inescapable fire and literally has fire burn over, under, and around him/her; this is the leading cause of firefighter deaths during wildfires.

CENTRAL ORDERING POINT – Facility or dispatch center where all personnel, supplies, and equipment requests are placed and tracked.

CHIEF OFFICERS – Agency Administrators, Fire Chiefs, Deputy Chiefs, Assistant Chiefs, Division Chiefs, and Battalion Chiefs with executive and/or management-level responsibilities.

COMPLEX – Two or more individual incidents located in the same general area that is assigned to a single Incident Commander or to Unified Command.

COMPRESSED AIR FOAM SYSTEM (CAFS) – Used in firefighting to deliver fire retardant foam for the purpose of extinguishing a fire or protecting unburned areas from becoming involved in flame. CAFS units are effective when used to pre-treat structures and vegetation with foam in advance of the fire to protect it from heat and flames.

CONFLAGRATION – Uncontrolled burning or fire that moves across natural and man-manmade barriers and threatens human life or property and the environment.

CONTAINMENT – Fire is contained when it is surrounded on all sides by some form of boundary, line, or clearance but is still burning and has the potential to jump or escape the containment line.

CONTROLLED – Fire is controlled when no further threat of it escaping outside the containment line exists.

COOPERATING AGENCY – Agency supplying assistance including—but not limited to—direct tactical or support functions or resources to the incident control effort.

DEFENSIBLE SPACE – Creating a fire safe landscape for at least 30 feet around homes—out to 100 feet or more in some areas—to reduce the chance of a wildfire spreading to structures. – Essentially, an area helping to protect a home and provide a safety zone for the firefighters battling flames.

DEFENSIVE – Firefighting mode primarily focusing on the protection of exposures through the confinement of the fire to a selected area.

DEPARTMENT OPERATIONS CENTER (DOC) – DOC provides agency dispatching capability independent and separate from routine emergency dispatch. The DOC is activated and staffed for large or complex incidents allowing personnel to focus efforts solely on the incident: maintaining situation status, processing orders for resources, and maintaining a direct link with EOCs.

EMERGENCY COMMAND CENTER (ECC) – Dispatch Center, an ECC is the center of an agency's information and communication capability. It is tasked with receiving and processing incoming calls for help. ECC personnel determine the nature of the request and forward it to the appropriate resource.

EXTREME FIRE BEHAVIOR – "Extreme" implies a level of fire behavior characteristics ordinarily precluding methods of direct control action. One or more of the following is usually involved high rate of spread, prolific crowning and/or spotting, presence of fire whirls, and/or strong convection column. Predictability is difficult since such fires often exercise some degree of influence on their environment and behave erratically and dangerously.

FIRE LINE – Area where the vegetation has been removed to deny the fire fuel—or a river, a freeway, or some other barrier expected to stop the fire. Hose lines from fire engines may also contribute to a fire being surrounded and contained.

FIRE MANAGEMENT ASSISTANCE GRANT (FMAG) – Federal assistance program

managed by FEMA through the State Office of Emergency Services (OES). Program is designed to help state and/or local jurisdictions impacted by high cost, high damage wildland fires.

FIRE PERIMETER – Entire outer edge or boundary of a fire.

FIRING OPERATIONS – Setting a controlled fire with the intent to create a fire break so the path of the fire will be impeded.

FIXED WING AIRCRAFT (AIR TANKERS) – Aircraft designed for the purpose of picking up and depositing fire retardant on a fire while in mid-air.

FUEL MODIFICATION – Modification and irrigation of combustible vegetation to reduce fuel energy output. Highly flammable wildland vegetation is replaced with managed areas of light or fire resistive fuels and thereby allowing firefighters the ability to control a fire while relatively small.

FUELS – Combustible material or vegetation.

GREY BOOK – Agreement between CAL FIRE and the six contract counties that addresses direct fire protection of State Responsibility Area (SRA) within each of the contract counties. Orange County, along with the other contract counties, receives funding from the state to provide protection to the SRA

HANDCREW – Team of wildland firefighters primarily assigned to fire line construction activities. Handcrews also mop up hot-spots, burn out vegetation to provide fuel free zones, and assist with hose lays.

HIGH WATERSHED DISPATCH – Level of dispatching ensuring the appropriate type and number of wildland firefighting resources based on current weather conditions.

INCIDENT COMMAND SYSTEM (ICS) – Standardized on-scene emergency management concept specifically designed to allow its user(s) to adopt an integrated organizational structure equal to the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries.

INCIDENT COMMANDER – ICS position responsible for overall management of the incident. Reports to the Agency Administrator for the agency having incident jurisdiction.

INCIDENT MANAGEMENT TEAM (IMT) – Incident commander and appropriate general and command staff personnel assigned to an incident. Also known as an Incident Command Team.

INITIAL ATTACK (IA) – Aggressive suppression action taken by first arriving resources with the priorities of protecting life, property, and the environment.

INTERFACE ZONE – Area where the wildland comes together with the urban areas. This is often referred to as the I-Zone or the Wildland Urban Interface (WUI).

MASTER MUTUAL AID SYSTEM – Creates a formal structure in which a jurisdictions

personnel, facilities, and equipment can voluntarily assist other jurisdictions when capabilities are overwhelmed.

MASTER STREAM – Controllable, high-capacity water jet used for manual firefighting or automatic fire protection systems; also known as a monitor, deluge gun, or deck gun.

MUTUAL THREAT ZONE – Area in which two or more jurisdictions have responsibility to protect in case of a fire, flood, or other emergency.

OFFENSIVE ATTACK – Putting water directly on the flames with the intent to extinguish.

OFFICE OF EMERGENCY SERVICES (OES) – The California Governor's Office of the Emergency Services.

PATROL UNIT – OCFA fire apparatus designed for wildland firefighting built on a heavy-duty passenger crew-cab truck chassis. It carries 100 gallons of water in a pressurized tank. OCFA Patrols are assigned to fire stations adjacent to wildland interface areas.

RATE OF SPREAD (ROS) – Relative activity of a fire as it extends from the point of origin and the total perimeter of the fire. Usually expressed in acres per hour.

RED FLAG WARNING – Term used by fire weather forecasters to alert users to an ongoing or imminent critical fire weather pattern.

REGIONAL ORDERING SUPPORT SYSTEM (ROSS) – Computer software program, which automates the resource ordering, status, and reporting process during a wildfire; tracks all tactical, logistical, service, and support resources mobilized by the incident dispatch community.

REHABILITATION – Activities necessary to repair damage or disturbance caused by wildfire or the wildfire suppression activity.

REKINDLED – Act of catching on fire once again; usually caused by a fire not fully extinguished.

RIPARIAN AREA – Interface between land and a stream—usually an ecological area with the abundance of both plants and animals.

SANTA ANA WINDS – Type of Foehn wind—a warm, dry, and strong general wind that flowing down into the valleys when stable, high pressure air is forced across and then down the lee side slopes of a mountain range. The descending air is warmed and dried due to adiabatic compression producing critical fire weather conditions. Locally, it is called by various names such as Santa Ana and Sundowner winds.

SOUTH OPS – Formally known as the Southern California Geographic Area Coordination Center (OSCC), it is the focal point for coordinating the mobilization of resources for wildland fire and other incidents throughout the Geographic Area. Located in Riverside, the Center also provides Intelligence and Predictive Services.

SPECIAL STAFFING – Persons put in place on assigned fire apparatus in addition to the normal staffing—usually done in case of an emergency such as a fire, wind event, or flood.

SPIKE CAMP – Remote camp usually near a fireline and lacking the logistical support a larger fire camp would have.

SPOT FIRE OR SPOTTING – Small fire ahead of the main fire—caused by hot embers being carried (generally by winds) to a receptive fuel bed or structure. Spotting indicates extreme fire conditions.

STATE RESPONSIBILITY AREA (SRA) – The California Board of Forestry and Fire Protection classifies areas in which the primary financial responsibility for preventing and suppressing fires is that of the state. CAL FIRE has SRA responsibility for the protection of over 31 million acres of California's privately-owned wildlands.

STRIKE TEAM – Engine strike team consisting of five fire engines of the same type and a lead vehicle. Strike team leaders are usually a Captain or a Battalion Chief. Strike teams can also be made up of bulldozers and handcrews. A strike team comprised of structure engines is designated with the letter "A"; i.e., 1400A. A strike team comprised of wildland engines is designated with the letter "C"; e.g., 9329C.

STRUCTURE PROTECTION GROUP – Two or more fire apparatus capable of pumping water for the purpose of preventing homes in a designated area from being burned by wildfire nearby.

UNIFIED COMMAND – Unified team effort allowing all agencies with jurisdictional responsibility for the incident, either geographical or functional, to manage an incident by establishing a common set of incident objectives and strategies.

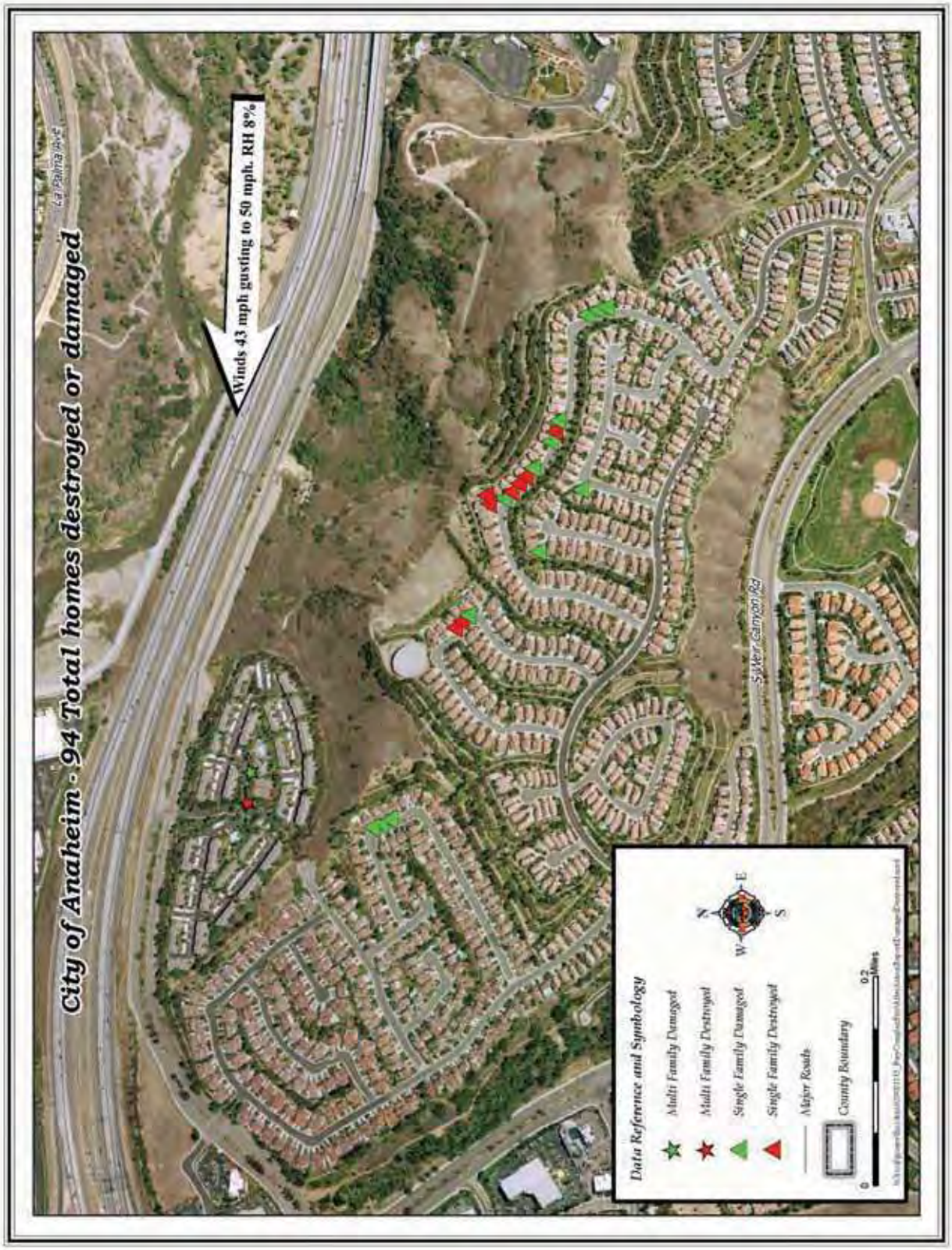
WATER TENDER – Specialized firefighting apparatus capable of transporting a minimum of 1,000 gallons of water from a water source directly to the fire scene.

WILDLAND ENGINE (Type 3) – Fire engines designed for the wildland firefighting environment. Constructed on heavy-duty commercial truck chassis with high ground clearance and often equipped with four wheel drive. Type 3 engines carry 500 gallons of water and have a minimum pump capacity of 120 gpm at 250 psi.

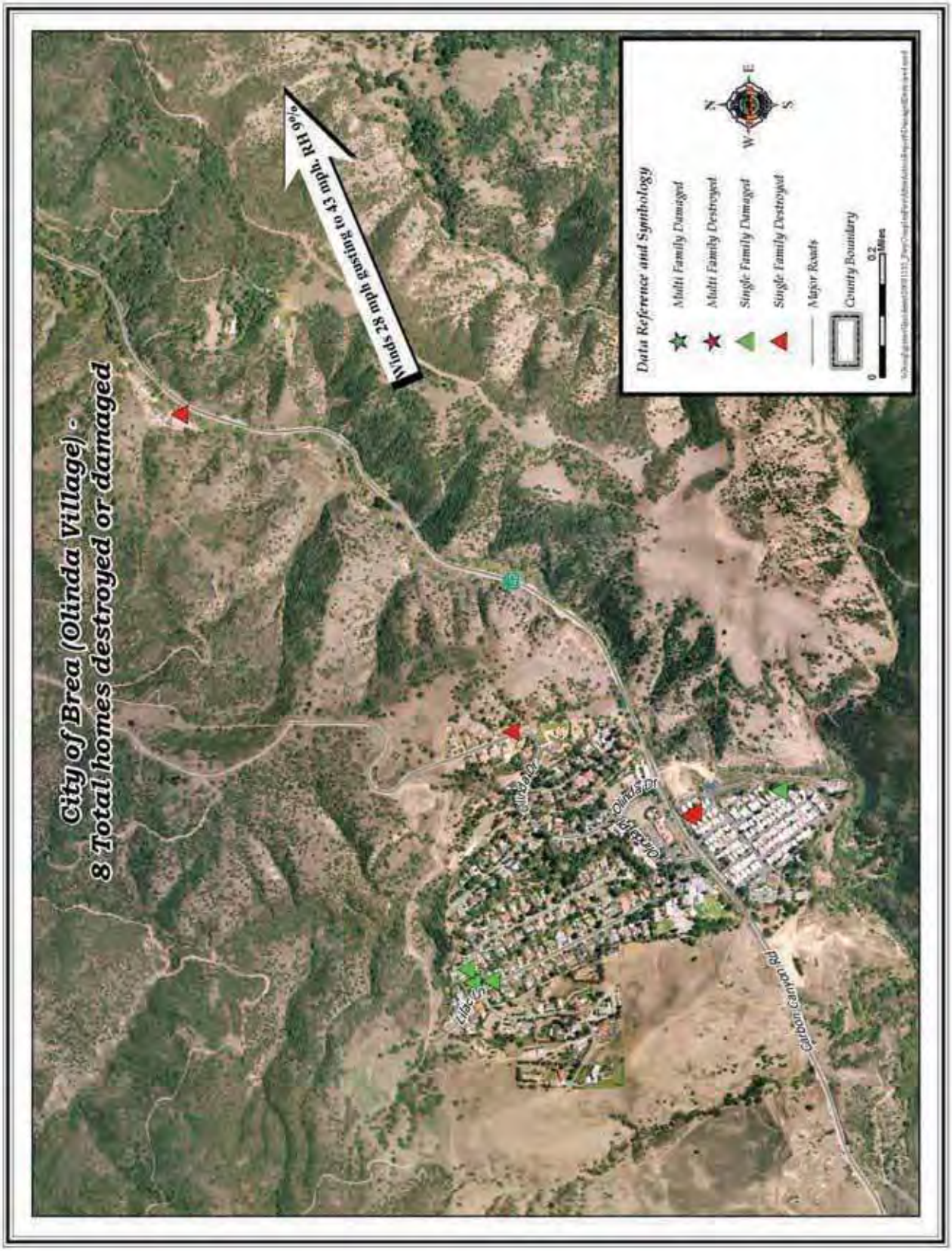
WILDLAND URBAN INTERFACE (WUI) – Line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

Appendix–Homes Destroyed or Damaged

Map 16: City of Anaheim—Homes Destroyed or Damaged

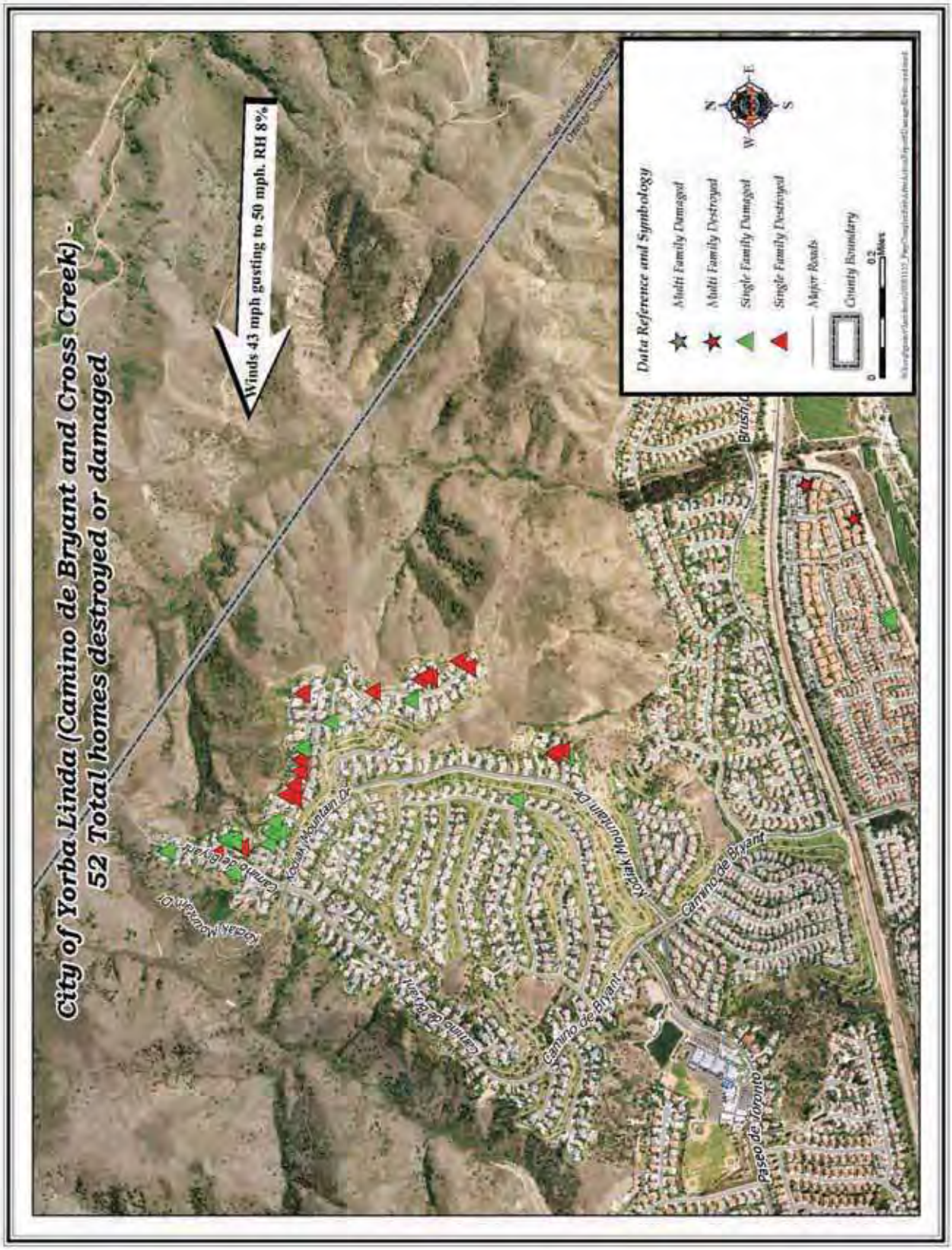


Map 17: City of Brea—Homes Destroyed or Damaged

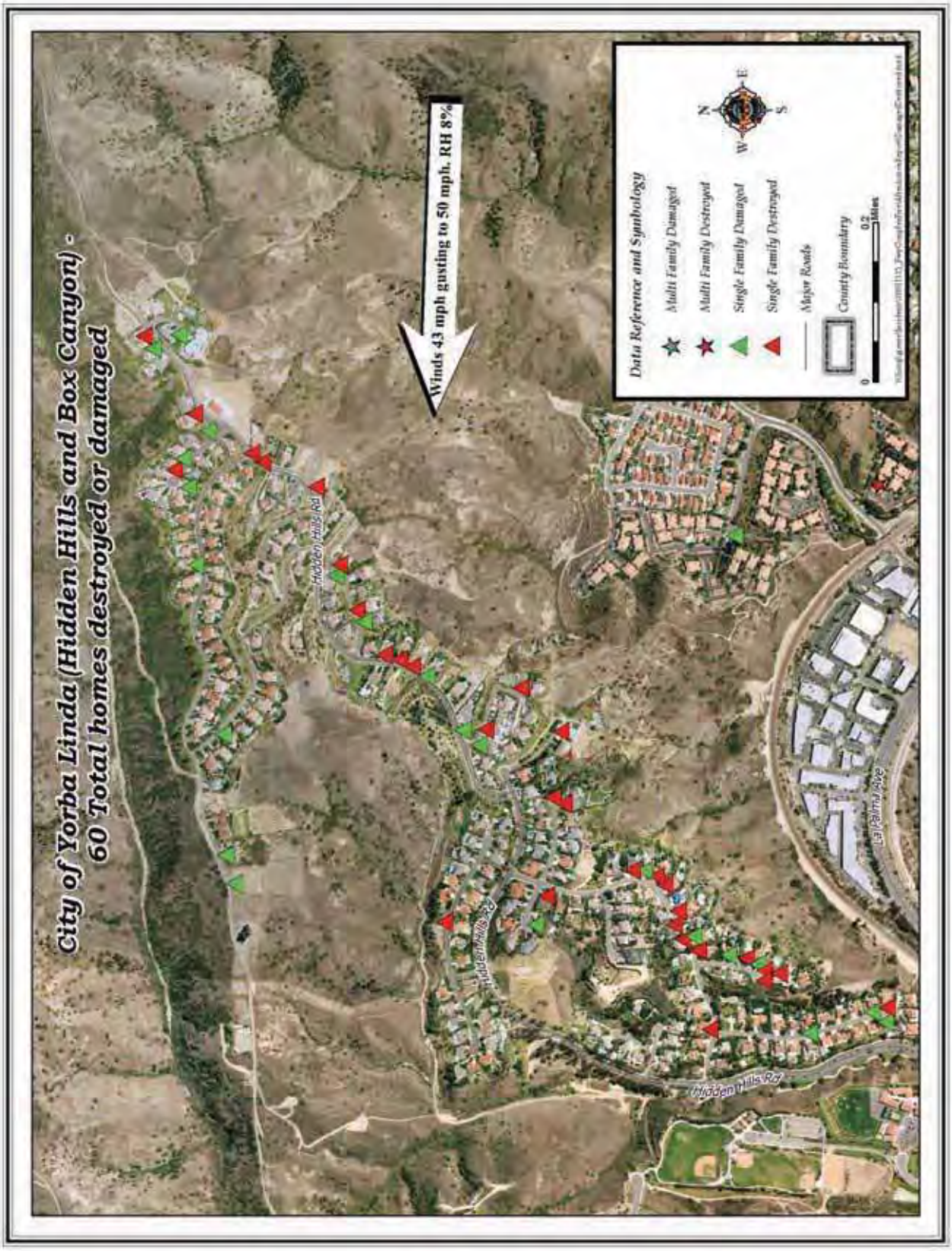


Map 18: City of Corona—Homes Destroyed of Damaged

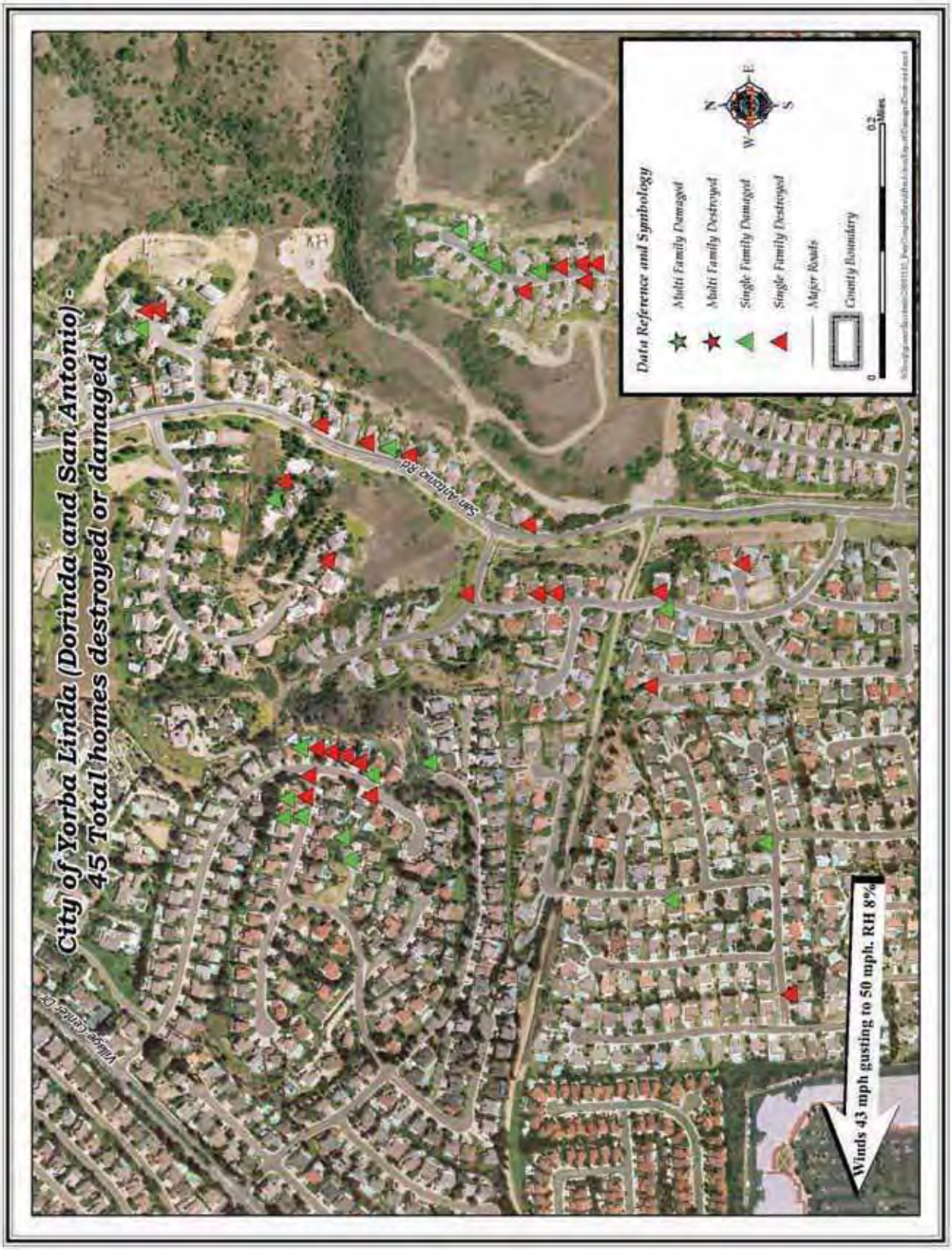
Map 19: City of Yorba Linda—Camino de Bryant and Cross Creek



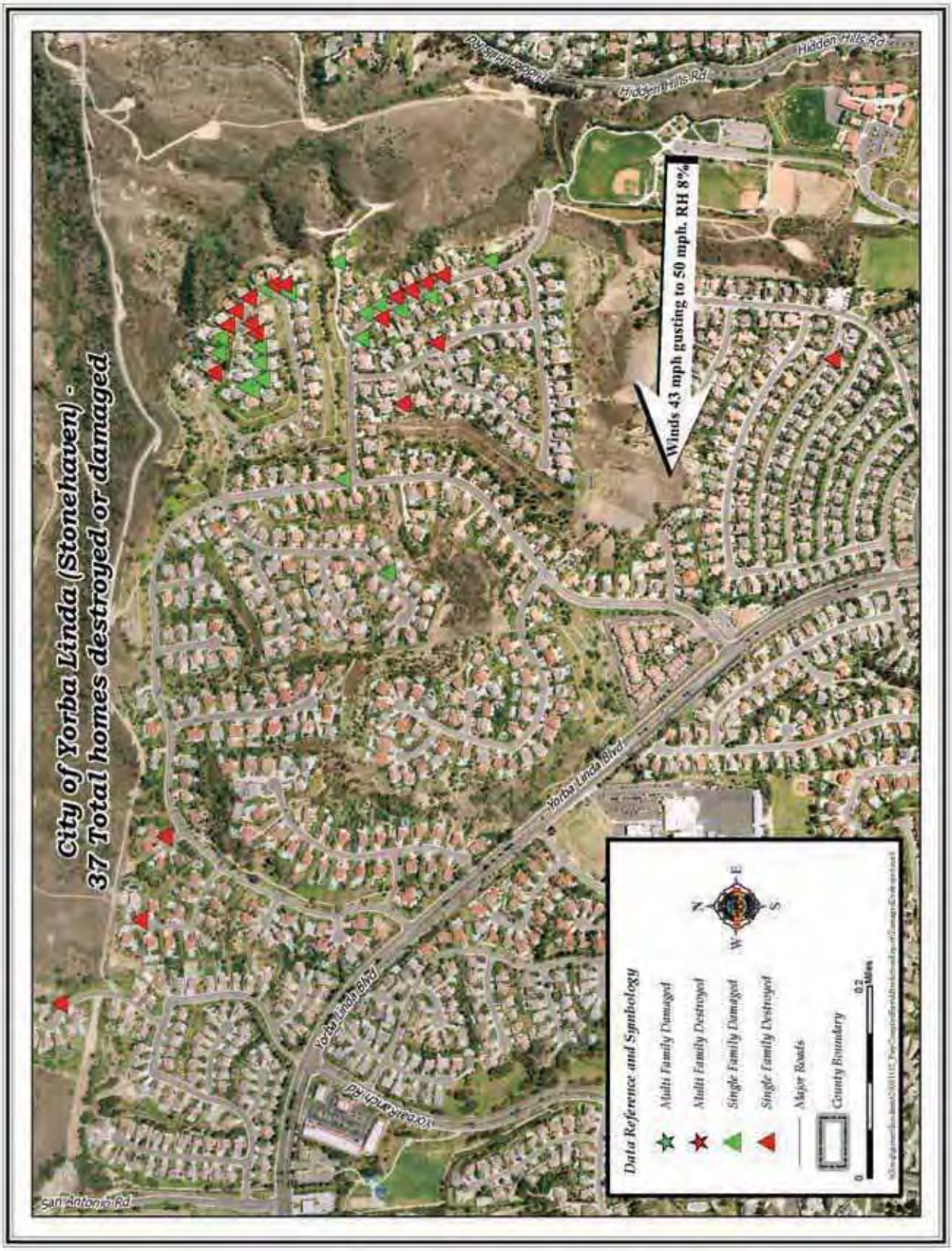
Map 20: City of Yorba Linda—Hidden Hills and Box Canyon



Map 21: City of Yorba Linda—Dorinda and San Antonio



Map 22: City of Yorba Linda—Stonehaven



Acknowledgements

A work of this type cannot be put together without the help and support of many people. The development and writing of this After Action Report has been a collaboration, drawing on the time and talents of personnel from every department within the OCFA. It is not possible to name every individual who played a role in the development of this document; however, it is appropriate to mention some of the key tasks and to thank those who are responsible for the the final outcome.

The following are thanked and commended for their contributions to this project. Those who completed After Action Surveys and documented their actions and observations. The Team Leaders who coordinated the gathering of information and compiling of data. The OCFA members who went into the impacted communities and spoke with residents and evaluated the damage to ensure accurate save and loss data. Those who listened to hours upon hours of radio traffic and phone calls to capture fire ground activity. The writers of the various report sections, and then to those who edited and proof read the Report over and over until it was just right. Technical specialists who created maps, charts, pictures, and graphics to support and to make the writing come alive. Allied agencies who provided critical review and submitted to interviews to ensure all actions were taken into account. Managers who provided oversight and ensured that personnel were always available to assist at a moment's notice and to those employees who had to carry an extra load so that a co-worker was able to help with the development of this document. The detail oriented people who worked on the layout of the final document, ensuring that indexes, pages and tabs all corresponded to each other. The OCFA Board Members and elected officials who took the time to provide critical review and commentary to ensure anticipated questions would be answered. The highly talented experts who worked to incorporate available technology to support the written document with an audio-visual record. The consultants and vendors who provided needed technical support, review, and publication of the final document.

A special thank you is extended to all those who responded to or supported the fire fighting and recovery actions that took place between 9:00 a.m. on November 15, and 7:00 a.m. November 19, 2008. The Fire Chief and the Executive Management Team are equally thanked for their leadership and guidance.

A most important thank you to the readers of this Report, who by taking time to study the actions and outcomes of the Freeway Complex Fire will be better prepared to respond to, support and manage emergency incidents that threaten communities, disrupt lives, and consume natural and financial resources.

A final thank you and acknowledment to all of the citizens who were affected by the Freeway Complex Fire. The men and women of the Orange County Fire Authority sincerely thank you for allowing us to be your fire department.

Letter: YLCR

From: D2bRiDn@aol.com [mailto:D2bRiDn@aol.com]
Sent: Thursday, January 16, 2014 1:30 PM
To: Spitzer, Todd [HOA]; Tippets, Ron
Cc: D2BRIDN@aol.com
Subject: Yorba Linda Star Letter to the Editor

Dear Mr. Spitzer & Mr Tippets,

Thank you for the opportunity to discuss the Cielo Vista Development as I have some major concerns regarding this project. I was very involved in the 2008 fires as my husband and I evacuated horses until the flames were at our trucks doors. I am the President of the Yorba Linda Country Riders and therefore I was contacted by several members that needed help getting their horses and other barn animals to safety. I was there to see the danger and the chaos of the current residents trying to flee the area. It was a very scary situation and my husband and I, in 2 different trucks, almost stayed too long and were then met by YL Blvd gridlock. One of my members on Willow Tree Lane lost her beautiful home and left with the clothes on her back, ALL of her animals and a handful of personal items. I would hate to see this repeated and exaggerated with the addition of these new homes.

I know there are water issues, ingress and egress issues and without those issues along with the fire danger mitigated I would like to see this project turned down.

Thank you for your time,

Dee Dee Friedrich
President/Yorba Linda Country Riders
Serving Yorba Linda for 44 Years
714-401-4215 714-996-6321
<\ ___ ~~
(( ))

Letter: YLL

From: Jeff Shepard [mailto:JShepard@cresa.com]
Sent: Wednesday, January 22, 2014 4:19 PM
To: Tippets, Ron; Canning, Kevin
Cc: Wayne Lamb
Subject: Cielo Vista - Esperanza Hills Comment letter

Kevin Canning

Ron Tibbets

Contract Planners

County of Orange

300 N. Flower

Santa Ana, CA

Re: Cielo Vista and Esperanza Hills Proposed Developments

Dear Sirs:

I am a member of Yorba Linda Land, LLC, which owns approximately 40 acres located directly north of the 44 acres owned by Bridal Hills, LLC property and east of the proposed Esperanza Hills property. Chino Hills State Park borders our property to the north.

Historical access to our site has come from both the Cielo Vista and the Esperanza Hills sites, over roads that still exist today, as well as roads coming through Chino Hills State Park. We believe that the County should ensure that our site will have continued access over these roads, or roads to be constructed in the future as set forth in the various options to the Esperanza Hills proposed project. According to the City of Yorba Linda general plan, proper planning principles and the overall welfare of the neighborhood, access and utilities to our site should be mandated in the designs of both projects.

We have worked with the Esperanza Hills developers on their project design, and they have accommodated our request for access and utilities to be run to eastern boundaries of our site. We have approved their current design, but want to ensure that if there are any design changes it does not adversely affect access or utility service to our land. We do not have any agreements in place with them at the present time for fuel modification, and are in the midst of litigating a partnership dispute that needs to be resolved prior to our entity entering into any agreements with any third parties. However, their present design does not require any fuel modification or other easement access to our site.

It is our understanding that the Cielo Vista project has included a potential access corridor in their Area Plan, on page 33, and that the Esperanza Hills project has designed two access options, 2A and 2B over this area, and that Esperanza Hills has also identified two other access options, Options 1 and 2, which provide for primary access from Stonehaven and Aspen Way, respectively.

It is our belief that all of these options are consistent with the City of Yorba Linda General Plan, which was adopted in 1993. It provides that access to our property and the properties owned by the Nicholas Long family, which is currently part of the proposed Esperanza Hills project and the Yorba Linda Land, LLC property, which lies to the north of our land, are to be served by access from the south and west, via easements to be given by the property owners to the south and west of us, which would include land included in the Cielo Vista and Esperanza Hills projects.

We also agree with the August 2, 2012 NOP comment letter issued by the Yorba Linda Water District on the Cielo Vista project, which is the sewer and water utility provider for this area, that the Cielo Vista project should provide an easement for gravity flow sewer through the Cielo Vista project for both the Cielo Vista and Esperanza Hills project, and we further request that accommodation be made for extension of this sewer service to our property, as is currently provided for in the Esperanza Hills project.

We further understand that the Yorba Linda Water District has completed its Northeast Area Planning Study, which provides for the installation of underground water reservoirs on sites located on the Esperanza Hills project site, at the 1200' and 1390' elevations, which will eventually provide water gravity fed water storage for our property, and we will, at some point, enter into an agreement with the Yorba Linda Water District and/or the Esperanza Hills developers for the water storage necessary to serve our property should we decide to develop it in the future.

We oppose any effort by the Cielo Vista developers or property owners to entitle their land without providing access to our property through the Esperanza Hills property, as they have stated they would do in their NOP public meeting, and request that the County require that they provide access as part of the approval for their Area Plan. If Cielo Vista is denied approval of their entitlement request, we request that the County use its eminent domain powers to obtain a right of way easement over the Cielo Vista project for use by our property and the Esperanza Hills development as currently designed, which provides access to both our property and the Bridal Hills property.

We believe that the County has a responsibility under the Subdivision Map Act to ensure that Cielo Vista and Esperanza Hills provide access and utility access through their properties to all of the unincorporated areas east of the City of Yorba Linda and west of Chino Hills State Park, so that future development of our property and any other properties are properly planned, taking into account future development. The Esperanza Hills developers have agreed to make this access part of their existing design and the Cielo Vista owners and developers should be required to as well.

Finally, we support the fire staging areas, emergency ingress and egress plan, fuel modification and trail system designs for the Esperanza Hills project, which we believe benefit our property and the surrounding existing neighborhood, particularly from a fire safety standpoint.

Should you have any questions, please contact me directly.

Respectfully Submitted,

Jeffrey G. Shepard

Member

Yorba Linda Land, LLC

Letter: YLE

January 22, 2014

Ron Tippets
Contract Planner
County of Orange
300 N. Flower
Santa Ana, CA

Re: Comment on Cielo Vista DEIR

Dear Mr. Tippets:

We are the developers of the Esperanza Hills project that is located to the east and north of the Cielo Vista project, and own the 277 acres to the east of the Cielo Vista project and have the following comments on the Cielo Vista Draft EIR.

I. Geology

The Alquist-Priolo Earthquake Fault Zoning Act, Public Resources Code 2623(a) states: "Cities and counties shall require, prior to the approval of a project, a geologic report defining and delineating any hazard of surface fault rupture." A project is defined in Public Resources Code 2621.6 as any subdivision of land subject to the Subdivision Map Act. No fault study has been completed or approved, although fault trenching was performed on the site, and it revealed the existence of a fault on site south of the Whittier Fault, which requires additional study to determine whether or not it is an active fault. The location of this fault was put onto a sketch and sent to County Geologist Nick Bebek by the geological firm conducting the study. The email is attached to this letter. Figure 4.5-1 of the EIR shows that the Cielo Vista project has lots designed in the AP Zone, and the sketch for the additional fault which its geologist consider older lies south of the Whittier Fault. Until the fault study is properly completed and approved, even an illustrative lot design cannot be properly analyzed, and the effects of this project on the environment cannot be established. The fault study needs to be completed and approved, and then those findings should be incorporated into a new EIR, which should then be recirculated.

The location of the Whittier Fault as discussed in the report, dated June 3, 2006 completed by Pacific Soils Engineering, is based only on cited references and "PSE's experience with the project vicinity." (Appendix E) The Pacific Soils report shows the approximate location of the Whittier Fault not only the Cielo Vista property but a portion of the Esperanza Hills project owned by Yorba Trail, LLC. This report is inaccurate and conflicts with the Fault Study report completed by American Geotechnical for the Esperanza Hills project, which was completed after extensive study, nearly one half mile of trenching on the Esperanza Hills project, and subsequent logging and photography of all trenching. The Esperanza Hills trenches were also reviewed by the State Geologist's office, as was the report, and the fault report was approved by the County on March 31, 2013. The location of the Whittier Fault as reflected in the Esperanza Hills Fault Study establishes the location of the fault, and this location should be substituted

for the estimate contained in the Pacific Soils Engineering Report insofar as it relates to the Yorba Trail LLC parcel.

In addition, the report dated March 1, 2013 by LGC Geotechnical, also in Appendix E, fails to take into account or otherwise reference the approved Esperanza Hills Fault Study report dated March 31, 2013. It also fails to disclose the work that was completed for purposes of the fault study, and fails to include any reference to the potential fault south of the Whittier Fault contained in the sketch completed by LGC and sent to Nick Bebek in the email attached to this email. The AP Act requires study, analysis, disclosure and approval of any fault or AP Zone that occurs on site where residential construction might occur, and until this fault study is completed and approved, the project cannot be approved. The fault trace for the Whittier Fault shown on Figure 4.5-1 of the EIR located on the Esperanza Hills project is inaccurate and should be revised to be consistent with the approved Esperanza Hills Fault Study.

II. Water

The analysis for the water storage facilities is inconsistent and erroneous. There is insufficient elevation to locate gravity flow water storage facilities on the Cielo Vista site which will be required by Orange County Fire Authority (OCFA) and YLWD. Therefore the water storage facilities will have to occur offsite, and according to the Northeast Area Planning Study (NEAPS) adopted by YLWD in March, 2013, there is insufficient existing capacity offsite so new storage facilities must be constructed for both the Esperanza Hills and Cielo Vista projects, as well as any other projects in this area. Figure 3.4.1 of the NEAPS shows that these water storage facilities must be constructed on the Esperanza Hills project site. At the present time, there is no agreement between the Cielo Vista project owners and developers to upsize the water storage facilities for the Cielo Vista project. As evidenced by the EIR comment letter from YLWD on the Cielo Vista EIR dated January 13, 2014, which is incorporated herein, the discussion regarding an alternate water storage method should be removed from the EIR and a new analysis showing the location and potential environmental effect of these water storage facilities should be included in the EIR. It should also be noted that the Cielo Vista project has no independent right to grade on or construct water storage facilities on the Esperanza Hills project site. It should also be noted that without gravity fed water storage the Cielo Vista project cannot comply with the requirements for fire flow as required by OCFA, unless and until the water storage facility to be located at the 1200 foot elevation is constructed on the Esperanza Hills project.

It should also be noted that the Cielo Vista project is not currently annexed into the YLWD, and that it must pay fees and comply with other requirements to be annexed.

III. Oil Well Relocation Conditions and Pad Construction

There is no disclosure in the EIR that a settlement agreement exists between the developers and property owners for the land involved in the Cielo Vista project and Santa Ana Canyon Development which provides for the relocation of wells, costs of abandonment of wells both onsite and offsite from the Yorba Trail LLC property, upon the occurrence of certain events by certain dates, and that if the contingencies do not occur the oil wells will not be required to be removed. There is only a cursory discussion of the applicable regulations regarding the location of the wells, the potential effects on the

environment for new drilling of wells, and the permits and other studies that will be necessary to enact the provisions of the settlement agreement. There is no discussion of the potential environmental effect of the potential relocation of wells from the Yorba Trail LLC property to the Cielo Vista property, or whether this relocation will be permitted under existing regulation.

To construct the oil well drilling pad, Exhibit 5 – 1 of the Cielo Vista Area Plan calls for manufactured slopes on the property owned by Yorba Trail, LLC, which lies directly north of the land owned by the Virginia Richards Intervivos Trust. This land is part of the proposed Esperanza Hills project and is under option to Yorba Linda Estates, LLC. The present owner has refused to give permission for this grading at the present time. An alternative design needs to be examined that does not include grading off site, as this design will affect the lot layout, density for the project, size of lots, and the overall configuration of the land available for use as an oil drilling pad.

The discussion of the relocation of the oil wells to the pad is contained on page 4.9-17 of the EIR.

IV. WQMP Designs

The BMP Exhibit following page 30 of the WQMP plan shows that, in addition to the offsite grading, debris basin/storm drain inlets are located offsite to the north of the property owned by Cielo Vista and to the east of the property owned by Cielo Vista, in Blue Mud Canyon. There is no permission given by either of the property owners for location of debris basins offsite, and particularly not in Blue Mud Canyon, which is an environmentally sensitive drainage area. Neither of these offsite facilities have been analyzed for any potential environmental effects, including any potential effect on the waters of the United States, biological impacts, or necessary mitigation.

The limits of grading as shown on the BMP Exhibit stretch north several hundred feet into the Yorba Trail property, west to property owned by individual lot owners in the City of Yorba Linda, southwest onto land owned by individual lot owners in the City of Yorba Linda, and west onto property owned by Yorba Linda Estates, LLC. No permission has been sought or given for the encroachment on the Yorba Linda Estates, LLC property or the Yorba Trail, LLC property, and there is no discussion in the EIR as to the requirement for permission for offsite grading from the other individual lot owners in the City of Yorba Linda. Further, none of the biology studies assess any impacts to the environment for this off site grading or construction of offsite debris basins or storm drain inlets. Further, there is no discussion or study of the jurisdictional features associated with offsite construction and impact on Blue Mud Canyon in Figure 4.3-4 of the EIR section on jurisdictional features. These studies must be completed in order for the potential environmental effects to be analyzed for the project to be approved with the condition that this permissions be granted. If the project is not approved subject to these off site permissions then new designs must be analyzed, as well as their effects on the lot design. The additional studies necessary for the offsite facilities would need to be incorporated into the environmental effects on natural communities, sensitive wildlife species, plant communities, and would also have to account for the mitigation designs of the proposed Esperanza Hills project. In addition to USACE jurisdiction, effects on CDFW jurisdiction would also have to be analyzed, as would compliance with regulations and

requirements for the Santa Ana Waterboard, particularly for the debris basins to be located in Blue Mud Canyon.

V. Sewer Study

The study on the sewer is incorrect. First, Figure 1 of the study conducted by Hunsaker & Associates in June, 2006 (Appendix K) identifies not only the Cielo Vista project, but the Yorba Trail LLC property as well, and identifies the sewer system as being owned and operated by the City of Yorba Linda, although it is now owned and operated by the Yorba Linda Water District ("YLWD"). It does not include any provision for upsizing the sewer lines for the Esperanza Hills project, as required by the YLWD in its NOP Comment letter dated August 2, 2012, which required that "the District will require gravity-sewer service from all areas of the Yorba Linda Estates Project, with such service extending southerly and westerly downward to and through the Cielo Vista project to connect to existing District sewers." The EIR does not include any analysis of the size or effect of this requirement.

VI. Easement On Virginia Richards Trust Property

The Yorba Trail LLC property has an easement as the result of a partition judgment entered by the Orange County Superior Court dated May 26, 1958, a certified copy of which was recorded in the Official Records of Orange County Recorder, California at Book 4297, Pages 93-116 on May 26, 1958 (hereinafter the "Partition Judgment"). The partition judgment granted to the Yorba Trail LLC property a 50 foot easement running from the northern border to the southern border of the Richards Trust property. It is anticipated that the sewer service and water connections to and from both the Esperanza Hills and Cielo Vista projects to the YLWD facilities will run across this easement. The EIR needs to identify this easement and amend its conceptual lot design around this easement.

The EIR also needs to identify the fact that the Esperanza Hills project has the right to utilize the easement for emergency road ingress and egress for its Option 1.

VII. Easements for Access

The Cielo Vista Area Plan has included a potential access corridor on page 33, and the Esperanza Hills project has designed two access options, 2A and 2B over this potential access corridor, and that Esperanza Hills has also identified two other access options, Options 1 and 2, which provide for primary access from Stonehaven and Aspen Way, respectively. No provision is made for access in the Cielo Vista plan for Esperanza Hills Option 2, or in the event that option 2 is not approved, for a potential fire evacuation route that connects into Aspen Drive.

These access option are consistent with good planning principles and the General Plan for the City of Yorba Linda, which provides for these access easements in the Murdock Appendix to the General Plan, stating: "Future access will be provided by San Antonio Road, located approximately ½ mile to the west, and Via De La Agua, located 700 feet to the west. Access easements or development in conjunction with adjacent properties (labeled 21, 20, and 19 on the attached exhibit) will be required."

These access options need to be analyzed in the EIR. Currently, there is no analysis relating to the Potential Access Corridor, even though it is identified and discussed in the Area Plan.

VIII. Failure to Identify Significant Impacts

The Esperanza Hills DEIR identifies potential significant and unavoidable impacts in the areas of Greenhouse Gas Emissions, and details the reasons therefore. The Cielo Vista EIR incorrectly states that there are no significant and unavoidable impacts.

The Esperanza Hills DEIR identifies the fact that the South Coast Air Basin has been classified as a non-attainment air basin, so any project will have a cumulatively considerable incremental increase in air emissions. The Cielo Vista EIR fails to recognize or analyze this fact.

The Esperanza Hills DEIR identifies the fact that erosion from grading and wind related soil disturbance could occur during construction if the Cielo Vista and Esperanza Hills projects are built simultaneously. The Cielo Vista EIR fails to recognize or properly analyze this.

The Esperanza Hills DEIR identifies the fact that when combined with the Cielo Vista project additional noise from traffic will exceed the 3 dB perceptible noise threshold and will be cumulatively considerable and significant.

Overall the Cielo Vista analysis of impacts should be amended and reanalyzed to be consistent with the Esperanza Hills DEIR.

IX. Inconsistency with Jurisdictional Delineation for Waters of the US

The Esperanza Hills project has received a preliminary jurisdictional delineation for waters of the United States from the Army Corps of Engineers, and it is difficult if not impossible to determine whether or not the jurisdictional delineation discussed in the Cielo Vista DEIR is consistent with that preliminary determination by the Corps.

X. Recirculation of EIR

Because each one of the items set forth above will add significant new information to the EIR, and may change mitigation measures and analysis, in addition to changing the level of significance of some environmental impacts to potentially significant, the DEIR should be amended and recirculated. In addition, the additional analysis should lead to a change in preliminary design of the project, which again, should require it to be recirculated. Finally, until a fault study is completed and approved, the DEIR should not be recirculated, as this is a requirement that is mandatory, and without completion of the fault study the feasibility of the existing design cannot be properly analyzed.

Please contact me should you have any questions.

Yorba Linda Estates, LLC

By: Wedge Partners, LLC
Its: Manager

__/s/ Douglas G. Wymore_____
Managing Member

Douglas Wymore

From: Bebek, Nick <Nick.Bebek@ocpw.ocgov.com>
Sent: Thursday, October 18, 2012 10:42 AM
To: Jeff Hull (hullj@amgt.com); dwymore@q.com
Subject: FW: Fault Trench Extension
Attachments: Sketch Map for Fault Trench Extension.pdf

From: Kevin Colson [mailto:kcolson@lgcgeotechnical.com]
Sent: Wednesday, October 10, 2012 2:54 PM
To: Bebek, Nick
Subject: Fault Trench Extension

Hi Nick,

Attached is a sketch of the additional length of off-site fault trench we believe we will need.

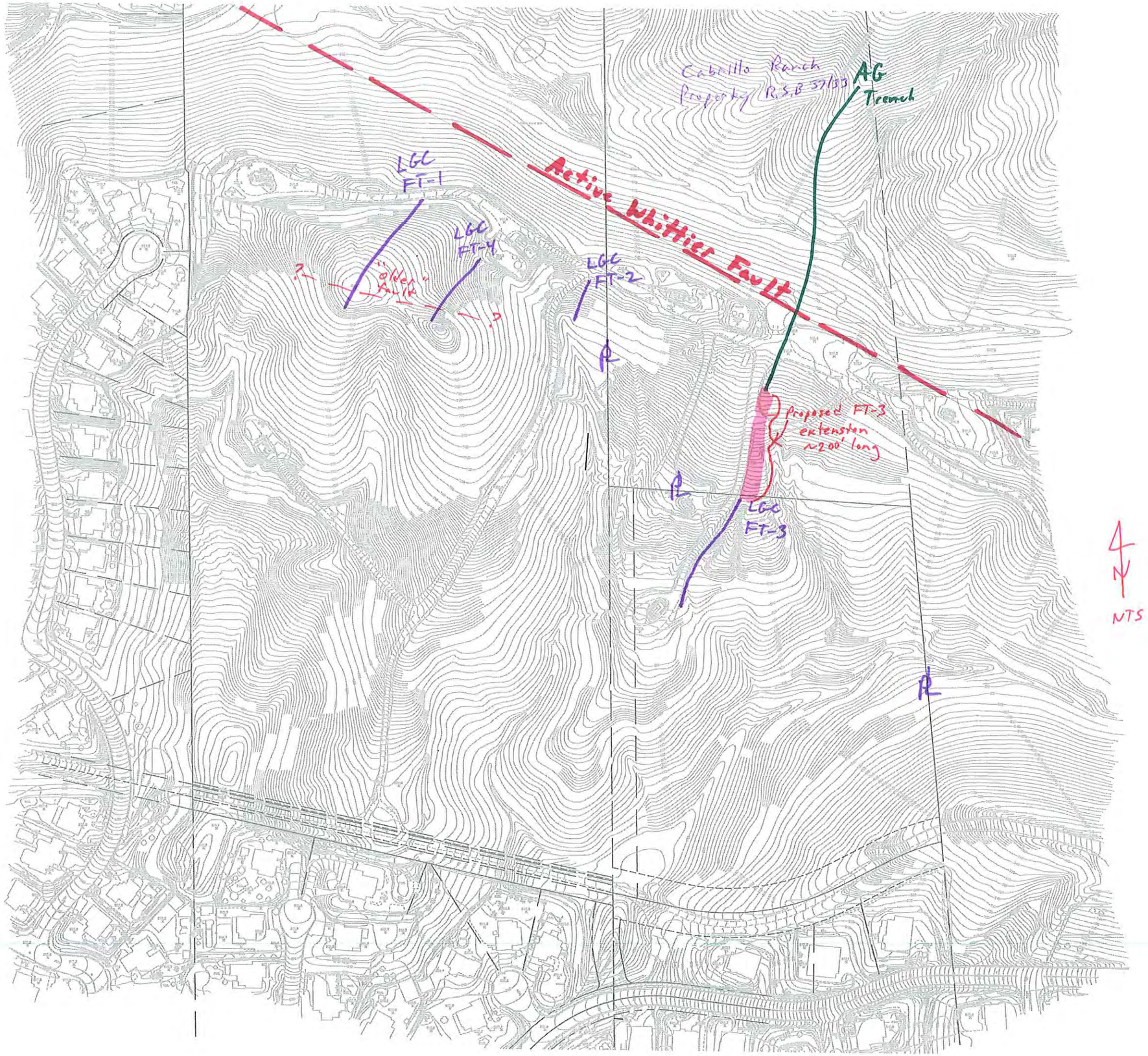
Thank you for your assistance.

Best regards,

Kevin B. Colson
Vice President

LGC Geotechnical, Inc.

120 Calle Iglesia, Suite A
San Clemente, CA 92672
office (949) 369-6141
cell (949) 412-0648
kcolson@lgcgeotechnical.com
www.lgcgeotechnical.com



Cabrillo Ranch
Property R.S.B 37/33
AG
Trench
Active Whittier Fault
LGC
FT-1
LGC
FT-4
LGC
FT-2
"Older" fault
?
?
Proposed FT-3
extension
~200' long
LGC
FT-3
N
NTS

Letter: POHH-Allen

Tara Allen
4100 San Antonio Rd
Yorba Linda, CA 92886

November 13, 2013

Via E-Mail and U.S. Mail

Orange County Planning
Attn: Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:

I am writing to request an extension of the public comment period for the subject draft EIR. There are complex legal and technical issues surrounding the Cielo Vista Project and the County's Draft EIR. Almost concurrently, the County is also in process of releasing the proposed Esperanza Hills Project on adjacent parcels directly east of the proposed Cielo Vista site. Because the Esperanza Hills development is a consequence of the Cielo Vista Project and both projects will share access easements and utilities connections, the two projects should be evaluated together. The near simultaneous release of these projects expands and complicates the scope of issues raised by the Cielo Vista Draft EIR.

A six-week comment period is blatantly insufficient for a thorough review by the public that CEQA proscribes. In addition, the public comment period runs through and closes within the winter holiday season, which precludes the public from making an effective response on the Cielo Vista Draft EIR. If not extended, the current comment period would result in minimal public response and participation. As the lead agency in this development process, at the doorstep of the City of Yorba Linda, the County should advocate for achieving maximum public participation in the important environmental review phase of both this and the Esperanza Hills Draft EIR process.

In view of both the complexity of technical data to be reviewed and the burden to the public to review such voluminous data during the holiday season, I respectfully request that the County lengthen the public comment period by 30 days which would extend responses to January 22, 2014. Thank you in advance for your approval of this request.

Very truly yours,

Tara Allen, Member
Protect Our Homes and Hills
Yorba Linda

Cc: The Honorable Todd Spitzer, Supervisor
Third District, County of Orange
10 Civic Center Plaza
Santa Ana, CA 92701

Emailed to: Ron.Tippets@ocpw.ocgov.com
Todd.Spitzer@ocgov.com

Letter: POHH-Anderson

From: Steve Anderson [mailto:sanderson7667@gmail.com]
Sent: Saturday, November 16, 2013 4:11 PM
To: Tippets, Ron; Spitzer, Todd [HOA]
Cc: mnelson76.mn@gmail.com; Steve Anderson
Subject: Cielo Vista Project Draft Environmental Impact Report

Steve and Caroyln Anderson

21270 Twin Oak

Yorba Linda, Ca

November 16, 2013

Orange County Planning

Attn: Ron Tippets

300 N. Flower Street

Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:

I am writing to request an extension of the public comment period for the subject draft EIR. There are complex legal and technical issues surrounding the Cielo Vista Project and the County's Draft EIR. Almost concurrently, the County is also in process of releasing the proposed Esperanza Hills Project on adjacent parcels directly east of the proposed Cielo Vista site. Because the Esperanza Hills development is a consequence of the Cielo Vista Project and both projects will share access easements and utilities connections, the two projects should be

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Very truly yours,

Steve and Carolyn Anderson Member

Protect Our Homes and Hills

Yorba Linda

Cc: The Honorable Todd Spitzer, Supervisor

Third District, County of Orange

10 Civic Center Plaza

Santa Ana, CA 92701

Emailed to: Ron.Tippets@ocpw.ocgov.com

Todd.Spitzer@ocgov.com

Letter: POHH-Bent

From: YLBOOKIE@aol.com [mailto:YLBOOKIE@aol.com]
Sent: Tuesday, November 12, 2013 7:59 PM
To: Tippets, Ron; Spitzer, Todd [HOA]
Subject: Cielo Vista Project Draft Environmental Impact Report

James and Anita Bent

5035 Via Del Cerro

Yorba Linda, CA 92887

November 12, 2013

Via E-Mail and U.S. Mail

Orange County Planning

Attn: Ron Tippets

300 N. Flower Street

Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:

I am writing to request an extension of the public comment period for the subject draft EIR. There are complex legal and technical issues surrounding the Cielo Vista Project and the County's Draft EIR. Almost concurrently, the County is also in process of releasing the proposed Esperanza Hills Project on adjacent

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Very truly yours,

James and Anita Bent, Members

Protect Our Homes and Hills

Yorba Linda

Cc: The Honorable Todd Spitzer, Supervisor

Third District, County of Orange

10 Civic Center Plaza

Santa Ana, CA 92701

Emailed to: Ron.Tippets@ocpw.ocgov.com

Todd.Spitzer@ocgov.com

Letter: POHH-Buie

Charles and Dawn Buie
4080 View Park Drive
Yorba Linda, CA 92886

November 18, 2013

Orange County Planning
Attn: Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:

We are writing to request an extension of the public comment period for the subject draft EIR. There are complex legal and technical issues surrounding the Cielo Vista Project and the County's Draft EIR. Almost concurrently, the County is also in process of releasing the proposed Esperanza Hills Project on adjacent parcels directly east of the proposed Cielo Vista site. Because the Esperanza Hills development is a consequence of the Cielo Vista Project and both projects will share access easements and utilities connections, the two projects should be evaluated together. The near simultaneous release of these projects expands and complicates the scope of issues raised by the Cielo Vista Draft EIR.

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In view of both the complexity of technical data to be reviewed and the burden to the public to review such voluminous data during the holiday season,

we respectfully request that the County lengthen the public comment period by 30 days which would extend responses to January 22, 2014. Thank you in advance for your approval of this request.

Very truly yours,

Charles Buie Dawn Buie

Charles Buie, Dawn Buie
Protect Our Homes and Hills
Yorba Linda

Cc: The Honorable Todd Spitzer, Supervisor
Third District, County of Orange
10 Civic Center Plaza
Santa Ana, CA 92701

Letter: POHH-Carillo

Robert & Linda Carrillo
21100 Ridge Park Dr.
Yorba Linda, CA 92886

November 16, 2013

Orange County Planning
Attn: Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:

I am writing to request an extension of the public comment period for the subject draft EIR. There are complex legal and technical issues surrounding the Cielo Vista Project and the County's Draft EIR. Almost concurrently, the County is also in process of releasing the proposed Esperanza Hills Project on adjacent parcels directly east of the proposed Cielo Vista site. Because the Esperanza Hills development is a consequence of the Cielo Vista Project and both projects will share access easements and utilities connections, the two projects should be evaluated together. The near simultaneous release of these projects expands and complicates the scope of issues raised by the Cielo Vista Draft EIR.

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Very truly yours,

Robert & Linda Carrillo, member
Protect Our Homes and Hills
Yorba Linda

Cc: The Honorable Todd Spitzer, Supervisor
Third District, County of Orange
10 Civic Center Plaza
Santa Ana, CA 92701

Emailed to: Ron.Tippets@ocpw.ocgov.com
Todd.Spitzer@ocgov.com

Letter: POHH-Gass

From: Brian Gass :: Sandbox Marketing [mailto:bgass@sandboxmarketing.com]
Sent: Tuesday, November 12, 2013 9:33 PM
To: Tippets, Ron
Cc: Spitzer, Todd [HOA]
Subject: Please extend to comment period for Cielo Vista by 30 days

Dear Mr. Tippets and Mr. Spitzer-

As a resident in your district, I respectfully ask that you extend the comment period by 30 days on the Cielo Vista project.

We are working with legal counsel and the City Council to prepare our comments that mainly address the lack of information regarding ingress and egress on San Antonio Road/Aspen Way and Via del Agua/Stonehaven. Both are city roads that are 2 lane and cannot handle the additional traffic caused by the additional homes from Cielo Vista and Esperanza Hills.

Both roads were jammed during the last fire and the builders/county representatives have not thoroughly addressed how you plan to create wider city roadways to access your proposed projects. Because the Esperanza Hills development is a consequence of the Cielo Vista Project and both projects will share access easements and utilities connections, the two projects should be evaluated together. The near simultaneous release of these projects expands and complicates the scope of issues raised by the Cielo Vista Draft EIR.

A six-week comment period is blatantly insufficient for a thorough review by the public that CEQA proscribes. In addition, the public comment period runs through and closes within the winter holiday season, which precludes the public from making an effective response on the Cielo Vista Draft EIR. If not extended, the current comment period would result in minimal public response and participation. As the lead agency in this development process, at the doorstep of the City of Yorba Linda, the County should advocate for achieving maximum public participation in the important environmental review phase of both this and the Esperanza Hills Draft EIR process.

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Very truly yours,

Brian Gass, Member
Protect Our Homes and Hills
Yorba Linda

Cc: The Honorable Todd Spitzer, Supervisor
Third District, County of Orange
10 Civic Center Plaza
Santa Ana, CA 92701

Letter: POHH-Johnson1

KEVIN K. JOHNSON, APLC

KEVIN K. JOHNSON
JEANNE L. MacKINNON
HEIDI E. BROWN

A PROFESSIONAL LAW CORPORATION
ATTORNEYS AT LAW
600 WEST BROADWAY, SUITE 225
SAN DIEGO, CALIFORNIA 92101

TELEPHONE (619) 696-6211
FAX (619) 696-7516

January 22, 2014

SENT VIA EMAIL AND U.S. MAIL

Orange County Planning
Attn: Mr. Ron Tippets
300 North Flower
Santa Ana, CA 92702-4048

Re: Cielo Vista Project – Draft Environmental Impact Report, EIR No. 615
Comments on DEIR Population and Housing Section 4.11

Dear Mr. Tippets:

This firm represents Protect Our Homes and Hills, an unincorporated citizens group consisting of residents and taxpayers in the City of Yorba Linda. We submit this comment letter on the deficiencies in the Draft Environmental Impact Report ("DEIR") prepared for the Cielo Vista development project ("Cielo"). Specifically, the DEIR fails to adequately analyze the potential of the project to result in housing and population impacts and and fails to accurately describe the existing housing and projected population in the County of Orange.

The DEIR makes reference to and is premised on the Regional Housing Needs Assessment (RHNA) "most recently adopted and approved" by the SCAG Regional Council on July 12, 2006, for the planning period from January 2006 through June 2014. However, in spite of the fact that the DEIR was issued in November 2013, it contains no report or analysis of the extent to which those needs have been met by projects completed or approved between 2006 and 2013 or proposed projects other than Esperanza Hills. In fact, the DEIR does not mention or factor into its analysis a number of pending projects in the immediate project vicinity. A list of these related projects is attached as Exhibit A. These omissions render the DEIR Population and Housing component outdated and incomplete.

Relevant, current information can be found with the County of Orange which is, by state law, required to periodically update the Housing Element of its General Plan. Importantly, the County utilizes the SCAG Regional Council's RHNA as a starting point for its analysis. On March 22, 2011, the Housing Element was amended and thereafter certified by the California Department of Housing and Community Development on April 15, 2011.

The 2011 Housing Element update was supported by a table of "Net Remaining RNHA, 2010-2014-Orange County Unincorporated Area" that took into account projects that had been

completed or approved between 2006 and 2009. Based on SCAG's RHNA figures relied upon in the DEIR, the table demonstrated that there were no "net remaining" housing needs for the above-median income category – in fact, there was a surplus of 2975 homes in that category. A second table of "Land Inventory vs. Net Remaining RHNA – Orange County Unincorporated Areas" indicated a surplus in both housing for both lower and above moderate income categories. The report concluded: "A comparison of these estimates with the County's remaining 2008-2014 RHNA need shows there is a significant amount of surplus capacity to meet the remaining need in the Lower and Above Moderate categories but there is a shortfall in the Moderate category." Copies of relevant portions of the Housing Element Final Draft January 27, 2011, are attached hereto as Exhibit B. The complete document can be found at http://cams.ocgov.com/Web_Publisher/Agenda03_22_2011_files/images/O00811-000249E.PDF.

The DEIR states that "[b]ecause Project housing price points are yet to be defined, the income subcategory for the Project's residences is to be determined." See p. 4.11-6 and -7 under findings of consistency. However, under SCAG 2012 RHNA standards cited in the agenda staff report for the Dec. 10, 2013, Orange County Board of Supervisors meeting, "Above Moderate" is calculated at over 120 percent of the Area Median Income which in 2013 for Orange County was $87,200.
http://cams.ocgov.com/Web_Publisher/Agenda12_10_2013_files/images/O01413-001402E.PDF

In other words, the "Above Moderate" income housing category requires a household income of $104,640. Given home values in the areas adjacent to the proposed development as well as lot sizes, the subject residences will in all likelihood be priced for sale to the buyers in the "Above Moderate" income category, a category which as of 2011 had a surplus of homes.

Orange County updated its Housing Element again in December 2013 and discussed housing inventory and projections. Relevant documents can be found at
http://cams.ocgov.com/Web_Publisher/Agenda12_10_2013_files/images/O01113-001402E.PDF and
http://cams.ocgov.com/Web_Publisher/Agenda12_10_2013_files/images/A13-001402.HTM.
This updated analysis noted that certain projects anticipated in 2011 had been held up by the slow housing market. The largest of these was "The Ranch Plan" planned community. As noted in the 2013 information, the slow housing market led to delays in planned construction so it remains unclear the extent to which the projections for Above Moderate housing are impacted on an ongoing basis.

To be adequate under CEQA, the DEIR should provide data and analysis of housing projects completed and approved since the initial figures upon which the document relies were issued. To the extent the DEIR relies on the Regional Housing Needs Assessment (RHNA) approved by the SCAG Regional Council on July 12, 2006, for the planning period from January 2006 through June 2014, updated information should be included in the DEIR. The changes between data used by the County for its 2011 amendments and its 2013 amendments to the Housing Element of its General Plan require an analysis of the status of approved but delayed projects. An evaluation of whether the Cielo Vista project is necessary to meet regional

housing needs must focus on both 1) approved, completed and planned developments since the 2006 RHNA relied upon in the DEIR and 2) inclusion of the project in the Above Moderate housing category. Based on information relied on by the County in its Housing Element update processes, it seems likely that the project is not necessary to meet regional housing needs and conclusions in the DEIR to the contrary, including consistency conclusions (DEIR pp. 4.11-6, 7), are not supported by substantial evidence.

Very truly yours,
KEVIN K. JOHNSON APLC

Kevin K. Johnson

Cc: Supervisor Todd Spitzer via email

EXHIBIT A

Projects within 5 miles of Cielo Vista/Esperanza Hills

Oakcrest Terrace
Project Type: 69 affordable residential units
Location: 22744 Eastpark Drive, Yorba Linda
Lead Agency: City of Yorba Linda
CEQA Status: MND
Last Action: Comment period ended March 26, 2012

Learn More: http://ci.yorba-linda.ca.us/index.php/city-departments/community-development?id=582:oakcrest-terrace-mitigation&catid=1

Mountain Park
Project Type: 2500 homes on 3000 acres
Location: South of the 91 / East of the 241
Lead Agency: City of Anaheim
CEQA Status: EIR
Last Action: Approved in 2005

Learn More: http://www.anaheim.net/article.asp?id=1225

Madrona (Canyon Crest)
Project Type: 162 homes on 367 acres
Location: Eastern Brea (off Carbon Canyon Road – Hwy 142)
Lead Agency: City of Brea
CEQA Status: FEIR released November 2012

Last Action: Appeal Hearing 1/21/14

Learn More: http://www.ci.brea.ca.us/index.aspx?NID=180

La Floresta
Project Type: 398 SFD and 712 Multi-family on 120 acres
Location: Imperial Highway and Valencia
Lead Agency: City of Brea
CEQA Status: FEIR released August 2008
Last Action: Approved May 2010, Construction Occurring

Learn More: http://www.ci.brea.ca.us/index.aspx?NID=180

Foremost Community (Canyon Hills)

Project Type: 76 homes on 141 acres
Location: Western Chino Hills (off Carbon Canyon Road – Hwy 142)
Lead Agency: City of Chino Hills
CEQA Status: EIR approved 1987
Last Action: Awaiting Tract Home Design Review by Planning Commission

Learn More: http://www.chinohills.org/index.aspx?NID=847

Pine Valley Estates

Project Type: 98 homes on 192 acres
Location: Western Chino Hills (off Carbon Canyon Road – Hwy 142)
Lead Agency: City of Chino Hills
CEQA Status: Final Map Recorded 2009
Last Action: Revised Design Review by Planning Commission approved 2009

Learn More: http://www.chinohills.org/index.aspx?NID=847

Stonefield Development

Project Type: 28 homes on 34 acres
Location: Western Chino Hills (off Carbon Canyon Road – Hwy 142)
Lead Agency: City of Chino Hills
CEQA Status: Website is unclear
Last Action: Website is unclear

Learn More: http://www.chinohills.org/index.aspx?NID=853

EXHIBIT B

County of Orange

HOUSING ELEMENT

Final Draft

January 27, 2011

Table X-42
Net Remaining RHNA, 2010-2014 –
Orange County Unincorporated Area

	Income Category				
	VL	Low	Mod	Above	Total
RHNA (total)	1,777	1,445	1,597	3,159	7,978
Units Completed or Approved 2006-2009	265	316	27	7,347	7,955
RHNA (net remaining)	1,512	1,129	1,570 1,546	0 2,975	4,211

Sources:
SCAG 7/2007
Appendix A, Table A-2; County of Orange/OC Planning, 5/2010

b. Inventory of Vacant & Underutilized Land

NEW MASTER-PLANNED COMMUNITIES

During the past 40 years the majority of development in unincorporated Orange County has occurred in major landholdings under the planned community concept. Most of these areas were incorporated into new cities between 1988 and 2001, including Mission Viejo (1988), Dana Point (1989), Laguna Niguel (1989), Lake Forest (1991), Laguna Hills (1991), Laguna Woods (1999), Rancho Santa Margarita (2000), and Aliso Viejo (2001). Most of these areas were originally approved as planned communities in unincorporated Orange County.

Only one planned community in the unincorporated area – The Ranch Plan – has a significant amount of land remaining to be developed during this Housing Element timeframe. Located in southeastern portion of the County east of Rancho Santa Margarita, Mission Viejo and San Juan Capistrano, The Ranch Plan was approved in 2004 with a maximum of 14,000 residential units. It is expected to be the final large landholding that will be developed in unincorporated Orange County since all other significant undeveloped parcels are located within cities, regional parks or the Cleveland National Forest.

As part of the General Plan amendment, Planned Community (zone change) and development agreement for The Ranch Plan, the property owner is required to dedicate 60 acres of land to the County for affordable housing development. Based on a typical density of 30 units per acre, it is anticipated that 1,800 lower-income units will ultimately be produced in The Ranch Plan Planned Community. Additional discussion of The Ranch Plan is provided in Appendix B – Land Inventory.

Table X-43
Land Inventory vs. Net Remaining RHNA –
Orange County Unincorporated Area

Category	Total Units	Income Category		
		Lower	Moderate	Above Moderate
Completed and approved projects (see Tables A-2 and B-1)	1,795	581	27	1,187
The Ranch Plan Planned Community	6,952*	792*	0	6,160*
Housing Opportunities Overlay Zone**	2,039	2,039	0	0
Other underutilized sites	824		824	
Total Land Inventory	**11,610**	**3,412**	**851**	**7,347**
RHNA Need (2006-2014)	7,978	3,222	1,597	3,159
Surplus (Deficit)	**3,632**	**190**	**(746)**	**4,188**

*Totals reflect approved RHNA assumptions for the current planning period (44% of approved zoning entitlements).
**Including both the original Overlay Zone and the Arterial Highway Expansion Area (see Appendix B)
Sources: OC Planning (5/2010); SCAG (7/2007)

A comparison of these estimates with the County's remaining 2008-2014 RHNA need shows that there is a significant amount of surplus capacity to meet the remaining need in the Lower and Above Moderate categories but there is a shortfall in the Moderate category. The Housing Action Plan (Section 5) contains a discussion of programs and policies to encourage and facilitate housing production, with particular emphasis on the lower-income categories.

Financial Resources

a. Federal Resources

HOME FUNDS

The Home Investment Partnership (HOME) Program is a federal program, created as a result of the National Housing Affordability Act of 1990. Under HOME, HUD awards funds to localities on the basis of a formula that takes into account tightness of the local housing market, inadequate housing, poverty and housing production costs. Localities must qualify for at least $500,000, based on HUD's distribution formula, to receive direct allocation of funds, or can apply to the state or combine with adjacent jurisdictions.

HOME funding is provided to jurisdictions to assist either rental housing or home ownership through acquisition, construction, reconstruction, and/or rehabilitation of affordable housing. Also possible is tenant based rental assistance, property

Letter: POHH-Johnson2

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January 22, 2014

SENT VIA EMAIL AND U.S. MAIL

Orange County Planning
Attn: Mr. Ron Tippets
300 North Flower
Santa Ana, CA 92702-4048

Re: Cielo Vista Project – Draft Environmental Impact Report, EIR No. 615
Comments on Inadequate Alternatives Section

Dear Mr. Tippets:

This firm represents Protect Our Homes and Hills, an unincorporated citizens group consisting of residents and taxpayers in the City of Yorba Linda. We submit this comment letter on the Alternatives Section of the Draft Environmental Impact Report.

By way of brief summary, the Alternatives Section is woefully inadequate and needs to be completely revised and expanded in scope. The inadequacy of the Alternatives Section arises in substantial part from artificially narrow project objectives and reliance upon multiple unsupportable conclusions from the body of the entire DEIR.

ALTERNATIVES SELECTION

The fundamental purpose of the Alternatives Section of an EIR is to look at alternative project designs, and in appropriate cases, alternative project locations that avoid and/or mitigate significant project impacts.

Here, the unreasonably limited and largely contrived project alternatives do not include a single off-site alternative, under circumstances where there are compelling reasons to look to build the project elsewhere. The wildfire, geologic, contamination, and methane risks at the site, individually, and certainly cumulatively, virtually require a good faith look at alternative locations.

SPECIFIC ALTERNATIVES

The **No Project Alternative** is functionally rejected based upon the unsupported assumption that it is sound wildfire protection strategy to buffer existing homes with new

homes placed in the path of advancing walls of flame. Nowhere in the document is there evidence or analysis supporting this unique assumption.

Alternative 2, Planning Area 1 Only Alternative, is fundamentally inadequate from both a legal and a common sense standpoint, because, while it changes the project footprint, it increases the number of units to be built by 47 % compared to the project. This approach is anything but a good faith proposal to reduce the major negative impacts from the Project. The alternative in fact materially increases impacts almost across the entire range of impact areas. By apparent design, it is put forward to be easily rejected.

Alternative 3, Large/Reduced Grading Alternative , is also designed to fail as a viable alternative with, for example, a "poison pill" in the form of reduced open space. Clearly the alternative could be designed to include 36.3 acres of permanent open space.

On the positive side, it is appropriate that the alternative does present the impact reduction features of reducing grading and the number of lots. However, when the alternative also wrongfully posits the apparent inalienable rights of homeowners to make "improvements" over the entire width and breadth of lands between their property boundaries and then concludes that this will result in more severe, negative visual impacts, it is clear that the alternative is constructed with the intent of creating negative impacts. Obviously landowners can be deed restricted to stay away from sensitive areas.

Another example of creating negative impacts comes with the convenient conclusion that the Alternative will have greater biological impacts than Alternative two. There is no basis to conclude that 65 lots, compared to 112, could not be placed on the site in a more biologically sensitive manner.

Alternative 4, Contested Easement Alternative, is grossly deficient as a matter of law because it does not offer up any meaningful impact reducing designs or mitigation measures.

The **Environmentally Superior Alternative** section is deficient for several reasons including its reliance upon the absence of substantial evidence and flawed analysis in each of the preceding alternatives sections.

Perhaps the most egregious example of incorporating flawed analysis comes with the conclusion that Alternative Three will result in greater wildland fire hazards. This conclusion is simply unsupportable. Among other factors in this regard is the critical fact that evacuating residents from 65 homes would be much easier than evacuating residents from 112 homes.

Off Site Alternatives

Because of the compelling need to examine possible off-site project locations, the DEIR should be revised to include 1) identification of a reasonable range of off-site properties suitable for similar density development, and 2) detailed discussion of at least one or two sites as actual project alternatives.

As one example of off-site properties to be identified, and possibly adopted and analyzed in the DEIR as an off-site alternative location, please see the attached Google Earth view (Exhibit "A") which shows vacant properties at and near the intersection of Los Angeles Street and Imperial Highway. The parcels are also identified on the Land Use Map for the Yorba Linda General Plan. The map is attached hereto as Exhibit "B". These parcels are a logical alternative location that should be considered.

Realistic and Reasonable Onsite Alternatives

The choice of alternatives reflected in the DEIR is artificially narrowed and constrained by the unusually narrow and therefore inappropriate project objectives. The objectives collectively and automatically limit the project to the subject site and provide artificial and bad faith grounds for rejecting everything but the project as proposed by the applicant.

The project objectives need to be fairly restated and a choice of new alternatives should be made based upon the new objectives and complete, well reasoned assessment-- based upon substantial evidence-- of project impacts, available avoidance measures and appropriate mitigation measures.

The choice of Offsite Alternative should be guided by the same standards.

In sum, the Alternatives Section is completely deficient on multiple levels. This is, in large part, due to the myriad of deficiencies throughout the DEIR that have been addressed in other comment correspondence from this office as well as a multiplicity of comment letters from experts, residents, non-profits, law firms and government entities.

The DEIR needs to be completely revised and recirculated.

Very truly yours,
KEVIN K. JOHNSON APLC

Kevin K. Johnson

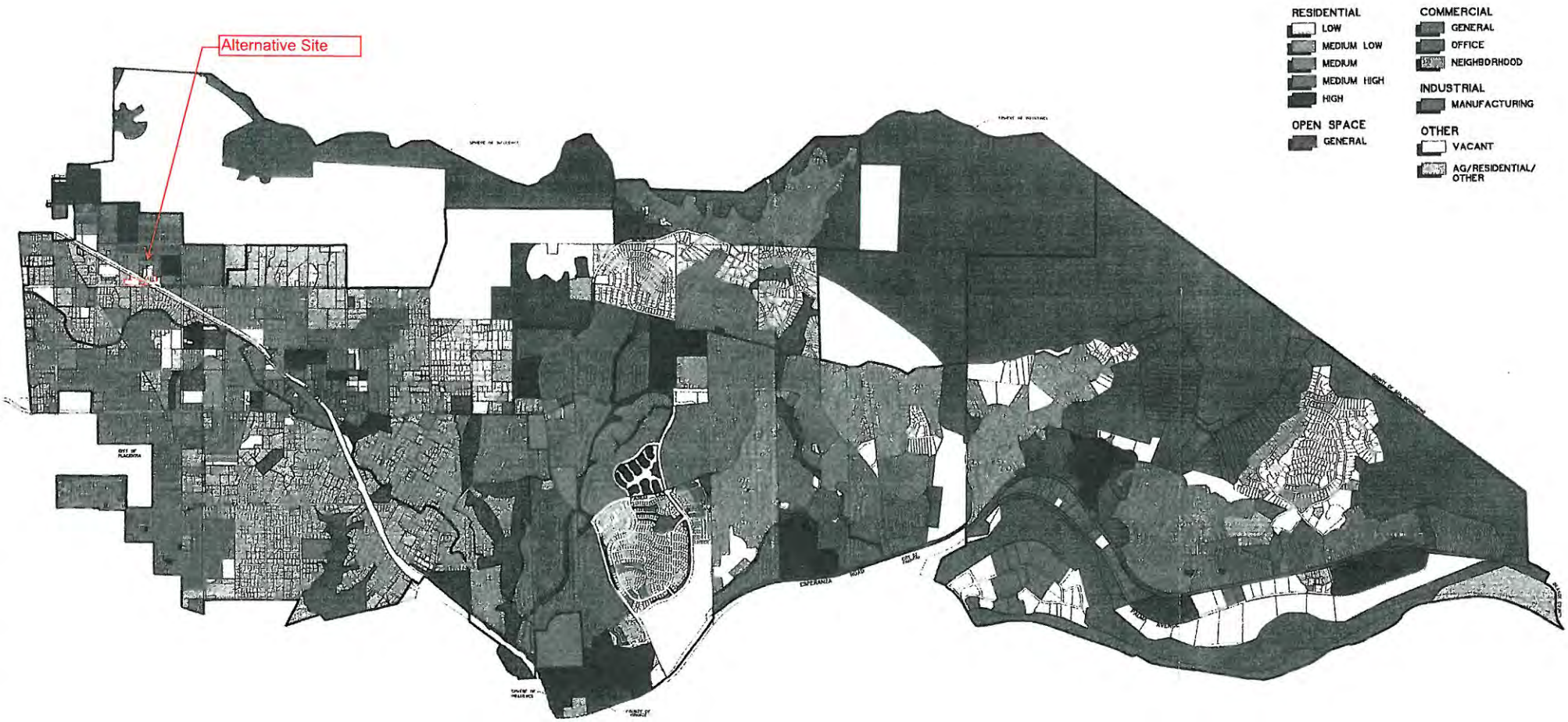
cc: Supervisor Todd Spitzer via email

EXHIBIT A

Brooklyn Ave
4th St
2nd St
3rd St
Ridgedale Ln
Carlton Pl
Briardale Ln
Los Angeles St
La Concetta Dr
Bastanchury
Valley View Ave
La Entrada Dr
Imperial Hwy
90
Aspenglow Ln
Citrus Cir
Osmond St
La Serena Dr
© 2013 Google
1995
Imagery Date: 4/16/2013 33°54'00.21" N 117°49'55.26" W elev 382 ft

EXHIBIT B

EXISTING LAND USE



The City of

YORBA LINDA

Note: Existing Land Use Exhibit reflects status of City in 1991. Present conditions may vary.

SCALE 1" = 3000'

THE PLANNING CENTER

GEOGRAPHIC INFORMATION SYSTEMS

Exhibit LU-2

Letter: POHH-Johnson3

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January 22, 2014

SENT VIA EMAIL AND U.S. MAIL

Orange County Planning
Attn: Mr. Ron Tippets
300 North Flower
Santa Ana, CA 92702-4048

Re: Cielo Vista Project – Draft Environmental Impact Report, EIR No. 615
Comments on Cumulative Impacts, Noise Impacts and Oil Production Impacts

Dear Mr. Tippets:

This firm represents Protect Our Homes and Hills, an unincorporated citizens group consisting of residents and taxpayers in the City of Yorba Linda. We submit this comment letter on the deficiencies in the Draft Environmental Impact Report ("DEIR") prepared for the Cielo Vista development project ("Cielo"). Specifically, the DEIR fails to include related projects in the cities of Brea and Chino Hills in the cumulative impacts analysis and contains an inadequate discussion and analysis of cumulative impacts and impacts from the proposed drilling pad, including noise impacts.

Cumulative Impacts Analysis

The cumulative impacts analysis is divided among the various impact subchapters making it difficult for the public and ultimately the decisionmaker to comprehensively grasp the full cumulative impact of the Cielo Project and other past, present and reasonably foreseeable future projects. The DEIR should provide a "**summary** of the expected environmental effects to be produced by those projects with **specific reference** to additional information stating where that information is available, and...A **reasonable analysis** of the cumulative impacts of the relevant projects. An EIR shall examine reasonable, feasible options for mitigating or avoiding the project's contribution to any significant cumulative effects." CEQA Guideline 15130(b)(4-5). The DEIR fulfills none of these CEQA informational roles.

The DEIR identifies other projects in Section 3.0 but makes no effort to reasonably analyze the impacts of the identified projects in the cumulative impacts discussion and makes no reference to additional information and where that information is available. This analytical and informational omission renders the DEIR insufficient as an informational document.

Clearly, many of these projects have reached the level of permit processing or environmental review such that information concerning their specific impacts is readily available and should properly be part of the cumulative impacts analysis. If it is "reasonable and practical to include the projects" in the cumulative impacts analysis, they should be included. *Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 723.

Instead, the DEIR relies on conclusions of significance or insignificance of impacts devoid of any reasoned analysis. This is not permissible under CEQA. *Whitman v. Board of Supervisors* (1979) 88 Cal.App.3d 397 (Discussion lacking even a "minimal degree of specificity or detail" is inadequate and the discussion must be more than a conclusion "devoid of any reasoned analysis." 88 Cal.App.3d at 411. Similarly, in *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713, EIR's analysis of significant cumulative impacts was legally inadequate because it simply asserted that nonspecific cumulative development would have community character, agricultural and visual impacts. These analytical deficiencies must be corrected.

In addition, the DEIR fails to include pending projects in the nearby incorporated cities of Brea and Chino Hills. These projects are within 5 miles of the Cielo project and should be included in any cumulative impacts analysis:

Madrona (Canyon Crest)

Project Type:	162 homes on 367 acres
Location:	Eastern Brea (off Carbon Canyon Road – Hwy 142)
Lead Agency:	City of Brea
CEQA Status:	FEIR released November 2012
Last Action:	Appeal Hearing 1/21/14

Information available at: http://www.ci.brea.ca.us/index.aspx?NID=180

Foremost Community (Canyon Hills)

Project Type:	76 homes on 141 acres
Location:	Western Chino Hills (off Carbon Canyon Road – Hwy 142)
Lead Agency:	City of Chino Hills
CEQA Status:	EIR approved 1987
Last Action:	Awaiting Tract Home Design Review by Planning Commission

Information available at: http://www.chinohills.org/index.aspx?NID=847

Pine Valley Estates

Project Type:	98 homes on 192 acres
Location:	Western Chino Hills (off Carbon Canyon Road – Hwy 142)
Lead Agency:	City of Chino Hills
CEQA Status:	Final Map Recorded 2009

January 22, 2014

Last Action: Revised Design Review by Planning Commission approved 2009

Information available at: http://www.chinohills.org/index.aspx?NID=847

Stonefield Development

Project Type: 28 homes on 34 acres
Location: Western Chino Hills (off Carbon Canyon Road – Hwy 142)
Lead Agency: City of Chino Hills
CEQA Status: Website is unclear but appears project is approved
Last Action: Website is unclear, but appears project is approved

Information available at: http://www.chinohills.org/index.aspx?NID=853

Note that information on other projects, including those listed in section 3.0, is generally readily available on the websites of the relevant agency. The DEIR should be revised to include this information in order to be compliant with the CEQA guidelines.

Drilling Pad and Noise Impacts

The approval of a contingent 1.8 acre "oil drilling pad" is inappropriate. Under CEQA, what will or could be built on the pad needs to be discussed in detail in the DEIR and all expected or reasonably foreseeable impacts from the proposed drilling pad need to be identified. Avoidance measures need to be analyzed and where avoidance is not possible, mitigation measures need to be identified and adopted.

Of particular concern to area residents is whether the new drilling pad will support horizontal drilling or fracking.

Reasonably foreseeable impacts include, but are not limited to: 1) pre-construction subsurface investigations on, near or from the pad; (2) construction impacts, including noise, air pollution, lighting and vegetation/soils impacts from vehicles and construction equipment; 3) visual impacts, air quality impacts, drilling apparatus noise and lighting and maintenance procedures associated with a fully operational drilling pad; 4) seismic impacts, including vibrations affecting wildlife and residents; and 5) impacts upon surface and groundwater resources.

Impacts associated with closing down existing wells and moving infrastructure to the new drilling pad need to be addressed and the expected operational life of an operational drilling pad as well as close down protocols need to be identified and analyzed.

On the specific subject of noise, residents report that poorly maintained oil drilling rigs can be heard squeaking throughout the canyon area. The squeaking can continue for days before maintenance is performed. The canyon walls and other topographic characteristics provide unique sound channeling features and need to be considered in the DEIR, along with

the oil rigs noise impacts, as noise enhancing features requiring appropriate mitigation.

In view of the foregoing deficiencies in the DEIR, the document should be revised and recirculated for public review.

Very truly yours,
KEVIN K. JOHNSON APLC

Kevin K. Johnson

Cc: Supervisor Todd Spitzer via email

Letter: POHH-Keuilian

Troy &Katrina Keuilian
4640 SanAntonio Rd
Yorba Linda, Ca 92886

November 14, 2013

Via E-Mail and U.S. Mail

Orange County Planning
Attn: Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:

I am writing to request an extension of the public comment period for the subject draft EIR. There are complex legal and technical issues surrounding the Cielo Vista Project and the County's Draft EIR. Almost concurrently, the County is also in process of releasing the proposed Esperanza Hills Project on adjacent parcels directly east of the proposed Cielo Vista site. Because the Esperanza Hills development is a consequence of the Cielo Vista Project and both projects will share access easements and utilities connections, the two projects should be evaluated together. The near simultaneous release of these projects expands and complicates the scope of issues raised by the Cielo Vista Draft EIR.

A six-week comment period is blatantly insufficient for a thorough review by the public that CEQA proscribes. In addition, the public comment period runs through and closes within the winter holiday season, which precludes the public from making an effective response on the Cielo Vista Draft EIR. If not extended, the current comment period would result in minimal public response and participation. As the lead agency in this development process, at the doorstep of the City of Yorba Linda, the County should advocate for achieving maximum public participation in the important environmental review phase of both this and the Esperanza Hills Draft EIR process.

In view of both the complexity of technical data to be reviewed and the burden to the public to review such voluminous data during the holiday season, I respectfully request that the County lengthen the public comment period by 30 days which would extend responses to January 22, 2014. Thank you in advance for your approval of this request.

Very truly yours,

Troy & Katrina Keuilian
Protect Our Homes and Hills
Yorba Linda

Cc: The Honorable Todd Spitzer, Supervisor
Third District, County of Orange
10 Civic Center Plaza
Santa Ana, CA 92701

Emailed to: Ron.Tippets@ocpw.ocgov.com
Todd.Spitzer@ocgov.com

Letter: POHH-MacKinnon1

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January 22, 2014

SENT VIA EMAIL AND U.S. MAIL

Orange County Planning
Attn: Mr. Ron Tippets
300 North Flower
Santa Ana, CA 92702-4048

Re: Cielo Vista Project – Draft Environmental Impact Report, EIR No. 615
Comments on Annexation and Failure of DEIR to Adequately Analyze Annexation Scenario

Dear Mr. Tippets:

This firm represents Protect Our Homes and Hills, an unincorporated citizens group consisting of residents and taxpayers in the City of Yorba Linda. We submit this comment letter on the deficiencies in the Draft Environmental Impact Report ("DEIR") prepared for the Cielo Vista development project ("Cielo"). Specifically, the DEIR fails to adequately discuss the annexation scenario, associated environmental impacts upon project annexation to the City of Yorba Linda, all jurisdictional changes involved and the discretionary approvals by LAFCO and the City of Yorba Linda.

The project site is within the City of Yorba Linda sphere of influence and according to the Project Description, "[t]he Project Applicant intends to seek annexation to the City through an annexation agreement to be negotiated with the City prior to the issuance of building permits" (DEIR p. 2-2). Although the DEIR characterizes the annexation as a mere possibility elsewhere, given the applicant's clear intention to seek annexation, all impacts, approvals and jurisdictional changes related to the annexation scenario should be fully analyzed in the DEIR. Instead, like several other areas in the DEIR, analysis of these issues is impermissibly deferred to a future date or omitted altogether.

The City of Yorba Linda and Orange County Local Agency Formation Commission ("LAFCO") have discretionary authority for carrying out or approving the Cielo project in an annexation scenario. As such, they are responsible agencies under the California Environmental Quality Act ("CEQA"), Pub. Res. Code sec. 21000 et seq. and should have been named as such. 14 Cal.Code Regs. §15381. LAFCO presents a clear example of a responsible agency. In their discussion of responsible agencies, authors Kostka & Zischke identify as a responsible agency "the Local Agency Formation Commission (LAFCO) for any annexation or

reorganization." Kosta & Zischke, *Practice Under the California Environmental Quality Act §3.18* (CEB 2013).

In our experience, LAFCO generally requires that an EIR contain information about the environmental consequences of the decisions that LAFCO will be making with regard to the whole project. *Habitat And Watershed Caretakers v. City of Santa Cruz* (2013) 213 Cal.App.4th 1277. This information includes: a discussion of the required jurisdictional and sphere of influence changes subject to LAFCO discretionary approval(s); the project's conformance with LAFCO statutory requirements and local policies; a description of the ability of existing agencies to provide services; a detailed description of existing and proposed infrastructure; and a discussion of the proposed provision of public services to the subject territory. The Project Description does not even mention LAFCO approvals (DEIR p. 2-37, 2-38) among the various approvals and permits and is inadequate on its face.

Likewise, the DEIR's description of approvals from the City of Yorba Linda appears incomplete and therefore inadequate (DEIR p. 2-38). The DEIR acknowledges that an annexation scenario "would include discretionary approvals on the part of the City" including possible changes to the Yorba Linda General Plan and zoning designations (DEIR p. 4.9-16). None of these possible discretionary approvals is listed in the approvals and permits listings (DEIR pp. 2-38, 4.9-7).

LAFCO has discretionary authority for approval of the annexation to the City of Yorba Linda and any concurrent annexations and/or detachments involving special district water, sewer, and/or fire protection service providers for the project. Discretionary authority for jurisdictional changes is statutorily reserved to LAFCO. Cal. Gov. Code §§56100(a) and 56375. Therefore, at a minimum, the DEIR should identify all discretionary actions related to the applicant's plan to seek annexation to the City of Yorba Linda by the type of jurisdictional change (annexation), the affected parcels and total acreage for each jurisdictional change, and the subject agency involved in the jurisdictional change. At present, the DEIR does not fulfill these most basic requirements and should be revised.

This failure to include discussion of all agency approvals in the Project Description presents a foundational problem that impacts other sections of the DEIR. For example, the Land Use and Planning section at 4.9 also contains an incomplete list of approvals and permits (DEIR pp. 4.9-6, 7). More seriously, the section's discussion of thresholds of significance is inadequate and incomplete because it fails in the first instance to identify all agencies with jurisdiction over the project. If an agency such as LAFCO has not been identified in the first instance, then discussion of conflicts with applicable plans, policies or regulations of that agency has not occurred and is inadequate on its face.

Moreover, to the extent the DEIR discusses consistency thresholds and conflicts with existing Yorba Linda zoning or land use plans, policies or regulations at pp. 4.9-5, 7, 13-16, it attempts to gloss over clear conflicts with the Yorba Linda land use designation (low density residential 0-1.0 dwelling unit per acre) and zoning designation (UNC-Unincorporated Area) which will require a land use designation and/or zoning change. The DEIR characterizes the necessary Orange County zoning change as making the project "essentially consistent" with the

changed Yorba Linda zoning, not the existing Yorba Linda zoning. Likewise, the DEIR indicates "the Project with approval of its requested discretionary actions would be potentially consistent with the applicable goals and policies in the [Yorba Linda] General Plan (DEIR p. 4.9-14). The proper issue for analysis is the project's consistency with the **current** Yorba Linda zoning and land use designations, not the consistency of the project with its discretionary approvals. The DEIR cannot properly avoid a significance determination by using the potentially changed zoning or land use designations which are part of the proposed project as a baseline. The Land Use and Planning section of the DEIR must be revised to employ the proper baseline and provide an open and forthright consistency analysis.

The discussion also refers the reader to other sections of the DEIR instead of setting out the full consistency analysis in the Land Use and Planning section (DEIR p. 4.9-17) (consistency with Yorba Linda's Hillside Development Zoning Code Regulations and consistency of residential development with oil production discussed in section 4.1 Aesthetics). The Land Use and Planning section should include the consistency discussion in its entirety and not refer the reader to another DEIR section which may not contain an adequate consistency analysis.

In this regard, the DEIR in both the Land Use and Planning section and the Aesthetics section fails to acknowledge that one effect of maintaining consistency with the hillside protection provisions in both the Yorba Linda General Plan and the zoning code may be reduced density and yield for this project. Under these circumstances, the proposed project density appears to be patently inconsistent with these policies.

The Recreation and Resource Element of the Yorba Linda General Plan seeks to "permanently preserve and protect sensitive hillside areas", "[r]espect the natural landform as a part of site planning", and "[p]reserve significant natural features, including sensitive hillsides" (DEIR p. 4.1-30). Similarly and consistent with these goals and policies, the Land Use Element contemplates and seeks "[l]ow density residential development in the hillside areas" and targets "lower densities to hillside areas with yield based on slope severity and stability, topographic conditions" ("DEIR p. 4.1-30). Application of these Yorba Linda policies will likely result in a much lower density than that proposed by the project and this inconsistency must be acknowledged and analyzed in the DEIR.

In view of the foregoing identified inadequacies in the Cielo DEIR, the document should be substantially revised and re-circulated for public comment.

Very truly yours,
KEVIN K. JOHNSON APLC

Jeanne L. MacKinnon

Cc: Supervisor Todd Spitzer via email

Letter: POHH-Mackinnon2

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January 22, 2014

SENT VIA EMAIL AND U.S. MAIL

Orange County Planning
Attn: Mr. Ron Tippets
300 North Flower
Santa Ana, CA 92702-4048

Re: Cielo Vista Project – Draft Environmental Impact Report, EIR No. 615
Comments on Inadequate Project Description and Related Issues

Dear Mr. Tippets:

This firm represents Protect Our Homes and Hills, an unincorporated citizens group consisting of residents and taxpayers in the City of Yorba Linda. We submit this comment letter on the deficiencies in the Project Description and Cumulative Impacts and Growth Inducing Impacts Analyses in the Draft Environmental Impact Report ("DEIR") prepared for the Cielo Vista development project ("Cielo").

By failing to accurately include all components of the Cielo project, including water infrastructure improvements, the DEIR's Project Description and related analyses are deficient in a number of fundamental and serious respects.

To be legally adequate, a project description must: depict the project accurately and not minimize its environmental effects; include reasonably foreseeable activities associated with the project; and be consistent throughout the EIR. Kostka & Zischke, *Practice Under the California Environmental Quality Act §12.6* (CEB 2013). A project description that omits components of the project results in an EIR that fails to disclose all project impacts. *Santiago County Water Dist. v. County of Orange* (1981) 118 Cal.App.3d 818, 829 (sand and gravel mine project description omitted discussion of water pipelines serving the project). An agency may not split a single large project into small pieces and thereby avoid environmental review of the entire project. *Orinda Ass'n v. Board of Supervisors* (1986) 182 Cal.App.3d 1145, 1171.

<u>The Project Description Omits Key Project Components and Thereby Fails to Disclose All Project Impacts</u>

The project description for the Cielo Project fails to accurately depict all components of the project including foreseeable, growth inducing, cumulative activities related to the

expansion of the water supply infrastructure and the related Esperanza Hills project. By adopting a narrow view of the project, the DEIR overlooks "its cumulative impact by separately focusing on isolated parts of the whole" and engages in a "fallacy of division." *San Joaquin Raptor Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713, 730.

The Cielo project, along with the directly adjacent, concurrently processed, related Esperanza Hills project, currently lacks any water infrastructure. The Cielo and Esperanza Hills projects rely on the same water infrastructure and access. Due to their adjacency, shared infrastructure and concurrent processing, these projects are effectively one project and the totality of their environmental impacts should be comprehensively evaluated in one EIR. In particular, treatment as two separate projects without accompanying analysis of the necessary water infrastructure impacts avoids and understates project impacts, particularly growth inducing impacts and cumulative impacts.

These two projects will require the construction of connections to the Yorba Linda Water District ("YLWD") water distribution system, storage infrastructure, pumping facilities, upgrades to booster stations and offsite improvements. These types of infrastructure improvements are by definition growth inducing (*see 14 Cal.Code Regs. §15126.2(d)),* are part of the projects and the projects are not possible without these improvements.

The DEIR presents a situation remarkably similar to the EIR found to be inadequate in *San Joaquin Raptor Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713 in which a housing development could not go forward without a sewer expansion project. The sewer expansion project was the subject of a feasibility report but the report was not included in the housing development EIR and the feasibility report contained no discussion of the environmental impacts of the sewer expansion.[1]

Likewise, the water infrastructure improvements necessary for both the Cielo and Esperanza Hills developments were the subject of a Northeast Area Planning Study ("NEAPS") dated March 2013 authored by YLWD. The NEAPS is referred to in Section 4.15 Utilities and Service Systems of the DEIR but is not included as an Appendix, is not discussed in any significant detail in the DEIR and does not contain any environmental review. Under the authority of *San Joaquin Raptor,* this is legal error. The DEIR "tells the public and decision makers nothing about how the impacts of the [water infrastructure improvements] would combine with the impacts of the [ ] houses. If that information had been clearly set forth in the beginning, it could have significantly affected how the County considered mitigation measures and overall alternatives to the project." *San Joaquin Raptor Wildlife Rescue Center v. County of Stanislaus,* 27 Cal.App.4th at 734.

The Project Description mentions the NEAPS but incorrectly minimizes the importance

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1 Unlike the present situation, although an EIR was prepared for the sewer expansion project in *San Joaquin Raptor,* it also was not made a part of the housing development EIR. Here, no environmental review for the water infrastructure improvements has occurred as more fully discussed *infra.*

and relevance of this document by stating that "some" of the infrastructure improvements/upgrades detailed in the NEAPS would support the project. In fact, the need for the improvements detailed in the NEAPS was triggered by the Cielo and Esperanza Hills projects. The Cielo project is referred to in the NEAPS as the Sage development. The NEAPS states:

> The purpose of the Northeast Area Planning Study is to evaluate the capacity of existing distribution system facilities and size new infrastructure required to provide water under anticipated operational conditions for future demands. The proposed Esperanza Hills Estates (EHE) and Sage (SG)[Cielo] developments are projected to add 542 acre-feet per year (afy) to the District's annual demands, resulting in an overall system annual demand of 25,388 afy, which equates to a 2 percent demand increase.
> NEAPS p. ES-1.
>
> This Northeast Area Planning Study is primarily limited to the system evaluation surrounding the new Esperanza Hills/Sage developments and the FPS [Fairmount Pump Station].
> NEAPS p. ES-3.
>
> The District is undertaking this study to evaluate water service in the northeast are of the District. Specifically, this study is intended to evaluate the capacity of the system to supply the areas of new development...
> Two developments are currently planned for the northeast area of the District's service area, the Esperanza Hills Estates development and the Sage development.
> NEAPS p. 1.

In addition to failing to acknowledge the centrality of these two projects as the reason for the NEAPS, the Cielo project description completely abdicates responsibility for environmental review of these water infrastructure improvements by: (1) characterizing the recommendations in the NEAPS as mere possibilities, i.e. improvements "could include improvements such as water tanks..."; (2) indicating that the "specific locations, designs, and extent of the improvements are not known"; and (3) effectively deferring environmental review and passing the environmental review buck to YLWD by stating "[o]nce the facilities are further planned and designed, YLWD would evaluate the potential for the construction or operation of these facilities to result in significant impacts." DEIR p. 2-22.

The DEIR fails to properly characterize the NEAPS recommendations; they are not mere possibilities, they are necessary if this project is to go forward. The DEIR fails to acknowlege that neither the Cielo project nor the Esperanza Hills project can go forward without the water infrastructure improvements; fails to analyze the environmental impacts of the total project as including the water infrastructure improvements; and improperly defers environmental review and formulation of mitigation for significant project impacts, including cumulative impacts of the three interdependent projects.

These omissions render the DEIR inadequate and require revision and recirculation of

the document. These water infrastructure improvements are properly part of the project, should be adequately described in the project description and their significant impacts identified and fully analyzed.

The Growth Inducing Impacts Section Improperly Defers Environmental Review

The DEIR Growth Inducing Impacts section also improperly defers analysis of water infrastructure impacts (DEIR p. 6-1- 2) again indicating "the specific locations, designs, and extent of the improvements are not known" and "[o]nce the facilities are further planned and designed, YLWD would evaluate the potential for construction or operation of these facilities with respect resulting in any significant impacts" which would be evaluated by YLWD as an independent project. The growth inducing impacts of the Cielo project must be considered in conjunction with the growth-inducing and cumulative impacts of the water infrastructure improvements, including whether these improvements would facilitate growth elsewhere in the Northeast Area of the YLWD. *San Joaquin Raptor Wildlife Rescue Center v. County of Stanislaus,* 27 Cal.App.4th at 732-733.

The Utilities and Service Systems Discussion Is Seriously Flawed

The Utilities and Service Systems section of the DEIR (Section 4.15) fails to even include the NEAPS in its discussion of the local and regional regulatory framework (DEIR p. 4.15-2).

More seriously, the Utilities and Service Systems section fails to properly apply threshold of significance 2 related to the water infrastructure improvements. Threshold 2 asks:

> Would the Project:
> Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.
> DEIR p. 4.15-11.

The DEIR acknowledges elsewhere in the document that the Cielo project will require the construction of connections to the Yorba Linda Water District ("YLWD") water distribution system, storage infrastructure, pumping facilities, upgrades to booster stations and offsite improvements. Therefore, any logical reading of these facts in conjunction with the question posed by threshold 2 would result in an affirmative response, i.e., yes, the project would require and result in the construction of new water facilities and the expansion of existing facilities, the construction of which could cause significant environmental effects.

However, the Utilities and Service Systems discussion of Threshold 2 (water infrastructure) contains an incomplete and inconsistent discussion of the threshold and further promotes confusion by combining its discussion of Threshold 2 with a discussion of Threshold 4 (adequacy of water supply). These thresholds of significance should be addressed separately (DEIR p. 4.15-14). Combining the thresholds serves to undermine conclusions of significance

by subsuming one threshold within another. The DEIR's conclusion that impacts regarding water supply would be less than significant does not even address the significance of impacts resulting from the new and expanded water infrastructure.

This error is not corrected by the statement four pages later that "[g]iven the need for new infrastructure to support the Project, the Project would have a potentially significant impact on water storage in the area" (DEIR 4.15-18). The error is compounded by the document's failure to analyze these potentially significant impacts, provide mitigation or alternatives and by deferring any consideration of these impacts to some future date by YLWD.

The foregoing fundamental omissions in the Cielo project description, in the growth inducing and cumulative impacts analyses and in the Utilities and Service Systems section require revision and recirculation of the DEIR to include an accurate, complete project description, analysis of all impacts related to the water infrastructure improvements and formulation of mitigation and alternatives discussion for these impacts.

Very truly yours,
KEVIN K. JOHNSON APLC

Jeanne L. MacKinnon

Cc: Supervisor Todd Spitzer via email

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January 22, 2014

SENT VIA EMAIL AND U.S. MAIL

Orange County Planning
Attn: Mr. Ron Tippets
300 North Flower
Santa Ana, CA 92702-4048

Re: Cielo Vista Project – Draft Environmental Impact Report, EIR No. 615
Comments on Greenhouse Gas Emissions Chapter Section 4.6

Dear Mr. Tippets:

This firm represents Protect Our Homes and Hills, an unincorporated citizens group consisting of residents and taxpayers in the City of Yorba Linda. We submit this comment letter on the Greenhouse Gas Emissions chapter of the Draft Environmental Impact Report ("DEIR") prepared for the Cielo Vista development project ("Cielo").

The Greenhouse Gas Emissions ("GHG") analysis is deficient in a number of fundamental and serious respects undermining the validity of any significance conclusions reached therein.

The GHG chapter consists of 23 pages of boilerplate and general background information followed by 3 ½ pages of "analysis" (see DEIR pp. 4.6-1 through 4.6-27). The entire chapter appears to simply be a copy of the equally inadequate and inaccurately named Appendix F – Greenhouse Gas Study which also provides 26 pages of background information followed by 6 pages of "analysis". This cursory, once over lightly treatment of GHG impacts is inadequate on its face.

Specifically, the "analysis" is deficient under the California Environmental Quality Act ("CEQA"), Pub. Res. Code sec. 21000 et seq. and the CEQA Guidelines, 14 Cal. Code Regs. sec. 15000 et seq. in numerous, specific respects as outlined below.

1. The GHG chapter fails to adequately discuss the existing conditions on the Cielo site or the appropriate baseline.

The DEIR does not measure the significance of the Project's GHG emissions by comparing them to the existing conditions as CEQA requires. In fact, CEQA Guideline section

15064(b) indicates that when evaluating whether the impacts of a project's GHG emissions are significant, an agency should consider whether the project "may increase or reduce greenhouse gas emissions compared to the existing environmental setting."

The GHG chapter fails to provide any baseline description of the existing environmental setting as it relates to GHGs. The chapter includes a single paragraph entitled "Existing Greenhouse Gas Emissions" at p. 4.6-18 which describes five operating oil wells and a recitation of regulations applicable to these operating wells as well as the abandoned wells onsite and concludes without any evidence or any effort to quantify or measure current GHG emissions that "existing CO2 e emissions are minimal."

This failure to adequately describe the current environmental setting provides no baseline with which to compare the project impacts. This omission is particularly troublesome for two reasons. First, oil production is one of the top GHG producers and in particular produces large amounts of methane. Although carbon dioxide is a much more abundant greenhouse gas, methane has a far bigger impact on climate change with more than 20 times the global warming potential of carbon according to the Environmental Protection Agency.[1] Accordingly, in order to properly analyze GHG impacts, the DEIR should quantify current GHG emissions in order to provide some valid basis for comparison with overall project impacts. However, the DEIR also fails to quantify emissions from reconsolidated wells (p. 4.6-25). In the absence of any effort to quantify or compare current well emissions levels with emissions of new or reconsolidated wells and overall project emissions, significance conclusions are of no value whatsoever and are not supported by substantial evidence.

Second, the GHG chapter contains inconsistent discussion of new wells planned as part of the project. The chapter acknowledges that the project includes development of a drilling pad for continued oil operations including consolidation of wells relocated from the rest of the project site and slant drilling of **new wells** below ground (pp. 4.6-24) but then, in the very next sentence, inconsistently claims that the Project "is not proposing new oil wells and as such, would not drill new wells." The DEIR alternately refers to new wells versus reconsolidated wells without quantification of impacts of either and concludes without any substantial evidence that "operational GHG impacts associated with the potential new oils [sic] wells would be less than significant". In order to serve its purpose as an informational document, the DEIR must include meaningful discussion of current GHG emissions from the operating and abandoned wells and how the project, including the drilling pad and the new and/or reconsolidated wells, may increase or reduce these impacts. As currently drafted, the discussion of GHG emissions from existing and planned wells is inadequate, contradictory and not supported by substantial evidence.

2. The GHG chapter fails to conduct any cumulative impacts analysis.

In an effort to avoid a significance determination on the issue of cumulative impacts, the DEIR's cumulative impacts discussion makes passing reference to the adjacent Esperanza Hills project, omits any discussion of 18 related projects discussed in the Traffic/Transportation

1 http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2013-ES.pdf

section of the DEIR, and inappropriately tries to minimize the incremental cumulative impact of this project by stating "[o]n a global scale, no single project alone will measurably contribute to a noticeable incremental change in global average temperature" (p. 4.6-26). Changes on a global scale are not necessary in order to meet a CEQA threshold of significance. The DEIR fails to conduct even a minimal cumulative impacts analysis as required under CEQA.

CEQA requires discussion of cumulative impacts of a project when the project's incremental effect is cumulatively considerable. 14 Cal. Code Regs. sec. 15130(a). "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. 14 Cal. Code Regs. sec. 15065(a)(3). An adequate discussion of cumulative impacts will include either: (1) a list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency; or (2) a summary of projections contained in an adopted local, regional or statewide plan, or related planning document, that describes or evaluates conditions contributing to the cumulative effect. 14 Cal. Code Regs. sec. 15130(1).

The Cielo GHG chapter fails to conduct any cumulative impacts analysis consistent with the foregoing Guideline sections. Even the DEIR for the adjacent Esperanza Hills Project recognizes the "addition of the adjacent Cielo Vista project and the 18 related projects identified in the Traffic Analysis will further contribute to an exceedence of GHG [emissions] and, therefore, cumulative impact remains significant and unavoidable" (DEIR Esperanza Hills p. 5-273).

The GHG chapter bases its conclusions on the draft, non binding Southern California Air Quality Management District ("SCAQMD") threshold of significance. Relying exclusively on these thresholds to reach a cumulative impacts conclusion results in a situation where if all 18 related projects individually fell below the SCAQMD threshold, they would not collectively be considered cumulatively considerable, even though their combined emissions vastly exceeded the threshold. This logically cannot represent proper reasoning or analysis under CEQA.

Although it may be appropriate to rely on thresholds of significance that are formally adopted for general use, the SCAQMD thresholds have not been adopted by regulation, rule, resolution or ordinance, as required by CEQA. 14 Cal. Code Regs. sec. 15064.7 (b). The fact that the thresholds were first proposed in 2008 and still have not been adopted further undermines their reliability as valid indicia of significance.

Even if application of the threshold were considered appropriate under these circumstances, the County would still need to consider other evidence that the project may cause a significant GHG impact. As stated in *Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th 1099, 1109, "in preparing an EIR, the agency must consider and resolve every fair argument that can be made about the possible significant environmental effects of a project, irrespective of whether an established threshold of significance has been met." An EIR is required to evaluate a particular environmental impact if it is "reasonably feasible" to do so. (14 Cal. Code Regs. sec. 15151). It is reasonably feasible to

evaluate the cumulative GHG impacts of this project in conjunction with the other related projects and appropriate mitigation or alternatives formulated and analyzed for such impacts.

The GHG chapter also cites to the much lower Bay Area Air Quality Management District's Proposed Air Quality CEQA Thresholds of Significance in support of the statement that "other air districts within the state have established that projects which are consistent with project-level GHG thresholds would not be 'cumulatively considerable" (p. 4.6-27). However, and importantly, the Bay Area Air Quality Management District ("BAAQMD") set a much lower threshold of significance for analyzing project level GHG emissions. The BAAQMD threshold recognizes that a residential or mixed-use development will normally have a significant GHG related impact if its emissions exceed **1,100 metric tons of CO2 equivalent per year**. The Cielo project GHG emissions clearly exceed this threshold and are considered significant under the BAAQMD threshold requiring mitigation for the project's GHG impacts.

3. The GHG chapter fails to compare GHG emissions impacts under various alternative scenarios.

The GHG chapter makes no attempt to evaluate the comparative merits of the alternatives identified in the DEIR from a GHG impacts standpoint. 14 Cal. Code Regs. sec. 15126.6(a). Given the analytical deficiencies identified herein, the DEIR should be revised and re-circulated to include quantification and comparison of GHG emissions under the alternatives analysis in the DEIR (The alternatives section, commented upon under separate cover, is woefully inadequate on independent grounds).

4. The GHG chapter relies on draft, non-binding thresholds of significance and fails to properly apply the County significance analysis.

Neither SCAQMD nor the County of Orange have adopted significance thresholds for GHG emissions from non-industrial development projects (DEIR p. 4.6-20). As previously indicated, although it may be appropriate to rely on thresholds of significance that are formally adopted for general use, the thresholds employed by the County and SCAQMD have not been adopted by regulation, rule, resolution or ordinance, as required by CEQA. 14 Cal. Code Regs. sec. 15064.7 (b).

Even if application of a draft threshold were considered appropriate under these circumstances, the DEIR fails to fully analyze the County's current significance methodology which includes not just the SCAQMD draft thresholds but also "an analysis of the Project's consistency with plans, policies, and regulations adopted for the purpose of reducing GHG emissions" (DEIR p. 4.6-20). As indicated in sections 5 and 6 below, the DEIR fails to include this required analysis.

5. The GHG chapter omits discussion of applicable regulations and plans.

The GHG chapter contains an incomplete and cursory discussion of SCAG's sustainable communities strategy ("SCS"); fails to discuss project consistency with the SCAG SCS; fails to identify that the Orange County Council of Governments ("OCCOG") has its own SCS

applicable to this project; and fails to discuss project consistency with OCCOG's SCS. OCCOG's. SCS is incorporated into the SCAG SCS but is not even mentioned in the DEIR.

Senate Bill 375 (SB 375) was enacted to reduce greenhouse gas emissions from automobiles and light trucks through integrated transportation, land use, housing and environmental planning. Under the law, SCAG was tasked with developing a Sustainable Communities Strategy (SCS), a newly required element of the 2012 Regional Transportation Plan (RTP) that provides a plan for meeting emissions reduction targets set forth by the California Air Resources Board (ARB). On September 23, 2010, ARB issued a regional 8% per capita reduction target for the planning year 2020, and a conditional target of 13% for 2035.

The DEIR fails to discuss how the project is or is not consistent with these reduction targets or the sustainable communities strategies outlined in the OCCOG SCS at pp. 77-149 (http://occog.com/pdf/OCSCS20110614.PDF). Some of these GHG reduction strategies outlined in the OCCOG SCS include:

· Promoting a land use pattern that accommodates future employment and housing needs.
· Using land in ways that make developments more compact and better links jobs, housing and major activity centers.
· Protecting natural habitats and resource areas.
· Implementing a transportation network of public transit, managed lanes and highways, local streets, bikeways, and walkways built and maintained with available funds.
· Managing demands on the transportation system (TDM) in ways that reduce or eliminate traffic congestion during peak periods of demand.
· Managing the transportation system (TSM) through measures that maximize the efficiency of the transportation network.
· Utilizing innovative pricing policies to reduce vehicle miles traveled and traffic congestion during peak periods of demand.

This multi-faceted analysis is particularly important for this project located in Yorba Linda's sphere of influence and likely to be annexed to Yorba Linda because the OCCOG SCS identifies Yorba Linda as one of the most dense Traffic Analysis Zones holding 3,000 housing units or more by year 2035 (p. 37 http://occog.com/pdf/OCSCS20110614.PDF).

6. The GHG chapter conflicts with AB 32 and Executive Order S-3-05.

The DEIR attempts to avoid the required consistency analysis and the conclusion that this project is inconsistent with the emission reduction mandates of AB 32 and EO S-3-05 by employing faulty logic and unfounded assumptions without any supporting evidence or authority. The DEIR asserts that SCAQMD's draft significance threshold was designed to ensure compliance with AB 32 emissions reduction requirements and therefore if a project doesn't meet the threshold, "it can be assumed to comply with AB 32" (DEIR p. 4.6-25). How a permissive emissions threshold equates with a mandated reduction in GHGs is not explained.

If the threshold was a performance standard requiring that every development project reduce GHG emissions by a certain percentage and this percentage represented compliance with AB 32's requirements, such a threshold could possibly be considered as designed to ensure compliance with AB32. One air pollution control district employs such a performance standard. The San Joaquin Valley Air Pollution Control District's Guidance for Valley Land Use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA indicates:

> [L]and use agencies adopting this guidance as policy for addressing GHG impacts under CEQA, as a lead agency will require all new projects with increased GHG emissions to implement performance based standards, or otherwise demonstrate that project specific GHG emissions have been reduced or mitigated by at least 29%.

http://www.valleyair.org/Programs/CCAP/12-17-09/3%20CCAP%20-%20FINAL%20LU%20Guidance%20-%20Dec%2017%202009.pdf

However, equating an emissions threshold with a reduction mandate without any supporting evidence does not provide evidence of consistency with either AB 32 or Executive Order S-3-05.

In addition, thresholds of significance and consistency determinations are two entirely different inquiries as recognized by the County of Orange which uses two, separate approaches in analyzing GHG impacts: (1) the draft SCAQMD threshold; and (2) "an analysis of the Project's consistency with plans, policies, and regulations adopted for the purpose of reducing GHG emissions" (DEIR p. 4.6-20).

The DEIR acknowledges Executive Order S-3-05 but fails to analyze the project's consistency with this official state policy. This gubernatorial order has not been withdrawn or modified by a subsequent governor. The DEIR fails to examine how or if the project complies with the Executive Order's policy to reduce GHG emissions to 1990 levels by 2020 and to 80% below 1990 levels by 2050.

The Sacramento Metropolitan Air Quality Management District has recognized the importance of new development achieving its "fair share" of reductions in GHG emissions when it indicated in its CEQA Guide December 2009, Revised April 2011, Revised April 2013:

> AB 32 demonstrates California's commitment to reducing the rate of GHG emissions...Thus, to achieve the goals of AB 32, which are tied to GHG emission rates of specific benchmark years (i.e., 1990), California will have to achieve a lower rate of emissions per unit of population and per unit of economic activity than it has now...Thus, future land use development projects that will not encourage new development to achieve its fair share of reductions in GHG emissions will conflict with the spirit of the policy decisions contained in AB 32, thus impeding California's ability to comply with the mandate.

http://www.airquality.org/ceqa/cequguideupdate/Ch6ghgFINAL.pdf.

Likewise, the County of Orange has recognized that not exceeding a threshold is not the end of the significance inquiry. The DEIR must conduct a full and fair consistency analysis and examine whether this project achieves the reduction mandates in AB 32 and EO S-3-05. Its failure to do so renders it inadequate as an informational document and its conclusions regarding the significance of GHG impacts are unsupported by substantial evidence.

7. The GHG chapter avoids a significance determination by segmenting the drilling pad impacts from the residential operational impacts.

Although the project includes development of a drilling pad for continued oil operations including consolidation of wells relocated from the rest of the project site and slant drilling of new wells below ground (pp. 4.6-24), the DEIR treats GHG impacts from this drilling pad and associated wells separately from other operational impacts, makes no attempt to measure, estimate or quantify these GHG impacts or compare them with existing GHG emissions concluding without any supporting evidence that "GHG emissions from the reconsolidated wells would not be greater than under existing conditions and in consideration of the factors cited above, operational GHG impacts associated with the potential new oil wells would be less than significant" (DEIR p. 4.6-25). In the absence of quantifiable emissions data, this "take our word for it" approach is not permissible or adequate under CEQA.

In view of the foregoing inadequacies in the Cielo GHG analysis, the DEIR should be revised and re-circulated, significance conclusions reexamined and appropriate, feasible mitigation measures formulated for the GHG impacts resulting from this and other related projects.

Very truly yours,
KEVIN K. JOHNSON APLC

Jeanne L. MacKinnon

Letter: POHH-Magsaysay

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November 13, 2013

Orange County Planning
Attn: Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:
We are writing to request an extension of the public comment period for the subject draft EIR. There are complex legal and technical issues surrounding the Cielo Vista Project and the County's Draft EIR. Almost concurrently, the County is also in process of releasing the proposed Esperanza Hills Project on adjacent parcels directly east of the proposed Cielo Vista site. Because the Esperanza Hills development is a consequence of the Cielo Vista Project and both projects will share access easements and utilities connections, the two projects should be evaluated together. The near simultaneous release of these projects expands and complicates the scope of issues raised by the Cielo Vista Draft EIR.

A six-week comment period is blatantly insufficient for a thorough review by the public that CEQA proscribes. In addition, the public comment period runs through and closes within the winter holiday season, which precludes the public from making an effective response on the Cielo Vista Draft EIR. If not extended, the current comment period would result in minimal public response and participation. As the lead agency in this development process, at the doorstep of the City of Yorba Linda, the County should advocate for achieving maximum public participation in the important environmental review phase of both this and the Esperanza Hills Draft EIR process.

In view of both the complexity of technical data to be reviewed and the burden to the public to review such voluminous data during the holiday season, we respectfully request that the County lengthen the public comment period by 30 days which would extend responses to January 22, 2014. Thank you in advance for your approval of this request.

Very truly yours,

Judith and Ron Magsaysay, members
Protect Our Homes and Hills
Yorba Linda

C: The Honorable Todd Spitzer, Supervisor

Letter: POHH-Mak

Lana Mak
4485 San Antonio rd
Yorba Linda, CA

November 17, 2013

Via E-Mail and U.S. Mail

Orange County Planning
Attn: Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:

I am writing to request an extension of the public comment period for the subject draft EIR. There are complex legal and technical issues surrounding the Cielo Vista Project and the County's Draft EIR. Almost concurrently, the County is also in process of releasing the proposed Esperanza Hills Project on adjacent parcels directly east of the proposed Cielo Vista site. Because the Esperanza Hills development is a consequence of the Cielo Vista Project and both projects will share access easements and utilities connections, the two projects should be evaluated together. The near simultaneous release of these projects expands and complicates the scope of issues raised by the Cielo Vista Draft EIR.

A six-week comment period is blatantly insufficient for a thorough review by the public that CEQA proscribes. In addition, the public comment period runs through and closes within the winter holiday season, which precludes the public from making an effective response on the Cielo Vista Draft EIR. If not extended, the current comment period would result in minimal public response and participation. As the lead agency in this development process, at the doorstep of the City of Yorba Linda, the County should advocate for achieving maximum public participation in the important environmental review phase of both this and the Esperanza Hills Draft EIR process.

In view of both the complexity of technical data to be reviewed and the burden to the public to review such voluminous data during the holiday season, I respectfully request that the County lengthen the public comment period by 30 days which would extend responses to January 22, 2014. Thank you in advance for your approval of this request.

Very truly yours,

Name, Member
Protect Our Homes and Hills
Yorba Linda

Cc: The Honorable Todd Spitzer, Supervisor
Third District, County of Orange
10 Civic Center Plaza
Santa Ana, CA 92701

Emailed to: Ron.Tippets@ocpw.ocgov.com
Todd.Spitzer@ocgov.com

Letter: POHH-Mellon

M.J. Mellon
21085 Ridge Park Dr.
Yorba Linda, CA 92886

November 13, 2013

Via E-Mail and U.S. Mail

Orange County Planning
Attn: Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:

I am writing to request an extension of the public comment period for the subject draft EIR. There are complex legal and technical issues surrounding the Cielo Vista Project and the County's Draft EIR. Almost concurrently, the County is also in process of releasing the proposed Esperanza Hills Project on adjacent parcels directly east of the proposed Cielo Vista site. Because the Esperanza Hills development is a consequence of the Cielo Vista Project and both projects will share access easements and utilities connections, the two projects should be evaluated together. The near simultaneous release of these projects expands and complicates the scope of issues raised by the Cielo Vista Draft EIR.

A six-week comment period is blatantly insufficient for a thorough review by the public that CEQA proscribes. In addition, the public comment period runs through and closes within the winter holiday season, which precludes the public from making an effective response on the Cielo Vista Draft EIR. If not extended, the current comment period would result in minimal public response and participation. As the lead agency in this development process, at the doorstep of the City of Yorba Linda, the County should advocate for achieving maximum public participation in the important environmental review phase of both this and the Esperanza Hills Draft EIR process.

In view of both the complexity of technical data to be reviewed and the burden to the public to review such voluminous data during the holiday season, I respectfully request that the County lengthen the public comment period by 30 days which would extend responses to January 22, 2014. Thank you in advance for your approval of this request.

Very truly yours,

Michael J. Mellon
Protect Our Homes and Hills
Yorba Linda

Cc: The Honorable Todd Spitzer, Supervisor
Third District, County of Orange
10 Civic Center Plaza
Santa Ana, CA 92701

Emailed to: Ron.Tippets@ocpw.ocgov.com
Todd.Spitzer@ocgov.com

Letter: POHH-Nelson1

January 14, 2014

Orange County Planning
Attn: Mr. Ron Tippets
300 North Flower
Santa Ana, CA 92702-4048

Dear Mr. Tippets:

Re: Cielo Vista Project – Draft Environmental Impact Report, EIR No. 615
Section 4.5 - Geology & Soils

Dear Mr. Tippets:

The following comments respond to Section 4.5, Geology and Soils of Draft Environmental Impact Report No. 615, Cielo Vista Project, Yorba Linda, and are submitted by me as both a resident and a member of the Leadership Team of Protect Our Homes and Hills of Yorba Linda.

Fault Rupture. Similar to other factors included in this section, such as Seismic Ground Shaking, Ground Failure, and Landslides and Slope Stability, Fault Rupture is of major concern. Per the applicant's own geologists' reports of 2006 and minor recent updates thereto, the specific location of the Whittier Fault is known to be located along the mid-point of the Whittier Fault Zone (see 4.5 Geology and Soils, at page 4.5-14). Further it is stated that the *specific location* of the *fault trace* has not been identified. A suggested "mitigation measure" is called out to require a subsurface investigation consisting of boring and trenching to identify this trace location. At this time, such additional subsurface analysis **has not been conducted**. More alarming, the tentative tract map shows approximately 42 of the 112 homes (37 percent) will likely be within the "limit of fault zone per a Fault Rupture Hazard Zone Map" (See Map at 4.5-1, LGC Geotechnical Inc., 2013). The impact of the fault trace however is minimized and downplayed by Cielo Vista at this time, as the DEIR states that, "impacts regarding fault rupture are conservatively considered to be potentially significant." (at page 4.5-14). In addition, the mitigation measure called out to consider that this issue complies with both the Orange County General Plan and the City of Yorba Linda General Plan is not known at this time. The statement on page 4.5-20 which provides, "compliance with applicable regulatory requirements and implementation of the prescribed mitigation measures would reduce potentially significant impacts regarding natural hazards to a less than significant level." (at Table 4.5-1), is an improper deferral of mitigation. We

need to know exactly where the structures are going to be built. There is no discussion of what the "applicable regulatory requirements" are in order for the developer to declare what the prescribed mitigation measure(s) would be to bring this development from their self-assessed status of a "potentially significant impact" down to a "less than significant level"!

The section on Geology and Soils is insufficient to support the conclusion that all impacts have been reduced to a less than significant level, because the true nature of the land to be bulldozed and rearranged by moving over 600,000 cubic yards of dirt, has not been established by a definitive subsurface geologist's study and recommendation. Further the applicant has failed to substantiate his "consistent" declaration as to Goal 1 of the County of Orange General Plan regarding the "Safety Element, Public Safety" section, that calls for ". . . a safe living and working environment consistent with available resources." Further, the "potentially consistent" declaration as to Goal 1 of the City of Yorba Linda General Plan regarding "Goals, Objectives, and Policies, Safety Element" to "Protect the community from hazards associated with geologic instability, seismic hazards" is not supported by the evidence. In addition, I live on the southern boundary of Planning Area 1 of this development, adjacent to a significant slope to the north of my property scheduled to be both cut and filled. My property may be put at risk for upset and destabilization as indicated by the 2006 geologist's finding that, "It is anticipated that planned cut, fill and/or natural slopes in and adjacent to the proposed project **may be unstable and require evaluation for stabilization."** emphasis added, (see page 14 of Appendix E, dated June 8, 2006, of Draft EIR). I am not interested in incurring property damage which may be caused by the disturbance of adjacent soils being severely compromised by upset caused by the grading of 600,000 cubic yards of dirt. Soils and seismic features must be fully evaluated at the EIR stage so it can be determined where, if at all, homes can be safely constructed and all environmental impacts fully mitigated.

Very truly yours,

Marlene Nelson, Member & Resident
Leadership Team
Protect our Homes and Hills
4790 Via De La Roca
Yorba Linda, CA 92887

Cc: Kevin Johnson, Esq.

Letter: POHH-Nelson2

PROTECT OUR HOMES AND HILLS
YORBA LINDA

January 16, 2014

Orange County Planning
Attn: Mr. Ron Tippets
300 North Flower
Santa Ana, CA 92702-4048

Dear Mr. Tippets:

Re: Cielo Vista Project – Draft Environmental Impact Report, EIR No. 615
Section 4.7 – Hazards and Hazardous Materials

Dear Mr. Tippets:

This following section pertains to the Hazards and Hazardous Materials section of the subject Draft EIR.

I am an eyewitness to a fire that occurred on November 15, 2008 adjacent, on and through the Cielo Vista property, subject to the Draft EIR. I have resided at 4790 Via De La Roca, Yorba Linda, for the past 28 years. Prior to purchasing this residence, we lived in Placentia. We are an original owner of our residence. We were aware that the area may burn, as we witnessed the 1980 Owl Fire and drove to Yorba Linda and actually saw "lazy flames" coming from Blue Mud Canyon to Yorba Linda Boulevard. We felt safe in that a fire station was less than a few blocks away from our Via De La Roca home, and the fire that we witnessed back in 1980 was a slow moving grass fire. The subject DEIR also mentions the close proximity of the fire station and states how fire assistance would be readily available to protect us! Then there was the Freeway Complex Fire of 2008! What a different fire experience that was.

That morning was unusually hot for November and was a typical Santa Ana wind event, but very strong, about 45 to 50 MPH conservatively. Out in our yard we noticed smoke to the East. I was getting ready to go to San Dimas close to noon. I actually drove over to Aviemore to see just where the smoke was coming from…it was way East and the radio and TV broadcasters confirmed that it was at Green River Golf Course. No problem I thought. I got in my car and my husband stayed at home working in the yard. By the time I arrived at San Dimas, my husband called to tell me to get back home as the fire had dumped a wad of brush in Blue Mud Canyon. I got in my car and drove home. On the way, I phoned my husband again. He told me that from the time he came in and called me the first time and the time he got back out to the yard, the fire had traveled

totally West across the back brush of our home and over the hill towards San Antonio, all in less than five minutes time. It took me 1 ½ hours to get back to Yorba Linda because of the freeway closure of the 57 because of the fire in the Hills of Brea. By the time I drove back to our home, came around the corner, to my horror my neighbor's home was COMPLETELY GONE with two cars burning in the driveway and his gas line burning like a roman candle less than fifteen feet from the corner of my home. There were NO Orange County Fire Authority personnel anywhere to be seen. I did not see my husband….

It took a few minutes to actually find my husband in the backyard of our half-acre lot. He had been busy during the last several hours putting out vegetation fires in our yard, and watering down our eaves next to our neighbor's home that burned down. The heat was horrendous, the wind was strong, and despite the strong wind, you couldn't see very far. My husband told me that earlier the evacuating traffic down Via Del Aqua was three wide and stopped for a considerable time and our neighbor who ultimately lost his home, grabbed his kids and pets, left his cars and literally ran down the sidewalk to Yorba Linda Boulevard. I was home about twenty minutes when the home above us literally exploded and burned down….this some two hours after the main fire went through. One fire water tender truck finally came in since the outbound, evacuating traffic subsided, and was putting out vegetation on my neighbors hill when they saw the neighbor's home above us go up in a blaze. They raced up to that home, but it was too late, the home was invaded by embers in the attic and it literally exploded before my eyes. In moments, it was a total loss, and this was over two hours after the main fire passed through the area.

Our home would certainly have been lost if my husband had not stayed home. No doubt about that. Would he stay if another fire occurs….yes. Why? Because he witnessed the fact that the congestion of evacuating neighbors, three wide, driving down Via Del Aqua all at once, backed up and stood still, and never permitted any OCFA vehicles up the road. It didn't matter how close the fire station was. To regress a bit, let me say, we did all the preventative chores we should have before the fire season. In February of 2008, we contacted The City of Yorba Linda, The County of Orange, and OCFA to request assistance in getting the weeds abated on the water/fire easement behind our home. Weed abatement had not taken place for two years and vegetation was high. It took until October 2008 until the County was able to contact Mr. Amos Travis, owner of the property, to arrange for the vegetation to be dished under. About three weeks before the fire, we had all our queen palms professionally skinned. Years earlier we had purposely planted our hill with ice plant (a fact other neighbors claim probably saved their homes). We purchased mini "fireman's hose nozzles" in August that allowed my husband to shoot water up those 30 foot palms and on the eaves during the fire. We even had contacted our insurance company the first of November and brought all our coverage up to date with appropriate replacement cost increases. We had done all the chores we should have done. We still nearly lost our home. The heat from the fire from our next door neighbor's house cracked two of our window panes but thankfully only the outside pane of the thermal glass panels, which we discovered a week after the fire…that's how close it was to losing or home.

I've learned more about fire than I ever thought I ever would. Everyone involved with these developments has assured us how much better off we'd be with development behind us. In a report after the fire, the Orange County Fire Authority considers that the evacuation was quite orderly. That is a complete fabrication from what we witnessed. In fact, at a recent meeting commemorating the five year anniversary of the fire, the Orange County Sheriff's Department said that the reason for the extreme congestion was that Brea Police Department did not have an evacuation plan! The fact was that gridlock occurred on all streets exiting to Yorba Linda Boulevard. Traffic was stopped going down Via Del Aqua, Stonehaven and San Antonio to name just three. If the Orange County Fire Authority states in their "Ready Set Go" DVD (produced post fire), that the major contributor to destruction in such a fire is building homes in a wild urban interface zone, then how can we be safer with 500 more homes? They say the new homes will be hardened, pointing to Casino Ridge. If you saw Casino Ridge in 2008, the vegetation and landscaping around those homes was new. If you see it today, the homes now have all the lush landscaping the older homes have and more. All that fuel that didn't exist in 2008, is now ready to burn and blow. Speaking to city council members last year, Councilman Young asked us why we thought we wouldn't be safer with development back there, that his in laws experienced a fire reduction in Mohler Canyon when development pushed east in Anaheim Hills. My response was this:

As long as Blue Mud Canyon is there (and it will remain open space after the developments of both Cielo Vista and Esperanza Hills) existing and new homes are at risk because we are at the end of that "wick". It will take but one cigarette, one catalytic converter along the side of the 91 Freeway at Green River to set off another path of destruction through the hills of Yorba Linda around and through Hidden Hills, into Blue Mud and to our homes. I've recently heard that firefighters will not go into a wild urban fire to within 300 feet of a fast moving blaze because that could basically suck the air out of your lungs and can't be survived (similar to the Preston, Arizona incident). I think back now that it was good I phoned my husband and he came inside to answer my call as the fire raced behind our home. He would have been within 300 feet of that advancing inferno. I've also heard that the Hidden Hills folks couldn't use an designated "emergency exit" to get out on the water easement/fire road that lies adjacent to Blue Mud Canyon and dumps onto Via del Aqua/Stonehaven (labeled as Green Crest Dr.) because no one had a key to get the gate open. THANK GOD. If anyone had opened those gates and any cars attempted to travel that emergency exit road, they would have been stopped by the traffic jam on Via Del Aqua/Stonehaven. That community was but one bolt cutter away from being fried in their cars. The current plans continue to identify that access road as an emergency exit, which if these developments proceed will merge together with our developments AND 500 MORE HOMES onto the same roads that were unable to handle evacuation in November of 2008. If you believe that this "perfect storm" couldn't happen again, think again. In late April of this year, we again had unusual weather. It was in the upper 80's and the Santa Ana's were blowing hard, much the same conditions as on that day in November of 2008 I thought. To my horror, there was a crew doing weed abatement with gas powered weed whackers working on the easement behind our home! After calls to the

City of Yorba Linda, The County of Orange, The Orange County Fire Authority, (everyone passed the buck with a County representative stating to me, "They know what and when to do that type of work.") I then went outside and talked to a supervisor of the crew over the fence. I learned that the Metropolitan Water District contracts with them to conduct weed abatement. I did call MWD but I was never given a good explanation as to who thought it was a good idea to do this type of work on a day like that or who was responsible for contract administration. It was a miracle that we didn't have another fire.

I've learned a lot from these experiences. There is insufficient ingress and egress to add another 500 homes to this area to evacuate on the same, existing roads that did not support evacuation in 2008 to make new development safe, pure and simple. It is foolish and irresponsible to suggest that residents of the new homes will "shelter in place". If you experienced what we did, you would know that will never happen as it was too hot, too windy, and too smoky for the majority of folks to do that.

Very truly yours,

Marlene Nelson, Member & Resident
Leadership Team
Protect our Homes and Hills
4790 Via De La Roca
Yorba Linda, CA 92887

Cc: Kevin Johnson, Esq.

Letter: POHH-Nelson3

PROTECT OUR HOMES AND HILLS
YORBA LINDA

January 17, 2014

Orange County Planning
Attn: Mr. Ron Tippets
300 North Flower
Santa Ana, CA 92702-4048

Dear Mr. Tippets:

Re: Cielo Vista Project – Draft Environmental Impact Report, EIR No. 615
Section 4.9 Land Use and Planning

Dear Mr. Tippets:

The following comments respond to Section 4.9., Land Use and Planning, of Draft Environmental Impact Report No. 615, Cielo Vista Project, located in the unincorporated foothills of Yorba Linda and are submitted by me as both a resident and a member of the Leadership Team of Protect Our Homes and Hills of Yorba Linda.

IMPACT:

Density. The density of the Project is such that the environmental impact should be classified as **"significant"**. The County General Plan designates approximately 41 acres of the project site as 1B, Suburban Residential, while the remaining 43 acres is designated as 5, Open Space. However, current Codified Ordinances of the County of Orange Zoning designates the entire project site as A1(O), General Agriculture with Oil Production Overlay per the County of Orange Zoning Map. This inconsistency needs to be addressed in the DEIR.

The Project entirely relies upon avoiding or mitigating an environmental impact by requiring rezoning through approval of their requested discretionary actions in order to declare the Project's consistency with various goals, objectives and policies within the County's General Plan as well as the General Plan of the City of Yorba Linda. As stated repeatedly throughout the Land Use and Planning section as well as nearly all other sections thereto, a "gross density" calculation is made at 1.33 dua, thereby declaring the proposed Project consistent with adjacent, existing development. Nothing could be further from the truth. The true density is 2.3 to 2.7 dua when allocating homes against the acreage where the homes will be built.

The existing residential developments surrounding the Project site were all built in the late 1980's, early 1990's. Clustering was not a design concept of residential development at that time. The densities of the adjacent, existing developments are not only an average 1.24 dua, the lot sizes of those developments, and specifically those lots abutting the Project, have lots that are over one-half acre. In the design of those existing homes, the "open space" is incorporated within the individual lots, much as the DEIR defines that concept in its "Large Lots/Reduced Grading" **alternative** as contained in Section 5.0 Alternatives. Under that alternative scenario, lots would average 12,000 square feet. While not as large as the 20,000 square foot average of abutting, existing homes, the 12,000 square foot lots are far more compatible with contiguous development than lots averaging a mere 7,500 square feet under the Project's proposal.

Having designed the Project under the County's residential zone of 1B has allowed the developer to avoid declaring numerous "significant" environmental impacts throughout the DEIR. Proposing the Project pursuant to the 1B designation provides the public with a false sense of the environmental damage that will be caused by such irresponsible development and masks the significant nature of such impacts on land use and planning. The developer purports to be a champion of environmental protection and in compliance when stating how responsible they are in building "only" 112 homes, when according to the proposed 1B rezoning designation, they state that 738 dwellings **could** be built per the County General Plan. They make circular arguments that they could obtain an upzone to a 1B designation and that they could, under that designation, build up to 738 dwelling units. Then they go on to discount the impacts of the 112 homes by comparing that to the hypothetical 738. This is circular reasoning at its worst. There remains one issue to overcome before the developer can self-identify as an environmental guardian.

<u>Environmental Constraint</u>. While the developer declares a gross density of 1.33 dua, the more accurate measure is the net of 2.3 to 2.7 dwelling units per acre (dua) upon the acreage appropriate to build homes upon. This increased density should classify this entire project as **"significantly inconsistent"** with the County and City of Yorba Linda General Plans. The developer continually boasts about the 36.3 acres that will remain as Open Space. The fact is that the area designated for Open Space must necessarily remain undeveloped due to, but not limited to, a major earthquake fault line that transects Planning Area 1 from Planning Area 2 as well as known, historic landslide areas.

The environmental constraint inherent in this property precludes any residential dwelling from being built on nearly 50 percent of its acreage. As such, the net acreage of approximately 41 acres should be what is used to calculate the dwelling units per acre. Visually, the Project with a net density of 2.3 to 2.7 dua (as small as 7,500 square foot lots) as proposed, is such that adjacent existing residential development with half acre lots (over 20,000 square feet) makes this development incompatible. The

difference in density between old and new development is significantly incompatible and should also be deemed **inconsistent** with adjacent development.

Per the County own draft General Plan Amendment GPA 12-01, "Potential slope and seismic hazards constrain development in certain parts of the County. While both conditions seldom preclude development, they *may increase the cost of construction*." (emphasis added). The developer should not be rewarded by the County with the grant of a functional higher density zone largely due to the environmental constraints of the subject property. The developer should be required, at a minimum, to lower density to a level that is truly consistent and compatible with adjacent, existing residential neighborhoods.

City of Yorba Linda Sphere of Influence. Since the Project relies upon a necessary rezoning to occur per the County General Plan of Zone 1B which allows .05 to 18 dwelling units per acre, it further states that such zoning is consistent with the City of Yorba Linda Land Use Element designation with a range of 0. – 1.0 dua. This is yet another example of an exaggeration of comparability. How can these densities relate when the county's 1B zone would theoretically allow up to 738 dwellings while the city's zone would allow just 84? There is no legitimate relationship.

Also, note that Cielo Vista/Sage, under different interests, did in fact file a plan for development with the City of Yorba Linda in 2006 on that same Cielo parcel. Said development had just 84 dwellings, and complied with the 1.0 dua contained in the City's general plan. Yet, that plan has been neither mentioned nor proposed as an option within this DEIR. Moreover, although the DEIR does give the briefest of mention to the additional, adjacent proposed development of Esperanza Hills with 340 proposed dwellings (with that developer indicating that an additional parcel under private ownership will be provided with an easement for future, yet to be determined development of more dwellings) it is unconscionable that any governmental jurisdiction be it county or city, would allow the magnitude of development being propose due to the recent, known outcomes of a major wild fire.

Freeway Complex Fire of 2008. The very property that is proposed for development of both Cielo Vista and Esperanza Hills was fully burned during the 2008 Freeway Complex fire. In addition, that same property was fully burned in the 1980 Owl fire. What is known today, and was not known in 2006 when different development interests actually proposed development, was just how fast and furious a wild fire can be with homes in its path.

The density of this Project makes it incompatible with the existing, limited capacity city streets that must be utilized for ingress and egress in the City of Yorba Linda. For those who lived through it, this writer is one, having 95 more residences (as planned for Planning Area 1 alone) trying to evacuate out on Via Del Aqua together with the existing residents is incomprehensible. Then there is the cumulative impact of 340

more homes in the proposed Esperanza Hills development. The complete project most likely includes plans to annex the property into the City of Yorba Linda. The project description as well as the rest of the DEIR should analyze the impacts of the developers proceeding in this direction.

Conclusions:

Cielo Vista, as proposed in its DEIR, should be categorized as **"significantly inconsistent**" with the County of Orange General Plan and additionally with the City of Yorba Linda General Plan (as a Sphere of Influence stakeholder). Additionally, adjacent neighborhoods are not "clustered" in design. This *design concept* should, therefore, be considered **significantly inconsistent** with adjacent homes, and lacking real or visual "buffer" as required in the County's General Plan, from existing development.

Environmental Constraints which exist on the property in the way of seismic and landslide dangers results in nearly 50 percent of the acreage being undevelopable. From a Land Use perspective, the developer should not be rewarded with the granting of a density which is **significantly inconsistent** with adjacent development. The 1B zoning as proposed by the developer for the other 50 percent of the property, would provide said developer with undue profit. This is particularly egregious if, once entitled, this developer sells off the property to a third party builder, leaving residents with the consequences.

Very truly yours,

Marlene Nelson, Member & Resident
Leadership Team
Protect our Homes and Hills
4790 Via De La Roca
Yorba Linda, CA 92887

Cc: Kevin Johnson, Esq.

Letter: POHH-Nelson4

PROTECT OUR HOMES AND HILLS
YORBA LINDA

January 18, 2014

Orange County Planning
Attn: Mr. Ron Tippets
300 North Flower
Santa Ana, CA 92702-4048

Re: Cielo Vista Project – Draft Environmental Impact Report, EIR No. 615
Section 4.14 – Traffic and Transportation

Dear Mr. Tippets:

The following comments are provided with regard to Section 4.14 Traffic and Transportation.

The traffic study concludes that the intersection of Yorba Linda and Stonehaven need not be included in the traffic study. There is a map and legend on Page 4.14-3 which states that, "intersection …does not meet 1% test (County of Orange) or 50 peak hour trip (City of Yorba Linda) threshold," and therefore Cielo Vista is of the opinion that Stonehaven and YL Blvd does not require analysis. What is the basis of that opinion and what data was used to arrive at it?

I note that the study was conducted in May-June of 2012. What are the exact dates of the study? Schools are out before the end of June so the study period was inadequate as the study included a period when school was out for summer. In addition, as commented below, when Via Del Aqua gets a signal, traffic will be disbursed more evenly throughout the Stonehaven/Aqua loop in my opinion. Question: Where was the counting mechanism/tube on Stonehaven placed exactly? There is a Kindercare Pre School at the corner and from experience upon taking my grandsons there, approximately 60 families drop off and pick up children during peak hours. Was the tube across the street placed north of Kindercare's approach so as to avoid including that count? This places the entire Traffic Study into question.

How can it be assumed that the addition of 95 homes with sole access to the terminus of Via Del Aqua and Stonehaven would only adversely impact Via Del Aqua. Based upon my personal observation as I travel these roads frequently, traffic can be observed now which shows that residents living off Via Del Aqua routinely travel north, up and to Stonehaven and proceed south, down to Yorba Linda Boulevard to turn left or south onto Yorba Linda Boulevard with benefit of the traffic control signal. Likewise

residents that live on the lower sections of Stonehaven (e.g., between Heatheridge and Aviemore) travel north UP Stonehaven to Via Del Aqua and down to Yorba Linda Blvd., turning right to the west in order to avoid the control of a traffic signal. It is totally insufficient not to address daily trips, particularly during peak periods, throughout the entire loop of Via Del Aqua and Stonehaven to include both intersections at Yorba Linda Boulevard. Cielo Vista suggests a mitigation measure for Via Del Aqua by the installation of traffic signal light. A traffic light at Via Del Aqua *will* change the dynamics of travel preference among the residents throughout the neighborhood. This needs further analysis.

Likewise, the cumulative analysis of adding yet 378 MORE HOMES from Esperanza Hills to access that same loop does not adequately address Stonehaven in this traffic study. When you factor in that there is a combination Elementary and Middle School between Via del Aqua and Stonehaven (Travis Ranch Elementary and Middle School) which is on Yorba Linda Blvd., plus Kindercare for infants through preschool located at the intersection of Stonehaven and Yorba Linda Blvd., residents from existing and new development will attempt to get their children to school in a timely manner. Speaking again from experience, the congestion caused by parents dropping off and picking up children causes backups beyond the capacity of the present turning ques. It is imperative that the traffic study include all intersections that are affected on the Via del Aqua/Stonehaven loop.

The traffic study also appears to speculate that the primary access by Esperanza Hills would be via Aspen/San Antonio when in fact that option would require that the developers/owners of Cielo Vista grant this easement right to Esperanza Hills. The fact is that there is a current lawsuit between Esperanza Hills vs. Cielo Vista (see Exhibit 1, attached) to utilize an emergency access point at Street A of the Cielo Vista project. Cielo Vista denies the existence of this easement right. Question: Why would Cielo Vista describe an ADDITIONAL access easement for Esperanza Hills when the applicant already denies the very existence of the emergency easement? Cielo Vista capitalizes on Esperanza Hills' access at Aspen/San Antonio to downplay traffic on the entire Via Del Aqua/Stonehaven loop. Again, the cumulative impact of all proposed development has not been sufficiently addressed and the traffic study should analyze traffic flows both with and without the easement.

The additional traffic generated by the proposed development calls for a "Traffic Calming" study in an effort to slow down the traffic, especially in the down-hill direction. Although the traffic study addresses the 240 foot sight lines at Street A at Via Del Aqua, it appears silent as to the considerable grade on Via Del Aqua's southern approach to Street A. The grade which contributes to current unsafe speeds should be taken into consideration with respect to traffic and in particular consider and address the cumulative impact of Esperanza Hills and its 378 additional homes. Mitigations from similar studies include landscaped raised median, traffic circles, stop signs, traffic humps.

Further, the proposed development should also consider widening the intersection of Yorba Linda Blvd. and Via Del Aqua to accommodate added traffic due to the development. There is no proof that a single traffic signal to be installed at Via Del Aqua and Yorba Linda Blvd., is all that is required to provide tolerable traffic conditions. Likewise, the widening and additional landscaped median at this intersection should be incorporated into the EIR.

Conclusions:

In summary, the text portion of the traffic study is in need of an update to quantify and add the 2013 data which is only incorporated as raw data in Appendix L. In addition, the traffic study insufficiently considers the cumulative impact of other new development (both adjacent and city-wide); ignores totally the traffic impact on Stonehaven omitting any data and discussion related thereto; places a positive spin (which downplays traffic impacts on Via Del Aqua) on an access point for Esperanza Hills to Aspen that Cielo Vista alone controls and for which Cielo Vista shows no interest in allowing; and does not address the impact of a significant downward grade approaching Street A with ramifications of increased speed and noise as a result of braking and "gunning" of engines. Cielo Vista provides a deficient mitigation measure with regard to Traffic which only provides for a new signal to be installed at Via Del Aqua and Yorba Linda Blvd. The result is that this development poses very negative impacts to existing streets and to the current and future residents of the City of Yorba Linda who will use them going forward.

Very truly yours,

Marlene Nelson, Member & Resident
Leadership Team
Protect our Homes and Hills
4790 Via De La Roca
Yorba Linda, CA 92887

Enc. Exhibit 1. Yorba Linda Estates L.L.C. vs. Virginia Richards Trust

Cc: Kevin Johnson, Esq.

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Attorneys for Plaintiff
Yorba Linda Estates, LLC

ELECTRONICALLY FILED
Superior Court of California,
County of Orange
05/21/2013 at 10:27:00 AM
Clerk of the Superior Court
By Eleanor Sutter, Deputy Clerk

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SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF ORANGE, CENTRAL JUSTICE CENTER

YORBA LINDA ESTATES, LLC, an Arizona limited liability company, Plaintiff, v. VIRGINIA RICHARDS AS TRUSTEE OF THE VIRGINIA RICHARDS REVOCABLE INTERVIVOS TRUST DATED MAY 1, 1986; NORTH COUNTY BRS PROJECT, LLC, a Delaware limited liability company; All Other Persons Or Entities Unknown, Claiming Any Legal Or Equitable Right, Title, Estate, Lien, Or Interest In The Real Property Described In The Complaint Adverse To Plaintiff's Interest Or Any Cloud On Plaintiff's Title Thereto; and Does 1 through 50, Defendants.	**Case No.** 30-2013-00650665-CU-OR-CJC Judge Robert J. Moss **VERIFIED COMPLAINT FOR:** **1. QUIET TITLE - EXPRESS EASEMENT;** **2. QUIET TITLE - EASEMENT BY IMPLICATION;** **3. QUIET TITLE - EASEMENT BY NECESSITY;** **4. INJUNCTIVE RELIEF; and,** **5. DECLARATORY RELIEF**

Plaintiff YORBA LINDA ESTATES, LLC (hereinafter "Plaintiff") alleges as follows:

GENERAL ALLEGATIONS

1. Plaintiff is, and at all relevant times hereto was, an Arizona limited liability company authorized to do business in the County of Orange, State of California. In 2012, Plaintiff entered into a contract to purchase certain real property located in an unincorporated area of Orange County, California and more particularly described in **Exhibit "A"** attached hereto and incorporated herein

by reference (hereinafter the "Yorba Trail Property" or "Dominant Parcel") from Yorba Trail, LLC (the "Yorba Trail Contract").

2. Plaintiff is informed and believes, and based thereon alleges, that defendant NORTH COUNTY BRS PROJECT, LLC (hereinafter "BRS") is, and at all relevant times hereto was, a Delaware limited liability company doing business in the County of Orange, State of California.

3. Plaintiff is informed and believes, and based thereon alleges, that defendant VIRGINIA RICHARDS AS TRUSTEE OF THE VIRGINIA RICHARDS REVOCABLE INTERVIVOS TRUST DATED MAY 1, 1986 (hereinafter the "Richards Trust") is the owner of certain real property located in an unincorporated area of Orange County, California and more particularly described in **Exhibit "B"** attached hereto and incorporated herein by reference (hereinafter the "Richards Trust Property" or "Servient Parcel").

4. Plaintiff is informed and believes, and based thereon alleges, that the defendants named herein as "All Other Persons Or Entities Unknown, Claiming Any Legal Or Equitable Right, Title, Estate, Lien, Or Interest In The Real Property Described In The Complaint Adverse To Plaintiff's Interest Or Any Cloud On Plaintiff's Title Thereto" are unknown to Plaintiff (hereinafter the "Unknown Defendants"). Plaintiff alleges on information and belief that these Unknown Defendants, and each of them, claim some right, title, estate, lien or interest in the real property described herein which is adverse to Plaintiff's title, rights, estate, lien or interest in the real property described herein.

5. The true names and capacities of the defendants sued herein as Does 1 through 50 (hereinafter the "DOE Defendants") are presently unknown to Plaintiff and Plaintiff therefore sues such parties by their fictitious names. Plaintiff will amend this Complaint to allege the true names and capacities of said fictitiously named parties when they have been ascertained. Plaintiff alleges on information and belief that each of these fictitiously named Doe Defendants claim some right, title, estate, lien or interest in the real property described herein that is adverse to Plaintiff's title, rights, estate, lien or interest in the real property described herein. Plaintiff further alleges that each Doe Defendant is responsible in some manner for the acts and omissions alleged herein. The allegations against the named defendants identified in each cause of action also apply to the Doe

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Defendants, and each of them, identified in each cause of action.

6. Plaintiff is informed and believes, and based thereon alleges, that at all times herein mentioned, BRS, the Richards Trust, the Unknown Defendants, and the Doe Defendants (hereinafter collectively referred to as "Defendants"), and each of them, were the agents, employees, principals, partners, joint venturers, associates, servants, or representatives of each other and that all acts alleged herein were done within the scope of such agency, employment, association, partnership, joint venture, association or servility with the permission and consent, expressed or implied, of each other.

7. Venue is proper in this court because the real property that is the subject of this action is located in the County of Orange, State of California.

FACTUAL ALLEGATIONS

A. The Real Property At Issue

8. The Yorba Trail Property and the Richards Trust Property were originally part of the Carrillo Ranch, a single parcel of land in the shape of an irregular rectangle approximately 223.14 acres, exclusive of Esperanza Road, situated on the northerly bank of the Santa Ana River approximately two (2) miles east and north of the Yorba Bridge, which was cut by the Esperanza Road and the Atchison and Topeka and Santa Fe Railroad (hereinafter the "Carrillo Ranch Property"). The Carrillo Ranch Property was historically used for agricultural purposes. The Yorba Trail Property and the Richards Trust Property are currently unimproved, vacant properties intended for residential development. The Richards Trust Property borders the Yorba Trail Property to the south.

B. The Partition Of The Carrillo Ranch Property

9. Prior to May 26, 1958, the Carrillo Ranch Property was owned by Esperanza Carrillo (hereinafter "Esperanza"), Norman and Ellen Reeves (hereinafter collectively referred to as "Reeves") and Eutimio Carrillo (hereinafter "Eutimio") as tenants in common. Esperanza, Reeves and Eutimio each owned an undivided one third (1/3) interest in the Carrillo Ranch Property.

10. On or about April 7, 1955, Esperanza and Reeves filed an action for partition of the Carrillo Ranch Property against Eutimio in Orange County Superior Court, Case No. 65076

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(hereinafter the "Partition Action").

11. In connection with the Partition Action, the court appointed John C. Wallace, Stanley Goode, Sr. and George Jones as referees (hereinafter the "Referees") to determine whether the Carrillo Ranch Property could be equitably partitioned or, if an equitable partition was impracticable, then to evaluate and appraise the Carrillo Ranch Property for sale. The report prepared by the Referees was filed in the Partition Action on or about October 31, 1957 (hereinafter the "Referees' Report"). A true and correct copy of the Referees' Report is attached hereto and incorporated herein as **Exhibit "C"**.

12. The Referee's Report recommended that a portion of the Carrillo Ranch Property be divided into three allotments, with "Allotment No. 1" going to Esperanza; "Allotment No. 2" going to Reeves; and "Allotment No. 3" going to Eutimio. (Referees' Report, Exhibit "C" at pp. 1-2) The Referees' Report also designated the remaining unimproved portion of the Carrillo Ranch Property as parcels "X", "Y" and "Z", the allotment of which was left to determination of the court. (Referees' Report, Exhibit "C" at pp. 1-2). The Referees' Report included legal descriptions of parcels "X", "Y" and "Z". (Referees' Report, Exhibit "C" at pp. 054-056)

13. The Referees' Report also proposed various easements, including three (3) easements identified as Road Easement Nos. 7, 8, and 9 ("Proposed Easements 7, 8, and 9"), which were each to be fifty (50) feet wide and located along the western border of parcels "X", "Y" and "Z". Holders of each of these easements were identified in the Referees' Report as "those two allotments which do not own underlying fee in strip involved". (Referees' Report, Exhibit "C" at p. 027) The Referee's report also included legal descriptions of Proposed Easements 7, 8 and 9, which are identified as easements for "road and public utility purposes". (Referees' Report, Exhibit "C" at pp. 067-069)

14. The Referees' Report also included a map of the Carrillo Ranch Property which showed "Allotment No. 1", "Allotment No. 2" and "Allotment No. 3" as well as additional parcels "X", "Y" and "Z" (hereinafter the "Carrillo Ranch Map"). Proposed Easements 7, 8 and 9 were identified on parcels "X", "Y" and "Z" respectively. A true and correct copy of the Carrillo Ranch Map is attached hereto and incorporated herein by reference as **Exhibit "D"**.

15. After the Referees' Report was filed, Esperanza, Reeves and Eutimio entered into a

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stipulation in or about April 1958, allocating parcel "Z" to Esperanza, parcel "Y" to Reeves, and parcel "X" to Eutimio, which stipulation was filed in the Partition Action in or about May 1958 (hereinafter the "Stipulation"). A true and correct copy of the Stipulation is attached hereto and incorporated herein as **Exhibit "E"**.

16. On or about May 26, 1958, the court entered a final judgment in the Partition Action, a certified copy of which was recorded in the Official Records of Orange County Recorder, California at Book 4297, Pages 93-116 on May 26, 1958 (hereinafter the "Partition Judgment"). A true and correct copy of the Partition Judgment is attached hereto and incorporated herein as **Exhibit "F"**.

17. The Partition Judgment partitioned the Carrillo Ranch Property pursuant to the recommendations in the Referees' Report as well as the Stipulation regarding the allotment of parcels "X", "Y" and "Z", and set forth the legal description of the property allocated to Esperanza, Reeves, and Eutimio, designating new parcels numbers in the legal descriptions, which included allotment of Proposed Easements 7, 8, and 9 identified in the Referees' Report. Pursuant to the Partition Judgment, Esperanza was allotted property identified as Parcels 1 through 8 (hereinafter the "Esperanza Allotment"); Reeves was allotted property identified as Parcels 1 through 9 (hereinafter the "Reeves Allotment"); and Eutimio was allotted property identified as Parcels 1 through 14 (hereinafter the "Eutimio Allotment").

18. In the Partition Judgment, the property previously identified in the Referees' Report as parcel "Z" was identified as Parcel 3 of the Esperanza Allotment (hereinafter the "Esperanza Allotment Parcel 3"). In the Partition Judgment, the property previously identified in the Referees' Report as parcel "Y" was identified as Parcel 2 of the Reeves Allotment (hereinafter the "Reeves Allotment Parcel 2").

19. In the Partition Judgment, a fifty (50) foot wide easement for road and public utility purposes over the Reeves Allotment Parcel 2 (the "Easement") was given to Esperanza. The Easement was identified and described as part of Parcel 6 of the Esperanza Allotment. (Partition Judgment, attached as Exhibit "F" at pp. 5-6) In the Partition Judgment, the description of Reeves Allotment Parcel 2 also referred to the Easement, stating that Reeves Allotment Parcel 2 was

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"SUBJECT TO an easement for road and public utility purposes over, under, along, across and through the Westerly 50.00 feet thereof." (Exhibit "F" at p. 11)

C. Present Dispute

20. Esperanza Allotment Parcel 3 is now the Yorba Trail Property. Reeves Allotment Parcel 2 now includes the Richards Trust Property. The Easement continues to burden the Richards Trust Property as the Servient Tenement in favor of the Yorba Trail Property as the Dominant Tenement.

21. Plaintiff is informed and believes, and based thereon alleges, that prior to 2012 the Richards Trust entered into a contract to sell the Richards Trust Property (hereinafter the "Richards Trust Contract") to Sage Community Group, Inc., a California corporation (hereinafter "Sage"). Plaintiff is further informed and believes, and based thereon alleges, that in or about April 2012, Sage assigned its rights under the Richards Trust Contract to BRS pursuant to an Assignment and Assumption Agreement recorded as Instrument No. 2012000218537 in the Official Records of Orange County on or about April 17, 2012.

22. Plaintiff has submitted an application for a Specific Plan, Vesting Tentative Tract Map and General Plan Amendment to the County of Orange to subdivide the Yorba Trail Property along with other property for residential development in Planning Area 120037 and Vesting Tentative Tract Map 17522 ("VTTM 17522"). Plaintiff's design as set forth in Planning Area 120037 and VTTM 17522 provides for utility connections through the Easement, and one of the access options for VTTM 17522 plans for an emergency road through the Easement.

23. BRS and the Richards Trust have submitted an application for Vesting Tentative Tract Map No. 17341 ("VTTM 17341) to the County of Orange which provides for the subdivision of lots on the Richards Trust Property. The design for VTTM 17341 provides for a drilling pad, streets and residential lots to be designed over the Easement, which would interfere with or destroy Plaintiff's rights to use the Easement for road and public utility purposes.

24. A dispute has arisen between Plaintiff and Defendants regarding the Easement and their respective proposed developments. Plaintiff is informed and believes, and based thereon alleges, that the Defendants dispute the validity of the Easement, dispute the Plaintiff's right to use

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the Easement and to include the Easement in Plaintiff's design of Plaintiff's project. Plaintiff contends that the Defendants' position has no merit, that the Easement is valid, and that the Defendants have no right to interfere with or destroy Plaintiff's rights to use the Easement for road and public utility purposes.

FIRST CAUSE OF ACTION

Quiet Title - Express Easement

(Against All Defendants)

25. Plaintiff incorporates by reference the allegations set forth in Paragraphs 1 through 24 above as though fully set forth herein.

26. Plaintiff has an interest in the Yorba Trail Property and the Easement as the buyer under the Yorba Trail Contract.

27. Pursuant to the Partition Judgment recorded in 1958, the Easement for road and public utility purposes was created over, under, along and across the Richards Trust Property for the benefit of the Yorba Trail Property. Plaintiff is entitled to the use and benefit of the Easement. The Easement was created expressly by the provisions of the Partition Judgment.

28. Plaintiff is informed and believes, and based thereon alleges, that Defendants dispute the validity of the Easement , claim the Richards Trust Property is not subject to the Easement, and claim the right to use the Richards Trust Property in a manner that will impair and/or destroy Plaintiff's interest in the Easement.

29. Defendants' claims are without right and have no merit and Defendants, and each of them, do not have any legal or equitable right, title, estate, lien, or interest in the Easement, or any part thereof and Defendants do not have any right to use the Richards Trust Property in a manner that impairs with, interferes with, and/or destroys Plaintiff's right to use the Easement for the benefit of the Yorba Trail Property.

30. Plaintiff seeks to quiet title against all claims of Defendants that are adverse to the Easement and requests a judgment quieting title to the Easement in favor of Plaintiff and Yorba Trail, LLC and against Defendants.

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SECOND CAUSE OF ACTION

QUIET TITLE - EASEMENT BY IMPLICATION

(Against All Defendants)

31. Plaintiff incorporates by reference the allegations set forth in Paragraphs 1 through 30 above as though fully set forth herein.

32. Plaintiff is informed and believes, and based thereon alleges, that at the time the Partition Judgment was entered, it was the intent of the court and Esperanza, Reeves and Eutimio that the Partition Judgment would create an easement for road and public utility purposes over, under, along, across and through the westerly fifty (50) feet of Reeves Allotment Parcel 2 for the benefit of Esperanza Allotment Parcel 3 as this easement was necessary to the use and benefit of the Esperanza Allotment Parcel 3. Plaintiff is informed and believes, and based thereon alleges, that in the event it is determined the Partition Judgment did create an express easement, then as a result of the Partition Judgment, a fifty (50) foot easement for road and public utility purposes over Reeves Allotment Parcel 2 in favor of Esperanza Allotment Parcel 3 arose by implication (the "Implied Easement").

33. Plaintiff is informed and believes, and based thereon alleges, that the Implied Easement burdens the Richards Trust Property for the benefit of the Yorba Trail Property. Plaintiff seeks to quiet title against all claims of Defendants that are adverse to the Implied Easement and requests a judgment quieting title to the Implied Easement in favor of Plaintiff and Yorba Trail, LLC and against Defendants.

THIRD CAUSE OF ACTION

QUIET TITLE - EASEMENT BY NECESSITY

(Against All Defendants)

34. Plaintiff incorporates by reference the allegations set forth in Paragraphs 1 through 33 above as though fully set forth herein.

35. Plaintiff is informed and believes, and based thereon alleges, that the partition of the Carrillo Ranch Property resulted in Esperanza Allotment Parcel 3 being landlocked which gave rise

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to the necessity of a fifty (50) foot easement for road and public utility purposes over Reeves Allotment Parcel 2 for the benefit of Esperanza Allotment Parcel 3 (the "Easement By Necessity").

36. Plaintiff is informed and believes, and based thereon alleges, that in the event it is determined the Partition Judgment did not create an express Easement, then the Easement By Necessity exists over the Richards Trust Property for the benefit of the Yorba Trail Property. Plaintiff seeks to quiet title against all claims of Defendants that are adverse to the Easement By Necessity and requests a judgment quieting title to the Easement By Necessity in favor of Plaintiff and Yorba Trail, LLC and against all Defendants.

FOURTH CAUSE OF ACTION

Injunctive Relief

(Against All Defendants)

37. Plaintiff incorporates by reference the allegations set forth in Paragraphs 1 through 36 above as though fully set forth herein.

38. Plaintiff is informed and believes, and based thereon alleges, that Defendants, and each of them, seek to interfere with Plaintiff's use of the Easement (or alternatively the Implied Easement and/or the Easement By Necessity) based on the Defendants' contention that the Richards Trust Property is not subject to any such easements. Defendants' conduct of interfering with Plaintiff's use of the Easement (or the Implied Easement and/or the Easement By Necessity), unless and until enjoined and restrained by order of this court, will cause great and irreparable injury to Plaintiff to the extent Plaintiff is prevented from using the Easement (or the Implied Easement and/or the Easement By Necessity) which is essential to Plaintiff's use and enjoyment of the Yorba Trail Property, including but not limited to Plaintiff's right to develop the Yorba Trail Property for Plaintiff's economic benefit.

39. Plaintiff has no adequate remedy at law for its injuries in that the Easement (or the Implied Easement and/or the Easement By Necessity) and the Yorba Trail Property are unique and Plaintiff's use and enjoyment of the Yorba Trail Property will be seriously impaired and/or threatened if Defendants are not enjoined and restrained by the court as set forth above.

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FIFTH CAUSE OF ACTION

Declaratory Relief

(Against All Defendants)

40. Plaintiff incorporates by reference the allegations set forth in Paragraphs 1 through 39 above as though fully set forth herein.

41. An actual controversy has arisen and now exists between Plaintiff and Defendants, and each of them, concerning their respective rights and interests in that Plaintiff contends that the Richards Trust Property is subject to the Easement (or, alternatively, the Implied Easement and/or the Easement By Necessity), which is a valid easement for road and public utility purposes for the benefit of Yorba Trail Property, and Plaintiff is entitled to use the Easement (or the Implied Easement and/or the Easement By Necessity) for the use and benefit of the Yorba Trail Property; and Defendants contend that the Easement is not valid and the Richards Trust Property is not subject to the Easement, or any easement, for the benefit of the Yorba Trail Property. Defendants' claims serve as a cloud on title to the Easement (or the Implied Easement and/or Easement By Necessity) and interfere with Plaintiff's use and enjoyment of the Yorba Trail Property, including Plaintiff's ability to develop the Yorba Trail Property for Plaintiff's economic benefit. A judicial determination is necessary and appropriate so that Plaintiff and Defendants may ascertain their respective rights and interests with respect to the Easement, the Implied Easement, the Easement By Necessity, the Richards Trust Property, and the Yorba Trail Property.

WHEREFORE, Plaintiff prays for judgment against Defendants as follows:

On The First Cause Of Action

1. For a judgment quieting title to the Easement against Defendants and in favor of Plaintiff and Yorba Trail, LLC;

On The Second Cause Of Action

2. For a judgment quieting title to the Implied Easement against Defendants and in favor of Plaintiff and Yorba Trail, LLC;

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On The Third Cause Of Action

3. For a judgment quieting title to the Easement By Necessity against Defendants and in favor of Plaintiff and Yorba Trail, LLC;

On The Fourth Cause Of Action

4. For a preliminary injunction and permanent injunction enjoining Defendants and their respective agents, servants, and employees, and all persons acting on their behalf from interfering in any manner with Plaintiff's use of the Easement (or alternatively, the Implied Easement and/or the Easement By Necessity) and/or use of the Yorba Trail Property, including but not limited to Plaintiff's right to utilize the Easement (or the Implied Easement and/or the Easement By Necessity) for the benefit of the Yorba Trail Property, including obtaining the necessary entitlements to develop the Yorba Trail Property;

On The Fifth Cause Of Action

5. For a declaration that the Richards Trust Property is subject to the Easement (or alternatively, the Implied Easement and/or the Easement By Necessity) for the benefit of the Yorba Trail Property ;

On All Causes Of Action

6. For costs of suit incurred herein; and,

7. For such other further relief as the Court deems just and proper.

Dated: May 20th, 2013

SONGSTAD RANDALL
COFFEE & HUMPHREY LLP

By: _____
William D. Coffee, Esq.
Attorneys for Plaintiff
Yorba Linda Estates, LLC

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LEGAL DESCRIPTION

ALL OF THAT CERTAIN REAL PROPERTY IN THE RANCHO CANON DE SANTA ANA, COUNTY OF ORANGE, STATE OF CALIFORNIA, BEING THAT PORTION OF THE CARRILLO RANCH PROPERTY, AS SHOWN ON THE MAP FILED IN BOOK 37, PAGE 33 OF RECORD OF SURVEYS, RECORDS OF SAID COUNTY, LYING NORTHERLY OF THE FOLLOWING DESCRIBED LINE:

BEGINNING AT THE POINT ON THE EASTERLY LINE OF SAID CARRILLO RANCHO PROPERTY DISTANT NORTH 6°40'31.3" WEST 6644.94 FEET FROM THE INTERSECTION OF SAID EASTERLY LINE WITH THE CENTERLINE OF THE CAJON CANAL OF THE ANAHEIM UNION WATER COMPANY, AS SHOWN ON SAID MAP; THENCE NORTH 87°54'37" WEST 619.76 FEET TO THE POINT ON THE WESTERLY LINE OF SAID CARRILLO RANCH PROPERTY DISTANT NORTH 2°02'20" WEST 7410.13 FEET FROM THE NORTHERLY LINE OF THE ATCHISON TOPEKA AND SANTA FE RAIL WAY COMPANY'S 100.00 FOOT STRIP OF LAND AS SHOWN ON SAID MAP.

SUBJECT TO AN EASEMENT FOR ROAD AND PUBLIC UTILITIES PURPOSES OVER, UNDER, ALONG, ACROSS AND THROUGH THE WESTERLY 50.00 FEET THEREOF AND COVENANTS, CONDITIONS, RESERVATIONS, RESTRICTIONS, RIGHTS, RIGHTS OF WAY AND EASEMENTS, IF ANY OF RECORD.

AN EASEMENT FOR ROAD AND PUBLIC UTILITY PURPOSES OVER, UNDER, ALONG, ACROSS AND THROUGH THAT PORTION OF THE RANCHO DE SANTA ANA, COUNTY OF ORANGE, STATE OF CALIFORNIA, BEING THE WESTERLY 50.00 FOOT OF THAT PORTION OF SAID CARRILLO RANCH PROPERTY LYING NORTHERLY OF THE LINE BEARING NORTH 87°57'40" EAST FROM THE POINT ON SAID WESTERLY LINE DISTANT NORTH 2°02'20" WEST 2489.05 FEET FROM THE INTERSECTION OF SAID WESTERLY LINE WITH THE CENTERLINE OF SAID CAJON CANAL.

EXHIBIT A

LEGAL DESCRIPTION

THAT PORTION OF THE RANCHO CANNON DE SANTA ANA, AS SHOWN ON A MAP ATTACHED TO THE FINAL DECREE OF PARTITION RECORDED FEBRUARY 8, 1874, IN BOOK 28, PAGE 158 OF DEEDS, RECORDS OF LOS ANGELES COUNTY, CALIFORNIA, ALSO BEING A PORTION OF THE CARRILLO RANCH PROPERTY, AS SHOWN ON A MAP FILED IN BOOK 37, PAGE 33 OF RECORD OF SURVEYS, IN THE OFFICE OF THE COUNTY RECORDER OF ORANGE COUNTY, CALIFORNIA, DESCRIBED AS FOLLOWS:

BEGINNING AT THE POINT ON THE WESTERLY LINE OF THE CARRILLO RANCH PROPERTY DISTANT NORTH 2 DEG. 02' 20" WEST 5363.01 FEET FROM THE NORTHERLY LINE OF THE ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY'S 100.00-FOOT STRIP OF LAND, AS SHOWN ON SAID RECORD OF SURVEYS MAP; THENCE SOUTH 87 DEG. 54' 37" EAST 787.19 FEET TO THE POINT IN THE EASTERLY LINE OF SAID CARRILLO RANCH PROPERTY, DISTANT NORTH 6 DEG. 40' 31.3" WEST 4579.01 FEET FROM THE INTERSECTION OF SAID EASTERLY LINE WITH THE CENTERLINE OF THE CAJON CANAL OF THE ANAHEIM UNION WATER COMPANY, AS SHOWN ON SAID RECORD OF SURVEYS MAP; THENCE NORTH 6 DEG. 40' 31.3" WEST, ALONG SAID EASTERLY LINE, 2065.93 FEET; THENCE NORTH 87 DEG. 54' 37" WEST 619.76 FEET TO A POINT IN SAID WESTERLY LINE, DISTANT NORTH 2 DEG. 02' 20" WEST 2047.12 FEET FROM THE PONT OF BEGINNING; THENCE SOUTH 2 DEG. 02' 20" EAST, ALONG SAID WESTERLY LINE, 2047.12 FEET TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM, THAT PORTION LYING SOUTHERLY OF THE CENTERLINE OF THE 100.00-FOOT WIDE STRIP OF LAND AS DESCRIBED IN THE PERMANENT EASEMENT TO THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA, RECORDED JANUARY 12, 1960, IN BOOK 5049, PAGE 316 OF OFFICIAL RECORDS OF SAID ORANGE COUNTY.

ALSO EXCEPTING THEREFROM, THE INTEREST IN AND TO ALL OIL AND OIL RIGHTS, IN, ON AND APPURTENANT TO SAID LAND, AS EXCEPTED IN THE JUDGMENT IN PARTITION RECORDED MAY 26, 1958 IN BOOK 4297, PAGE 93 OF SAID OFFICIAL RECORDS.

THE SURFACE RIGHTS TO A DEPTH OF 500 FEET WERE QUITCLAIMED BY INSTRUMENTS OF RECORD.

SUBJECT TO AN EASEMENT FOR ROAD AND PUBLIC UTILITY PURPOSES OVER, UNDER ALONG, ACROSS AND THROUGH THE WESTERLY 50.00 FEET THEREOF.

EXHIBIT B

Webb & Lee
407 California Bank Bldg.
Anaheim, California
PRospect 4-2817

ATTORNEYS FOR Plaintiffs

FILED
OCT 31 1957
L. D. WALLACE, County Clerk
By

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA
IN AND FOR THE COUNTY OF ORANGE

ESPERANZA CARRILLO, ELLEN REEVES, and NORMAN REEVES, Plaintiffs, -vs- EUTIMIO CARRILLO, Defendant.	No. 65076 REPORT OF REFEREES MAKING ACTUAL PARTITION.

Comes now JOHN C. WALLACE, STANLEY C. GOODE, SR., and GEORGE H. JONES, the Referees appointed by this Court to make partition of certain real property among the several parties and in the manner directed by an interlocutory decree of this Court, and report to this Court as follows:

That attached hereto or filed concurrently herewith and by this reference made a part hereof are the following exhibits:

EXHIBIT "A" Referees' Report of Partition;

EXHIBIT "B" Schedule of charges attending the execution of the appointment as Referees;

EXHIBIT "C" Schedule of Surveyors' and Engineers' Charges.

That pursuant to such Interlocutory Decree and under the authority conferred thereby, they did, on the 29th day of October, 1957, complete the partition of said real property and apportion the same between the owners, quality and quantity relatively considered, as follows, to-wit:

EXHIBIT C

TO ESPARANZA CARRILLO, one of the plaintiffs:

The land described in Referees' Report of Partition, (EX. A), designated therein as Allotment No. 1, and outlined in blue on the map attached to said Exhibit;

The easements allotted to Allotment No. 1 as noted in said report;

Subject to the easements over or through Allotment No. 1, as noted in said report;

The real property described in said report and designated as "Esparanza Carrillo Homesite";

An undivided one-third interest in the property referred to in said report and designated as "Wellsite";

TO ELLEN REEVES; one of the plaintiffs,

The land described in Referees Report of Partition, (EX. A), designated therein as Allotment No. 2, and outlined in yellow on the map attached to said Exhibit;

The easements allotted to Allotment No. 2 as noted in said report;

Subject to the easements over or through Allotment No. 2, as noted in said report;

An undivided one-third interest in the property referred to in said report and designated as "Wellsite";

TO EUTEMIO CARRILLO, the defendant:

The land described in Referees Report of Partition, (EX. A), designated therein as Allotment No. 3, and outlined in red on the map attached to said Exhibit;

The easements allotted to Allotment No. 3 as noted in said report;

Subject to the easements over or through Allotment No. 3, as noted in said report;

An undivided one-third interest in the property referred to in said report and designated as "Wellsite".

That the unimproved land described in said Report and designated therein as Parcels "X", "Y" and "Z", and likewise referred to on the map attached to said Report, are of equal acreage and equal value and have not been allotted by the Referees; and allotment thereof has been left to the determination of the Court.

Webb & Lee
407 California Bank Building
Anaheim, Calif.
Phone: 4-2817

That they employed competent surveyors, to-wit, Bradford & Czaplinski, to assist them in marking out the respective shares allotted to the above named parties, who made all of the surveys.

That they have delivered to Webb & Lae, attorneys for plaintiffs, three copies of Referees Report, EXHIBIT "A", and three copies of this report; and have delivered to Stephen F. Gallagher, attorney for defendant, two copies thereof.

Dated October 29, 1957.

Respectfully submitted,

John C. Wallace

John C. Wallace,

Stanley C. Goode

Stanley C. Goode, Sr.,

George H. Jones

George H. Jones

REFEREES

Webb & Lae
427 California Bank Building
Anaheim, Calif.
Phone 4-2817

Exhibit "A"

EXHIBITS A, B, and C

Orange County
P.O. Box 838
Santa Ana, Calif.

GEORGE HAMILTON JONES, M.A.I.
REAL ESTATE APPRAISER
125 SOUTH CLAUDINA STREET
ANAHEIM, CALIFORNIA

RESIDENCE TELEPHONE
HARBOR 4182 R

OFFICE TELEPHONE
KEYSTONE 5-7848

March 4, 1958

Honorable John Shay
Judge of Superior Court
County of Orange
Santa Ana, Calif.

Re: SCC 56076
Carrillo Partition

Services Rendered by Referee: George Hamilton Jones

Trial Testimony: Dec. 23, 1957 - 1 day
Dec. 30, 1957 - ½ day

1½ days @ $100 per day.....$150.00

George Hamilton Jones, M.A.I.

GOODE AND GOODE

REAL ESTATE APPRAISERS

March 5, 1958

STANLEY E. GOODE, MAI.
STANLEY E. GOODE, JR., MAI.

115-115 WEST FIFTH ST.
SANTA ANA, CALIFORNIA
PHONE: KI 7-5464

No. 021057

Honorable John Shea, Judge
Superior Court of Orange County
Department 5
Court House, Santa Ana, California

Additional Fee for 1-1/2 days in Court - Referees -

12/23/57---1 day @ $100
12/30/57---1/2 day @ $50 ----------$150.00
Stanley E. Goode, Referee

In re: Esperanza Carillo, Ellen and Norman Reeves vs.
Eutimio Carillo, SCC No. 56076;

JOHN C. WALLACE

305-307 WEST THIRD STREET
PHONE: KIMBERLY 2-5171
SANTA ANA, CALIFORNIA

March 6, 1958

Honorable John Shea
Judge, Superior Court
of Orange County
Santa Ana, California

Esperanza Carillo, Ellen and Norman
Reeves vs. Eutimio Carillo
~~SCC No. 65076~~

Court appearance December 23, 1957 $100.00

EXHIBIT "B"

REFEREES' REPORT OF PARTITION

Esperanza Carillo, Ellen and Norman Reeves
-vs-
Eutimio Carillo
SCC No. 56076

Services Rendered by Referees,
To Date of Filing:

Stanley E. Goode ----------	$ 1,762.50
John C. Wallace ----------	$ 1,762.50
George Hamilton Jones---------	$ 1,762.50
Total ----------	$ 5,287.50

Exhibit "C"

STEPHEN W. BRADFORD
LICENSED LAND SURVEYOR
135 SO. CLAUDINA ST.
ANAHEIM, CALIFORNIA
TELEPHONE [redacted]
PRospect 4-5740

October 29, 1957

Carrillo Ranch
% Mr. Wm. Webb
Mr. Stephen Gallagher
Anaheim, Calif.

FINAL STATEMENT

Carrillo Ranch Survey

The Carrillo Ranch is a parcel of land in the Rancho Canon de Santa Ana, In the County of Orange, State of California. A Decree of Partition of this Rancho in 1874 shows this property as comprising the W. McKee allotment. The original government survey of this area by Hancock in 1858 and later surveys, indicate very substantial differences between surveys. The Decree of Partition and map indicate material descrepancies up to 660 feet in some cases from the original U. S. Government Hancock Survey. Bearings of lines which were indicated as true North and South in the original Partition were later re-run by M. L. Lum, Civil Engineer, in the 1890's as 5½° off true North and South. Extensive surveying has been required in order to effect the compromise line on the East with Anaheim Union Water Company and establish the true location of the lines of occupation. The division of the property for appraisal purposes due to the rough terrain and size of the property required extensive office and field work.

March 9, 1956 (Period Oct. 1955 thru February 1956)

Discussion with Engineering Departments of Orange County Title Company and Title Insurance & Trust Company. 12 hrs @ $6.00	$ 72.00	
Search of records of County Surveyors office 12 hrs @ 6.00	72.00	
Search of records of Tax Assessors office 6 hrs @ 6.00	36.00	
Analysis and study of deeds and Miscellaneous records received from Orange County Title Company (133 deeds and documents) 127½ hr @ 6.00	765.00	
Calculations, drafting, reports, etc. 62 hr @ 6.00	372.00	
Field reconnaissance 8 hr @ 6.00	48.00	
		$1365.00

STEPHEN W. BRADFORD
LICENSED LAND SURVEYOR
135 SO. CLAUDINA ST.
ANAHEIM, CALIFORNIA
TELEPHONE KE[illegible]
PRospect 4-5740

July 16, 1956 (Period from March 1 thru July 9, 1956)
Research; analysis; conferences; calculations; record map preparations; and conferences with County Surveyor.
194 hrs @ $ 5.50 $1067.00

Field preliminary reconnaissance
15½ hrs @ 6.00 93.00

Field survey (includes baseline establishment measure, set up and measurement of triangulation system)
24 hr @ 14.50 (3 man party) 348.00
72½ hr @ 10.00 (2 man party) 722.50

Filing fee to Orange County Recorder 5.00

$2235.50

December 18, 1956 (Period July 10 thru December 17, 1956)
PRINCIPALS - S. W. Bradford - conferences with Mr. Wm. Webb, Mr. Stephen Gallagher, Mr. Wm. Wattles and Mr. Don Hillyard for Anaheim Union Water Company; check records in Title Company, and make field inspection with Mr. Wattles.

OFFICE - Calculations and check of data shown by Mr. Don Hillyard (Anaheim Union Water Company) Record of Survey; calculations of areas and offsets for legal descriptions; prepare legal descriptions and sketches. Prepare analysis of North line of Rancho and Partition line establishment.

FIELD - Tie out with pipe all triangulation points in order to preserve for additional work. Lay out procedure to establish common line between Anaheim Union Water Company and Carrillo Ranch in order to reduce field time.

Principals:	24 hr	@ $ 7.50		180.00
Office:	95½	@ 5.50		525.25
Field:	17	@ 13.00	(2 man)	221.00

926.25

March 23, 1957
Stake compromise line between Carrillo Ranch and Anaheim Union Water and file Record of Survey map. (per agreement) 750.00

STEPHEN W. BRADFORD
LICENSED LAND SURVEYOR
128 SO. CLAUDINA ST.
ANAHEIM, CALIFORNIA
TELEPHONE [illegible]
PRospect 4-5740

October 28, 1957 (Period from March 23, 1957 to Oct. 28, 1957)

PRINCIPALS: Conferences with Mr. Wattles, Mr. Stephen Gallagher and Mr. William Webb; conferences with appraisers Jones, Goode and Wallace; trip to Los Angeles to confer with Santa Fe Railway engineers; trips to Santa Ana to confer with Mr. Darrell Truby of Orange County Title Company; field inspection trips; supervision of office work and legal descriptions.

OFFICE: Calculations of closures and areas, (parcels having as many as 42 sides); legal descriptions for 8 parcels of land and 13 easements; prepare maps showing proposed divisions per appraisers instructions, (original survey covering ten parcels was later reduced to eight).

FIELD: Survey Westerly property boundary by occupation line; locate cultivated areas and wind break tree rows, pipelines, fences, etc.; set monuments at corners of well site and Esperanza Carrillo homesite, (survey area covers 277 plus acres).

Principals:	99 hrs	@ $ 7.50	$742.50	
Office:	587 3/4	@ 6.00	3526.50	
Field:	177	@ 15.25 (3 man)	2699.25	
				$6968.25

SPECIAL CHARGES

Aerophoto of area from Fairchild Aero Industries	34.51
Miscellaneous Prints	6.24
Stenographic Service (preliminary transcribing report)	12.00
Five copies of preliminary report	8.32
Paid to Mr. Wm.C.Wattles, consultant (July,Oct.,Dec.,1956)	190.00
Paid to Mr. Wm.C.Wattles, consultant (April 1957)	35.00
Paid to A & F Blueprint Co. Photostatic copies & prints	69.11
	$12,600.18

[illegible]

[illegible] Carillo, [illegible]

Reeves vs. Eutimio Carillo

SCC No. 36070

EXHIBIT "A"

REFEREES REPORT OF PARTITION

Esperanza Carillo, Ellen and Norman
Reeves vs. Eutimio Carillo
SCC No. 65076

Dated at:
Santa Ana, California
October 18, 1957

For: Honorable John Shea, Judge
Superior Court of Orange
County
Santa Ana, California

By: Stanley E. Goode
John C. Wallace
George H. Jones,

Referees

October 18, 1957

Honorable John Shea
Judge, Superior Court of Orange County
Santa Ana, California

In re: Referees Report of Partition;
Esperanza Carillo, Ellen and Norman
Reeves vs. Eutimio Carillo;
SCC No. 65076

Dear Sir:

In accordance with the appointment of the undersigned as Referees of the above entitled action by your Court on September 21, 1955, we have examined the subject property for the purpose of evaluating same and making an equitable partition thereof to the best of our knowledge and ability.

On the following pages will be found descriptions and evaluations of the property as a whole, as well as that of the specific allotments, together with certain factual data and computations felt pertinent to the partition. Other less significant data is held in the files of the Referees and is available upon request.

Respectfully submitted,

Stanley E. Goode

John C. Wallace

George Hamilton Jones

Referees

PREMISE SECTION

This evaluation and partition has been based upon the following assumptions and limiting conditions:

(1) That we assume no responsibility for matters legal in character, nor do we render any opinion as to the title, which is assumed to be good. All existing liens and encumbrances have been disregarded and the property is appraised as though free and clear, under responsible ownership and competent management.

(2) That since mineral rights are currently divided among four parties, three of which are included in this partition, no attempt has been made by these Referees to further allot said mineral rights. It is assumed, however, that right of entry for drilling or exploration is limited to the Northerly 98.79 acres of the whole Carillo Ranch, as legally described in the Addenda Section of this report.

(3) That all boundary lines of subject as set out in the map of Carillo Ranch recorded as Map No. 33, Book 37, Records of Surveys, County of Orange, are legally established. It is assumed that no one property line is any more subject to future revision than any other.

(4) That no evaluation of crops is included in this appraisement and partition.

(5) That real property only is being evaluated, including structures and land and trees attached thereto.

(6) That information as regards parcel dimensions and land areas were obtained from a source deemed reliable (Office of Stephen Bradford, Registered Surveyor), but are in no way guaranteed by these Referees.

(7) That an agreement shall be entered into between the three parties of interest so as to equitably divide the costs of maintaining and operating the pumping plant, well and pipelines. In addition, a proper schedule for the use of said facilities shall be set up, agreeable to all three parties.

(8) That although the Anaheim Union Water Company irrigation canal passes through portions of subject land, and there exists a possibility that water may, in the future, be

obtained by the subject from this source, at the date of this partition the Referees have considered no enhancement to the value of adjoining lands by reason of this possibility. There is, in our opinion, a substantial enough element of speculation concerning such a connection so as to preclude its consideration in a fair partition.

obtained by the subject from this source, at the date of this partition the Referees have considered no enhancement to the value of adjoining lands by reason of this possibility. There is, in our opinion, a substantial enough element of speculation concerning such a connection so as to preclude its consideration in a fair partition.

GENERAL DESCRIPTION OF TOTAL RANCH

Location:

Property is situated on the Northerly bank of the Santa Ana River (approximately 2 miles East and North of the Yorba Bridge) being cut by Esperanza Road and the Atchison, Topeka and Santa Fe Railroad.

It lies 4 miles East of Atwood, 5 miles Northeast of Olive and about 8 miles Northeast of the City of Orange.

Surrounding Influences:

To East:

Anaheim Union Water Company holding, basically undeveloped except for minor residential and farm buildings.

To West:

Travis Ranch, central and Southerly portion planted to mature citrus, back land undeveloped, rolling hills.

To North:

Undeveloped rolling hill land divided to 50-160 acre ownerships. San Bernardino County line lies about 1.5 miles Northeast.

To South:

Santa Ana River with Santa Ana Canyon Freeway lying to the South of river bed.

Property Size:

223.14 acres (exclusive of Esperanza Road).

Parcel Shape:

Irregular rectangle (see map attached).

Contour:

Subject property rises from an elevation of 320 more or less

feet at the Santa Ana River to 350 more or less feet at Esperanza Road. From this point Northerly to the upper extremity of the area planted to citrus, land rises to an elevation of approximately 400 feet. Beyond the rolling and undeveloped back hill land reaches a maximum elevation of 900 more or less feet on a knoll near the North property line.

Soil:

Soil on this property varies considerably and may be generally described as follows:

Most Southerly 10 acres (adjacent to river), Hanford Sand.

15 more or less acres between the above and gum row and bank adjacent to Simmons' residence, Hanford Fine Sandy Loam.

Central 35 more or less acres (from gum row bank to Anaheim Union Ditch), Yolo Loam.

40 more or less acres Northerly of Anaheim Union Canal, Ramona Loam.

Upper elevation of citrus (10 more or less acres) and undeveloped hill land, Altamont Soil Series.

Water:

Irrigation Water:

The total subject property is currently served by one well, with an estimated production of 90 miners inches and possessing a Layne Bowler booster pump which lifts the water from the well's location just South of the railroad right of way to the upper areas of citrus to the North. The main line follows the paved access road which extends Northerly from Esperanza Road to the dwellings above.

The citrus land South of the railroad right of way is served by gravity flow from this well.

Domestic Water:

Currently domestic water is obtained from tapping the main irrigation line running North and South through the developed portion of the property. The supply of said domestic water is limited, therefore, to the volume of this line until replenished by later irrigation. There exists a domestic pressure pump lying just South of the

Anaheim Union ditch.

Zoning:

Property is fully zoned A-1, (General Agriculture).

Current Land Use:

At date of evaluation the subject property, consisting of 223 more or less acres had approximately 92.5 acres planted to citrus, five improved building sites, 5 plus acres of undeveloped land adjacent to the river and 6.5 more or less acres of undeveloped knoll adjacent to the property's West line, 13 more or less acres of undeveloped and moderately rolling pasture land and 106 more or less acres in rough and unutilized rolling hill land and ravines.

Assessed Valuation: (1956-57)

Land ----------	$ 12,250.00
Improvements ----------	$ 2,530.00
Trees ----------	$ 8,070.00
Total ----------	$ 22,850.00

TOTAL VALUE OF ENTIRE PROPERTY

The total value of the entire property, considered as one ownership, excluding the Esperanza Carillo - Simmons Improvements, is as follows:

Total Value Entire Property ----------$ 342,250.00

ALLOTMENT DESCRIPTIONS AND EVALUATION

General:

The undersigned Referees feel the following described allotments are equitable.

It will be noted that the Northerly portion of the ranch, comprising 98.93 acres of undeveloped hill land has been divided equally, area wise, into three parcels. Since the utility of said land is currently marginal, the allotment of the specific portions of this section to any particular party has been left to determination by mutual agreement. It appears most feasible, however, that the 32.97 acres lying adjacent to the upper pasture land should go to either Allotment II or III, who would then have a contiguous ownership.

Well Pumping Plant and Pipelines:

Location:

The existing well is located approximately 80 feet South of the railroad right of way and 850 more or less feet West of the East property line. The main irrigation line extends Northerly and Southerly from this point to serve the total 92.5 acres currently planted to citrus.

Legal Description:

The legal description of the pipeline easements and the well site felt appropriate to serve this facility, together with that of the access road to said well site, may be found in the Addenda Section of this report. Also set out is a sketch indicating the relative location of this well site (well site area is 0.03 acres) and its access road. Pipeline easements may be noted on the Allotment Sketch.

Allotment:

It is our opinion that the well, well site, pumping plant and pipelines with necessary easements should be allotted. as undivided 1/3 interest to each of the principals.

It has been an assumption of this report that an agreement

shall be made between all parties as to a fair division of well operation and maintenance costs, as well as a proper scheduling of irrigation periods.

Road Easements:

Existing Roadways:

(1) Esperanza Road:

Fee interest underlying this 40 foot County road easement shall go to the land adjoining on the North (Allotment II). There are 1.14 acres underlying Esperanza Road.

(2) Existing paved access road to upper building group shall be owned in fee by Allotment II, which adjoins it on either side. It shall be subject to no road easement, although it will be encumbered by a water pipeline easement 6 feet in width following the existing pipeline course (see legal description of "Well Site, Pipeline Easement" in Addenda Section).

Proposed Roadways (see map for identification).

Road Easement No. 1-

Location:

East line of Attlotment II, extending from Esperanza Road to centerline Anaheim Union Ditch.

Underlying Fee:

Allotment II.

Easement Holder:

Allotment III.

Nature of Easement:

Non-exclusive road easement.

Width of Easement:

Ultimate----------60 feet
Immediate---------- 30 feet (lying West of existing gum row)

Estimated Area:

Ultimate----------60 x 350 more or less, or 0.49 acres
Immediate -------- 30 x 350 more or less, or 0.24 acres.

Conditions:

60 feet width available if and when subdivision development (more than 4 sites) is effected by Allotment III. Gum row, however, may not be removed as long as adjacent land on Allotment II is devoted to the raising of citrus crops in commercial amounts.

Legal:

See Addenda Section.

Road Easement No. 2-

Location:

West line Allotment II extending from Esperanza Road to centerline Anaheim Union Ditch.

Underlying Fee:

Allotment II.

Easement Holder:

Allotment I and III.

Nature of Easement:

Non-exclusive road easement.

Width of Easement:

30 feet.

Estimated Area:

30 x 1062, 31,860 square feet or 0.73 acre.

Legal:

See Addenda Section.

Road Easement No. 3-

Location:

West line of Allotment III extending from centerline Anaheim Union Ditch to intersection of gum row with existing road (see Sketch).

Underlying Fee:

Allotment II.

Easement Holder:

Allotment I and III.

Nature of Easement:

Non-exclusive road easement.

Width of Easement:

30 feet.

Estimated Area:

30 x 1060 more or less, or 31,798 square feet, or 0.73 acre.

Legal:

See Addenda Section.

Road Easement No. 4-

Location:

From road easement No. 3 just North of Anaheim Union Ditch to Esperanza Carillo homesite.

Underlying Fee:

Allotment III.

Easement Holder:

Allotment I.

Road Easement No. 4- Continued-

Nature of Easement:

Exclusive road easement.

Width:

30 feet measured from centerline Anaheim Union Ditch.

Estimated Area:

30 x 266 feet, more or less, or 7,980 square feet, or 0.20 acre.

Road Easement No. 5-

Location:

West central portion of property through Area G and extending from North end of Road Easement No. 3 to Southerly line of land known as "back hill land" (see Sketch).

Underlying Fee:

Allotment II.

Easement Holder:

Allotment I and Northerly 250 feet to Allotment III.

Nature of Easement:

Non-exclusive road easement. This easement shall include a provision that in the future the fee owner may relocate said easement to any more efficient course as long as the easement holder retains a reasonably equivalent means of ingress and egress over same.

Width of Easement:

30 feet.

Estimated Area:

Northerly 400 more or less feet, 50 feet width;

Road Easement No. 5- Continued-

Estimated Area -Continued:

Balance 30 feet wide; area, 70,567 square feet, or 1.62 acres.

Legal:

See Addenda Section.

Road Easement No. 6-

Location:

Central portion of property in valley between citrus land and back hill land. Extending from a point on East line upper Allotment II at its intersection with an existing dirt road to Road Easement No. 4's Northerly terminus.

Underlying Fee:

Allotment II.

Easement Holder:

Allotment III.

Nature of Easement:

Non-exclusive road easement. This easement shall include a provision that in the future the fee owner may relocate said easement to any more efficient course as long as the easement holder retains a reasonably equivalent means of ingress and egress over same.

Width of Easement:

30 feet.

Estimated Area:

30 x 880, or 26,410 square feet, or 0.59 acre.

Legal:

See Addenda Section.

Road Easement Nos. 7 - 8 - 9 -

Location:

West line of property extending from Northerly terminus of Road Easement No. 5 at Southerly boundary of back hill land to North property line.

Underlying Fee:

By owner of adjoining fee land. (Ownerships of adjoining back hill land portions to be decided at a later date).

Easement Holder:

Those two allotments which do not own underlying fee in strip involved.

Nature of Easement:

Non-exclusive road easement.

Width of Easement:

50 feet.

Estimated Area:

No. 7-	50 x 1441 more or less, or 71,000 square feet, or	1.65 acres
No. 8-	50 x 2047, or 102,000 square feet, or	2.35 acres
No. 9-	50 x 2865, or 143,500 square feet, or	3.29 acres
	Total ----------	7.29 acres

BRADFORD & CZAPLINSKI
SURVEYORS & ENGINEERS
1[illegible] SO. CLAUDINA ST.
ANAHEIM, CALIFORNIA
TELEPHONE [illegible]
PRospect 4-5740

October 10, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Allotment #1)

All that certain real property in the Rancho Canor de Santa Ana, County of Orange, State of California, described as follows:

Beginning at the intersection of the Southerly line of the land conveyed to the Atchison Topeka and Santa Fe Railway Company by deed recorded in Book 173, Page 296 of Deeds, records of said County, with the Easterly boundary of the Carrillo Ranch property as said intersection is shown on the map filed in Book 37, Page 33 of Record of Surveys; thence South 71°04'33" West, along said Southerly line, 1248.37 feet to the Westerly line of said Carrillo Ranch property, as shown on said map; thence South 2°02'20" East, along said Westerly line, 1341.25 feet to the Southwest corner thereof; thence North 62°23'49" East, along the Southerly line of said property, 1439.50 feet to a line bearing South 6°40'31.3" East from the point of beginning; thence North 6°40'31.3" West 1286.89 feet to the point of beginning. Excepting that portion thereof described as follows: Beginning at the point distant South 71°04'33" West 848.10 feet and South 4°47'57" East 54.04 feet from the Northeast corner of the above described Parcel 1; thence South 4°47'57" East 50.00 feet; thence South 85°12'03" West 30.00 feet; thence North 4°47'57" West 50.00 feet; thence North 85°12'03" East 30.00 feet to the point of beginning.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

Stephen W. Bradford

ALLOTMENT I

Location:

South of Atchison, Topeka and Santa Fe Railroad right of way, extending to Northerly bank of Santa Ana River.

Also included in this allotment is the 0.19 acre Esperanza Carillo homesite situated at the Northerly end of the paved drive North of Esperanza Road and the 32.97 acres of back hill land being 1/3 of the undeveloped rear area of the property.

Size:

Gross Area:

South of Railroad ----------	40.96 acres
Northerly building site ----------	0.19 acre
Back hill land ----------	32.97 acres
Total ----------	74.12 acres

Less Easements:

Road Easement (back hill land), No. 7, No. 8 or No. 9:
Road Easement to well site: (No. 10), 780 square feet or 0.02 acre;
Pipeline Easement (No. A): .008 acre.

Access:

South of Railroad:

By unsurfaced 12 foot grade crossing over Santa Fe Railroad right of way from Esperanza Road. This by permit from Santa Fe Railroad as issued in 1929. It has 10 day cancellation clause and is not assignable. (Interview with Mr. Muchow of Santa Fe, 7-24-57).

Northerly Homesite:

By exclusive road easement from Road Easements No. 2 and No. 3 along Westerly line of property.

Current Land Use:

South of Railroad:

Current Land Use - Continued:

Upper Bench:

17.04 acres currently planted to 16 net acres of 26 year old Valencias (Plot A). Estimated blighted trees, 7%. Soil good. Building site near Southerly limit of this bench. (see Improvements).

Lower Bench:

18.63 acres currently planted to 16 acres of 8 year old Valencias (Plot H) of which the Northerly 12.5 acres appear healthy, balance (3.5 acres) of marginal quality. Soil in Southerly portion is of high sand content. To East And South of citrus are 5.32 acres of land currently undeveloped.

Northerly Homesite:

0.19 acre parcel used as Homesite.

Back Hill Land:

32.97 acres of rolling hill land, currently undeveloped and unutilized.

Citrus Production (South of Railroad only):

	Upper Bench (Plot A)	Lower Bench (Plot H) 12.5 Acres Only
Field box/acre (10 year avg.)	454	156 (1956 only)
Peak out average (5 years)	200's	252 (1956)
Per cent Sunkist (5 years)	85%	82% (1956)
Gross Receipts/acre (4 year avg.)	$1037	$338 (1956)
Total Annual Gross Receipts, (4 year avg.)	$16,734	$4227 (1956)

~~Total receipts for Allotment I (4 year avg. for A, 1956 for H,)----$20,951~~

This is equivalent to $735/acre of healthy citrus (28.5 acres).

Note:

It will be noted that Plot H (12.5 more or less acres) is planted to trees which have not reached maturity and will look forward to a substantial increase in productivity in years to come.

Improvements:

South of Railroad Right of Way:

Situated on the Southerly edge of the Northerly bench of this section is a frame stucco dwelling constructed and owned by Ellen and Charles Simmons. It is not considered in this evaluation and partition, but is described and evaluated independently under separate cover. This structure and adjoining yard encompasses approximately 0.5 acre of land.

Northerly Portion:

The 0.19 acre building site previously described is improved with a two-story, frame stucco garage apartment, constructed and owned by Esperanza Carillo. It is likewise not considered in this partition, but is described and evaluated independently under separate cover.

Evaluation:

South of Railroad:

Plot A: 17.04-.03 (well site), or 17.01 acres @ $3750 ----------	$ 63,787.00
Plot H - Upper: 14.63 acres @ $2350 -------	$ 34,380.00
Plot H - Lower: 4.0 acres @ $850 --------	$ 3,400.00
Undeveloped 5.32 Acres @ $400 ----------	$ 2,128.00
Northerly Building Site (0.19) acres--------	$ 1,000.00
Back Hill Land, 32.97 acres @ $150 -------	$ 4,945.00
Total ----------	$109,640, say $109,650.00

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ANAHEIM, CALIFORNIA
TELEPHONE [illegible]
PRospect 4-5740

October 14, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Allotment No. 2)

All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Beginning at the intersection of the centerline of the Cajon Canal of the Anaheim Union Water Company with the Easterly line of the Carrillo Ranch property as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence Westerly, along said centerline, South 85°44'23" West 8.19 feet; South 88°54'08" West [illegible] feet; North 88°23'08" West 18.90 feet; North 80°35'23" West [illegible].69 feet; North 70°07'03" West 18.23 feet; North [illegible]" West 168.10 feet; North 68°53'00" West 35.93 feet; North 71°41'39" West 571.16 feet; North 80°05'22" West 271.81 feet to a line parallel with the Westerly line of said Carrillo Ranch property and distant Easterly 50.00 feet therefrom, measured at right angles; thence North 2°02'[illegible]" West, along said parallel line, 424.08 feet; thence North 85°31'04" East 222.60 feet to the beginning of a tangent curve concave Northwesterly and having a [illegible] 100.00 feet; thence Northeasterly, along said [illegible] through a central angle of 98°49'59", a distance of [illegible] feet; thence, tangent to said curve, North 13°18'55" West [illegible] feet; thence North 40°20'57" East 115.95 feet; thence North 34°40'00" West 78.46 feet; thence North 3°20'43" West [illegible].26 feet; thence North 4°23'04" East 100.60 feet; thence North 16°22'24" East 100.50 feet; thence North 4°[illegible]" East 52.69 feet; thence North 57°38'13" East [illegible] feet; thence North 44°14'43" East 53.41 feet; thence North 16°28'17" West 62.45 feet; thence North 43°49'45" West [illegible].35 feet; thence North 8°34'50" West 62.96 feet; thence North 21°44'22" West 36.37 feet; thence North 38°53'45" West [illegible].95 feet; thence North 15°33'08" East 96.96 feet; thence North 52°10'47" West 86.52 feet; thence North 11°16'27" West 46.62 feet; thence North 46°47'38" East 90.01 feet; thence North 13°51'10" East 713.11 feet; thence South [illegible]°34'53" West 59.86 feet; thence South 87°25'58" West [illegible] feet; thence South 88°51'06" West 56.38 feet; thence North 74°14'36" West 45.59 feet; thence North 56°35'03" West [illegible].11 feet; thence North 49°59'14" West 104.47 feet;

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thence North 44°07'50" West 99.54 feet; thence North 42°07'13" West 79.48 feet; thence North 41°19'19" West 157.87 feet to the point on the Westerly line of said Carrillo Ranch property distant North 2°02'20" West 3950.98 feet from the Northerly line of the Atchison Topeka and Santa Fe Railway Company's 100.00 foot strip of land, as shown on said map; thence South 2°02'20" East 3950.98 feet to said Northerly line; thence North 71°04'33" East, along said Northerly line, 1239.73 feet to said Easterly line; thence North 6°40'31.3" West, along said Easterly line, 383.48 feet to the point of beginning.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

Stephen W. Bradford

ALLOTMENT II

Location: (See Sketch in Yellow)

That land lying Northerly of Esperanza Road and South of Anaheim Union Water Company Ditch, as well as 20.35 more or less acres in the central Western portion and 32.97 acres of undeveloped back hill land.

Size:

Gross:

Between Anaheim Ditch & Highway----19.25 acres (exclusive of highway-1.14 ac.)
Westerly Central Portion ---------- 20.96 acres
Back Hill Land ---------- 32.97 acres

Total ---------- 73.18 more or less acres.

Less Road Easements:

Between Anaheim Ditch & Highway:

Easterly Road Easement (No. 1)-Ultimate-----0.49 acre
Westerly Road Easement (No. 2):----------0.73 acre

Westerly Central Portion:

Road Easements:

No. 3 ---------- 0.73 acre
No. 5 ---------- 1.62 acres
No. 6 ---------- 0.59 acre

Back Hill Land:

No. 7, 8 or 9: ----------1.65, 2.35 or 3.29 acres

Total Road Easement Area ---------- 2.94 acres, plus Back Hill Land Easement.

Pipeline Easement (b)---------- 0.12 acre

Net Acreage:---------- 35.93 acres, plus Back Hill Land.

Access:

Area Between Anaheim Union Ditch & Highway:

From Esperanza Road frontage and easements at East and West lines.

Westerly Central Portion:

By unsurfaced road along West boundary owned in fee by Allotment II, but subject to road easement for Allotments I and III.

Back Hill Land:

Same as above.

Current Land Use:

Area Between Anaheim Union Ditch & Highway:

This portion of 18 more or less acres (net) (17 acres citrus) is divided into two areas by a paved access drive and known as Plots B & C of 9.1 more or less and 7.9 more or less acres, respectively, are planted to 31 year old Valencias. There are less than 7% of blighted trees in the Easterly segment (B), and less than 3% in the Westerly segment (C). Soil and contour is uniform with the high land of poorer soil quality near the Southeasterly corner of Plot B.

There are also two dwellings on this segment.

Westerly Central Portion:

This section of the ranch comprises 20.35 more or less acres and is utilized as follows:

Area G:

7.0 more or less acres of Valencias, approximately 13 years old and somewhat spotty due to irregular soil conditions.

Knoll Area:

Lying Southwest of Area G is a knoll area, comprising 6.51 acres more or less, which, at date of partition, was unutilized except for a modest barn structure at the Southeasterly end.

Current Land Use - Continued:

Westerly Central Portion - Continued:

Connecting Strip:

Included in this allotment is a 50' x 253' more or less strip comprising 22,651 square feet or 0.52 acre, which connects Plot C, discussed previously, with the knoll area; A 30 foot width of this strip is subject to a road easement for allotments I and III. It currently is traversed by an unpaved ranch road.

Pasture Land:

Immediately to the North and East of Area G is an area of 7.45 more or less acres, of which 1.20 acres more or less is in ravine and rough land; 6.25 acres is currently unutilized but readily adaptable to either pasture or citrus or avacado planting. It is currently crossed by an unsurfaced ranch road to be designated Road Easement No. 6.

Back Hill Land:

This portion, comprising 32.97 acres, is currently undeveloped and unutilized.

Citrus Production:

	Southerly of Anaheim Union Ditch		Northerly of Ditch
	Plot B (9.1)	Plot C (7.9)	Plot G (7 acres)
Field Box/ac. (10 year avg.)	434	449	197
Peak Out Study (5 year avg.)	220's	220's	220's
Per cent Sunkist (5 year avg.)	80%	89%	67%
Gross Receipts per acre- (4 year avg.)	$855	$1358	$519
Total Gross Receipts- (4 year avg.)	$7758	$10,982	$3644

Total Receipts for Allotment II (4 year avg.):----------$22,384
This is equivalent to $933/acre of citrus planted (24 acres).

Improvements:

Contained on this portion of the ranch and situated on the Westerly edge of Plot B are two dwellings, described as follows:

Northerly Residence (Reeves Home):

General Description:

A one-story, six room, frame stucco and adobe dwelling, built in 1920 with concrete foundation and composition roof.

Structure contains 1520 square feet of living area, with 60 square feet of covered porch.

Room Descriptions:

Dining Room-Living Room:

Oak floor, painted plaster interior, wood burning fireplace, built-ins on North side.

Entry Parlor:

Tile floor, painted stucco interior.

North Bedroom:

Pine floor with dry rot evident, painted plaster interior, walk-in closet.

Rear Bedroom:

Hardwood floor in poor condition, plywood over, wallboard interior, adobe wall in portion, walk-in closet.

Dressing Room-Closet:

Linoleum floor, wallboard interior.

Rear Large Closet:

Cement floor, wallboard interior.

Den:

Asphalt tile floor, wallboard interior, electric wall heater.

Room Descriptions:- Continued

Utility Room:

Cement floor, wallboard interior.

Bath:

Asphalt tile floor, painted wallboard interior, electric wall heater.

Service Porch:

Cement floor, exposed ceiling, cement floor, Thermador hot water heater, built-in cabinets.

Kitchen:

Linoleum floor, painted wallboard interior, stainless steel sink unit, fluorescent lighting, normal cabinets.

Yard Improvements:

Barbeque & Patio:

900 square feet colored cement patio, surrounded by approximately 100 lineal feet of red brick wall from 3 to 6 feet in height. Large Barbecue.

Concrete Slab: (North of House)

18' x 48', or 864 square feet.

Southerly Residence: (Ranch Hand's Home)

General Description:

A one-story, frame composition siding, four room, single family residence, with concrete foundation and composition roof. Structure appears in excess of 35 years of age but was reportedly moved in in 1947.

It contains 714 square feet with 60 square feet of front covered porch and 234 square feet of rear service porch.

Room Descriptions:

Living Room:

Asphalt tile floor, paper on single wall, wallboard interior.

Bedroom:

Linoleum floor, painted wallboard interior, removable wardrobe closet.

Rear Bedroom:

Pine floor, painted wallboard interior, walk-in closet.

Kitchen:

Linoleum floor, painted wallboard interior, sink unit, linoleum and formica drain and splash.

Bath:

Linoleum floor, painted wallboard interior, Essex tub, modern toilet and lavatory, electric wall heater.

Service Porch:

Pine floor, screen and wood siding, electric wall heater.

Carport:

Near new 355 square feet carport, with cement floor, flat composition roof, lattice sides, wiring.

Evaluation:

Between Anaheim Ditch and Highway:

Plot B: 10.66 gross acres (9 more or less acres in citrus); 10.66 acres @ $3600 ----------$ 38,369.00
(or 10.05 acres net @ $3818)

Plot C: 8.59 gross acres (8 more or less acres in citrus)
8.59 acres @ $4200 ----------$ 36,078.00
(or 7.88 acres @ $4578)

Evaluation: Continued

Westerly Central Portion:

Plot G: 7.01 gross acres (7 more or less in citrus)
7.0 acres @ $2000 ---------- $ 14,000.00

Knoll Area: (Under hill land)
6.53 acres @ $1000 ---------- $ 6,530.00

Connecting Strip (Subject to road easement):
0.52 acres ---------- $ 100.00

Pasture Land:
5.50 acres @ $650 ---------- $ 3,575.00
0.75 acre rough slopes and gulleys ----- Nil

Back Hill Land:
32.97 acres @ $150 ---------- $ 4,945.00

Total Land Value ---------- $ 103,597, say

$ 103,600.00

Estimated Value Improvements:

Northerly Residence ----------$ 4,000.00
Southerly Residence ----------$ 2,500.00

Total Value Improvements----------$ 6,500.00

TOTAL VALUE, ALLOTMENT II ----------$ 110,100.00

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October 14, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Allotment No. 3)

All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Beginning at the intersection of the centerline of the Cajon Canal of the Anaheim Union Water Company with the Easterly line of the Carrillo Ranch property as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence Westerly, along said centerline, South 85°44'23" West 8.19 feet; South 88°54'08" West 36.94 feet; North 88°23'08" West 18.90 feet; North 80°35'23" West 39.69 feet; North 70°07'03" West 18.23 feet; North 65°58'15" West 168.10 feet; North 68°53'00" West 35.93 feet; North 71°41'39" West 571.16 feet; North 80°05'22" West 271.81 feet to a line parallel with the Westerly line of said Carrillo Ranch property and distant Easterly 50.00 feet therefrom, measured at right angles; thence North 2°02'20" West, along said parallel line, 424.08 feet; thence North 85°31'04" East 222.60 feet to the beginning of a tangent curve concave Northwesterly and having a radius of 100.00 feet; thence Northeasterly, along said curve, through a central angle of 98°49'59", a distance of 172.50 feet; thence, tangent to said curve, North 13°18'55" West 233.41 feet; thence North 40°20'57" East 115.95 feet; thence North 34°40'00" West 78.46 feet; thence North 3°20'43" West 47.26 feet; thence North 4°23'04" East 100.60 feet; thence North 16°22'24" East 100.50 feet; thence North 4°08'39" East 52.69 feet; thence North 57°38'13" East 30.62 feet; thence North 44°14'43" East 53.41 feet; thence North 16°28'17" West 62.45 feet; thence North 43°49'45" West 51.35 feet; thence North 8°34'50" West 62.96 feet; thence North 21°44'22" West 36.37 feet; thence North 38°53'45" West 75.95 feet; thence North 15°33'08" East 96.96 feet; thence North 52°10'47" West 86.52 feet; thence North 11°16'27" West 46.62 feet; thence North 46°47'38" East 90.01 feet; thence North 13°51'10" East 713.11; thence North 75°39'36" East 128.13 feet; thence North 76°13'48" East 137.57 feet; thence South 34°06'59" East 42.04 feet; thence South 31°21'37" East 123.92 feet; thence South 73°27'51" East 18.33 feet to the point on said Easterly

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line distant North 6°40'31.3" West 2750.10 feet from the point of beginning; thence South 6°40'31.3" East 2750.10 feet to the point of beginning. Excepting therefrom that portion described as follows:

Commencing at the intersection of the centerline of the Cajon Canal of the Anaheim Union Water Company with the Easterly line of the Carrillo Ranch property as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence Westerly along said centerline, South 85°44'23" West 8.19 feet; South 88°54'08" West 36.94 feet; North 88°23'08" West 18.90 feet; North 80°35'23" West 39.69 feet; North 70°07'03" West 18.23 feet; North 65°58'15" West 168.10 feet; North 68°53'00" West 35.93 feet; North 71°41'39" West 483.38 feet to the true point of beginning of the boundary of the land herein described; thence, continuing along said centerline, North 71°41'39" West 87.78 feet; North 80°05'22" West 8.76 feet; thence leaving said centerline, North 9°34'36" East 82.11 feet; thence South 72°05'17" East 108.03 feet; thence South 17°40'43" West 80.63 feet to the true point of beginning.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

Stephen W. Bradford

ALLOTMENT III

Location: (See Sketch in Red)

This portion lies in the Easterly central segment of the property, extending from the Anaheim Union Water Company Ditch northward to the South line of the undeveloped back hill land. Also included is one-third of this 98.79 acres of back hill land.

Size:

Gross Area:

East Central Citrus Land ----------	30.34 more or less acres
Undeveloped and gulleys ----------	3.75 acres
Rolling Pasture Land:	
Northerly of road ----------	5.74 acres
Southerly of road ----------	3.00 acres
Undeveloped back hill land ----------	32.93 acres
Total ----------	75.76 acres

Less Easements:

Road Easements:

East central citrus land:
Road Easement No. 4----------0.20 acre
Undeveloped back hill land:
Road Easement No.s 7, 8, or 9----1.63, 2.34 or 3.29 acres
Pipeline Easement C ----------0.14 acre

Net Area: 42.49 acres, plus back hill land.

Access:

To East Central Segment:

(a) By Road Easement No. 1 along Easterly line of Allotment II from Esperanza Road. This area is currently neither surfaced or graded.

(b) By Road Easement No. 2 along Westerly line of Allotment II from Esperanza Road. This easement area is currently graded but unsurfaced.

Access: Continued

To Back Hill Land:

(a) By Road Easement Nos. 1, 4, 5, and 7, 8, or 9 from Esperanza Road. Nos. 1, 3 and 5 are currently partially graded.

(b) By Road Easement No. 6 from pasture land area to Road Easement No. 5, thence Northward as above. This easement area is currently an unpaved ranch road.

Current Land Use:

East Central Citrus Land (29.30 acres):

This section of subject allotment consists of Plots Dw, De and E-F, comprising 2.1 acres, 11.47 acres and 15.73 acres, or 29.30 acres of citrus. Trees are Valencias, 31 years old, with less than 5% blighted in De and Dw with the Southerly 8 acres of Plots E-F fair to average condition, but the balance less than fair. The above is consistent with underlying soil quality. Northerly portion of E-F is on a knoll and appears to be less efficiently irrigated. There is a small homesite near the Anaheim Union Water Company Ditch and the irrigation pipeline on this portion.

Undeveloped and Gulley Land (6.75 acres):

Lying in an irregular pattern between Plot E-F and an existing ranch road to the North is an area which comprises 6.75 acres, of which approximately 3.0 acres is usable and the balance is too rough for economic development.

Rolling Pasture Land (5.74 acres):

Extending from an East-West ranch road described above to the South line of the back hill land is a rolling area of land currently undeveloped but adaptable to pasture usage, or planting to citrus or avacados.

Back Hill Land:

This portion comprising 32.97 acres is the one-third of the undeveloped and unutilized back hill land of the ranch.

Citrus Production:

	Plot D (13.57 acres)	Plot E-F (15.73 acres)
Field Box/acre (10 year avg.)	511	175
Peak Out Study (5 year avg.)	200's	252's
Per cent Sunkist (5 year avg.)	88%	95%
Gross Receipts/acre - (4 year avg.)	$1459	$358
Total Gross Receipts - (4 year avg.)	$19,714	$5,631

Total Receipts Allotment III (4 year avg.) ----------$ 25,345.00
This is equivalent to $865/acre of citrus planted (29.30 acres).

Improvements:

Contained on subject Allotment III, near the intersection of the Anaheim Union Water Company Ditch and the irrigation pipeline are the following structures:

Dwelling:

General Description:

A one-story, board and batten dwelling, moved in in 1916, with some addition made in 1919. Structure contains four rooms in 920 square feet of living area, 144 square feet of screened porch and 72 square feet of service porch. It has low stone foundation and wood shingle gable roof. Structure is in poor condition.

Room Descriptions:

Living Room:

Pine floor, plywood interior.

Kitchen:

Linoleum floor, painted wallboard interior; woodstone drain and splash, 30 gallon electric water heater.

Improvements: Continued

Room Descriptions: Continued

Two Bedrooms:

Pine floor, papered wallboard interior.

Service Porch:

Cement floor, exposed interior, double laundry tray.

Screened Porch:

Concrete floor, screened.

Garage:

Frame siding, 12' x 16', or 192 square feet; poor condition.

Evaluation:

East Central Portion:

Dw:	2.1 acres (all citrus) 2.1 acres @ $4750 ----------	$ 9,975.00
De:	11.47 acres (all citrus) 11.47 acres @ $4250 ----------	$ 48,750.00
Southerly:	8.0 acres E-F (7.0 citrus) 8.0 acres @ $3000 ----------	$ 24,000.00
Northerly:	7.73 acres (all citrus) 7.73 acres @ $2000----------	$ 15,460.00

Undeveloped and Gulleys:

Undeveloped Valley Land 3.0 acres @ $400 ----------	$ 1,200.00
Gulleys and Slopes 3.75 acres ----------	Nil

Pasture Land:

5.74 acres @ $650 ---------- $ 3,731.00

Evaluation: Continued

(Brought Forward) -- $ 103,116.00

Back Hill Land:

32.97 acres @ $150 ---------- $ 4,945.00

Total Land Value ---------- $ 108,061, say

$ 108,100

Estimated Value Improvements:

Residence and Garage ---------- $ 1,000.00

TOTAL VALUE, ALLOTMENT III ---------- $ 109,100.00

SUMMARY OF ALLOTMENTS

	Allotment I	Allotment II	Allotment III
Total Gross Acreage	74.12	73.18	75.76
Acres in Citrus	28.5	24.0	29.30
Undeveloped Land	45.62	49.18	46.48
Avg. Annual Gross Receipts from Citrus	$20,951	$22,384	$25,345
Receipts/acre Citrus	$735	$933	$865
Total Value	$109,650	$110,100	$109,100
Land ----------	$109,650	$103,600	$108,100
Improvements----	$ ----	$ 6,500	$ 1,000
Avg. Land Value/Acre	$1,479	$1,416	$1,427

ALLOTMENT TO INDIVIDUALS

After consideration of the physical characteristics of subject allotments and their adaptability to use by the various parties involved, it would be our recommendation that subject partition be allotted as follows:

ALLOTMENT I:

Esperanza Carillo

ALLOTMENT II:

Ellen and Norman Reeves

ALLOTMENT III:

Eutimio Carillo

October 18, 1957

Honorable John Shea
Superior Court Judge
Orange County, California

In re: Improvement Evaluation
SCC No. 65076
Carillo Partition

Dear Sir:

In accordance with Paragraph No. 6 and No. 7 in the Interlocutory Decree in Partition of the above entitled action we, the undersigned, as duly appointed referees, do hereby submit descriptions and evaluations of the Esperanza Carillo and Ellen and Charles Simmons improvements.

Esperanza Carillo Improvements

Location:

At Northerly end of existing paved drive from Esperanza Road, being about 875 feet North of Esperanza Road and 350 feet East of the property's West line, adjacent to the Anaheim Union Water Company ditch.

General Description:

A two story frame stucco garage apartment building with garage portion originally erected in 1937 with living quarters above added in 1946.

Foundation and first floor slab is concrete. Sash is wood, double hung. First floor contains three car spaces and a shop room, all with plastered ceiling. Area: 800 square feet.

Second floor is accessible by an outside stairway. Contains 1133 square feet and has the following interior description:

Living Room:

Asphalt tile floor, plastered ceiling, fibre paper on plaster walls, built-in bookcase, 1250 watt Thermador electric wall heater.

Half Bath:

4 feet tile wainscot, papered plaster above, modern plumbing fixtures. Adjoining is shower room with tile up six feet, glass door, linoleum floored dressing area.

Kitchen:

Linoleum floor, tile drain and splash, electric range, standard cabinets.

Two Bedrooms:

Wall to wall carpet pad over pine floor, paper on plaster interior, 1250 watt Thermador electric wall heater.

Sun Porch:

Asphalt tile floor, fibre paper on plaster, built-in cabinets West end.

Condition:

Structure is in good condition.

Evaluation:

Garage Apartment----------	$ 8,700.00
Yard Improvements ----------	300.00
Total ----------	$ 9,000.00

ESTIMATED VALUE ESPERANZA CARILLO IMPROVEMENTS---$9,000.00

Ellen and Charles Simmons Improvements

Location:

Approximately 550 feet South of Esperanza Road and 450 feet East of West property line.

General Description:

Dwelling:

A one story, six room, frame stucco dwelling, erected in 1948 with concrete foundation, boxed eaves and wood shingle hip roof.

(Dwelling - Continued):

It contains a total living area of 1407 square feet, with 162 square feet of covered porch and 99 square feet of breezeway connecting the house to the garage.

Room descriptions follow:

Living Room:

Asphalt tile on pine floor, wood burning fireplace, dual floor furnace, plastered interior.

East Bedroom:

Asphalt tile floor, painted plaster interior, no closet.

West Bedroom:

Asphalt tile floor, plastered interior, wardrobe closet.

Rear Bedroom:

Asphalt tile floor, plastered interior, wardrobe closet.

Dining Room:

Asphalt tile floor, papered and plaster interior, picture windows on North side.

Kitchen and Nook:

Linoleum floor, painted and papered plaster interior, linoleum drain and splash, garbage disposal unit.

Bath:

Linoleum floor, painted plaster interior, 2 feet tile over tub, 1250 watt electric wall heater.

Service Porch:

Linoleum floor, painted plaster interior, enameled laundry tray.

Three-Quarter Bath:

Linoleum floor, painted plaster interior, electric wall heater, tile shower with glass door.

Garage:

Matching frame stucco construction with wood shingle roof, two overhead doors, Bruce water softener, concrete foundation and floor slab. Area: 22 x 28 feet or 616 square feet.

Yard Improvements:

Black top drive area ---------- 600 square feet
Concrete slab ---------- 98 square feet
Normal Landscaping.

Condition:

Structure is in excellent condition.

Evaluation:

Dwelling ----------	$ 11,900.00
Garage ----------	1,100.00
Yard Improvements ----------	200.00
Total ----------	$ 13,200.00

ESTIMATED VALUE ELLEN AND CHARLES SIMMONS
IMPROVEMENTS ---------- $ 13,200.00

Supporting data analyzed and computations employed in arriving at the above value estimates are held in the files of the referees and are available upon request.

Respectfully submitted,

Stanley E. Goode

John C. Wallace

George Hamilton Jones

ADDENDA SECTION

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TELEPHONE [illegible]

Pilgrimport 4-5740

October 14, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Parcel "X")

All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Beginning at the point on the Westerly line of the Carrillo Ranch property distant North 2°02'20" West 3950.98 feet from the Northerly line of the Atchison Topeka and Santa Fe Railway Company's 100.00 foot strip of land, as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 41°19'19" East 157.87 feet; thence South 42°07'13" East 59.48 feet; thence South 44°07'50" East 99.54 feet; thence South 49°59'14" East 104.47 feet; thence South 56°35'03" East 102.11 feet; thence South 74°14'36" East 45.59 feet; thence North 88°51'06" East 56.38 feet; thence North 87°25'58" East 48.52 feet; thence North 76°34'53" East 59.86 feet; thence North 75°39'36" East 128.13 feet; thence North 76°13'48" East 137.57 feet; thence South 34°06'59" East 42.04 feet; thence South 31°21'37" East 123.92 feet; thence South 73°27'51" East 18.33 feet to the point on the Easterly line of said Carrillo Ranch property distant North 6°40'31.3" West 2750.10 feet from the intersection of said Easterly line with the centerline of the Cajon Canal of the Anaheim Union Water Company, as shown on said map; thence North 6°40'31.3" West, along said Easterly line, 1828.91 feet; thence North 87°54'37" West 787.19 feet to the point on said Westerly line distant North 2°02'20" West 1412.03 feet from the point of beginning; thence South 2°02'20" East 1412.03 feet to the point of beginning.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

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October 14, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Parcel "Y")

All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Beginning at the point on the Westerly line of the Carrillo Ranch property distant North 2°02'20" West 5363.01 feet from the Northerly line of the Atchison Topeka and Santa Fe Railway Company's 100.00 foot strip of land as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 87°54'37" East 787.19 feet to the point on the Easterly line of said Carrillo Ranch property distant North 6°40'31.3" West 4579.01 feet from the intersection of said Easterly line with the centerline of the Cajon Canal of the Anaheim Union Water Company, as shown on said map; thence North 6°40'31.3" West, along said Easterly line, 2065.93 feet; thence North 87°54'37" West 619.76 feet to the point on said Westerly line distant North 2°02'20" West 2047.12 feet from the point of beginning; thence South 2°02'20" East, along said Westerly line, 2047.12 feet to the point of beginning.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

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October 14, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Parcel "Z")

All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California being that portion of the Carrillo Ranch property, as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County, lying Northerly of the following described line:

Beginning at the point on the Easterly line of said Carrillo Ranch property distant North 6°40'31.3" West 6644.94 feet from the intersection of said Easterly line with the centerline of the Cajon Canal of the Anaheim Union Water Company, as shown on said map; thence North 87°54'37" West 619.76 feet to the point on the Westerly line of said Carrillo Ranch property distant North 2°02'20" West 7410.13 feet from the Northerly line of the Atchison Topeka and Santa Fe Railway Company's 100.00 foot strip of land, as shown on said map.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

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October 11, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Esperanza Carrillo Homesite)

All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Commencing at the intersection of the centerline of the Cajon Canal of the Anaheim Union Water Company with the Easterly line of the Carrillo Ranch property as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence Westerly along said centerline, South 85°44'23" West 8.19 feet; South 88°54'08" West 36.94 feet; North 88°23'08" West 18.90 feet; North 80°35'23" West 39.69 feet; North 70°07'03" West 18.23 feet; North 65°58'15" West 168.10 feet; North 68°53'00" West 35.93 feet; North 71°41'39" West 483.38 feet to the true point of beginning of the boundary of the land herein described; thence, continuing along said centerline, North 71°41'39" West 87.78 feet; North 80°05'22" West 8.76 feet; thence leaving said centerline, North 9°34'36" East 82.11 feet; thence South 72°05'17" East 108.03 feet; thence South 17°40'43" West 80.63 feet to the true point of beginning.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

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October 14, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Well Site)

All that certain real property situated in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Commencing at the point on the Southerly line of the Atchison Topeka and Santa Fe Railway property distant South 71°04'33" West 848.10 feet from the intersection of said Southerly line, with the Easterly line of the Carrillo Ranch property as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 4°47'57" East 54.04 feet to the true point of beginning of the boundary of the land herein described; thence South 4°47'57" East 50.00 feet; thence South 85°12'03" West 30.00 feet; thence North 4°47'57" West 50.00 feet; thence North 85°12'03" East 30.00 feet to the true point of beginning.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

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October 11, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Easement #1)

An easement for road and public utility purposes over, under, along across and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California, included within a strip of land 30.00 feet in width, the Easterly line of said strip being described as follows:

Commencing at the intersection of the centerline of the Cajon Canal of the Anaheim Union Water Company with the Easterly line of the Carrillo Ranch property, as shown on a map filed in Book 37, Page 33 of Record of Surveys in the office of the County Recorder of Orange County, California; thence South 85°44'23" West 8.19 feet; thence South 88°54'08" West 1.83 feet, said point being the true point of beginning of said Easterly line; thence South 6°40'31.3" East 345.23 feet parallel with the Easterly line of said Carrillo Ranch property to the Northerly line of the Esperanza Road as shown on said Record of Survey, said strip to terminate at the Northerly end with the intersection of the centerline of said Cajon Canal and at the Southerly end with the intersection of the Northerly line of said Esperanza Road.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

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October 11, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Easement #2)

An easement for road and public utility purposes, over, under, along, across and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California included within the Westerly 30.00 feet of that portion of the Carrillo Ranch property shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County, lying Southerly of the centerline of the Cajon Canal of the Anaheim Union Water Company, and Northerly of the Northerly line of Esperanza Road, as shown on said map.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

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October 11, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Easement #3)

An easement for road and public utility purposes over, under, along, across and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California, included within a strip of land 30.00 feet in width, lying 15.00 feet on each side of the following described centerline:

Beginning at the intersection of the centerline of the Cajon Canal of the Anaheim Union Water Company with a line parallel with and distant 15.00 feet Easterly, measured at right angles from the Westerly line of the Carrillo Ranch property as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence North 2°02'20" West, along said parallel line, 430.19 feet; thence North 85°31'04" East 256.99 feet to the beginning of a tangent curve concave Northwesterly and having a radius of 85.00 feet; thence Northeasterly, along said curve, through a central angle of 98°49'59", a distance of 146.62 feet; thence, tangent to said curve, North 13°18'55" West 222.38 feet to the Northerly terminus of this easement. The side lines of said 30.00 foot strip being prolonged or shortened to terminate on the centerline of said Cajon Canal on the South, and on a line bearing North 40°20'57" East through said Northerly terminus, on the North.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

Stephen W. Bradford

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October 11, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Easement #4)

An easement for road and public utility purposes over, under, along, across and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California included within a strip of land 30.00 feet in width, described as follows:

Commencing at the intersection of the centerline of the Cajon Canal of the Anaheim Union Water Company with the Easterly line of the Carrillo Ranch property as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence Westerly along said centerline, South 85°44'23" West 8.19 feet; South 88°54'08" West 36.94 feet; North 88°23'08" West 18.90 feet; North 80°35'23" West 39.69 feet; North 70°07'03" West 18.23 feet; North 65°58'15" West 168.10 feet; North 68°53'00" West 35.93 feet; North 71°41'39" West 571.16 feet; North 80°05'22" West 8.76 feet to the true point of beginning of the strip of land herein described; thence North 9°34'36" East 30.00 feet to a line parallel with said centerline and distant 30.00 feet Northerly therefrom, measured at right angles; thence North 80°05'22" West, along said parallel line, 289.67 feet to a line parallel with the Westerly line of said Carrillo Ranch property, and distant Easterly 30.00 feet therefrom, measured at right angles; thence South 2°02'20" East, along said parallel line, 30.66 feet to said centerline; thence South 80°05'22" East 283.50 feet to the true point of beginning.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

Stephen W. Bamford

POOR CONTRAST

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October 11, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Easement #5)

An easement for road and public utility purposes over, under, along, across, and through those portions of the Rancho Canon de Santa Ana, County of Orange, State of California, described in parcels as follows:

Parcel 1

A strip of land 30.00 feet in width, lying 15.00 feet on each side of the following described centerline: Commencing at the intersection of the centerline of the Cajon Canal of the Anaheim Union Water Company with a line parallel with and distant Easterly 15.00 feet, measured at right angles, from the Westerly line of the Carrillo Ranch property, as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence North 2°02'20" West, along said parallel line, 430.19 feet; thence North 85°31'04" East 256.99 feet to the beginning of a tangent curve concave Northwesterly and having a radius of 85.00 feet; thence Northeasterly, along said curve, through a central angle of 98°49'59", a distance of 146.62 feet; thence North 13°18'55" West, tangent to said curve, 222.38 feet to the true point of beginning of the centerline herein described; thence North 13°18'55" West 51.84 feet; thence North 30°27'12" West 79.88 feet; thence North 20°09'12" West 137.44 feet; thence North 36°15'10" West [illegible] feet; thence North 20°25'27" West 23.76 feet; thence North [illegible]'35" West 31.90 feet; thence North 20°01'15" East 75.43 feet; thence North 9°47'57" East 80.78 feet; thence North 0°20'07" West [illegible] feet; thence North 11°09'03" West 36.82 feet; thence North [illegible]'09" West 305.95 feet; thence North 26°02'47" West 43.90 feet to said parallel line; thence North 2°02'20" West, along said parallel line [illegible].00 feet to a point North 87°57'40" East 15.00 feet from a point on said Westerly line distant North 2°02'20" West 2489.05 feet from the centerline of said Cajon Canal. The side lines of this easement are to be prolonged or shortened to terminate on a line bearing North 40°20'57" East through the true point of beginning.

Parcel 2

A strip of land 50.00 feet in width, lying 25.00 feet on each side of the following described centerline: Beginning at the point [illegible] North 2°02'20" West 2489.05 feet and North 87°57'40" East [illegible] from the intersection of the centerline of the Cajon Canal [illegible] Union Water Company and the Westerly line of the Carrillo [illegible] as shown on the map filed in Book 37, Page 33 of Record

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of Surveys, records of said County; thence North 2°02'20" West, parallel with said Westerly line, 319.44 feet to a line bearing South 41°19'19" East from a point on said Westerly line distant North 2°02'20" West 2839.05 feet from said intersection. The side lines of this easement are to be prolonged or shortened to terminate on said line bearing South 41°19'19" East.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

Stephen W. Bradford

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October 11, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Easement #6)

An easement for road and public utility purposes over, under, along, across and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California included within a strip of land 30.00 feet in width, lying 15.00 feet on each side of the following described centerline:

Beginning at the point on the Westerly line of the Carrillo Ranch property distant North 2°02'20" West 2606.08 feet from the intersection of said Westerly line with the centerline of the Cajon Canal of the Anaheim Union Water Company as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 43°32'54" East 182.30 feet; thence South 23°25'29" East 193.53 feet; thence South 10°07'54" East 184.93 feet; thence South 20°46'04" East 262.31 feet; thence South 46°13'33" East 108.75 feet to the Southeasterly terminus of this easement. Excepting that portion lying within the Westerly 50.00 feet of said Carrillo Ranch property. The Southwesterly side line of this easement to be shortened to terminate on a line bearing South 46°47'38" West from said Southeasterly terminus, and the Northeasterly side line to be shortened to terminate on a line bearing North 13°51'10" East from said Southeasterly terminus.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

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October 11, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Easement #7)

An easement for road and public utility purposes over, under, along, across and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California described as follows:

Beginning at the point on the Westerly line of the Carrillo Ranch property distant North 2°02'20" West 2839.05 feet from the intersection of said Westerly line with the centerline of the Cajon Canal of the Anaheim Union Water Company as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence North 2°02'20" West, along said Westerly line, 1412.03 feet; thence South 87°54'37" East 50.07 feet to a line parallel with said Westerly line and distant Easterly 50.00 feet therefrom, measured at right angles; thence South 2°02'20" East, along said parallel line, 1470.50 feet to a line bearing South 41°19'19" East from the point of beginning; thence North 41°19'19" West 78.79 feet to the point of beginning.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

Stephen W. Bradford

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October 11, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Easement #8)

An easement for road and public utility purposes over, under, along, across and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California described as follows:

Beginning at the point on the Westerly line of the Carrillo Ranch property distant North 2°02'20" West 4251.08 feet from the intersection of said Westerly line with the centerline of the Cajon Canal of the Anaheim Union Water Company as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence North 2°02'20" West, along said Westerly line 2047.12 feet; thence South 87°54'37" East 50.07 feet to a line parallel with said Westerly line and distant Easterly 50.00 feet therefrom, measured at right angles; thence South 2°02'20" East, along said parallel line, 2047.12 feet to a line bearing South 87°54'37" East from the point of beginning; thence North 87°54'37" West 50.07 feet to the point of beginning.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

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October 11, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Easement #9)

An easement for road and public utility purposes over, under, along, across and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California described as follows:

Beginning at the point on the Westerly line of the Carrillo Ranch property distant North 2°02'20" West 6298.20 feet from the intersection of said Westerly line with the centerline of the Cajon Canal of the Anaheim Union Water Company as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence North 2°02'20" West, along said Westerly line 2865.41 feet to the Northwest corner of said Carrillo Ranch property; thence South 87°54'37" East, along the Northerly line of said property 50.07 feet to a line parallel with said Westerly line and distant Easterly 50.00 feet therefrom, measured at right angles; thence South 2°02'20" East, along said parallel line 2865.41 feet to a line bearing South 87°54'37" East from the point of beginning; thence North 87°54'37" West 50.07 feet to the point of beginning.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

Stephen W. Bradford

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October 10, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Easement #10)

An easement for road and public utility purposes over, under, along, across, and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Beginning at the point on the Southerly line of the land conveyed to the Atchison Topeka and Santa Fe Railway Company by deed recorded in Book 173, Page 296 of Deeds, records of said County, distant South 71°04'33"West 848.10 feet from the Easterly line of the Carrillo Ranch property, as said Southerly and Easterly lines are shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 4°47'57" East 54.04 feet; thence South 85°12'03" West 15.00 feet; thence North 4°47'57" West 50.27 feet to said Southerly line; thence North 71°04'33" East, along said Southerly line to the point of beginning.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

Stephen W. Bradford

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October 10, 1957

DESCRIPTION FOR THE CARRILLO RANCH (Easement "A")

An easement for water pipeline purposes over, under, along, across, and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California, lying 3.00 feet on each side of the following described centerline:

Commencing at the intersection of the Southerly line of the land conveyed to the Atchison Topeka and Santa Fe Railway Company by deed recorded in Book 173, Page 296 of Deeds, records of said County, with the Easterly line of the Carrillo Ranch property as said Southerly and Easterly lines are shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 71°04'33" West along said Southerly line 848.10 feet; thence South 4°47'57" East 54.04 feet; thence South 85°12'03" West 30.00 feet; thence South 4°47'57" East 2.83 feet to the true point of beginning of the centerline herein described; thence North 9°16'39" West 48.51 feet to the point on said Southerly line distant South 71°04'33" West 882.94 feet from said intersection. The side lines of this easement are prolonged or shortened to terminate on the lines above described as having bearings of South 85°12'03" West, and south 4°47'57" East from the true point of beginning, and on said Southerly line.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

Stephen W. Bradford

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October 11, 1957

[illegible] FOR THE CARRILLO RANCH (Easement "B")

A [illegible].00 foot wide easement for water pipeline purposes [illegible], along, across and through that portion of the [illegible] de Santa Ana, County of Orange, State of [illegible] 3.00 feet on each side of the following [illegible]:

[illegible] at the point on the Northerly line of the [illegible] and Santa Fe Railway Company property [illegible] North 71°04'33" East 353.00 feet from the Westerly [illegible] Carrillo Ranch property as shown on the map [illegible] Book 37, Page 33 of Record of Surveys, records [illegible] County; thence North 3°59'16" East 904.22 feet [illegible] on the centerline of the Cajon Canal of the [illegible] Water Company as shown on said map distant [illegible]'22" East 322.92 feet and South 71°41'39" East [illegible] from the intersection of said centerline with [illegible] line.

[illegible] covenants, conditions, reservations, [illegible], rights of way and easements, if any,

Stephen W. Bradford

BRADFORD & CZAPLINSKI
SURVEYORS & ENGINEERS
133 SO. CLAUDINA ST.
ANAHEIM, CALIFORNIA
TELEPHONE KE[illegible]
PRospect 4-[illegible]740

October 11, 1957

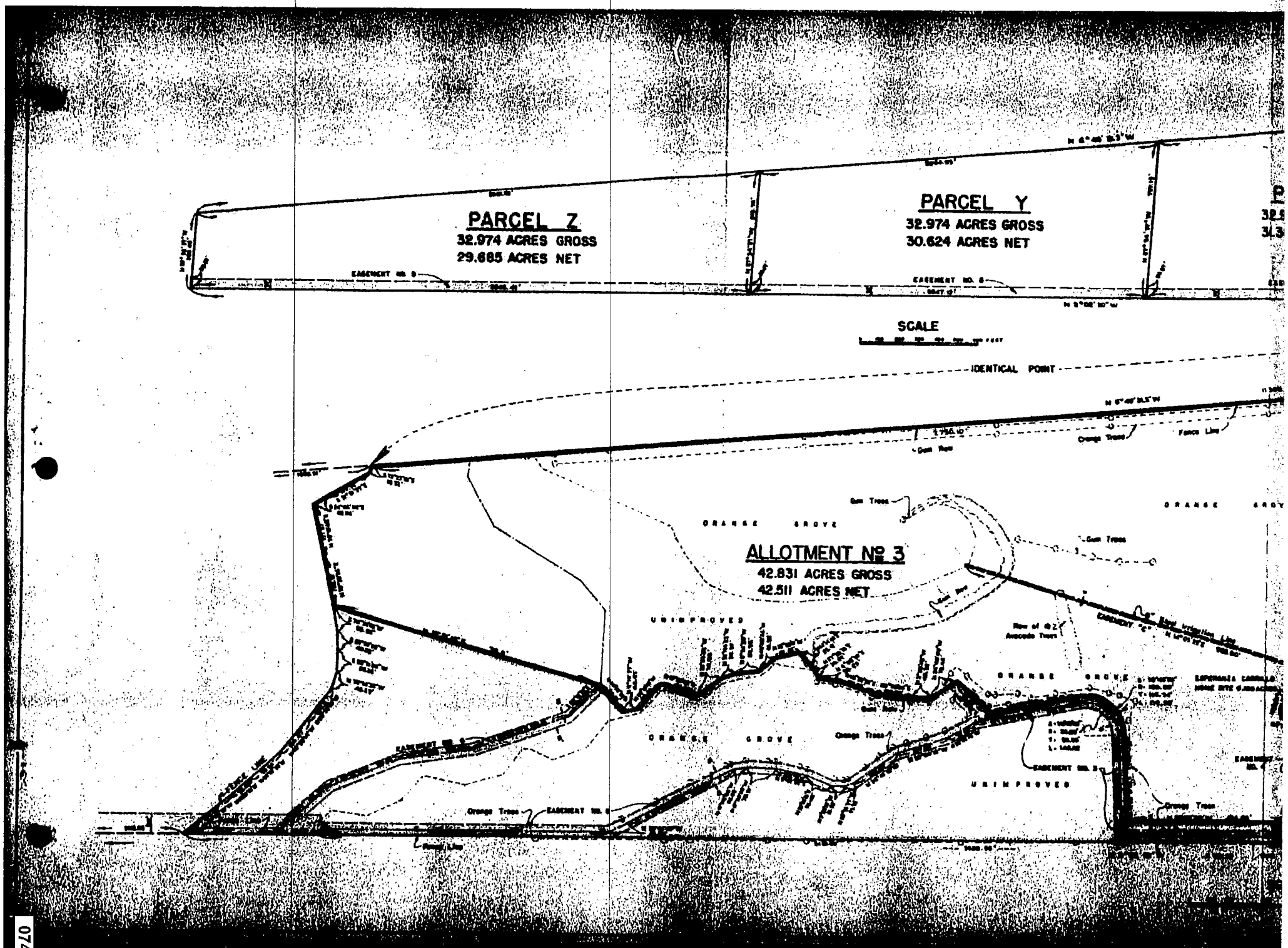
DESCRIPTION FOR THE CARRILLO RANCH (Easement "C")

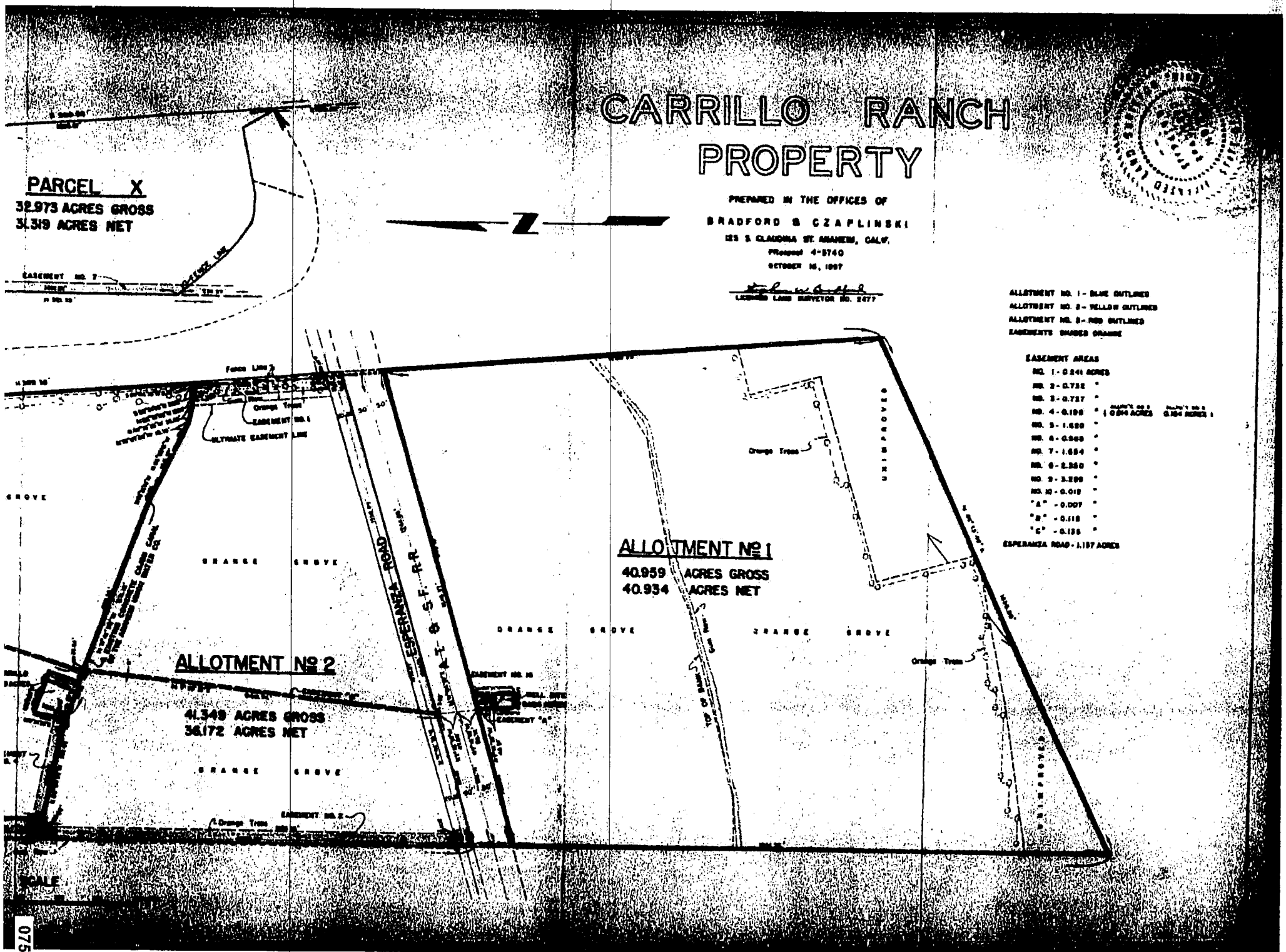
A 6.00 foot wide easement for water pipeline purposes over, under, along, across and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California lying 3.00 feet on each side of the following described centerline:

Beginning at the point on the centerline of the Cajon Canal of the Anaheim Union Water Company distant South 80°05'22" East 322.92 feet and South 71°41'39" East 124.56 feet from the intersection of said centerline with the Westerly line of the Carrillo Ranch property, as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence North 3°59'16" East 32.54 feet; thence North 14°03'23" East 955.00 feet to the Northerly terminus of this easement.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

Stephen W. Bradford


PARCEL Z
32.974 ACRES GROSS
29.685 ACRES NET
PARCEL Y
32.974 ACRES GROSS
30.624 ACRES NET
SCALE
IDENTICAL POINT
ALLOTMENT Nº 3
42.831 ACRES GROSS
42.511 ACRES NET
ORANGE GROVE
UNIMPROVED
Gum Trees
Orange Trees
Fence Line
Row of 10 Avocado Trees
EASEMENT NO. 3
EASEMENT NO. 6


CARRILLO RANCH
PROPERTY
PREPARED IN THE OFFICES OF
BRADFORD & CZAPLINSKI
125 S. CLAUDINA ST. ANAHEIM, CALIF.
PRospect 4-5740
OCTOBER 16, 1997
LICENSED LAND SURVEYOR NO. 2477
ALLOTMENT NO. 1 - BLUE OUTLINED
ALLOTMENT NO. 2 - YELLOW OUTLINED
ALLOTMENT NO. 3 - RED OUTLINED
EASEMENTS SHADED ORANGE
EASEMENT AREAS
NO. 1 - 0.241 ACRES
NO. 2 - 0.732 "
NO. 3 - 0.727 "
NO. 4 - 0.198 "
NO. 5 - 1.620 "
NO. 6 - 0.568 "
NO. 7 - 1.654 "
NO. 8 - 2.350 "
NO. 9 - 3.299 "
NO. 10 - 0.019 "
"A" - 0.007 "
"B" - 0.118 "
"C" - 0.135 "
ESPERANZA ROAD - 1.157 ACRES
PARCEL X
32.973 ACRES GROSS
31.319 ACRES NET
ALLOTMENT Nº 1
40.959 ACRES GROSS
40.934 ACRES NET
ALLOTMENT Nº 2
41.349 ACRES GROSS
36.172 ACRES NET
ESPERANZA ROAD
A.T. & S.F. R.R.
ORANGE GROVE
Orange Trees
UNIMPROVED
EASEMENT NO. 1
EASEMENT NO. 2
EASEMENT NO. 16
EASEMENT "A"
ULTIMATE EASEMENT LINE
Fence Line
SCALE

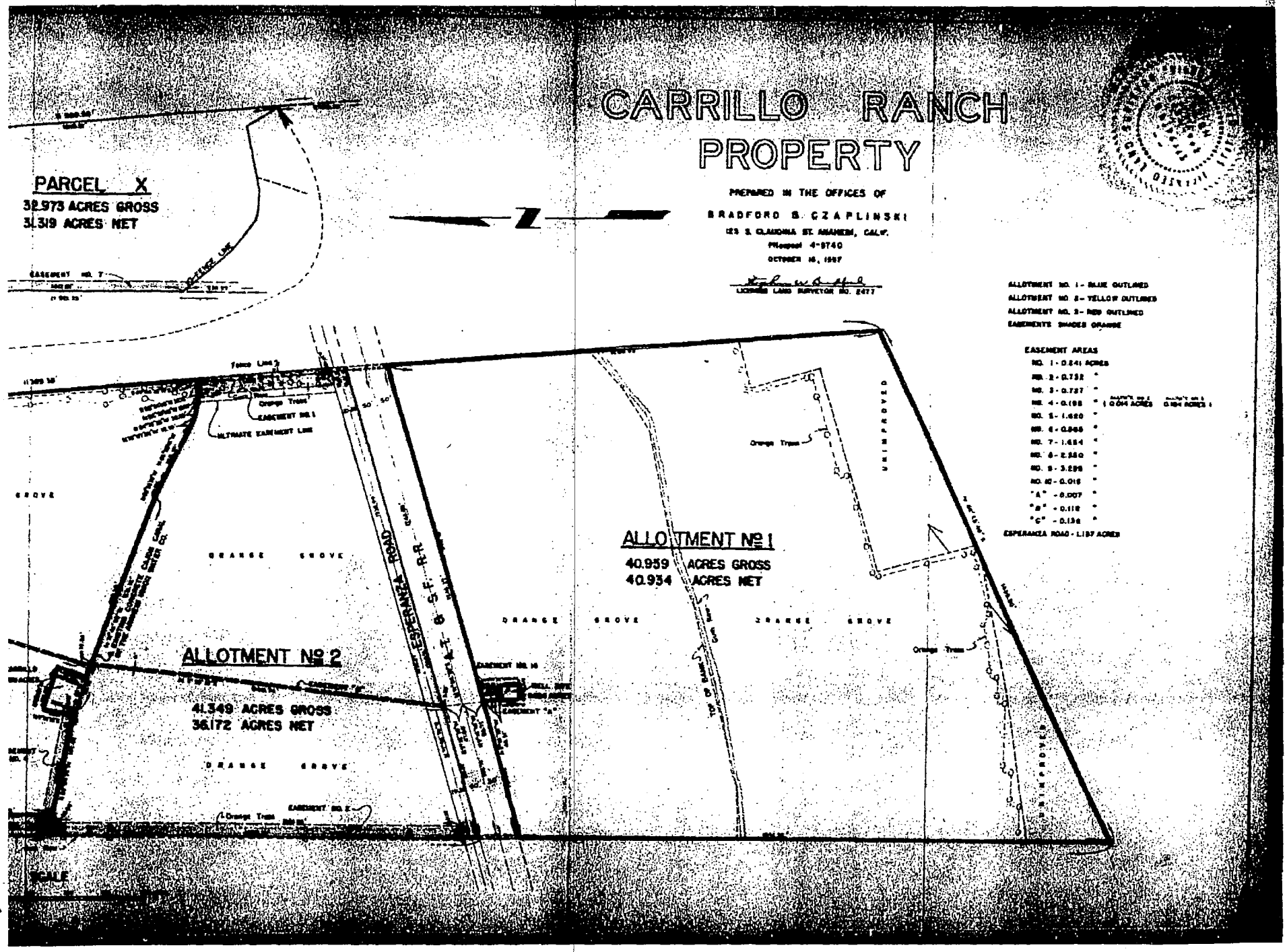
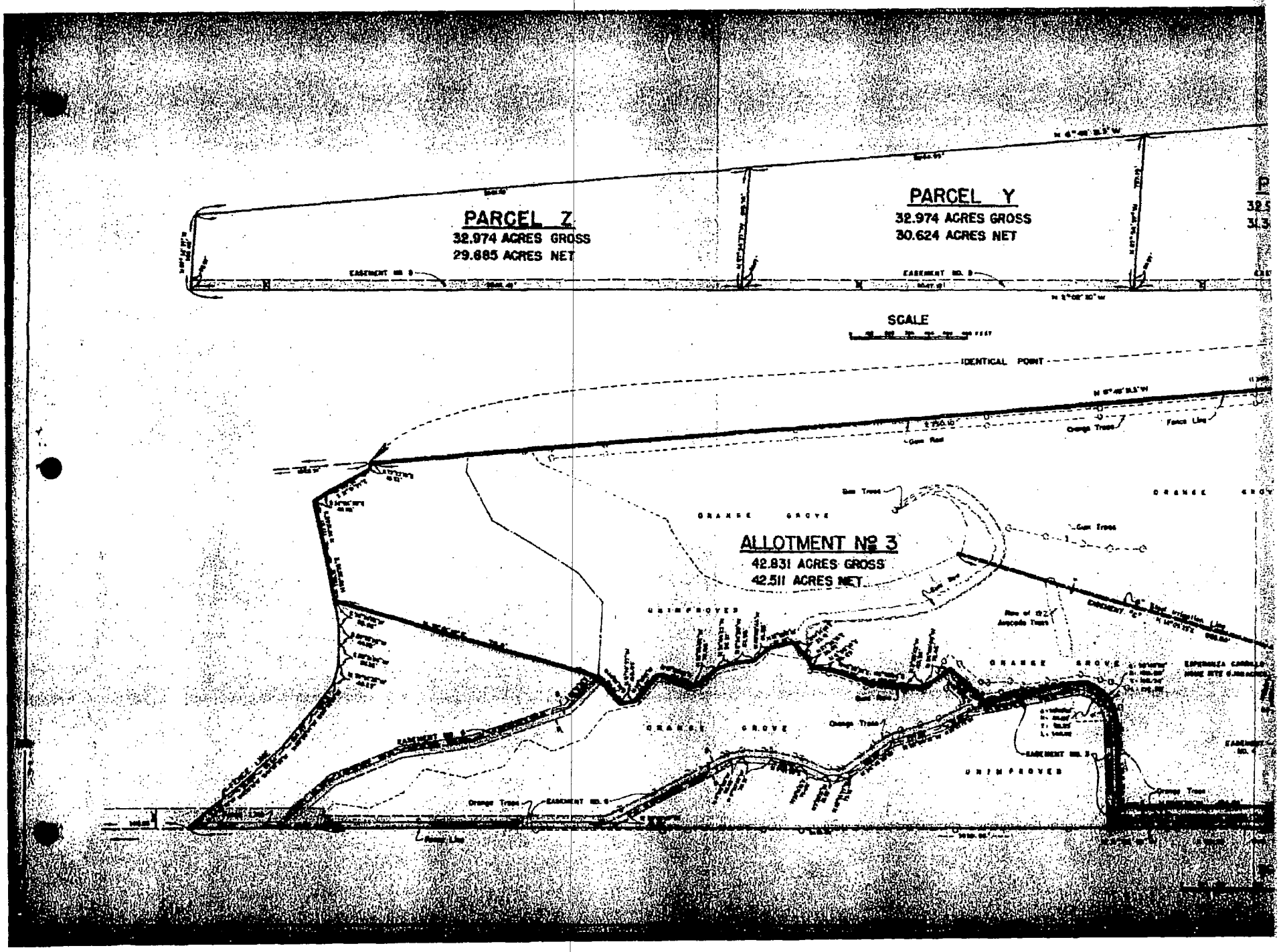

CARRILLO RANCH
PROPERTY
PREPARED IN THE OFFICES OF
BRADFORD S. CZAPLINSKI
LICENSED LAND SURVEYOR NO. 2477
PARCEL X
32.973 ACRES GROSS
31.319 ACRES NET
ALLOTMENT NO. 1 - BLUE OUTLINED
ALLOTMENT NO. 2 - YELLOW OUTLINED
ALLOTMENT NO. 3 - RED OUTLINED
EASEMENTS SHADES ORANGE
EASEMENT AREAS
ALLOTMENT Nº 1
40.959 ACRES GROSS
40.934 ACRES NET
ALLOTMENT Nº 2
41.349 ACRES GROSS
36.172 ACRES NET
ESPERANZA ROAD
A.T. & S.F. R.R.
ORANGE GROVE
UNIMPROVED
Orange Trees
SCALE

EXHIBIT D


PARCEL Z
32.974 ACRES GROSS
29.685 ACRES NET
PARCEL Y
32.974 ACRES GROSS
30.624 ACRES NET
SCALE
IDENTICAL POINT
ALLOTMENT Nº 3
42.831 ACRES GROSS
42.511 ACRES NET
ORANGE GROVE
UNIMPROVED
Orange Trees
Fence Line
Gum Trees
Gum Rest
Row of 12 Avocado Trees
EASEMENT NO. 3
EASEMENT NO. 6

Webb & Lae
407 California Bank Bldg.
Anaheim, California
PRospect 4-2817

ATTORNEYS FOR Plaintiffs

FILED
MAY [illegible] 1958
L. E. WA[illegible], County Clerk
By [illegible] Deputy

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF ORANGE

ESPERANZA CARRILLO, ELLEN REEVES and NORMAN REEVES, Plaintiffs, vs. EUTIMIO CARRILLO, Defendant.	NO. 65076 STIPULATION

IT IS HEREBY STIPULATED AND AGREED by and between the parties hereto, and their respective counsels, that the attorneys' fees of said attorneys for services rendered for the common benefit of plaintiffs and defendant in the above entitled action, and for all other services rendered by said attorneys in said action, be and the same are hereby fixed and shall be payable within ten days after the entry of the Final Decree of Partition in said action, as follows:

TO WEBB & LAE, attorneys for plaintiffs, the total sum of $10,000.00, of which the sum of $5,000.00 shall be paid by plaintiff, Esperanza Carrillo, and the sum of $5,000.00 shall be paid by plaintiff, Ellen Reeves.

TO STEPHEN F. GALLAGHER, attorney for defendant, the sum of $7,500.00, of which amount the sum of $5,833.34 shall be paid by defendant, Eutimio Carrillo, the sum of $833.33 shall be paid by plaintiff, Esperanza Carrillo, and the sum of $833.33 shall be paid by plaintiff, Ellen Reeves.

EXHIBIT E

IT IS FURTHER STIPULATED that parcels designated "x," "y," and "z" on the map on file as an exhibit in this action, being Exhibit No. _____, shall be allocated to the respective parties, as follows:

TO EUTIMIO CARRILLO, parcel designated "x";

TO ELLEN REEVES, parcel designated "y"; and

TO ESPERANZA CARRILLO, parcel designated "z";

provided, however, that all oil, gas and mineral rights in, upon and under said respective parcels "x," "y," and "z" shall be and remain in said parties in equal shares, and as the owners thereof as tenants in common.

IT IS FURTHER STIPULATED that the Court in its Final Decree of Partition may fix the fees of the parties' attorneys and require the fees to be payable in accordance herewith, subject to ownership of said mineral rights as tenants in common, as aforesaid.

Dated this 11th day of April, 1958.

Esperanza Carrillo
Esperanza Carrillo

Ellen Reeves
Ellen Carrillo

WEBB & LAE

By Wm H Webb
Attorneys for Plaintiffs

Eutimio Carrillo
Eutimio Carrillo

Stephen F. Gallagher
Stephen F. Gallagher
Attorney for Defendant.

STEPHEN F. GALLAGHER
ATTORNEY AT LAW
CALIFORNIA BANK BLDG.
ANAHEIM, CALIF.
PHONE
KEYSTONE 8-2745

BOOK 4297 PAGE 93

Webb & Lee
407 California Bank Bldg.
Anaheim, California
PRospect 4-2817

62719

FILED
MAY 20 1958
L. D. WALLACE, County Clerk
By _____ Deputy

ATTORNEYS FOR Plaintiffs

#7

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF ORANGE

ESPERANZA CARRILLO, ELLEN REEVES and NORMAN REEVES, Plaintiffs, vs. EUTIMIO CARRILLO, Defendant.	NO. 65076 JUDGMENT IN PARTITION, CONFIRMING REPORT OF REFEREES IN PARTITION AND REPORT OF REFEREE TAKING AN ACCOUNTING OF THE PARTNERSHIP AFFAIRS, AND FOR ALLOWANCE OF REFEREES' FEES AND EXPENSES AND ALLOWANCE OF ATTORNEYS' FEES FOR PLAINTIFFS AND DEFENDANT

This cause, having been brought on to be heard upon the report of John G. Wallace, Stanley Goode, Sr., and George H. Jones, referees in partition, appointed under and by virtue of the Interlocutory Judgment made and rendered herein on September 21, 1955, upon the report of Robert D. Schafer, referee appointed under and by virtue of said Interlocutory Judgment to take an accounting of the partnership affairs of the parties herein, and upon due proof of the service of notice of application for judgment on said reports on the attorney for defendant; and it appearing that said referees in partition have filed in this Court their written report of their proceedings, and said referee appointed to take an accounting of the partnership affairs has filed in this Court his account thereof; and evidence, both oral and documentary, having been introduced and the cause submitted for decision, written findings of fact and conclusions of law having been expressly waived in writing by counsel for the respective parties hereto and on file herein, and plaintiffs Esperanza Carrillo and

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EXHIBIT F

Ellen Reeves, and defendant Eutimio Carrillo, and their respective counsel having fixed, by written stipulation on file herein, the attorneys fees for the respective parties and the payment thereof, including a division of those parcels delineated on the Surveyor's Map of the Carrillo Ranch Property, a copy being attached to Referees' Report of Partition and a copy being on file herein as an exhibit in this action, and delineated thereon as Parcels "X", "Y" and "Z", and providing that the oil, gas and mineral rights in said parcels shall be owned in common by said parties, and the Court having examined said report; and being fully advised,

IT IS THEREFORE ORDERED, ADJUDGED AND DECREED as follows:

1. That said report of said Referees in Partition be, and the same is, in all things, approved and confirmed, except as noted herein, and that the property involved in these partition proceedings, described in the Interlocutory Decree rendered herein on September 21, 1955, and herein described, be partitioned and allotted to the parties hereto as follows:

(a) TO ESPERANZA CARRILLO the following described property:

PARCEL 1.

All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Beginning at the intersection of the Southerly line of the land conveyed to the Atchison, Topeka and Santa Fe Railway Company by deed recorded in Book 173, page 296 of Deeds, records of said County, with the Easterly boundary of the Carrillo Ranch property as said intersection is shown on the map filed in Book 37, page 33 of Record of Surveys, Records of said County; thence South 71° 04' 33" West, along said Southerly line 1248.37 feet to the Westerly line of said Carrillo Ranch property as shown on said map; thence South 2°02'20" East along said Westerly line 1541.25 feet to the Southwest corner thereof; thence North 62°23'49" East along the Southerly line of said property 1439.50 feet to a line bearing South 6°40'31.3" East from the point of beginning; thence North 6°40'31.3" West 1256.89 feet to the point of beginning.

EXCEPTING THEREFROM a two-thirds interest in the following described portion thereof:

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r: 72010304 Comment:

Beginning at the point distant South 71°04'33" West 848.10 feet and South 4°47'57" East 54.04 feet from the Northeast corner of the above described Parcel 1; thence South 4°47'57" East 50.00 feet; thence South 85°12'03" West 30.00 feet; thence North 4°47'57" West 50.00 feet; thence North 85°12'03" East 30.00 feet to the point of beginning.

EXCEPTING THEREFROM a one-fourth interest in and to all oil and oil rights in, on and appurtenant to said lands.

SUBJECT TO an easement for road and public utility purposes over, under, along, across and through that portion thereof described as follows:

Beginning at the point on the Northerly line of the above described Parcel 1, distant South 71°04'33" West, 848.10 feet from the Northeasterly corner thereof; thence South 4°47'57" East 54.04 feet; thence South 85°12'03" West 15.00 feet; thence North 4°47'57" West 50.27 feet to said Northerly line; thence North 71°04'33" East, along said Northerly line to the point of beginning.

ALSO SUBJECT TO a 6.00 foot easement for pipeline purposes over, under, along, across and through that portion thereof lying 3.00 feet on each side of the following described centerline:

Commencing at the Northeast corner of the above described Parcel 1; thence South 71°04'33" West along the Northerly line thereof 848.10 feet; thence South 4°47'57" East 54.04 feet; thence South 85°12'03" West 30.00 feet; thence South 4°47'57" East 2.83 feet to the true point of beginning of the centerline herein described; thence North 9°16'39" West 48.51 feet to the point on said Notherly line distant South 71°04'33" West 882.94 feet from said Northeast corner. The sidelines of this easement are prolonged or shortened to terminate on the lines above described as having bearings of South 85°12'03" West and South 4°47'57" East from the true point of beginning, and on said Northerly line.

PARCEL 2:

All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Commencing at the intersection of the centerline of the Cajon Canal of the Anaheim Union Water Company with the Easterly line of the Carrillo Ranch property shown on a map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence Westerly along said centerline South 85°44'23" West 8.19 feet; South 88°54'08" West 36.94 feet; North 88°23'08" West 18.90 feet; North 80°35'23" West 39.69 feet; North 70°07'03" West 15.23 feet; North 65°58'15" West 168.10 feet; North 68°53'00" West 35.93 feet; North 71°41'39" West 483.38 feet to the true point of beginning of the boundary of the land herein described; thence continuing along said centerline North 71°41'39" West 87.78 feet; North 80°05'22" West 8.76 feet; thence leaving said centerline North 9°34'36" East 82.11 feet; thence South 72°05'17" East 108.03 feet; thence South 17°40'43" West 80.63 feet to the true point of beginning.

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er: 72010204 Comment:

EXCEPTING THEREFROM a one-fourth (1/4th) interest in and to all oil and oil rights in, on and appurtenant to said lands.

PARCEL 3:

All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California, being that portion of the Carrillo Ranch property as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County, lying Northerly of the following described line: beginning at the point on the Easterly line of said Carrillo Ranch property distant North 6°40'31.3" West 6644.94 feet from the intersection of said Easterly line with the centerline of the Cajon Canal of the Anaheim Union Water Company, as shown on said map; thence North 87°54'37" West 619.76 feet to the point on the Westerly line of said Carrillo Ranch property distant North 2°02'20" West 7410.13 feet from the Northerly line of the Atchison, Topeka and Santa Fe Railway Company's 100.00 feet strip of land as shown on said map.

EXCEPTING THEREFROM a three-fourths (3/4ths) interest in and to all oil and oil rights in, on and appurtenant to said lands.

SUBJECT TO an easement for road and public utility purposes over, under, along, across and through the Westerly 50.00 feet thereof.

PARCEL 4:

A one-fourth (1/4th) interest in and to all oil and oil rights in, on, and appurtenant to the following described land:

All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Beginning at the point on the Westerly line of the Carrillo Ranch property distant North 2°02'20" West 3950.98 feet from the Northerly line of the Atchison, Topeka and Santa Fe Railway Company's 100.00 foot strip of land, as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 41°19'19" East 157.87 feet; thence South 42°07'13" East 59.48 feet; thence South 44°07'50" East 99.54 feet; thence South 49°59'14" East 104.47 feet; thence South 56°35'03" East 102.11 feet; thence South 74°14'36" East 45.59 feet; thence North 88°51'06" East 56.38 feet; thence North 87°25'58" East 48.52 feet; thence North 76°34'53" East 59.86 feet; thence North 75°39'36" East 128.13 feet; thence North 76°13'48" East 137.57 feet; thence South 34°06'59" East 42.04 feet; thence South 31°21'37" East 123.92 feet; thence South 73°27'51" East 18.33 feet to the point on the Easterly line of said Carrillo Ranch property distant North 6°40'31.3" West 2750.10 feet from the intersection of said Easterly line with the centerline of the Cajon Canal of the Anaheim Union Water Company, as shown on said map; thence North 6°40'31.3" West, along said Easterly line, 1828.91 feet; thence North 87°54'37" West 787.19 feet to the point on said Westerly line distant North 2°02'20" West 1412.03 feet from the point of beginning; thence South 2°02'20" East 1412.03 feet to the point of beginning.

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SUBJECT TO an easement for road and public utility purposes over, under, along, across and through the Westerly 50.00 feet thereof.

PARCEL 5:

A one-fourth (1/4th) interest in and to all oil and oil rights in, on, and appurtenant to the following described land:

All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Beginning at the point on the Westerly line of the Carrillo Ranch property distant North 2°02'20" West 5363.01 feet from the Northerly line of the Atchison, Topeka and Santa Fe Railway Company's 100.00 foot strip of land as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 87°54'37" East 787.19 feet to the point on the Easterly line of said Carrillo Ranch property distant North 6°40'31.3" West 4579.01 feet from the intersection of said Easterly line with the centerline of the Cajon Canal of the Anaheim Union Water Company, as shown on said map; thence North 6°40'31.3" West, along said Easterly line, 2065.93 feet; thence North 87°54'37" West 619.76 feet to the point on said Westerly line distant North 2°02'20" West 2047.12 feet from the point of beginning; thence South 2°02'20" East, along said Westerly line, 2047.12 feet to the point of beginning.

SUBJECT TO an easement for road and public utility purposes over, under, along, across and through the Westerly 50.00 feet thereof.

PARCEL 6:

An easement for road and public utility purposes over, under, along, across and through that portion of the Rancho de Santa Ana, County of Orange, State of California, being partly 50.00 feet in width and partly 30.00 feet in width; the 30.00 feet wide portion lying 15.00 feet on each said of the following described centerline:

Beginning at the intersection of the Northerly line of Esperanza Road with a line parallel with the Westerly boundary of the Carrillo Ranch property, and distant Easterly 15.00 feet therefrom, measured at right angles, as said Westerly boundary and said Northerly line are shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence North 2°02'20" West, along said parallel line to the point distant 430.19 feet North 2°02'20" West from the intersection of said parallel line with the centerline of the Cajon Canal of the Anaheim Union Water Co. as shown on said map; thence North 85°31'04" East 256.99 feet to the beginning of a tangent curve concave Northwesterly and having a radius of 85.00 feet; thence Northeasterly along said curve, through a central angle of 98°49'59", a distance of 146.62 feet; thence, tangent to said curve, North 13°18'55" West 274.22 feet; thence North 30°27'12" West 79.88 feet; thence North 20°09'12" West 137.44 feet; thence North 36°15'10" West 136.83 feet; thence North

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20°25'27" West 23.76 feet; thence North 3°09'35" West 31.90 feet; thence North 20°01'15" East 75.43 feet; thence North 9°47'57" East 80.78 feet; thence North 0°20'07" West 70.91 feet; thence North 11°09'03" West 36.82 feet; thence North 29°21'09" West 305.95 feet; thence North 26°02'47" West 43.90 feet to said parallel line; thence North 2°02'20" West, along said parallel line, 744.00 feet to the Northerly terminus of said 30.00 feet wide portion; said Northerly terminus being distant North 87°57'40" East 15.00 feet from the point on said Westerly line distant North 2°02'20" West 2489.05 feet from the intersection of said Westerly line with the centerline of said Cajon Canal.

The 50.00 foot wide portion being the Westerly 50.00 foot of that portion of said Carrillo Ranch property lying Northerly of the line bearing North 87°57'40" East from the point on said Westerly line distant North 2°02'20" West 2489.05 feet from the intersection of said Westerly line with the centerline of said Cajon Canal.

EXCEPTING THEREFROM that portion included within Parcel 3 above described.

PARCEL 7:

An easement for road and public utility purposes, over, under, along, across and through the Southerly 30.00 feet of that portion of the Carrillo Ranch property in the Rancho Canon de Santa Ana, County of Orange, State of California, lying Northerly of the centerline of the Cajon Canal of the Anaheim Union Water Co. as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County, lying Westerly of Parcel 2, above described and Easterly of the Westerly line of said Carrillo Ranch.

PARCEL 8:

A 6.00 foot wide easement for water pipeline purposes over, under, along, across and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California, lying 3.00 feet on each side of the following described centerline:

Beginning at the point on the Northerly line of the Atchison, Topeka and Santa Fe Railway Company property distant North 74°04'33" East 353.00 feet from the Westerly line of the Carrillo Ranch property, as said Northerly and Westerly lines are shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence North 3°59'16" East 904.22 feet to the centerline of the Cajon Canal of the Anaheim Union Water Company, as said centerline is shown on said map.

Together with an easement for the use of existing pipelines joining an existing eight inch steel pipeline in the above described 6.00 foot wide easement with that property described in Parcel 2, above.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.

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Prospect 4-2817

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(b) TO ELLEN REEVES the following described property:

PARCEL 1:

All that certain real property in the Rancho Canon d Santa Ana, County of Orange, State of California, described as follows:

Beginning at the intersection of the centerline of the Cajon Canal of the Anaheim Union Water Company with the Easterly line of the Carrillo Ranch property as shown on the map filed in Book 37, Page 33 of Surveys, records of said County; thence Westerly, along said centerline, South 85°44'23" West 8.19 feet; South 88°54'05" West 36.94 feet; North 88°23'08" West 18.90 feet; North 80°35'23" West 39.69 feet; North 70°07'03" West 18.23 feet; North 65°58'15" West 168.10 feet; North 68°53'00" West 35.93 feet; North 71°41'39" West 571.16 feet; North 80°05'22" West 292.26 feet to a line parallel with the Westerly line of said Carrillo Ranch property and distant Easterly 30.00 feet therefrom, measured at right angles; thence North 2°02'20" West, along said parallel line, 418.99 feet; thence North 85°31'04" East 242.62 feet to the beginning of a tangent curve concave Northwesterly and having a radius of 100.00 feet; thence Northeasterly, along said curve, through a central angle of 98°49'59" a distance of 172.50 feet; thence, tangent to said curve, North 13°18'55" West 233.41 feet; thence North 40°20'57" East 115.95 feet; thence North 34°40'00" West 78.46 feet; thence North 3°20'43" West 47.26 feet; thence North 4°23'04" East 100.60 feet; thence North 16°22'24" East 100.50 feet; thence North 4°08'39" East 52.69 feet; thence North 57°38'13" East 30.62 feet; thence North 44°14'43" East 53.41 feet; thence North 16°28'17" West 62.45 feet; thence North 43°49'45" West 51.35 feet; thence North 8°34'50" West 62.96 feet; thence North 21°44'22" West 36.37 feet; thence North 38°53'45" West 75.95 feet; thence North 15°33'08" East 96.96 feet; thence North 52°10'47" West 86.52 feet; thence North 11°16'27" West 46.62 feet; thence North 46°47'38" East 90.01 feet; thence North 13°51'10" East 713.11 feet; thence South 76°34'53" West 59.86 feet; thence South 87°25'58" West 48.52 feet; thence South 88°51'06" West 56.38 feet; thence North 74°14'36" West 45.59 feet; thence North 56°35'03" West 102.11 feet; thence North 49°59'14" West 104.47 feet; thence North 44°07'50" West 99.54 feet; thence North 42°07'13" West 59.48 feet; thence North 41°19'19" West 157.87 feet to the point on the Westerly line of said Carrillo Ranch property distant North 2°02'20" West 3950.98 feet from the Northerly line of the Atchison, Topeka and Santa Fe Railway Company's 100.00 foot strip of land, as shown on said map; thence South 2°02'20" East 3950.98 feet to said Northerly line; thence North 71°04'33" East, along said Northerly line, 1239.73 feet to said Easterly line; thence North 6°40'31.3" West, along said Easterly line, 383.48 feet to the point of beginning. EXCEPTING THEREFROM a 1/4th interest in and to all oil and oil rights in, on and appurtenant to said lands.

SUBJECT TO an easement for road and public utility purposes over, under, along, across and through the Westerly 30.00 feet of the Easterly 40.00 feet of that portion thereof lying Southerly of the centerline of said Cajon Canal.

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In the event subdivision development (more than 4 dwellings) is effected in the property lying Northerly of the centerline of said centerline of the Cajon Canal, and served by this easement, this easement shall be widened to include the Easterly 60.00 feet of that portion of said Carrillo Ranch property lying Southerly of said centerline of the Cajon Canal, and Northerly of said Northerly line of the Atchison, Topeka and Santa Fe Railway Company land. If and when this widening is accomplished, the existing wind break of eucalyptus trees along the Easterly side of said easement shall not be removed so long as that portion of Parcel 1, above described, adjoining said easement Westerly is devoted to the raising of citrus crops in commercial amounts.

ALSO SUBJECT to the right of Eutimio Carrillo to use the existing driveway running from Esperanza Road over Parcel 1, above described, to Parcel 1 of the property partitioned to said Eutimio Carrillo, until September 30, 1958, on which date this right shall cease.

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ALSO SUBJECT TO a 6.00 foot wide easement for water pipeline purposes over, under, along, across and through that portion thereof lying 3.00 feet on each side of the following described centerline.

Beginning at the point on the Northerly line of the Atchison, Topeka and Santa Fe Railway Company property as shown on said map distant North 71°04'33" East 353.00 feet from the Westerly line of said Carrillo Ranch property; thence North 3°59'16" East 904.22 feet to the centerline of said Cajon Canal. Together with an easement for the use of existing pipelines joining an eight inch steel pipe line in the above described 6.00 foot wide easement with that real property described as follows:

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Commencing at the intersection of the centerline of the Cajon Canal of the Anaheim Union Water Company with the Easterly line of the Carrillo Ranch property shown on a map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence Westerly along said centerline South 85°44'23" West 8.19 feet; South 88°54'08" West 36.94 feet; North 88°23'08" West 18.90 feet; North 80°35'23" West 39.69 feet; North 70°07'03" West 13.23 feet; North 65°58'15" West 168.10 feet; North 68°53'00" West 35.93 feet; North 71°41'39" West 483.38 feet to the true point of beginning of the boundary of the land herein described; thence continuing along said centerline North 71°41'39" West 87.78 feet; North 80°05'22" West 5.76 feet; thence, leaving said centerline North 9°34'36" East 62.11 feet; thence South 72°05'17" East 105.03 feet; thence South 17°40'43" West 80.63 feet to the true point of beginning.

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ALSO SUBJECT TO an easement for road and public utility purposes, over, under, along, across and through that portion thereof, being partly 50.00 feet in width, and partly 30.00 feet in width; the 30.00 foot wide portion lying 15.00 feet on each side of the following described centerline:

Beginning at the intersection of the Northerly line of Esperanza Road with a line parallel with the Westerly boundary of the Carrillo Ranch property and distant Easterly 15.00 feet therefrom, measured at right angeles, as said Westerly boundary and said Northerly line are shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence North 2°02'20" West along said parallel line to the point distant 430.19 feet North 2°02'20" West, from the intersection of said parallel line with the centerline of the Cajon Canal of the Anaheim Union Water Co., as shown on said map; thence North 85°31'04" East 256.99 feet to the beginning of a tangent curve concave Northwesterly and having a radius of 85.00 feet; thence Northeasterly, along said curve through a central angle of 98°49'59", a distance of 146.62 feet; thence, tangent to said curve, North 13°18'55" West 274.22 feet; thence North 30°27'12" West, 79.84 feet; thence North 20°09'12" West 137.44 feet; thence North 36°15'10" West 136.83 feet; thence North 20°25'27" West 23.76 feet; thence North 3°[illegible]'35" West 31.90 feet; thence North 20°01'15" East 75.43 feet; thence North 9°47'57" East 80.78 feet; thence North 0°20'07" West 70.91 feet; thence North 11°09'03" West 36.82 feet; thence

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North 29°21'09" West 305.95 feet; thence North 26°02'47" West, 43.90 feet to said parallel line; thence North 2°02'20" West, along said parallel line, 744.00 feet to the Northerly terminus of said 30.00 foot wide portion, said Northerly terminus being distant North 87°57'40" East, 15.00 feet from the point on said Westerly line, distant North 2°02'20" West 2489.05 feet from the intersection of said Westerly line with the centerline of said Cajon Canal.

The 50.00 foot wide portion being the Westerly 50.00 feet of that portion of Parcel 1 lying Northerly of the line bearing North 87°57'40" East from the point on said Westerly line distant North 2°02'20" West 2489.05 feet from the intersection of said Westerly line with the centerline of said Cajon Canal.

ALSO SUBJECT TO an easement for road and public utility purposes over, under, along, across and throughd that portion thereof included within a strip of land 30.00 feet in width lying 15.00 feet on each side of the following described centerline:

Beginning at the point on the Westerly line of the Carrillo Ranch property distant North 2°02'20" West 2606.08 feet from the intersection of said Westerly line with the centerline of the Cajon Canal of the Anaheim Union Water Company as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 43°32'54" East 182.30 feet; thence South 23°25'29" East 193.53 feet; thence South 10°07'54" East 184.93 feet; thence South 20°46'04" East 262.31 feet; thence South 46°13'33" East 108.75 feet to the Easterly line of the above described Parcel 1. The sidelines of this easement are extended or shortened to terminate on said Easterly line.

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SUBJECT TO the right of Eutimio Carrillo to use the existing electrical and telephone poles, lines and facilities for telephone and electric line service running over and across said Parcel to Parcel 1 and the property partitioned herein to Eutimio Carrillo, until other similar facilities are made available for such services.

PARCEL 2.

All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Beginning at the point on the Westerly line of the Carrillo Ranch property distant North 2°02'20" West 5363.01 feet from the Northerly line of the Atchison, Topeka and Santa Fe Railway Company's 100.00 foot strip of land as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 87°54'37" East 787.19 feet to the point on the Easterly line of said Carrillo Ranch property distant North 6°40'31.3" West 4579.01 feet from the intersection of said Easterly line with the centerline of the Cajon Canal of the Anaheim Union Water Company, as shown on said map; thence North 6°40'31.3" West, along said Easterly line, 2065.93 feet; thence North 87°54'37" West 619.76 feet to the point on said Westerly line distant North 2°02'20" West 2047.12 feet from the point of beginning; thence South 2°02'20" East, along said Westerly line, 2047.12 feet to the point of beginning.

EXCEPTING THEREFROM a three-fourths (3/4ths) interest in and to all oil and oil rights in, on, and appurtenant to said lands.

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SUBJECT TO an easement for road and public utility purposes over, under, along, across and through the Westerly 50.00 feet thereof.

PARCEL 3:

A one-fourth (1/4th) interest in and to all oil and oil rights in, on, and appurtenant to the following described land:

All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Beginning at the point on the Westerly line of the Carrillo Ranch property distant North 2°02'20" West 3950.98 feet from the Northerly line of the Atchison, Topeka and Santa Fe Railway Company's 100.00 foot strip of land, as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 41°19'19" East 157.87 feet; thence South 42°07'13" East 59.48 feet; thence South 44°07'50" East 99.54 feet; thence South 49°59'14" East 104.47 feet; thence South 56°35'03" East 102.11 feet; thence South 74°14'36" East 45.59 feet; thence North 88°51'06" East 56.38 feet; thence North 87°25'58" East 48.52 feet; thence North 76°34'53" East 59.86 feet; thence North 75°39'36" East 128.13 feet; thence North 76°13'48" East 137.57 feet; thence South 34°06'59" East 42.04 feet; thence South 31°21'37" East 123.92 feet; thence South 73°27'51" East 18.33 feet to the point on the Easterly line of said Carrillo Ranch property distant North 6°40'31.3" West 2750.10 feet from the intersection of said Easterly line with the centerline of the Cajon Canal of the Anaheim Union Water Company, as shown on said map; thence North 6°40'31.3" West, along said Easterly line, 1828.91 feet; thence North 87°54'37" West 787.19 feet to the point on said Westerly line distant North 2°02'20" West 1412.03 feet from the point of beginning; thence South 2°02'20" East 1412.03 feet to the point of beginning.

SUBJECT TO an easement for road and public utility purposes over, under, along, across and through the Westerly 50.00 feet thereof.

PARCEL 4:

A one-fourth (1/4th) interest in and to all oil and oil rights in, on, and appurtenant to the following described land:

All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California, being that portion of the Carrillo Ranch property as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County, lying Northerly of the following described line: beginning at the point on the Easterly line of said Carrillo Ranch property distant North 6°40'31.3" West 6644.94 feet from the intersection of said Easterly line with the centerline of the Cajon Canal of the Anaheim Union Water Company, as shown on said map; thence North 87°54'37" West 619.76 feet to the point on the Westerly line of said Carrillo Ranch property distant North 2°02'20" West 7410.13 feet from the Northerly line of the Atchison, Topeka and Santa Fe Railway Company's 100.00 foot strip of land as shown on said map.

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SUBJECT TO an easement for road and public utility purposes over, under, along, across and through the Westerly 50.00 feet thereof.

PARCEL 5:

A one-third (1/3rd) interest in and to that real property in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Commencing at the point on the Southerly line of the Atchison, Topeka and Santa Fe Railway property distant South 71°04'33" West, 846.10 feet from the intersection of said Southerly line, with the Easterly line of the Carrillo Ranch property as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 4°47'57" East 54.04 feet to the true point of beginning of the boundary of the land herein described; thence South 4°47'57" East 50.00 feet; thence South 85°12'03" West 30.00 feet; thence North 4°47'57" West 50.00 feet; thence North 85°12'03" East 30.00 feet to the true point of beginning. EXCEPTING THEREFROM a 1/4th interest in and to all oil and oil rights in, on and appurtenant to said lands.

PARCEL 6:

An easement for road and public utility purposes over, under, along, across and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Beginning at the point on the Southerly line of the land conveyed to the Atchison, Topeka and Santa Fe Railway Company by deed recorded in Book 173, Page 296 of Deeds, records of said County, distant South 71°04'33" West 846.10 feet from the Easterly line of the Carrillo Ranch property, as said Southerly and Easterly lines are shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 4°47'57" East 54.04 feet; thence South 85°12'03" West 15.00 feet; thence North 4°47'57" West 50.27 feet to said Southerly line; thence North 71°04'33" East, along said Southerly line to the point of beginning.

PARCEL 7:

An easement for water pipeline purposes over, under, along, across and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California, lying 3.00 feet on each side of the following described centerline:

Commencing at the intersection of the Southerly line of the land conveyed to the Atchison, Topeka and Santa Fe Railway Company by deed recorded in Book 173, Page 296 of Deeds, records of said County, with the Easterly line of the Carrillo Ranch property as said Southerly and Easterly lines are shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 71°04'33" West along said Southerly line 846.10 feet; thence South 4°47'57" East 54.04 feet; thence South 85°12'03" West 30.00 feet; thence South 4°47'57" East 2.83 feet to the true point of beginning of the centerline herein described; thence North 9°16'39" West 48.51 feet to the point on said Southerly line distant

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SUBJECT TO an easement for road and public utility purposes over, under, along, across and through the Westerly 50.00 feet thereof.

PARCEL 5:

A one-third (1/3rd) interest in and to that real property in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Commencing at the point on the Southerly line of the Atchison, Topeka and Santa Fe Railway property distant South 71°04'33" West, 848.10 feet from the intersection of said Southerly line, with the Easterly line of the Carrillo Ranch property as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 4°47'57" East 54.04 feet to the true point of beginning of the boundary of the land herein described; thence South 4°47'57" East 50.00 feet; thence South 85°12'03" West 30.00 feet; thence North 4°47'57" West 50.00 feet; thence North 85°12'03" East 30.00 feet to the true point of beginning. EXCEPTING THEREFROM a 1/4th interest in and to all oil and oil rights in, on and appurtenant to said lands.

PARCEL 6:

An easement for road and public utility purposes over, under, along, across and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Beginning at the point on the Southerly line of the land conveyed to the Atchison, Topeka and Santa Fe Railway Company be deed recorded in Book 173, Page 296 of Deeds, records of said County, distant South 71°04'33" West 848.10 feet from the Easterly line of the Carrillo Ranch property, as said Southerly and Easterly lines are shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 4°47'57" East 54.04 feet; thence South 85°12'03" West 15.00 feet; thence North 4°47'57" West 50.27 feet to said Southerly line; thence North 71°04'33" East, along said Southerly line to the point of beginning.

PARCEL 7:

An easement for water pipeline purposes over, under, along, across and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California, lying 3.00 feet on each side of the following described centerline:

Commencing at the intersection of the Southerly line of the land conveyed to the Atchison, Topeka and Santa Fe Railway Company by deed recorded in Book 173, Page 296 of Deeds, records of said County, with the Easterly line of the Carrillo Ranch property as said Southerly and Easterly lines are shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 71°04'33" West along said Southerly line 848.10 feet; thence South 4°47'57" East 54.04 feet; thence South 85°12'03" West 30.00 feet; thence South 4°47'57" East 2.83 feet to the true point of beginning of the centerline herein described; thence North 9°16'39" West 48.51 feet to the point on said Southerly line distant

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South 71°04'33" West 882.94 feet from said intersection. The side lines of this easement are prolonged or shortened to terminate on the lines above described as having bearings of South 85°12'03" West, and South 4°47'57" East from the true point of beginning, and on said Southerly line.

PARCEL 8.

An easement for road and public utility purposes over, under, along, across and through that portion of the westerly 50.00 feet of the Carrillo Ranch property in the Rancho Canon de Santa Ana, County of Orange, State of California, shown on map filed in Book 37, Page 33, Record of Surveys, records of said County lying Northerly of the Northerly boundary of Parcel 1, above described.

EXCEPTING THEREFROM that portion included in Parcel 2, above described.

PARCEL 9.

A 6.00 foot wide easement for water pipeline purposes over, under, along, across and through that portion of the Rancho Canon d Santa Ana, County of Orange, State of California, lying 3.00 feet on each side of the following described centerline:

Beginning at the point on the Northerly line of the Atchison, Topeka and Santa Fe Railway Company property distant North 71°04'33" East 353.00 feet from the Westerly line of the Carrillo Ranch property, as said lines are shown on the map filed in Book 39, Page 33 of Record of Surveys, records of said County; thence North 3°59'16" East 936.76 feet; thence North 14°03'23" East 955.00 feet; thence South 14°03'23" West 6.52 feet; thence North 59°54'37" West 129.99 feet; thence North 54°51'52" West 226.56 feet to the point on the Easterly boundary of the above described Parcel 1, distant North 4°23'04" East, 96.40 feet from the Southerly terminus of that certain course described as having a bearing of North 4°23'04" East and a length of 100.60 feet. The side lines of this easement are prolonged or shortened to terminate on said Easterly boundary.

EXCEPTING THEREFROM that portion included within Parcel 1, above described.

Subject to covenants, conditions, reservations, restrictions, rights, rights of way and easements, if any, of record.
ITEM 1: Domestic water system situate on Parcel 1.

(c) TO EUTIMIO CARRILLO, as his separate property, the following described property:

PARCEL 1.

All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Beginning at the intersection of the centerline of the Cajon Canal of the Anaheim Union Water Company with the Easterly line of the Carrillo Ranch property as shown

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on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence Westerly, along said centerline South 85°44'23" West 8.19 feet; South 88°54'08" West 36.94 feet; North 88°23'08" West 18.90 feet; North 80°35'23" West 39.69 feet; North 70°07'03" West 18.23 feet; North 65°58'15" West 168.10 feet; North 68°53'00" West 35.93 feet; North 71°41'39" West 571.16 feet; North 80°05'22" West 292.26 feet to a line parallel with the Westerly line of said Carrillo Ranch property and distant Easterly 30.00 feet therefrom, measured at right angles; thence North 2°02'20" West, along said parallel line, 418.99 feet; thence North 85°31'04" East 242.62 feet to the beginning of a tangent curve concave Northwesterly and having a radius of 100.00 feet; thence Northeasterly along said curve, through a central angle of 98°49'59" a distance of 172.50 feet; thence, tangent to said curve, North 13°18'55" West 233.41 feet; thence North 40°20'57" East 115.95 feet; thence North 34°40'00" West 78.46 feet; thence North 3°20'43" West 47.26 feet; thence North 4°23'04" East 100.60 feet; thence North 16°22'24" East 100.50 feet; thence North 4°08'39" East 52.69 feet; thence North 57°38'13" East 30.62 feet; thence North 44°14'43" East 53.41 feet; thence North 16°28'17" West 62.45 feet; thence North 43°49'45" West 51.35 feet; thence North 8°34'50" West 62.96 feet; thence North 21°44'22" West 36.37 feet; thence North 38°53'45" West 75.95 feet; thence North 15°33'08" East 96.96 feet; thence North 52°10'47" West 86.52 feet; thence North 11°16'27" West 46.62 feet; thence North 46°47'38" East 90.01 feet; thence North 13°51'10" East 713.11 feet; thence North 75°39'36" East 128.13 feet; thence North 76°13'48" East 137.57 feet; thence South 34°06'59" East 42.04 feet; thence South 31°21'37" East 123.92 feet; thence South 73°27'51" East 18.33 feet to the point on said Easterly line distant North 6°40'31.3" West 2750.10 feet from the point of beginning; thence South 6°40'31.3" East 2750.10 feet to the point of beginning.

EXCEPTING THEREFROM that portion described as follows:

Commencing at the intersection of the centerline of the Cajon Canal of the Anaheim Union Water Company with the Easterly line of the Carrillo Ranch property as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence Westerly along said centerline, South 85°44'23" West 8.19 feet; South 88°54'08" West 36.94 feet; North 88°23'08" West 18.90 feet; North 80°35'23" West 39.69 feet; North 70°07'03" West 18.23 feet; North 65°58'15" West 168.10 feet; North 68°53'00" West 35.93 feet; North 71°41'39" West 483.38 feet to the true point of beginning of the boundary of the land herein described; thence continuing along said centerline, North 71°41'39" West 87.78 feet; North 80°05'22" West 8.76 feet; thence, leaving said centerline, North 9°34'36" East 82.11 feet; thence South 72°05'17" East 108.03 feet; thence South 17°40'43" West 80.63 feet to the true point of beginning.

EXCEPTING THEREFROM a one-fourth (1/4th) interest in and to all oil and oil rights in, on, and appurtenant to said lands.

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SUBJECT TO an easement for water pipeline purposes over, under, along, across and through that portion thereof included within a strip of land 6.00 feet in width, lying 3.00 feet on each side of the following described centerline:

Beginning at the point on the centerline of the Cajon Canal of the Anaheim Union Water Company distant South 80°05'22" East 322.92 feet and South 71°41'39" East 124.56 feet from the intersection of said centerline with the Westerly line of the Carrillo Ranch property, as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence North 3°59'16" East 32.54 feet; thence North 14°03'23" East 948.48 feet; thence North 59°54'37" West 179.99 feet; thence North 54°51'52" West, 226.56 feet to the point on the Westerly boundary of the above described Parcel 1, distant North 4°23'04" East 96.40 feet from the Southerly terminus of that certain course described as having a bearing of North 4°23'04" East, and a length of 100.60 feet. The side lines of this easement are prolonged or shortened to terminate on said Westerly boundary.

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ALSO SUBJECT TO an easement for road and public utility purposes over, under, along, across and through that portion thereof included within a strip of land 30.00 feet in width, described as follows:

Commencing at the intersection of the centerline of the Cajon Canal of the Anaheim Union Water Company with the Easterly line of the Carrillo Ranch property as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence Westerly along said centerline South 85°44'23" West 3.19 feet; South 88°54'08" West 36.94 feet; North 88°23'08" West 11.90 feet; North 80°35'23" West 39.69 feet; North 70°07'03" West 18.23 feet; North 65°58'15" West 168.10 feet; North 68°53'00" West 35.93 feet; North 71°41'39" West 571.16 feet; North 80°05'22" West 8.76 feet to the true point of beginning of the strip of land herein described; thence North 9°34'36" East 30.00 feet to a line parallel with said centerline and distant 30.00 feet Northerly therefrom, measured at right angles; thence North 80°05'22" West, along said parallel line, 289.67 feet to a line parallel with the Westerly line of said Carrillo property, and distant Easterly 30.00 feet therefrom, measured at right angeles; thence South 2°02'20" East, along said parallel line, 30.66 feet to said centerline; thence South 80°05'22" East 283.50 feet to the true point of beginning.

Canal

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PARCEL 2.

All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Beginning at the point on the Westerly line of the Carrillo Ranch property distant North 2°02'20" West 3950.98 feet from the Northerly line of the Atchison, Topeka and Santa Fe Railway Company's 100.00 foot strip of land, as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 41°19'19" East 157.87 feet; thence South 42°07'13" East 59.48 feet; thence South 44°07'50" East 99.54 feet;

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thence South 49°59'14" East 104.47 feet; thence South 56°35'03" East 102.11 feet; thence South 74°14'36" East 45.59 feet; thence North 88°5[illegible]'06" East 56.38 feet; thence North 87°25'58" East 48.52 feet; thence North 76°34'53" East 59.86 feet; thence North 75°39'36" East 128.13 feet; thence North 76°13'48" East 137.57 feet; thence South 34°06'59" East 42.04 feet; thence South 31°21'37" East 123.9[illegible] feet; thence South 73°27'51" East 18.33 feet to the point on the Easterly line of said Carrillo Ranch property distant North 6°40'31.3" West 2750.10 feet from the intersection of said Easterly line with the centerline of the Cajon Canal of the Anaheim Union Water Company, as shown on said map; thence North 6°40'31.3" West, along said Easterly line, 1828.91 feet; thence North 87°54'37" West 787.19 feet to the point on said Westerly line distant North 2°02'20" West 1412.03 feet from the point of beginning; thence South 2°02'20" East 1412.03 feet to the point of beginning.

EXCEPTING THEREFROM a three-fourths (3/4ths) interest in and to all oil and oil rights in, on, and appurtenant to said lands.

SUBJECT TO an easement for road and public utility purposes over, under, along, across and through Westerly 50.00 feet thereof.

PARCEL 3:

A one-fourth (1/4th) interest in and to all oil and oil rights in, on, and appurtenant to the following described land:

All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Beginning at the point on the Westerly line of the Carrillo Ranch property distant North 2°02'20" West 5363.01 feet from the Northerly line of the Atchison, Topeka and Santa Fe Railway Company's 100.00 foot strip of land as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 87°54'37" East [illegible] feet to the point on the Easterly line of said Carrillo Ranch property distant North 6°40'31.3" West 4579.01 feet from the intersection of said Easterly line with the centerline of the Cajon Canal of the Anaheim Union Water Company, as shown on said map; thence North 6°40'31.3" West, along said Easterly line, 2065.93 feet; thence North 87°54'37" West 619.76 feet to the point on said Westerly line distant North 2°02'20" West 2047.12 feet from the point of beginning; thence South 2°02'20" East, along said Westerly line, 2047.12 feet to the point of beginning.

SUBJECT TO an easement for road and public utility purposes over, under, along, across and through the Westerly 50.00 feet thereof.

PARCEL 4:

A one-fourth (1/4th) interest in and to all oil and oil rights in, on, and appurtenant to the following described land:

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All that certain real property in the Rancho Canon de Santa Ana, County of Orange, State of California, being that portion of the Carrillo Ranch property as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County, lying Northerly of the following described line: beginning at the point on the Easterly line of said Carrillo Ranch property distant North 6°40'31.3" West 6644.94 feet from the intersection of said Easterly line with the centerline of the Cajon Canal of the Anaheim Union Water Company, as shown on said map; thence North 87°54'37" West 619.76 feet to the point on the Westerly line of said Carrillo Ranch property distant North 2°02'20" West 7410.13 feet from the Northerly line of the Atchison, Topeka and Santa Fe Railway Company's 100.00 foot strip of land as shown on said map.

SUBJECT TO an easement for road and public utility purposes over, under, along, across and through the Westerly 50.00 feet thereof.

PARCEL 5:

A one-third (1/3rd) interest in and to that real property in the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Commencing at the point on the Southerly line of the Atchison, Topeka and Santa Fe Railway property distant South 71°04'33" West 844.10 feet from the intersection of said Southerly line, with the Easterly line of the Carrillo Ranch property as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 4°47'57" East 54.04 feet to the true point of beginning of the boundary of the land herein described; thence South 4°47'57" West 50.00 feet; thence South 85°12'03" West 30.00 feet; thence North 4°47'57" West 50.00 feet; thence North 85°12'03" East 30.00 feet to the true point of beginning.

EXCEPTING THEREFROM a one-fourth (1/4th) interest in and to all oil and oil rights in, on and appurtenant to said lands.

PARCEL 6.

An easement for water pipeline purposes over, under, along, across and through that portion of the Rancho de Canon de Santa Ana, County of Orange, State of California, lying 3.00 feet on each side of the following described centerline:

Commencing at the intersection of the Southerly line of the land conveyed to the Atchison, Topeka and Santa Fe Railway Company by deed recorded in Book 172, Page 29[illegible] of Deeds, records of said County, with the Easterly line of the Carrillo Ranch property as said Southerly and Easterly lines are shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 71°04'33" West along said Southerly line 844.10 feet; thence South 4°47'57" East 54.04 feet; thence South 85°12'03" West 30.00 feet; thence South 4°47'57" East 2.03 feet to the true point of beginning of the centerline herein described; thence North 9°16'29" West 46.51 feet to the point on said Southerly

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line distant South 71°04'33" West 882.94 feet from said intersection. The side lines of this easement are prolonged or shortened to terminate on the lines above described as having bearings of South 85°12'03" West, and South 4°47'57" East from the true point of beginning and on said Southerly line.

PARCEL 7.

An easement for road and public utility purposes over, under, along, across and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California, described as follows:

Beginning at the point on the Southerly line of the land conveyed to the Atchison, Topeka and Santa Fe Railway Company by deed recorded in Book 173, page 296 of Deeds, records of said County, distant South 71°04'33" West 848.10 feet from the Easterly line of the Carrillo Ranch property, as said Southerly and Easterly lines are shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence South 4°47'57" East 54.04 feet; thence South 85°12'03" West 15.00 feet; thence North 4°47'57" West 50.27 feet to said Southerly line; thence North 71°04'33" East, along said Southerly line to the point of beginning.

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PARCEL 8.

An easement for road and public utility purposes over, under, along, across and through the Westerly 30.00 feet of the Easterly 40.00 feet of that portion of the Carrillo Ranch property in the Rancho Canon de Santa Ana, County of Orange, State of California, lying Southerly of the centerline of the Cajon Canal of the Anaheim Union Water Company and Northerly of the Northerly line of the land of the Atchison, Topeka and Santa Fe Railway Company, as said Carrillo Ranch property is shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County. In the event subdivision development (more than 4 dwellings) is effected in Parcel 1, above described, this easement shall be widened to include the Easterly 60.00 feet of that portion of said Carrillo Ranch property lying Southerly of said centerline of the Cajon Canal, and Northerly of said Northerly line of the Atchison, Topeka and Santa Fe Railway Company land. If and when this widening is accomplished, the existing wind break of eucalyptus trees along the Easterly line of said easement shall not be removed, so long as said Carrillo Ranch property adjoining Westerly is devoted to the raising of citrus crops in commercial amounts.

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PARCEL 9.

A 6.00 foot wide easement for water pipeline purposes over, under, along, across and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California, lying 3.00 feet on each side of the following described centerline:

Beginning at the point on the Northerly line of the Atchison, Topeka and Santa Fe Railway Company property distant North 71°04'33" East 353.00 feet from the Westerly line of the Carrillo Ranch property as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence North 3°59'16" East 904.22 feet to the point on the centerline of the Cajon Canal of the Anaheim Union Water Company as shown on said map distant South 80°05'22" East 322.92 feet and South 71°41'39" East 124.56 feet from the intersection of said centerline with said Westerly line.

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PARCEL 10.

An easement for road and public utility purposes over, under, along, across and through that portion of the

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Rancho Canon de Santa Ana, County of Orange, State of California, being partly 50.00 feet in width and partly 30.00 feet in width; the 30.00 foot wide portion lying 15.00 feet on each side of the following described centerline:

Beginning at the intersection of the Northerly line of Esperanza Road with a line parallel with the Westerly boundary of the Carrillo Ranch property, and distant Easterly 15.00 feet therefrom, measured at right angeles, as said Westerly boundary and said Northerly line are shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County; thence North 2°02'20" West, along said parallel line to the point distant 430.19 feet North 2°02'20" West from the intersection of said parallel line with the centerline of Cajon Canal of the Anaheim Union Water Company, as shown on said map; thence North 85°31'04" East, 256.99 feet to the beginning of a tangent curve concave Northwesterly and having a radius of 85.00 feet; thence Northeasterly, along said curve, through a central angle of 98°49'59", a distance of 146.62 feet; thence, tangent to said curve, North 13°18'55" West 274.22 feet; thence North 30°27'12" West, 79.88 feet; thence North 20°09'12" West 137.44 feet; thence North 36°15'10" West 136.83 feet; thence North 20°25'27" West 23.76 feet; thence North 3°09'35" West 31.90 feet; thence North 20°01'15" East 75.43 feet; thence North 9°47'57" East 80.78 feet; thence North 0°20'07" West 70.91 feet; thence North 11°09'03" West 36.82 feet; thence North 29°21'09" West 305.95 feet; thence North 26°02'47" West 43.90 feet to said parallel line; thence North 2°02'20" West, along said parallel line, 744.00 feet to the Northerly terminus of said 30.00 foot wide portion; said Northerly terminus being distant North 87°57'40" East 15.00 feet from the point on said Westerly line distant North 2°02'20" West 2489.05 feet from the intersection of said Westerly line with the centerline of said Cajon Canal.

The 50.00 foot wide portion being the Westerly 50.00 feet of that portion of said Carrillo Ranch property lying Northerly of the line bearing North 87°57'40" East from the point on said Westerly line distant North 2°02'20" West 2489.05 feet from the intersection of said Westerly line with the centerline of said Cajon Canal.

EXCEPTING THEREFROM that portion included within Parcel 1 above described.

PARCEL 11.

An easement for road and public utility purposes over, under, along, across and through that portion of the Rancho Canon de Santa Ana, County of Orange, State of California, included within a strip of land 30.00 feet in width, lying 15.00 feet on each side of the following described centerline:

Beginning at the point on the Westerly line of the Carrillo Ranch property distant North 2°02'20" West 2606.08 feet from the intersection of said Westerly line with the centerline of the Cajon Canal of the Anaheim Union Water Company as shown on the map filed in Book 37, Page 33 of Record of Surveys, records of said County;

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thence South 43°32'54" East 182.30 feet; thence South 23°25'29" East 193.53 feet; thence South 10°07'54" East 184.93 feet; thence South 20°46'04" East 262.31 feet; thence South 46°13'33" East 108.75 feet to the Westerly line of the above described Parcel 1.

EXCEPTING THEREFROM that portion lying within the Westerly 50.00 feet of said Carrillo Ranch property. The side lines of this easement are extended or shortened to terminate on said Westerly line.

PARCEL 12.

The right to farm that portion of Parcel 10, above described, lying Westerly of that certain course in the boundary of Parcel 1 described as having a bearing of North 2°02'20" West, and a length of 418.99 feet, until such time as said portion of Parcel 10 is used for road and/or public utility purposes.

PARCEL 13.

The right to use the existing electrical and telephone poles, lines and facilities for telephone and electric line service running over and across Parcel 1 of the property partitioned herein to Ellen Reeves from Esperanza Road to Parcel 1 hereinbefore described, until other similar facilities are made available for such services.

PARCEL 14.

The right to use the existing driveway running from Esperanza Road over Parcel 1 of the property partitioned to Ellen Reeves herein, to Parcel 1, above described, until September 30, 1958, on which date this right shall cease.

2. That each of the parties be forthwith let into possession of the distinct parcel herein allocated to her or him.

3. That plaintiffs, Esperanza Carrillo and Ellen Reeves, and defendant, Eutimio Carrillo, shall have the right to water for domestic purposes produced from the well site, owned in common by the owner-parties hereto of the land involved in these proceedings continuously, and to all of the irrigation water produced by said well site during the following periods, and at no other time, to wit: Esperanza Carrillo, the first ten (10) days of each calendar month; Ellen Reeves, the second ten (10) days of each calendar month; and Eutimio Carrillo for the remaining days of each calendar month.

4. That the Court costs, Referees' fees and expenses, and attorneys' fees incurred herein for the common benefit of the plaintiffs and defendant, be, and the same is hereby, fixed as follows:

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COURT COSTS:

4/6/55	- County Clerk, Filing Petition	$	9.00
12/12/55	- Orange County Title - Reports		25.00
1/20/56	- Orange County Title - Deeds, etc.		285.90
11/23/56	- County Clerk, San Bernardino, certified copy decree re minerals rights		2.50
	Total	$	322.40

The above court costs have been prepaid by the parties equally.

REFEREES' FEES:

John C. Wallace	$ 1862.50		
Aerial Map	17.51	$	1,880.01
Stanley Goode, Sr.			1,912.50
George H. Jones			1,912.50
Robert D. Schafer			1,520.00
Stephen W. Bradford, Surveyor's charges and disbursements	$ 13,087.18		
Paid on account by parties equally	5,530.32		7,556.86

ATTORNEYS' FEES:

Webb & Lae, Plaintiffs' attorneys			10,000.00
Stephen F. Gallagher, Defendant's attorney			7,500.00
		$	32,281.87

5. That the above costs, fees and expenses be paid by the parties hereto within thirty (30) days as follows:

ESPERANZA CARRILLO, one of the plaintiffs, the following sums to the following persons:

John C. Wallace, Referee	$	626.67
Stanley Goode, Sr., Referee		637.50
George H. Jones, Referee		637.50
Robert D. Schafer, Referee		506.67
Stephen W. Bradford, Surveyor		2,518.95
Webb & Lae, Plaintiffs' Attorneys		5,000.00
Stephen F. Gallagher, Defendant's Attorney		833.33
Total	$	10,760.62

ELLEN REEVES, one of the plaintiffs, the following sums to the following persons:

John C. Wallace, Referee	$	626.67
Stanley Goode, Sr., Referee		637.50
George H. Jones, Referee		637.50

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Robert D. Schafer, Referee	$ 506.67
Stephen W. Bradford, Surveyor	2,512.95
Webb & Lee, Plaintiffs' Attorneys	5,000.00
Stephen F. Gallagher, Defendant's Attorney	823.23
Total	$ 10,760.62

EUTIMIO CARRILLO, defendant, the following sums to the following persons:

John C. Wallace, Referee	$ 626.67
Stanley Goode, Sr., Referee	637.50
George H. Jones, Referee	637.50
Robert D. Schafer, Referee	506.66
Stephen W. Bradford, Surveyor	2,513.96
Stephen F. Gallagher, Defendant's Attorney	5,823.24
Total	$ 10,760.63

6. That the report of the referee to take an accounting of the affairs of the partnership filed herein on December 3, 1957, be, and the same is, hereby approved as rendered.

7. That the assets of said co-partnership, (excepting land and the improvements thereon herein partitioned, and excepting miscellaneous equipment and tools), with the values hereby fixed and set opposite each item, are described as follows:

Corporation Cash in Bank	$ 264.11
Partnership Cash in Bank	3,677.41
Revolving Funds withheld by Yorba Orange Growers Association	12,060.21
Equipment owned by partnership	840.00
Total	$ 17,041.73

that the interest of plaintiff Esperanza Carrillo is a one-third (1/3rd) part thereof, the interest of plaintiffs Ellen Reeves and Norman Reeves is a one-third (1/3rd) part thereof, and the interest of defendant Eutimio Carrillo is a one-third (1/3rd) part thereof, except to equalize capital accounts of each, there shall be paid to plaintiffs Norman and Ellen Reeves $352.35, and to Esperanza Carrillo $1,392.13 out of partnership funds.

8. That the equipment hereinafter described, belonging to said co-partnership, be, and the same is hereby, set over to

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defendant, Eutimio Carrillo, upon said defendant paying to plaintiff, Esperanza Carrillo $2g0.00 and to plaintiffs, Norman Reeves and Ellen Reeves, $2g0.00, within ten (10) days after date this judgment becomes final. In the event defendant, Eutimio Carrillo fails to exercise his right to acquire said co-partnership equipment, as hereinbefore provided, then plaintiff, Esperanza Carrillo, shall be entitled to said equipment belonging to said co-partnership by paying to defendant, Eutimio Carrillo the sum of $2g0.00, and to plaintiffs Norman and Ellen Reeves, the sum of $2g0.00, on or before ten (10) days after defendant Eutimio Carrillo's right to buy or acquire the same has expired. In the event that neither defendant Eutimio Carrillo, nor plaintiff Esperanza Carrillo, exercises his or her right to acquire said co-partnership equipment, as hereinbefore provided, then plaintiffs Norman and Ellen Reeves shall be entitled to said equipment belonging to said co-partnership by paying to defendant, Eutimio Carrillo, the sum of $2g0.00, and to plaintiff, Esperanza Carrillo, the sum of $2g0.00, on or before ten (10) days after plaintiff Esperanza Carrillo's right to buy or acquire the same has expired.

9. That in the event neither plaintiffs nor defendant acquire the equipment of said co-partnership as herein provided, then, upon motion of any party, an order will be made appointing a receiver to sell said equipment of said co-partnership, and to equally divide the proceeds between plaintiffs and defendant.

10. That the equipment of said co-partnership herein referred to is described as follows:

1 - Cat Tractor	400.00
1 - 1948 Pickup Truck	150.00
1 - Disc	25.00
1 - Burrower	15.00
1 - Diesel Fuel Tank, 550 gallons	50.00
1 - Pump - Diesel Fuel Tank	5.00
1 - Gasoline Fuel Tank Pump	5.00
2 - 50 gallon drums - empty	10.00
1 - Galvanized tank -haul water to small trees	5.00
1 - Gasoline Fuel tank - buried	0.00
1 - Orchard Trailer	50.00
1 - Terracer with Blade	100.00
Junked Farming Implements	25.00
Total	$ 840.00

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That the small lot of miscellanous hand tools and small equipment owned by said co-partnership be, and the same is hereby, divided between the parties hereto as follows:

ESPERANZA CARRILLO, a one-third (1/3rd) part thereof;

ELLEN and NORMAN REEVES, a one-third (1/3rd) part thereof;

EUTIMIO CARRILLO, a one-third (1/3rd) part thereof,

the physical division to be made by mutual agreement of said parties. In the event they are unable to agree as to such division, then on motion of any of said parties an order will be made appointing a receiver to sell said small lot of miscellaneous hand tools and small equipment of said co-partnership, and to equally divide the proceeds thereof between the parties in accordance with their interest as set out above.

Done in Open Court this 26 day of May, 1958.

John S. Leo
Judge of said Superior Court.

APPROVED AS TO FORM;

Stephen F. Gallagher
Stephen F. Gallagher, Attorney for defendant, Eutimio Carrillo

THE FOREGOING INSTRUMENT IS CORRECT COPY OF THE ORIGINAL ON FILE IN THIS OFFICE.
ATTEST May 26 1958
L. S. WALLACE
County Clerk and ex-officio Clerk of the Superior Court of the State of California in and for the County of Orange.
BY John C. R. Ewis DEPUTY

RECORDED AT REQUEST OF
Webb & Lee Atty
BOOK 4297 PAGE 93
MAY 26 1958
AT 24 MIN. PAST 9 A.M.
OFFICIAL RECORDS OF
ORANGE COUNTY CALIFORNIA
Ruby McFarland
COUNTY RECORDER
$19.60

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VERIFICATION

STATE OF CALIFORNIA, COUNTY OF Orange

I have read the foregoing Verified Complaint for Quiet Title-Express Easement; Quiet Title-Easement by Implication; Quiet Title-Easement by Necessity; Injunctive Relief; Declaratory Relief and know its contents.

[ ] **CHECK APPLICABLE PARAGRAPHS**

[ ] I am a party to this action. The matters stated in the foregoing document are true of my own knowledge except as to those matters which are stated on information and belief, and as to those matters I believe them to be true.

[x] I am [ ] an Officer [ ] a partner _____ [x] a Manager _____ of Wedge Partners LLC, the Manager of Yorba Linda Estates LLC _____, a party to this action, and am authorized to make this verification for and on its behalf, and I make this verification for that reason. [x] I am informed and believe and on that ground allege that the matters stated in the foregoing document are true. [ ] The matters stated in the foregoing document are true of my own knowledge, except as to those matters which are stated on information and belief, and as to those matters I believe them to be true.

[ ] I am one of the attorneys for _____, a party to this action. Such party is absent from the county of aforesaid where such attorneys have their offices, and I make this verification for and on behalf of that party for that reason. I am informed and believe and on that ground allege that the matters stated in the foregoing document are true.

Executed on May 9th, 2013, at Irvine, California.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Douglas G. Wymore
Type or Print Name

Signature

PROOF OF SERVICE

1013a (3) CCP Revised 5/1/88

STATE OF CALIFORNIA, COUNTY OF

I am employed in the county of _____, State of California.

I am over the age of 18 and not a party to the within action; my business address is: _____

On, _____ I served the foregoing document described as _____

_____ on _____ in this action

[ ] by placing the true copies thereof enclosed in sealed envelopes addressed as stated on the attached mailing list:

[ ] by placing [ ] the original [ ] a true copy thereof enclosed in sealed envelopes addressed as follows:

[ ] **BY MAIL**

[ ] *I deposited such envelope in the mail at _____, California. The envelope was mailed with postage thereon fully prepaid.

[ ] As follows: I am "readily familiar" with the firm's practice of collection and processing correspondence for mailing. Under that practice it would be deposited with U.S. postal service on that same day with postage thereon fully prepaid at _____ California in the ordinary course of business. I am aware that on motion of the party served, service is presumed invalid if postal cancellation date or postage meter date is more than one day after date of deposit for mailing in affidavit.

Executed on _____, at _____, California.

[ ] **(BY PERSONAL SERVICE) I delivered such envelope by hand to the offices of the addressee.

Executed on _____, at _____, California.

[ ] (State) I declare under penalty of perjury under the laws of the State of California that the above is true and correct.

[ ] (Federal) I declare that I am employed in the office of a member of the bar of this court at whose direction the service was made.

Type or Print Name

Signature

*(BY MAIL SIGNATURE MUST BE OF PERSON DEPOSITING ENVELOPE IN MAIL SLOT, BOX, OR BAG)

**(FOR PERSONAL SERVICE SIGNATURE MUST BE THAT OF MESSENGER)

Letter: POHH-Nelson5

PROTECT OUR HOMES AND HILLS
YORBA LINDA

January 19, 2014

Orange County Planning
Attn: Mr. Ron Tippets
300 North Flower
Santa Ana, CA 92702-4048

Re: Cielo Vista Project – Draft Environmental Impact Report, EIR No. 615
Section 4.2 AIR QUALITY

Dear Mr. Tippets:

The following comments are provided in regard to the Cielo Vista Draft Environmental Report under Section 4.2 Air Quality.

"3. Cumulative Impacts. The Project combined with cumulative development in the area may result in cumulative air quality impacts. However, project-by-project analysis of air quality impacts and compliance with applicable regulatory requirements would ensure that potentially significant cumulative impacts regarding air quality impacts are reduced to a less than significant level." (emphasis added)

The above comment is quoted from page 4.2-32 of the Air Quality section of the Cielo Draft Environmental Impact Report regarding **cumulative impacts** of this and adjacent development. As in other sections of the Cielo DEIR, cumulative impacts are given inadequate, incomplete and insignificant attention throughout the document and Air Quality is no exception.

The DEIR for Cielo Vista just ignores other development, stating there is no significant cumulative impact when dealing with their own project. This is not a proper CEQA analysis.

I would like, at this point, digress a bit, to the late 1980's, with a factual analysis of the impact on air quality of hillside development that requires an inordinate amount of earth to be bulldozed and graded for months and even years before the "dust settles."

We bought our home and moved to 4790 Via De La Roca, in November 1985. At that time, Via Del Aqua stubbed out at a dead-end just past our street, Via De La Roca. The dead-end was actually overlooking a small canyon beyond…where Cielo Vista now

wants to build and is precisely where Street A (primary entrance) would be located. About three years after we moved in, bulldozers started to cut Stonehaven up from Yorba Linda Boulevard through the hills to our northwest. The real estate market started to heat up with lotteries the common scene for anxious buyers. To our amazement the extreme amount of dirt that was cut from Stonehaven soon found its place….it was dumped to the northwest of Heatherridge. So at that time, for months, we watched as the dozers continued to bring thousands of cubic yards of dirt over to our side of the ridge and to our amazement, Stonehaven was eventually tied in to Via Del Aqua. That was certainly not what we were shown when we purchased our Brock Estates home as to potential development behind our home. Devonport, Stirlingbridge, and Blue Mountain all were fabricated by the fill from cutting Stonehaven. We were amazed and disappointed because we had been told when we purchased our home that Via Del Aqua would continue into the Blue Mud area for large, one acre equestrian estates at some time in the future. And then it started….

My daughter, 8 years old at the time, began having severe coughing events whenever she caught even a mild cold. She coughed so much that she could literally be sleeping and still violently cough. It took months of going back and forth to the doctor. Finally a diagnosis was provided….the doctor told us that she had ENVIRONMENTAL ASTHMA caused by the release of spores from all the earth that was being bulldozed by the cut and fill of Stonehaven. She eventually had to have sinus surgery a couple years later. To this day, now in her early 30's, she continues to have extreme, prolonged coughing spells whenever she has a cold or is exposed to air pollutants.

So here we are with these proposed developments by developers who would claim that there will be no import or export of soil in the grading of the property. Projects, however, will require over two years' worth of grading activity and on land that, this time, has known carcinogens from oil production and which has the potential to release methane. Cielo Vista and the adjacent proposed development of Esperanza Hills will need to move hundreds of thousands cubic yards of dirt, primarily to skirt around known hazards including the Whittier Fault and landslide areas, as well as a topography of deep canyons and oil field operations (both active and capped).

A visual survey of the land as it now exists would certainly cause any normal person to believe the land is undevelopable. But to a developer, with enough capital, and enough bulldozers, a lot of money could be made. No matter that the full development could take a minimum of two years of cutting, filling and grading activity, but the full completion of the area could take upwards of SEVEN years to complete (taken from the DEIR of Esperanza Hills….but then the **cumulative** impacts are supposed to be addressed are they not?).

Existing residents, many original owners, who have lived here since 1985, some twenty-eight years, are now expected to be exposed and put in harm's way by massive

grading operations resulting in endless phases of development and construction lasting for nearly one-third of the time they have resided in their homes. Many of the original homeowners are now retired, and some have developed health issues of their own in their senior years. Should they now be forced to shutter their windows, stay inside, "shelter-in-place" not because of fire, but because of the prolonged exposure to dust and dirt? Developers who wish to bulldoze this amount of land that will take years to complete should be required to compensate adjacent homeowners who will incur a huge expense by running their air conditioners 24/7. Will that mitigation be provided to residents of Yorba Linda who prefer fresh country air?

Can adjacent homeowners be assured that there will not be the exporting of contaminated dirt? What studies have been done to ensure that this won't occur? Can this be known before the property is torn up and earth spores exposed? What protection will residents of property abutting the land be provided if environmental hazards are exposed and released into the air during upset of the land?

Cielo Vista's DEIR is very clear under the GEOLOGY section that necessary coring and sampling of soil in its geologist's reports has not been accomplished and remains to be done. All developer assertions made are sheer speculation that there will not be significant negative impacts on existing residents or that Air Quality will not be adversely impacted by the development of this property. Note that the DEIR for Esperanza Hills states that Greenhouse Gases is one negative impact that cannot be mitigation to a level less than significant. Yet Cielo Vista's DEIR is silent.

The County of Orange should demand that the developer do the necessary due diligence required now versus gaining entitlement and thereafter no doubt sell off the property to a builder. Per the County of Orange General Plan, this property suffers from *environmental constraints* and while not precluding development, development may require additional expense of mitigation from the impacts of the project which needs to be paid for by the developer

Very truly yours,

Marlene Nelson, Member & Resident
Leadership Team
Protect our Homes and Hills
4790 Via De La Roca
Yorba Linda, CA 92887

Cc: Kevin Johnson, Esq.

Letter: POHH-Nelson6

Marlene Nelson
4790 Via De La Roca
Yorba Linda, CA 92887

November 19, 2013

Via E-Mail

Orange County Planning
Attn: Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:

I am writing to request an extension of the public comment period for the subject draft EIR. There are complex legal and technical issues surrounding the Cielo Vista Project and the County's Draft EIR. Almost concurrently, the County is also in process of releasing the proposed Esperanza Hills Project on adjacent parcels directly east of the proposed Cielo Vista site. Because the Esperanza Hills development is a consequence of the Cielo Vista Project and both projects will share access easements and utilities connections, the two projects should be evaluated together. The near simultaneous release of these projects expands and complicates the scope of issues raised by the Cielo Vista Draft EIR.

A six-week comment period is blatantly insufficient for a thorough review by the public that CEQA proscribes. The current response period is just 15 days longer than the NOP comment period despite the fact that the draft EIR contains hundreds more pages, exhibits, and data to review. In addition, the public comment period runs through and closes within the winter holiday season, which precludes the public from making an effective response on the Cielo Vista Draft EIR. If not extended, the current comment period would result in minimal public response and participation. As the lead agency in this development process, at the doorstep of the City of Yorba Linda, the County should advocate for achieving

maximum public participation in the important environmental review phase of both this and the Esperanza Hills Draft EIR process.

In view of both the complexity of technical data to be reviewed and the burden to the public to review such voluminous data during the holiday season, I respectfully request that the County lengthen the public comment period by 30 days which would extend responses to January 22, 2014. Thank you in advance for your approval of this request.

Very truly yours,

/s/ *Marlene Nelson*

Marlene Nelson

Cc: The Honorable Todd Spitzer, Supervisor
Third District, County of Orange
10 Civic Center Plaza
Santa Ana, CA 92701

Emailed to: Ron.Tippets@ocpw.ocgov.com
Todd.Spitzer@ocgov.com

Letter:POHH-Pailma

Christopher and Jaime Pailma
4710 Blue Mountain Drive
Yorba Linda, CA 92887

November 12, 2013

Via E-Mail and U.S. Mail

Orange County Planning
Attn: Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

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Very truly yours,

Christopher and Jaime Pailma, Member
Protect Our Homes and Hills
Yorba Linda

Cc: The Honorable Todd Spitzer, Supervisor
Third District, County of Orange
10 Civic Center Plaza
Santa Ana, CA 92701

Emailed to: Ron.Tippets@ocpw.ocgov.com
Todd.Spitzer@ocgov.com

Letter: POHH-Pizzati

Mr. & Mrs. S. Pizzati
4901 Orlando Dr.
Yorba Linda, CA 92886

November 12, 2013

Via E-Mail and U.S. Mail

Orange County Planning
Attn: Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

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Very truly yours,

Sal and Linda Pizzati

Sal & Linda Pizzati, Member
Protect Our Homes and Hills
Yorba Linda

Cc: The Honorable Todd Spitzer, Supervisor
Third District, County of Orange
10 Civic Center Plaza
Santa Ana, CA 92701

Emailed to: Ron.Tippets@ocpw.ocgov.com
Todd.Spitzer@ocgov.com

Letter: POHH-Prina

Dennis Prina
4620 San Antonio Rd.
Yorba Linda, CA 92886

November 13, 2013

Via E-Mail and U.S. Mail

Orange County Planning
Attn: Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:

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In view of both the complexity of technical data to be reviewed and the burden to the public to review such voluminous data during the holiday season, I respectfully request that the County lengthen the public comment period by 30 days which would extend responses to January 22, 2014. Thank you in advance for your approval of this request.

Very truly yours,

Dennis Prina
Protect Our Homes and Hills
Yorba Linda

Cc: The Honorable Todd Spitzer, Supervisor
Third District, County of Orange
10 Civic Center Plaza
Santa Ana, CA 92701

Emailed to: Ron.Tippets@ocpw.ocgov.com
Todd.Spitzer@ocgov.com

Geotechnical Exploration, Inc.

SOIL AND FOUNDATION ENGINEERING ● GROUNDWATER ● ENGINEERING GEOLOGY

22 January 2014

Orange County Planning Commission
300 North Flower
Santa Ana, CA 92702-4048
Attn: Mr. Ron Tippets

Job No. 14-10450

Subject: **Review of Geotechnical and Geologic Concerns**
Draft Environmental Impact Report
Cielo Vista Project EIR No. 615
Yorba Linda, California

Dear Mr. Tippets:

In accordance with the request of Protect Our Homes and Hills represented by KEVIN K. JOHNSON, APLC, ***Geotechnical Exploration, Inc***. herein provides commentary on the subject draft EIR based upon our review of the reported geotechnical and geologic conditions.

We are a full-service soil engineering firm located in the City of San Diego, established in 1976, with staff possessing the appropriate registrations and certifications in civil engineering, geotechnical engineering, geology and engineering geology. The personnel at ***Geotechnical Exploration, Inc.*** have background experience in soil mechanics, feasibility and design, environmental planning, hazard evaluation, quality control, field supervision and inspection, material testing, and management consultation. This experience has been applied to geotechnical and geologic investigations for residential subdivisions, multi-story commercial complexes, light residential foundations and deep caisson design, street and septic system design, hazard mitigation and litigation, dams, slope stability and settlement analyses. Our work includes predevelopment exploration and grading observation and testing services, hydrogeologic water resource and hazardous

7420 TRADE STREET ● SAN DIEGO, CA. 92121 ● (858) 549-7222 ● FAX: (858) 549-1604 ● EMAIL: geotech@gei-sd.com

materials studies, forensic investigations and expert testimony, and geotechnical services related to post damage reconstruction.

We have explored and investigated active California faults and landslides in San Diego County, Orange County, Los Angeles County and northwestern Mexico for the purposes of project development, mitigation and repair. Our experience includes evaluation of reported residential damage to homes following earthquakes that occurred on the Newport-Inglewood and Whittier Fault zones.

Our Scope of Work was limited to review of the referenced DEIR and preparation of this letter with our comments. We have not performed a site investigation or reconnaissance of the site.

BACKGROUND DOCUMENTS

We have reviewed the Draft Environmental Impact Report (DEIR) No. 615 for the planned Cielo Vista project. This document was prepared by PCR Services Corporation and is dated November 2013. The DEIR included the following sections pertinent to the discussion of site geologic and geotechnical conditions:

1. Executive Summary, pages ES-3, ES-21 through ES-23;
2. 2.0 Project Description;
3. 4.5 Geology and Soils;
4. Appendix E Geology Study including:
    a. "Geologic and Geotechnical Evaluation In support of Due Diligence Evaluation "Travis" Property; City of Yorba Linda, County of Orange, California" dated June 8, 2006, prepared by Pacific Soils Engineering, Inc. work order 500674.

b. "Geotechnical Feasibility Study, Proposed Development of Tentative Tract Map No. 17341, County of Orange, California" dated March 1, 2013, prepared by LGC Geotechnical, Inc.; Project No. 10106-01.

Our description of site conditions as provided herein is based solely on review of these pertinent project and geologic/geotechnical references. Our opinions are based on this review and our experience as an active geotechnical consultant in southern California.

PROJECT AND SITE DESCRIPTION

We understand the planned Cielo Vista project includes development of an 84 acre tract located in unincorporated Orange County adjacent to the City of Yorba Linda. The project applicant plans for a maximum of 112 single-family dwellings to be constructed on 47.7 acres in 2 Planning Areas. The remaining 36.3 acres would be preserved as open space. The site is currently primarily vacant land with some operational and abandoned oil wells and appurtenant dirt access roads and trails.

Residential communities exist along the north, south and west sides of the property. The 469-acre undeveloped Esperanza Hills parcel exists to the east. The site and adjacent undeveloped properties are within an area commonly referred to as the Murdock Properties. Chino Hills State Park exists to the north and east of this undeveloped area of Orange County.

The L-shaped site is characterized by moderate to steeply sloping hillsides with over 300 feet of relief, from lower elevations in the south (565 feet above Mean Sea Level, MSL) to 885 feet above MSL in the north. Three relatively deeply incised southerly and westerly draining canyons cross the site. Native vegetation

supporting natural habitats exists across most of the site except where oil operations and associated facilities exist.

REGIONAL AND LOCAL GEOLOGIC SETTINGS

The site is located in the Puente Hills which are the foothills of the northwestern portion of the Santa Ana Mountains. These form the eastern boundary of the Los Angeles Basin within the Peninsular Ranges Geomorphic Province within California, characterized by northwest trending mountain ranges, intervening valleys and multiple sub-parallel fault systems. The faults in this province are typically right-lateral strike slip faults. Several large active faults exist in the region of the site including the San Joaquin Hills Thrust Fault, Newport-Inglewood Fault, San Andreas Fault and Whittier-Elsinore Fault.

The Tertiary-age Puente Formation forms the site bedrock materials. This Miocene unit consists of thin to massively bedded sandstone, siltstone and shale with minor overlying topsoil and colluvium. Older alluvial materials and abandoned stream terrace deposits are also present on upper portions of the site. Younger alluvium exists within canyon bottoms.

The bedrock materials within the Puente Formation are highly folded due to regional faulting and proximity to the Whittier Fault, with multiple east-west trending synclines and anticlines. Beds dip steeply to both the north and south and include thin weak planes along and across the bedding subject to localized instability. Several large-scale potentially hazardous landslide areas have been indentified on the northwestern portion of the project site. The hazard represented by these landslides has not been evaluated. This hazard could modify or preclude the current planned development on the northwestern portion of the project.

The Whittier Fault forms the dominant structural feature on the site. It crosses the central portion of the site from northwest to southeast and is approximately 1,660 feet long on the site. This fault is considered active by the State of California per the Alquist-Priolo Act of 1972 and is identified as a 1000-foot-wide Fault Rupture Hazard Zone on the fault-rupture hazard zone map. The hazard zone map uses the base USGS Yorba Linda 7.5′ quadrangle. The surface trace of the fault has not been identified within this zone on the map and is dashed to indicate only an approximate location. The Alquist-Priolo Act requires that active fault locations be identified such that habitable structures are not located across the surface fault trace.

GEOLOGIC HAZARDS

Federal, State of California, County of Orange and City of Yorba Linda regulations control the development of the project including the geotechnical and geologic aspects of site development. The geotechnical and geologic consultants for the project have identified several hazards on the site that will require avoidance or mitigation. The degree of project redesign and loss of planned lots resulting from the avoidance or mitigation of these hazards and their impacts cannot be determined until site conditions are investigated and fully addressed. Due to the presence of hazards associated with the Whittier Fault Zone (WFZ) the site is considered a high risk site, which will most likely require significant redesign. The hazards include:

- Significant ground shaking from potential seismic events on the Whittier Fault on site, up to magnitude M_w7.2, and other large active southern California faults;

- Ground surface rupture due to a seismic event on the Whittier Fault on site;
- Ground failure as the result of localized liquefaction on the southern portion of the site during a seismic event on the Whittier Fault on site or other active southern California faults;
- Landsliding/slope instability due to the presence of an ancient landslide complex on the northern portion of the site and in several mapped potential earthquake-induced landslide areas;
- Expansive soils requiring special grading and/or design of proposed foundations, floors and pavements, etc.

The most significant geologic hazards are associated with potential earthquakes on the Whittier Fault on the site. The location of the surface trace and associated additional traces within the 1,000-foot wide Whittier Fault Zone (which may restrict buildable areas) has not yet been determined. State of California Public Resources Code Section 2621 requires this determination prior to project approval and issuance of grading permits by cities and counties.

DISCUSSION

Neither of the geologic/geotechnical consultant reports referenced here provides the subsurface fault investigation to determine the actual (not approximate) location of the Whittier Fault on the planned Cielo Vista project site as required by PRC Section 2621 prior to project approval and permitting by a city and/or county. The fault surface trace is depicted in these reports as being generally along the center of the 1,000-foot-wide zone as approximately shown on the official State of

California Fault Rupture Hazards Zone map. The approach to investigating the site for faulting requires that exploratory trenches and ancillary borings be excavated generally perpendicular to the trend of the faulting such the ground surface fault trace(s) can be identified both within the zone and adjacent to the zone (per current state-of-the-art practice). Trenches of the type required to explore the Whittier Fault Zone could be up to 20 feet or more deep and several hundred feet long. Multiple trenches will be required to fully evaluate the 1,000-foot wide zone. Spoils removed from the trenches would have to be properly stockpiled. Field operations could span months.

The Alquist-Priolo Act requires that habitable structures not be located astride or over these offsets. Therefore, the investigations required to accurately locate the faults have to be performed before project approval, issuance of grading permits and development. Setbacks from the fault trace(s) would also be required. Both geotechnical/geologic consultant reports recommend further investigation of the fault.

The locations of these surface fault traces are significant with respect to the location of the planned project residential structures and appurtenant improvements. A Geologic Map of the site is provided in the referenced LGC Geotechnical, Inc. report. It provides an overlay of the planned project configuration within (and adjacent to) the mapped Whittier Fault Zone (WFZ). Based on review of this project overlay, 56 planned residential lots are within the WFZ. Additionally, 10 planned lots are within 100 to 200 feet of the WFZ. These 66 lots represent 59 percent of the planned project. Should active faulting be discovered beneath the location of planned lots significant re-siting of these lots, associated project utilities and roads would be required to comply with the Alquist-Priolo requirements.

In effect, any approval of a housing site plan before these geologic investigations are completed could be subject to major revisions and possible significant down-sizing of the project as currently planned.

In addition to the hazards associated with the WFZ, the planned project site has ancient landslide features and steep slopes that pose potential hazards to the planned residential lots. These features have not been investigated. A landslide complex is mapped above and abutting the eastern side of Planning Area 2 (PA2). All 17 planned residential units within PA2 could be affected by this hazard. Additionally, steep slopes with adverse geologic bedding may pose significant potential slope failure hazards. All potential landslide, steep slope and adverse geologic bedding hazards require thorough subsurface investigation before project approval.

The normal approach to investigating these features would be to drill large-diameter borings that would allow downhole inspection and logging by the project geologists of the ancient landslide features and bedding within steep slope areas. The borings, advanced by large truck-mounted or track-mounted drill rigs, would be 2½ to 3 feet in diameter and up to 150 feet deep. Spoils excavated from the borings would have to be stockpiled and the borings appropriately sealed after backfilling.

Following subsurface investigation and soil strength testing cross sections through the hillsides and landslide features and slope stability/engineering analyses would be performed to assess the stability of these features both in the short term and long term. Planned project development would likely include stabilization of potential landsliding hazards, either by buttress grading or excavation, etc. of unstable features. Setbacks from the hazards would likley be required. Depending

on the details of the field investigation findings, significant re-siting or redesign of planned project lots, streets, utilities, etc. would likely be required. Both referenced geotechnical consultant reports recommend further investigation of these features.

The subsurface investigations to address both the WFZ and landsliding/steep slope hazards require the mobilization of exploratory equipment across the site. Large exploratory trenches will have to be excavated by four-wheel drive or track-mounted excavators in all planned project areas. We understand from review of available photographs that similar fault trenching studies were performed on the adjacent Esperanza site.

Trenches will have to be open for the time required for detailed logging by project geologists and therefore commonly require shoring. Multiple overlapping or long trenches may be required. Access to certain site areas may have to be created by temporary road building. The large-diameter borings will require that drill rigs access higher landslide and slope areas such that the exploratory borings drill down through the areas of concern. Temporary access roads may also have to be created. Multiple borings will be required. The detailed exploration and updated investigation, as described, could take several months to complete. Significant environmental impacts due to trenching and drilling should be anticipated including soil and ground disturbance, noise, dust, effects to sensitive biological resources, potential effects on ground water, potential disturbance to archaeological and/or paleontological resources, habitat destruction or disturbance, etc.

LIMITATIONS

Our discussion and opinions have been based upon the provided materials as described in this report, as well as our experience with the soils and native

materials located in this area of Orange County. We have not performed a geotechnical or geologic investigation of the site.

Should you have any questions, please feel free to contact our office. Reference to our **Job No. 14-10450** will help expedite a reply to your inquiries.

Respectfully submitted,

GEOTECHNICAL EXPLORATION, INC.

Leslie D. Reed, President
C.E.G. 999/P.G. 3391

PROFESSIONAL GEOLOGIST
LESLIE D. REED
No. 999
Exp. 3/31/15
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Cc: Kevin K. Johnson, KEVIN K. JOHNSON, APLC

Letter: POHH-Rehmeyer1

From: Sharon Rehmeyer [mailto:ssrehmeyer@gmail.com]
Sent: Tuesday, November 12, 2013 11:09 PM
To: Tippets, Ron
Cc: Spitzer, Todd [HOA]
Subject: Extension of Public Comment Period for Cielo Vista Draft EIR

TO: Orange County Planning
ATTN: Ron Tippets
300 N. Flower St.
Santa Ana, CA 92702-4048

DATE: November 12, 2013

RE: Cielo Vista Project Draft Environmental Impact Report
REQUEST FOR EXTENSION OF PUBLIC COMMENT PERIOD

Dear Mr. Tippets.

We have received the Cielo Vista Project Draft Environmental Impact Report Notification and would urge you to consider an extension of time for the public comment period for Cielo Vista. Because of the voluminous amount of reading and study this Draft EIR entails and because we have received it with the approaching holiday season upon us, and a deadline for submission of our public comments coming right at Christmas time, we would urge an extension of 30 days beyond the current deadline to January 22, 2014.

(1) There are complex legal and technical isssues surrounding the Cielo Vista Project and the County's Draft EIR.

(2) We understand that the County is in process of releasing a Draft EIR for the Esperanza Hills Project on parcels east of the Cielo Vista project. Both projects will share access easements and utilities connections, and the two projects, in our opinion, should be considered and evaluated together. The near simultaneous release of these projects expands and complicates the scope of issues raised by the Cielo Vista Draft EIR.

(3) The present comment period is totally insufficient for a thorough review by the public that CEQA requires. If the public comment period is not extended, the current comment period will not allow full public participation in the response process because of the approaching holiday season.

Because of the complexity of technical data to be reviewed in this Draft EIR, and the burden on the affected Yorba Linda community residents and other members of the public impacted by this Draft EIR to review and respond to such voluminous data during the holiday season, we request that the **Public Comment Period be extended by 30 days to January 22, 2014**.

Thank you for considering our **request for the 30 day extension.**

Sharon & Ted Rehemeyer
Residents of 4795 Via De La Roca, Yorba Linda, CA 92887 since November, 1985.
Members of Protect Our Homes and Hills, Yorba Linda.
Email: ssrehmeyer@gmail.com

Cc: The Honorable Todd Spitzer, Supervisor
Third District, County of Orange
10 Civic Center Plaza
Santa Ana, CA 92701

Letter: POHH-Rehmeyer2

From: Sharon Rehmeyer [mailto:ssrehmeyer@gmail.com]
Sent: Monday, January 20, 2014 12:28 PM
To: Tippets, Ron
Cc: Spitzer, Todd [HOA]; Kevin Johnson
Subject: Fwd: Rehmeyer: CORRECTED AIR QUALITY 4.2 RESPONSE to CV DEIR

TO: Mr. Ron Tippets

Orange County Planning

300 North Flower Street

Santa Ana, CA 92702-4048

Cc: The Honorable Todd Spitzer, OC Supervisor, Third District

CORRECTED COPY ATTACHED/ Please discard copy sent 1/19/14

FROM: Sharon S. Rehmeyer & Ted Rehmeyer

(Members of PROTECT OUR HOMES AND HILLS LEADERSHIP TEAM & Yorba Linda residents (at address below) for 28 years

4795 Via De La Roca

Yorba Linda, CA 92887-1816

(714) 777-6818

ssrehmeyer@gmail.com

DATE: January 20, 2014

SUBJECT: Cielo Vista Project DRAFT EIR No. 615,

Section 4.2 AIR QUALITY

CORRECTED COPY ATTACHED:

We are responding to this CV DEIR No. 615, Sec. 4.2 Air Quality as members of the Protect Our Homes and Hills Leadership Team and as Yorba Linda residents who have lived for 28 years in our home adjacent to the OC County Hillside where the Cielo Vista Project is proposed to be developed.

ATTACHED are the FOLLOWING ITEMS:

- **Our RESPONSE TO CIELO VISTA PROJECT DEIR No. 615, Sec/. 4.2 AIR QUALITY**
- plus **4 referenced ATTACHMENTS** to support the document above:

1. **Exhibit A:** Los Angeles Times Article re: Whittier Earthquake Fault Line which runs through Cielo Vista Project--"Fault Lines in Law Leave Homes on Shaky Ground"
2. **Exhibit B-1 Fracking Map "Well-Wide-View.jpg)** and **Exhibit B-2 Fracking Map** showing **two Yorba Linda Fracking sites** near Cielo Vista Project **(Well-Close-Up.jpg)**
3. **Exhibit C: "100 Year History of Wildfires Near Chino Hills State Park"--see p. 21 & p. 18**

Please CONFIRM that you have received this email with our CORRECTED response to the CV DEIR No. 615, Sec. 4.2 Air Quality--five (5) attachments plus this cover letter. (This replaces the documents sent to you yesterday via email on 1/19/14 which should be discarded.)

We will be happy to hand deliver these same documents (attached to today's email) to you on Tuesday a.m., Jan. 21, 2014, if there is any confusion about our submissions. Please advise.

Thank you.

Sharon & Ted Rehmeyer

ssrehmeyer@gmail.com

FROM: Sharon S. Rehmeyer & Ted Rehmeyer
(Members of **Protect Our Homes And Hills** Leadership Team;
Residents of Yorba Linda at address below since 1985—28+ years)
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ajjmps@att.net

DATE: January 20, 2012

CORRECTED COPY

SUBJECT: RESPONSE TO CIELO VISTA PROJECT DRAFT EIR No. 615)—
SECTION 4.2 AIR QUALITY

The following comments are in response to **Section 4.2 AIR QUALITY** of the subject Draft Environmental Impact Report for Cielo Vista (hereinafter referred to as "Project"):

SECTION 4.2 AIR QUALITY
In the Cielo Vista Project (EIR No. 615), dated November, 2013, the Executive Summary, shown in Table ES-1, states that the Cielo Vista Project "with implementation of prescribed mitigation measures…would not violate any air quality standards…." However, after a careful review of this Project's Draft EIR, we find this Air Quality section to be a rosy, glossy review, and it's projected "Less than Significant Impact" or "No Impact" statements are not supported by substantial evidence.

MAJOR CONCERNS:
1. BASIS OF ANALYSIS: For Air Quality Analysis, the developer of the Project relies upon an **Urban Crossroads document** prepared by Haseeb Qureshi, MES, and Ryan Richards for North County BRS Project, LLC, for SAGE COMMUNITY GROUP, INC., c/o Mr. Larry Netherton. Although this document was prepared August 8, 2012; and August 28, 2012, with a revision date of March 7, 2013, the basis of the Air Quality Analysis is NOT CURRENT. **Further research and analysis are needed**. Of the seven documents that form the basis of this Urban Crossroads document (see pg. 39), one is dated 1993, one is dated 2003, two are dated 2007, one is dated 2009, one is dated 2011, and one Urban Crossroads, Inc. revised document--"Cielo Vista Traffic Impact Analysis"--is dated 2013. However, that document relies on older documentation from studies done on urban areas not anywhere near the Project. Question: What has changed in the research data between 1993 and the present regarding Air Quality? The Project relies on the Crossroads study data which, in some cases, is more than two decades old and therefore suspect.

2. <u>WHITTIER EARTHQUAKE FAULT and LAWSUIT ANALYSIS:</u> The Project's location in relation to the **<u>Whittier Earthquake Fault line that runs through it</u>** is NOT addressed in the DEIR, though this is a major Air Quality and Public Safety issues.

The Project's DEIR also does NOT address information about lawsuits against the City of Yorba Linda regarding the **Whittier Earthquake Fault line which runs through the Project** and into the Bryant Ranch/Brush Canyon areas of Yorba Linda. This is documented in the *Los Angeles Times* article below.

http://www.ela-iet.com/LATimesonQuake81102.htm

(See Exhibit A)

"Fault Lines in Law Leave Homes on Shaky Ground"

(Aug. 11, 2002 article by Evan Halper, *Los Angeles Times* Staff Writer.

The Whittier Earthquake Fault is dangerous, as was learned in the aftermath of the major October, 1987 Whittier Earthquake.

(I grew up and lived in Whittier for over 25 years. I taught at Lincoln School (corner of Broadway and Pickering Ave., Uptown Whittier) in the Whittier City School District during the October, 1987 Whittier Earthquake. My mother lived in Whittier, 6208 Alta Ave., Whittier, CA 90601, for over 65 years, including the time of the Whittier Quake of 1987.)

But this Los Angeles Times article shows another reason the Whittier Earthquake Fault line is dangerous. What happens to unsuspecting house buyers who purchase houses along the Whittier Fault line? Why should Yorba Linda City Planning and Orange County Planners be wary of potential developments along the Whittier Earthquake Fault Line? There are **environmental conditions** that have **led to the Yorba Linda litigation this article describes**, and these need to be analyzed.

(Just an FYI, at least three minor earthquakes have occurred in the Project area along this fault line in the past month, including two on January 15, 2014, at 1:35 a.m. and again at 11:40 p.m. In both instances the jolt and rocking motions were felt at our house (4795 Via De La Roca, Yorba Linda, CA 92887) and in our neighborhood in eastern Yorba Linda. Our daughter & son-in-law, and granddaughter--- Kim & Donald Torrence and Anna (age: 18), 5530 Feather Grass Lane, Yorba Linda, 92887—also felt these quakes.

- **<u>Questions:</u>** Will the Cielo Vista Project cause financial woes for the City of Yorba Linda, if/when the Project buyers seek annexation? Will financial woes also be faced by the County of Orange because of this project? Who will be held legally and financially responsible when lots and/or houses are damaged or destroyed by earthquakes along the Whittier Earthquake Fault Line, or if the "shelter in place" houses are damaged or destroyed by wildfires, by fracking, or by methane gas explosions in this HIGH RISK WILDFIRE ZONE? Who will be responsible for informing new buyers of the Project's inherent dangers? Who will help the potential house buyers--or existing residents-- to obtain insurance and/or adequate coverage if insurance companies refuse to insure them—or cancel them---because of the Project's location in a HIGH RISK WILDFIRE ZONE with the Whittier Earthquake Fault running through it, further complicated by the presence of active and inactive oil wells? What about the potential for hazardous explosions as wildfires hit potential pockets of methane gas in the Project?

More subterranean research and analysis of the Whittier Earthquake Fault Line is needed by the Project developers, and by both Orange County and Yorba Linda City Planners. This **<u>public safety issue</u>** needs to be considered by all concerned with the CV and EH Projects-- especially the OC Planners, Supervisors and Yorba Linda City Council members responsible for project approvals. The Whittier Earthquake Fault not only impacts public health and safety, but it impacts air quality, geology, soils, and many other aspects of this Project. More research and analysis are needed.

3. FRACKING: The Project's DEIR ignores **"fracking"** which is currently going on in various Southern California areas--including at least **two in Yorba Linda— both are close to the Project—just off San Antonio Rd**. **in San Antonio Park, and another** one **between Dorinda and San Antonio Rd.** *Baldwin Hills Oil Watch states, "There have been 50 Hydraulic Fracturing events (in Southern California), and that Hydraulic Fracturing activity predominately occurs in two areas: Offshore Long Beach/Seal Beach and the rest between Chino Hills and Brea."*

(See MAP Exhibits B-1 (top map on website shown below) **and B-2 (**lower map on website**)**
http://baldwinhillsoilwatch.org/action-center/sc-aqmd-rule-1148-2-maps/

MAP B-1: shows **Fracking Sites** in Southern California, from Santa Monica east to Yorba Linda, and extending further east to the California border. **(Well-Wide-View (jpeg)**

MAP B-2: shows **two Yorba Linda Fracking sites near the Project:** one off San Antonio Rd. in **San Antonio Park**, **and one between Dorinda Rd. and San Antonio. Rd.**, in Yorba Linda. **(Well-Close-Up (jpeg)**

Questions: How does Fracking impact the Project and the surrounding neighborhoods? Has Fracking caused the recent earthquakes in the area that have been felt at our house and in eastern Yorba Linda and beyond? Does Fracking pose public health and safety issues? Does Fracking cause the release of Greenhouse Gases or other gases or elements?

4. PUBLIC SAFETY and PUBLIC HEALTH ISSUES: Subterranean Research and Analysis are needed for this Project because of its location in an **EXTREMELY HIGH RISK WILDFIRE ZONE** with oil wells, and with unknown issues about what lies underground, and the fact the Whittier Earthquake Fault line runs through it. At least **five active oil wells** are in the Project, and at least **one non-active** and **one abandoned oil well** are also on the Project site. This is a major public safety and public health issue. The Project's DEIR does not address these public safety and public health issues regarding the oil wells and their potential contamination, air quality, and other issues, including Green House Gases. Are there subterranean fissures? What research has been done on historic landslides within the Project? Are there subterranean pockets of methane, oil, gas? If the developer waits until grading to find out, there will be an improper deferral of impact assessment and mitigation analysis. What will the mitigation be if there are subterranean issues? Can they be mitigated after the fact? Will they be ignored until well over 600,000 cubic acres of ground surface are dug up and the problems exposed? What provision will be made for detecting, protecting, venting, monitoring, and measuring these potential subterranean issues, especially for Green House Gases? Methane gas (CH_4) absorbs radiation and is known to exist in fossil-fuel oil combustion, and Nitrous Oxide (N_2O)is also known as laughing gas which can cause brain damage. Are there pools of methane gas in the Project? What about Nitrous Oxide? What is the impact on public health and safety not just during the Project's development stage, but long term? Methane gas is highly volatile and prone to explosions. The Project lies in a documente**d HIGH RISK WILDFIRE ZONE** with a known wildfire history to it. What if there are pockets of methane gas within the Project now buried underground? The heavily documented **Freeway Complex Fire of Nov. 15, 2008** raced through this Project. The raging inferno, moving at the 40-60 mph speeds of the Santa Ana winds, damaged or destroyed 312 homes. Air quality was sacrificed as the 2008 wildfire ate up oxygen in the Project, and embers,

soot, ash, smoke, dust, and debris from the burning embers filled the air-- and the lungs of neighborhood residents as they fought or fled the flames.

See Exhibit C

http://www.hillsforeveryone.org/projects/fire-files/A-100-Year-History-of-Wildfires-Near-CHSP.pdf

"100 YEAR HISTORY OF WILDFIRES NEAR CHINO HILLS STATE PARK," a 35 page document published in August, 2012, by Melanie and Claire Schlotterbeck (Directors of Hills For Everyone)

Page 21: *"This study shows that Chino Hills State Park and environs have endured significantly more fires, 101 to be exact, than would have naturally occurred by lightning strikes…Instead of a fire burning every 50 years in the natural fire regime, humans have increased the ratio essentially to a fire a year."*
Page 18: *"If there are lessons to be learned, it seems there are opportunities for jurisdictions to revisit how their communities grow and where the most appropriate place for housing developments should be located….Even with more stringent building codes and relatively new houses, hundreds of homes were lost or damaged (in the 2008 Freeway Complex Fire)."*

How is public safety protected if this Project, Esperanza Hills, Bridal Hills, or other potential developments adjacent to these projects are approved by the County in this hillside area? How does the potential for methane explosions impact construction of "shelter in place" Houses? Will they be able to withstand any potential blast? Will there need to be a "blast zone" for protection?

5. PROJECT DENSITY: The DENSITY proposed in this Project is inconsistent with both Orange County and the City of Yorba Linda General Plans. How does the projected density of this Project, along with Esperanza Hills, Bridal Hills, and potential future developments near the Project, relate to Air Quality, in terms of transportation fumes, and other health issues? This impact needs further research and analysis.

6. HEALTH ISSUES: Health issues are directly related to Air Quality and are a huge concern, not just during the Project's development and construction phase for workers, but for potential buyers, and for residents of existing neighborhoods, the "sensitive receptors" near the Project. The DEIR should analyze the public health issues as they are impacted by the unique topographic and wind conditions of this Project. The geology reports which form the basis of this Draft EIR are out of date. **CEQA requires studies over 12 months old be reviewed and updated. Additional studies are needed**.
In the **Summary of Findings** in the ***Urban Crossroads Cielo Vista Air Quality Impact Analysis,*** (p.2), it states:

- The Project will not conflict with or obstruct implementation of the applicable air quality plan.
- The Project will not violate any air quality standard or contribute substantially to an existing or projected air quality violation.
-The Project will not result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions, which exceed quantitative thresholds for ozone precursors.
-The Project will not expose sensitive receptors (Project neighbors and Project buyers) to substantial pollutant concentrations.
-The Project will not create objectionable odors affecting a substantial number of people.

Where is the analysis that supports these statements? These statements are not factual.
In our immediate neighborhood, we have knowledge of at least two neighbors who have suffered from respiratory issues, some long term, which were either caused by or intensified by grading in the hills of the Project area. Both suffered asthma attacks, allergies, and breathing difficulties during and after the construction of Stonehaven Dr. in the late 1980s, early 1990s. More recently--during exploratory digging

and grading for Cielo Vista and/or Esperanza Hills-- on the Project hillside, at least one neighbor suffered additional health issues.

- **Ron T. Carboni, 21620 Stonehaven Dr., Yorba Linda, CA 92887**
  Phone: (714) 779-8129. Ron has asthma and allergies which were seriously impacted from the time he and his wife Judi moved into their new home 24 years ago. His health issues were reactivated with the recent hillside testing and digging in and near the Project site.
- **Kenneth & Marlene Nelson's daughter Jennifer** moved into her parents' new home with them in Fall, 1985, at **4790 Via De La Roca, Yorba Linda, CA 92887**. Phone: (714) 777-4815. Jennifer was a young child at the time the family moved in 28 years ago in 1985. In the late 1980s, early 1990s, according to Marlene, Jennifer began to suffer from asthma, allergies, sinus issues and a persistent cough as a result of exposure to air quality contaminants and issues caused by earth excavation and grading to form Stonehaven Dr. and its resultant side streets, plus the grading and construction of lots and housing. Jennifer still suffers from these contaminated soil and airborne health issues.

7. <u>The OC HILLSIDE PROJECTS SHOULD BE CONSIDERED AS ONE PROJECT</u>:
Both the Cielo Vista Project and the proposed Esperanza Hills Project are intertwined, not only geographically, but they **share the same environmental impact issues, including Air Quality. <u>They need to be considered as one project for ALL planning purposes and environmental review under CEQA</u>. The same applies to all** other parcels slated for development on this Orange County hillside within the City of Yorba Linda's sphere of influence, including Bridal Hills which proposes to add 38-48 additional houses, with access dependent upon Esperanza Hills. The Cielo Vista DEIR states on page 4.2-32 (*<u>4.2-5, 3. Cumulative Impacts</u>*) that "***The Project combined with cumulative development in the area may result in cumulative air quality impacts.*** *However, project-by-project analysis of air quality impacts and compliance with applicable regulatory requirements* ***would*** *ensure that potentially significant cumulative impacts regarding air quality impacts are reduced to a less than significant level."* The separate Projects proposed for this OC hillside in the City of Yorba Linda's sphere of influence need to be treated as ONE planning project. Would the adoption of these Hillside Projects in a piece meal way allow CV and EH developers to bypass the cumulative impacts issues?

8. <u>GREENHOUSE GASES</u> cannot be mitigated. **More research and analysis are needed.** The studies cited in the Draft EIR are insufficient and out of date by several years. The Project "assumes" it would not conflict with the State's ability to achieve reduction targets defined in AB 32 (within the SCQMD's jurisdiction) (See 4.6-25). This is an assumption, and NOT a fact. More research and analysis is needed <u>BEFORE</u> approval is granted and excavation and grading begins on this Project. Are there pockets of methane gas in and around the various current and old oil well sites? What other gases and soil contaminants are likely to be discovered once grading begins? These issues need further study, research and analysis before approval is granted to begin grading. What happens to the Project if discovery is made after grading begins? What happens to "sensitive receptors" if contaminants are discovered after grading begins?

9. <u>SANTA ANA WINDS:</u> The climate of this Project, given its unique location in a basin of low hills and valleys in the region, is determined by its unique terrain, geography, topography, and wind patterns. Hot, dry Santa Ana wind conditions are greater from Spring through Winter through the Project, especially between April and January. The wind patterns, especially the hot, dry Santa Anas, form wind tunnels, and sometimes wind tunnels within wind tunnels which spread pollutants and contaminants, as

well as dust, dirt, and debris. This was very evident during the 2008 Freeway Complex Wildfire that traversed the entire Project area. The wind patterns, including the Santa Anas, determine the air quality of the Project. The impact of the Santa Ana winds and wind patterns on the Project need further study and analysis. How will this Project affect air quality for sensitive receptors and potential house buyers, plus the entire Yorba Linda community?

ATTACHMENT A

Fault Lines in Law Leave Homes on Shaky Ground

Land that has passed inspection can still prove unstable for homeowners

http://www.ela-iet.com/LATimesonQuake81102.htm

August 11, 2002, LA Times
By EVAN HALPER, TIMES STAFF WRITER

When Ron Muranaka paid $564,000 for a stucco Colonial in Yorba Linda with dramatic views of the Chino Hills, he was vaguely aware that the area was earthquake-prone. But so was the rest of California, he figured. Seven years later, his yard cracked apart. Then the driveway split. The living room walls separated and door frames warped.

But all that paled next to what happened early one summer morning in 1999: With a roar, much of the backyard slid 40 feet down a cliff. Geologists hired by Muranaka and his wife, Dawn, reported grim news: The Whittier fault system, which their real estate agent had told them was miles from their house, actually ran right beneath it. The land was shifting constantly, trapping water beneath the foundation and undermining the property.

"The dirt underneath us is totally unstable," said Dawn Muranaka. "We're terrified."

Owners of at least two dozen other houses in Yorba Linda's Bryant Ranch development are in the same predicament. Their plight illustrates the limitations of the Alquist-Priolo Act, the 30-year-old state law intended to prevent construction atop active earthquake faults. When Bryant Ranch was being planned in the late 1970s, geologists hired by the developers warned that an active fault line ran through parts of some neighborhoods. The developers hired new geologists, who declared the faults inactive. That allowed more homes to be squeezed onto the hillsides than otherwise would have been permitted. It was all perfectly legal. Those familiar with the Alquist-Priolo Act say it's a common pattern: When one geologist says not to build, developers find another to tell them to go right ahead.

"I don't know why so many developers work so hard to make the faults disappear, but they do," said J. David Rogers, whose firm, Geolith in Pleasant Hill, has reviewed hundreds of geological reports for California cities. One of the most notorious examples occurred in the Bay Area city of Pleasanton in the late 1980s. Detailed federal and state maps showed that the Calaveras fault ran through a 258-acre site where 80 homes were proposed. The presence of the fault was confirmed by the first geologist hired by the developers.

Then another expert was brought in. He reached a different conclusion: that the 110-mile-long fault hopped over the project site, stopping just south of the property and picking up again beyond the northern boundary. State officials expressed concern about the finding, and the U.S. Geological Survey offered to help locate the fault lines. Pleasanton officials declined the assistance, and the development was approved. The homes have not suffered fault damage. City officials say they followed the law to the letter.

Critics say that is the problem: The Alquist-Priolo Act relies on developers and their hired experts to assess seismic risks, and on local officials to ensure that everything is aboveboard.

Some cities thoroughly review geologists' reports, but others lack the interest or the expertise. Yorba Linda officials acknowledge that their review of the Bryant Ranch project was limited.

"That's for the developer to do," said Roy Stephenson, who was city engineer when the subdivisions were approved. "We assume the developer wouldn't want to submit false reports. That could just bring them trouble later on." Earlier this year, 80 Bryant Ranch homeowners collected a $6-million settlement from the developers and subcontractors after a six-year court battle. The Muranakas and several others are pursuing a separate lawsuit against the city of Yorba Linda.

The developers say the damage to the Bryant Ranch homes is unrelated to the Whittier fault system. They blame bad landscaping, El Nino rains, over-watering of lawns and ill-advised pool installations. "No one we have consulted has said this damage is being caused by faults," said Bob Carlson, an attorney for Brighton Homes of Orange County, one of the companies that developed Bryant Ranch. The homeowners say doubters are welcome to stop by the next time the fault shudders.

Steve Patterson lives with his wife in a five-bedroom Bryant Ranch house they bought in 1990 for $584,500. Patterson woke up one morning in the summer of 1999 to find that a large section of his backyard had disappeared. It is now at the bottom of a 50-foot cliff, along with a fence he had installed days before. "The city should have investigated this," Patterson said of the conflicting geological findings. "There were reports that said not to build."

* Labeled Quake-Prone

Planning for the Bryant Ranch development--high on jagged ridges above the Riverside Freeway in north Orange County--began in 1978, when the land was controlled by the Campeau Corp. of Canada and John Wertin, a local real estate tycoon.
The historic ranch was carved out of the massive Rancho Canon de Santa Ana by John Bixby in 1875. His daughter, Susanna Bixby Bryant, took over the cattle and citrus grove operations in 1911 and later added a large botanical garden in memory of her father. Her descendants managed the property until they decided to sell it for development. Campeau and Wertin merged to form CW Associates and in early 1982 hired a former assistant city manager of Yorba Linda, Brian Johnson, to oversee development of the land.

A major obstacle loomed. In 1980, about a quarter of the 3,300-acre ranch was declared an active earthquake zone under the Alquist-Priolo Act. The law had been passed after the San Fernando Earthquake of Feb. 9, 1971, killed 65 people and caused more than $500 million in damage. Much of the destruction resulted from "surface ruptures," which occur when fault movements deep underground tear gashes in the Earth's surface. This is one of many kinds of earthquake damage, but geologists say it is the easiest to prevent because areas prone to surface ruptures are readily identified. The Alquist-Priolo Act sought to stop construction of houses and offices in such places. State maps show generally where the main branch of a fault runs. It's up to developers and their geological consultants to locate the dozens of active, secondary branches and "threads" that run underground in all directions. The act prohibits building homes within 50 feet of them.

Early drafts of the law provided for rigorous state oversight of development in active earthquake zones and strict guidelines for determining whether a site was safe for building. Real estate interests lobbied hard against those provisions. Geologists also objected, complaining that the law would leave them vulnerable to lawsuits. Legislators removed the tough oversight language.

In the case of Bryant Ranch, the state maps show that the Whittier Fault passes through Yorba Linda as it runs 25 miles from Corona to the Los Angeles Basin. State studies project that a 7.4-magnitude quake is possible on the fault within the next few decades. In the mid-1980s, the Bryant Ranch developers hired Leighton & Associates of Irvine to map the neighborhood where Ron and Dawn Muranaka's home sits.

The firm determined that an active fault ran through that parcel and at least four others were in the area. It advised building fewer homes, with construction kept a safe distance from the fault lines. The discovery affected a proposed subdivision of 50 homes. The 3,300-acre site has 1,700 homes in several neighborhoods, each developed separately.

"The fault crossed right along the ridge just south of [the Muranakas'] house," said Eldon Gath, a geologist with Leighton who is regarded as an expert on the Whittier Fault system. "Then we found another fault there we were concerned about." Campeau had withdrawn from the project by then, selling the ranch to a partnership controlled by Wertin and George Argyros, now the U.S. ambassador to Spain. The new partnership kept Leighton on for a while. Then the firm was fired.

"That had never happened to me before," Gath said. "To be involved with a project all of the way up through design and then be told, 'You're out of here'--that's pretty stunning. "Maybe they thought we were too conservative," he said. "It costs money to be that conservative. Some people would rather take a risk."

Another group of geologists with a now-defunct firm, Soil and Testing Engineers, took over from Leighton and concluded, after their own investigation, that half a dozen more homes could safely be built on the tract. A similar pattern played out with a different cast of consultants in the other neighborhoods on the ranch. At least 18 additional homes were built against the advice of geologists and are now cracking. "Builders can keep buying, buying, buying reports until they find someone who doesn't see it, or someone whose ethics are compromised," said Patrick Abbott, a professor of geology at San Diego State University and author of a widely used textbook on natural disasters. "I remember a developer telling me he had six studies all saying don't build. But, he said, 'The seventh one said we can build, and that's what we are going to use.' "

Argyros and David Ball, the principal developers for Bryant Ranch, declined to be interviewed. Soil and Testing Engineers has long since gone out of business. Efforts to reach the geologist who wrote the company's report were unsuccessful. It was up to the city of Yorba Linda to review the geologist's findings.

Jim Slosson, who oversaw the Alquist-Priolo program as California's state geologist in the late 1970s, said many cities don't have the resources to spot-check the work done on site. A

thorough review would involve boring holes in the ground to test the engineers' findings. That rarely happens."There are all kinds of tricks being used to get around that law," Slosson said. "It's easy."

* Officials Accused

Bryant Ranch homeowners contend that Yorba Linda's government, at best, had been lax in its oversight and, at worst, had engaged in self-dealing. They point out that Johnson, the former assistant city manager, went to work for the developer less than a year after leaving his city position--a violation of state lobbying laws. Johnson, now based in Dana Point, refused to comment. "We had former employees of the city acting as representatives for developers," said Barbara Kiley, a former Yorba Linda councilwoman. "There were no checks and balances." In addition, City Atty. Leonard Hampel oversaw the approval process for Bryant Ranch while working for Argyros at another real estate company in Orange County.

Hampel disclosed his connection to Argyros in a letter he sent to then-City Manager Arthur Simonian, who ruled that Hampel need not recuse himself. Simonian later left the city's employ after an outside auditor found that he had awarded unauthorized raises to himself and colleagues on the city payroll. Kiley and other council members said they learned only years later that Hampel had been working for Argyros. "I had no idea," said former Mayor Gene Wisner. "He never recused himself."

City meeting minutes also show that Yorba Linda officials accommodated the developers' wish to downplay the seismic hazards at Bryant Ranch. Johnson asked the Planning Commission in 1982 for permission to delete the term "active earthquake zone" from disclosure documents to be given to prospective home buyers in the neighborhood where the Muranakas now live. He expressed concern that such a designation would be too "stark" and might frighten off buyers.

The commission obliged, and said home buyers could be told that they were moving into a "potentially active" earthquake zone--a description that applies to nearly all of California. When the City Council approved the project in 1987, it sanctioned the "potentially active" language. Disclosure has consistently been a problem with the earthquake law. State studies show that many homeowners living in Alquist-Priolo zones have no idea what that means.

In some cases, the homeowners have been told that the so-called earthquake special study zones are the safest places to be, because scientists have studied the areas and certified them as safe. A 1991 State Department of Conservation report on the law said that the risk of buying a house in an earthquake zone is "typically understated and not even known about" by purchasers. That conclusion remains valid today, said the report's author, Robert Reitherman. "Some people think being in the zone means there is no earthquake hazard," he said.

* Financial Effects

For Hans Spitz, who lives across the valley from the Muranakas in a neighborhood called Brighton Ridge, the "potentially active" disclosure simply stated the obvious for any California real estate purchase. He didn't realize, he says, that he was actually in an area of elevated risk when he bought his luxury six-bedroom house in December 1989.

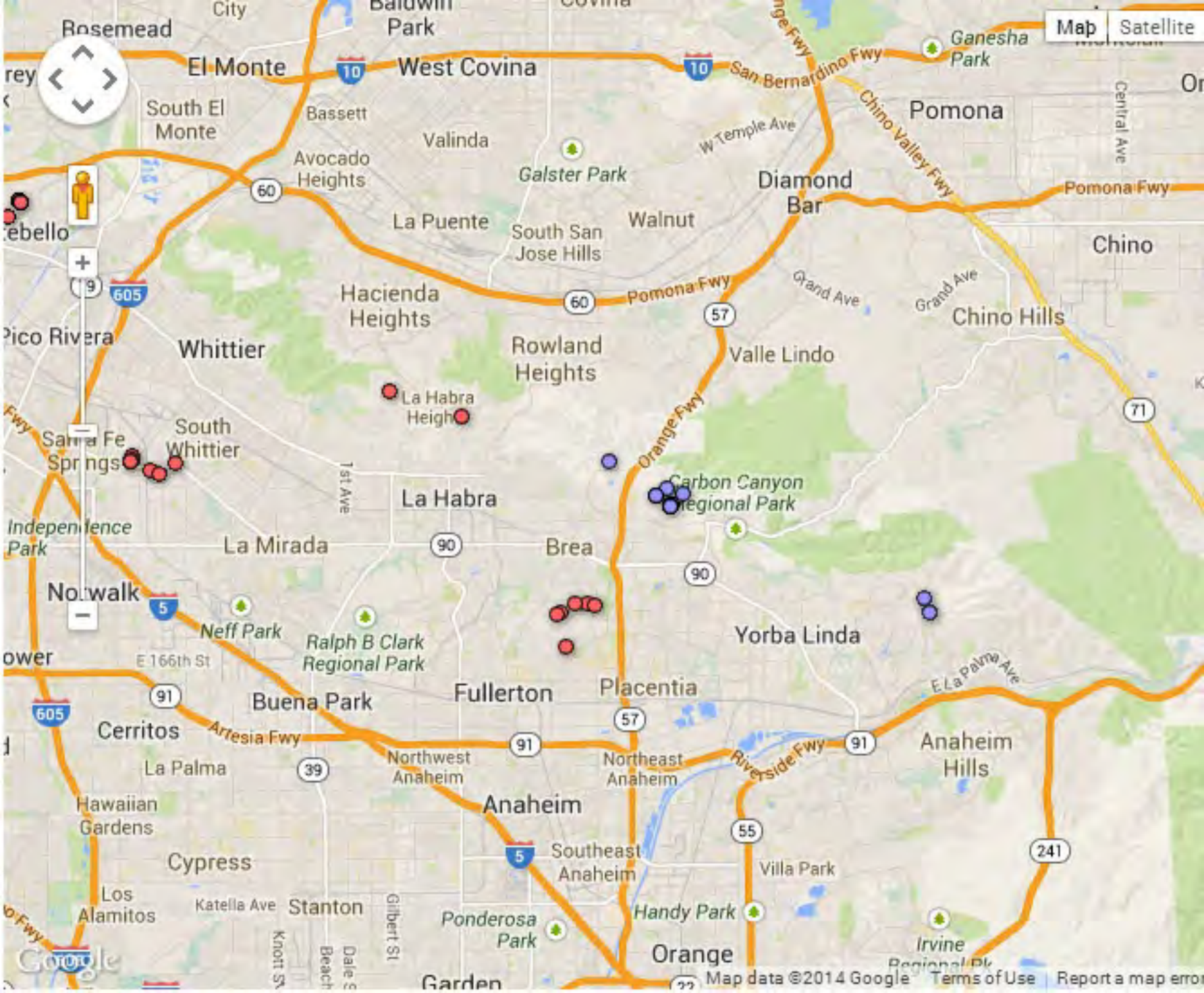
Today, a giant crack runs down the wall in the master bedroom of the Spitz home on La Fiesta. One side of the living room is four inches lower than the other. The floor between the kitchen and dining room has a deep gap an inch wide, and the cabinets have become detached from the wall. The foundation has been warped by shifts and tremors. Spitz paid $609,000 for the house. City officials valued it at $160,000 in their most recent assessment. "We have to suffer," Spitz said, whose mortgage payment is $3,400 a month. "We cannot refinance or anything with the house in this condition."

A few blocks away, on Avenida de Marcia, Tim and Lucy Pham can't open most of the doors and windows in their home because the frames are warped. Large cracks are visible everywhere: through a marble mantel, across the ceiling, in some Roman columns installed along the walls. The wallpaper is torn in spots. "I called them many times," Lucy Pham said of developer Brighton Homes. "They said I would have to sign a paper saying I wouldn't sue them if I wanted to get the house fixed."

The Phams refused to sign and instead joined Spitz and 79 other property owners in a lawsuit that was settled several months ago. The Spitzes and Phams have been offered $60,000 each out of the $6-million settlement pool. The families rejected the money and have hired a new lawyer in an attempt to get a larger piece of the settlement. The Muranakas say they have spent $260,000 on lawyers, engineers and other consultants in their quest to get out and get compensated. The bills ate up all but $12,000 of a separate settlement they reached with the developers and subcontractors last month. The Muranakas and their neighbors still have a suit pending against the city.

Real estate agents have told the couple that the house is close to worthless. Dawn Muranaka says she lives in fear that the entire hillside will collapse before this is all settled. "They need to buy our house back and pay the attorneys fees," she said. "They can't just fix a few things and walk away. No one will buy this house after the problems we discovered. The city should condemn it and not let anyone live here again."

xxx


Map
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El Monte
West Covina
San Bernardino Fwy
Ganesha Park
Pomona
Chino Valley Fwy
Central Ave
South El Monte
Bassett
Valinda
W Temple Ave
Avocado Heights
Galster Park
Diamond Bar
Pomona Fwy
La Puente
South San Jose Hills
Walnut
Chino
Hacienda Heights
Pomona Fwy
Grand Ave
Grand Ave
Chino Hills
Pico Rivera
Whittier
Rowland Heights
Valle Lindo
La Habra Heights
Orange Fwy
South Whittier
Santa Fe Springs
1st Ave
La Habra
Carbon Canyon Regional Park
Independence Park
La Mirada
Brea
Norwalk
Neff Park
Ralph B Clark Regional Park
Yorba Linda
E 166th St
Buena Park
Fullerton
Placentia
E La Palma Ave
Cerritos
Artesia Fwy
Northwest Anaheim
Northeast Anaheim
Riverside Fwy
Anaheim Hills
La Palma
Hawaiian Gardens
Anaheim
Southeast Anaheim
Villa Park
Cypress
Los Alamitos
Katella Ave
Stanton
Gilbert St
Ponderosa Park
Handy Park
Irvine Regional Pk
Orange
Garden
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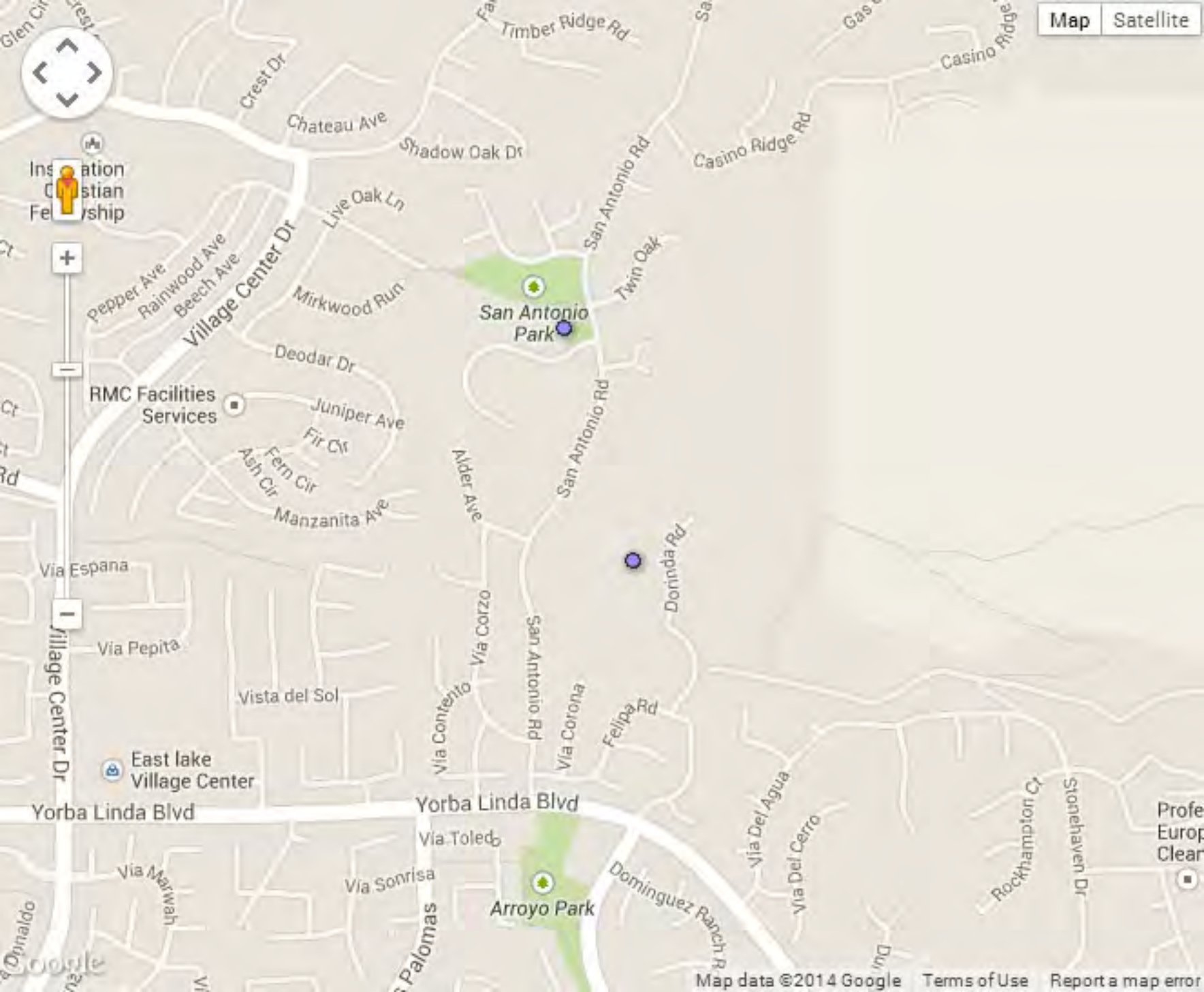
Map
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Beech Ave
Village Center Dr
Mirkwood Run
San Antonio Park
Deodar Dr
RMC Facilities Services
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Fir Cir
Fern Cir
Ash Cir
Manzanita Ave
Alder Ave
Dorinda Rd
Via Espana
Via Pepita
Vista del Sol
Via Corzo
Via Contento
Via Corona
Felipa Rd
East lake Village Center
Yorba Linda Blvd
Via Toledo
Via Marwah
Via Sonrisa
Arroyo Park
Dominguez Ranch R
Via Del Agua
Via Del Cerro
Rockhampton Ct
Stonehaven Dr
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A 100 Year History of Wildfires

Near Chino Hills State Park

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ABSTRACT

After witnessing the devastation of the Freeway Complex Fire, the regional conservation non-profit Hills For Everyone undertook a study of fires in the region. Though fires are a natural part of the ecosystem, there is nothing natural about the size and frequency of the fires destroying our wildlands year after year. Data, mainly from fire agencies, the California Department of Parks and Recreation, and newspapers, have provided details on fire perimeters, points of origin, and fire causes. This paper is the culmination of research that documents a near 100-year fire history (1914-2011) in and around Chino Hills State Park. This paper articulates the problem months, weather conditions, and "hot spots" of fire ignition. Recommendations are included for residents, jurisdictions, and fire, transportation, and natural resource agencies to implement that would reduce the number of fires to a more natural fire regime. We will continue to work with fire and natural resource agencies to bring the necessary resources to this area.

INTRODUCTION

Fires are a natural part of the ecosystem. Many factors influence the natural fire regime: weather conditions, vegetation (fuel) types, vegetation moisture, and plant distribution, etc. The natural fire regime, however, has been drastically altered by humans who have caused many more fires than would have occurred naturally. "New" factors influencing this increased fire regime include the introduction and proliferation of flammable non-native vegetation (e.g., palm trees, pampas grass, *Arundo donax*, exotic annual grasslands, etc.), increased Wildland-Urban Interface (WUI), and roadways to name a few.

An article on global warming on the website of the State of California's Attorney General cites higher temperatures and decreased moisture in the vegetation will result in increased fires.[1] In fact, statistics show that the western United States now has a longer fire season (starting earlier and ending later) that is more intense than in previous decades.[2] A nearby example of a California landscape modified by wildfires is Chino Hills State Park in Southern California, where the dominant coastal sage scrub and chaparral vegetation is converting to highly flammable non-native annual grasses.[3]

Claire Schlotterbeck, Hayashi (1999)

Type conversion as seen after one fire.

Claire Schlotterbeck, Hayashi (2012)

In 2003 Southern California experienced 13 major wildland fires that swept through the region at an alarming rate.[4] The Cedar Fire (San Diego) was called the state's most devastating as it burned down entire communities, including historic buildings in Cuyamaca, and killed 15 people.[5] In 2007 the Santiago Fire (Orange County) burned 28,517 acres in the foothills of the Santa Ana Mountains, which damaged or destroyed 22 homes.[6] Just a year later, in 2008, two fires ignited at opposite ends of the hills and merged to create the Freeway Complex Fire which burned down 187 homes, damaged another 131 homes and other structures, burned 95% of Chino Hills State Park, and scorched a four-county region.[7]

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1 Department of Justice. "Global Warming Impacts in California." Retrieved 28 Dec 2011 from the California Attorney General's website: *http://www.ag.ca.gov/globalwarming/impact.php*.

2 Ibid.

3 Ing, Alissa. Environmental Scientist, Department of Parks and Recreation. Personal communication approximately June 2010.

4 CNN. "California Wildfires Burn Through 600,000 Acres." Retrieved 28 Dec 2011 from the CNN website: *http://articles.cnn.com/2003-10-28/us/california.wildfire_1_blazes-cuyamaca-and-julian-firefighters?_s=PM:US*.

5 Ibid.

6 Orange County Fire Authority. After Action Report: Santiago Fire. Retrieved 3 Aug 2012, from the OCFA website: *http://www.ocfa.org/_uploads/pdf/aar_3-27-08.pdf*.

7 Fire Department Network News. "Orange County Fire Authority Declares Full Containment Today of Triangle Complex Fire." Retrieved 3 Aug 2012 from the Fire Department Network News website: *http://www.fdnntv.com/news.asp_Q_articleID_E_3868_A_title_E_Orange_County_Fire_Authority_Declares_Full_Containment_Today_of_Triangle_Complex_Fire*.

After completing a lengthy review of the fires throughout the Chino Hills area, it is now known that the State Park and neighboring hillsides have experienced more than 100 fires in just as many years, though most of the fires have occurred since 1977. As a result of this information, conservation advocates are working with fire, transportation, and natural resource agencies to protect the landscape from continued wildfire assaults. Together through protective mitigation measures that can reduce the fire frequency toward a more natural fire regime, this approach will protect life and property, and ensure our human and natural communities are safer.

Chino Hills State Park — The Setting

The State Park sits at the juncture of four of Southern California's most urbanized counties: Los Angeles, Orange, Riverside, and San Bernardino. The Park has been assembled through more than 30 different acquisitions to grow to more than 14,100 acres. The Park's first acquisition was in 1981 and even 30 years later the Park continues to expand. Chino Hills State Park was secured to protect its many rare natural resources. Its gently rolling hills are covered in grasslands and dotted with oak and walnut trees. In the steep canyons of the interior, sycamore-lined streams and walnut woodlands abound.

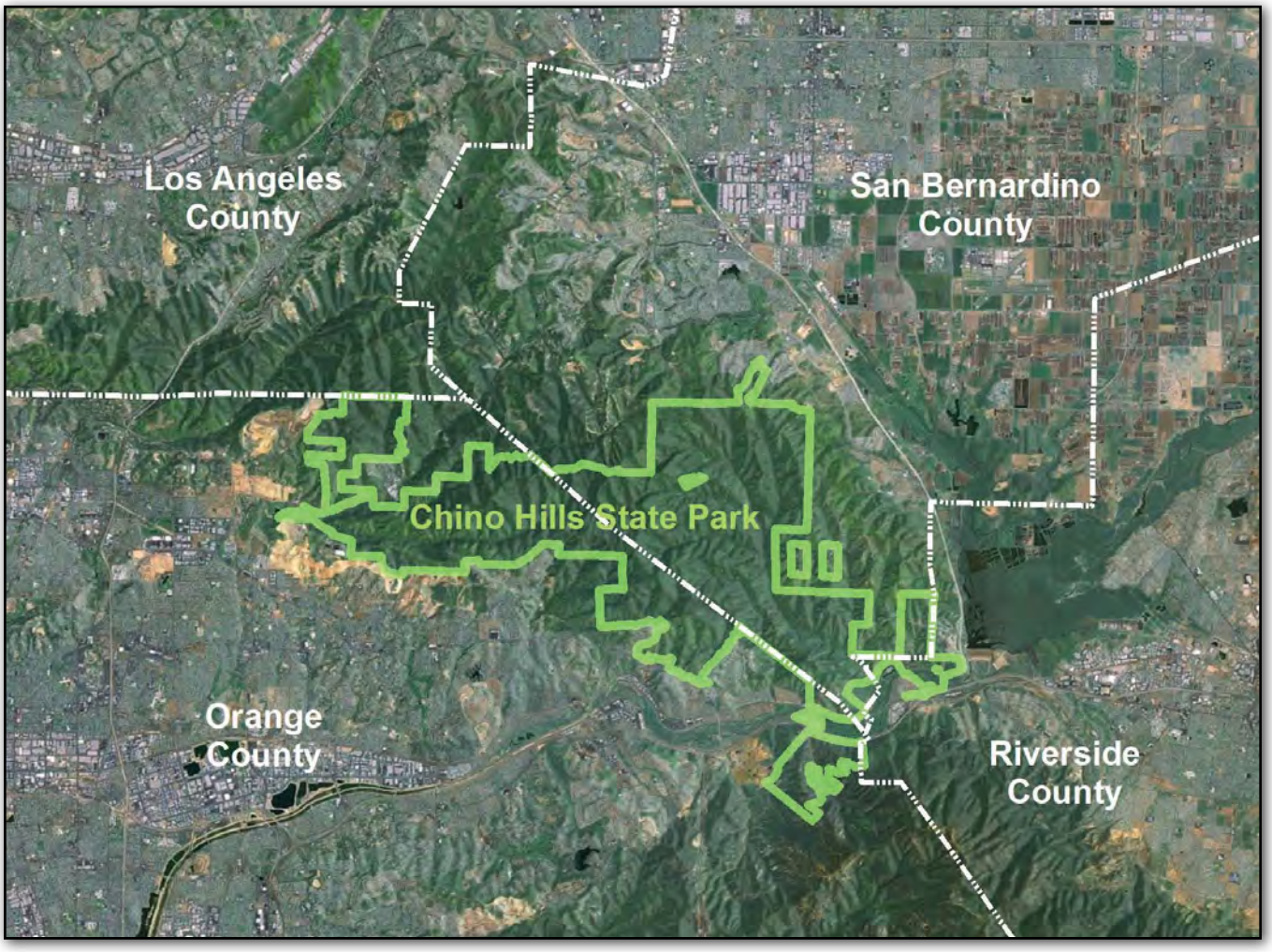

Figure 1. *Chino Hills State Park is located at the juncture of four Southern California counties.*

In 1771 the area was used for extensive grazing operations and by the early 1870s individuals began purchasing the land and using it for sheep and cattle ranching.[8] This grazing damaged the native plants and allowed opportunistic non-natives to spread. Now that the land is protected as a State Park, the grazing has been stopped and habitat restoration is underway.

The Park protects five main plant communities: southern oak woodland (11%), native and non-native grasslands (70%), coastal sage scrub (13%), mixed chaparral (5%), and cottonwood riparian woodland and riparian zones (1%).[9] In fact, the Park "supports 14 different vegetation series defined in the California Native Plant Society's classification,"[10] and 10 are considered unique or significant in Southern California because of their importance as habitat and because they are rapidly disappearing due to development.[11] The State Park contains some of the best remaining stands of walnut woodlands in Southern California. Similarly, the northern most stand of the rare tecate cypress tree is found in Coal Canyon in the State Park and neighboring Ecological Reserve.

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[8] Department of Parks and Recreation. Chino Hills State Park General Plan. February 1999.

[9] Department of Parks and Recreation. Chino Hills State Park General Plan. August 1986. p. 21.

[10] Department of Parks and Recreation. Chino Hills State Park General Plan. (1999). p. 21.

[11] Ibid.

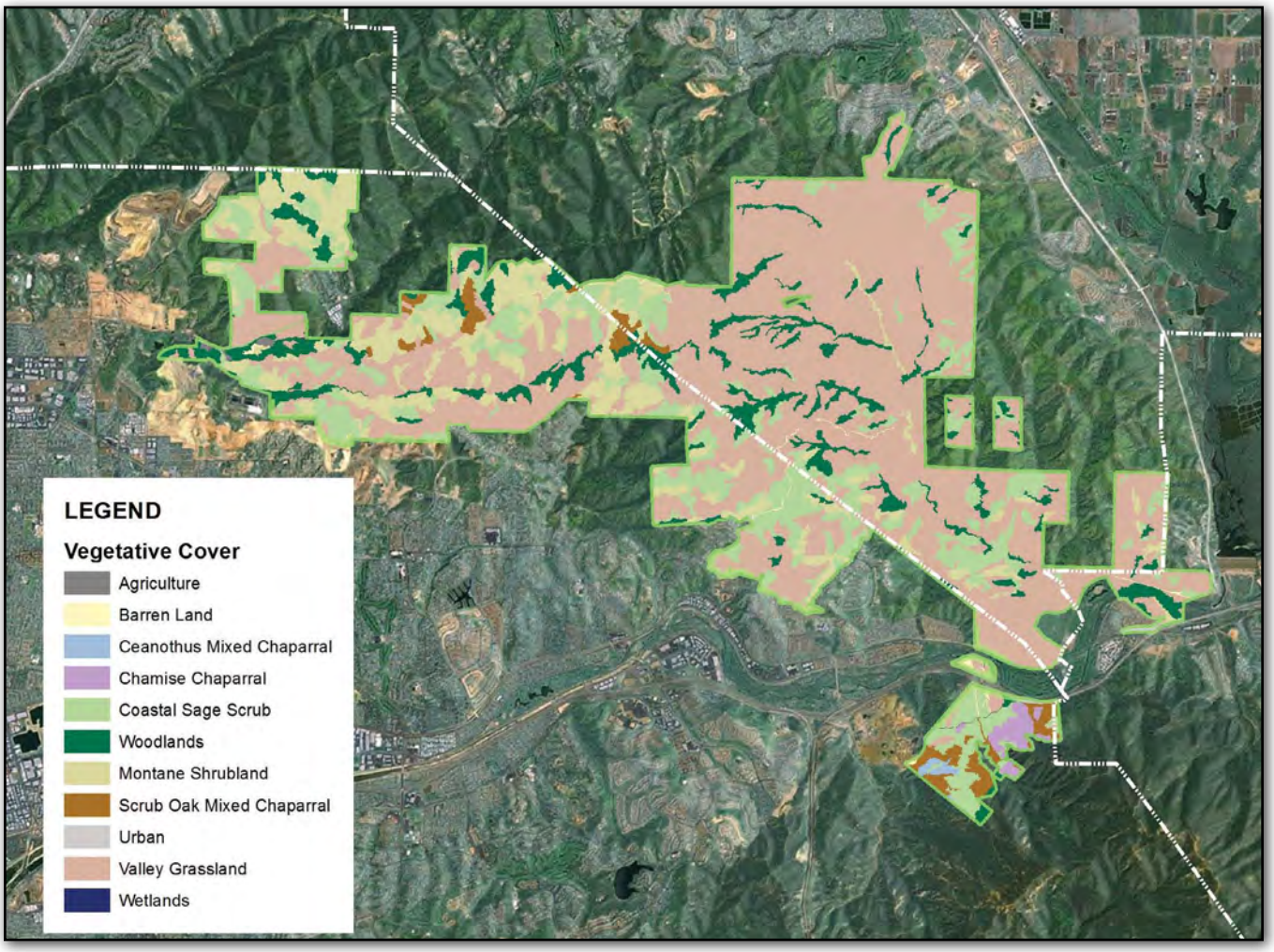

Figure 2. *Chino Hills State Park's vegetative cover provided by USDA Forest Service (EVEG Data) from 2002-2003.*

A wide variety of wildlife depend on the vegetative cover. Deer, bobcats, foxes, coyotes, raccoons, and the occasional mountain lion live in the hills. Falcons, hawks, owls, songbirds, and even golden eagles are protected in the Park. Several endangered birds are making a comeback as well.

Bicyclists, hikers, equestrians, photographers, campers, and other park enthusiasts frequent this natural area.

Ron Krueper, Coal Canyon Underpass (2003)

Hills For Everyone (HFE), a regional non-profit conservation organization, founded Chino Hills State Park in the early 1980s and has been working over the last 30 years to connect and protect this anchor parcel with protected lands in the Puente-Chino Hills Wildlife Corridor. Due to the work of HFE and State Parks, along with many other non-profits, agencies, and jurisdictions, a permanent connection at Coal Canyon was secured in 2001. Coal Canyon links the Trabuco District of the Cleveland National Forest in the Santa Ana Mountains with Chino Hills State Park and the greater Puente-Chino Hills ecosystem. This linkage provides a critical connection that allows wildlife to move freely between the Santa Ana Mountains and the Puente-Chino Hills. It also provides a source to repopulate natural areas should a catastrophic event, like a fire or disease outbreak, occur.

THE STUDY

After three decades of witnessing fires race through the hills and, in the aftermath of the 2008 Freeway Complex Fire which devastated the State Park, HFE launched a study to try to understand why so many fires burned in or adjacent to the State Park and to see if any actions could be taken to reduce the number of fires, resulting in the protection of both houses and natural resources. The study has resulted in the digital history of more than 100 fires that have burned between 1914 and 2011.

The Study Area includes lands generally bounded on the west by the 57 Freeway, Grand Avenue to the north, the 71 Freeway to the east, and the 91 Freeway to the south. The region studied includes all of Chino Hills State Park, but due to the proximity of other protected natural lands, portions of the northern section of the Cleveland National Forest's Trabuco District, the northern portion of the Irvine Ranch Lands (OC Parks), and the Prado Wetlands were also reviewed. Numerous private ownerships in Orange, Riverside, San Bernardino, and Los Angeles Counties that abut these protected lands were also included due to proximity.

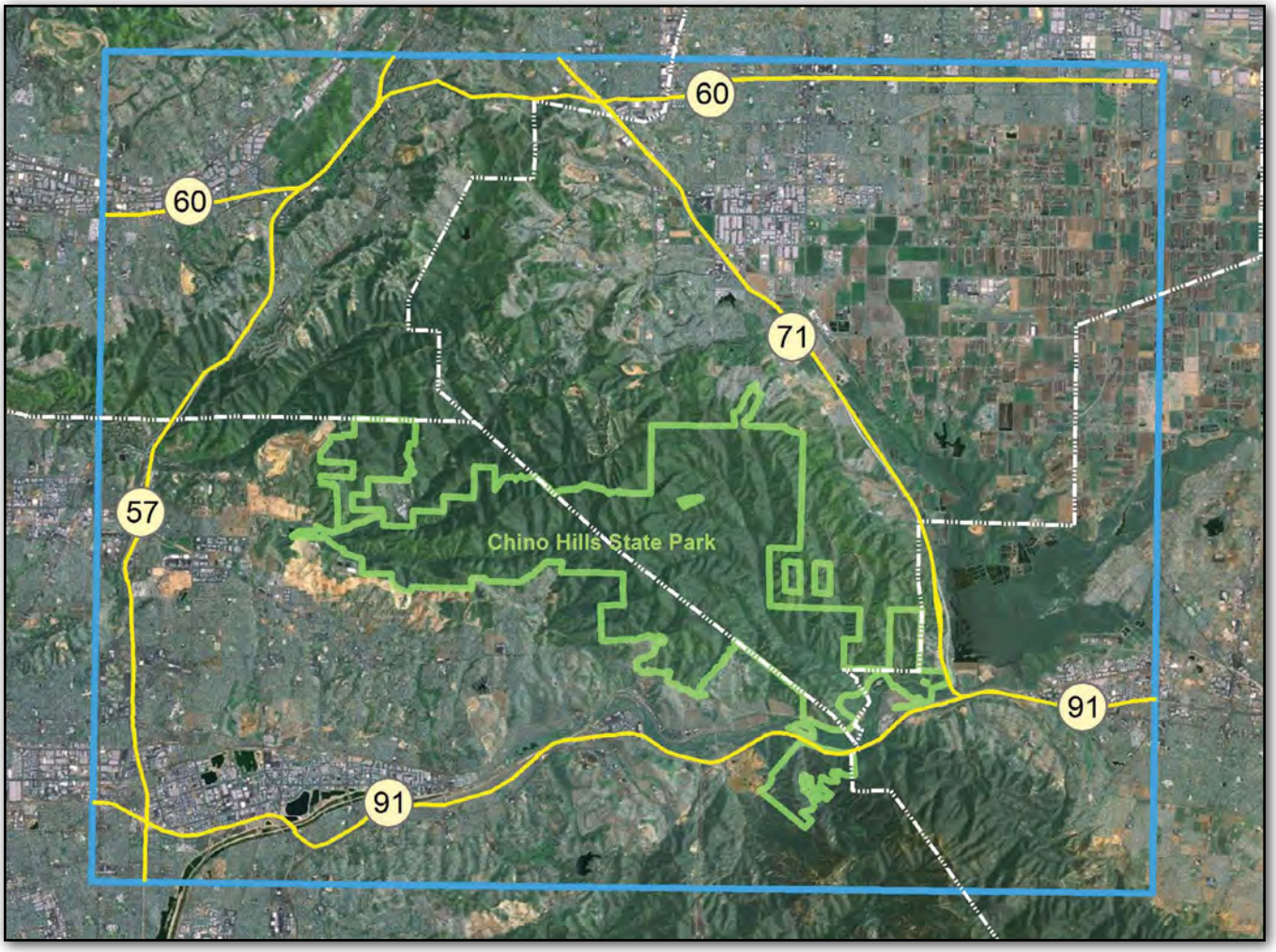

Figure 3. *The Study Area, shown in blue, includes Chino Hills State Park and surrounding hillsides.*

HFE had three main objectives in carrying out this study:

1. Using the data available document the fire perimeters, points of origin, causes, and weather conditions for each fire that burned in, adjacent to, or near Chino Hills State Park;
2. Analyze the results of the research and determine any fire-prone areas that needed particular attention; and
3. Provide general recommendations for residents and agencies to reduce the number of fires and impacts associated with wildland fires, and concurrently protect homes, people, and parkland from unnaturally frequent fires.

There are important terms used throughout this study and their meaning is useful to understand:

Cause: The confirmed or unconfirmed source of the wildland fire's ignition.

Fire Perimeter: The farthest geographical extent, also known as the outer boundary, of a fire. Note: Not all areas within the perimeter necessarily burned.

Fire Frequency: The number of times a specific geographic region has burned. This is similar to how population density is displayed, the darker the color the more frequent the area has burned.

Natural Fire Regime: The general classification of the role fire would play in the natural environment in the absence of modern human intervention.

Point of Origin: The approximate or exact location where the wildland fire ignited within the Study Area.

Study Area: Chino Hills State Park and environs.

Wildland-Urban Interface (WUI): The boundary between developed regions and the natural wildland areas.

Nancy Clifton Hawkes, Freeway Complex Fire (11/08)

Information Sources and GIS Analysis

HFE secured the shapefiles (digital data sets) of fire perimeters and points of origin from the California Department of Forestry and Fire Protection (CalFire), the Orange County Fire Authority (OCFA), and Chino Valley Independent Fire District (CVFD). Where appropriate, newspaper articles/maps, State Park Wildland Fire Reports, and personal accounts were used to digitally create a fire perimeter and/or point of origin. HFE used the ArcMap 10.1, a geographic information system (GIS) program, to assimilate the fire data. To enable wide distribution, the files were exported from ArcMap for use in Google Earth.

Through this research, HFE was able to piece together a digital dataset that outlines where known fires burned and where, and in some cases why, the fires started. Unfortunately, not all fires that burned in the Study Area were formally documented or no details about the perimeter or point of origin were complete enough to include in the study. Consequently, there are actually many additional fires that were not included in the study due to lack of adequate data. Historic record keeping for wildland fires wasn't as complete as it is now.

Fire Regime

HFE analyzed the fire regime (both natural and human-caused) of all documented fires that burned in, adjacent to, or had the potential to burn into Chino Hills State Park from 1914 – 2011. It seems in that 97 year history only two fires occurred naturally due to lightning strikes. This means the natural fire regime was one fire every 50 years. The balance of the fires (101) was caused by humans, either intentionally or unintentionally.

Fire Perimeters

HFE accumulated 71 separate fire perimeters in this study with 37 of those fires having known points of origin. The smallest fire is less than one acre, while the largest is over 41,000 acres.

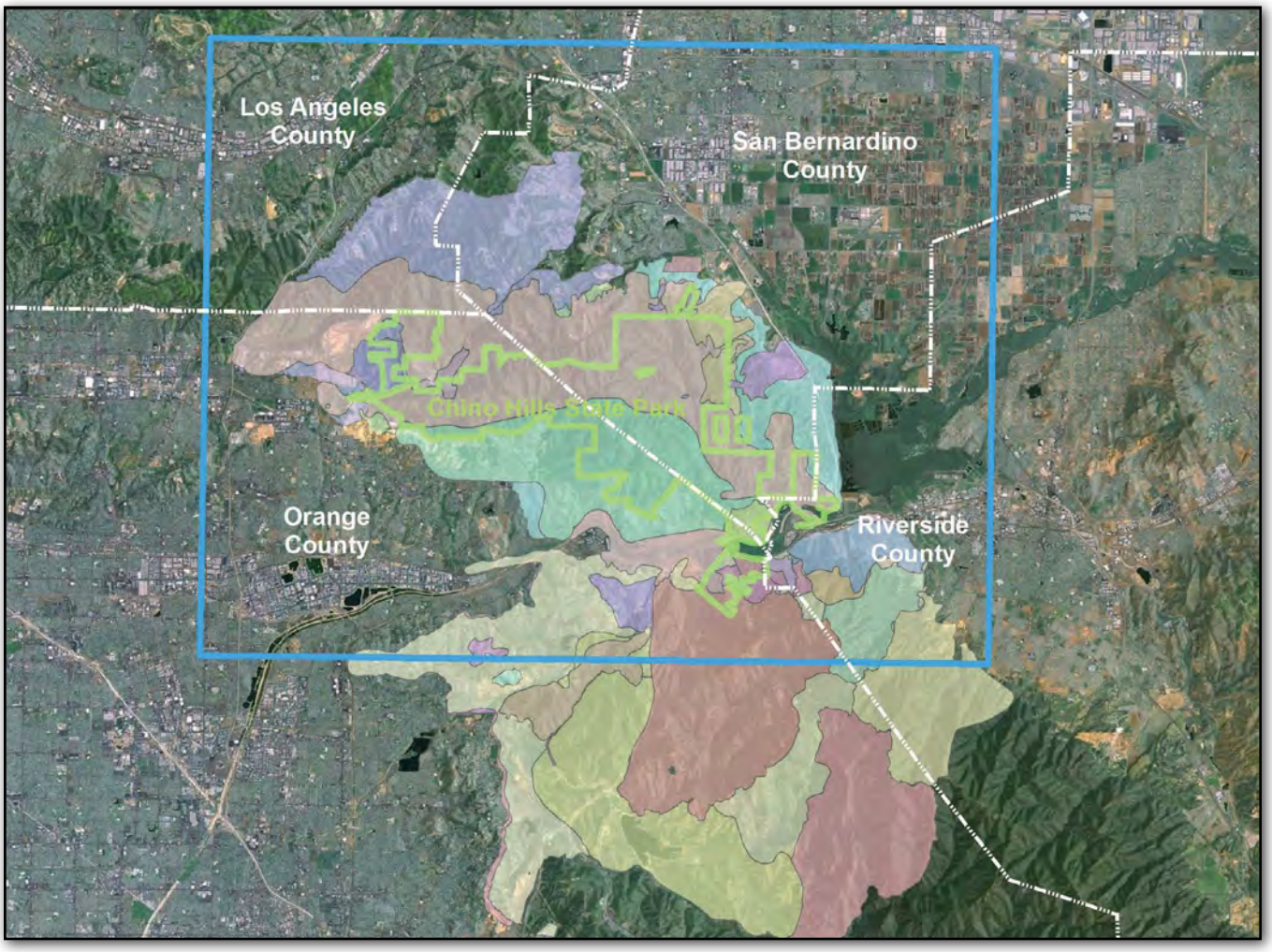

Figure 4. *The Study Area included 71 fire perimeters between 1914 - 2011.*

The three largest fires from the study include:

- Green River Fire - 41,285 acres
  November 1948
- Paseo Grande Fire - 39,872 acres
  October 1967
- Freeway Complex Fire - 30,306 acres
  November 2008

The first acquisition of parkland occurred in 1981 and since that date there has been increased pressure from residential development and road creation or expansions that have increased access to the undeveloped hills and the Park. It appears that the added housing developments at the WUI surrounding the Park have increased threefold the number of fires burning the Park. There were 26 fires between 1914-1980 and 76 fires between 1981-2011.

Claire Schlotterbeck, Freeway Complex Fire (11/08)

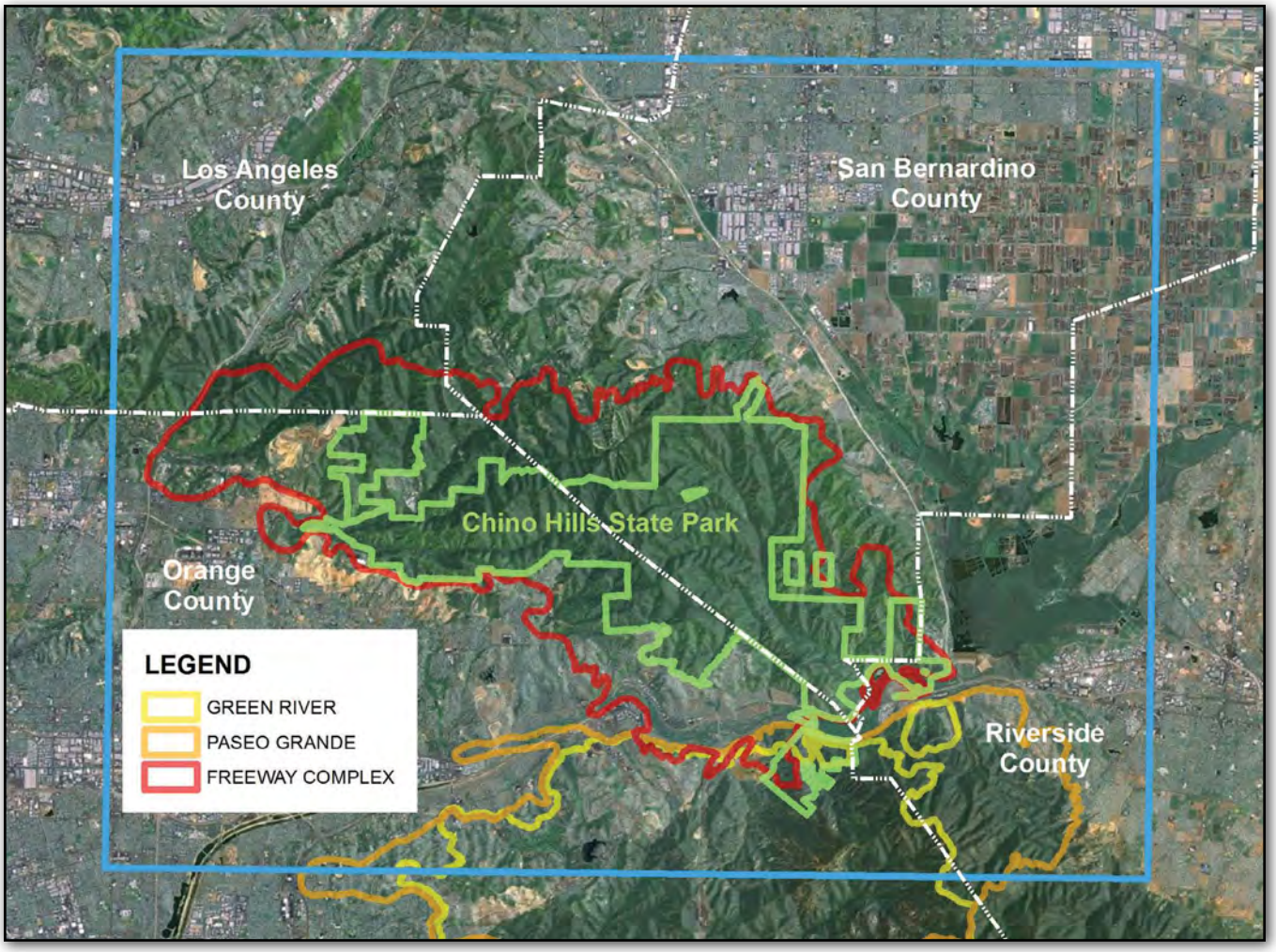

Figure 5. *The Study Area's three largest fires included the Green River, Paseo Grande, and Freeway Complex Fires.*

Fire Points of Origin

HFE documented 70 separate fire points of origin in this study, with 37 of the fires having known perimeters. The smallest fires are less than one acre in size, while the largest with a known point of origin is over 38,000 acres.

Claire Schlotterbeck, Green Fire (2/02)

Claire Schlotterbeck, Carbon Canyon Fire (9/90)

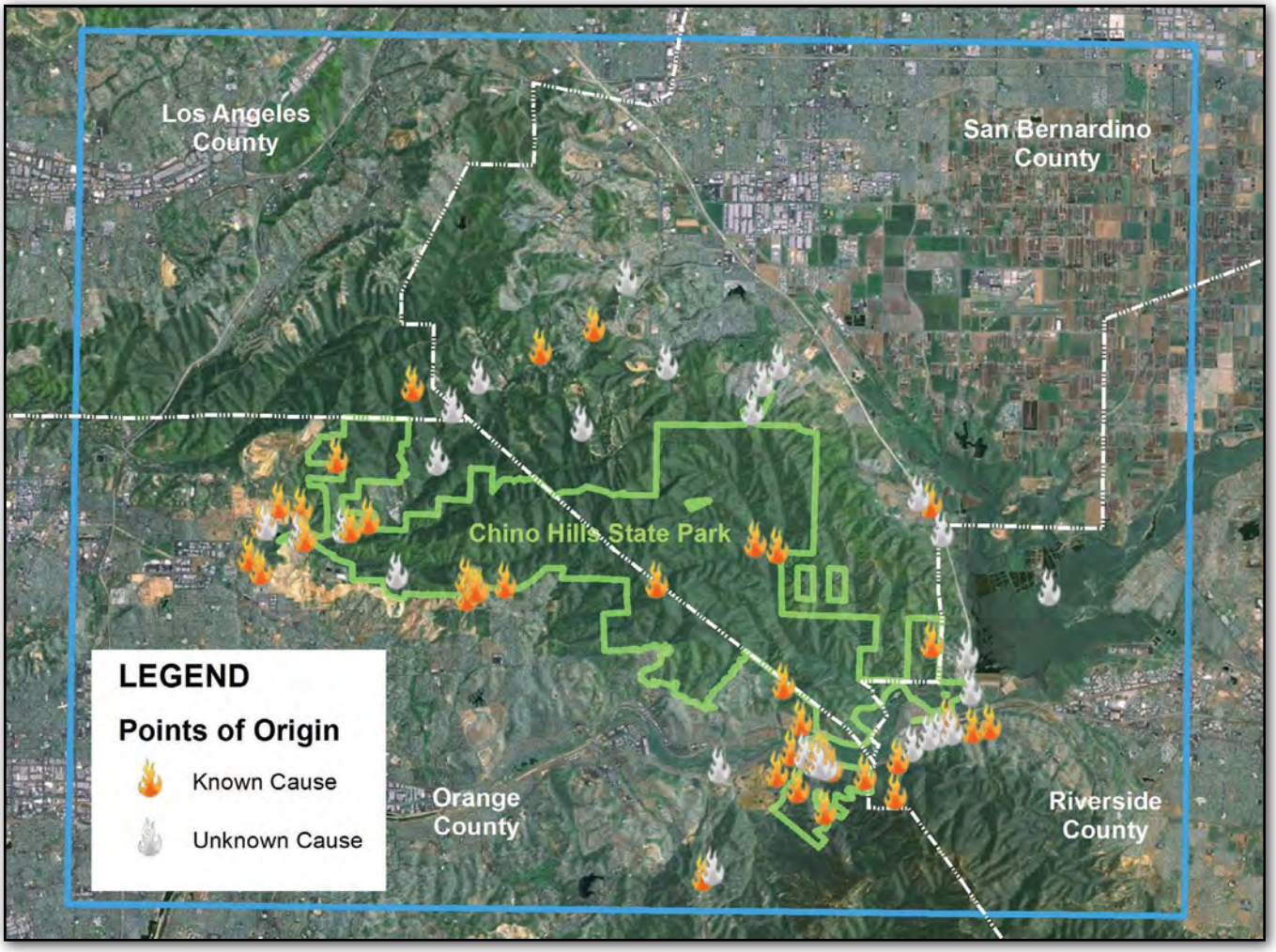

Figure 6. *The Study Area included 70 points of origin between 1914 - 2011, with some known causes and some unknown.*

The points of origin data indicate fires started due to a variety of causes. They are broken down as follows:

Table 1. *Fire causes, quantities, and total acreage burned.*

Cause	Number of Fires	Total Acreage Burned
Unknown	29	83,405*
Arson	9	9,349*
Power lines	7	53,048
Automobile	7	30,357*
Fireworks	5	10,316
Plane Crashes	5	829*
Machinery	4	393
Fire Agency**	2	14,150
Lightning	2	734
Total:	**70**	**202,599***

* indicates some acreages are unknown and therefore the number is actually higher than shown.
** indicates a re-ignited prescribed burn.

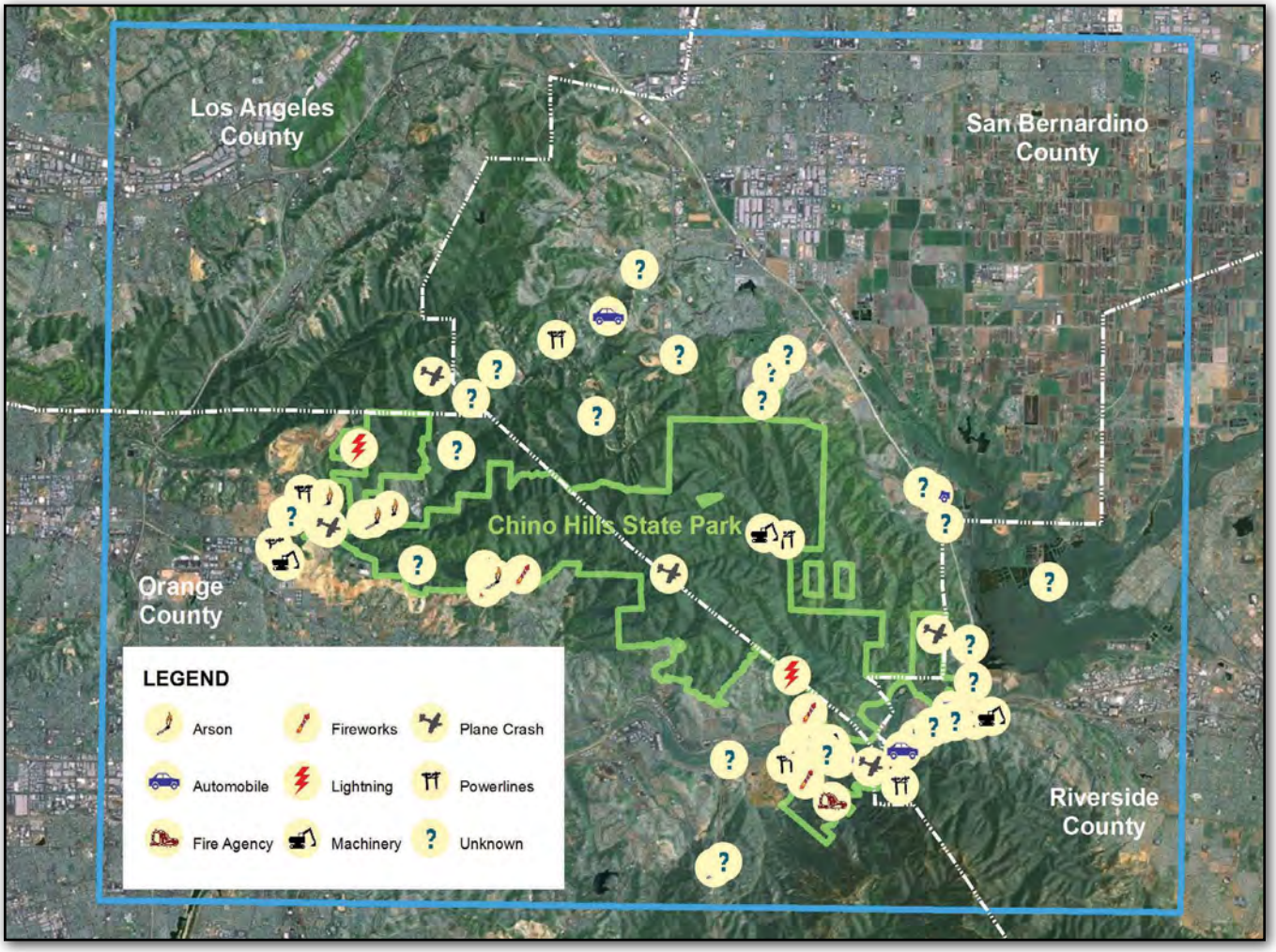

Figure 7. *The fire causes have been broken down into different categories with arson, power lines, and automobiles as the three main causes.*

Obtaining historic fire records was an issue during this study as 29 of the fires researched did not have a known or confirmed cause. The top three most identifiable causes of wildland fires in the Study Area are: arson, power lines, and automobiles.

Fire Frequency

By overlapping all the fire perimeters, HFE was able to determine the fire frequency in the Study Area. The lightest color on the map indicates that area only burned once. Whereas the darkest color on the map, a maroon color, indicates the area burned six or more times.

When one looks at the fire frequency and the points of origin there are obvious locations that have burned repeatedly. The data show the 91 Freeway Corridor (Santa Ana Canyon) between Anaheim and Corona, Carbon Canyon in Brea, and the Rim Crest entrance to Chino Hills State Park in Yorba Linda have burned the most. Later in this report, HFE will provide general recommendations for potential proactive steps to reduce the fire frequency at these known "hotspots."

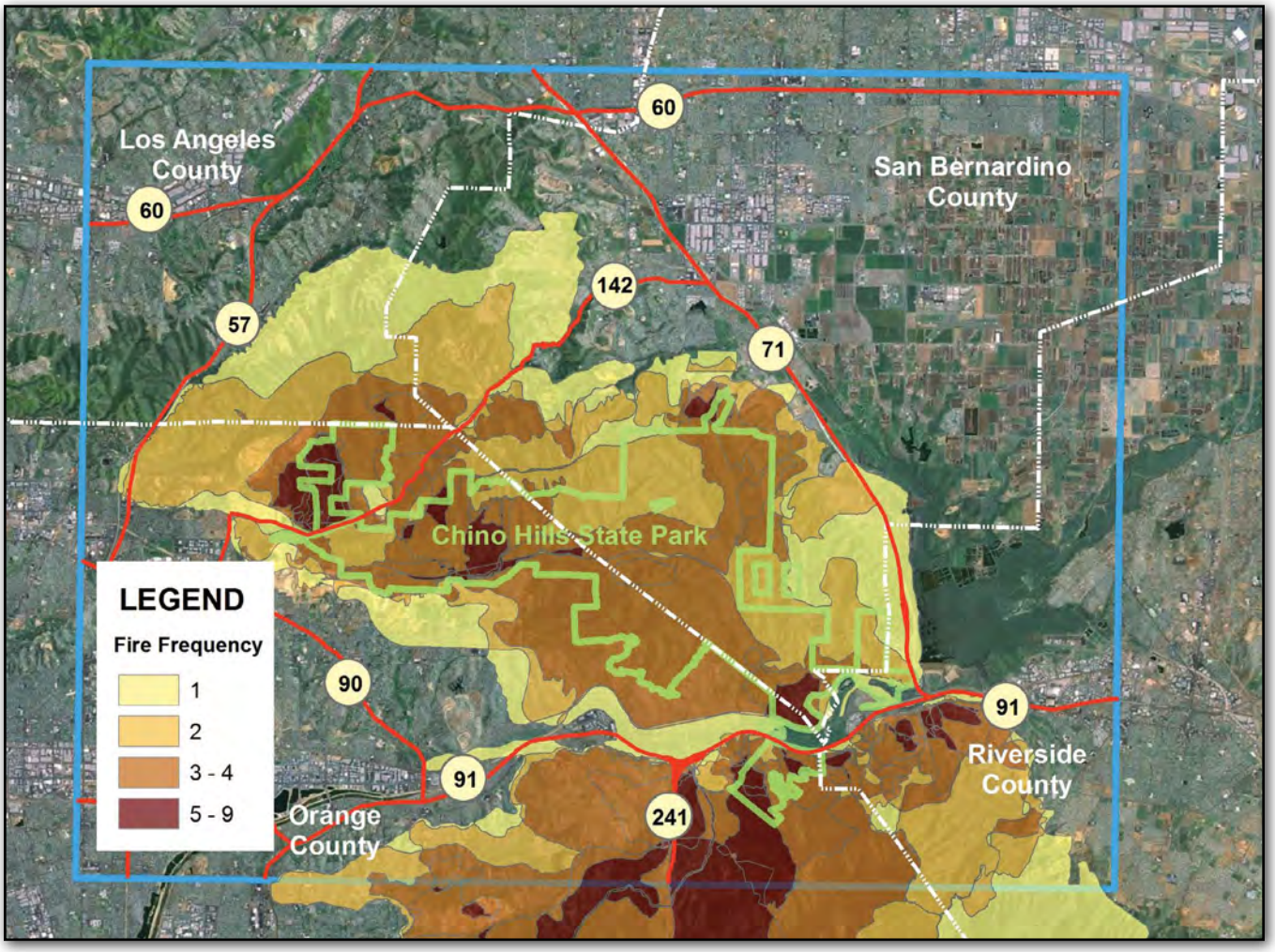

Figure 8. *The fire frequency shows three "hotspots:" the 91 Freeway Corridor, Carbon Canyon, and Rim Crest.*

Fires and Weather Patterns

The prevailing wind for this region is a westerly onshore flow and the majority of the fires occur during those normal conditions. The Santa Ana Winds (which come from the east/northeast) are the exception and as these winds tend to be hot and dry, fires that start under these extreme conditions have a tendency to get out of hand. The relative humidity and temperature play a significant role in reducing the fuel moisture in the vegetation, especially the fine dead fuel (such as annual grasses and mustard). It was noted in the After Action Report for the Freeway Complex Fire that due to the winds (gusts above 60 mph) and heat, "over 10,000 acres were consumed in the first 12 hours—roughly 14 acres per minute. That's nearly the length of 14 football fields every 60 seconds."[12] Consequently, Santa Ana Wind events are known for helping spread the fires and therefore require expanded and rapid fire protection presence.

Briefly, the feohn winds, known locally as Santa Ana Winds, are caused when high pressure systems sit inland and a low pressure system sits off the coast. In our area, the foehn/Santa Ana Winds are generated when the high pressure system is positioned over the high desert (Mojave and Great Basin). The winds blow from the southern side of the high pressure system toward the low pressure system over the Pacific Ocean. Typically they are hot and dry with a very low relative humidity (10-20%).[13] This is due to the compression of the wind after going up and over the mountains. Relative humidity indicates the ratio between the moisture in the air and the amount of moisture needed to saturate the air—it is a function of both moisture and temperature. Moisture in vegetation can be rapidly depleted in Santa Ana Wind conditions. Generally the finer the vegetation (grass) the quicker it dries out compared to a mature oak tree with a thick bark and a thick trunk.

Also researched were the weather patterns from the fires included in the study. Weather Underground and The Weather Channel websites were used to collect the data, using Chino Hills as the location. HFE was unable to obtain weather data before 1977.

Table 2. *Weather features during fire events.*

Weather Features on Fire Days		
Average Temperature was: (Data was available for 58 fires)	90°F	
Average Relative Humidity was: (Data was available for 34 fires)	51%	
Average Wind Speed was: (Data was available for 78 fires)	6 mph	
Average Wind Gusts were: (Data was available for 26 fires)	28 mph	
Wind Direction was: (The direction the wind originates from) (Data was available for 78 fires)	North (N, NE, NW)	11 fires
	East (E, ENE, ESE)	6 fires
	South (S, SE, SW)	16 fires
	West (W, WNW, WSW)	45 fires

[12] Orange County Fire Authority. After Action Report: Freeway Complex Fire. November 15, 2008. Retrieved 3 Aug 2012 from the OCFA website: *http://www.ocfa.org/_uploads/pdf/aar1_freeway.pdf*.

[13] National Oceanic and Atmospheric Administration. "Santa Ana Conditions – Southern California." Retrieved 20 June 2012 from the National Oceanic and Atmospheric Administration website: *http://www.noaawatch.gov/2008/santa_ana.php*.

Melanie Schlotterbeck, 91 Freeway Fire (6/10)

Duane Thompson, Carbon Canyon Fire (7/11)

Fires and Seasonal Patterns

It is not surprising that in the hotter, drier months between May and November there are more fires than in the moister winter months between December and April. There is a clear correlation between fire frequency and the summer months as seen in the table below. The majority of fires occur in July. However, October and November have the largest average acres burned. This is likely due to the fact that this is the end of the dry season and these months are prone to Santa Ana Wind conditions.

Table 3. *Fires by month, acreage burned, and average acreage burned.*

Month	Known Fires	Total Acreage Burned	Average Acreage Burned
Unknown	10	18,526*	2,058** (9 fires)
January	2	175*	175** (1 fire)
February	2	12,740	6,370
March	3	1,628*	814** (2 fires)
April	3	926	309
May	7	188	27
June	10	8,958	896
July	22	18,386*	919** (20 fires)
August	10	2,685*	298** (9 fires)
September	11	5,529*	614** (9 fires)
October	11	85,407*	8,541** (10 fires)
November	10	97,526	9,753
December	2	4*	4** (1 fire)
Total:	**103**	**252,678***	**2,717** (93 fires)**

* indicates some acreages are unknown and therefore the number is actually higher than shown.
** indicates acreages were averaged only where known fire acreages existed; if a fire acreage was unknown the fire was left out of the average.

CASE STUDY - THE 2008 FREEWAY COMPLEX FIRE

The power of zoning carries with it the responsibility for consequences.

Claire Schlotterbeck, Freeway Complex Fire (11/08)

The City of Yorba Linda has developed rapidly over the last 40 years. The data shows that Yorba Linda's population of 29,847 in 1980[14] had grown to 64,234 by 2011.[15] Despite the fact that many of the homes are relatively new and include fuel modification zones and other "ignition resistant" construction for the WUI, there was a tremendous loss of property in the 2008 Freeway Complex Fire. This case study outlines some of the fire statistics, anecdotes from Yorba Linda residents, and summarizes key points from the OCFA After Action Report.

The Freeway Complex Fire

On November 15, 2008 two fires started on opposite ends of the hills about two hours apart. The first fire ignited near the 91 Freeway on the eastern side of the hills in Corona by an automobile exhaust catching dry brush on fire, while the second fire began nearly 11 miles away to the northwest, in Brea, due to an unmaintained power line that also ignited dry brush.[16]

The weather conditions were ideal for a fire: 91°F, 4% relative humidity, sustained wind gusts at 35 mph (OCFA reports 43 mph with gusts at 60+ mph) coming from the northeast (a Santa Ana Wind event).[17] Due to the extreme weather conditions OCFA had ramped up its crews in the days preceding the fire.[18]

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[14] City Data. "Yorba Linda, California." Retrieved 31 Jul 2012 from the City Data website: *http://www.city-data.com/city/Yorba-Linda-California.html*.

[15] United States Census Bureau. "State and County Quick Facts." Retrieved 31 Jul 2012 from the U.S. Census Bureau website: *http://quickfacts.census.gov/qfd/states/06/0686832.html*.

[16] Orange County Fire Authority. Freeway Complex Fire - After Action Report.

[17] Weather Underground. "Fullerton Weather Station." Retrieved 1 Aug 2012 from the Weather Underground website: *http://www.wunderground.com/history/airport/KFUL/2008/11/15/DailyHistory.html?req_city=NA&req_state=NA&req_statename=NA*.

[18] Orange County Fire Authority. Freeway Complex Fire - After Action Report.

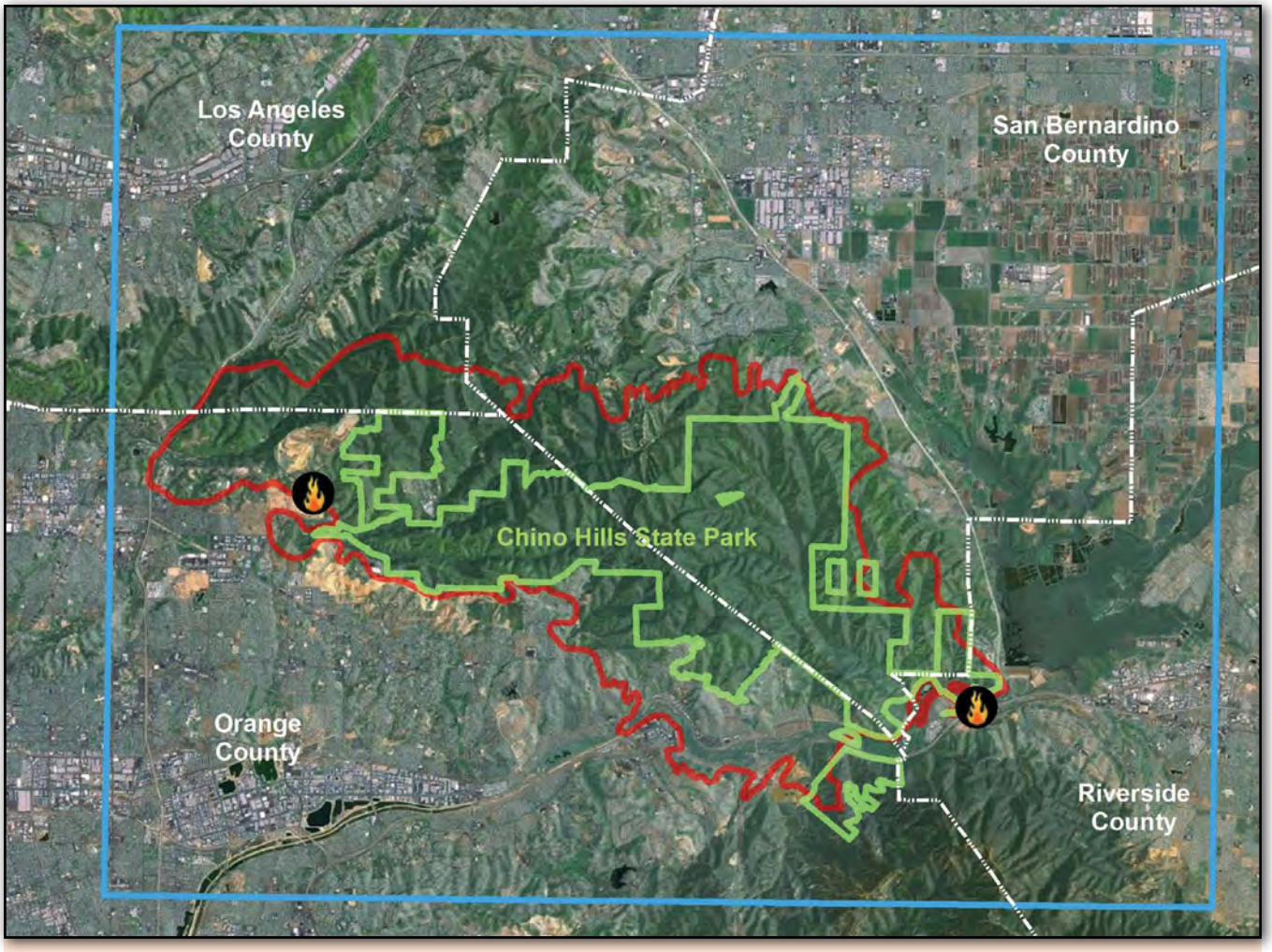

Figure 9. *The red outline indicates the fire perimeter for the Freeway Complex Fire of 2008 with its two points of origin.*

The Initial Timeline

The Corona Fire was reported at 9:01 AM. The first Orange County strike team arrived at 9:23 AM, and the first air assaults began at 10:10 AM. By 10:20 AM, OCFA reported the fire would reach the City of Yorba Linda within 30 minutes. The first 911 call to report the Brea fire arrived at 10:43 AM.[19] A personal account from a 911 caller revealed the dispatcher dismissed the notion that a new fire had started in Brea, stating the smoke the caller was seeing was from the Corona blaze. The caller relayed that flames could be seen from Carbon Canyon Road (in Brea), which is no where near the Corona blaze.

Nicholas Staddon, Freeway Complex Fire (11/08)

[19] Ibid.

Firefighting crews arrived on scene for the Olinda Landfill Fire by 10:55 AM.[20] The presence of this second fire, which immediately threatened homes, shifted the firefighting strategy. By 10:58 AM Yorba Linda's first home had already been destroyed.[21]

Yorba Linda on Fire

With many residents at home on a Saturday morning, they were witness to the quick moving Corona Fire. Residents began self evacuating and quickly clogged traffic on the major thoroughfares. Evacuees streamed down from the higher elevations making it harder for those closest to the thoroughfares to enter the traffic flow. The flood of cars brought the main east-west traffic corridors of Imperial Highway and Yorba Linda Boulevard to a standstill. In addition, due to the Corona fire, traffic was stopped on the other east-west corridor, the 91 Freeway. Fire trucks struggled to get to the fire as residents struggled to leave from the oncoming flames.[22]

> *"The fire moved through residential neighborhoods from Brush Canyon to the San Antonio neighborhood—a 5.5 mile span in less than five hours."*
> *— OCFA After Action Report, p. 36*

Bob Kanne, Freeway Complex Fire (11/08)

Anecdotal accounts from Yorba Linda residents describe the chaos of trying to evacuate during the firestorm. One resident stated, "people can't get out on San Antonio... [it was] a huge, huge traffic jam."[23] When exiting their neighborhoods they also hit gridlock on the major arterial of Yorba Linda Boulevard. One resident who lost his home had no time to even drive his cars out of the driveway. With no car to drive, he ended up directing traffic at Via Del Agua and Yorba Linda Boulevard. Evacuees from his neighborhood couldn't leave because there was no traffic signal to stop the flow of traffic.

A Predictable Disaster

This disaster was predictable since large fires on Santa Ana Wind days on east-west trending terrain have occurred over and over again. Land use decisions in the City of Yorba Linda may have contributed to placing residents, their homes, and businesses at risk. In late 2002 the City of Yorba Linda approved the Shapell project which allowed a threefold increase over the General Plan density.[24] It is uncertain whether mitigations for traffic impacts on major thoroughfares, in times of emergency, were adequate.

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[20] Ibid.

[21] Ibid.

[22] Ibid.

[23] The Weather Channel (Producer). Weathering Disaster: "Yorba Linda Fires" (Episode). (24 Sep 2011). Yorba Linda, CA: The Weather Channel.

[24] Los Angeles Times. "Yorba Linda Seeks to Rescind Development Vote." 5 Dec 2002. Retrieved 2 Aug 2012 from the Los Angeles Times website: http://articles.latimes.com/2002/dec/05/local/me-yorba5.

Melanie Schlotterbeck, Yorba Linda Flight (2008)

The Freeway Complex Fire burned down 187 homes, damaged another 131 homes and other structures[25] and burned 95% of Chino Hills State Park. According to the OCFA After Action Report: The Freeway Complex Fire burned "30,305 acres of watershed ... across six cities and four counties. [Fire] [s]uppression costs exceeded $16.1 million, and property loss has been estimated at nearly $150 million."[26]

Lessons Learned

If there are lessons to be learned, it seems there are opportunities for jurisdictions to revisit how their communities grow and where the most appropriate place for housing developments should be located. Cities and homeowners' associations must maintain defensible space at the WUI, buffering the homes from the edge of the WUI. When cities increase the density of a housing development but do not adequately increase the road capacity on arterials, evacuations during a fire storm are difficult, dangerous, and potentially disastrous.

Bob Kanne, Freeway Complex (11/08)

Even with more stringent building codes and relatively new houses, hundreds of homes were lost or damaged. According to Kris Concepcion of OCFA, "embers were getting into the attics of homes."[27] It seems there is still work to be done to harden homes from both flame fronts and ember storms. Most importantly, fleeing residents need to be able to evacuate safely.

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[25] Fire Department Network News. "Orange County Fire Authority Declares Full Containment Today of Triangle Complex Fire."

[26] Orange County Fire Authority. Freeway Complex Fire - After Action Report. p. 28.

[27] The Weather Channel. Weathering Disaster: "Yorba Linda Fires" (Episode).

Freeway Complex Fire Photos (11/08)

Dr. Jeff Hansen (Yorba Linda)

Bob Kanne (Yorba Linda)

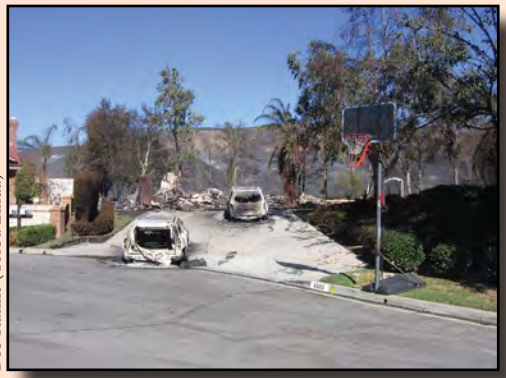
Bob Kanne (Yorba Linda)

© Lee Paulson (Diamond Bar) *used with permission*

Nicholas Staddon (Brea)

Nicholas Staddon (Brea)

Jeff Garvin (Chino Hills)



Bob Kanne (Yorba Linda)

RECOMMENDATIONS

The data demonstrate that there are three "hotspots" in the Study Area that show a propensity to burn: Santa Ana Canyon, Carbon Canyon, and Rim Crest. With that in mind HFE developed several suggestions for possible adoption by transportation and fire agencies, State Parks, cities, and homeowners. We recognize that these recommendations require appropriate staffing and reliable funding. HFE is willing to help develop the political will and partner on implementing these recommendations.

Melanie Schlotterbeck, Yorba Linda (8/12)

General Recommendations

- Enforcement of fire rules and regulations is essential if fires in this region are to be reduced. Develop an effective and funded mechanism for fining violators to improve safety.
- OCFA and citizens of Yorba Linda should organize and work together to increase fire safety as the neighboring Carbon Canyon Fire Safe Council has done.
- Communities around the hills should create volunteer Fire Watch programs that patrol streets on high wind days, like the Santiago Canyon area residents have implemented.
- Individual residents should take personal responsibility to improve the fire safety of their own homes.
- Jurisdictions should require the highest standard and state-of-the-art construction for fire prevention (e.g., installing passive closure attic vents, which close without human intervention).
- When planning for future development at the WUI, developers and lead agencies should involve fire agencies at the earliest planning stages.

Santa Ana Canyon Recommendations

- Harden the edges of the 91 Freeway that abut natural lands using K-rails or similar structures.
- Incorporate and enforce an appropriately frequent maintenance program for the power lines owned or operated by Edison and any other utility providers.
- The steep terrain and the wind tunnel effect of this east-west trending canyon heighten the threat of fire in this location. It seems prudent to add a new fire station at either Green River or Gypsum Canyon to improve response time to Santa Ana Canyon fires especially given that the 91 Freeway is often congested which reduces response time.
- Continue to increase fire patrols or fire agency presence on high wind/high heat/low humidity days on the 91 Freeway and neighboring streets/communities.
- Include Caltrans-type flashing signage on high fire hazard days alerting commuters to be cautious and report suspicious behavior.
- Improve safety by enforcing violations caused by agencies, contractors, and businesses that work along the Santa Ana Canyon. For example, agencies should requiring spotters and water trucks when working in or next to natural lands.

Carbon Canyon Recommendations

- Caltrans should continue to improve consistency on fuel clearance in a more timely fashion along Carbon Canyon Road (Highway 142). Spraying of the plants in the Caltrans right-of-way should occur early in the growing season, when the plants are small making handcrew removal easier and more economical.
- Consider reducing the participation for fire agency mutual aid for cities with a WUI and a history of fires. For example, the fire agencies serving Brea, Yorba Linda, and Chino Hills should be "at the bottom of the list" for sending mutual aid to other areas on high fire hazard days since they may have their own fire to respond to. Requests for mutual aid should first be made to more urbanized communities with no WUIs.
- Continue to increase fire agency presence and patrols during high wind/high heat/low humidity days.

Rim Crest Recommendations

- Include a door-to-door homeowner education program before fire season begins each year.
- Incorporate proactive steps by OCFA and the City of Yorba Linda for retrofitting homes with hardening techniques e.g., boxed eaves, automatic attic vent closures, roofs cleared of leaf debris, no ladder fuels near the house, etc.
- Remove non-native highly flammable vegetation (such as palm trees and pampas grass).
- Give fire risk the highest consideration in approving housing projects on the WUI.
- Continue fire agency presence and patrols during high wind/high heat/low humidity days.
- Require new developments to use native, fire resistance landscape to reduce ignition at the WUI and incorporate defensible space within the development.

CONCLUSION

This study shows that Chino Hills State Park and environs have endured significantly more fires, 101 to be exact, than would have naturally occurred by lightning strikes (2). Instead of a fire burning every 50 years in the natural fire regime, humans have increased the ratio essentially to a fire a year. HFE recognizes that a sample size of two fires is not enough to draw firm conclusions. However, our local examples of natural fires indicate fewer acres burn (367 acres) on average than fires ignited by humans or human error (2,494 acres). Natural fires tend to ignite on ridge tops with a lightning strike. The fire then generally spreads downhill and does so more slowly allowing firefighters more time to attack the blaze. Human-caused fires tend to start at a canyon bottom, where roads usually are, and race uphill.

As communities arose and developments were built, opportunities for fires to ignite at the WUI increased. It is clear from this research that humans have changed the natural fire regime—both intentionally and unintentionally. Some of the causes, like machinery hitting a rock igniting dry brush could be prevented. Risk could be reduced with the incorporation of fire spotters, restrictions on work during certain weather conditions, and the presence of water trucks. Other fires ignited by power lines seem to indicate the region would benefit from an improved maintenance schedule before the fire season begins.

Claire Schlotterbeck, Soquel Fire (10/78)

It is clear there are many more fires occurring here than would have occurred naturally and there are many consequences to having a fire a year burn in the region. First, there is an increased risk of loss of life, property, and natural resources, which all translate to a huge economic loss, not to mention personal losses, for a region each time it burns. Second, increased fires mean a shift in the type and location of vegetation that normally could have recovered in a natural fire regime. When burned too frequently the native vegetation does not have enough time, and in some cases stored energy, to regenerate or become mature enough to produce seeds. This stress on the native vegetation allows non-native plants to dominate the landscape. Finally, given the $150+ million investment made by private and public agencies in protecting and restoring the hills, it challenges the sensibilities to think of the State Park merely as fuel load. In the short-term, reducing the fuel load exacerbates the long-term problem of type conversion to highly flammable non-native fuels, which generally dry earlier, ignite easier, and spread fire faster than native plants. It was reported during the Freeway Complex Fire (2008) that the non-native 30 foot tall water-loving *Arundo donax* spread the flames up Carbon Canyon Creek toward the community of Sleepy Hollow. Riparian corridors are natural buffers to flames, but not when they are choked by non-native, highly flammable plants.

The responsibility for protection of the community from wildland fires lies first with the developer during the planning phase of the development. Governmental jurisdictions also share in this responsibility because decision makers have the power to approve or deny inappropriate developments at the WUI. Finally, private homeowners have the responsibility to learn the vulnerabilities of their home and take proactive steps to remedy them where possible. Additionally, the city and homeowners' associations must ensure proper maintenance of the defensible space within the community.

To reduce the unnatural frequency of fires to a more natural pace: education, outreach, planning, and a shift in approach is needed. HFE is committed to working with planners, natural resource, transportation, and fire agencies to reduce the fire frequency to a more natural fire regime in the Study Area.

Suggestions for Further Study

Due to capacity and time limitations, HFE was only able to report on the wildland fires (perimeters and points of origin), however HFE believes there are additional areas of study that would benefit fire prevention, resource protection, and planning efforts at the WUI. These include:

- An analysis of the effect of repeated wildfires on wildlife habitat and its effect on wildlife
- A historical analysis documenting the loss of valuable vegetation types and type conversion
- The effects wildfires have on wildlife movement, foraging, reproduction, and survival
- Whether enforcement measures for fire prevention are adequate
- The expansion of the WUI and its impacts on the Park

ACKNOWLEDGEMENTS

About the Authors

Claire and Melanie Schlotterbeck are conservation advocates specializing in the Puente-Chino Hills Wildlife Corridor. This mother-daughter team both work as long time consultants to HFE. Melanie is a technical consultant and works on GIS mapping, land acquisition, research projects, and outreach efforts. More recently, her efforts have resulted in acquisition and restoration projects that benefit the State Park. She earned her bachelor's degree in Environmental Geography and her Master of Science in Environmental Science from Cal State Fullerton. Claire Schlotterbeck is the Executive Director of HFE and has been involved in preservation of the Puente-Chino Hills for over three decades. She played a key role in the formation of the 14,100-acre Chino Hills State Park. Claire earned her bachelor's degree in Political Science from UCLA and a Master of Science from Purdue University.

HFE also gratefully recognizes the contributions of:

- CalFire, Orange County Fire Authority, and Chino Valley Independent Fire District for providing digital data for analysis and inclusion in this study.
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- Scott Carpenter of the National Weather Service for assisting HFE accumulate weather statistics on the wildland fires.
- GreenInfo Network for providing the initial mapping for this project.
- Dan Nove for his expertise in converting the GIS data to Google Earth and refinement of the maps for this project.
- Carbon Canyon Fire Safe Council, for its support of this project and efforts to educate canyon residents through its outreach and annual Wildfire Awareness Fair.
- The City of Brea, California Fire Safe Council, and the Santa Ana Watershed Association for their funding and work in restoring Carbon Creek through the *Arundo* removal project post Freeway Complex Fire.
- Drs. Rod and Carol McKenzie for their able editorial assistance.

APPENDIX A

Fire Perimeter Data

Fire Name	Fire Date	Acreage Burned	Cause	Point of Origin
Fuel Break (Historical)	—	132	—	—
Irvine Ranch	1914	14,830	Unknown	Unknown
Fresno Canyon*	1928	1,007	Unknown	Unknown
Gypsum*	1929	1,085	Unknown	Unknown
Carbon Canyon*	1930	733	Unknown	Unknown
Santa Ana Canyon	Nov. 8, 1943	9,375	Unknown	Unknown
Gaines	Sep. 22, 1944	270	Unknown	Unknown
Shell	July 2, 1947	118	Unknown	Unknown
Green River	Nov. 4, 1948	41,285	Unknown	Unknown
Nohl	June 21, 1951	176	Unknown	Unknown
Santiago	Oct. 15 ,1958	110	Unknown	Unknown
La Vida	Nov. 29, 1959	611	Unknown	Unknown
91 Freeway*	1962	139	Unknown	Unknown
Paseo Grande	Oct. 29, 1967	39,872	Unknown	Known
Firestone	Oct. 30, 1967	236	Unknown	Known
Tonner Canyon	June 13, 1971	9	Unknown	Unknown
Serranos	Sep. 9, 1973	304	Unknown	Known
Mine	July 28, 1977	4,956	Unknown	Unknown
Soquel	Oct. 23, 1978	5,428	Unknown	Known
Soquel Canyon*	Oct. 25, 1978	251	Unknown	Unknown
Los Sarranos [Serranos]	June 19, 1979	172	Unknown	Known
Paseo	Sep. 15, 1979	3,644	Smoldering Sleeper Fire	Known
Corona	1980	116	Unknown	Unknown
Green River	July 13, 1980	379	Unknown	Known
Owl	Oct. 28, 1980	18,332	Unknown	Known
Carbon Canyon	Nov. 16, 1980	14,613	Unknown	Known
Euclid	Oct. 30, 1981	714	Unknown	Known
Fresno Canyon*	Oct. 1982	211	Unknown	Unknown
Gypsum	Oct. 9, 1982	19,986	Power lines	Known

* indicates the fire name was assigned by Hills For Everyone.

Fire Perimeter Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Point of Origin
Santa Ana Canyon*	Fall 1983	443	Unknown	Unknown
Fresno*	July 12, 1983	642	Unknown	Unknown
91 Freeway*	July 13, 1983	1,618	Unknown	Unknown
Bane Canyon*	Sep. 14, 1983	581	Unknown	Unknown
Wardlow Wash*	July 8, 1984	114	Unknown	Unknown
Coal Canyon	July 9, 1984	450	Fireworks (Bottle Rocket)	Known
Coal Canyon	July 2, 1985	540	Plane Crash into Power lines	Known
Shell	Aug. 11, 1985	1,635	Unknown	Known
Green River	Oct. 6, 1985	Less than 1	Unattended Children	Known
Fresno Canyon*	Aug. 2, 1986	95	Unknown	Unknown
Bane Canyon*	June 24, 1988	820	Unknown	Unknown
South Ridge	May 24, 1989	5	Mower hit rock, ignited brush	Known
Aliso Canyon	June 29, 1989	44	Unknown	Unknown
Carbon Canyon	June 27, 1990	6,664	Arson	Known
Yorba	July 12, 1990	7,884	Model Rocket	Known
91 Freeway	July 5, 1991	50	Machinery	Known
San Juan Hill	June 10, 1992	249	Plane Crash	Known
Stagecoach	Oct. 26, 1993	581	Unknown	Unknown
91 Freeway*	1994	41	Unknown	Unknown
Carbon Canyon [Wagon]	June 25, 1994	757	Unknown	Known
91 Freeway*	Aug. 5, 1994	28	Unknown	Known
Highway 91	Aug. 26, 1995	177	Unknown	Unknown
Carbon Canyon	Aug. 31, 1998	733	Lightning	Known
Green	Feb. 9, 2002	2,234	Downed Power lines	Known
Evening	Apr. 21, 2002	893	Fireworks	Known
Blue Gum	Nov. 20, 2002	497	Arson	Known
Coal Canyon	July 12, 2003	2	Arson	Known
Green River	July 24, 2004	16	Car Crash	Known
Carbon Canyon	Sep. 25, 2004	18	Car Fire	Known

* indicates the fire name was assigned by Hills For Everyone.

Fire Perimeter Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Point of Origin
Yorba Linda	July 5, 2005	1,079	Fireworks	Known
Carbon Canyon	Aug. 4, 2005	1	Arson	Unknown
Sierra Peak	Feb. 6, 2006	10,506	Backfire	Known
Brush Canyon	July 11, 2006	1	Unknown	Unknown
Blue Gum	Aug. 2, 2006	3	Illegal Campfire	Unknown
241 Incident	Aug. 22, 2006	Less than 1	Unknown	Unknown
Windy Ridge [241 Incident]	Mar. 11, 2007	1,618	Burning Car (Arson)	Known
Rose	Apr. 12, 2007	8	Machinery	Known
Freeway Complex	Nov. 15, 2008	30,306	Auto Exhaust & Power lines	Known
241 Incident	Sep. 25, 2009	Less than 1	Unknown	Unknown
91 Freeway Incident	June 16, 2010	47	Unknown	Known
Carbon Canyon	July 11, 2011	518	Arson	Known
Rose Drive*	Nov. 2, 2011	5	Power lines	Known

* indicates the fire name was assigned by Hills For Everyone.

APPENDIX B

Fire Causes and Points of Origin Data

Fire Name	Fire Date	Acreage Burned	Cause	Perimeter
Sonome Canyon	Unknown	Unknown	Plane Crash	Unknown
Paseo Grande	Oct. 29, 1967	39,872	Unknown	Known
Firestone	Oct. 30, 1967	236	Unknown	Known
Serranos	Sep. 9, 1973	304	Unknown	Known
Soquel	Oct. 23, 1978	5,428	Unknown	Known
Los Sarranos [Serranos]	June 19, 1979	172	Unknown	Known
Paseo	Sep. 15, 1979	3,644	Smoldering Sleeper Fire	Known
Green River	July 13, 1980	379	Unknown	Known
Owl	Oct. 28, 1980	18,332	Unknown	Known
Carbon Canyon	Nov. 16, 1980	14,613	Unknown	Known
Euclid	Oct. 31, 1981	714	Unknown	Unknown
Gypsum Canyon	Oct. 9, 1982	19,986	Electric Lines	Known
Coal Canyon	July 9, 1984	450	Fireworks (Bottle Rocket)	Known
Coal Canyon	July 2, 1985	540	Plane Crash into Power lines	Known
Shell	Aug. 11, 1985	1,635	Unknown	Known
Green River	Oct. 6, 1985	Unknown	Unattended Children	Known
Coal Canyon	Apr. 21, 1987	25	Vehicle Fire	Unknown
Gypsum Canyon	May 12, 1987	20	Incendiary Device	Unknown
Coal Canyon	July 7, 1987	5	Unknown	Unknown
Coal Canyon	July 28, 1987	10	Unknown	Unknown
Rim Crest	Mar. 13, 1988	10	Kids with Matches	Unknown
Coal Canyon	May 13, 1988	3	Unknown	Unknown
La Vida	Dec. 4, 1988	Unknown	Unknown	Unknown
South Ridge	May 24, 1989	5	Mower hit rock, ignites brush	Known
Carbon Canyon	July 5, 1989	Unknown	Unknown	Unknown
Featherly Regional Park	July 14, 1989	Unknown	Unknown	Unknown

Fire Causes and Points of Origin Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Perimeter
Chino Hills State Park	Oct. 10, 1989	400	Unknown	Unknown
Carbon Canyon	June 27, 1990	6,664	Arson	Known
Yorba	July 12, 1990	7,884	Model Rocket	Known
Carbon Canyon	July 22, 1990	1	Unknown	Unknown
Carbon Canyon	July 27, 1990	2	Downed Power line	Unknown
91 Freeway	July 5, 1991	245	Machinery	Known
Coal Canyon	May 10, 1992	3	Unknown	Unknown
San Juan Hill	June 10, 1992	249	Plane Crash	Known
Chino Hills State Park	Sep. 8, 1992	500	Power lines	Unknown
Carbon Canyon	Nov. 15, 1993	40	Plane Crash	Unknown
Carbon Canyon [Wagon]	June 25, 1994	757	Unknown	Known
91 Freeway	Aug. 5, 1994	28	Unknown	Known
71 Freeway	Dec. 19, 1994	4	Unknown	Unknown
Carbon Canyon	June 24, 1998	20	Road Flare (Arson)	Unknown
Carbon Canyon	Aug. 31, 1998	733	Lightning	Known
Chino Hills State Park	Jan. 19, 1999	Unknown	Plane Crash	Unknown
Woodview	Sep. 12, 2000	200	Unknown	Unknown
Chino Hills Parkway	Sep. 18, 2000	2	Unknown	Unknown
Green	Feb. 9, 2002	2,234	Downed Power lines	Known
Evening	Apr. 21, 2002	893	Fireworks	Known
71 Freeway	Aug. 3, 2002	10	Car Exhaust Pipe	Unknown
Blue Gum	Nov. 20, 2002	497	Arson	Known
Coal Canyon	July 12, 2003	2	Arson	Known
71 Freeway	Aug. 19, 2003	3	Unknown	Unknown
Coal Canyon	May 30, 2004	2	Unknown	Unknown
Green River	July 24, 2004	16	Car Crash	Known
Carbon Canyon	Sep. 25, 2004	18	Car Fire	Known

Fire Causes and Points of Origin Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Perimeter
Yorba Linda	July 5, 2005	1,079	Illegal Fireworks	Known
Sierra Peak	Feb. 6, 2006	10,506	Back Fire	Known
Brush Canyon	July 23, 2006	1	Lightning	Unknown
Feldspar	Sep. 26, 2006	Unknown	Car Crash	Unknown
Red Star	Jan. 7, 2007	175	Unknown	Unknown
Windy Ridge [241 Incident]	Mar. 11, 2007	1,618	Burning Car (Arson)	Known
Rose	Apr. 12, 2007	3	Machinery	Known
Coal Canyon	May 7, 2007	140	Caltrans Machinery	Unknown
Western Hills	May 16, 2008	15	Downed Power lines	Unknown
Freeway Complex	Nov. 15, 2008	30,306	Auto Exhaust Power lines	Known
Windy Ridge	Nov. 25, 2009	80	Unknown	Unknown
Coal Canyon	Mar. 16, 2010	Unknown	Car Accident	Unknown
91 Freeway Incident	June 16, 2010	47	Unknown	Known
Quarter Horse	Sep. 4, 2010	10	Fireworks	Unknown
Carbon Canyon	July 11, 2011	518	Arson	Known
Rose Drive	Nov. 2, 2011	5	Power lines	Known

APPENDIX C

All Fires Combined (Perimeters and Points of Origin) Data

Fire Name	Fire Date	Acreage Burned	Cause	Data Type
Fuel Break (Historical)	—	132	—	Perimeter
Sonome Canyon	Unknown	Unknown	Plane Crash	Point of Origin
Irvine Ranch	1914	14,830	Unknown	Perimeter
Fresno Canyon*	1928	1,007	Unknown	Perimeter
Gypsum*	1929	1,085	Unknown	Perimeter
Carbon Canyon*	1930	733	Unknown	Perimeter
Santa Ana Canyon	Nov. 8, 1943	9,375	Unknown	Perimeter
Gaines	Sep. 22, 1944	270	Unknown	Perimeter
Shell	July 2, 1947	118	Unknown	Perimeter
Green River	Nov. 4, 1948	41,285	Unknown	Both
Nohl	June 21, 1951	176	Unknown	Perimeter
Santiago	Oct. 15, 1958	110	Unknown	Perimeter
La Vida	Nov. 29, 1959	611	Unknown	Perimeter
91 Freeway*	1962	139	Unknown	Perimeter
Paseo Grande	Oct. 29, 1967	39,872	Unknown	Both
Firestone	Oct. 30, 1967	236	Unknown	Both
Tonner Canyon	June 13, 1971	9	Unknown	Perimeter
Serranos	Sep. 9, 1973	304	Unknown	Both
Mine	July 28, 1977	4,956	Unknown	Perimeter
Soquel	Oct. 23, 1978	5,428	Unknown	Both
Soquel Canyon*	Oct. 25, 1978	251	Unknown	Perimeter
Los Serranos [Serranos]	June 19, 1979	172	Unknown	Both
Paseo	Sept. 15, 1979	3,644	Smoldering Sleeper Fire	Both

* indicates the fire name was assigned by Hills For Everyone.

All Fires Combined (Perimeters and Points of Origin) Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Data Type
Corona	1980	116	Unknown	Perimeter
Green River	July 13, 1980	379	Unknown	Both
Owl	Oct. 28, 1980	18,332	Unknown	Both
Carbon Canyon	Nov. 16, 1980	14,613	Unknown	Both
Euclid	Oct. 30, 1981	714	Unknown	Both
Fresno Canyon*	Oct. 1982	211	Unknown	Perimeter
Gypsum	Oct. 9, 1982	19,986	Power lines	Both
Santa Ana Canyon*	Fall 1983	443	Unknown	Perimeter
Fresno*	July 12, 1983	642	Unknown	Perimeter
91 Freeway*	July 13, 1983	1,618	Unknown	Perimeter
Bane Canyon*	Sep. 14, 1983	581	Unknown	Perimeter
Wardlow Wash*	July 8, 1984	114	Unknown	Perimeter
Coal Canyon	July 9, 1984	450	Fireworks (Bottle Rocket)	Both
Coal Canyon	July 2, 1985	540	Plane Crash into Power lines	Both
Shell	Aug. 11, 1985	1,635	Unknown	Both
Green River	Oct. 6, 1985	Less than 1	Unattended Children	Both
Fresno Canyon*	Aug. 2, 1986	95	Unknown	Perimeter
Coal Canyon	Apr. 21, 1987	25	Vehicle Fire	Point of Origin
Gypsum Canyon	May 12, 1987	20	Incendiary Device	Point of Origin
Coal Canyon	July 7, 1987	5	Unknown	Point of Origin
Coal Canyon	July 28, 1987	10	Unknown	Point of Origin
Rim Crest	Mar. 13, 1988	10	Kids with Matches	Point of Origin
Coal Canyon	May 13, 1988	3	Unknown	Point of Origin
Bane Canyon*	June 24, 1988	820	Unknown	Perimeter
La Vida	Dec. 4, 1988	Unknown	Unknown	Point of Origin
South Ridge	May 24, 1989	5	Mower hit rock, ignited brush	Both
Aliso Canyon	June 29, 1989	44	Unknown	Perimeter
Carbon Canyon	July 5, 1989	Unknown	Unknown	Point of Origin
Featherly Regional Park	July 14, 1989	Unknown	Unknown	Point of Origin

* indicates the fire name was assigned by Hills For Everyone.

All Fires Combined (Perimeters and Points of Origin) Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Data Type
Chino Hills State Park	Oct. 10, 1989	400	Unknown	Point of Origin
Carbon Canyon	June 27, 1990	6,664	Arson	Both
Yorba	July 12, 1990	7,884	Model Rocket	Both
Carbon Canyon	July 22, 1990	1	Unknown	Point of Origin
Carbon Canyon	July 27, 1990	2	Downed Power lines	Point of Origin
91 Freeway	July 5, 1991	50	Machinery	Both
Coal Canyon	May 10, 1992	3	Unknown	Point of Origin
San Juan Hill	June 10, 1992	249	Plane Crash	Both
Chino Hills State Park	Sep. 8, 1992	500	Power lines	Point of Origin
Stagecoach	Oct. 26, 1993	581	Unknown	Perimeter
Carbon Canyon	Nov. 15, 1993	40	Plane Crash	Point of Origin
91 Freeway*	1994	41	Unknown	Perimeter
Carbon Canyon [Wagon]	June 25, 1994	757	Unknown	Both
91 Freeway*	Aug. 5, 1994	28	Unknown	Both
71 Freeway	Dec. 19, 1994	4	Unknown	Point of Origin
Highway 91	Aug. 26, 1995	177	Unknown	Perimeter
Carbon Canyon	June 24, 1998	20	Road Flare (Arson)	Point of Origin
Carbon Canyon	Aug. 31, 1998	733	Lightning	Both
Chino Hills State Park	Jan. 19, 1999	Unknown	Plane Crash	Point of Origin
Woodview	Sep. 12, 2000	200	Unknown	Point of Origin
Chino Hills Parkway	Sep. 18, 2000	2	Unknown	Point of Origin
Green	Feb. 9, 2002	2,234	Downed Power lines	Both
Evening	Apr. 21, 2002	893	Fireworks	Both
71 Freeway	Aug. 3, 2002	10	Car Exhaust Pipe	Point of Origin
Blue Gum	Nov. 20, 2002	497	Arson	Both
Coal Canyon	July 12, 2003	2	Arson	Both
71 Freeway	Aug. 19, 2003	3	Unknown	Point of Origin

* indicates the fire name was assigned by Hills For Everyone.

All Fires Combined (Perimeters and Points of Origin) Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Data Type
Coal Canyon	May 30, 2004	2	Unknown	Point of Origin
Green River	July 24, 2004	16	Car Crash	Both
Carbon Canyon	Sep. 25, 2004	18	Car Fire	Both
Yorba Linda	July 5, 2005	1,079	Fireworks	Both
Carbon Canyon	Aug. 4, 2005	1	Arson	Perimeter
Sierra Peak	Feb. 6, 2006	10,506	Backfire	Both
Brush Canyon	July 11, 2006	1	Unknown	Perimeter
Brush Canyon	July 23, 2006	1	Lightning	Point of Origin
Blue Gum	Aug. 2, 2006	3	Illegal Campfire	Perimeter
241 Incident	Aug. 22, 2006	Less than 1	Unknown	Perimeter
Feldspar	Sep. 26, 2006	Unknown	Car Crash	Point of Origin
Red Star	Jan. 7, 2007	175	Unknown	Point of Origin
Windy Ridge [241 Incident]	Mar. 11, 2007	1,618	Burning Car (Arson)	Both
Rose	Apr. 12, 2007	8	Machinery	Both
Coal Canyon	May 7, 2007	140	Caltrans Machinery	Point of Origin
Western Hills	May 16, 2008	15	Downed Power lines	Point of Origin
Freeway Complex	Nov. 15, 2008	30,306	Auto Exhaust & Power lines	Both
241 Incident	Sep. 25, 2009	Less than 1	Unknown	Perimeter
Windy Ridge	Nov. 25, 2009	80	Unknown	Point of Origin
Coal Canyon	Mar. 16, 2010	Unknown	Car Accident	Point of Origin
91 Freeway Incident	June 16, 2010	47	Unknown	Both
Quarter Horse	Sep. 4, 2010	10	Fireworks	Point of Origin
Carbon Canyon	July 11, 2011	518	Arson	Both
Rose Drive*	Nov. 2, 2011	5	Power lines	Both

* indicates the fire name was assigned by Hills For Everyone.

HILLS FOR EVERYONE

P.O. Box 9835 • Brea, CA 92822 • *www.HillsForEveryone.org*

Letter: POHH-Roizman

Daniel Roizman
4700 Blue Mountain dr.
Yorba Linda CA 92887

November 13 , 2013

Via E-Mail and U.S. Mail

Orange County Planning
Attn: Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:

I am writing to request an extension of the public comment period for the subject draft EIR. There are complex legal and technical issues surrounding the Cielo Vista Project and the County's Draft EIR. Almost concurrently, the County is also in process of releasing the proposed Esperanza Hills Project on adjacent parcels directly east of the proposed Cielo Vista site. Because the Esperanza Hills development is a consequence of the Cielo Vista Project and both projects will share access easements and utilities connections, the two projects should be evaluated together. The near simultaneous release of these projects expands and complicates the scope of issues raised by the Cielo Vista Draft EIR.

A six-week comment period is blatantly insufficient for a thorough review by the public that CEQA proscribes. In addition, the public comment period runs through and closes within the winter holiday season, which precludes the public from making an effective response on the Cielo Vista Draft EIR. If not extended, the current comment period would result in minimal public response and participation. As the lead agency in this development process, at the doorstep of the City of Yorba Linda, the County should advocate for achieving maximum public participation in the important environmental review phase of both this and the Esperanza Hills Draft EIR process.

In view of both the complexity of technical data to be reviewed and the burden to the public to review such voluminous data during the holiday season, I respectfully request that the County lengthen the public comment period by 30 days which would extend responses to January 22, 2014. Thank you in advance for your approval of this request.

Very truly yours,

Daniel Roizman

Protect Our Homes and Hills
Yorba Linda

Cc: The Honorable Todd Spitzer, Supervisor
Third District, County of Orange
10 Civic Center Plaza
Santa Ana, CA 92701

Emailed to: Ron.Tippets@ocpw.ocgov.com
Todd.Spitzer@ocgov.com

Letter: POHH-Sinner

From: Barbara Sinner [mailto:barbsinner@gmail.com]
Sent: Tuesday, November 12, 2013 10:24 PM
To: Tippets, Ron
Subject: request for extension

Barbara Sinner

4520 San Antonio Road

Yorba Linda, CA 92886

November 12, 2013

Via E-Mail and U.S. Mail

Orange County Planning

Attn: Ron Tippets

300 N. Flower Street

Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:

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Very truly yours,

Barbara Sinner, Member

Protect Our Homes and Hills

Yorba Linda

Cc: The Honorable Todd Spitzer, Supervisor

Third District, County of Orange

10 Civic Center Plaza

Santa Ana, CA 92701

Letter: Allison

From: Bob Allison [mailto:boballison123@gmail.com]
Sent: Monday, January 06, 2014 8:27 AM
To: Tippets, Ron
Cc: Green2go Allison
Subject: Cielo Vista project

Dear Mr Tippets,

My name is Bob Allison I live at 4480 San Antonio Road in Yorba Linda. I am writing to you to please help support the residence of Yorba Linda and do everything you can to stop the Cielo Vista project. I lost my house in the November 2008 Complex Fire. Thankfully I was able to safely evacuate the area with my family (and dog). However it was not easy to safely get out of the area, San Antonio road was a gridlock of cars, instead of driving down San Antonio road toward Yorba Linda Blvd. I had to drive up San Antonio road, toward the fire as going down the road was blocked with traffice. Luckily we got out. I know that if the Cielo Vista project goes forward we will not all get out when the next fire hits us. We cannot think that another fire will not happen, it will it's just a matter of when! Adding more families (houses) into these canyons is not a good idea and it will end badly. I'm all for development and progress, however we love where we live and want to keep it safe for our families. Please help us protect what we have all worked so hard for; a safe place for our families to live!

Thank you for your help.

Kind regards,
Bob Allison

Letter: Bartels1

Cielo Vista Project – Proposed Single-Family Residential Development
Community Open House
Comment Form

The County of Orange welcomes your comments on the environmental review process. Your comments will assist us in better understanding your concerns regarding the proposed Project.

You may submit your comments to County staff at the Community Open House on December 16, 2013, or if you prefer, you can mail, FAX, hand deliver, or e-mail your comments to OC Planning, attention Ron Tippets, Project Planner, **by January 7, 2014.**

Mail: P.O. Box 4048
Santa Ana, CA 92702-4048

Hand Delivery: 300 North Flower Street, 3rd Floor
Santa Ana, CA 92702-4048

Fax: (714) 796-0307

E-mail: Ron.Tippets@ocpw.ocgov.com

Telephone: (714) 667-8856

1. What specific comments do you have on the issues analyzed in the Draft EIR?

Aesthetics

SYNOPSIS- The Draft EIR fails and lacks credibility due to the fact that it does not address the most important aspect of a proposed development in a **VERY HIGH RISK FIRE ENVIRONMENT**. This area was ground zero in the **2008 Freeway Complex Fire**. Yet the EIR offers no scenario of how the additional 200+ vehicles that this project will add are going to evacuate over the same roads that in 2008 were over capacity during that evacuation. There is no mathematical or computer modeling done. There are no interviews done with residents who experienced the 2008 evacuation. There is no satellite or aerial photography showing the evacuation route. There are no maps/diagrams showing how an additional 200+ vehicles will evacuate. This development offers one way in and one way out- and the one way out during a fire is to an evacuation route that cannot support the additional traffic flow. **IGNORING THIS COMPONENT CONSTITUTES A CONVENIENT OMISSION AND CONCEALMENT OF THE TRUTH AND RENDERS THE DOCUMENT IN IT'S ENTIRETY NON-CREDIBLE. WHAT ELSE DID THE DEVELOPER CONCEAL OR OMIT IN THIS DOCUMENT?** See Attachments for additional comments.

It is an **INSULT** to every Yorba Linda resident who experienced and survived the 2008 Freeway Complex Fire for this draft EIR to ignore this event **AND PRETEND LIKE IT NEVER HAPPENED.** To put profit and government revenue ahead of the safety of established residents is inexcusable.

THE COUNTY NEEDS TO LOOK CLOSELY AT A DEVELOPER THAT WOULD IGNORE THIS CRITICAL COMPONENT IN A DOCUMENT LIKE THE EIR. THIS OMISSION IS CRIMINAL. IT ENDANGERS THE LIVES OF EXISTING RESIDENTS. IT ENDANGERS THE LIVES OF PROSPECTIVE RESIDENTS. THIS IS A LIFE AND DEATH ISSUE AND I HEREBY PROTEST AND PUT ON NOTICE BOTH THE COUNTY AND DEVELOPER.

I WILL OFFER THIS WRITTEN WARNING FOR USE IN ANY CRIMINAL OR CIVIL LITIGATION AGAINST ANYONE WHO CONCEALS THE TRUTH REGARDING THIS LIFE OR DEATH ISSUE IN THE EVENT OF BODILY INJURY OR LOSS OF LIFE.

Robert G Bartels
4750 Blue Mountain Drive
Yorba Linda, Ca 92887

Robert G Bartels
4730 Blue Mountain Drive
Yorba Linda, Ca 92887

1) Fire Hazard- I witnessed the fire and it's devastating effects in 2008. The dynamics involved in prevailing winds driving a fire with 20'-30' high flames through the canyon that traverses this development are catastrophic and creates a blow torch effect and throws a storm of embers well ahead of the fire that cannot be addressed by brush mitigation or fuel modification zones. People will die.

2) Evacuation during fire or disaster- I witnessed the bottleneck of traffic on Stonehaven/Via Del Agua during the 2008 fire. People in a panic do not evacuate in an orderly fashion. It is chaotic and adding another feeder street increases the likelihood of a traffic accident. An accident on the evacuation route would be CATASTROPHIC by closing the evacuation route-possibly for the duration of the evacuation as no emergency vehicles can respond to the accident in a timely manner. They will all be tied up with evacuation. Two lanes of traffic- one going the wrong way of vehicles with people nearly incinerated in their vehicles (as my wife was during the Freeway Complex Fire) while evacuating. Adding a single point of egress to Via Del Agua with any additional vehicles will cause deaths during the gridlock- guaranteed. Most will be in the new neighborhood as those people will have no chance of getting out in a timely manner. Placing homes here is irresponsible and criminal. Any profits made from this ill-advised project will be lost in later wrongful death lawsuits. A TRAFFIC SIGNAL AT YORBA LINDA BLVD. AND VIA DEL AGUA ***WILL NOT*** MITIGATE THIS ISSUE. THIS PROPOSAL FAILS ON THIS ISSUE AND ALL OTHER ISSUES ARE IRRELEVANT. IF EVACUATION ISSUES ARE IGNORED AND FATALITIES ARE SUSTAINED IN THE NEXT FIRE, THE WARNINGS ISSUED IN WRIITEN RESPONSES BY YORBA LINDA RESIDENTS WILL SERVE AS AN INDICTMENT FOR LEGAL ACTION AGAINST THOSE WHO CHOSE TO IGNORE THOSE WARNINGS AND SIGN APPROVALS. ***I WILL NEVER FORGET, AND I WILL REMIND ANYONE WHO DOES.*** EXPERT "OPINIONS" ON THIS ISSUE ARE SECONDARY TO THE TRUTH AND REALITIES OF WHAT WERE EXPERIENCED FIRSTHAND BY YORBA LINDA RESIDENTS IN THE 2008 FREEWAY COMPLEX FIRE. **EVACUATION SCENARIOS WERE NOT EVEN ADDRESSED IN THE DRAFT EIR- TRAFFIC SECTION** WHICH DESTROYS THE CREDIBILITY OF THE ENTIRE DRAFT EIR DOCUMENT. IF THIS CRITICAL POINT WAS OMITTED AND CONCEALED, WHAT OTHER DAMNING FACTS WERE OMITTED?

3) Health of established residents- The ground soil of the proposed development is contaminated by carcinogenic petroleum products- a result of 75+ years of oil extraction from the site. Construction in this area will stir up this contaminated soil in the form of airborne particulates, which will in turn be breathed for years by men, women and children already living in established neighborhoods. Those already suffering respiratory ailments such as asthma will be profoundly and negatively impacted. Those not already suffering from such ailments are at risk of developing them. Then there are the long term effects of breathing carcinogenic dust- lung cancer and other related illnesses.

GREENHOUSE GASES- The EIR concludes that hazardous greenhouse gases cannot be mitigated. So the County is going to allow thousands of established residents be exposed to these dangerous gases for years? THIS IS UNACCEPTABLE. Would you like your family to be exposed to a hazard like this? If it cannot be mitigated, the project should not be allowed to continue.

4) Seismic issues- The Whittier fault zone traverses this proposed development. Placing homes and infrastructure in this close of proximity to it is not only irresponsible- it is criminal- for obvious reasons.

Robert G Bartels
4730 Blue Mountain Drive
Yorba Linda, Ca 92887

5) Geological issues- Several identified landslide zones are contained within the proposed development. Hillsides of established residents will be disturbed- potentially destroying their property. This is a fragile environment and should not be disturbed.

6) Noise impact- Noises created during construction will be amplified by the bowl-like configuration of the site and broadcast to the established existing neighborhoods negatively impacting the quality of life of those residents.

7) Added traffic flow- The equivalent of 1200 vehicle trips per day will be created by the addition of the residents in this development. All arriving and leaving through a single ingress/egress point to share one access road (Via Del Agua) to the main thoroughfare (Yorba Linda Blvd.) It doesn't take a math major to see the negative impact this will have on existing residents and neighborhoods.

8) Protected species habitat- The county currently does not do brush/fire abatement in certain areas of this zone (despite the danger to some existing homes) because they are protected species habitats. Now all of a sudden it is okay to destroy those same habitats?

9) Impact on area schools- Schools in the area are at capacity. Is the developer going to build new ones?

10) Loss of aesthetics- Existing homeowners who bought properties based on views and open space will lose property values and enjoyment of serenity and peace. Yorba Linda's careful preservation of ridge lines will be destroyed.

11) Disruption of existing neighborhoods- The proposed development site is landlocked by existing neighborhoods, some there for 20-25 years. All access during construction and by future residents is through our neighborhoods. This is immoral, unethical and wrong. The impact is staggering and the fact that this development is even being considered boggles the mind.

12) Precarious economic conditions- A sudden unfavorable turn in an already unstable economy could cause the developer to bail out of the project. This could be catastrophic to the area if hillsides and terrain have been graded bare and left. The ensuing landslides and mudflow would destroy this already fragile area, existing homes would be lost and both the County and developer would be sued into the next millennia. Frankly, I can't think of a worse time to undertake a project of this nature.

13) Air Pollution- Vehicle emissions from the additional 200-300 vehicles, as well as construction equipment will not be acceptable.

14) Risk assessment- I have listed a few of the serious risks involved in this project. I pay $10,000 a year to the county in the form of property tax and I have a vested interest in the County of Orange staying viable financially and not exposing itself foolishly by approving ill-advised developments. Almost anyone can see that the risks for future litigation are especially inherent in this proposal. I do not like the idea of my tax dollars being used to pay out future legal actions that could have been prevented. Neither the County or developer will be able to claim that they were not warned.

Letter: Bartels2

January 14, 2014

To: Mr. Ron Tippets, Project Manager
OC Public Works OC Planning Services

Subject: Draft EIR for Cielo Vista Development

From: Norah Bartels
4730 Blue Mountain Dr
Yorba Linda CA 92887

I submit my written comments regarding the Cielo Vista development. I will keep my concerns to the primary areas that affect Hazards/fire safety and traffic/evacuation. All other concerns are irrelevant since the developer has demonstrated that these areas cannot be mitigated.

The developer ignores the 2008 Freeway Complex Fire in the EIR. Pretends like it never happened. Supervisor Todd Spitzer has characterized the 2008 evacuation as "virtually impossible for (existing) residents to evacuate." This begs the question, with no new roads proposed by the Cielo Vista developer, where are the 200 plus vehicles generated by this development going to go? Is there a term for "more impossible?" Supervisor Spitzer understands that unless new roads going North or East are proposed, this project cannot go forward. The developer is painted into a corner and his answer to the traffic/evacuation issue is to put broad generalities about irrelevant traffic studies into the EIR. The EIR fails on this point alone. To ignore this places the county and it's staff as well as the developer at significant civil and criminal prosecution exposure.

Thank you,

Norah Bartels

Norah Bartels

NORAH BARTELS
4730 BLUE MOUNTAIN DRIVE
YORBA LINDA, CA 92887

Letter: Brown

From: hi2meb@gmail.com [mailto:hi2meb@gmail.com]
Sent: Sunday, January 05, 2014 10:01 PM
To: Tippets, Ron
Subject: New development in yorba Linda bad idea

Dear sirs, we are not in favor of the development planed for yorba Linda. It so not safe for the new residents and it will cause overcrowding. Please vote against this new development.

Thank you,
Mike Brown

Letter: Bryant

From: Connie Bryant [mailto:conniex195@gmail.com]
Sent: Monday, January 06, 2014 10:58 AM
To: Tippets, Ron
Subject: Cielo Vista

Hello Mr. Tippets:

I have been a resident of Yorba Linda since 1984. I am writing in regards to the Cielo Vista project which I am totally against.

I was at home during the Yorba Linda fires we had a few years back. It was a dangerous situation not having more than 1 way to exit the area residences in some areas. This is unacceptable and cannot be made worse with this project.

I am against and will vote against any huge multip housing projects as in townhomes or condo's or apartments. There must be a way for residences to exit their homes besides one street and adding to this nightmare is NOT acceptable.

Thank you for your time.

Connie Bryant

20860 Chateau Ave. Yorba Linda, CA 92886

Letter: Bucklin

December 2, 2013

Dear Mr. Tippets,

I am writing to voice my concerns regarding the proposed Cielo Vista project. While the EIR shows minimal impact on the environment (i.e. animals and plants), the impact on the people in the area will be significant.

I live on San Antonio Road and was living here at the time of the fires in 2008. Many homes on my street and in neighboring streets were burned in the fires. San Antonio Road is a very small two lane street. The street can hardly safely accommodate the emergency evacuation of the occupants of the homes already in existence in this area, much less the occupants of another 100+ homes. Adding 100+ homes with dependence on such a small residential street as an outlet is extremely dangerous and should not be permitted.

I am attaching pictures of the fires to remind everyone reviewing this project of the reality of the fires in this area. The area that the developers want to build on was on fire just 5 years ago. Despite the brave and hard work of the firemen in Yorba Linda and surrounding areas, many homes in the area burned to the ground. This project would add 100+ homes where the fire once ravaged to the workload of already overburdened fire workers. This is a recipe for more disaster. In 2008, we were very fortunate that no lives were lost. We may not be so fortunate the next time if fire workers are burdened with 100+ additional homes to salvage.

While the EIR demonstrates the safety of the environment, I would implore the OC Planning Committee and Board to consider the safety of the citizens in this area and those who would potentially live in the project's danger zone.

If you have any questions pertaining to this letter, please feel free to email me at this email address. Thank you for your time and consideration of this matter.

Sincerely,

Chris Bucklin

3760 San Antonio Rd

Yorba Linda, CA 92886

cjbkb@sbcglobal.net

Letter: Buie

Cielo Vista Project – Proposed Single-Family Residential Development
Community Open House
Comment Form

RECEIVED
JAN 03 2014
COUNTY OF ORANGE

The County of Orange welcomes your comments on the environmental review process. Your comments will assist us in better understanding your concerns regarding the proposed Project.

You may submit your comments to County staff at the Community Open House on December 16, 2013, or if you prefer, you can mail, FAX, hand deliver, or e-mail your comments to OC Planning, attention Ron Tippets, Project Planner, **by January 7, 2014**.

Mail: P.O. Box 4048
Santa Ana, CA 92702-4048

Hand Delivery: 300 North Flower Street, 3rd Floor
Santa Ana, CA 92702-4048

Fax: (714) 796-0307

E-mail: Ron.Tippets@ocpw.ocgov.com

Telephone: (714) 667-8856

1. What specific comments do you have on the issues analyzed in the Draft EIR?

Aesthetics

Air Quality

Biological Resources

Cultural Resources

Greenhouse Gas/Climate Change

Geology and Soils

Hazards/Hazardous Materials

Hydrology/Water Quality

Land Use/Planning

Noise

Population and Housing Houses are being built in clusters with more than one house per developed acre

Public Services

Recreation

Traffic/Transportation The INGRESS & EGRESS IN case of needed evacuation IS Simply NOT Acceptable OR Feasible

Utilities

Alternatives

2. What specific comments do you have regarding the proposed Cielo Vista project?

This Project AND THE ESPERANZA Hills Project Should be Considered IN their ENTIRETY NOT piecemeal. TRAFFIC CANNOT BE MITIGATED IN AN Emergency Evacuation. You Can't Triple the Number of Homes Using Only one Single Escape ROUTE AND SAY The Impact IS INSIGNIFICANT OR MITAGATED

Please provide your name and contact information below:

Name: C L Buie
Address: 4080 View Park Dr
Yorba Linda, CA 92886

Email: DABUIES4YL@sbcglobal.net

If you are mailing your comments, please fold the paper in half and place first class postage in the upper right corner before dropping in the mail box. **Please submit your comments** as soon as possible, but **no later than** the close of the Draft EIR public comment period on **January 7, 2014, 5:00 p.m.**

OC Public Works
OC Planning Services
300 North Flower Street
P. O. Box 4048
Santa Ana, CA 92702-4048

ATTN: Mr. Ron Tippets, Project Planner

Letter: Byrne

From: Paulette Byrne [mailto:pabyrne@sbcglobal.net]
Sent: Wednesday, January 22, 2014 6:26 PM
To: Tippets, Ron
Cc: Joe Byrne
Subject: Cielo Vista Project

I would like to express my deep concern at the projects proposed in the area of the Cielo Vista project. I do not look at the Cielo Vista project in isolation as the other proposed developments go in tandem with it.

1) Notification: The counties minimal requirement to only notify residence within the 300' radius of the project is completely insufficient. That is only the length of a football field! It is obvious this project will impact those well beyond that. They should be afforded the opportunity to give input as well.

At the time the NOP's went out my husband & I lived in the 92886 zip code. We were woefully ignorant of the proposed projects and as a result bought a high end home within range of these projects. The sellers did not disclose the proposals so as a result we closed escrow on 10/4 & did not find out about how we might be impacted till 11/19 when my husband saw the billboard erected by 'Save our Hills YL". The county does a grave dis-service to its residence by keeping them uninformed. Even if we had remained in the 92886 zip code we would still be affected by this proposed influx of population. I understand the counties reluctance to notify more residence & risk the additional 'feedback'.

2) Water: Southern Ca is technically a desert & these last few years have shown that. The drought we've experienced is reflected in our hills. If these hills are developed & paved over there will be less seepage into the ground to maintain the water table. The water required by this development to maintain the residence, their landscaping & pools is profound & will obviously be a burden on our water resources.

Although the Yorba Linda water district says it can always get water, there are no guarantees. And of course meeting the ever increasing demand comes at a cost. A cost that not just the Cielo Vista residence will incur but the whole of Yorba Linda! Yes, even those who were never notified of the proposed project.

3) Roads/Traffic: Our current roads do not adequately handle the traffic in Yorba Linda. Yes widening Imperial & the Ezperanza overpass have helped, but at rush hour traffic all along Yorba Linda Blvd is bad. Especially at YL Blvd & Imperial & around Savi Ranch, Weir Cnyn & the 91 Fwy. The traffic study done was far too narrow. Development of the hills to the level being proposed will affect the already overly congested 91 Fwy. We know these homes are not going to be sold to retirees but working people who will need means to get to their jobs wherever they might be. As there is no longer student bus service, traffic around any of the schools in the area in the morning is bad.

Also as population increases so do accidents. I did not see in the EIR any mention of a study done on the number of accidents & their severity along YL Blvd.

As we learned in 2008, the existing roads in the residential areas around the proposed project areas was woefully inadequate for a mandatory evacuation. There is NO proposal for widening the existing roads, only for adding a road that will allow additional traffic to the tune of 1500+ vehicles to be added to the already existing inadequate roads. This is a formula for disaster!

4) Sewage/Disposal Services: Increasing the # of residence will place a burden on the cities sewage system & disposal mgmt. How much longer can the Brea-Olinda facility continue at it's current rate? Increasing the # of residence can only shorten its years so service. Our current counties sewage facilities are inadequate for treating raw sewage when we do experience a heavy rain. This often results in raw sewage being released into the ocean & our beaches being shut down.

5) Ecology: If you reduce the area where coyotes can hunt & feed themselves, out of desperation, as we have seen, they will start coming into neighborhoods to hunt. This significantly lowers the quality of life for all animal lovers who than fear for their pets safety.

6) Noise & Light Pollution: The # of homes being proposed & the # of cars these residence will bring will significantly increase noise & light pollution. The routes in & out of the development will impact existing residence who currently enjoy a quiet rural atmosphere.

7) Density: To let the developer put the # of units it's proposing into the area is contrary to the numerous existing equestrian properties surrounding the area. Residence bought in this area for a particular lifestyle. What the developer is proposing negatively affects this lifestyle to a significant degree. What about the existing residence rights to have their cherished lifestyle protected?

Thank you for your attention to these concerns.

Regards,

Joe & Paulette Byrne

Letter: Carboni

From: Ronald Carboni [mailto:rjcarboni@sbcglobal.net]
Sent: Monday, December 23, 2013 3:10 PM
To: Tippets, Ron
Subject: Cielo Vista Project issues

Dear Mr. Tippets,

I live at 21620 Stonehaven Dr. yes that's just one house east of the new entrance to the Cielo Vista project that the developer and the County of Orange is working to approve.

I'm the original owner of this house and one of the features that was sold to me was the hill views from my front yard. These homes (Brighton Estates) were all sold at a premium due to lot size and location, the same home could have been purchased for $80K less at the other Brighton location in Yorba Linda.

The selling agents at the time informed me that the hills would not be built on due to oil and water district leases. Appears that was not true. Never trust a sales person.

My wife and I have enjoyed living here for over 23 years and have always considered this home as a good investment for the future? However, with this new proposed development and all of the noise, traffic, pollution, congestion, destruction of nature and wild life it will bring to my neighborhood the result will be detrimental to my property value and make my home and my immediate neighbors homes undesirable and difficult to sell in the future.

This is a flawed development with many problems and issues that you are aware of. Decreased property values is one more item that will most likely result in legal action against the developer.

Best regards,

Ron and Judi Carboni

21620 Stonehaven Dr. Yorba Linda

Letter: Carillo

Cielo Vista Project – Proposed Single-Family Residential Development
Community Open House
Comment Form

RECEIVED
JAN 03 2014
COUNTY OF ORANGE

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You may submit your comments to County staff at the Community Open House on December 16, 2013, or if you prefer, you can mail, FAX, hand deliver, or e-mail your comments to OC Planning, attention Ron Tippets, Project Planner, **by January 7, 2014**.

Mail: P.O. Box 4048
Santa Ana, CA 92702-4048

Hand Delivery: 300 North Flower Street, 3rd Floor
Santa Ana, CA 92702-4048

Fax: (714) 796-0307

E-mail: Ron.Tippets@ocpw.ocgov.com

Telephone: (714) 667-8856

1. What specific comments do you have on the issues analyzed in the Draft EIR?

Aesthetics: Poor not in line with Yorba Linda Horse community.

Air Quality: The dust particles blowing off the hill will make air quality poor for kids playing outside

Biological Resources:

Cultural Resources:

Greenhouse Gas/Climate Change:

Geology and Soils:

Hazards/Hazardous Materials:

Hydrology/Water Quality:

Land Use/Planning: poor planning on space + access

Noise:

Population and Housing: too large of a project for area

Public Services:

Recreation: no parks planned?

Traffic/Transportation: traffic will increase + accidents will happen on San Antonio because street is narrow

Utilities:

Alternatives: needs to be a much smaller project + horse trails

2. What specific comments do you have regarding the proposed Cielo Vista project?

It will create too much traffic on San Antonio
more congestion. The left turn lane on Yorba Linda/ Fire station
blvd only handles 4-5 vehicles. If more traffic
it will create hazard on Yorba Linda Blvd.

Fire hazard zone where house are to be built
very High wind area. + potential lawsuits to
the County for approving project.

Please provide your name and contact information below:

Name: Rob Carrillo
Address: 2110 Ridge Park Dr.
Yorba Linda, CA
92886

Email: klubber@msn.com

If you are mailing your comments, please fold the paper in half and place first class postage in the upper right corner before dropping in the mail box. **Please submit your comments** as soon as possible, but **no later than** the close of the Draft EIR public comment period on **January 7, 2014, 5:00 p.m.**

OC Public Works
OC Planning Services
300 North Flower Street
P. O. Box 4048
Santa Ana, CA 92702-4048

ATTN: Mr. Ron Tippets, Project Planner

MEDAL OF HONOR
NAVY/FORI VER/USA

Letter: Casacchia

From: Brian C. [mailto:bjcasacs@sbcglobal.net]
Sent: Wednesday, January 22, 2014 2:49 PM
To: Tippets, Ron
Cc: Spitzer, Todd [HOA]
Subject: Commnt letter Cielo Vista project

Please see my attached comment letter in regards to the Cielo Vista project. Please keep in mind that my residence of almost 25 years backs up directly this potential development. This will be a life changing event for me, my family and neighbors should it be approved, with a negative impact for both well being and property value.

Brian Casacchia

Brian J. Casacchia
Parcel # 350 051 09
4570 Dorinda Rd.
Yorba Linda, CA
92887

TO: Orange County Public Works/OC Planning **JAN. 22, 2014**

SUBJECT: Cielo Vista Project, DRAFT ENVIRONMENTAL IMPACT REPORT # 615

ATTN: Mr. Ron Tippets

Dear Planning Commission, as a resident and homeowner in Yorba Linda since 1989 I feel compelled to submit this letter in response and in protest to the proposed "Cielo Vista Project". My family and I reside at 4570 Dorinda Rd., Yorba Linda CA, 92887 and have done so for over 23 years. My house is seen in picture #3, figure 3(a) of the Notice of Preparation letter which I received, specifically at the upper most end of the street (3) houses from the end of the Dorinda Rd's. cul-de-sac. One of the main reasons that I purchased my house was the fact that the property behind me was zoned "A1(O)", exclusively for agriculture with oil. My home is constructed in a housing tract known as Travis Ranch which was built in 1984 on the adjacent hill of the proposed "Project" and has spectacular views of the area's natural rolling hills and habitat. I bought this house knowing and believing that I would always be able to enjoy the natural scenery of the hills and wildlife, as well as the serene privacy and peace of mind knowing that I would never have anyone or anybody living behind me or looking down onto my property. It appears that the "Project's" preliminary tract plan shows houses and streets constructed above and directly behind me in close proximity to my property line. It specifically shows a street "identified as D on their tract map" that will likely "light" my house up at night with each and every oncoming and passing vehicles headlights. I am positive and truly believe that my concerns regarding my home and neighborhood and the uncertainty for the future of my home and neighborhood and the lifestyle and comforts which I have enjoyed and have become accustomed to, would be shared by anyone found in my predicament. The following items are a list of additional concerns that I feel need to be addressed prior to any approvals to proceed with this project. I also find it hard to believe that the Esperanza Hills Project does not share vital common interests with the Cielo Vista Project as their representative claimed at the meetings. It would appear to me, through common sense that the main incentive to justify the expense to build such a small tract of homes off Aspen way, would be to use the street to access the Esperanza Hills Project's proposed 400 homes. I believe one project could not survive without the other and that both projects should be reviewed as "one" project.

Additional items of concerns:

a) Traffic congestion. Existing traffic is already congested during school days and also with commuters using Yorba Linda Blvd as a short cut from the 55, 57 and 91freeways.
b) Preservation and protection of wildlife, habitats and wilderness, both endangered and not.
c) Fire dept. approvals due to the high risk fire area. EMERGENCY EVACUATION STUDIES MUST BE CONSIDERED WHEN THE SITUATION ARISES AT ITS WORST, e.g. 2:00 AM, 80 MPH WINDS, RAGING FIRE, COMPLETE POWER AND PHONE / COMMUNICATION OUTAGE, NO AVAILABLE FIRE FIGHTERS, POLICE SERVICE OR TRAFFIC CONTROL.
d) Overloading of the Public schools or additional demand on the city of Yorba Linda's infrastructure including public servants such as police and fire.
e) Safely plugging or capping of abandoned oil wells, specifically the ones that have broken drilling bits still lodged in them.
f) Construction DUST CONTROL, <u>high winds blow regularly through this canyon</u>, and construction dirt and dust would be intolerable if not contained or controlled.
g) Restrictions on work days allowed and "quiet" times must be set and enforced for early mornings, evenings and absolutely no weekend construction.
h) Specific storm water plans for the construction phase, approved by the city of Yorba Linda to avoid potential land and mud slides.
i) Water! there is historical drought going on, we need a moratorium on all new housing and developments. It seems ridiculous that the governor of California is implementing mandatory water rationing and yet government agencies are allowing huge neighborhoods to be built.

In closing, I feel that the city of Yorba Linda should have 100% input and a majority voice in any or all zoning, building or infrastructure changes or approvals, both preliminary and permanent, to allow this project to proceed. I also feel that all the residents of Yorba Linda should have been notified in regards to this major development and not just the residents along the Projects immediate borders.

Respectfully,
Brian J. Casacchia

Letter: Cobb

From: lesliebc@aol.com [mailto:lesliebc@aol.com]
Sent: Sunday, January 19, 2014 9:20 PM
To: Tippets, Ron
Subject: Cielo Vista

Mr. Tippets,

I am writing to ask you to please help the citizens and city of Yorba Linda by stopping the development of Cielo Vista.

I have been a resident of Yorba Linda for more than thirty years. I have watched the city grow and I love it. Five years ago we went through a very traumatic fire. I have never been more aware of the lack of emergency exits in this city. My home was in the direct path of the fire. I drove past burning houses leaving my home. When I reached Yorba Linda Blvd., my exit was blocked by miles of cars trying to leave. We do not have the ability to evacuate the city as quickly and as orderly as we need to as it now stands. Putting more homes into the direct path of fire, therefore adding more cars to our already overtaxed exit routes is without a doubt asking for casualties the next time we have a major fire. We were lucky last time---adding to our burden is ridiculously ignorant of how frightening our situation was five years ago.

Please help us remain as safe as we are now…..do not add to our danger. STOP CIELO VISTA!

Sincerely,

Leslie Cobb

Letter: Collinsworth1

9222 Lake Canyon Road
Santee, CA 92071

January 16, 2014

Mr. Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702-4048

RE: Cielo Vista Project EIR

Dear Mr. Tippets,

Please consider the following expert comments upon the Cielo Vista Project EIR related to the Public Safety impacts of the Project.[1] The Project as currently proposed has significant adverse fire safety impacts that are not adequately mitigated to a level of insignificance.

The Project is located entirely within a Very High Fire Hazard Severity Zone (VHFHSZ). Fire history makes clear that it is not a question of if a major firestorm will occur, but when the next firestorm will occur. Fire Safety Impacts are considered significant at the following thresholds.

Thresholds of Significance

> *"Threshold 4: Impair Implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?"*
>
> *"Threshold 5: Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands (refer to impact Statement 4.75)."*

The EIR acknowledges significant fire risk in the Project vicinity by referencing the November 15, 2008 "Freeway Complex Fire" that destroyed 187 homes, 2 commercial buildings and damaged another 127 homes and 2 commercial buildings while burning 30,305 acres[2]. Fire risk on the Project site is increased and complicated by past, current and potential oil extraction that releases combustible methane gas. Note that the EIR has not revealed or considered whether modern hydraulic fracturing "fracking" techniques are or will be utilized under or within the

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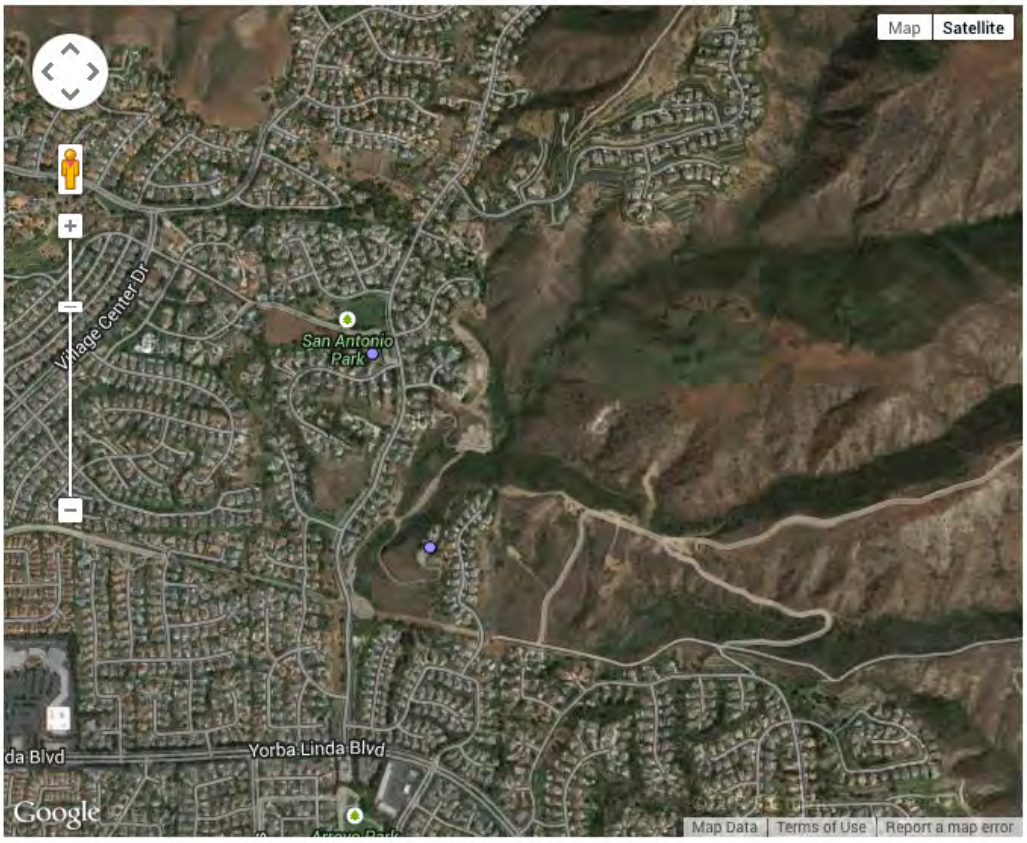
[1] Van Collinsworth is a Natural Resource Geographer and former US-Forest Service Wildland Firefighter. Collinsworth has reviewed environmental documents during the last 20 years (including Fire Protection Plans) and provided expert depositions to the courts in regard to these documents. Resume Attached.
[2] Cielo Vista Fire Behavior Analysis Report, page 6.

vicinity of the Project site. Vague reference is made to potential "slant drilling" which can be utilized with "fracking". In fracking, 5 % of well casings fail immediately and all are subject to failure over time due to entropy, which has implications for methane release into groundwater and the atmosphere. Any Project in a VHFHSZ that proposes to mix residential development and fossil fuel extraction by hydraulic fracturing or horizontal drilling needs to better document the status of past, present and future extraction plans in order to avoid or mitigate the associated hazards. This analysis should be performed and the results recirculated for public review. Furthermore, considering that climate change is creating weather extremes and higher intensity fires, there can be no assurance that the inevitable "worst scenario" considered by the Fire Behavior Analysis model will not have even greater severity.



Hydraulic Fracturing Sites Identified in the Cielo Project Vicinity June 2013 – January 2014 (Blue Circles)[3]

[3] http://baldwinhillsoilwatch.org/action-center/sc-aqmd-rule-1148-2-maps/

The EIR downplays Fire Risk introduced by the Project

At 4.12-11 the EIR asserts:
"…existing single-family residences to the west and south of the Project site would gain increased protection from the spread of fire. As such, the Project would reduce the threat of wildland fires to people and structures in the project vicinity and thus, lessen the potential demand for fire services needed in the event of a wildland fire."

This assertion is unsubstantiated, incorrect and should be stricken from the EIR.

In fact, the Project creates substantial new wildland-urban-interface (WUI) in need of emergency response that potentially diverts and dilutes available fire suppression resources from the existing WUI. The Orange County Fire Authority (OCFA) preliminary report on the Freeway Complex Fire recognizes, "…*urban conflagrations are beyond the ability of a fire agency to control with initial response resources and that triage decisions must be made as to which structures to defend*."[4] Some of the homes that burned in the Project vicinity during the Freeway Complex Fire could have been saved if fire resources were not already occupied elsewhere when the structures initially ignited.[5] Fire resources are already overwhelmed by the extent of the existing WUI during major incidents. Furthermore, the conversion

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"…oil well stimulation reports for the initial 7 months of reporting: June 2nd, 2013 and January 6th, 2014." South Coast AQMD 1148.2- Well stimulation mapping project.

[4] Freeway Complex Preliminary Report to City of Yorba Linda, Orange County Fire Authority (OCFA), December 2, 2008, Page 15. *"Triaging of homes in regard to an urban conflagration is very similar to what a paramedic would do for a mass casualty incident. Triage is to allow the organization to do the most good for the greatest number of people when the available resources do not match the need. This same goal applies to the triage of structures in a wildland urban interface fire. Fire personnel are trained to recognize which structures are least-salvageable and then to direct their efforts toward saving those structures that have the greatest potential to be saved. However, even with the best training and practice it takes great discipline to trade off the life of one patient for another, just as it takes the same discipline to drive past a structure that is on fire to defend one that is not. These triage decisions are often made in seconds with little more information than firefighters can gather as they drive down a smoky and ember ridden street."*

[5] Reference the eyewitness testimony of resident Edward Schumann whose home burned in the 2008 fire. Mr. Schuman was told by a firefighter that the fire was in his attic and there were no resources available to extinguish it. Edward Schumann DEIR Comment Letter, January 2014. Also, "*Brush clearance and "hardened" (ignition resistant) homes go far in improving the chances for a home's survival from a wind-driven WUI fire. However, intervention by firefighters is often necessary in saving a home that is determined to be defensible.*" Freeway Complex Preliminary Report to City of Yorba Linda, Orange County Fire Authority (OCFA), December 2, 2008, P. 7.

of native lands to extensive fuel management zones often converts more fire resistant vegetation into weeds and exotic flash fuels that are two-way fire conduits at greater risk of ignition and rapid rates of initial spread.
The Project is not sited adjacent to existing development, but instead embeds itself within fuels ignitable through embers, radiant heat or flame impingement.[6] The report on the Freeway Complex Fire losses notes the general insulation of homes from direct flame impingement contrasted by their vulnerability to air born embers.[7] Furthermore, the ability to backfire from older homes along the existing WUI is precluded by locating structures and circulation routes in the path of potential backfire operations.[8] The continued vulnerability of existing homes to wind driven embers coupled with the dilution/diversion of fire suppression resources over a longer WUI and the preclusion of backfiring tactics, is a significant adverse impact of Project location/configuration.

In addition, water supply dwindled and hampered the effectiveness of available resources during the Freeway Complex Fire. Water supply would be further taxed by building additional homes / expanding the WUI in the Project vicinity. The report on the Freeway Complex Fire makes clear that water supply cannot be assured during a severe wildland firestorm.

> *"The demands of a single structure fire can tax even a well functioning water system. In contrast to the usual situation where an engine will pump directly from a hydrant to fight a structure fire, in a wildland event the hydrants are used to refill the water tenders and the engine water tanks. The engines then usually use their tank water to attack the fires during their mobile suppression efforts. As ground forces moved into threatened neighborhoods and tried to extinguish or defend dozens of homes, the Yorba Linda water supply was severely impacted. At approximately 2:00 P.M., several radio calls were received reporting fire companies encountering low or no water pressure in various sections of the Hidden Hills area. Fire companies encountered low or no water pressure on Hidden Hills Road, Mission Hills Lane, High Tree Circle, Fairwood Circle, Green Crest Drive, Skyridge Drive and others. With homes burning on multiple fronts Strike Team Leaders directed*

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[6] Even the "Special Maintenance Area" zone separating Cielo Phase 1 from part of the existing WUI is ignitable and requires ongoing inspection and maintenance to reduce fire risk. CVFBAR page 23.
[7] *"Properly established and maintained brush clearance is typically very effective in protecting homes for direct flame impingement and radiant heat. However, it can do little to nothing to protect homes from ember intrusion. Homes must be constructed to withstand ignition from embers that land on homes or enter through attics and other openings."* Freeway Complex Preliminary Report to City of Yorba Linda, Orange County Fire Authority (OCFA), December 2, 2008, Page 6.
[8] Backfiring Standard Operating Procedures, Novato Fire Protection District, (attachment).

companies to move to areas that had available water."[9]

For all of the reasons above, the sheltering benefit asserted by the EIR at 4.12-11 is limited and inconsequential relative to the severe adverse impacts of diluting availability of fire suppression resources / expanding the WUI, precluding backfire tactics, taxing firefighter water supply and locating new families in harm's way. Clearly, the current Project *exposes people or structures to a significant risk of loss, injury or death involving wildland fires.*

Cielo Vista Fire Behavior Analysis Report (CVFBAR), 8/27/2013

According to Firesafe Planning Solutions, the purpose of the Cielo Vista Fire Behavior Analysis Report (CVFBAR)**,** is to assess the "*risks related to wildland fire and to establish the appropriate criteria for a defensible space installation and maintenance program that will reduce the intensity of a wildfire…The report provides results of computer calculations that measured fire intensity from a worst case scenario wildfire…The results of fire behavior calculations have been incorporated into the fire protection design built into the Cielo Vista development*." (CVFBAR page 3)

To adequately assess the risks associated with wildfire, the CVFBAR must accurately report the fire history for the Project site, the site vicinity with its continuous fuels and integrate any known or expected land use changes off site. The report does none of these adequately, as it fails to consider the long history of wildfire over the entire Chino Hills, the potential for rapid rates of spread from various eastern points of origin, nor does it consider the potential development of the Esperanza Hills Project. It fails to distinguish the most common sources and locations for ignitions. The CVFBAR does not clarify if, how, or under what circumstances residents would be expected to evacuate or remain at the site during wildfire emergencies. It fails to reveal how long it will take to evacuate the Project and compare that to potential rates of spread from various points of origin under extreme weather conditions. The CVFBAR discounts the severity of site topography to channel wind and convective heat by placing too heavy confidence in the results from developmental application Wind Ninja. The Missoula Fire Lab states Wind Ninja is "under development" has "Faster computation than WindWizard, *but is less accurate*".[10] Without adequately addressing these issues, fire safety risk impacts remain significant.

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[9] Freeway Complex Preliminary Report to City of Yorba Linda, OCFA, December 2, 2008, Page 13.

[10] Even WindWizard is considered developmental and "no longer available". http://www.firemodels.org

Topographical wind corridors impacting the Project site

The Fire Behavior Analysis Report considers current vegetation, yet needs to account for the fact that the current vegetation of the site vicinity does not reflect climax vegetation due to only five years of recovery from the 2008 Freeway Complex Fire with below normal precipitation during the recovery period. The climax condition for the site (as evidenced in historical aerial photos) would reflect greater fuel loads and areas of Fuel Model 4 (FM4) vegetation with potential for significantly greater flame lengths, fire intensity and ember production. The Fire Behavior Analysis Report needs to reveal all of the input assumptions (including relative humidity, wind speed, slope percentage) utilized to generate the Behave Fire Model results. The Fire Behavior Analysis Report (page 19) model results for FM4 (six foot high chaparral / the most dangerous classification on site) generates a maximum flame length of 79.9 ft., however, providing only summary results does not allow evaluation of the variable assumptions utilized.[11] Behave Fire Model results run for other project sites with Fuel Model 4 vegetation generate maximum

[11] *The Fire Beha*vior Analysis Report on page 42, references "Behave Reports", but these reports are not included within the EIR or its Appendices. The EIR should be recirculated with the Behave Reports included so that the assumptions utilized can be evaluated.

flame lengths of 95 ft. and 96.7 ft.[12] The Behave Fire Model is only accurate for its variable inputs (these change under real geophysical conditions), which is why field observations for chaparral fires have documented flame lengths exceeding 100 feet during extreme weather conditions.

The CVFBAR even discounts the BEHAVE 79.9 ft. flame length calculation by suggesting that the maximum flame length will be 41.8 ft. (CVFBAR page 21). That conclusion is unlikely for a Santa Ana wind driven fire that reaches the site with momentum and moves upslope consuming FM4 vegetation.

It is also important to recognize that standardized fuel modification zones generally sufficient to prevent structure ignition from direct flame impingement does not assure survival of the associated structures.[13] Even though 189 structures were destroyed (with another 129 damaged) in the Freeway Complex Fire, the Orange County Fire Authority (OCFA) considered "*…brush clearance to be adequate*" based upon its inspections of fuel management zones prior to the fire.[14] Wind driven

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[12] Behave Fire Model results for a Santa Ana wind driven fire in Fuel Model 4: Flame Length 96.7 feet, Rate of Spread 2,041 feet/minute, Fire Line Intensity 117 380 BTU's/foot/second "CFPP Cielo Ranch Santa Fe" page 15. Fanita Ranch Fire Protection Plan Behave Fire Model results generated 95 ft. flames in FM 4.

[13] "*Fire officials believe that embers driven by raging winds through small openings or against exposed wood were responsible for igniting a majority of the 1,125 homes leveled by the Witch fire, the most destructive in California this year…An analysis of the Witch fire's pattern of destruction points to deficiencies in long-held beliefs about building in fire-prone areas. Fire-resistant walls and roofs are helpful, and brush clearance is essential. But alone they are insufficient in the face of millions of burning embers flying horizontally more than a mile ahead of the flames. Of 497 structures that burned in unincorporated areas of San Diego County during the Witch fire, more than half had fire- resistant walls and roofs, a Times analysis of government data showed. Information on construction materials has not been compiled for neighborhoods inside the cities of San Diego and Poway, but senior fire officials estimate that well over 75% of the destroyed homes had fire-resistant exteriors."* "**Lessons From the Fire"** Joe Mozingo, Ted Rohrlich and Rong-gong Lin li, Los Angeles Times, December 23, 2007.

[14] *"In 2008, staff inspected 587 WUI parcels and found only 16 out of compliance with minimum requirements for defensible space. By July 22, all properties were in compliance. In addition, staff inspected approximately 790 of some 950 fuel modification parcels to ensure that they were in "substantial compliance" with provisions of the requirements and found 322 in need of some type of corrective action. As of the date of the fire, all but 25 had met minimum requirements. A preliminary assessment of homes destroyed or damaged in the freeway fire indicates that they were victim to ember intrusion rather than direct flame impingement indicating brush clearance was adequate."* Freeway Complex Preliminary Report to City of Yorba Linda, Orange County Fire Authority (OCFA), December 2, 2008, page 6.

embers are capable of penetrating the smallest of openings[15] on structures and can ignite spot fires adjacent to structures in ignitable materials that can then damage or ignite structures[16]. Severe convective heat transfers through fire whirls/tornadoes can also bypass standard brush management zones.

> *"Extreme Wildfires can produce firebrand spot-ignitions at distances of a mile or more; however* ***intense firebrand exposures within one-half to one-quarter mile*** *often ignite numerous surface fires within a residential area that spread to contact and ignite homes and****/or firebrands directly ignite homes****."* US Forest Service Fire Scientist Jack Cohen, 4/23/2009 (bold emphasis added).

Attic vent vulnerable to embers within a fire tornado.

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[15] Research data has been gathered regarding the ineffectiveness of current ventilation standards for preventing ember penetration. BFRL/NIST researchers tested ¼-inch or 6 mm (the recently adopted California WUI standard) 3 mm and 1.5 mm screens. "*For all screen sizes tested, the firebrands were observed to penetrate the screen and produce a self-sustaining smoldering ignition inside the paper beds inside the structure*." Samuel L. Manzello, John R Shields, and Jiann C. Yang, **On the Use of a Firebrand Generator to Investigate the Ignition of Structures in Wildland-Urban Interface (WUI) Fires,** Building and Fire Research Laboratory (BFRL), National Institute of Standards and Technology (NIST), 2007, p. 11.

[16] The Fanita Ranch Fire Protection Plan acknowledged, "The Santa Ana winds with wind gusts of up to 60 mph blowing from the northeast/east pose significant threat from wind-blown embers to all structures within this project." Page 14.

Homes with standard brush management zones still have the following significant vulnerabilities:

- Vulnerability of structures to embers/firebrands due to extreme events, human error, or inadequate maintenance (i.e., fire tornados or fire whirls, [17] broken windows from flying debris, drapes left over windows, open windows, open doors and garage doors, settlement cracks of structures built in landslide areas, wood piles, gas barbeques and motor-homes and other flammables stored too close to structures, delinquent or inadequate fuel treatments).

Wind-blown embers

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[17] "*Observed fire whirl behavior was both unexpected and extreme in these fires, catching many firefighters by surprise and significantly contributing to spotting up to 3/4 mile. 180-degree wind shifts proceeded fire whirls by 45 seconds to a minute."* [Firefighter] *"Respondents reported unusual numbers of fire whirls that ranged from several yards wide up to a 1/2 mile wide. Destructive fire whirls, those causing structural damage unrelated to fire, also were reported. In addition to appearing suddenly, large fire whirls, characterized by a jet engine noise, took in debris such as large tumbleweeds and bushes from the bottom and ejected flaming debris from top—raining embers and violently showering sparks as much as 3/4 of a mile beyond the head of the fire. In one reported case, a fire whirl entered an area that had already burned clean down to three-inch stubble and whirled across several hundred feet of burned area into unburned fuel, carrying fire the whole way and igniting the unburned fuel. Another fire whirl crossed an eight-lane freeway. Small fire whirls merged into larger ones. Some reported fire whirls moving downhill." "What we were expecting to see were fire whirls (4' to 6' tall), what we actually saw were true fire tornadoes. The fire researchers kept telling us what we were seeing was impossible and never seen before. After three days of discussion, the fire researchers started to understand that what they were expecting and what was happening was not jiving. -Division Supervisor"* **Southern California Firestorm 2003 Report for the Wildland Fire Lessons Learned Center**, Mission Centered Solutions, December 8, 2003, page 6.

- Vulnerability of adjacent homes and the entire development from flame impingement and radiant heat once one or more homes are ignited from embers/extreme events or human error. There remains significant fire risk of structures within 100-feet of each other to cluster burn (especially those with north to east wildland interfaces).[18]

- Vulnerability of people outside of structures to flame impingement, radiant heat and smoke. (Individuals on foot, on motorized and un-motorized vehicles, hikers and other individuals in natural lands, individuals attempting to evacuate or reach and secure their homes, or individuals simply locked out of vacant structures because they reside in another neighborhood or are children without keys; individuals at inadequate fuel buffers on sloped sections of emergency access routes; firefighters defending structures without adequate safety zones or escape routes).

- Vulnerability of elderly and weak individuals within structures to smoke, stress, or loss of power.

Flame Lengths and Fire Intensity as related to Safe Evacuation Routes and Fire Safety Zones

Radiant and convective heat can be deadly for exposed residents, evacuees and firefighters drawn into defend or dispatched to inappropriately sited structures. A distance factor of 4x maximum flame length is utilized by firefighters to estimate the location of safety zones from radiant heat exposure. The 4x flame length radius

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[18] "*As a type of fuel, involved structures emanated intense radiant heat. Heat levels in the street were unusually high*." **Southern California Firestorm 2003 Report for the Wildland Fire Lessons Learned Center**, Mission Centered Solutions, December 8, 2003, page 7.

Cluster burn example from Cedar fire. Photo by John Gibbins, SDUT.

distance from flames may not be sufficient to prevent injury or death if there is severe convective heat transfer.[19] For example, an expected flame length of 100 feet would require a safety zone with a radius of 400 feet from the fuel. 400 feet would likely be insufficient if the available safety zone was sited in, near or above steep topography that funnels convective heat.

Cedar Fire victim perished in area of wide clearance.

The Cielo Vista Fire Behavior Analysis Report fails to analyze whether the Project has configured evacuation routes and safety zones sufficiently to protect firefighters or residents from radiant heat exposure. Of related concern, is the CVFBAR's inconsistency with itself and other fire protection plans regarding the expected flame lengths for FM 4 vegetation. Compare the CVFBAR maximum 79.9 feet [page 19] or maximum 41.8 feet estimate [page 19] to other Behave Results for the same FM4 Fuel (95 feet at Fanita and 96.7 at Cielo CFPP). Furthermore, the results for Fuel SCAL18 (3 feet tall coastal sage / chaparral mix) **cannot generate only 15.3 feet flames for the same conditions that generate 23.1 feet flames for gs2** (1-3 feet tall grasses and shrubs), 34.2 feet flames for sh5 (4-6 feet tall shrubs) and 79.9 feet for FM 4 (southern mixed chaparral)[page 19 chart]. The Report needs to revisit these issues and recirculate its findings.

[19] Butler and Cohen. Firefighter Safety Zones: A Theoretical Model Based Upon Radiative Heating. Firefighter Safety Zones: How Big Is Big Enough?

BehavePlus 3.0.1 Fri, Oct 27, 2006 at 00:01:35

Fanita, under a 60 mph Santa Ana wind in an FM-4

Surface Rate of Spread (maximum)	1966.5	ft/min
Fireline Intensity	113088	Btu/ft/s
Flame Length	95.0	ft
Midflame Wind Speed	30.0	mi/h
Max Eff Wind Exceeded?	No	
Area	30229.3	ac
Perimeter	241689	ft

Fanita Ranch FPP BehavePlus calculation.

TABLE 2.3.6	
Expected fire behavior for a North, Northeast and East Santa Ana Wind Condition in a Fuel Model 4 (A Fuel Model 4 is a continuous cover of chaparral vegetation greater than 6' in height)	
RATE OF SPREAD	**2,041 feet/minute**
FIRE LINE INTENSITY	**117,380 BTU's/foot/second**
FLAME LENGTH	**96.7 feet in length**
Additional Fire Behavior Calculation Input: • 60 mph 20-foot wind speed (30.0 mph mid-flame wind speed) • 30 percent slope • 45° direction of wind vector to uphill slope	

This equates to 7,952 acres in 30 minutes and 31,809 acres in 60 minutes assuming no initial attack.

"CIELO CFPP"	**Page 15**

Rancho Cielo FPP BahavePlus calculation.

The CVFBAR acknowledges "flame lengths of just under 50-feet are possible" in narrative [page 22] and 79.9 feet flames by chart [page 19]. A factor of 4x multiple of these outcomes generates safety zone radius distance of 200 feet, or 319.6 feet, or 380 feet (Fanita) or 386.8 feet (Cielo CFPP) to prevent radiant heat injury without additional convective heat transfer.[20] So the range is roughly a 200-400 feet radius distance needed from the most dangerous fuels to prevent radiant heat injury. Fuel modification zones for the Project extend to 170 feet, so the unmodified heaviest fuels at 170-feet or more have the potential to inflict radiant heat injury. This reality is significant for evacuees, firefighters or any individual that decides not to evacuate and attempts to defend property.

The CVFBAR has not considered the implications of potential radiant heat exposure to individuals, evacuees and firefighters. For instance, any firefighter dispatched to the Project during a firestorm needs to have viable escape routes and safety zones available. Where are these escape routes and safety zones? Are there areas of the Project and fire circumstances that firefighters would not be assigned to defend it, or expected to retreat? Under what circumstances are residents expected to evacuate or remain on the Project site and where? If residents are expected to remain on site, then what are they expected to do if confronted by a cluster burn within the Project? If they are expected to evacuate, then what are they expected to do if the streets are gridlocked by traffic or cut off by firestorm? What areas of the Project are the most vulnerable to convective heat transfer? The CVFBAR needs to answer these questions and recirculate the findings for pubic review.

[20] As an example, see the attached diagram that illustrates the lack of adequate escape routes and safety zones on the "Rock Point Peninsula" and the distances required for safety from radiant heat.

Rudy Reyes was unable to safely evacuate the Cedar Fire.

It has already been documented that without adding new development that traffic circulation is severely constricted or gridlocked at commuter hours and/or under emergency conditions. The intersection of Via del Agua / Yorba Linda Boulevard has an "unsatisfactory" or "F" failing Level of Service, EIR at 4.14-15.

> *"As residents began to evacuate, traffic grid-locked in some areas as emergency apparatus tried to enter the neighborhoods while residents tried to exit."*[21]

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[21] Freeway Complex Preliminary Report to City of Yorba Linda, Orange County Fire Authority (OCFA), December 2, 2008, page 14. (Bold emphasis added).

Evacuation can be treacherous even without gridlocked streets based upon when the order is given, visibility, the fires direction and rate of spread, distance from fuel loads, etc. and the timing of the decisions made to evacuate. Fire authorities cannot force individuals to evacuate,[22] which can put firefighters in greater jeopardy if lingering residents find themselves in trouble and request emergency assistance.

> *"Wildland urban interface fires present many challenges pertaining to evacuation.* ***The fire spread rate is often so fast that emergency responders can only estimate the rate of spread and direction of travel****. In this case, within minutes of the fire start, spotting was reported one mile down-wind from the head of the fire. Driven by winds of 40 MPH and higher the rate of spread went from the usual estimate of acres per hour in a non wind driven fire to acres per minute."*[23]
>
> ***"… law enforcement does not have the legal authority to force residents out of their homes****; however, law enforcement may restrict the return of residents once they leave.* ***Determining where and when to evacuate is often difficult****. Each decision brings with it a new set of risks and benefits.* ***The greatest risk by permitting residents to remain with their homes is the potential for loss of life****."*[24]
>
> *"The Tea Fire in Montecito resulted in more than two dozen civilian injuries, two of which were critical burns received while trying to flee their residence. In 2006, in Cabazon, the Esperanza Fire resulted in four firefighter fatalities that occurred during structure protection efforts. The Cedar Fire that occurred in San Diego County in 2003 resulted in the death of fourteen civilians and a firefighter all while trying to flee or protect homes.* ***Investigation into the citizen deaths and injuries identified one commonality: they all occurred because people decided to stay and protect their property or they evacuated too late and got caught in the fire front****."*[25]

When land use decisions can site development away from high-risk topography, (whether its fire, flood or landslide zones) what circumstances justify placing people and firefighters at greater risk of severe and life threatening injuries?

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[22] Under certain circumstances evacuation may pose the greatest risk.
[23] Freeway Complex Preliminary Report to City of Yorba Linda, Orange County Fire Authority (OCFA), December 2, 2008, page 15.
[24] Freeway Complex Preliminary Report to City of Yorba Linda, Orange County Fire Authority (OCFA), December 2, 2008, page 14.
[25] Freeway Complex Preliminary Report to City of Yorba Linda, Orange County Fire Authority (OCFA), December 2, 2008, page 14.

Firefighter fatality reports conclude that decisions to defend vulnerable structures located on high-risk topography were a primary factor in the fatalities of the Esperanza Fire and the Cedar Fire. The recent loss of a 19-person Granite Mountain crew in Arizona occurred when they were traveling though unburned fuel toward threatened structures at the town of Yarnell.[26]

The Esperanza report identified "Causal" and "Contributing" factors for the firefighter fatalities. The root cause of the deaths was the decision to approve and build the home in a location destined to burn. While some consider this incident an accident, it may more readily be considered a high-risk gamble that was lost. The report identified these top factors:

> *"Contributing Factor 1. Organizational culture - The public (social and political) and* ***firefighting communities expect and tolerate firefighters accepting a notably higher risk for structure protection*** *on wildland fires, than when other resources/values are threatened by wildfire." (Bold emphasis added)*
>
> *"Causal Factor 2. The decision by command officers and engine supervisors to attempt structure protection at the head of a rapidly developing fire either underestimated, accepted, and/or misjudged the risk to firefighter safety."*

When faced with a Santa Ana wind driven fire head rapidly approaching Cielo Vista Project homes, will firefighters be expected to defend or decline to defend threatened homes directly in the path of the fire head?[27]

Alternatives - Project configuration and the lack of site design for high-risk topography

The EIR's downplay of the significant adverse fire risks associated with the Project and its focus upon the inconsequential benefits of the Project to homes on the existing WUI is used to rationalize a dismissal of superior Alternatives to the Project. The stacked rationalization favoring the Project over Alternatives should be rejected.

The fire risks of Cielo Vista Project cannot be mitigated to a level of insignificance and justification for a statement of overriding considerations is unlikely. Unfortunately, the CVFBAR attempts to bandage a high-risk site configuration with

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[26] Esperanza Fire Accident Investigation Factual Report, USDA-Forest Service, October 26, 2006. Novato Fire Protection District Cedar Fire Incident Recovery Report, May 26, 2004. Yarnell Hill Incident Reports, https://sites.google.com/site/yarnellreport/

[27] Reference Wildland Structure Protection Standard Operating Procedure, Novato Fire Protection District, Cedar Fire Recovery Report, May 26, 2004 (attached).

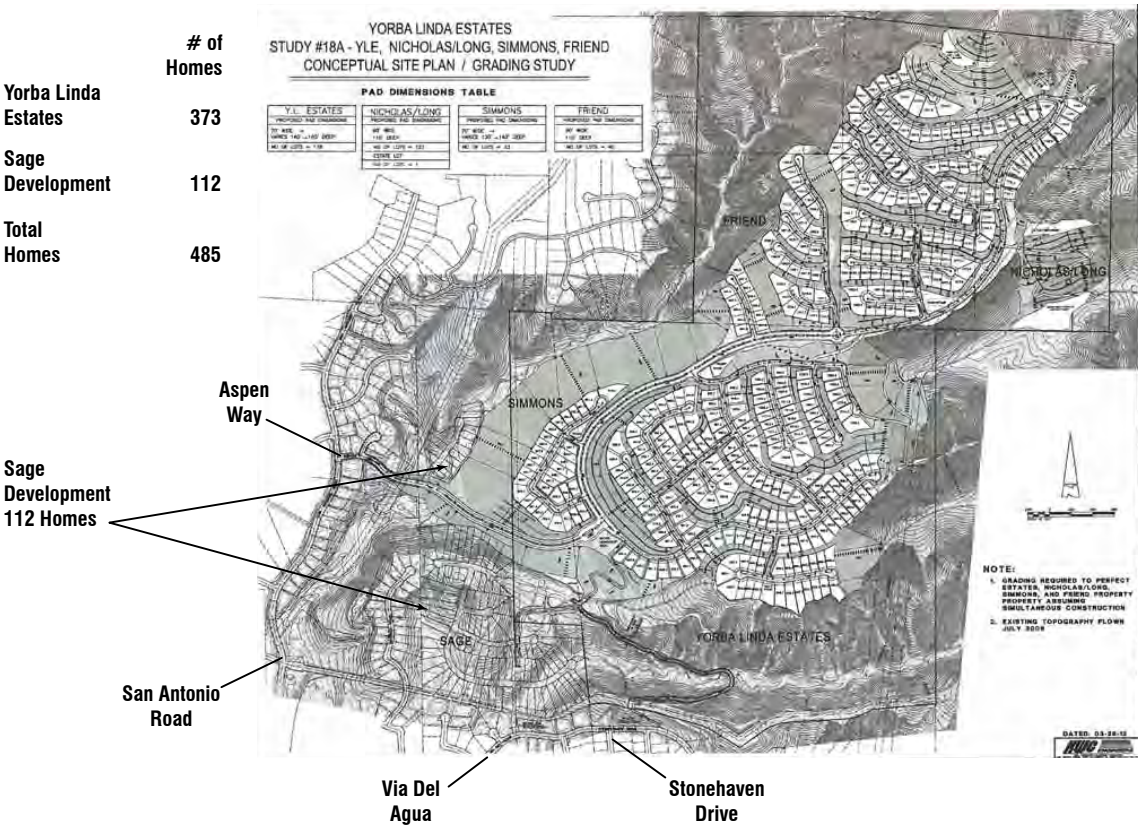
fuel modification zones rather than integrating techniques available to reduce site risk. If a Project is to be considered, it should be reconfigured with a new Alternative. Lots adjacent to high-risk topographic features should be replaced with pocket parks. Narrow peninsulas extending into natural lands should be eliminated. Streets should be placed on the perimeter of homes adjacent to wildlands to act as anchor points for suppression tactics and better insulate structures [place the front yards adjacent to natural lands instead of the back yards]. Alleys that allow for ready fire access and a better facilitation for evacuation should separate the backyards of homes. Homes directly on the wildland interface should be on larger lots to increase the space between home structures to a minimum of thirty-feet thereby reducing the vulnerability of homes to cluster burn. Homes within 30 feet of each other have significantly greater potential to ignite each other. Cul-de-sacs should be eliminated in favor of open circulation. Homes/lots should be oriented to minimize garage doors, large windows and other openings on the north to east interface with Santa Ana winds. Public spaces should be incorporated that are insulated enough to act as safety zones from radiant heat exposure. Functional evacuation routes and safety zones for residents and firefighters should be designed and incorporated.

The No Project Alternative is superior to any of the deficient Alternatives presented in the EIR. The No Project Alternative recognizes the volatile mix of locating residents upon high-risk topography within a Very High Fire Hazard Severity Zone, fossil fuel production under and within ten feet of homes that potentially releases flammable methane gas, an inability to forcibly evacuate homeowners, an already overburdened circulation system, the introduction of excessive risk to firefighters, questionable water supply demands and an already extensive WUI that is already in a state of triage during major firestorm.

Significant Cumulative Impacts Not Evaluated

The Fire Behavior Analysis Report does not recognize the impacts associated with the approximately "340-Unit Esperanza Hills" / "Yorba Linda Estates (Murdock Property)".[28] In fact, the Cielo Vista EIR barely recognizes the Project even though Esperanza Hills and Cielo Vista are interdependent and would be considered more efficiently as a single Project. The Project footprint and traffic circulation system for Esperanza Hills has significant fire safety implications if it is to be integrated with or added onto a Cielo Vista Project. All safety issues raised in this letter need to be addresses in the context of both interacting Projects.

[28] Cielo Vista Draft EIR 3-1-3-4.



"340-Unit Esperanza Hills" / "Yorba Linda Estates (Murdock Property)"

Conclusion

The Cielo Vista Project's present configuration exposes people and structures to a significant risk of loss, injury or death involving wildland fires. The Cielo Vista Fire Behavior Analysis Report does not adequately research and mitigate the significant fire safety issues associated with the Project. The gaps identified in this letter need to be addressed and the document recirculated for further public review and comment.

Thank you for considering these comments,

Van K. Collinsworth,
Wildland Fire Expert / Natural Resource Geographer

CC. Supervisor Todd Spitzer
Kevin K. Johnson, APLC
Attachments:

Attachments Continued – Collinsworth Cielo Vista Comments

Resume
Structure Protection / Backfiring Standard Operating Procedures
Significant Freeway Complex Fire Photographs
Freeway Complex Preliminary Report
BehavePlus 3.0.1 Results Excerpt – Fanita Ranch
BehavePlus 3.0.1 Results Excerpt – Rancho Cielo
Use of a Firebrand Generator to Investigate the Ignition of Structures in Wildland-Urban Interface (WUI) Fires
Firefighter Safety Zones: A Theoretical Model Based Upon Radiative Heating
Firefighter Safety Zones: How Big Is Big Enough?
Significant Fire Illustrations
Esperanza Hills Project Map

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Wildland Fire and Natural Resource Expert

Experience

Wildland Firefighter - Forestry Technician, USDA Forest Service **1980-1993**

- Responded to fire emergencies in the Western Unites States including major Sana Ana wind driven fires on Engine and Hand Crews. Performed in supervisory positions: Incident Commander, Assistant Operations Chief, Assistant Air Operations Chief, Fire Engine Operator, Assistant Fire Engine Operator, Squad Supervisor. Performed backfire and burnout operations with drip torches and fusees. Coordinated with a heli-torch in chaparral backfiring. Participated in search & rescue operations. Completed and taught fire training courses and exercises. Planned and executed successful prescription burns without escape incidents.

Natural Resource Geographer / Resource Analyst **1994-2014**

- Shape community development and policy through analysis of and contribution to environmental documents, planning efforts and public relations. Review legal notices, hearing notices, staff reports, conditional use permits, general plans, zoning overlays, grading ordinances, fire protection plans, aerial photographs and other planning documents. Provide expert testimony on fire and natural resource issues.
- Performed site field evaluations. Identified and documented resources with high-resolution images and GPS. Created maps, spreadsheets, films and web content for negotiation and public distribution.
- Organized and participated in public forums. Delivered television, radio and telephone press interviews.
- Provided oversight for construction mitigation & monitoring agreements, including the application of storm water regulations; development and implementation of landscaping plans for the SR-125 Tollway.
- Coordinated with Caltrans, CA Regional Water Quality Control Board, County of San Diego, City of San Diego, City of Chula Visa staff, elected officials, planning group representatives and community members to resolve transportation, land use and various community environmental issues.
- Served as a founding member of the Policy Committee for the San Diego Fire Recovery Network. Authored "Preventing Firestorm Disaster" PPT, November 2003, Advising Editors, Jon Keeley, Richard Minnich, Rick Halsey, Patrick Abbott and Jack Cohen.

Instructor – Grossmont Union High School District **1988-1994**

- Designed a high-tech learning laboratory addressing critical needs at multiple skill levels. Most graduates, highest test scores, highest attendance in system.

Education

Master of Arts, Geography/Political Science emphasis, Humboldt State University **1986**

Teaching Credential, Social Science, Humboldt State University **1983**

Bachelor of Arts, Geography, Humboldt State University **1982**

Includes 125-quarter units of Environmental Resource and Biological Sciences.

Title: Wildland Structure Protection Standard Operating Procedure

Overview

Structure protection is a dangerous task often performed at the most intense segments of the fire. Due to the inherent dangers of wildland firefighting in general and structure protection specifically it is imperative that personnel maintain "Situational Awareness" and focus on personnel safety and survival at all times.

Situational Awareness is the process used to identify, comprehend, analyze and react to critical elements of information or events that may impact the crew's ability to carry out assignments safely.

Philosophy

The Novato Fire Districts philosophy is based on a simple premise, *"Every Firefighter Deserves a Round Trip Experience"*. It must be the motto of all members that no structure protection operation is worth risking firefighter injuries, near misses or fatalities.

Structure protection operations are not worth sustaining damage to an engine. Even minor damage to an engine such as, melted lenses or bubbled paint should be considered a near miss, a close call for the crew and investigated as such.

Every structure protection operation must be based on a Situational Awareness and Structure Protection Assessment, and the development of Structure Protection, Safety, Survival and Mop Up Plans.

There may be times when it becomes necessary to turn down an assignment for fear of sustaining firefighter injuries, a potential near miss situation or possible fatality(s). In these situations the individual in charge should follow the District Refusing Risk SOP to the extent possible but without further risking the safety of the crew or engine.

Procedures

Situational Awareness Assessments must be based on:

- Information, events, decisions, orders or actions beginning prior to dispatch and continuing until the crew and engine are safely back in quarters, that may immediately or eventually affect the safety and survivability of the crew and engine

- Communication including questioning each other to increase the Situational Awareness of all crew members

Structure Protection Assessments must be based on:

- The survivability and safety of the crew and the engine
- Actions the homeowner has taken to create an adequate defensible space, non-pyrophytic landscaping and fire resistive construction
- Standard Structure Protection Assessment guidelines
- The potential for changes in weather and fire behavior
- Never accepting or settling for a bad situation
- The fact that what works at home may not work elsewhere in the State and conversely conditions experienced elsewhere can occur at home.

Structure Protection Plans must be based on:

The crew's ability to identify, in the Situational Awareness and Structural Assessments, the cumulative circumstances that conspire to create hazardous situations and their ability to eliminate the hazards or change tactics in time to make the situation safe for themselves and their engine including:

- The ability of the crew and engine to safely survive the passage of the flame front without taking refuge in the engine, structure or deploying a fire shelter
- Establishing Trigger Points which cause an immediate re-assessment of the situation and potential changes in tactics
- Identifying safe alternative options such as prepping and leaving and/or returning after the flame front has passed
- The Standard Firefighting Orders, the Watch Out Situations and the Common Denominators of Fire Behavior on Tragedy Fires
- A physical or mental step back to assure that your actions appear to be in accordance with your plans, and always searching for a safer solution.

*If conditions exist to safely make a direct attack on the fire all Firefighter Safety and Survival guidelines will be followed.

Safety Plans must be based on:

The crew's ability to establish Lookouts, Communications, Escape Routes and Safety Zones (LCES). LCES must be established, re-assessed and revised as conditions change. As Safety Plans change they must be communicated to the

entire crew. In operation, LCES functions sequentially and is a self-triggering mechanism.

Lookouts

- Lookouts assess – and reassess – the fire environment and communicate to each firefighter threats to their safety. Firefighters use escape routes and move to safety zones when threats to safety occur.

- Lookouts should be trained to observe the wildland fire environment and to anticipate and recognize and communicate fire behavior changes.

- Lookouts should be positioned where both the hazard and the firefighters can be seen.

    - Terrain, cover, and fire size determine the number of lookouts needed; every firefighter has the authority and the responsibility to warn others of threats to safety.

    - Lookouts must be in a position to provide the working crews with sufficient warning so that they are able to reach their Safety Zone safely.

Communications

- Set up communications system - radio, voice, or both – by which the lookout warns firefighters promptly and clearly of an approaching threat.

- It is paramount that every firefighter receives the correct message in a timely manner.

Escape Routes

- Escape Routes must be verified by actually traversing the route and assessing the time it takes to reach the Safety Zone.

- Preservation of the homeowner's vegetation, fences, or other structural features that impede the crew's use of the Escape Route(s) should be of minimal concern to the crew and if need be, cleared or removed.

- Driveways or access roads must meet the requirements of an Escape Route if the Safety Zone is not near the structure.

Safety Zones

- A Safety Zone must be an area where survivability is possible without fire shelter deployment.

- The optimum Safety Zones is four times the maximum flame length, measured from the center of the Safety Zone to the nearest fuel on all four sides

- The optimum area of a Safety Zone may be reduced based on varying fuel types, topography and structures or other natural objects that will act as a heat barriers as the flame front passes

- Engines, structures and bodies of water should be considered last resort survival options not Safety Zones.

Last Resort Survival Plans must be based on:

The crew's ability to identify, verify, establish and communicate Last Resort Survival Options before an event occurs. Last Resort Survival Options must be re-assessed, revised and communicated to the entire crew as conditions change. In operation, Last Resort Survival Options should be self-triggering when conditions change and Safety Plans are no longer an option.

- In the event that Safety Plans fail the survivability of the crew must become the only priority.

- Last resort survival options include taking refuge in an engine, structure, fire shelter or body of water

- The most effective option or combination of options will vary according to the conditions present at the time of the event

Mop up Plans must be based on:

The crew's ability access a water supply, the degree to which the structure was exposed to the flame front, other available resources and the urgency to take on a new assignment.

- A thorough mop up of the area surrounding the structure for a minimum of 50' or as dictated by an assessment of the surrounding fuel models

- Checking and re-checking for potential ignitions sources in the interior and exterior of the structure

- Waiting for a sufficient period of time to determine if re-ignition will occur

Summary

No plan to protect a structure should be based on the anticipated need to seek refuge in the engine, structure or in a fire shelter when the flame front passes. On the other hand even the best managed events can change for the worse. In these cases last resort survival options such as entering the engine, structure, shelter deployment body of water, or any combination of these options should be identified early, re-assessed regularly and shared with all crew members.

In no case should policy impede firefighter safety nor should the basic premise of firefighter safety be forgotten or neglected.

- Activities that present a significant risk to the safety of personnel shall be limited to situations where there is a potential to save endangered lives.

- Activities that are routinely employed to protect property shall be recognized as inherent risks to the safety of personnel, and actions shall be taken to reduce/avoid these risks or change tactics.

- No risk to the safety of personnel shall be acceptable where there is no possibility to save lives or property.

Simply stated:

- We Will risk our lives a lot, in a calculated manner, to save SAVABLE lives.

- We Will risk our lives a little, in a calculated manner, to save SAVABLE property.

- We Will Not risk our lives at all for lives, property or the environment that are already Lost/Cannot Be Saved.

Title: Risk Refusal Standard Operating Procedure

Overview

The Novato Fire Protection District is an all risk organization responsible for responding to and mitigating medical emergencies, vehicle accidents, hazardous material releases, specialized rescue events, structure fires, vehicle fires, and wildland fires. As such we must recognize that there are both acceptable and un-acceptable risks to our personnel that come with this responsibility.

Philosophy

The Novato Fire District philosophy is that "Every Firefighter Deserves a Round Trip Experience". Therefore, every individual has the right and obligation to refuse an assignment, in accordance with this SOP, if that assignment is likely to result in injuries, near miss situations, or fatalities.

Procedure

A Risk Refusal is a situation where an individual having conducted a Risk and Situational Awareness Assessment determines that they cannot undertake the assignment because they deem it unsafe.

Assignments may be refused as unsafe when:

- There is a violation of safe work practices, District Policy, the Firefighting Orders, Watch Out Situations, LCES, etc.
- Environmental conditions make the work unsafe
- Crew members lack the necessary qualifications or experience
- Equipment is defective or unavailable
- The risk can not be mitigated and/or tactics cannot be changed
- An adequate Risk and Situational Awareness Assessment cannot be conducted

When an individual or person in charge chooses to refuse an assignment because they deem it unsafe, they must provide their immediate supervisor with the following information immediately:

- The reason for the for the Risk Refusal

- To the degree possible, safe alternatives for completing that assignment

The Supervisor who receives the Risk Refusal will make every effort to notify the Safety Officer. If there is no Safety Officer, notification will go to the appropriate Supervisor or to the Incident Commander. This assures accountability for decisions and communicates safety concerns to the entire incident organization.

If the Supervisor who receives the Risk Refusal asks another resource to perform the assignment, they are responsible for informing the new resource that the assignment has been refused and the reasons for that refusal.

If an unresolved safety hazard exists or an unsafe act was committed, the individual or person in charge should also document the Risk Refusal with a memo to their immediate Supervisor and/or the Safety Officer.

Summary:

These actions do not necessarily stop an operation from being carried out as long as the identified risk can be mitigated. This SOP is integral to the effective management of risk and the timely identification of hazards through the chain of command to promote firefighter safety and accountability.

In no case should policy impede firefighter safety nor should the basic premise of firefighter safety be forgotten or neglected.

- Activities that present a significant risk to the safety of personnel shall be limited to situations where there is a potential to save endangered lives.

- Activities that are routinely employed to protect property shall be recognized as inherent risks to the safety of personnel, and actions shall be taken to reduce/avoid these risks or change tactics.

- No risk to the safety of personnel shall be acceptable where there is no possibility to save lives or property.

Simply stated:

- We Will risk our lives a lot, in a calculated manner, to save SAVABLE lives.

- We Will risk our lives a little, in a calculated manner, to save SAVABLE property.

- We Will Not risk our lives at all for lives, property or the environment that are already Lost/Cannot Be Saved.

Title: Wildland Firing Operations Standard Operating Procedures

Overview

Firing operations are often critical operations in the fire management job. If planned and executed correctly, they can speed control of a fire and greatly reduce suppression costs. Conversely, if not done right, they can endanger personnel, extend control time, damage property and increase cost.

Philosophy

Firing operations must not jeopardize the safety of personnel or equipment or invalidate suppression action on adjacent Divisions/Groups. Confirmation of this is absolutely mandatory prior to firing. No backfiring action regardless of strategic importance or other critical factors is worth risking one human life! When in doubt choose another safe and appropriate tactic.

Procedure

Backfiring

Backfiring operations are a method of indirect attack typically used against rapidly spreading fires. Safety considerations must be given first priority. Backfiring must be approved by the Incident Commander and should be performed by properly certified and qualified personnel.

The most successful backfiring is conducted from completed control lines. These are best located at a break in the terrain - the lee side of ridgetops is often best choice, canyon bottoms second choice and benches or roads in mid-slope third. The third choice is the most dangerous from the personnel safety standpoint and requires the most skill and understanding of fire behavior.

Backfiring is most often used to contain a rapidly spreading fire. Backfiring provides a wide defense perimeter, and may be further employed to change the force of the convection column. Backfiring is a tactic which makes possible a strategy of locating control lines at places where the fire can be fought safely on the firefighter's terms.

Except for rare circumstances meeting specified criteria, backfiring is executed on a command decision made through the ICS channels of authority. Occasionally a situation may develop requiring immediate action to backfire. Division/Group Supervisors, Initial Attack and Extended Attack Incident Commanders should be authorized to initiate backfiring provided:

- The act does not jeopardize the safety of personnel or invalidate the actions of adjacent resources and personnel.

- A change in weather or fire behavior requires this course of action to maintain control of the situation or control lines

- It is taken to mitigate a safety situation such as creating a safety or deployment zone

One Certified and Qualified individual must be responsible for controlling and directing the backfiring operation. If a qualified individual is not available the operation should not be attempted. In addition to Certified and Qualified individuals it is also necessary to have available:

- A sufficient number of skilled personnel assigned as a firing team

- A sufficient number of resources and personnel assigned to hold the firing operation

Burning Out

Typically Novato Fire District personnel are not certified and qualified to conduct firing operations; however, they may support a back firing operation by a certified and qualified individual or team, if needed.

A Burn Out operation is the intentional burning of fuels inside the control line to strengthen the line. Burning out is almost always done as a part of line construction (direct attack/parallel attack); the control line is considered incomplete unless there is no fuel between the fire and the line. Burn Out operations are typically performed without the approval of the Incident Commander or direct supervisor however, a notification of both is essential to avoid confusion regarding observed fire behavior on the incident.

Guidelines

The following guidelines apply to all firing operations and you must assure that you:

- Do not place fire fighting personnel or the public at risk
- Do not put property at risk
- Will be able to maintain control of the operation
- Will not make the situation worse
- Have a beginning point and an ending point (anchor points)
- Will be able to complete your operation with the personnel and equipment on hand
    - Do not start an operation that in order to complete you must rely on resources that are not on scene, they may never arrive
- Have considered all other options including the use of other tactics

- Will not delay suppression activities by spending the time to gather resources, prepare and execute the firing operation
- ***Coordinate with adjoining resources/personnel***

Conclusion

If you can not unequivocally make meet the guidelines of this SOP in the time available, do not fire!

Significant Freeway Complex Fire Photographs[1]

BRUCE CHAMBERS, THE ORANGE COUNTY REGISTER

MINDY SCHAUER, THE ORANGE COUNTY REGISTER

[1] Source: Orange County Register, November 15, 2008, **http://www.ocregister.com/news/fire-190401-coverage-complete.html**

Freeway Gridlock

Mark Avery, AP

Mark Avery, AP

Santa Ana Wind Driven Firestorm

Kevin Sullivan, The Orange County Register

Kevin Sullivan, The Orange County Register

FREEWAY COMPLEX FIRE
PRELIMINARY REPORT

December 2, 2008

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Freeway Complex Fire
Preliminary Report

Purpose

November 2008 Southern California was devastated by wildland fires. On November 13, 2008 several large fires were burning and being fueled by an extreme Santa Ana wind condition and low humidity. In the aftermath, hundreds of homes were destroyed and thousands of acres burned in Santa Barbara, Los Angeles, Riverside, San Bernardino, and Orange Counties. In total, the fires in Southern California consumed over 850 homes, and burned more than 40,000 acres.

At the request of the Yorba Linda City Council, the preliminary report on the November 15, 2008 Freeway Complex fire is being provided. The comprehensive Freeway Complex Fire After Action Report (AAR), which will be more thorough and detailed, is expected to be completed prior to the March 2009 OCFA Board of Directors (BOD) meeting. A draft of this report will be presented to the Yorba Linda City Council for review and comment prior the final report being submitted to the OCFA Board of Directors. In addition, OCFA staff will provide monthly AAR progress reports to the City Council.

Conditions at Time of the Fire

A Red Flag Warning was in effect for the 24-hour period preceding the start of the Freeway Fire on Saturday, November 15, 2008 and had been extended through 10:00 A.M. for an area including Orange County by the National Weather Service (NWS). This decision by the NWS is based on local weather data and is an important planning triggering event for the OCFA. The Weather Condition Summary contained in this preliminary report comes from climatic archives taken from the two closest National Oceanic and Atmospheric Administration (NOAA) certified Remote Automated Weather Stations (RAWS) to the origin of the Freeway Fire; Fremont Canyon and the Corona Airport. The RAWS provides hourly weather information by collecting, storing and forwarding data to computerized systems. Several indicators are measured including air temperature, local wind speeds and relative humidity around the clock.

The Freemont Canyon (RAWS) site is located on a Santa Ana Mountain ridge above the origin of the fire.

Freemont Canyon RAWS - Santa Ana Mountains

Time	Temperature	Wind Speed	Humidity
9:00 A.M.	75°	43 mph, Gusts to 61 mph	8%
3:00 P.M.	80°	25 mph, Gusts to 45 mph	7%

The second RAWS is located at the Corona Airport and is approximately 3 miles east of the fire's origin, near the entrance to Santa Ana Canyon.

Corona Airport RAWS - Santa Ana Canyon

Time	Temperature	Wind Speed	Humidity
9:00 A.M.	83°	20 mph, Gusts to 24 mph	6%
3:00 P.M.	90°	29 mph, Gusts to 37 mph	4%

Advanced Planning

During periods of extreme weather, OCFA routinely monitors weather forecasts and takes actions commensurate with these forecasts and predictions. OCFA has a comprehensive Standard Operating Procedure (SOP) titled *Extreme Weather Plan Winds/Red Flag and Rain/Floods* (OM 209.13). This SOP provides a standardized operational approach in response to extreme or predicted extreme weather conditions.

Additionally, OCFA has an SOP titled *Red Flag Alert/Hazardous Fire Conditions Program* (OM 209.12). This SOP describes the Red Flag Alert Program which is designed to prevent large fires that may occur as a result of extreme weather conditions and OCFA's actions in response to Red Flag Alerts that are issued by the U.S. Weather Service. Essentially this program is an intensive, cooperative; watch and-warning fire prevention patrol, and public awareness program conducted by local, state, and federal fire agencies in conjunction with private cooperators during periods of extreme fire danger.

In preparation for the expected extreme fire conditions, the OCFA implemented an emergency staffing pattern on November 14, 2008 which included:

- One Type-III Strike Team with 4-person staffing
- Staffing of a second helicopter
- Increased staffing on five engine companies in the wildland interface areas from three to four firefighters each (these are referred to as the "Grey Book" stations)
- An additional fire dispatcher was added to the Emergency Communication Center

At the inception of the Freeway Fire Southern California was already besieged by two other resource intensive wildfires in the counties of Santa Barbara and Los Angeles County. The Tea Fire started on November 13, 2008 and burned through the community of Montecito located in Santa Barbara County. It would ultimately char 1,940 acres, destroy 210 homes, damage 9 others and cost 5.7 million dollars to extinguish. The Sayre Fire started on November 14, 2008 in the community of Sylmar in Los Angeles County. This fire charred 11,262 acres, destroyed 487 homes, 1 commercial building and 146 outbuildings. The cost of fighting this fire was 13.5 million dollars.

As a cooperating member of the California Fire and Rescue Emergency Mutual Aid Plan, the OCFA had three strike teams of engines deployed out-of-county at the start of the Freeway Fire . The mutual aid system is founded on the principle of neighbor helping neighbor. When an emergency is of such a nature that it overwhelms an agency's ability to manage it on their own, other California fire departments provide resources. The system allows for an orderly escalation and distribution of resource commitment to one or more incidents and from a single resource to several hundred.

During most wildland fires, Mutual Aid resources are requested and assembled in preparation for anticipated strategic actions. However, with wildland fires that rapidly turn into urban interface conflagrations such as the November 2008 fires, planning must make way for rapid initial attack strategies and the immediate deployment of available resources.

November 14, 2008 OCFA Out-of-County Strike Teams	
Tea Fire	One OCFA Type-III Strike Team (9328-C) was committed to the Tea Fire on 11/13/08 at 9:00 P.M.
Tea Fire	One OCFA engine (OES-E303) was committed as part of OES Type-I Strike Team (1830C) to the Tea Fire on 11/13/08 at 11:47 P.M.
Tea Fire	One OCFA Type-I Strike Team (1400-A) was committed to the Tea Fire on 11/14/08 at 3:55 A.M.
Sayre Fire	One OCFA Type-I Strike Team (1402-A) was committed to the Sayre fire on 11/15/08 at 00:40 A.M.

In addition, neighboring MetroNet fire agencies committed three strike teams of engines to the Tea and Sayre Fires and additional OES engines for the OES strike team. This represents a total of 35 fire engines and seven strike team leaders from the OCFA and other Orange County fire agencies assigned to fires outside of the county at the inception of the Freeway Fire. As OCFA resources are committed on a mutual aid response personnel are recalled to staff relief engines to ensure adequate station coverage. Staffing the OCFA's relief/surge engine fleet, all fire engines sent out of county had been covered either through the use of backfill (10 engines) or by the on-coming shift personnel (5 engines). All the essential station openings had been covered prior to the start of the Freeway Fire.

Fire History of the Area

Yorba Linda has an extensive history of wildland fire due to its location within the Santa Ana Canyon. Weather, vegetation and topography are the significant factors contributing to the rapid spread and impact of wildland fires. Since 1980, the Yorba Linda area has experienced 25 separate wildland fires burning a total of 82,734 acres; events range from one (1) to 19,986 acres. The most notable and devastating of these are the 1982 Gypsum Incident (19,986 acres), the 1980 Owl Incident (18,332 acres), the 1980 Carbon Canyon Incident (14,613 acres) and the 2006 Sierra Peak Incident (10,506 acres). The commonality of each of these larger fires is the Santa Ana Wind and the effect it has on vegetation and fire behavior. The Santa Ana Canyon funnels the wind, increasing its speed and magnifying the effects on the available fuel bed. The

frequency of fire in this area has allowed non-native vegetation of volatile grasses and weeds to become the dominate fuel type.

Pre-planning for emergency events is a familiar concept to the OCFA. Operational plans exist or are under development for many high risk areas. A few weeks prior to the Freeway Fire, in an effort to bring stakeholder agencies (OCFA, LACO, Corona FD, Cal Fire RRU/BDU, San Bernardino CFD, Chino Valley IFD, Anaheim FD, Orange FD, USFS, and South Ops.) together to develop and review operational plans for the wildland urban interface area along the 91 Freeway corridor a table top "gaming" exercise was conducted. This exercise provided chief officers the opportunity to consider fire progression and fire spread potential. Trigger points were also developed with a course of action for each one. This exercise proved to be highly beneficial as some of the first responding officers were participants in the gaming process.

An example of one of these trigger points is demonstrated through actions taken by OCFA Battalion 2 while enroute to the fire. Based upon the radio traffic from the initial attack companies, Battalion 2 ordered two strike teams to report to OCFA Station 53 in East Yorba Linda. The purpose was to get ahead of the fire and place additional engines into Yorba Linda which was in the direct path of the rapidly advancing fire from Corona.

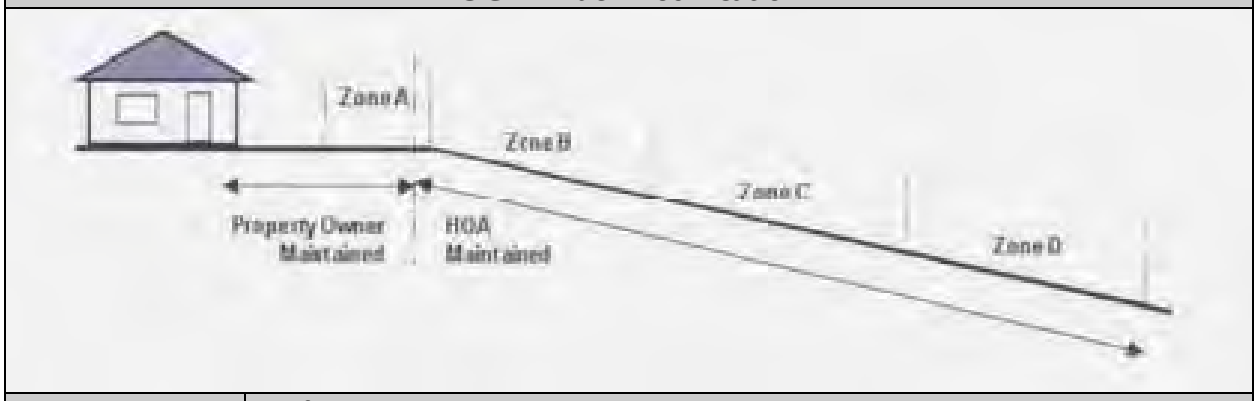
Fire Prevention: Brush Clearance and Construction

Land use planning and fire prevention play a key role in reducing the wildfire threat to communities in the wildland-urban interface (WUI). To adequately protect communities in these areas, a combination of brush clearance measures and ignition resistant construction of structures is necessary.

Brush Clearance

The Orange County Fire Authority has enforced "fuel modification" requirements since the County adopted these provisions in 1979 to protect homes in the WUI. The requirements and provisions are also included in the local ordinances of the 22 cities protected by OCFA. Homes constructed in Yorba Linda since 1980 are most likely protected by a fuel modification program.

Fuel modification is a program consisting of four zones totaling 170 feet in width. Features include: set-backs and irrigated zones along with a selection of appropriate plant palettes for each zone. A 20 foot "non-combustible zone" is included in the yards of homes adjacent to fuel modification areas where fencing, patio covers, decks, etc. must be constructed of non-combustible materials.

OCFA Fuel Modification	
	
A Zone	20 feet wide and on level ground, landscaped with approved plants Helps prevent direct flame impingement on the structure and deflect radiant heat
B Zone	Minimum of 50 feet wide Irrigated and landscaped with approved plants Slows fire and reduces fire intensity
C and D Zones*	Each zone is a minimum of 50 feet wide All dead and dying materials are removed Native vegetation thinned 50% in C zone, 30% in D zone Slows fire and reduces fire intensity *Some older fuel modifications have only a C Zone

Homes constructed in the WUI prior to 1980 are required to maintain "defensible space" between their home and the property line that separates them from the WUI. Defensible space is less prescriptive than fuel modification and consists of thinning vegetation and ensuring tree branches are not within ten feet of chimneys.

The provisions for fuel modification and defensible space have evolved over the past 30 years and, although proven effective in protecting communities during wildfire incidents, are not without implementation challenges. The most significant implementation challenge is maintenance.

Maintenance of Brush Clearance

OCFA does not have a formal WUI inspection program. As a result, if areas are not properly maintained on a voluntary basis by the responsible landowner, they can become overgrown and, in some instances, irrigation can be stopped due to cost or poor maintenance of water lines. OCFA staff attempts to identify the worst cases and work with landowners to restore the land to an approved condition. In Yorba Linda, this is complicated by the fact that, unlike most of Orange County where fuel modification zones are owned and maintained by a homeowner's association, the OCFA must usually work with each individual homeowner on compliance plans or, in some cases, to access the area for inspection.

In 2008, staff inspected 587 WUI parcels and found only 16 out of compliance with minimum requirements for defensible space. By July 22, all properties were in compliance. In addition, staff inspected approximately 790 of some 950 fuel modification parcels to ensure that they were in "substantial compliance" with provisions of the requirements and found 322 in need of some type of corrective action. As of the date of the fire, all but 25 had met minimum requirements. A preliminary assessment of homes destroyed or damaged in the freeway fire indicates that they were victim to ember intrusion rather than direct flame impingement indicating brush clearance was adequate.

Prior to the fire, staff had made it a priority to conduct a complete inspection of all homes protected by fuel modification to ensure all zones are planted, irrigated and maintained as required. This will be the first comprehensive inspection conducted by OCFA and is expected to take more than a year. This effort may also be combined with an educational component that informs the homeowner of action they can take to protect their home through plant choices outside the fuel modification zones. Information on action that can be taken to prevent fire and embers from entering their homes through open windows, combustibles stacked too close to their home, or inadequate construction features will also be included.

Ignition Resistant Construction

Properly established and maintained brush clearance is typically very effective in protecting homes for direct flame impingement and radiant heat. However, it can do little to nothing to protect homes from ember intrusion. Homes must be constructed to withstand ignition from embers that land on homes or enter through attics and other openings.

The Office of the State Fire Marshal has worked with stakeholders for several years developing "ignition resistant building standards" that were adopted by the California Building Standards Commission and became applicable in January 2008. These standards, which dictate construction methods for roofs, eaves, vents, walls, doors, windows, and patio covers and decks, apply to all homes constructed in "Very High Fire Hazard Severity Zones" or locally designate WUI areas. The State has not yet sent Orange County the final maps for adoption by the City but has indicated they will be mailed early next year. In the interim, the regulations are applicable in the "Special Fire Protection Areas" (SFPA), adopted by the City in 1996.

In 1996, the City also adopted an ordinance for construction within designated SFPA areas. Many construction requirements of that 1996 ordinance are similar to the new statewide standards although notable improvements relative to application and protection of walls and vents were made to the new provisions. It is also notable that, according to our records, none of the homes damaged or destroyed in the Freeway Fire were constructed after 1996 and thus, were not protected by provisions required by the City's ordinance for WUI areas.

The application of ignition resistant construction requirements is critical to the survivability of homes that are subject to ember intrusion hundreds of feet from the interface. Maps depicting impact areas must be locally adopted.

Water for Firefighting

Brush clearance and “hardened” (ignition resistant) homes go far in improving the chances for a home’s survival from a wind-driven WUI fire. However, intervention by firefighters is often necessary in saving a home that is determined to be defensible. Water is essential to aiding firefighters in these efforts.

OCFA's Planning and Development Services Section reviews all plans for new development to ensure an adequate water supply is provided in accordance with the adopted Fire Code for the city. Like all California jurisdictions, Yorba Linda is required by State law to adopt the California Fire Code (CFC) and adopted the latest edition in 2007. The CFC requires all structures be within a specified distance to an approved water supply. An "approved" water supply can be defined by the adopting jurisdiction or, the adopting jurisdiction may choose to adopt the water supply provisions found in Appendix B of the CFC. At OCFA's recommendation, Yorba Linda adopts Appendix B, which specifies the water supply; know as "fire flow" based on the square footage of the structure and the construction type. Fire flow is comprised of the flow volume (gpm), residual pressure (psi), and duration of flow (in hours). Another table indicates the number of fire hydrants that must supply this fire flow and their spacing relative to structures protected.

Incident Summary

On Saturday, November 15, 2008 at 9:07:37 A.M., the Orange County Fire Authority responded to a 911 cell phone report of a vegetation fire in the area of the west bound 91 Freeway, west of the Green River off-ramp. OCFA’s initial dispatch to the incident was a High Watershed Response, which included the following:

- Two Battalion Chiefs (ORCB2 and ANAB1)
- Seven Engines (ORC E10, E53, E15, E832 and ANA E8, E9 and E10)
- Two Helicopters (ORC HC41 and HC-241)
- Two Patrols (ORC P10 and P32)
- One Fire Bulldozer (ORC Dozer 2)
- One Water Tender (ORC W10)

At 9:01 A.M. the Corona Fire Department received the initial 911 call reporting the fire and had dispatched three engines and one Battalion Chief to a report of a vegetation fire at the west bound 91 Freeway and Green River.

- COR Brush-1, Brush-3, Engine-2 and Battalion 3

After arriving on scene Corona Battalion 3 assumes the Freeway Incident Command. COR B3 reports that the fire is advancing at a rapid rate and is immediately threatening structures.

Even as the initial response was traveling to the incident the OCFA Emergency Communications Center continue to receive a large volume of 911 calls reporting the fire. A total of 711 telephone

calls were handled by the ECC in the first four hours of the incident. At 9:11 A.M. the response is augmented by the following resources:

- One Type III Strike Team (9329C) responding from the RFOTC
- OC Sheriff helicopter (Duke 1)
- One Division Chief (D-5)
- One Hand Crew and the Crew Superintendent (Crew 1)

At 9:19 A.M. while still enroute and having heard the Freeway Incident Commander's report, ORC Battalion 2 uses established trigger points and immediately orders additional resources.

- Two Type-I Strike Team's (1403-A and 1404-A) – These engines were directed to assemble and stage at OCFA Fire Station 53 in Yorba Linda approximately 2.5 miles down wind from the point of origin.
- Two fixed wing aircraft and a lead plane

Within 15 minutes of the original dispatch the following resources had been added to the incident.

- One Battalion Chief (ORC B3)
- One Engine (ORC E221)
- Two Water Tenders (ORC W7 and W16)
- One Patrol (ORC P16/CAFS)
- One Reserve Hand Crew (ORC Crew 18)

Resources either on scene or ordered within the first 20 minutes of the fire totaled 26 Engines and 5 aircraft

When Battalion 2 arrived on scene at 9:25 A.M., he met with Corona Battalion 3 and Anaheim Battalion 1. They discussed the fire conditions and spread. By then the fire had grown to over 20 acres with a rapid rate of spread and long range spotting (flying embers) occurring well in advance of the fire. The fire was continuing to spread in a westerly direction towards the Green River Homes development of Corona. Structures had begun to burn in the Penny Royal and Feather River area. All available resources were deployed for structure protection.

It was apparent from the onset that this would become a rapidly spreading and significant fire. At 10:12 A.M. the OCFA Incident Commander (Division 5) called for all highest ranking responding agency chief officers to report to the command post to establish a unified command. The unified command post was established at the Green River Golf Course. The Unified Command Team eventually included the OCFA, O.C. Sheriff's Department (OCSD), Anaheim Fire Department (AFD), Brea FD, LA County Fire Department (LACO), Chino Valley IFD, Corona Fire Department (COR), and Cal Fire.

At 10:14 A.M. Helicopter 41 reports that the main fire has spotted one mile ahead of itself. At 10:20 A.M. ORC B2 instructs the ECC to notify the Brea P.D. and the Yorba Linda City Manager of the risk to homes in the Brush Canyon area and that there is a need to evacuate homes within Thomas Brother's Map Page 741, Grids E4, F4, and G5. B2 reports that the fire

will reach the homes within 30 minutes. B2 orders four additional Type-I Strike Teams to stage at Fire Station 53.

During the first hour of the fire the ECC Supervisor established that the OCFA would be the Central Ordering Point for the fire. ECC dispatchers initiated move-up and cover protocols to fill open fire stations caused by the fire response. The OCFA activated and staffed the Department Operations Center (DOC) in the ECC to manage essential operational functions and to provide assistance to the Freeway Fire Incident Commanders. At approximately 9:30 A.M., Division 3 arrived at the DOC and assigned OCFA personnel to report to the County of Orange EOC on Loma Ridge, the OCSD DOC at the Sheriff's facility in Santa Ana, and the Yorba Linda EOC in the Yorba Linda Community Center.

A second vegetation fire is reported in the City of Brea near Carbon Canyon

At 10:46 A.M. a second vegetation fire is reported in the area of the Olinda Alpha Landfill in the City of Brea. The OCFA dispatch center sent the following units from available resources covering nearby fire stations.

- Two Battalion Chiefs (ORC B1 and B8)
- Four Engines (ORC E817, E47, E62 and E223)
- Two Patrols (ORC P23 w/CAFS and P26)
- One Paramedic (ORC M26)
- One Safety Officer

Olinda Alpha Landfill Fire Timeline	
10:46 A.M.	OCFA receives 911 call
11:00 A.M.	OCFA B-8 arrived on scene reported 2-3 acres moving rapidly toward structures and ordered three Type-I Strike Teams and firefighting aircraft
11:08 A.M.	Units from Brea FD and Fullerton FD are dispatched to the fire. Brea B-1, E-1, E-2, E-3, E-304 Fullerton E-1 and E-4
11:28 A.M.	OCFA and Brea FD form a unified command at the "Dump Fire"
17:17 A.M.	Incident commanders at the Freeway Fire roll the Dump Fire into the Freeway Fire and designate the Dump Fire as Branch III of the Freeway Complex.

Freeway Complex Fire Timeline and Fire Spread Summary	
9:00 A.M.	A vegetation fire is established in the vicinity of the 91 and Green River. Aided by above average air temps and single digit RH, Santa Ana winds push fire through the riverbed vegetation and into the surrounding foothills west and north of Green River Golf Course.
9:25 A.M.	Fire is bumping up against and destroying homes in the city of Corona on Feather River Rd and Penny Royal Rd., east of the golf course.
9:45 A.M.	Fire is immediately threatening the golf course and the order to evacuate is given. Fire is also making a run to the WNW and becoming well established in Chino Hills State Park.
10:04 A.M.	The order is given to the BNS Railroad to stop all rail traffic in the affected area.
10:31 A.M.	Reports of fire running into Brush Canyon and threatening homes in Yorba Linda on Evening Breeze, Blue Ridge and Big Horn.
10:52 A.M.	Reports of homes burning in the area of Paseo de Toronto and Bryant Elementary School.
12:53 P.M.	The fire jumps the 91 Fwy and threatens structures in Anaheim Hills
1:08 P.M.	The fire is now taking structures in Hidden Hills
1:18 P.M.	Structures are threatened on Stonehaven, west of Hidden Hills
2:03 P.M.	Reports of structures on fire in the area of New River and Esperanza, west of Yorba Linda Blvd
3:05 P.M.	Reports of structures on fire in the areas of San Antonio and Alder, north of Yorba Linda Blvd
3:13 P.M.	Reports of homes on fire in the area of San Antonio and Fairmont
3:14 P.M.	Reports of numerous businesses threatened in SAVI Ranch
5:08 P.M.	Homes reported to be burning in the area of Black Forest and Banyan Rim
7:00 P.M.	Cal Fire Incident Management Team. Six assumes control of the fire and continues to support the established Unified Command
7:47 P.M.	Report of fire in the Yorba Linda Blvd and Kellogg area
8:15 P.M.	Fire is now reported to be in Telegraph Canyon and approaching Carbon Canyon
9:53 P.M.	Fire has become established in the area of Lambert and the 57 Freeway

Freeway Complex Statistics

The Freeway Fire burned approximately 10,000 acres in the first 12-hours. After just 24-hours, the fire had consumed 23,640 acres and numerous homes.

- 30,305 acres burned
- 187 Residential structures destroyed (includes multi-family residences)
- 127 residential structures damaged
- 2 commercial properties destroyed

- 2 commercial properties damaged
- 11 outbuildings destroyed
- 32 outbuildings damaged
- $16.1 million in suppression costs to date, 11/26/08

Mutual Aid

As signatory to the California Master Mutual Aid agreement, the OCFA provides mutual aid assistance to those communities in need. In the same respect, when the OCFA is in need mutual aid is provided by fire agencies who are able to do so. During the Santiago Fire in 2007, there were nine other major fires in California. This unusual circumstance required the OCFA to be self sufficient for the first 48 hours of that fire.

In contrast, when the Freeway Fire started there were two fires of significance in Southern California; the Tea Fire in Santa Barbara County and the Sayre Fire in Los Angeles County were both well underway and seeking mutual aid resources. Prior to the start of the Freeway Fire the OCFA had sent one Type-III and one Type-I Strike Team. to the Tea Fire. MetroNet cities had sent three Type I Strike Teams along with an OES engine Type-I Strike Team from both OCFA and MetroNet cities to the Tea Fire. The Sayre Fire received one Type-I Strike Team from the OCFA and one Type-I Strike Team from MetroNet.

When the Freeway Fire began there were immediate requests for both Type-I and Type-III Strike Teams beyond what could be provided by local agencies. In total 35 Strike Teams of various types were ordered within the first four hours of the incident. Of these, seven Type-I and one Type-III Strike Teams were filled with resources within Orange County as immediate need requests . By 11:00 A.M. six Strike Teams (5 Type-I and 1 Type-III) had arrived from Riverside County. By 1:30 P.M. a total of 19 Strike Teams and one task force were operating on the complex. This was in additions to the 58 engines, 3 trucks, 8 patrols and 5 water tenders that responded as single increments to the complex in the first four hours of the incident. In total, prior to 2:00 P.M. there were 159 engines assigned to and operating on the Freeway Complex.

This rapidity in which resources were filled is largely due to the lack of competition for resources from other fires and a change in mutual aid policy. This change initiated in 2007 allowed for Operational Area and Region Coordinators to directly order and request up to five Strike Teams across operational area boundaries based on the closest resource concept; this is in contrast to the previous rule that permitted only one Strike Team resource to be ordered outside the regional system.

Air Resources

At the time of the initial dispatch of the first air resources to the fire on November 15 (9:08 A.M.), winds at the Fullerton Airport were light and blowing offshore. When the crews of OCFA Helicopters 41 and 241 lifted off they noted that the smoke column rising from the fire in Corona was building and beginning to bend with the influence of the Santa Ana wind. As they headed toward the Santa Ana Canyon the flight crews experienced a 20 to 30 knot head wind. Although their airspeed indicated 110 knots, their actual ground speed was only 70 knots. Wind turbulence was a continual factor for the helicopters as they began making water drops in the interface where the fire was threatening residences. The low lying smoke challenged the pilots' ability to maintain visual flight conditions while making concentrated, effective drops.

The initial aircraft response consisted of OCFA H-41, H-241 and OCSO Duke-1. Duke-2 was later added to the response to assist with water dropping missions. Both OCFA helicopters arrived on scene at the fire at 9:29 A.M. and began dropping water on the fire near the threatened homes. Duke-1 arrived shortly afterward. Because the Sheriff's helicopter does not have a fixed water tank, Duke-1 must land and deploy their 170 gallon bucket prior to engaging in the firefighting efforts.

While engaged in fire fighting, a Corona City Fire crew was overrun by the rapidly escalating fire front. With the fire environment becoming untenable OCFA flight crews began making water drops on the firefighters' position. The firefighters sustained minor injuries. A burn over investigation was initiated by Cal Fire.

At 9:19 A.M. ORC Battalion 2 ordered "Fixed wing aircraft" which resulted in the dispatch of two S2T Air Tankers and an Air Attack out of San Bernardino. The first fixed wing assets arrived at 10:10 A.M. and at the direction of Air Attack began making drops along the North flank of the fire. At 10:24 A.M. ORC HC 41 relayed a resource request from Air Attack to OCFA dispatch "For three additional Air Tankers with a Lead Plane and four Type 2 helicopters."

The Freeway Complex eventually had 17 fire fighting helicopters assigned. These helicopters were comprised of local and state government fire helicopters, law enforcement and commercial vender *call when needed* (CWN) aircraft. During the first six hours of the fire, the OCFA helicopters dropped 48,400 gallons of water and fire retardant foam on the fire. By the end of the second day they delivered over 88,000 gallons of water and foam during water dropping missions on the Freeway Complex. During that same two day period, twelve fixed wing Air Tankers with four Lead Planes being fueled and re-supplied out of San Bernardino and Hemet Ryan air bases dropped 208,791 gallons of retardant on the fire. Tanker 910 (DC-10 aircraft) made a total of ten drops (8 on 11/15 and 2 on 11/16) in the Yorba Linda/ Chino Hills area for a total of 109,445 gallons of retardant. This availability of air resources is also in contrast to the Santiago Fire, where much of California's airborne fire suppression ability was engaged in the numerous other fires in place when the Santiago Fire began.

Water Supply

The demands of a single structure fire can tax even a well functioning water system. In contrast to the usual situation where an engine will pump directly from a hydrant to fight a structure fire, in a wildland event the hydrants are used to refill the water tenders and the engine water tanks. The engines then usually use their tank water to attack the fires during their mobile suppression efforts. As ground forces moved into threatened neighborhoods and tried to extinguish or defend dozens of homes, the Yorba Linda water supply was severely impacted. At approximately 2:00 P.M., several radio calls were received reporting fire companies encountering low or no water pressure in various sections of the Hidden Hills area. Fire companies encountered low or no water pressure on Hidden Hills Road, Mission Hills Lane, High Tree Circle, Fairwood Circle, Green Crest Drive, Skyridge Drive and others. With homes burning on multiple fronts Strike Team Leaders directed companies to move to areas that had available water.

In an effort to ensure that rekindles were kept to a minimum a Patrol with Compressed Air Foam System (CAFS) Task Force was established and put under the direction of a Battalion Chief. The Task Force remained in the Hidden Hills area extinguishing fires and laying down protective foam on unburned structures.

The Yorba Structure Protection Group was using two water tenders to shuttle water to the fire companies. The water tenders systematically began checking fire hydrants until one was found that had enough pressure to fill the water tanks. Eventually water tenders had to fall back to the hydrants at the lowest point in the system to refill. A request for service was placed to the Water District via the Yorba Linda EOC at approximately 2:00 P.M. The Water District responded into the area quickly but was unable to immediately determine the reason for the pressure loss, resulting in the service not being restored for some time. At approximately 5:00 P.M. the water tenders found that the pressure had improved sufficiently enough to permit filling. Also at 5:50 P.M. the Yorba Linda Water District requested three fire engines to assist them in supplementing the water grid system at Pepper and Manzanita.

Evacuations

The Freeway Fire raced from Riverside County on forty to fifty mile per hour winds into the City of Yorba Linda. At approximately 10:20 A.M. the OCFA ECC received direction from OCFA Battalion 2 to advise the City of Yorba Linda that evacuations should be initiated in the areas of Brush Canyon and that the fire would be upon those homes within thirty minutes. Within 90 seconds the Brea PD was notified to initiate the evacuations and the City Manager was contacted. At 10:31 A.M. the first reports are received that the fire is spotting and homes are threatened on Bighorn Mountain Way in Yorba Linda. At 10:39 A.M. OCFA Helicopter 41 confirms that homes on Bighorn Mountain Way, Blue Ridge Drive, and Evening Breeze Drive are threatened.

Although a collaborative decision, the responsibility for civilian evacuation is statutorily a law enforcement function, which also allows the fire department to focus on control efforts. It is impossible to know how many citizens evacuated at any one time in any single area of the city; however it is known that nearly 9,000 dwelling units were impacted in Yorba Linda by the evacuation order as a result of the fires that comprised the Freeway Complex. It is estimated that at the height of the firefight approximately 24,000 citizens were evacuated or kept from returning to their homes due to safety concerns.

As residents began to evacuate, traffic grid-locked in some areas as emergency apparatus tried to enter the neighborhoods while residents tried to exit. The Brea Police Department and other assisting law enforcement agencies took control of the traffic flow which helped firefighters gain access to threatened homes. In any firefighting effort rescue is the first priority. However, in this case resident self evacuation was in effect assuring that rescue from an active fire front would be minimized. It is noteworthy that with such an expansive and escalating evacuation boundary the residents stayed calm and followed evacuation directions. At 11:30 A.M. Patrol 10 reported to incident command that evacuations in their area were orderly and without incident.

Law enforcement agencies possess the legal authority to conduct evacuations of populated areas. Although a mandatory evacuation was declared, law enforcement does not have the legal authority to force residents out of their homes; however, law enforcement may restrict the return of residents once they leave. Determining where and when to evacuate is often difficult. Each decision brings with it a new set of risks and benefits. The greatest risk by permitting residents to remain with their homes is the potential for loss of life. The fact that there was no loss of life or serious injury to residents should not go unnoticed.

Similar wildland urban interface fires in other communities have not been so fortunate. The Tea Fire in Montecito resulted in more than two dozen civilian injuries, two of which were critical burns received while trying to flee their residence. In 2006, in Cabazon, the Esperanza Fire resulted in four firefighter fatalities that occurred during structure protection efforts. The Cedar Fire that occurred in San Diego County in 2003 resulted in the death of fourteen civilians and a firefighter all while trying to flee or protect homes. Investigation into the citizen deaths and injuries identified one commonality: they all occurred because people decided to stay and protect their property or they evacuated too late and got caught in the fire front.

Although there was no loss of life in Yorba Linda, there may have been close calls. The following was put into the call history by an OCFA dispatcher during the fire.

> "Wife called to report her husband is trapped somewhere in the Yorba Linda Fire. He was working in the area and started to hose down houses then became trapped. She was unable to give any type of location. She was advised to keep trying to contact her husband to find out his location. He is not answering his cell."

We do not know who this man was or what impact his efforts may have had. What we do know is that he found himself at risk and may have faced serious injury or death. We also know that because the call came into the ECC, firefighters on the line were notified to be alert for trapped

civilians. Having to focus the already limited resources on both firefighting and potential rescue situations does impact the efficiency of the emergency operations.

Recently the OCFA held a summit for Southern California fire officials to discuss a program designed to help communities better prepare residents of wildland urban interface areas. This program is named *Leave Early or Stay and Defend* (LEOSAD) and is a development of the Australian fire service. The OCFA is evaluating the viability of this program. A key premise of LEOSAD is that residents have a vested interest in protecting their property in the face of a catastrophic fire event. It also reinforces that these urban conflagrations are beyond the ability of a fire agency to control with initial response resources and that triage decisions must be made as to which structures to defend.

Wildland urban interface fires present many challenges pertaining to evacuation. The fire spread rate is often so fast that emergency responders can only estimate the rate of spread and direction of travel. In this case, within minutes of the fire start, spotting was reported one mile down-wind from the head of the fire. Driven by winds of 40 MPH and higher the rate of spread went from the usual estimate of acres per hour in a non wind driven fire to acres per minute.

Recent simulation training for a fire along the 91 Freeway corridor gave incident commanders some practical trigger points when and where to call for evacuation. Radio traffic supports that when these trigger points were reached planned actions were put into motion. The manner and timeliness in which residents were notified is being reviewed. After the Santiago Fire in 2007 the County of Orange led the development and implementation of a public notification/alert system called *AlertOC* which has been adopted and activated in many cities throughout the county.

The City of Yorba Linda is in the process of implementing AlertOC and plans to use the system to communicate to Yorba Linda residents and businesses affected by local emergency events. Residents may use the online process to register their contact information. AlertOC is designed to be implemented by designated city officials during an emergency.

Triaging of homes in regard to an urban conflagration is very similar to what a paramedic would do for a mass casualty incident. Triage is to allow the organization to do the most good for the greatest number of people when the available resources do not match the need. This same goal applies to the triage of structures in a wildland urban interface fire. Fire personnel are trained to recognize which structures are least-salvageable and then to direct their efforts toward saving those structures that have the greatest potential to be saved. However even with the best training and practice it takes great discipline to trade off the life of one patient for another, just as it takes the same discipline to drive past a structure that is on fire to defend one that is not. These triage decisions are often made in seconds with little more information than firefighters can gather as they drive down a smoky and ember ridden street.

Investigation

The fire originated in Riverside County near the 91 Freeway and the Green River off-ramp in the City of Corona. The area of origin is the jurisdiction of Cal Fire. Cal Fire investigators assumed the responsibility for the fire investigation. The preliminary fire cause is reported as accidental; the result of a vehicle exhausts system igniting roadside vegetation. The Landfill Fire is also currently under investigation.

Cost and Reimbursement

Annually the OCFA establishes *Cost Reimbursement Rates* for personnel and equipment resources that are requested on an *Assistance-by-Hire* basis by local, state and federal agencies seeking OCFA services. The personnel rates are based on budgeted salary and benefit costs and also include indirect costs such as financial services, purchasing, and human resources. Equipment rates are based on rate schedules provided by Cal Fire and the Federal Emergency Management Agency (FEMA). To date the cost for the Freeway Complex Fire is estimated at $16.1 million dollars.

Within the first hours of the fire, a Federal Management Assistance Grant (FMAG) was submitted for each of the Freeway and Landfill fires. Both were subsequently approved. Due to the magnitude of the incident, FEMA and the State's Office of Emergency Services (OES) declared the Freeway Complex Fire as a Major Incident. This made Public Assistance Funding available to the participating agencies.

The OCFA is responsible for a small percentage of the cost of fighting the fire on the first day. Cal Fire will assume the remaining firefighting costs.

Recovery

Even as the Freeway Complex Fire was being brought under control, efforts began to address the post fire risk to lives and property that could arise during the coming rainy season. The combined effects of vegetation loss and the effect on soils from fire, created conditions that greatly increased the threat of flooding, erosion, and debris flow in the impacted areas.

In order to prepare for the winter season, the OCFA along with the California State Office of Emergency Services (OES) coordinated assessments of the burned areas with State Emergency Assessment Teams (S.E.A.T.). These teams were made up of representatives from CAL FIRE, California Geological Survey, Department of Water Resources, Department of Fish and Game, Department of Parks and Recreation and Regional Water Quality Control Boards.

The S.E.A.T. members conduct a rapid assessment of the fire area to identify hazards and subsequent mitigations including:

- Identifying on-site and downstream. threats to public health or safety from land sliding, debris torrents, flooding, road hazards, and other fire related problems.
- Identifying threats to watershed resources, including: excessive erosion; impaired water quality; threats to wildlife, fisheries, and botanical values; and cultural resources.
- Determining measures needed to prevent or mitigate identified threats.

The report provided by the S.E.A.T. members suggests mitigations that can be used to reduce but not entirely eliminate all risk from the identified hazards. Some possible recommendations:

- Straw mulching and erosion control fabric or blankets
- Straw wattles to provide a mechanical barrier to water flow and trap sediment
- Hydro-mulching in selected areas

Any recommended mitigations will normally be implemented by private, local, state and federal agencies. The S.E.A.T. has no control over the implementation of the mitigations.

Rain Event

A moderate to heavy rain storm was predicted for the Orange County area on November 26-27, 2008. Predicted rainfall amounts ranged from 1.5 inches to 2.5 inches. The OCFA began preparations for the possibility of mud and debris flows by working closely with the local communities of Yorba Linda, as well as the Santiago Fire areas. Evacuation plans were coordinated with local government and law enforcement agencies in the areas directly impacted by the fires.

The three main objectives for the OCFA were to provide incident management and support in the event of significant flooding and debris flow in the burn areas. Second, to coordinate weather related calls for service to the city of Yorba Linda if the call volume were to overwhelm the OCFA's Communication Center. And third, to assist with the timely and orderly evacuation of residential areas as necessary.

The following OCFA resources were pre-staged in order to reduce reaction time and get needed help to any impacted areas as soon as possible. The augmented resources were staged at the Yorba Linda Community Center.

- Incident Management Team
- One Dozer
- Two Swift Water Rescue units
- One Hand Crew
- One Type 3 Strike Team
- Reserve Patrols 10 and 32

The City of Yorba Linda and its residents played a significant role in preparing for the rain event. Even while fire crews were continuing to overhaul the burn areas, community efforts were underway to fill, distribute and place sandbags, straw bales and other mitigation efforts.

Incident Summary

On November 15, 2008 the Cities and Communities of Yorba Linda, Corona, Anaheim, Brea, Carbon Canyon, Diamond Bar, and Chino Valley were tested by fire. In short the residents and businesses in the affected areas were victim of an urban conflagration. What has become a common occurrence in Southern California this dramatic and damaging fire known as the Freeway Fire Complex focused its full furry into residential neighborhoods that once enjoyed panoramic views of the urban wildland interface (WUI). Fanned by Santa Ana winds this fire grew from a roadside start in light grasses to a consuming furnace moving faster than ground forces were able to predict. Analogous to taking a bag of confetti, lighting it on fire and tossing it in front of a high powered fan; showers of embers rained down without discrimination.

Pushed by winds greater than 40 mph, fueled by single digit relative humidity and in alignment with favorable terrain the Freeway Fire capitalized on these key burn factors to consume more than 30,000 acres, destroy 200 structures, and damage 161 others at a cost of more than 16.1 million dollars.

Initiating a unified incident command structure the OCFA with the assistance of more than 276 mutual aid agencies fought back for five days to gain control and then spent several more days to ensure that every open fire line was closed and every burned structure was overhauled. Combining a well coordinated ground attack with a military like air assault every effort was made to protect homes, businesses and infrastructure while ensuring public safety as best as possible. In the end, properties were lost and damaged, and while devastating, satisfaction must be found in that no lives were lost and only a few minor injuries were reported. In that satisfaction the OCFA recognizes that even the loss of one home is unacceptable and has already begun the organizational learning process.

This preliminary report is the precursor to a more formal and detailed After Action Review. Staff has already been assigned to manage the process and the goal has been established to have the finished report ready by March 1, 2009. Regular updates will be provided to the Yorba Linda City Council as the report is developed. The OCFA will not be waiting for the final report to initiate needed changes or action items. For instance, the OCFA had initiated the process of subscribing to the Alert OC public notification system and will work with the City of Yorba Linda, other partner cities, and law enforcement agencies to ensure systems and processes are reviewed and established that will ensure prompt public notification of emergency situations.

The OCFA understands the concern in regard to ensuring an adequate water supply is available and accessible for fires and other emergencies. In that regard the OCFA has already initiated meetings with the Yorba Linda Water District to determine the nature and cause of water delivery issues related to the Freeway Fire. As soon as practical the OCFA will initiate discussion with other municipal water districts and city water departments. The focus of these

meetings will be to determine how water agencies can work together to enhance service during emergencies.

As previously discussed in this report the OCFA has already initiated action toward future implementation of the "Leave Early or Stay and Defend" (LEOSAD) program. Understanding that homeowners have a vested interest in the protection of their property, the OCFA desires to provide a proven methodology that will meet that goal while making safety of the homeowner a key principle. In that regard, the OCFA will work with the City of Yorba Linda and community leaders to develop educational methodologies and vendor resources to ensure that the LEOSAD philosophy is widely disseminated and supported.

Furthermore as the recovery process begins the OCFA is committed to ensuring that those residents and business owners who sustained either a wholesale loss or even the most minor of damage receive the assistance most needed. Fire Prevention personnel are ready to assist in every phase of the recovery. OCFA Fire Prevention staff will work with the City of Yorba Linda Building Department to streamline permit and plan check processes. The OCFA's Fire Marshal has initiated an assessment of the damage relative to brush clearance and building construction and will review existing codes and ordinances. Working with City staff, they will make recommendations to City Council on revisions that will better protect homes from flames and ember intrusion.

The OCFA has provided this preliminary report to meet the need and request of the City of Yorba Linda. While not able to provide final and determinant information at this early phase of the incident review, it is sincerely hoped that the information contained herein has been satisfactorily developed and presented.

Glossary of Terms

CONFLAGRATION – An uncontrolled burning or fire that threatens human life, property and the environment.

CONTAINMENT – A fire is contained when it is surrounded on all sides by some form of boundary, line or clearance, but is still burning and has the potential to jump or escape the containment line.

CONTROLLED – A fire is controlled when there is no further threat of it jumping or escaping outside the containment line.

COOPERATING AGENCY – An agency supplying assistance including but not limited to direct tactical or support functions or resources to the incident control effort.

DEFENSIBLE SPACE -Creating a fire safe landscape for at least 30 feet around homes (and out to 100 feet or more in some areas), to reduce the chance of a wildfire spreading to structures. This is the basis for creating a "defensible space" - an area that will help protect a home and provide a safety zone for the firefighters battling flames.

DEPARTMENT OPERATIONS CENTER (DOC) – Also known as "Expanded Dispatch". A DOC provides agency dispatching capability independent and separate from routine emergency dispatch. The DOC is activated and staffed for large or complex incidents allowing personnel to focus efforts solely on the incident, maintaining situation status, processing orders for resources and maintaining a direct link with EOCs.

ECC – Emergency Communications Center. Also known as a Dispatch Center, an ECC is the center of an agencies information and communication capability tasked with receiving and processes incoming calls for help. ECC personnel determine the nature of the request and forward it to the appropriate resource.

EXTREME FIRE BEHAVIOR – "Extreme" implies a level of fire behavior characteristics that ordinarily precludes methods of direct control action. One or more of the following is usually involved: High rate of spread, prolific crowning and/or spotting, presence of fire whirls, strong convection column. Predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, and dangerously.

FIRE LINE - A strip of area where the vegetation has been removed to deny the fire fuel, or a river, a freeway or some other barrier which is expected to stop the fire. Hose lines from fire engines may also contribute to a fire being surrounded and contained.

FIRE PERIMETER – The entire outer edge or boundary of a fire.

FMAG – Fire Management Assistance Grant. A federal assistance program managed by FEMA through the state Office of Emergency Services (OES). This program is designed to help state and/or local jurisdictions impacted by high cost, high damage wildland fires.

FUEL MODIFICATION – The practice of modifying and irrigating vegetation to reduce fuel energy output. Highly flammable wildland vegetation is replaced with managed areas of light or fire resistive fuels thereby allowing firefighters the ability to control a fire while relatively small.

FUELS - Combustible material.

GREY BOOK – The Gray Book is the agreement between Cal Fire and the six contract counties that addresses direct fire protection of State Responsibility Area (SRA) within each of the contract counties. Orange County, along with the other contract counties receives funding from the state to provide protection to the SRA

HANDCREW – A team of wildland firefighters primarily assigned to fire line construction activities. Handcrews also mop up hot spots; burn out vegetation to provide fuel free zones and assist with hose lays.

INCIDENT COMMANDER – This ICS position is responsible for overall management of the incident and reports to the Agency Administrator for the agency having incident jurisdiction.

INCIDENT COMMAND SYSTEM (ICS) – A standardized on-scene emergency management concept specifically designed to allow its user(s) to adopt an integrated organizational structure equal to the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries.

INCIDENT MANAGEMENT TEAM (IMT) – The incident commander and appropriate general and command staff personnel assigned to an incident. Also known as an Incident Command Team.

INITIAL ATTACK (IA) – An aggressive suppression action taken by first arriving resources consistent with firefighter and public safety and values to be protected.

INTERFACE ZONE – It is the area where the wildlands come together with the urban areas. Also referred to as the I-Zone. Also referred to as Wildland Urban Interface (WUI)

MASTER MUTUAL AID SYSTEM – Master Mutual Aid creates a formal structure in which a jurisdictions personnel, facilities and equipment can voluntarily assist other jurisdictions when their capabilities are overwhelmed.

OES – The California Governor's Office of the Emergency Services.

PATROL UNIT – An OCFA fire apparatus designed for wildland firefighting built on heavy duty passenger crew-cab truck chassis and carries 100-gallons of water in a pressurized tank. OCFA Patrols are assigned to fire stations adjacent to wildland interface areas.

RATE OF SPREAD (ROS) – The relative activity of a fire as it extends out from the point of origin and the total perimeter of the fire. It is usually expressed in acres per hour.

SANTA ANA WINDS – Is a type of Foehn wind. A Foehn wind is a warm, dry and strong general wind that flows down into the valleys when stable, high pressure air is forced across and then down the lee side slopes of a mountain range. The descending air is warmed and dried due to adiabatic compression producing critical fire weather conditions. Locally it is called by various names such as Santa Ana winds and Sundowners.

SEAT TEAM – State Emergency Assessment Team (SEAT). A team comprised of multi-agency and multi-disciplined resource specialists assembled to assess fire damage, suppression effects and prepare mitigation measures. Upon development of a rehabilitation plan, the team makes recommendations on hazard mitigation.

STRIKE TEAM - An engine strike team consists of five fire engines of the same type and a lead vehicle. The strike team leader is usually a captain or a battalion chief. Strike Teams can also be made up of bulldozers and handcrews.

SPOT FIRE OR SPOTTING – A small fire that is ahead of the main fire, caused from hot embers being carried (generally by winds) to a receptive fuel bed or structure. Spotting indicates extreme fire conditions.

RED FLAG WARNING – Term used by fire weather forecasters to alert users to an ongoing or imminent critical fire weather pattern.

REHABILITATION – The activities necessary to repair damage or disturbance caused by wildfire or the wildfire suppression activity.

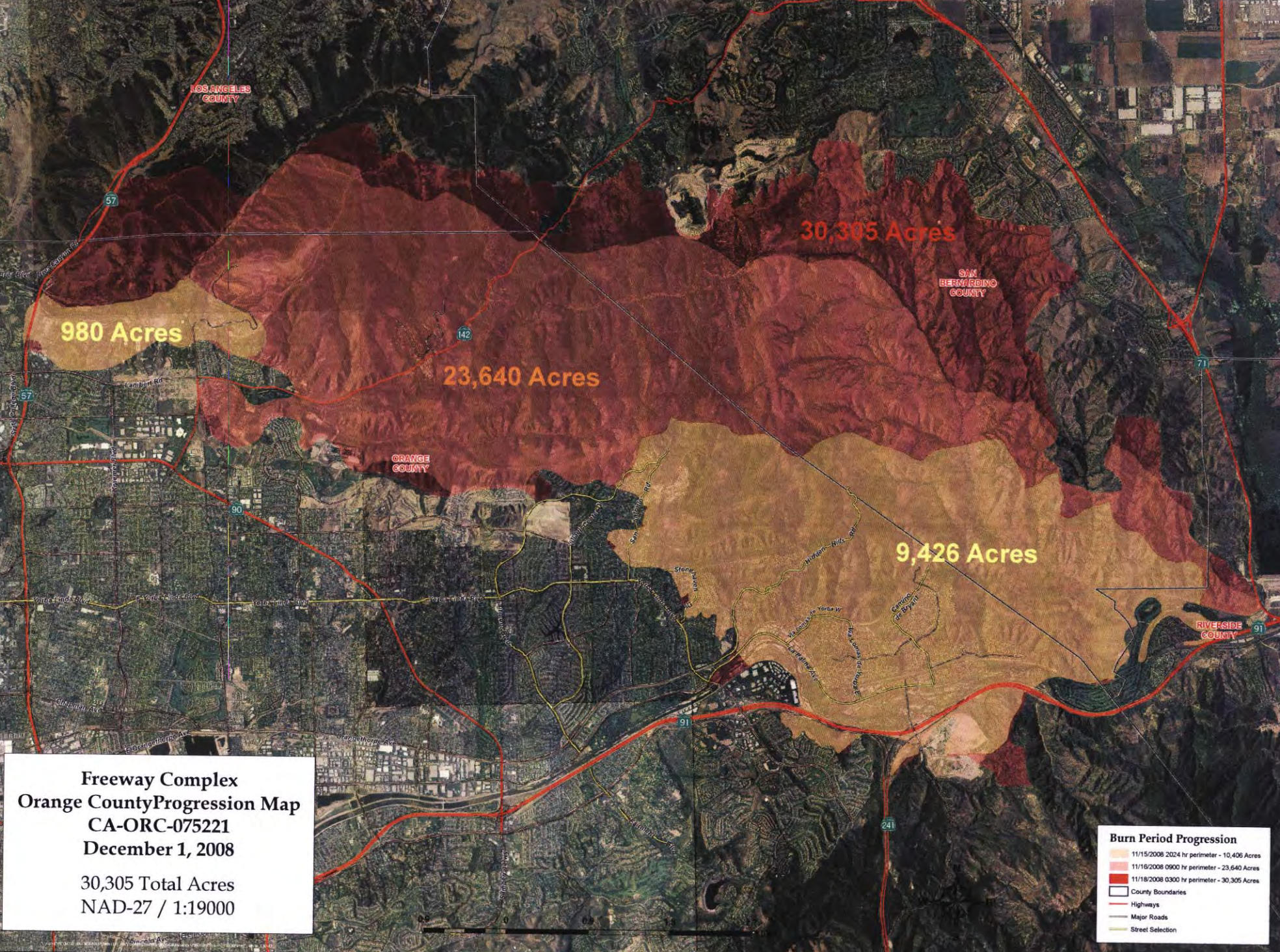
STATE RESPONSIBILITY AREA (SRA) - The California Board of Forestry and Fire Protection classifies areas in which the primary financial responsibility for preventing and suppressing fires is that of the state. CDF has SRA responsibility for the protection of over 31 million acres of California's privately-owned wildlands.

UNIFIED COMMAND – In ICS, unified command is a unified team effort which allows all agencies with jurisdictional responsibility for the incident, either geographical or functional, to manage an incident by establishing a common set of incident objectives and strategies.

WATER TENDER – A specialized firefighting apparatus capable of transporting a minimum of 1000 gallons of water from a water source directly to the fire scene.

WILDLAND ENGINE (Type III) – Fire engines designed for the wildland firefighting environment. Constructed on heavy-duty commercial truck chassis with high ground clearance and often equipped with four wheel drive. Type III engines carry 500 gallons of water and have a minimum pump capacity of 120gpm at 250psi

WILDLAND/URBAN INTERFACE – The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.


LOS ANGELES COUNTY
SAN BERNARDINO COUNTY
ORANGE COUNTY
RIVERSIDE COUNTY
980 Acres
23,640 Acres
30,305 Acres
9,426 Acres
Freeway Complex
Orange CountyProgression Map
CA-ORC-075221
December 1, 2008
30,305 Total Acres
NAD-27 / 1:19000
Burn Period Progression
11/15/2008 2024 hr perimeter - 10,406 Acres
11/16/2008 0900 hr perimeter - 23,640 Acres
11/18/2008 0300 hr perimeter - 30,305 Acres
County Boundaries
Highways
Major Roads
Street Selection

Modules: SURFACE, SIZE

Description: Fanita, under a 60 mph Santa Ana wind in an FM-4

Fuel/Vegetation, Surface/Understory

Fuel Model		4

Fuel Moisture

1-h Moisture	percent	2
10-h Moisture	percent	3
100-h Moisture	percent	5
Live Herbaceous Moisture	percent	
Live Woody Moisture	percent	50

Weather

20-ft Wind Speed	mi/h	60
Wind Adjustment Factor		0.5
Direction of Wind Vector (from upslope)	deg	180

Terrain

Slope Steepness	percent	45

Fire

Elapsed Time	h	1.0

Run Option Notes

Calculations are only for the direction of maximum spread [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind and spread directions are degrees clockwise from upslope [SURFACE].

Direction of the wind vector is the direction the wind is pushing the fire [SURFACE].

Output Variables

Surface Rate of Spread (maximum) (ft/min) [SURFACE]

Fireline Intensity (Btu/ft/s) [SURFACE]

Flame Length (ft) [SURFACE]

Midflame Wind Speed (mi/h) [SURFACE]

Max Eff Wind Exceeded? [SURFACE]

Area (ac) [SIZE]

Perimeter (ft) [SIZE]

(continued on next page)

Input Worksheet (continued)

Notes

RUN #6

A late season wildfire under 60 mph Santa Ana wind conditions in a FM-4, continuous chaparral vegetation over 6' in height.

Fanita, under a 60 mph Santa Ana wind in an FM-4

Surface Rate of Spread (maximum)	1966.5	ft/min
Fireline Intensity	113088	Btu/ft/s
Flame Length	95.0	ft
Midflame Wind Speed	30.0	mi/h
Max Eff Wind Exceeded?	No	
Area	30229.3	ac
Perimeter	241689	ft

TABLE 2.3.4	
Expected fire behavior for a Prevailing Southwest Wind Condition in a Fuel Model 4 (A Fuel Model 4 is a continuous cover of chaparral vegetation greater than 6' in height)	
RATE OF SPREAD	**200.3 feet/minute**
FIRE LINE INTENSITY	**9,652 BTU's/foot/second**
FLAME LENGTH	**30.6 feet in length**
Additional Fire Behavior Calculation Input: • 15 mph 20-foot wind speed (7 mph mid-flame wind speed) • 30 percent slope • 270° direction of wind vector to downhill slope	

This equates to 231 acres in 30 minutes and 953 acres in 60 minutes assuming no initial attack.

TABLE 2.3.5	
Expected fire behavior for a Late Fire Season Above Average Southwest Wind Condition in a Fuel Model 4 (A Fuel Model 4 is a continuous cover of chaparral vegetation greater than 6' in height)	
RATE OF SPREAD	**783 feet/minute**
FIRE LINE INTENSITY	**45,027 BTU's/foot/second**
FLAME LENGTH	**62.2 feet in length**
Additional Fire Behavior Calculation Input: • 30 mph 20-foot wind speed (15.0 mph mid-flame wind speed) • 30 percent slope • 270° direction of wind vector to downhill slope	

This equates to 2,105 acres in 30 minutes and 8,420 acres in 60 minutes assuming no initial attack.

TABLE 2.3.6	
Expected fire behavior for a North, Northeast and East Santa Ana Wind Condition in a Fuel Model 4 (A Fuel Model 4 is a continuous cover of chaparral vegetation greater than 6' in height)	
RATE OF SPREAD	**2,041 feet/minute**
FIRE LINE INTENSITY	**117,380 BTU's/foot/second**
FLAME LENGTH	**96.7 feet in length**
Additional Fire Behavior Calculation Input: • 60 mph 20-foot wind speed (30.0 mph mid-flame wind speed) • 30 percent slope • 45° direction of wind vector to uphill slope	

This equates to 7,952 acres in 30 minutes and 31,809 acres in 60 minutes assuming no initial attack.

Modules: SURFACE, SIZE

Description: TM 5441 in a FM-4 under a 60 MPH Santa Ana wind

Fuel/Vegetation, Surface/Understory

Fuel Model		4

Fuel Moisture

1-h Moisture	percent	2
10-h Moisture	percent	3
100-h Moisture	percent	5
Live Herbaceous Moisture	percent	
Live Woody Moisture	percent	50

Weather

20-ft Wind Speed	mi/h	60
Wind Adjustment Factor		0.5
Direction of Wind Vector (from upslope)	deg	0

Terrain

Slope Steepness	percent	30

Fire

Elapsed Time	h	.5, 1

Run Option Notes

Calculations are only for the direction of maximum spread [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind and spread directions are degrees clockwise from upslope [SURFACE].

Direction of the wind vector is the direction the wind is pushing the fire [SURFACE].

Output Variables

Surface Rate of Spread (maximum) (ft/min) [SURFACE]

Heat per Unit Area (Btu/ft2) [SURFACE]

Fireline Intensity (Btu/ft/s) [SURFACE]

Flame Length (ft) [SURFACE]

Direction of Maximum Spread (from upslope) (deg) [SURFACE]

Midflame Wind Speed (mi/h) [SURFACE]

Max Eff Wind Exceeded? [SURFACE]

Area (ac) [SIZE]

(continued on next page)

Input Worksheet (continued)

Perimeter (ft) [SIZE]

Notes

This BehavePlus run calculates the flame length for 3 sites on the north side of TM 5441. This run is at the request of RSFFPD who indicated that north slope fuels behave like a FM-4. FM-4 fuels consist of continuous chaparral over 6 feet in height. This run depicts a late season Santa Ana wind on a 30% up slope.

TM ~~5440~~, 5441, [illegible] for a FM4 under a~~n above ave SW~~ 60 mph Santa Ana wind

Elapsed Time h	ROS (max) ft/min	Heat per Unit Area Btu/ft2	Fireline Intensity Btu/ft/s	Flame Length ft	Direction Max ROS deg	Midflame Wind Speed mi/h	> > >
0.5	2041.2	3450	117380	96.7	0	30.0	
1.0	2041.2	3450	117380	96.7	0	30.0	

TM ~~5440~~, 5441; for a FM4 under an ~~above ave SW~~ Compit santa Ana wind

< Elapsed Time h	Max Wind Exceeded	Fire Area ac	Fire Perimeter ft
0.5	No	7952.2	125304
1.0	No	31808.7	250607

ON THE USE OF A FIREBRAND GENERATOR TO INVESTIGATE THE IGNITION OF STRUCTURES IN WILDLAND-URBAN INTERFACE (WUI) FIRES

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ABSTRACT

An experimental apparatus has been constructed to generate a controlled and repeatable size and mass distribution of glowing firebrands. The present study reports on a series of experiments conducted in order to characterize the performance of this firebrand generator. Firebrand generator characterization and subsequent structural ignition experiments were performed at the Fire Research Wind Tunnel Facility (FRWTF) at the Building Research Institute (BRI) in Tsukuba, Japan. The firebrand generator was fed with mulch generated from Korean Pine trees. To produce repeatable initial conditions for each experiment, the Korean Pine mulch was sorted using a series of filters prior to being loaded into the firebrand generator. The size and mass distribution of firebrands produced from the generator was tuned to be representative of firebrands produced from burning trees. After the size and mass distribution of firebrands was characterized, the device was then used to direct firebrand fluxes towards a structure installed inside the FRWTF. A gable vent was installed on the front face of the structure and three different steel screens were installed behind the gable vent to ascertain the ability of the screen to block firebrands from penetrating into the structure. The mechanism of firebrand penetration through screens was observed for the first time. The firebrands were not quenched by the presence of the screen and would continue to burn until they were able to fit through the screen opening. Results of the study are presented and discussed.

INTRODUCTION

The Wildland-Urban Interface (WUI) is defined where structures meet or intermingle with undeveloped wildland. Fires in the WUI pose a significant threat to communities throughout the USA. From 1984, WUI fires have consumed an average of 850 homes per year[1]. Presently, it is estimated that some 3.2 million homes in California alone are located in the WUI[1]. The destruction from a single WUI fire event can be tremendous. In 2003, for example, WUI fires in the vicinity of San Diego, California displaced nearly 100,000 people and destroyed over 3000 homes, leading to over $2B in insured losses[1].

For structures to burn in WUI fires, they must be ignited. Research conducted in tandem with post-fire analysis by the US Forest Service and the California Department of Forestry suggests that spotting is the major source of structural ignition in WUI fires[2]. Spot fires are defined as new fires that propagate away from the main fire line due to lofted firebrands. These firebrands are produced as vegetation and structures burn in WUI fires. Understanding how these hot firebrands can ignite surrounding structures is an important consideration in mitigating fire spread in communities[3].

Japan has been plagued by structural ignition from firebrands as well. The initial fire outbreak mechanism is different in Japan than the USA. Japan is a country subjected to many earthquakes due to its geographical location. After these earthquakes have occurred, many fires are produced. At the same time, traditional ceramic roofing tiles are displaced as a result of the earthquakes exposing the bare wood roof under pining. Firebrands are produced as structures burn and with the presence of high winds these firebrands are dispersed throughout the atmosphere and produce spot fires which result in severe urban fires that are difficult to extinguish.

Due to the sheer complexity involved, it is useful to delineate the firebrand problem into three main areas: the generation from vegetation and structures, subsequent transport through the atmosphere, and the ultimate ignition of fuels after firebrand impingement. Of these processes, firebrand transport has been investigated most extensively[4-12]. These models have generally assumed firebrand sizes to perform transport calculations, since little quantitative data exists with regard to firebrand size or firebrand mass produced from vegetation and structures. Unfortunately, a very limited number of studies have been performed investigating firebrand generation from vegetation and structures[13-14] and the ultimate ignition of materials due to firebrand attack[15-20]. The general lack of knowledge of the type of firebrands that are produced as well as the type of materials that may be ignited has greatly hampered further understanding of this problem.

A pragmatic approach to mitigate firebrand ignition of structures in WUI fires is to design homes that are more resistant to firebrand ignition. Consequently, building codes and standards are needed to guide construction of new structures in areas known to be prone to WUI fires in order to reduce structural ignition in the event of a firebrand attack[1]. To the authors' knowledge, no experimental methods are presently available to generate a controlled flux of firebrands on a realistic scale and direct this firebrand flux onto structural elements to ascertain their resistance to ignition as a part of a full scale structural system.

To this end, an experimental apparatus has been constructed to generate a controlled and repeatable size and mass distribution of glowing firebrands. The present study reports on a series of experiments conducted in order to characterize the performance of this firebrand generator. Firebrand generator characterization experiments were performed at the FRWTF at the Building Research Institute (BRI) in Tsukuba, Japan. The effort described is part of an international collaboration established between the National Institute of Standards and Technology (NIST) in the USA and the Building Research Institute (BRI) in Japan to quantify firebrand production from vegetation and investigate firebrand ignition of structures. The firebrand generator was fed with mulch generated from Korean Pine trees. The size and mass distribution of firebrands produced from the generator was selected to be representative of firebrands produced from burning vegetation. After the size and mass distribution of firebrands was characterized, the device was then used to direct firebrand fluxes towards a structure installed inside the FRWTF. A gable vent was installed on the front face of the structure and three different steel screens were installed behind a gable vent to ascertain the ability of the screen to block firebrands from penetrating into the structure. Behind the screen, shredded paper of fixed moisture content was placed in pans to observe if the firebrands that penetrated the vent and subsequent screen were able to produce an ignition event.

EXPERIMENTAL DESCRIPTION

Figure 1 is a drawing of the experimental apparatus. The present apparatus is a scaled up version of a smaller first generation, proof-of-concept device[21]. The bottom left panel displays the procedure detailing the methodology for loading the Korean Pine tree mulch into the apparatus. The mulch pieces were deposited into the firebrand generator by removing the top portion. The mulch pieces were supported using a stainless steel mess screen (0.35 cm spacing), which was carefully selected. Two different screens were used to filter the mulch pieces prior to loading into the firebrand generator. The

first screen blocked all mulch pieces larger than 25 mm in diameter. A second screen was then used to remove all needles from the mulch pieces. The justification for this filtering methodology is provided below. A total of 2.1 kg of mulch was used as the initial mass for each of the experiments. The average moisture content of the mulch pieces used at ignition was 10 % (dry basis).

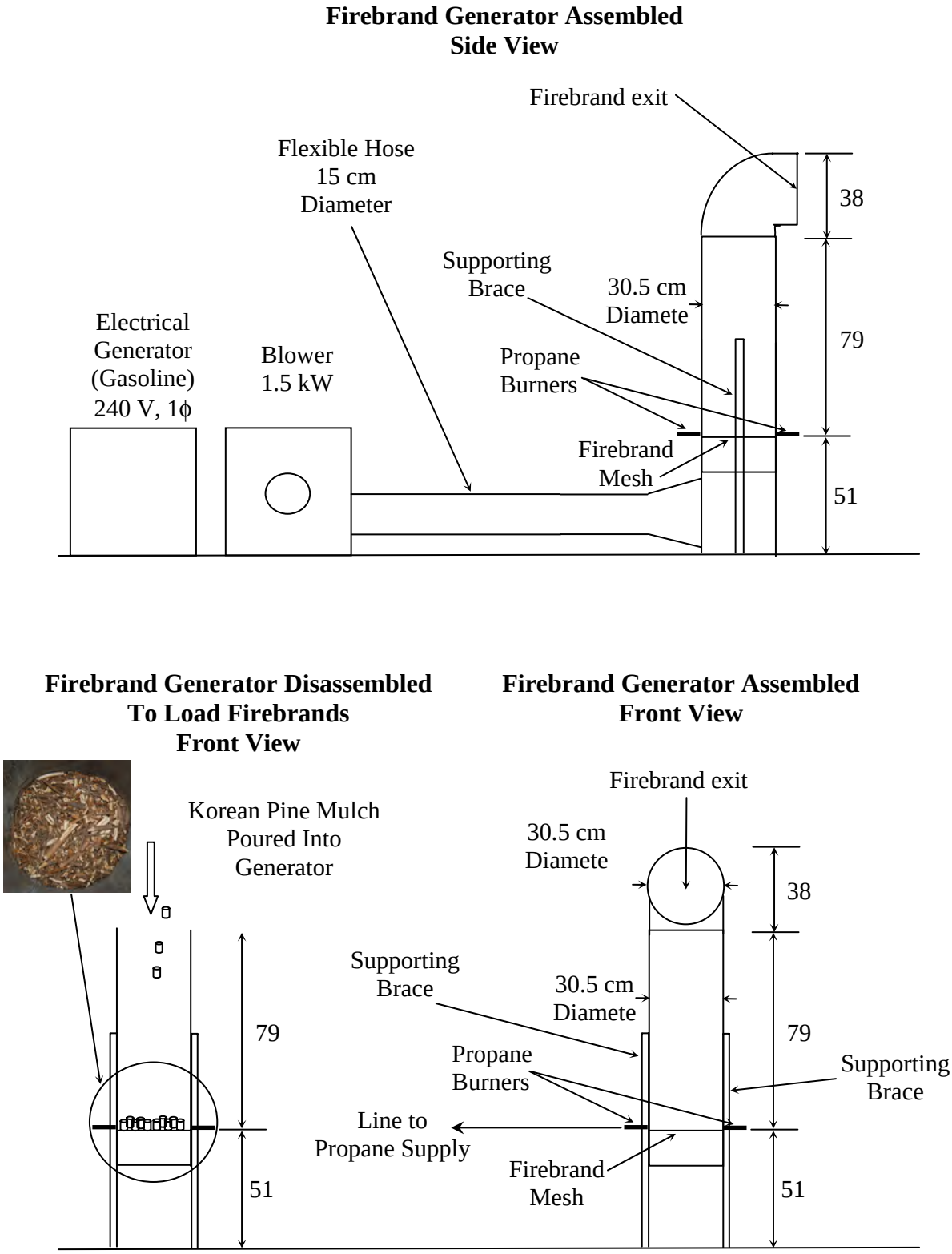


Figure 1 Schematic of the firebrand generator. Both front and side views are shown.

The firebrand generator was driven by a 1.5 kW blower that was powered by a gasoline electrical generator. The gasoline electric generator provided the blower with the necessary power requirements (see figure 1). These power requirements were not available at the FRWTF, necessitating the use of a portable power source. Furthermore, the firebrand generator was designed to be fully portable in order to test ignition of any structure or structural element.

The experiments were conducted in the following manner. After the Korean Pine tree mulch was loaded, the top section of the firebrand generator was coupled to the main body of the apparatus (see figure 1). With the exception of the flexible hose, all components of the apparatus were constructed from galvanized steel sections (0.8 mm in thickness). The blower was then switched to provide a low flow for ignition (1.0 m/s flow inside the duct measured upstream of the wood pieces). The two propane burners were then ignited individually and simultaneously inserted into the side of the generator. Each burner was connected to a 0.635 cm diameter copper tube with the propane regulator pressure set to 344 kPa at the burner inlet; this configuration allowed for a 1.3 cm flame length from each burner. The Korean Pine mulch was ignited for a total time of 45 seconds. After 45 seconds of ignition, the fan speed of the blower was increased (2.0 m/s flow inside the duct measured upstream of the wood pieces). The burners were subsequently switched off at 90 seconds after ignition. This sequence of events was selected in order to generate a continuous flux of glowing firebrands for approximately six minutes duration.

The principle behind the operation of the apparatus was rather simple, after ignition, the mulch would begin to burn and the density decreased until which point the low air flow passing through the support mesh was able to loft and exit the device as firebrands at low velocity. The timing and fan blower speed timing is not random; if a higher fan speed of the blower was selected, the firebrands produced would be forced out of the exit earlier, resulting in flaming firebrands, which was not desired in this phase of characterization.

The firebrand generator was installed inside the test section of the FRWTF at BRI. A drawing of the facility is shown in Figure 2 and displays the location of the firebrand generator with respect to the structure used for ignition testing. The facility was equipped with a 4.0 m fan used to produce the wind field and was capable of producing up to a 10 m/s wind flow. The wind flow velocity distribution was verified using a 21 point hot wire anemometer array. To track the evolution of the size and mass distribution of firebrands produced, a series of water pans was placed downstream of the firebrand generator. A total of 157 rectangular pans (water-filled) were used to collect firebrands. Each pan was 49.5 cm long by 29.5 cm wide. The arrangement and width of the pans was not random; rather it was based on scoping experiments to determine the locations where the firebrands would most likely land. After the experiments were completed, the pans were collected and the firebrands were filtered from the water using a series of fine mesh filters. The firebrands were subsequently dried in an oven held at 104 °C for eight hours. The firebrand sizes were then measured using precision calipers (1/100 mm resolution). Following size determination, the firebrands were then weighed using a precision balance (0.001 g resolution). For each experiment conducted, more than 200 firebrands were dried and measured.

After the generator was characterized, the structure used for vent penetration experiments was installed inside the FRWTF (see Figure 2). Prior to conducting the experiments, computer simulations were performed using the NIST Fire Dynamics Simulator (FDS) to help guide the location of the structure with respect to the firebrand generator. Figure 3 is a detailed drawing of the front face of the structure, showing the location of the gable vent. The overall dimensions of the structure were 3.06 m in height, 3.04 m wide, and 3.05 m in depth. A common type of gable vent, 30.5 cm wide by 45.7 cm long, was used. Experiments were conducted using the same vent but modifying the screen placed behind the vent. Three different screen sizes were used, 1.5 mm, 3 mm, and 6 mm. The justification for these sizes is provided below.

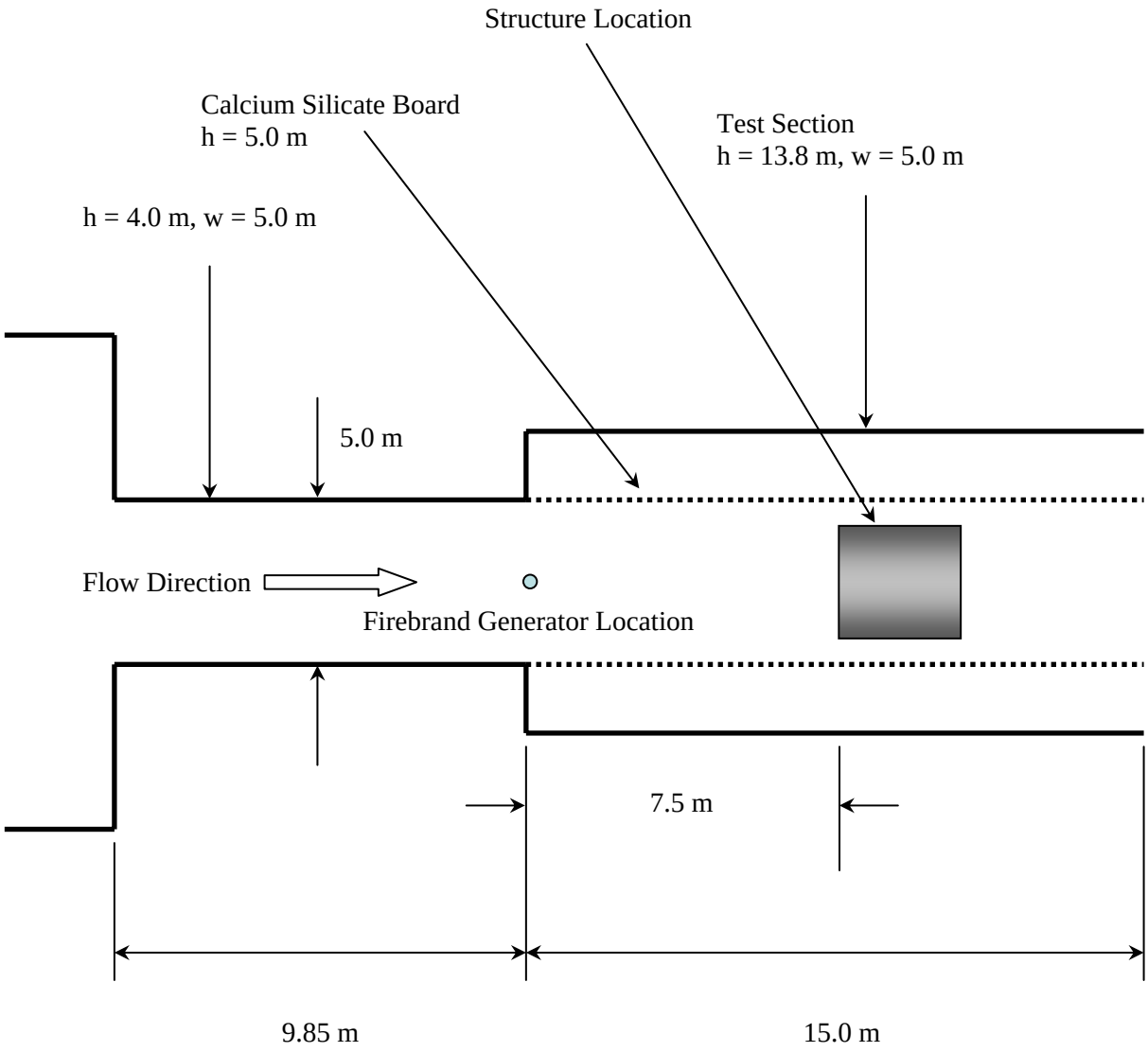


Figure 2 Drawing of the FRWTF (Top View). The location of the firebrand generator is shown.

Two pans, 49.5 cm long by 29.5 cm wide, filled with shredded paper (5 % moisture content dry basis) were placed under the vent opening (behind the screen) to ascertain ignition inside the structure. Firebrands that were able to penetrate the vent and subsequent screen landed in the paper filled pans. Shredded paper was used as a surrogate for cellulosic fuels typically found in attic spaces. The moisture content of 5 % was selected based on work of Manzello *et al.*[18]; firebrands ignite paper at 5 % moisture content.

RESULTS AND DISCUSSION

Experiments were first conducted to determine the size and mass distribution of the firebrands produced from the firebrand generator. The impetus for these experiments was to be able to produce firebrands that are characteristic of those produced by burning trees. Manzello *et al.*[14,22] have performed a series of experiments to characterize firebrand production from burning trees. Based on the results of two different tree species of varying crown height and moisture content (Douglas-Fir Trees and Korean Pine Trees) burning singly under no wind, cylindrical firebrands were observed to be produced. It was observed that the mass distribution of firebrands produced from two different tree species under similar moisture levels and crown size ranges were similar for mass classes up to 0.4 g. A noticeable difference

was observed in the larger mass classes. It was also observed that more than 85 % of the firebrands produced from trees were in mass classes up to 0.4 g.

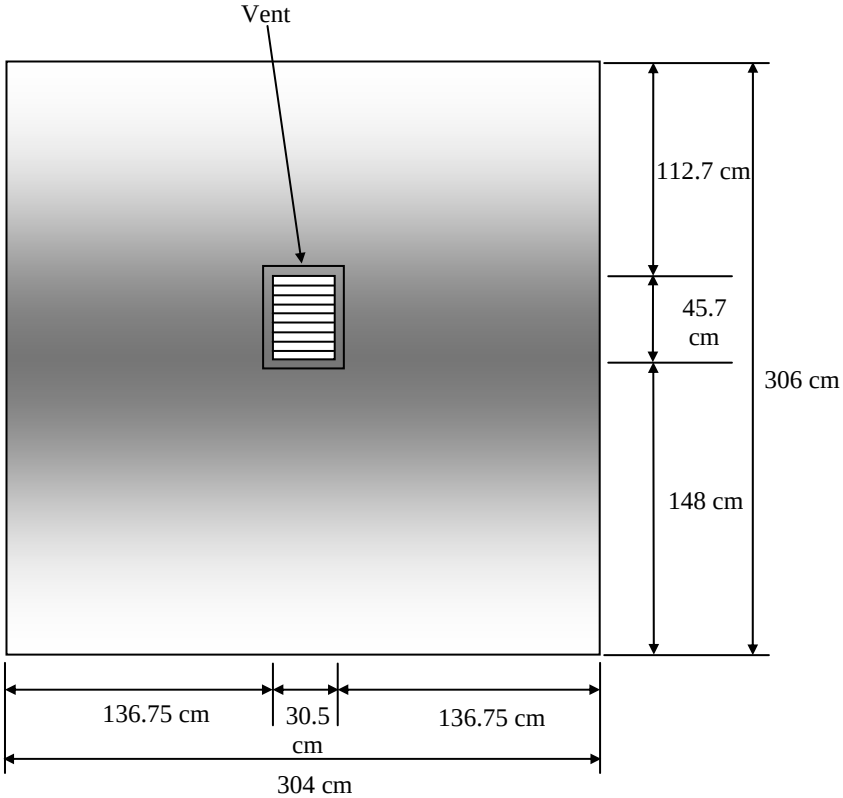


Figure 3 Schematic of the front face of the structure. The location of the gable vent is shown.

Accordingly, the input conditions for the firebrand generator were intentionally selected to produce firebrands with mass classes up to 0.4 g. This was accomplished by sorting the Korean Pine tree mulch using a series of filters prior to being loaded into the firebrand generator. Figures 4 displays a picture of typical firebrands produced from the firebrand generator under these conditions. Since many of the firebrands produced are cylindrical, the length and diameter of the generated firebrands was measured. This information was then used to calculate the surface area of the firebrands produced and was plotted as a function of the measured firebrand mass (see Figure 5). Figure 5 also displays the same analysis performed for firebrands collected from Douglas-Fir trees as well as Korean Pine Trees under similar moisture content. From the figure, the firebrand generator was capable of producing the size and mass distribution of firebrands from burning trees up to 0.4 g.

Figure 4 Digital picture of the firebrands produced from the firebrand generator. These images are taken after the firebrands were extracted from the water filled collection pans and dried.

The average total mass of firebrands generated per experiment was 131 g (varied from 110 g to 163 g). The total firebrand mass was an important parameter to characterize since it allows for a comparison of the total mass of firebrands generated from the device as compared to the amount of firebrands generated from a single tree burn. Based upon the results of the tree burning experiments, the firebrand generator, under the present operating conditions, was capable of producing about 2.5 times the total mass of firebrands produced from a single 4.5 m crown height Douglas-Fir tree. For completeness, figure 6 displays the measured size distribution of the cylindrical firebrands produced from the generator.

Once the firebrand size and mass distribution was characterized and similar to that produced from burning trees up to 0.4 g, the vent penetration experiments were conducted. In order to ensure repeatability of the firebrand size and mass distributions generated, the sorted Korean Pine tree mulch was metered out and weighed using a precision balance for each subsequent experiment.

Figure 7 displays a digital picture of a typical experiment conducted with a 3 mm screen mesh in place. A wind flow of 9 m/s was selected to direct firebrands towards the structure. The reason for this flow selection was twofold: the firebrands were observed to be lofted from the generator and carried to the structure, and it was desired to replicate a firebrand shower in these experiments as firebrand showers in WUI fires are observed under windy conditions (*e.g.* Santa Ana winds).

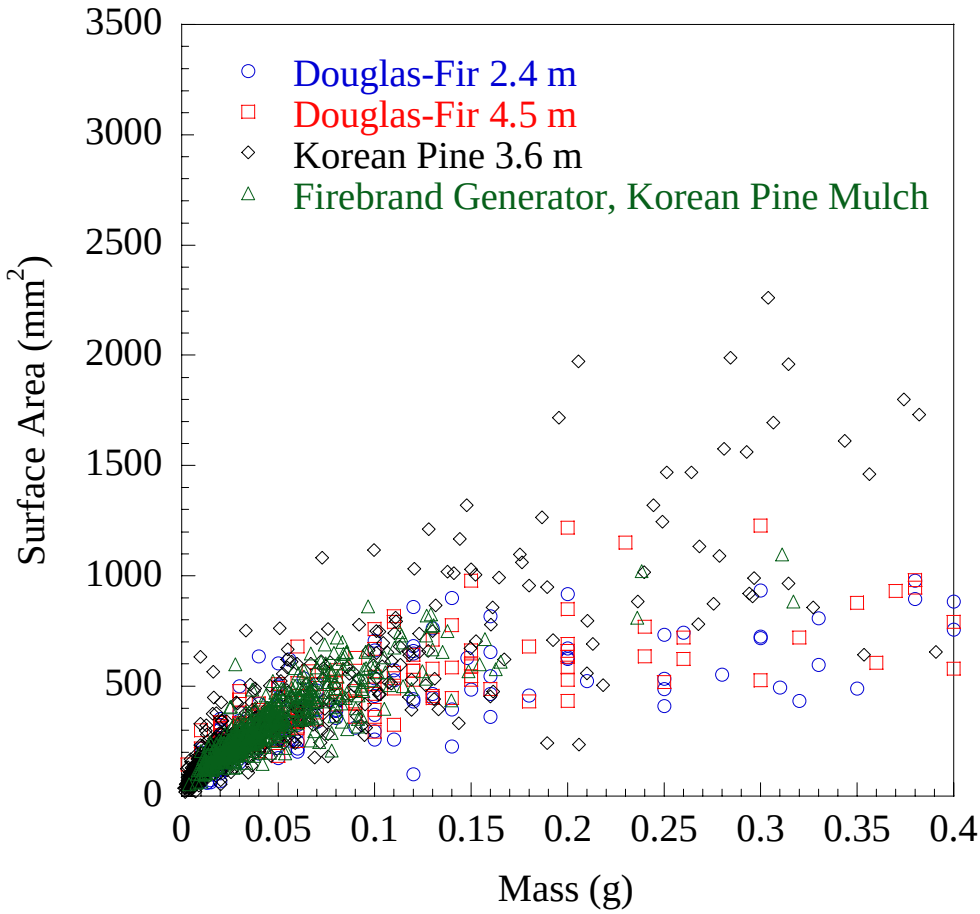


Figure 5 Comparison of firebrands produced from burning trees to those produced from the firebrand generator.

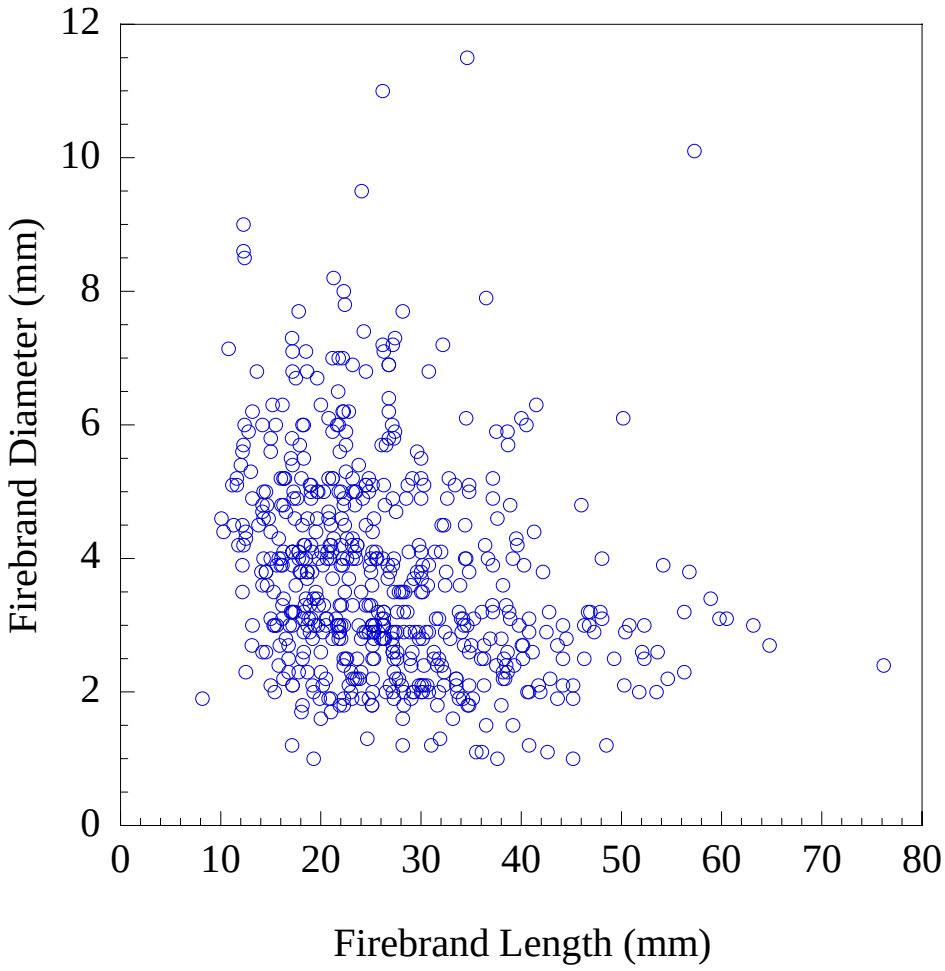


Figure 6 Size distribution of firebrands produced from the firebrand generator.

Three different steel screen sizes were tested in these experiments. The first screen size used was 6 mm (1/4”). This size was selected since it has been recommended in the recently adopted WUI California Building Standards intended to mitigate firebrand penetration through building vents[23]. However, smaller screen sizes of 3 mm and 1.5 mm are commercially available. Consequently, it was desired to test these smaller sizes as well. Only non-combustible steel screens were used in this study. Prior to conducting the experiments, it was hypothesized that combustible screens (*e.g.* plastic) would be of no use to preventing firebrand penetration into a structure. For each screen size, three similar experiments were performed.

Two standard video cameras were located inside the structure; one camera directly behind the vent/screen assembly and another camera focused on the shredded paper bed below the vent/screen assembly. Figure 8 displays still mages taken from video graphic records obtained from the camera focused behind the vent/screen assembly for a 3 mm screen.

The mechanism of firebrand penetration through screens was observed for the first time. Firebrands were blown through the vent and were pressed against the steel screen. The firebrands were not quenched by the presence of the screen and would continue to burn until they were able to fit through the screen opening. For all screen sizes tested, the firebrands were observed to penetrate the screen and produce a self-sustaining smoldering ignition inside the paper beds installed inside the structure. Figure 9 displays a digital photograph taken 10 minutes after the experiment was completed demonstrating the self-sustaining

smoldering propagation inside the paper bed for a 6 mm screen. It is important to point out that for the 6 mm screens tested; a majority of the firebrands simply flew through the screen, resulting in an ignition of the paper behind the screen considerably more quickly as compared to the smaller screen sizes of 3 mm and 1.5 mm.

The flow field was characterized using a 21 point anemometer array outside the structure in front of the building vent. In addition to this, the flow field was measured at six points, 1 cm behind the vent/screen assembly. It was desired to characterize the flow field through the vent/screen assembly as future work will attempt to provide similar flow conditions using a bench scale wind generator and investigate the salient dynamics of firebrand penetration through vents at reduced scale.

vent

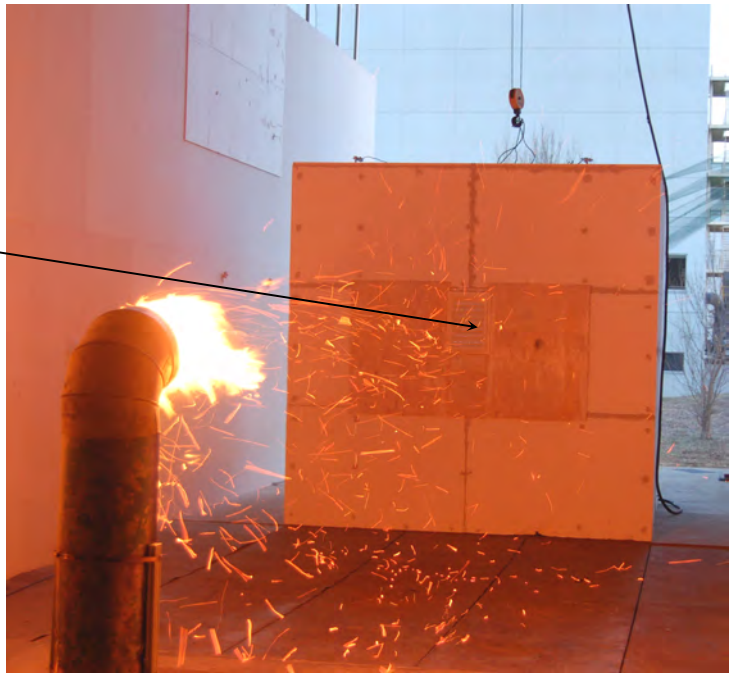
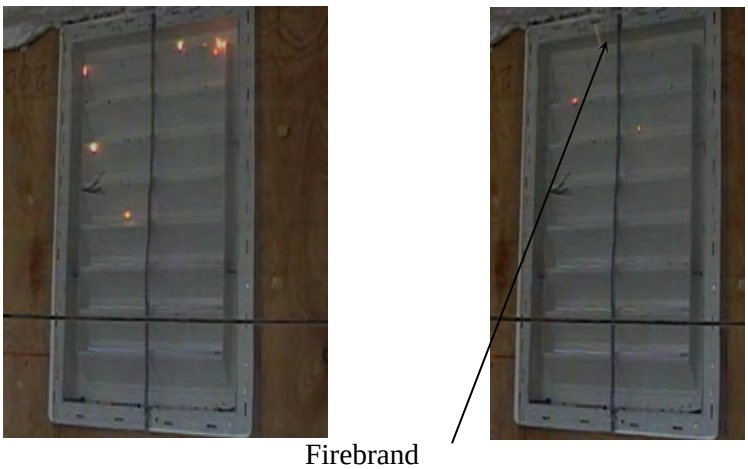


Figure 7 A digital picture of a typical experiment. A 3 mm steel screen is located behind the gable vent in this particular experiment. The arrow shows the vent location.



Firebrand passing through screen

(a) **(b)**

Figure 8 Images of the steel screen (3 mm) located behind the gable vent. Panel (b) shows a firebrand penetrating the screen after burning to a small enough size (see arrow).

The results of these experiments have demonstrated the danger of firebrand storms in WUI fires. In Japan, many building have similar vents used for ventilation as in the USA. It is desired to use these results to provide scientific guidance for enhanced WUI building standards in the USA. Additional experimental work will be required to design building vents that can resist the penetration of firebrands. Finally, the utility of the firebrand generator has been demonstrated. It was simple to operate and capable to direct repeatable firebrand fluxes for structural ignition studies.

Figure 9 Picture taken 10 minutes after completion of the experiments. Self-sustaining smoldering ignition is observed in the shredded paper bed at 5 % moisture content (dry basis). This image was taken for a 6 mm screen installed behind the vent. The obscuration in the image was due to smoke production due to smoldering combustion.

CONCLUSIONS

The effort described in this paper is part of an international collaboration established between the National Institute of Standards and Technology (NIST) in the USA and the Building Research Institute (BRI) in Japan to quantify firebrand production from vegetation and investigate firebrand ignition of structures. The firebrand generator was fed with mulch generated from Korean Pine trees. The size and mass distribution of firebrands produced from the generator was selected to be representative of firebrands produced from burning trees. After the size and mass distribution of firebrands was characterized, the device was then used to direct firebrand fluxes towards a structure installed inside the FRWTF. A gable vent was installed on the front face of the structure and three different steel screens were installed behind a gable vent to ascertain the ability of the screen to block firebrands from penetrating into the structure. Behind the screens, shredded paper of fixed moisture content was placed in pans to observe if the firebrands that penetrated the vent and subsequent screen were able to produce an ignition event.

The mechanism of firebrand penetration through screens was observed for the first time. Firebrands were blown through the vent and were pressed against the steel screen. The firebrands were not quenched by the presence of the screen and would continue to burn until they were to fit through the screen opening. For all screen sizes tested, the firebrands were observed to penetrate the screen and produce a self-sustaining smoldering ignition inside the paper beds installed inside the structure. For the 6 mm screens tested a majority of the firebrands simply flew through the screen, resulting in an ignition of the paper behind the screen considerably more quickly as compared to the smaller screen sizes of 3 mm and 1.5 mm. The results of these experiments demonstrate the danger of firebrand storms in WUI fires.

It is desired to use these results to provide scientific guidance for enhanced WUI building standards in the

USA. In Japan, firebrands produce fire spread by not only landing on bare wood roofs but also by firebrands penetrating through vent openings; these results can provide valuable information in Japan. Additional experimental work will be required to design building vents that can resist the penetration of firebrands. Future work will attempt to provide similar flow conditions using a bench scale wind generator and investigate the salient dynamics of firebrand penetration through vents at reduced scale.

ACKNOWLEDGMENTS

Mr. Syuuji Nanno and Mr. Kazutaka Nakamura (BRI Guest Researchers, under the supervision of Dr. Ichiro Hagiwara of BRI) completed some of the analysis for the firebrand mass and size distributions; their able help in this regard is appreciated. Dr. William 'Ruddy' Mell is acknowledged for assisting in FDS simulations. Mr. Alexander Maranghides, NIST Large Fire Laboratory Manager, is acknowledged for providing access to the LFL to test the operation of the firebrand generator. Dr. William Grosshandler, Fire Research Division Chief, is acknowledged for supporting this research at NIST. The work conducted by BFRL-NIST staff at BRI was possible through a Memorandum of Understanding (MOU) in place between BFRL-NIST and BRI.

REFERENCES

1. Government Accountability Office (2005) 'Technology Assessment: Protecting Structures and Improving Communications During Wildland Fires.' GAO-05-380 (Washington, DC).

2. NIST Session (William Mell, BFRL-NIST Moderator) *Structure Ignition in WUI Fires*, at 2nd Fire Behavior and Conference, March 26-30 Destin, FL, 2007. Presentations-Jack Cohen, US Forest Service; David Sapsis, California Department of Forestry; Samuel L. Manzello, BFRL-NIST.

3. Babrauskas V (2003) 'Ignition Handbook.' (Fire Science Publishers: Issaquah, WA)

4. Albini F (1979) 'Spot Fire Distances From Burning Trees – A Predictive Model.' USDA Forest Service General Technical Report INT-56. (Missoula, MT).

5. Albini F (1983) Transport of Firebrands by Line Thermals. *Combustion and Flame* **32**, 277-288.

6. Muraszew A, Fedele JF (1976) 'Statistical Model for Spot Fire Spread.' The Aerospace Corporation Report No. ATR-77758801 (Los Angeles, CA).

7. Tarifa CS, del Notario PP, Moreno, FG (1965) On the Flight Paths and Lifetimes of Burning Particles of Wood. *Proceedings of the Combustion Institute* **10**, 1021- 1037.

8. Tarifa CS, del Notario PP, Moreno FG (1967) 'Transport and Combustion of Fire Brands.' Instituto Nacional de Tecnica Aerospacial "Esteban Terradas", Final Report of Grants FG-SP 114 and FG-SP-146, Vol. 2. (Madrid, Spain).

9. Tse SD, Fernandez-Pello AC (1998) On the Flight Paths of Metal Particles and Embers Generated by Power Lines in High Winds and Their Potential to Initiate Wildfires. *Fire Safety Journal* **30**, 333-356.

10. Woycheese JP (2000) 'Brand Lofting and Propagation for Large-Scale Fires.' Ph.D. Thesis, University of California, Berkeley.

11. Woycheese JP (2001) Wooden Disk Combustion for Spot Fire Spread. In '9th Fire Science and Engineering Conference Proceedings (INTERFLAM)' (Ed. S. Grayson) pp. 101-112. (Interscience Communications: London).

12. Knight IK (2001) The Design and Construction of a Vertical Wind Tunnel for the Study of

Untethered Firebrands in Flight. *Fire Technology* **37**, 87-100.

13. Waterman TE (1969) 'Experimental Study of Firebrand Generation.' IIT Research Institute, Project J6130. (Chicago, IL).

14. Manzello SL, Maranghides A, Mell WE (2007) Firebrand Generation from Burning Vegetation. *International Journal of Wildland Fire*, in press.

15. Waterman TE, Takata AN (1969) 'Laboratory Study of Ignition of Host Materials by Firebrands.' Project J6142 – OCD Work Unit 2539A, IIT Research Institute, (Chicago, IL).

16. Dowling VP (1994) Ignition of Timber Bridges in Bushfires. *Fire Safety J*. 22:145-168.

17. Ellis PF (2000) 'The Aerodynamic and Combustion Characteristics of Eucalypt Bark – A FireBrand Study.' Ph.D. Dissertation, Australian National University, Canberra.

18. Manzello SL, Cleary TG, Shields JR, Yang JC (2006) On the Ignition of Fuel Beds by Firebrands. *Fire and Materials* **30**, 77-87.

19. Manzello SL, Cleary TG, Shields JR, Yang JC (2006) Ignition of Mulch and Grasses by Firebrands in Wildland-Urban Interface (WUI) Fires. *International Journal of Wildland Fire* **15**, 427-431.

20. Manzello SL, Cleary TG, Shields JR, Maranghides A, Mell WE, Yang JC (2007) Experimental Investigation of Firebrands: Generation and Ignition of Fuel Beds. *Fire Safety Journal* in press.

21. Manzello SL, Cleary TG, Shields JR, Yang JC, Maranghides A, Mell WE, Hayashi, Nii D (2007) On the Development and Characterization of a Firebrand Generator. *Fire Safety Journal* in review.

22. Manzello SL, Shields JR, Maranghides A, Mell WE, Hayashi Y, Nii D (2007) On the Size and Mass Distribution of Firebrands Produced From Burning Korean Pine Trees. *Fire and Materials* in review.

23. California Code of Regulations, Title 24, Part 9, California Fire Code, Article 8604 B 2.1, Materials and Construction Methods for Exterior Wildfire Exposure, Attic Ventilation.

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Firefighter Safety Zones: A Theoretical Model Based on Radiative Heating

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Abstract. Quantitative information regarding safety zone size for wildland firefighters is limited. We present a 3-surface theoretical model that describes the net radiant energy transfer to a firefighter standing a specified distance from a fire of specified height. Model predictions compare favorably with qualitative data from entrapments on four wildfires and two previously published models. Calculations indicate that for most fires, safety zones must be greater than 20 m wide to ensure firefighter survival. A general rule-of-thumb derived from this work is that a safety zone radius must be equal to or greater than 4 times the maximum flame height.

Keywords: Net radiant energy transfer; entrapment; wildfires; safety zones.

Introduction

Firefighter safety is a primary concern in both initial and extended attack on wildfires. Unfortunately, situations arise wherein firefighters are threatened and even trapped by fire. Firefighters in the U. S. Forest Service are taught to take action to prevent entrapments. One of the required actions is that firefighters actively identify areas to which they can retreat to escape injury. These areas have been labeled safety zones.

Beighley (1995) defined safety zone as "an area distinguished by characteristics that provide freedom from danger, risk, or injury." The National Wildfire Coordinating Group (USDA/USDI 1995) has defined safety zone as: "An area (usually a recently burned area) used for escape in the event the line is outflanked or in case a spot fire causes fuels outside the control line to render the line unsafe . . . areas that can be used with relative safety by firefighters and their equipment in the event of blowup in the vicinity." Although safety zones have been the topic of much discussion among firefighters, few quantitative studies have been reported (Alexander 1994, 1995).

Continued occurrence of firefighter entrapments suggests a need for increased understanding about safety zones. What may not be clear are the factors that determine the size of a safety zone necessary to prevent firefighter injury. We present a mathematical model describing safety zone size as a function of flame height and distance from the flame. Predictions are compared against data from four wildfires.

Convective energy transport is not addressed in this study. Without a doubt, convection can play a major role in energy transfer between a fire and firefighters in its vicinity. For example, it is not uncommon for firefighters to observe intensely burning fire whirls. When close to the edge of a forest canopy, a wind-driven crown fire can generate turbulent eddies that will migrate some distance ahead of the fire front. In these cases, convection is a major energy transfer mechanism. Quantitative information on the magnitude and effect of convective heating in front of wildfires is needed.

Previous Work.

Some of the information required to specify safety zone size is the rate of energy transfer from the flame to its surroundings and the effect of that energy on humans.

Only a few reported studies directly address the distribution of energy in front of a wildland fire. Bond and Cheney (1986) described measurements made in 9 m diameter clearings overburned by a crown fire with 25 m flame heights. Air temperatures were measured with radiation shielded, naturally aspirated, platinum resistance thermometers located 2 and 5 m above the ground. They measured peak air temperatures of 300 °C at the center of the clearing. Survival would have been unlikely without the protection of a fire shelter.

Others have discussed the design and performance of fire shelters under different heating regimes and the characteristics of a fire shelter deployment site (King and Walker 1964; Jukkala and Putnam 1986; Knight 1988). A fire shelter is a device used to protect firefighters from injury in a fire. Fire shelters currently approved for use by U. S. Forest Service firefighters consist of pup-tents

constructed of lightweight highly reflective aluminum foil and fiberglass. All U. S. Forest Service firefighters are required to carry a fire shelter with them while working on or near the fire.

As one would suspect, it is difficult to find analytical studies reporting the effect of heat on human skin. Most of the work that has been done was performed on prisoners of war during World War II or on military volunteers in later studies. Green and Schimke (1971) state that 12 kW-m^{-2} will cause injury, no exposure time is given. Others suggest that the upper limit of incident radiant heat flux on bare skin that can be sustained without injury for a short time (less than 2 minutes) is approximately 2.3 kW-m^{-2} (Stoll and Greene 1959; Budd and Cheney 1984; Fogarty 1996).

Other studies have explored the performance of fabrics used in firefighter clothing (Braun and others 1980; Behnke 1982; Bond and Cheney 1986). These studies have led to several proposed testing methods that do not require human subjects. The data reported by Braun and others (1980) suggest that when firefighters wear Nomex cloth (210 g-m^{-2}), second degree burns will occur after 90 seconds at incident radiant heat fluxes of approximately 7 kW-m^{-2}. The Nomex shirts and trousers currently used by wildland firefighters in the U. S. have fabric weights of 190 and 280 g-m^{-2} respectively.

Analytical Model

We present a mathematical model based on a 3-surface radiative enclosure. This model is used to predict the net radiant energy transfer to a firefighter from a flame as a function of flame height and the distance between the firefighter and the flame. The flame was approximated as a flat sheet of given height and width with uniform temperature and emissivity (figure 1). The firefighter was approximated as another flat surface. Gray diffuse radiant exchange was assumed.

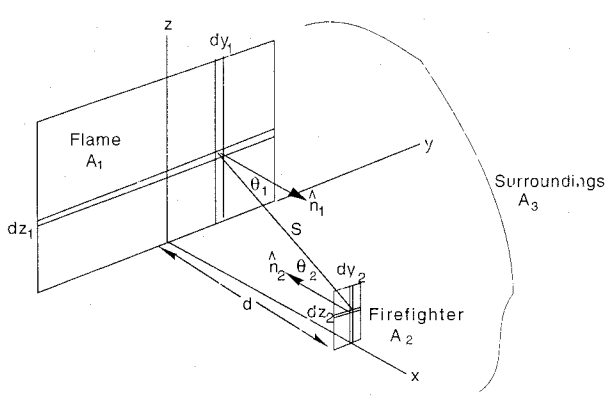

Figure 1. Schematic of geometry used in mathematical model.

Laboratory and field measurements suggest that a flame radiative temperature of 900 °C and emissivity of 1 are appropriate for large wildland fires. Assuming that the firefighter's clothing was subject to some radiative heating, we assigned a surface temperature of 45 °C to surface 2 with an emissivity of 0.8 (Incropera and Dewitt 1985). The surroundings act as an energy sink, absorbing energy emitted by the flame and reflected from the firefighter; however, they do not significantly affect the net energy transfer to the firefighter. The surroundings were assumed to be approximately 22 °C with an emissivity of 1.

The net radiant flux q_i on surface i can be defined as:

$$q_i = A_i (J_i - G_i) \tag{1}$$

Where radiosity J_i from surface i with emissivity ε_i and temperature T_i is:

$$J_i = \varepsilon_i \sigma T_i^4 + (1-\varepsilon_i)\, G_i \tag{2}$$

The Stefan-Boltzman constant σ is approximated by 5.67 x 10^{-11}kW-m^{-2}-K^{-4}. Irradiation G_i incident on surface i with n being the total number of surfaces can be defined as:

$$G_i = \sum_{j=1}^{n} F_{i\text{-}j} J_j \tag{3}$$

The radiant view factor between the flame and firefighter ($F_{1\text{-}2}$) is the fraction of radiant energy leaving the flame (surface 1) that arrives at the firefighter (surface 2). Mathematically it is expressed as:

$$F_{1\text{-}2} = \frac{1}{A_1} \iint_{A_1 A_2} \frac{\cos \mu_1 \cos \mu_2}{\pi S^2}\, dA_2 dA_1 \tag{4}$$

Where A_1 and A_2 are the respective surface areas with differential areas dA_1 and dA_2. μ_1 and μ_2 are the angles between the respective surface normal vectors $\hat{n}_1$ and $\hat{n}_2$ and line of length S connecting the differential areas.

We numerically integrated equation 4 to obtain the radiation view factors and then solved equations 1 through 4 to obtain q_2. Solutions were computed assuming flat terrain.

Discussion

Webster (1986) presents work by Tassios and Packham (1964) that discusses theoretical values of incident radiant heat on a firefighter. They predict a maximum heat flux of 60 kW-m^{-2} incident on a firefighter standing 6 m from a 21 m tall flame. Fogarty (1996) combined work reported by Leicester (1985) and Thomas (1963) to develop a model that predicts incident radiant energy on firefighters as a function of fireline intensity and distance from

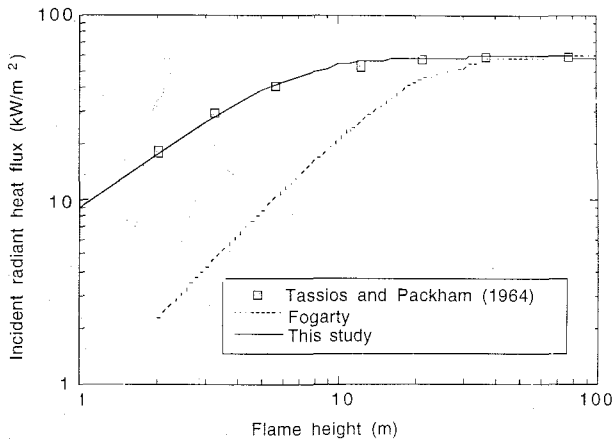

Figure 2. Comparison between previous models and that presented in this study. For this comparison we assumed a flame temperature of 1200 K and flame width of 20 m, the firefighter was approximated as a flat surface 1 m wide by 2 m tall located 6 m from the flame.

the fire. Green and Schimke (1971) discuss safety zones principally in the context of fire break size; they present required separation distances as a function of burning index. Unfortunately they did not provide sufficient information to relate fire break size to flame heights. Figure 2 presents predictions from the model presented in this study and those from the models presented by Tassios and Packham (1964) and Fogarty (1996). We assumed a flame temperature of 1200 K, flame and firefighter emissivities of unity, 20 m wide flame and 1 m wide by 2 m tall firefighter. Our model quantitatively matched that of Tassios and Packham (1964); however, it does not agree so well with Fogarty's (1996) model for flame heights less than 20 m. The agreement between the models shown in figure 2 lends credibility to the model presented herein--differences can be attributed to variations in flame temperature, surface dimensions, emissivities and model geometry. The fact that we could only find three studies relating fire behavior to firefighter safety zones indicates that lack of quantitative information on this subject.

Predictions for a range of separation distances and flame heights are shown as surface contours in Figure 3. Clearly, the incident radiant heat flux is strongly dependent on distance from the flame and flame height. We selected an incident heat flux level of 7 kW-m^{-2} as the maximum level tolerable by firefighters wearing Nomex clothing and protective head and neck equipment.

The trends shown in Figure 3 suggest that in most cases safety zones must be relatively large. We compared separation distances predicted by our model against those reported on four wildfires: the Mann Gulch Fire, the Battlement Creek Fire, the Butte Fire and the South Canyon Fire.

The Mann Gulch Fire overran 16 firefighters on August 5, 1949. Only the foreman and two crew members of the 18-man smokejumper crew survived.

The fire crew were hiking up a steep, as much as 76 percent, slope. The fire was approaching them from below and was burning through an open stand of scattered, mature (60 to 100+ year old) *Pinus ponderosa* (ponderosa pine) with a grass understory. Flames were 10 m high (Rothermel 1993). Recognizing that the fire was outrunning them and had approached to within 50 m of the crew. The foreman stopped and lit an escape fire with the intention that the crew could lie down in the burned out area to escape the main fire. Rothermel (1993) indicates that the escape fire burned about 90 m before the main fire overran it. Assuming an elliptical shape for the burned area, with its width approximately half the length, the safety zone created by the escape fire would have been about 45 m wide. Figure 3 indicates a minimum safety zone size of 40 to 50 m.

The Battlement Creek Fire occurred in western Colorado during July, 1976 (USDI/USDA 1976). The fire burned on steep slopes covered with 2 to 4 m high *Quercus gambeli* (Gambel oak). Flames were estimated to be 7 to 10 m above canopy. Four firefighters were cut off from their designated safety zone. When the fire overran them, they were lying face down on the ground without fire shelters in an 8 m wide clearing near the top of a ridge. Tragically, only one of the four survived, and he suffered severe burns over most of his body. Figure 3 suggests that for this fire, a minimum safety zone size is 40 m, with 55 m being preferable. Clearly, the 8 m wide clearing did not qualify as a safety zone.

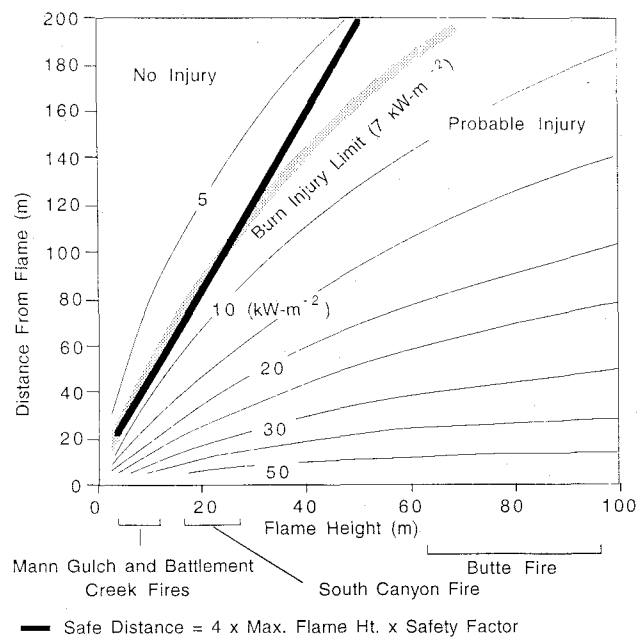

Figure 3. Lines represent predicted net radiant heat flux to a firefighter as a function of flame height and distance from the flame. It is assumed that the firefighter is wearing fire retardant clothing (Nomex) and protective head and neck equipment. Heavy shaded line represents burn injury threshold (7 kW-m^{-2}).

Flame heights were reported to be 60 to 100 m high on the Butte Fire. It burned on steep slopes covered with mature *Pinus contorta* (lodgepole pine) and *Psuedotsuga menziesii* (Douglas-fir) during August 1985 (Mutch and Rothermel 1986). Figure 3 indicates a minimum required separation distance of approximately 240 m. In fact, safety zones 90 to 125 m in diameter were prepared (Mutch and Rothermel 1986). This was not sufficiently large to meet the definition of a safety zone, as indicated by the fact that 73 firefighters had to deploy in fire shelters to escape the radiant heat.

During the afternoon of July 6, the South Canyon Fire burning in western Colorado "blewup", burning across the predominately *Quercus gambeli* (Gambel oak) covered slopes with 15 to 30 m tall flames and spread rates of 1.3 to 2.5 m-s^{-1} (USDA/USDI 1994). Fourteen firefighters were overrun by the fire and died while attempting to deploy their fire shelters along a 3 to 4 m wide fireline on a 55 percent slope. Eight other firefighters deployed their fire shelters in a burned out area approximately 45 m wide. They remained in their shelters while three separate fire runs occurred 160 m away from them (Petrilli 1996); none were injured. Survivors felt they were far enough from the flames that survival with minor injuries would have been possible without the protection of a fire shelter (Petrilli 1996). One firefighter who did not deploy in a shelter, but remained on a narrow ridge below the eight firefighters during the "blowup" experienced no injuries (USDA/USDI 1994). Figure 3 suggests that in this situation the safety zone must be large enough to allow 60 to 120 m separation between the firefighters and flames.

A general rule-of-thumb can be derived from Figure 3 by approximating the injury limit with a straight line. After doing so, it appears that safety zone size predicted by this model should be at least 4 times the maximum flame height. In some instances--such as the Mann Gulch, Battlement Creek and Butte fires--the fire may burn completely around the safety zone. In such fires, the separation distance suggested in Figure 3 is the radius of the safety zone, meaning the safety zone diameter should be twice the value indicated. Factors that will reduce safety zone size include reduction in flame height by thinning or burnout operations, shielding the safety zone from direct exposure to the flame by locating it on the lee side of ridges or other geographical structures, or reducing flame temperatures by applying fire retardant to the area around the safety zone.

This model did not include a safety factor. A safety factor of 2 to 4, possibly higher, would be appropriate for this situation (Baumeister 1978). This means that the distance predicted by the rule-of-thumb should be multiplied by the safety factor to obtain the recommended safe separation distance.

We calculated the net radiant energy transferred to a fire shelter like that used by firefighters in the U. S. Forest Service. The fire shelter is based on the concept that the surface will reflect the majority of the incoming radiant energy. An average emissivity for the aluminum foil exterior of a fire shelter is 0.07 (Incropera and Dewitt 1985), indicating that approximately 93 percent of the energy incident on a fire shelter is reflected away (Putnam 1991). Model predictions shown in Figure 4 suggest that heat levels remain below the injury limits for deployment zones wider than 15 m. However, this model does not account for convective heating which could significantly increase total energy transfer to a fire shelter, especially when deployed within one or two flame lengths of the fire.

Conclusions

We have presented a theoretical model that predicts safety zone sizes consistent with the information gathered from firefighter entrapments on four wildfires. The agreement between the model presented in this study and those presented in previous studies and also with the information from actual wildfire entrapments lends credibility to this work. We emphasize that this study represents a mathematical evaluation of the radiant heat transfer from wildland fires; it does not include any convective energy transfer, which can be significant. For example, firefighters caught in the Butte and South Canyon Fires recall intense turbulent gusts and loud noise associated with the fire front's passage. It is possible that hot turbulent eddies can be generated in and around large fires. Convective heat transfer from such eddies may increase the required safety zone size.

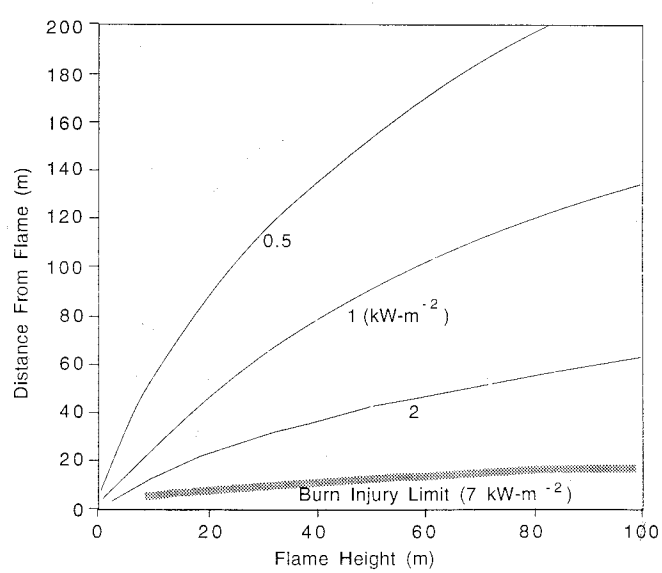

Figure 4. Predicted net radiant heat flux into a fire shelter as a function of flame height and distance between the fire shelter and flames. Heavy shaded line represents burn injury threshold (7 kW-m^{-2}).

Acknowledgments. Marty Alexander of the Canadian Forest Service deserves credit for initially suggesting the study. The U. S. Department of Interior through the Interior Fire Coordinating Committee in Boise, Idaho formally requested proposals for safety zone standards and subsequently provided some financial assistance for this study. Ted Putnam of the U. S. Forest Service's Missoula Technology and Development Center in Missoula, Montana provided valuable information and advice on the effects of heat on human. We also thank the several technical reviewers for their constructive criticism and comments.

References

Alexander, M.E. 1994. Limits of fire shelter effectiveness in relation to fire intensity. presented at National Fire Behavior Workshop. June 21-24: Missoula, Montana. 1p.

Alexander, M.E. 1995. The relevancy and validity of protective fire shelters in Canada. Canadian Interagency Forest Fire Centre (CIFFC) - Canadian Committee on Forest Fire Management (CCFFM) Fourth Annual Joint Meeting. November 21-24: Edmonton, Alberta. 3 p.

Baumeister, T., Avallone, E.A. and T. Baumeister III (editors). 1978. Marks' Standard Handbook for Mechanical Engineers. McGraw-Hill, New York. 1694 pages.

Behnke, W.P. 1982. Predicting flash fire protection of clothing from laboratory tests using second degree burn to rate performance. International Conference on Flammability. March 30: University of Surrey. London, England. 30 p.

Beighley, M. 1995. Beyond the safety zone: Creating a Margin of Safety. Fire Management Notes, 55(5):22-24.

Bond, A. and N.P. Cheney. 1986. A discussion paper on techniques and equipment for bush firefighters entrapped by fire, Including a Summary of Reports on "Survival" Shelter Testing. Bush Fire Council of N.S.W. Sydney, New South Wales. 30 p.

Braun, E., Cobb, D., Cobble, V.B., Krasny, J.F. and R.D. Peacock. 1980. Measurement of the protective value of apparel fabrics in a fire environment. Journal of Consumer Product Flammability. 7:15-25.

Budd, G.M. and N.P. Cheney. 1984. Bushfire safety and physiological stresses on fire fighters. Australian Fire Protection Association 9th National Conference on Fire. 4 p.

Fogarty, L.G. 1996. Two rural/urban interface fires in the Wellington suburb of Karori: assessment of associated burning conditions and fire control strategies. FRI Bulletin No. 197, Forest and Rural Fire Scientific and Technical Series, Rep. No. 1. New Zealand Forest Research Institute, Rotorua. In association with the National Rural Fire Authority: Wellington. 16 p.

Green, L.R. and H.E. Schimke. 1971. Guides for fuel-breaks in the Sierra Nevada mixed-conifer type. Res. Pap. INT-221. Berkeley, CA: U. S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station. 14 p.

Incropera, F.P. and D.P. Dewitt. 1985. Introduction to heat transfer. John Wiley and Sons, New York. 712 p.

Jukkala, A. and T. Putnam. 1986. Forest fire shelter saves lives. Fire Management Notes 47(2):3-5.

Leicester, R H. 1985. Building technology to resist fire flood and drought. Proceedings of Natural Disasters in Australia. Ninth Invitation Symposium. October 16-17. Academy of Technical Science: Sydney, Australia: 221-236.

King, A.R. and I.S. Walker. 1964. Protection of forest fire fighters. Unasylva 18(1):29-32.

Knight, I. 1988. What intensity of fire can a fire fighter survive in a reflective shelter? Fire Technology 24(4):312-332.

Mutch, R.W. and R.C. Rothermel. 1986. 73 firefighters survive in shelters. Fire Command 53(3):30-32, 48.

Petrilli, A. 1996. [personal communication]. May 21, 1996. Missoula, MT: U. S. Department of Agriculture, Forest Service.

Putnam, T. 1991. Your Fire Shelter. Pub. NFES 1570. National Wildfire Coordinating Group. National Fire Equipment System. Boise ID. National Interagency Fire Center. 18 p.

Rothermel, R.C. 1993. Mann Gulch Fire: A race that couldn't be won. Gen. Tech. Rep. INT-299. Ogden, UT: U. S. Department of Agriculture, Forest Service, Intermountain Research Station. 10 p.

Stoll, A.M. and L.C. Greene. 1959. Relationship between pain and tissue damage due to thermal radiation. Journal of Applied Physiology 14(3):373-382.

Tassios, S. and D. Packham. 1964. National Center for Rural Fire Research. technical paper no. 1. Forest Research Institute, Forestry and Timber Bureau: Canberra, ACT, Australia. 3 p.

Thomas, P. H. 1963. The size of flames from natural fires. Ninth International Symposium on Combustion. Academic Press. New York. 844-859.

USDA/USDI. 1994. Report of the South Canyon fire accident investigation team. Rep. 573-183. USDA, USDI, USDC, Washington, DC: U. S. Government Printing Office, Region 8. 236 p.

USDA/USDI. 1995. Glossary of wildland fire terminology, produced by: Incident Command System Working Team. Boise, ID: National Interagency Fire Center, National Fire and Aviation Support Group. 160p.

USDI/USDA. 1976. Accident report, Battlement Creek Fire, Fatalities and injury July 17, 1976. USDI, USDA, Washington, DC: U. S. Government Printing Office. 125 p.

Webster, J. K. 1986. The complete Australian bushfire book. Thomas Nelson Australia, Melbourne, Victoria. 269 p

Firefighter Safety Zones: How Big Is Big Enough?

Bret W. Butler and Jack D. Cohen

All wildland firefighters working on or near the fireline must be able to identify a safety zone. Furthermore, they need to know how "big" is "big enough."

Beighley (1995) defined a safety zone as "an area distinguished by characteristics that provide freedom from danger, risk, or injury." The National Wildfire Coordinating Group proposed that a safety zone be defined as "a preplanned area of sufficient size and suitable location that is expected to prevent injury to fire personnel from known hazards without using fire shelters" (USDA/USDI 1995).

In our study of wildland firefighter safety zones, we focused on radiant heating only. In "real" wildland fires, convective energy transport in the form of gusts, fire whirls, or turbulence could contribute significantly to the total energy received by a firefighter. However, convection is subject to buoyant forces and turbulent mixing, both of which suggest that convective heating is important only when a firefighter is relatively close to the fire. One reason that firefighters in potential entrapment situations are told to lie face down on the ground is to minimize their exposure to convective heating. We hope to define more clearly the relationship between convective heating and safety zone size in future work.

Bret Butler and Jack Cohen are research scientists in the Fire Behavior Research Unit, Rocky Mountain Research Station, Intermountain Fire Sciences Laboratory, Missoula, MT.

> A safety zone should be large enough so that the distance between the firefighters and flames is at least four times the maximum flame height.

What Do We Know?

Two questions are important when specifying safety zone size: 1) What is the radiant energy distribution in front of a flame? and 2) How much heat can humans endure before injury occurs? Concerning the first question, Fogarty (1996) and Tassios and Packham (1984) related the energy received by a firefighter to fireline intensity and distance from the flame front. Green and Schimke (1971) presented very specific information about fuel break construction on slopes and ridges in the Sierra Nevada mixed-conifer forest type. Others have discussed the performance of fire shelters under different heating regimes (for example, King and Walker 1964; Jukkala and Putnam 1986; Knight 1988). As one would expect, there is not much information related to the second question. The available information suggests that 0.2 Btu/ft^2/s (2.3 kW/m^2) is the upper limit that can be sustained without injury for a short time (Stoll and Greene 1959; Behnke 1982). Studies by Braun and others (1980) suggest that when a single layer of 6.3 oz/yd^2 (210 g/m^2) Nomex cloth is worn, second degree burns will occur after 90 seconds when a firefighter is subjected to radiant fluxes greater than 0.6 Btu/ft^2/s (7 kW/m^2).

The Nomex shirts and trousers currently used by wildland firefighters have fabric weights of 5.7 and 8.5 oz/yd^2 (190 and 280 g/m^2), respectively. Few studies, however, have explored relationships between flame height and the safety zone size necessary to prevent burn injury.

Theory Versus Reality

We formulated a theoretical model to predict the net radiant energy arriving at the firefighter wearing Nomex clothing as a function of flame height and distance from the flame (Butler and Cohen [In press]). Figure 1 displays the results.

The amount of radiant energy arriving at the firefighter depends both on the distance between the firefighter and the flame and on the flame height. The information shown suggests that in most cases safety zones must be relatively large to prevent burn injury.

We compared safety zone sizes predicted by our model against those reported on four wildfires: the

Continued on page 14

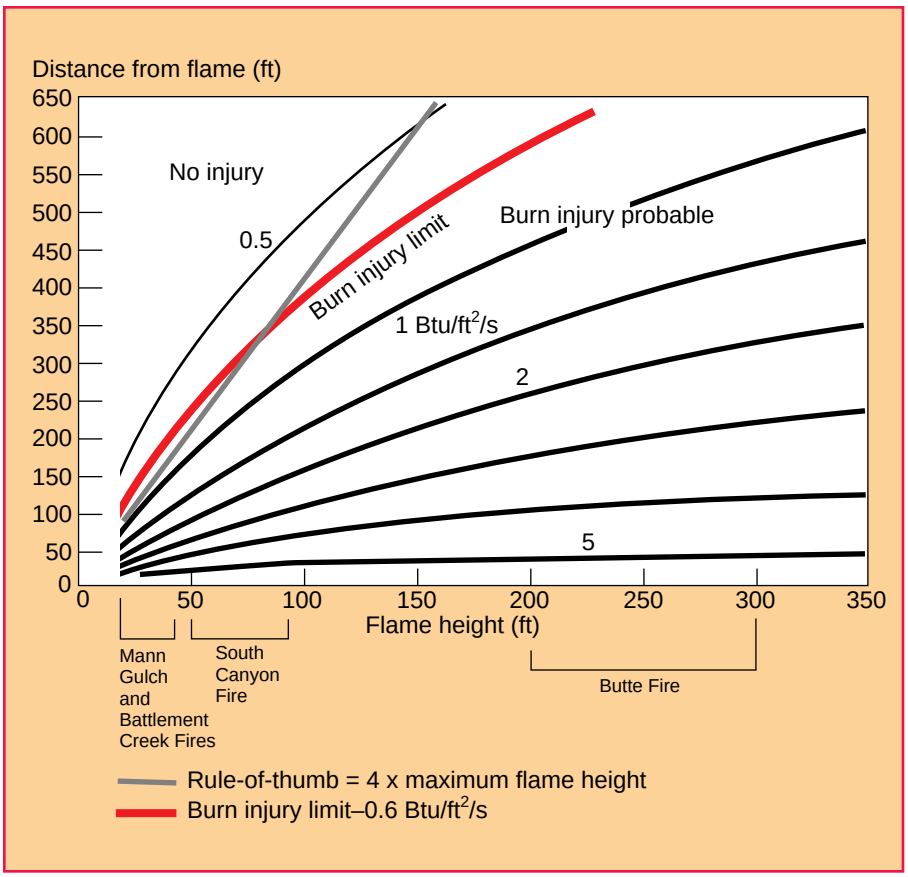

Figure 1—*Lines represent predicted radiant energy arriving at the firefighter as a function of flame height and distance from the flame. It is assumed that the firefighter is wearing fire-retardant clothing and protective head and neck equipment. The heavy shaded line represents the burn injury threshold of 0.6 Btu/ft²/s (7 kW/m²). The heavy solid black line indicates the rule of thumb for the size of the safety zone.*

Mann Gulch Fire, the Battlement Creek Fire, the Butte Fire, and the South Canyon Fire.

The Mann Gulch Fire overran 16 firefighters on August 5, 1949. Wag Dodge, one of only three survivors, lit a fire and then lay face down in the burned-out area as the main fire burned around him. The Mann Gulch Fire occurred in an open stand of scattered, mature ponderosa pine (60 to 100+ years old) with a grass understory. Flame heights of 10 to 40 feet (3 to 12 m) were estimated to have occurred at the time of entrapment. Rothermel (1993) indicates that Dodge's fire burned about 300 feet (92 m) before the main fire overran it. Assuming an elliptical shape for the burned area, with its width approximately half the length, the safety zone created by Dodge's escaped fire would have been about 150 feet (46 m) wide. Figure 1 indicates that the safety zone needed to be large enough to separate the firefighters and flames by 90 to 150 feet (27 to 46 m) or approximately the same width as the area created by Dodge's fire.

The Battlement Creek Fire occurred in western Colorado during July of 1976 (USDI 1976). The fire burned on steep slopes covered with 6- to 12-foot- (2- to 4-m-) high Gambel oak. Flames were estimated at 20 to 30 feet (6 to 9 m) above the canopy. Four firefighters were cut off from their designated safety zone. When the fire overran them, they were lying face down on the ground without fire shelters in a 25-foot- (8-m-) wide clearing near the top of a ridge. Tragically, only one of the four survived, and he suffered severe burns over most of his body. Figure 1 suggests that for this fire, the safety zone should have been large enough to separate firefighters from flames by 150 feet (46 m). Clearly, the 25-foot- (8-m-) wide clearing did not qualify as a safety zone.

Flame heights were reported to be 200 to 300 feet (62 to 92 m) high on the Butte Fire that burned on steep slopes covered with mature lodgepole pine and Douglas-fir during August of 1985 (Mutch and Rothermel 1986). Figure 1 indicates that a cleared area greater than 1,200 feet (370 m) across would have been needed to prevent injury to the firefighters standing in its center. In fact, safety zones 300 to 400 feet (92 to 123 m) in diameter were prepared (Mutch and Rothermel 1986). This diameter was not sufficiently large enough to meet the definition of a safety zone, as indicated by the fact that 73 firefighters had to deploy in fire shelters to escape the radiant heat. As the fire burned around the edges of the deployment zone, the intense heat forced the firefighters to crawl while inside their shelters to the opposite side of the clearing.

On July 2, 1994, the South Canyon Fire was ignited by a lightning strike to a ridgetop in western Colorado. During the afternoon of July 6, the South Canyon Fire "blew up," burning across the predominately Gambel-oak-covered slopes with 50- to 90-foot- (15- to 28-m-) tall flames (South Canyon

Fire Accident Investigation Team 1994). Tragically, 14 firefighters were overrun by the fire and died while attempting to deploy their fire shelters. Twelve of the firefighters died along a 10- to 12-foot- (3- to 4-m-) wide fireline on a 55-percent slope, the other two in a steep narrow gully. Eight other firefighters deployed their fire shelters in a burned out area approximately 150 feet (46 m) wide. They remained in their shelters during three separate crown fire runs that occurred 450 feet (138 m) away from them; none of these eight firefighters was injured (Petrilli 1996). One firefighter estimates that air temperatures inside the shelters reached 115 °F (46 °C) and remembers smoke and glowing embers entering the fire shelters during the crown fire runs. Survivors felt they were far enough from the flames that survival with minor injuries would have been possible without the protection of a fire shelter (Petrilli 1996). A firefighter who did not deploy in a shelter but remained on a narrow ridge below the eight firefighters during the "blowup" experienced no injuries (South Canyon Fire Accident Investigation Team 1994). Figure 1 suggests that in this situation, the safety zone must be large enough to separate the firefighters and flames by 250 to 350 feet (77 to 115 m).

A general rule of thumb can be derived from figure 1 by approximating the injury limit with a straight line. After doing so, it appears that a safety zone should be large enough that the distance between the firefighters and flames is at least four times the maximum flame height. In some instances—such as the Mann Gulch, Battlement Creek, and Butte fires—the fire may burn completely around the safety zone. In such fires, the separation distance suggested in figure 1 is the radius of the safety zone, meaning the safety zone diameter should be twice the value indicated.

What About Fire Shelters?

We calculated the net radiant energy transferred through a fire shelter like those used by firefighters in the USDA Forest Service. The fire shelter is based on the concept that the surface will reflect the majority of the incoming radiant energy. An average emissivity for the aluminum-foil exterior of a fire shelter is 0.07, indicating that approximately 93 percent of the energy incident on a fire shelter is reflected away (Putnam 1991). Model predictions shown in figure 2 suggest that heat levels remain below the injury limits for deployment zones wider than 50 feet (15 m), even with 300-foot- (92-m-) tall flames. However, this model does not account for convective heating that could significantly increase the total energy transfer to shelters deployed within a few flame lengths of the fire.

Conclusions

Radiant energy travels in the same form as visible light, that is, in the line of sight. Therefore, locating safety zones in areas that minimize firefighters' exposure to flames will reduce the required safety zone size. For example, topographical features that act as radiative shields are the lee side of rocky outcroppings, ridges and the tops of ridges, or peaks containing little or no flammable vegetation. Safety zone size is proportional to flame height. Therefore, any feature or action that reduces flame height will have a corresponding effect on the required safety zone size. Some examples are burnout operations that leave large "black" areas, thinning operations that reduce fuel

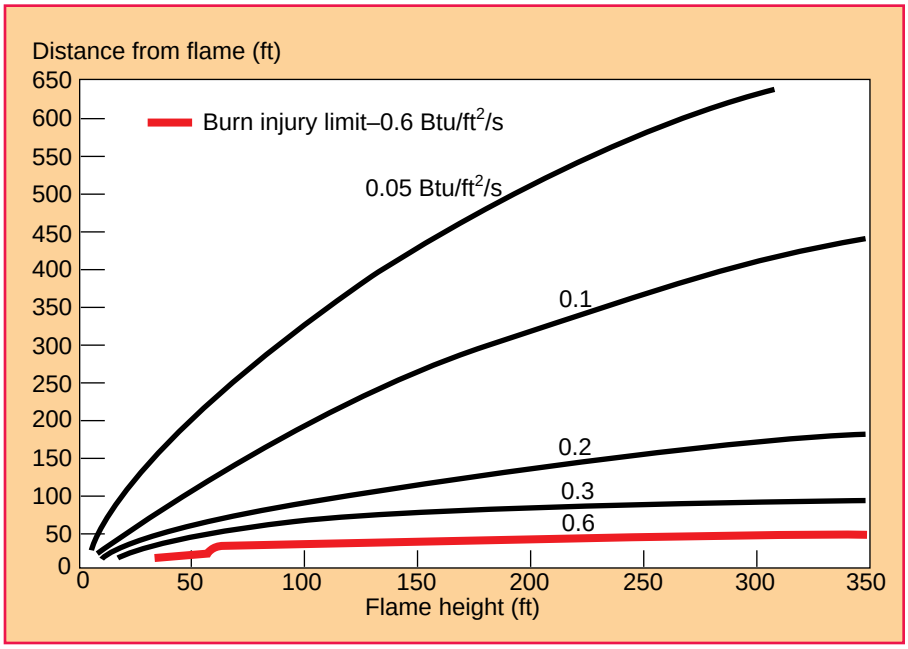

Figure 2—*Predicted radiant energy on a fire shelter as a function of distance between the fire shelter and flames, and flame height. The heavy shaded line represents the burn injury threshold for a firefighter inside a deployed fire shelter.*

Continued on page 16

load, and retardant drops that decrease flame temperatures.

We emphasize that while this study addresses the effects of radiant energy transfer, convection is not addressed. Convective energy transfer from gusts, fire whirls, or turbulence could significantly increase the total heat transfer to the firefighter and thus the required safety zone size. Further work in this area is needed.

Acknowledgments

The United States Department of the Interior's Fire Coordinating Committee, Boise, ID, provided financial assistance for a portion of this study. Ted Putnam of the Forest Service's Missoula Technology and Development Center, Missoula, MT, provided valuable information and advice on the effects of heat on human tissue.

Literature Cited

Behnke, W.P. 1982. Predicting flash fire protection of clothing from laboratory tests using second degree burn to rate performance. London: International Conference on Flammability; 30 p.

Beighley, Mark. 1995. Beyond the safety zone: Creating a margin of safety. Fire Management Notes. 55(4): 22-24.

Braun, E.; Cobb, D.; Cobble, V.B.; Krasny, J.F.; Peacock, R.D. 1980. Measurement of the protective value of apparel fabrics in a fire environment. Journal of Consumer Product Flammability. 7: 15-25.

Butler, B.W.; Cohen, J.D. [In press]. Firefighter safety zones: A theoretical model. International Journal of Wildland Fire.

Fogarty, L.G. 1996. Two rural/urban interface fires in the Wellington suburb of Karori: Assessment of associated burning conditions and fire control strategies. FRI Bulletin No. 197, Forest and Rural Fire Scientific and Technical Series, Rep. No. 1. Rotorua and Wellington, NZ: New Zealand Forest Research Institute in association with the National Rural Fire Authority. 16 p.

Green, L.R.; Schimke, H.E. 1971. Guides for fuel-breaks in the Sierra Nevada mixed-conifer type. Berkeley, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station. 14 p.

Jukkala, A.; Putnam, T. 1986. Forest fire shelter saves lives. Fire Management Notes. 47(2): 3-5.

King, A.R.; Walker, I.S. 1964. Protection of forest firefighters. Unasylva. 18(1): 29-32.

Knight, Ian. 1988. What intensity of fire can a fire fighter survive in a reflective shelter? Fire Technology. 24(4): 312-332.

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Petrilli, A. May 21, 1996. [Personal communication with B. Butler]. Missoula, MT.

Putnam, T. 1991. Your fire shelter: Pub. NFES 1570. Boise, ID: National Interagency Fire Center, National Wildfire Coordinating Group, National Fire Equipment System, 18 p.

Rothermel, R.C. 1993. Mann Gulch Fire: A race that couldn't be won. GTR INT-299. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 10 p.

South Canyon Fire Accident Investigation Team. 1994. Report of the South Canyon Fire Accident Investigation Team. Atlanta, GA: U.S. Department of Agriculture Forest Service, Southern Region. 39 p. plus appendices.

Stoll, Alice M.; Greene, Leon C. 1959. Relationship between pain and tissue damage due to thermal radiation. Journal of Applied Physiology. 14(3): 373-382.

Tassios, S.; Packham, D. 1984. An investigation of some thermal properties of four fabrics suitable for use in rural firefighting. National Center for Rural Fire Research. Tech. pap. no. 1. Canberra, ACT, Australia: Forest Research Institute, Forestry and Timber Bureau. 13 p.

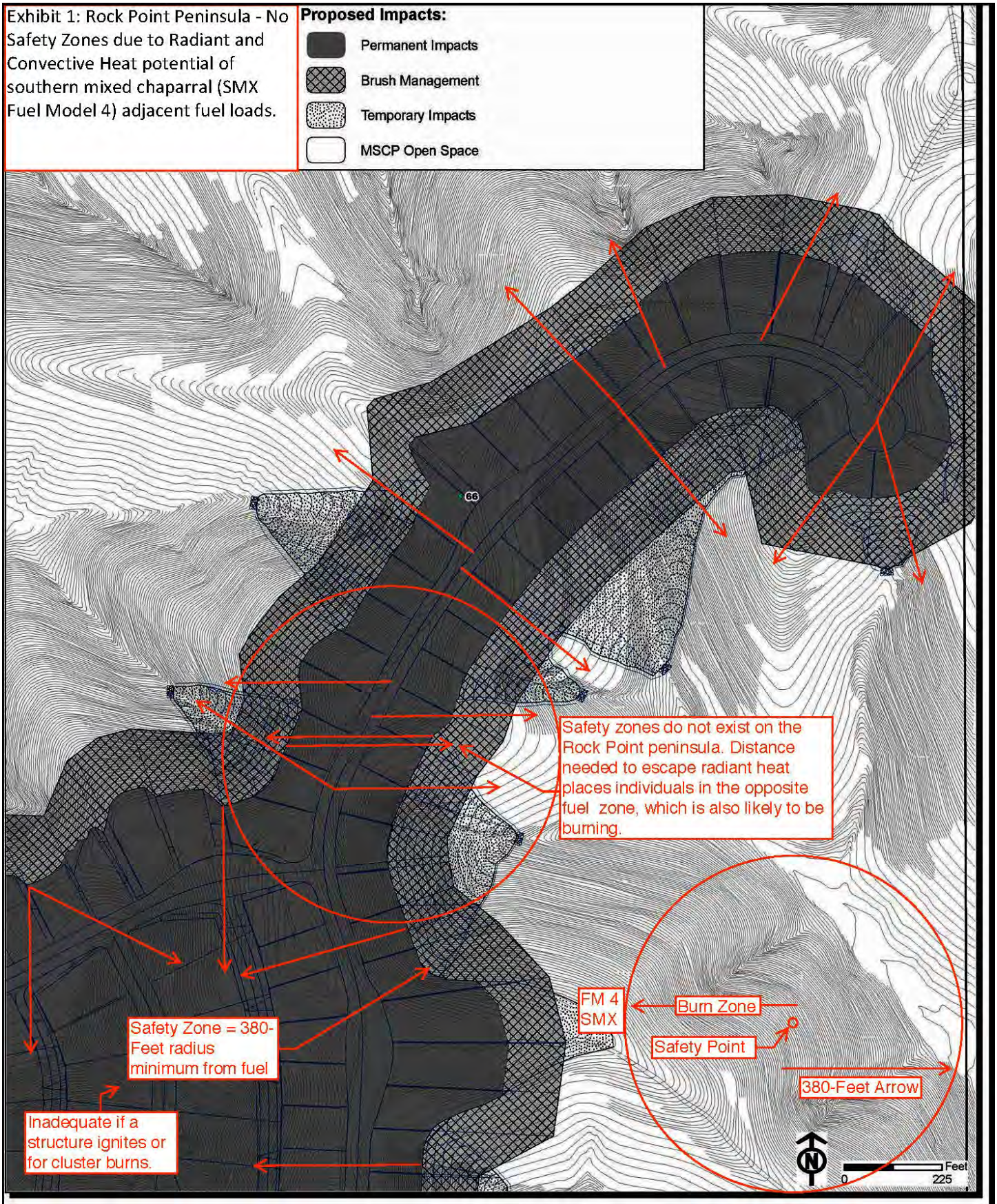
U.S. Department of the Interior. [Unpublished July 17, 1976, report]. Accident report of Battlement Creek Fire fatalities and injury. U.S. Department of the Interior. 125 p.

USDA/USDI. [Review copy, 10/31/95]. Glossary of wildland fire terminology. Boise, ID: National Interagency Fire Center, National Fire and Aviation Support Group. 160 p. ■

Selected Fire Illustrations

Convective Heat Transfer through Fire Whirls can render a Safety Zone 4x Flame Length Inadequate [Butler & Cohen].

Exhibit 1: Rock Point Peninsula - No Safety Zones due to Radiant and Convective Heat potential of southern mixed chaparral (SMX Fuel Model 4) adjacent fuel loads.



Radiant Heat Safety Zone requirements based upon the FPP BehavePlus predicted flame length of 95-Feet. Actual flame lengths under severe fire weather will exceed over 100-Feet (II:6:28596) expanding the radius needed for a safety zone by a multiple of 4x flame length. Safety zones do not exist on Rock Point peninsula.

Radiant Heat Burn Injury Limit – Safe Distance Relative to Flame Height
Butler & Cohen, Firefighter Safety Zones
4X Flame Height may be Inadequate for Convective Energy Transfer

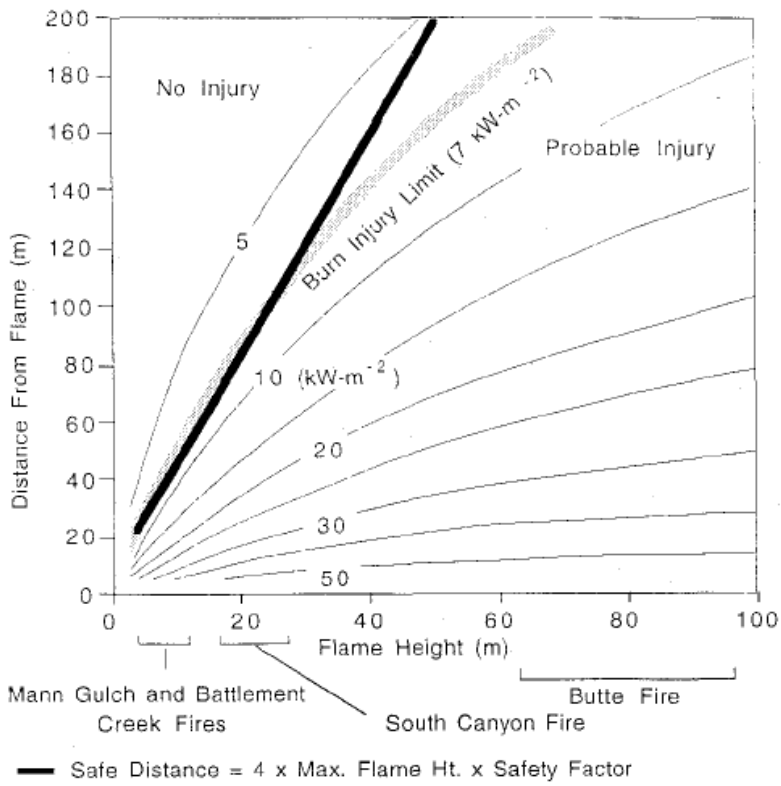


Figure 3. Lines represent predicted net radiant heat flux to a firefighter as a function of flame height and distance from the flame. It is assumed that the firefighter is wearing fire retardant clothing (Nomex) and protective head and neck equipment. Heavy shaded line represents burn injury threshold (7 kW-m^{-2}).

Cedar Fire Fatality Despite Clearance

Safe Distance Estimates

"We emphasize that this study represents a mathematical evaluation of the radiant heat transfer from wildland fires; **it does not include any convective energy transfer, which can be significant**. For example, firefighters caught in the Butte and South Canyon Fires recall intense turbulent gusts and loud noise associated with the fire front's passage. It is possible that hot turbulent eddies can be generated in and around large fires. **Convective heat** transfer from such eddies **may increase the required safety zone size."**
II:101: 29196

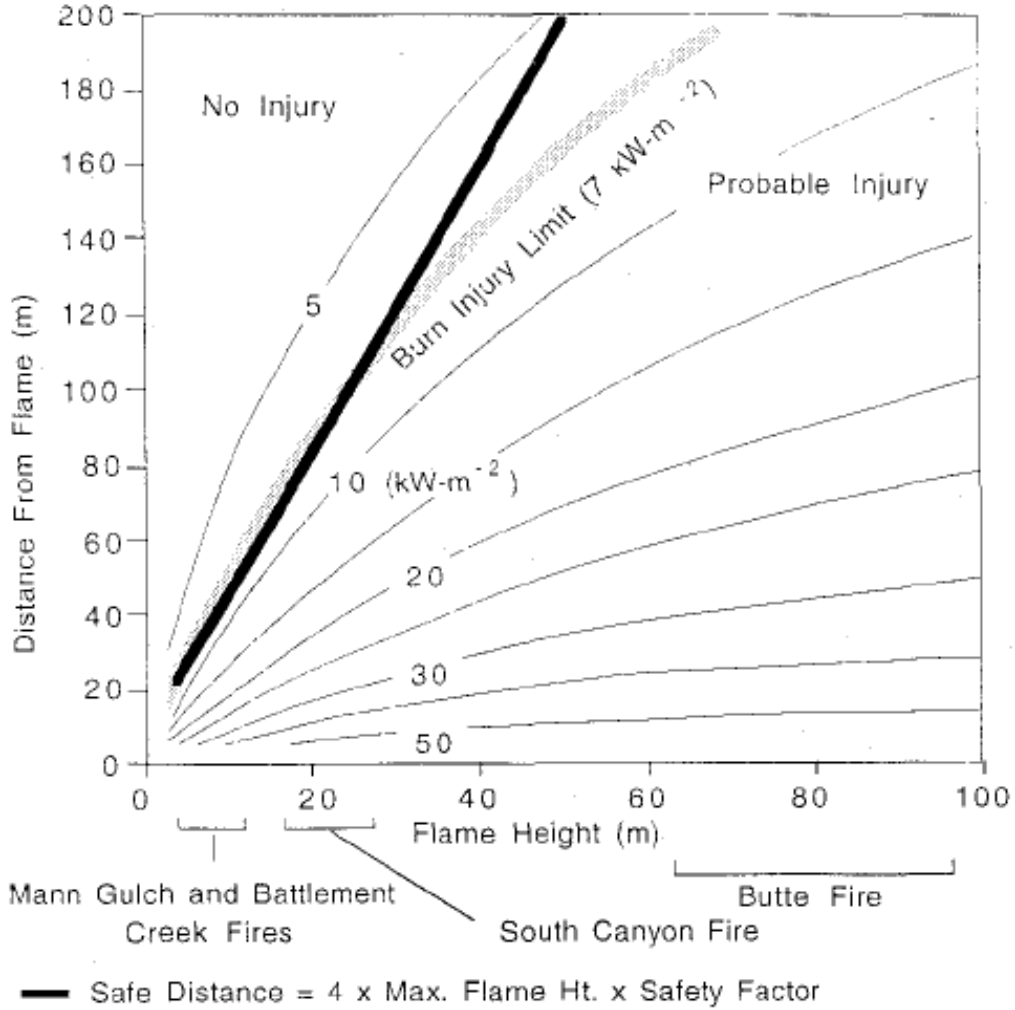


Figure 3. Lines represent predicted net radiant heat flux to a firefighter as a function of flame height and distance from the flame. It is assumed that the firefighter is wearing fire retardant clothing (Nomex) and protective head and neck equipment. Heavy shaded line represents burn injury threshold (7 kW-m^{-2}).

Firefighter Safety Zones: A Theoretical Model Based on Radiative Heating
Bret W. Butler and Jack D. Cohen
Int. J. Wildland Fire 8 (2): 73-77, 1998
II:101:29193

Convective Heat Transfer through Fire Whirls can render a Safety Zone 4x Flame Length Inadequate

Firebrands can penetrate screen smaller than 1/8-inch
City RTC references larger screens 1/8 – 1/4-inch.

Excerpt photos II:101:29036-37
Heat Transfer/Safety Zones II:101:29193, Screen Size 4:101:28339, II:101:29165-66

"The **firebrands were not quenched by the presence of the screen** and would continue to burn until they were to fit through the screen opening. **For all screen sizes tested, the firebrands were observed to penetrate the screen** and produce a self-sustaining smoldering ignition…For the 6 mm screens tested a majority of the firebrands simply flew through the screen…**The results of these experiments demonstrate the danger of firebrand storms in WUI fires**."

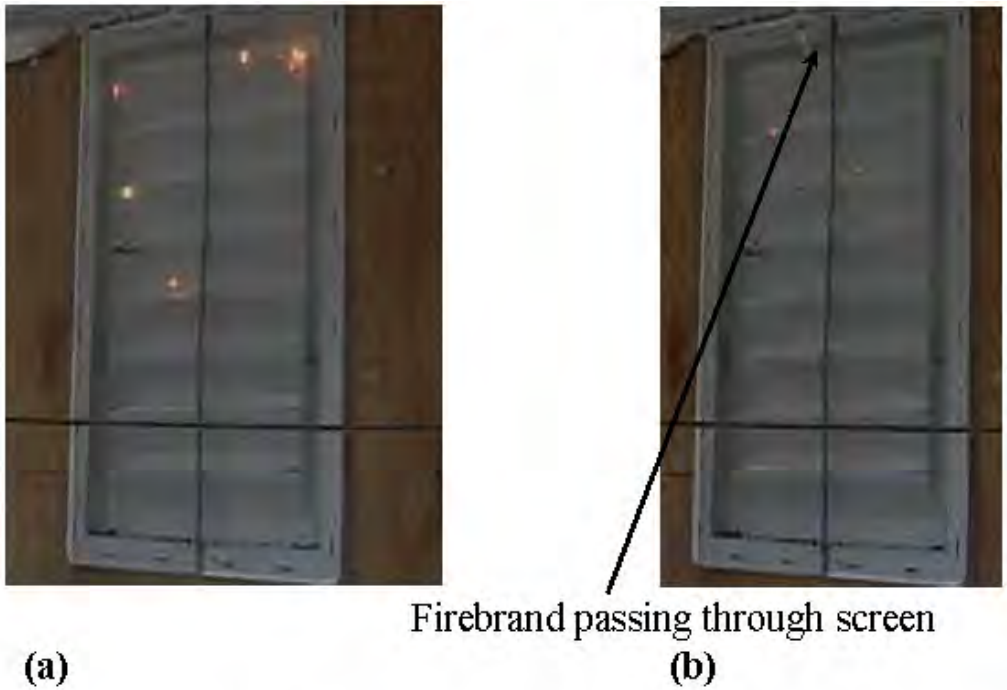


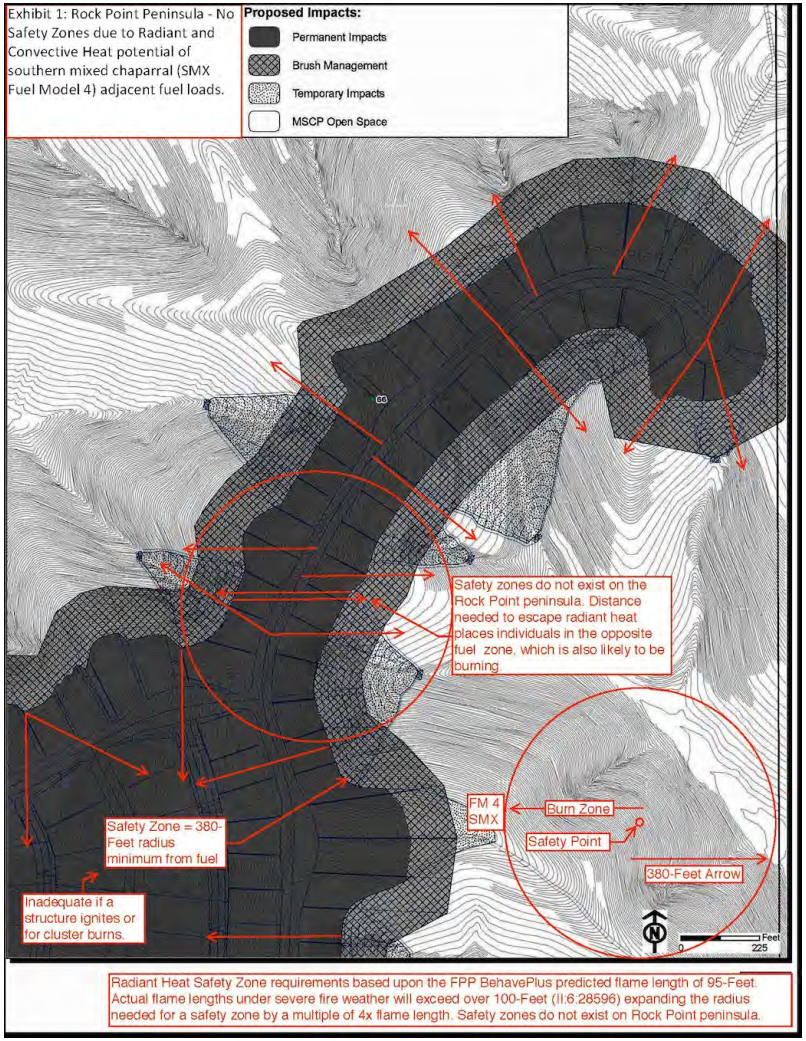
Figure 8 Images of the steel screen (3 mm) located behind the gable vent. Panel (b) shows a firebrand penetrating the screen after burning to a small enough size (see arrow).

"ON THE USE OF A FIREBRAND GENERATOR TO INVESTIGATE THE IGNITION OF STRUCTURES IN WILDLAND-URBAN INTERFACE (WUI) FIRES"
Samuel L. Manzello*, John R. Shields, and Jiann C. Yang, Building and Fire Research Laboratory (BFRL)
National Institute of Standards and Technology (NIST)

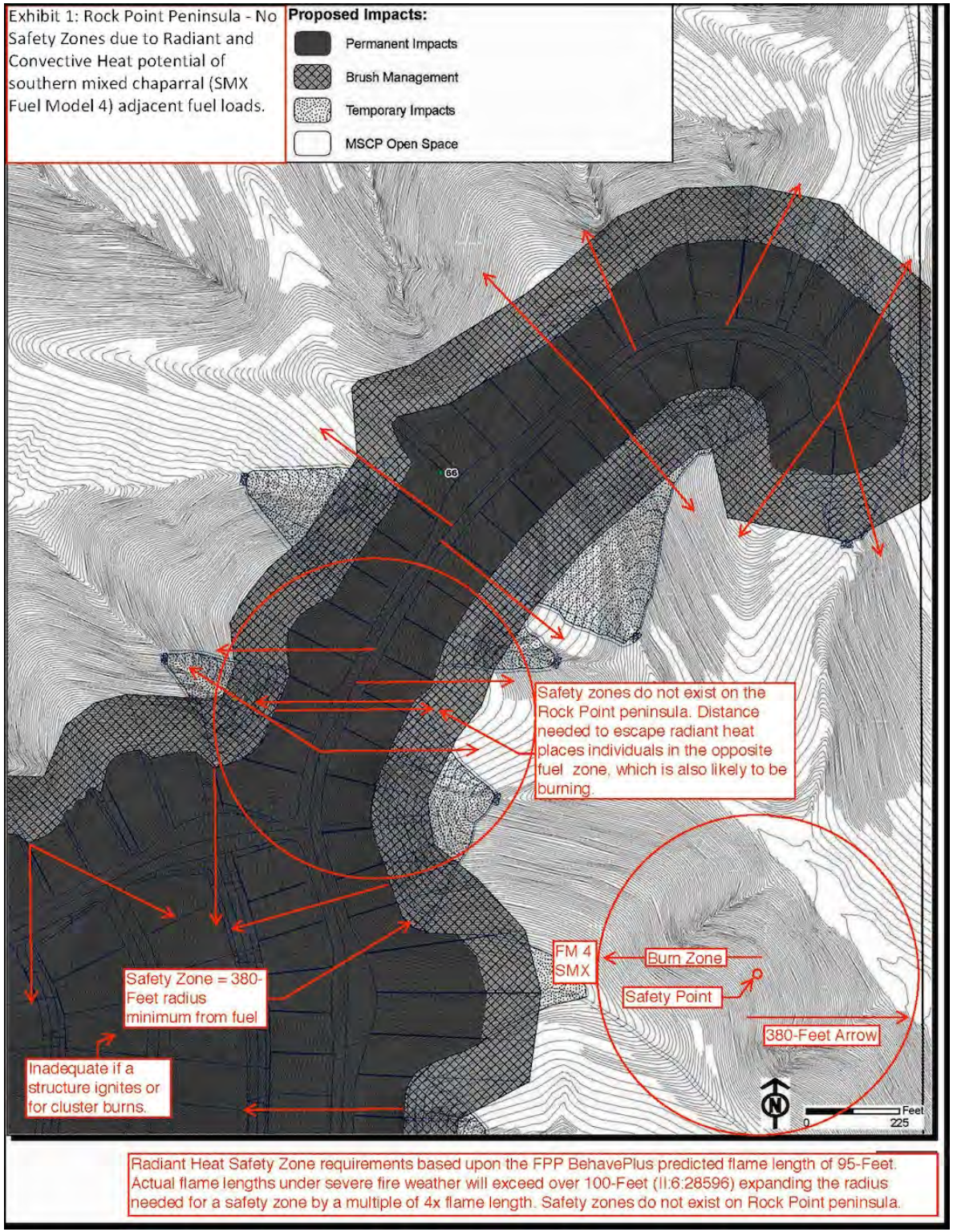
Hazards of Rock Point Fire Wick

- Extremely vulnerable to **cluster burns** due to the configuration of the Rock Point peninsula and overall WUI design.

- FM-4 SMX Fuels

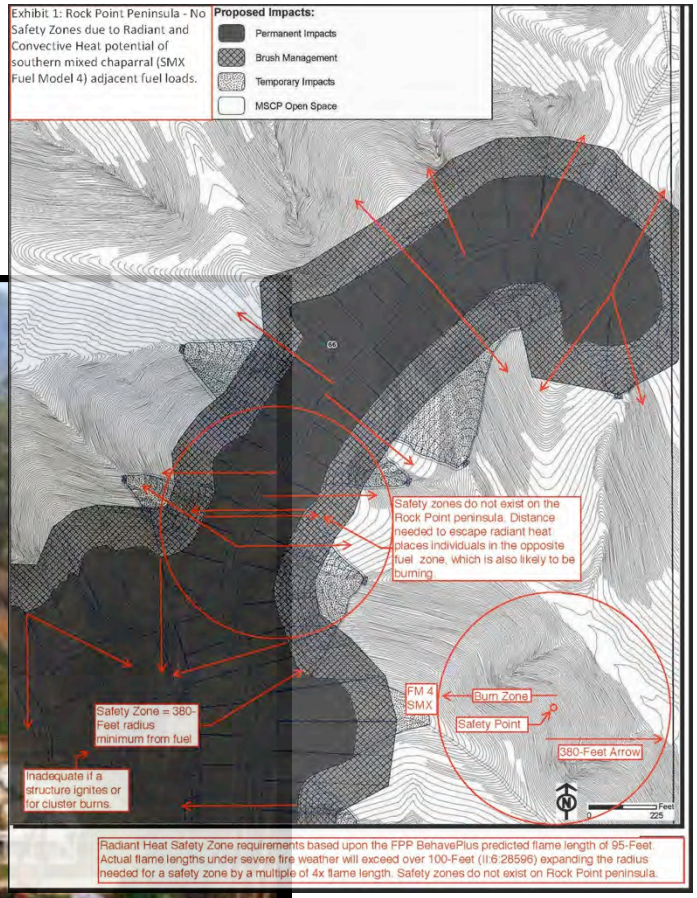


Rock Point Peninsula



Not enough distance from fuel to establish points of safety – or firefighter safety zones

Cluster Burn Hazard



I:193:16206, I:331:27887

Wider Lots on the WUI could Reduce the Risk of Cluster Burn

Narrow Lots generally 70-105 Feet

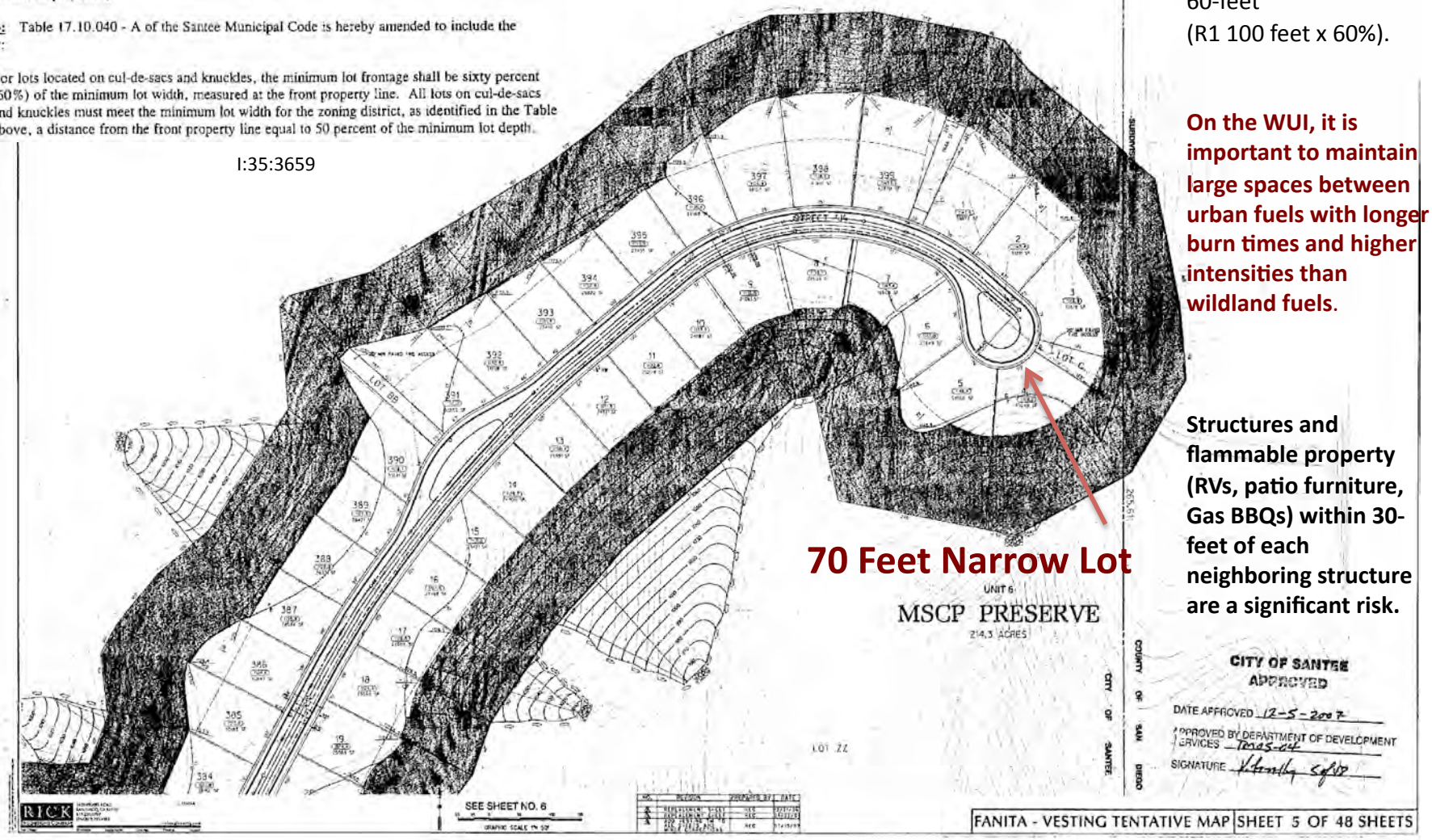
Section 2: Table 17.10.040 (A) (3) of the Santee Municipal Code is hereby amended to read as follows:

	HL	R-1
Minimum lot Dimensions (Width/depth) (feet)	150/150**	100/100 **

Section 3: Table 17.10.040 - A of the Santee Municipal Code is hereby amended to include the following:

** For lots located on cul-de-sacs and knuckles, the minimum lot frontage shall be sixty percent (60%) of the minimum lot width, measured at the front property line. All lots on cul-de-sacs and knuckles must meet the minimum lot width for the zoning district, as identified in the Table above, a distance from the front property line equal to 50 percent of the minimum lot depth.

I:35:3659



Width of lots on cul-de-sacs can be as narrow as 60-feet
(R1 100 feet x 60%).

On the WUI, it is important to maintain large spaces between urban fuels with longer burn times and higher intensities than wildland fuels.

Structures and flammable property (RVs, patio furniture, Gas BBQs) within 30-feet of each neighboring structure are a significant risk.

019852

Backfiring SOPs

- The following guidelines apply to all firing operations and you **must** **assure** that you:

- Do not place fire fighting personnel **or the public at risk**
- **Do not put property at risk**
- **Will be able to maintain control of the operation**
- Will not make the situation worse
- Have a **beginning point and an ending point (anchor points)**
- Will be able to **complete your operation with the personnel and equipment on hand**
- Do not start an operation that in order to complete you must rely on resources that are not on scene, **they may never arrive**
- Have considered all other options including the use of other tactics
- **Will not delay suppression activities by spending the time to gather resources, prepare and execute the firing operation**
- Coordinate with adjoining resources/personnel
- **Conclusion**
- **If you can not unequivocally meet the guidelines of this SOP in the time available, do not fire!**

Novato Fire Protection District, Cedar Fire Incident Recovery Report, May 26, 2004, II:101:29191-92

"An FM-4, chaparral vegetation greater than 6-feet in height, provides the greatest rates of spread and energy release with flame length **usually exceeding 100 feet**. Wildfires burning under Santa Ana wind conditions in this type of vegetation are the most destructive and difficult to control."

FPP @ II:6:28596

"2.3 Predicting Wildland Fire Behavior
'Whether wildland fire behavior can be predicted depends on how accurate the answer is expected to be. The minute-by-minute movement of a wildland fire will probably never be totally predictable-certainly not from weather conditions forecast many hours before the fire. Nevertheless, practice and experienced judgment in assessing the fire environment, coupled with a systematic method of calculating fire behavior, yields surprisingly good results (Rothermel 1983)'."

FPP @ II:6:28607

Different Wind Speeds Create Different Flame Length
FPP SMX-FM4 Comparison of SW versus NE Wind Fires

RUN #4

A late season wildfire on the west slopes of Fanita under an above average 30 mph Southwest wind in a FM-4, continuous chaparral vegetation over 6' in height. This wind condition is associated with the breakdown of a sustained Santa Ana wind episode.

BehavePlus 3.0.1 Thu, Oct 26, 2006 at 23:55:45 Page 3

Fanita, under an above average SW wind in an FM-4

Surface Rate of Spread (maximum)	811.7	ft/min
Fireline Intensity	46678	Btu/ft/s
Flame Length	63.2	ft
Midflame Wind Speed	15.0	mi/h
Max Eff Wind Exceeded?	No	
Area	8857.9	ac
Perimeter	103475	ft

BehavePlus 3.0.1 Thu, Oct 26, 2006 at 23:55:45 Page 1

Modules: SURFACE, SIZE

Description Fanita, under an above average SW wind in an FM-4

Fuel/Vegetation, Surface/Understory		
Fuel Model		4
Fuel Moisture		
1-h Moisture	percent	2
10-h Moisture	percent	3
100-h Moisture	percent	5
Live Herbaceous Moisture	percent	
Live Woody Moisture	percent	50
Weather		
20-ft Wind Speed	mi/h	30
Wind Adjustment Factor		0.5
Direction of Wind Vector (from upslope)	deg	0
Terrain		
Slope Steepness	percent	45
Fire		
Elapsed Time	h	1.0

FPP II:6:2862-64

RUN #6

A late season wildfire under 60 mph Santa Ana wind conditions in a FM-4, continuous chaparral vegetation over 6' in height.

BehavePlus 3.0.1 Fri, Oct 27, 2006 at 00:01:35 Page 3

Fanita, under a 60 mph Santa Ana wind in an FM-4

Surface Rate of Spread (maximum)	1966.5	ft/min
Fireline Intensity	113088	Btu/ft/s
Flame Length	95.0	ft
Midflame Wind Speed	30.0	mi/h
Max Eff Wind Exceeded?	No	
Area	30229.3	ac
Perimeter	241689	ft

BehavePlus 3.0.1 Fri, Oct 27, 2006 at 00:01:35 Page 1

Modules: SURFACE, SIZE

Description Fanita, under a 60 mph Santa Ana wind in an FM-4

Fuel/Vegetation, Surface/Understory		
Fuel Model		4
Fuel Moisture		
1-h Moisture	percent	2
10-h Moisture	percent	3
100-h Moisture	percent	5
Live Herbaceous Moisture	percent	
Live Woody Moisture	percent	50
Weather		
20-ft Wind Speed	mi/h	60
Wind Adjustment Factor		0.5
Direction of Wind Vector (from upslope)	deg	180
Terrain		
Slope Steepness	percent	45
Fire		
Elapsed Time	h	1.0

FPP II:6:2868-70

Different Fuel Moisture & Winds Create Different Flame Length
FPP SMX-FM4 Comparison of SW versus NE Wind Fires

RUN #2

A summer afternoon wildfire on the west slopes of Fanita under a prevailing 15 mph Southwest wind in a FM-4, continuous chaparral vegetation over 6' in height..

BehavePlus 3.0.1 Thu, Oct 26, 2006 at 23:46:46 Page 3

Fanita, under a prevailing SW wind in an FM-4

Surface Rate of Spread (maximum)	271.7	ft/min
Fireline Intensity	13097	Btu/ft/s
Flame Length	35.2	ft
Midflame Wind Speed	9.0	mi/h
Max Eff Wind Exceeded?	No	
Area	1441.5	ac
Perimeter	36327	ft

BehavePlus 3.0.1 Thu, Oct 26, 2006 at 23:46:46 Page 1

Modules: SURFACE, SIZE

Description		Fanita, under a prevailing SW wind in an FM-4
Fuel/Vegetation, Surface/Understory		
Fuel Model		4
Fuel Moisture		
1-h Moisture	percent	4
10-h Moisture	percent	6
100-h Moisture	percent	8
Live Herbaceous Moisture	percent	
Live Woody Moisture	percent	80
Weather		
20-ft Wind Speed	mi/h	15
Wind Adjustment Factor		0.6
Direction of Wind Vector (from upslope)	deg	0
Terrain		
Slope Steepness	percent	45
Fire		
Elapsed Time	h	1.0

FPP II:6:28656-58

RUN #6

A late season wildfire under 60 mph Santa Ana wind conditions in a FM-4, continuous chaparral vegetation over 6' in height.

BehavePlus 3.0.1 Fri, Oct 27, 2006 at 00:01:35 Page 3

Fanita, under a 60 mph Santa Ana wind in an FM-4

Surface Rate of Spread (maximum)	1966.5	ft/min
Fireline Intensity	113088	Btu/ft/s
Flame Length	95.0	ft
Midflame Wind Speed	30.0	mi/h
Max Eff Wind Exceeded?	No	
Area	30229.3	ac
Perimeter	241689	ft

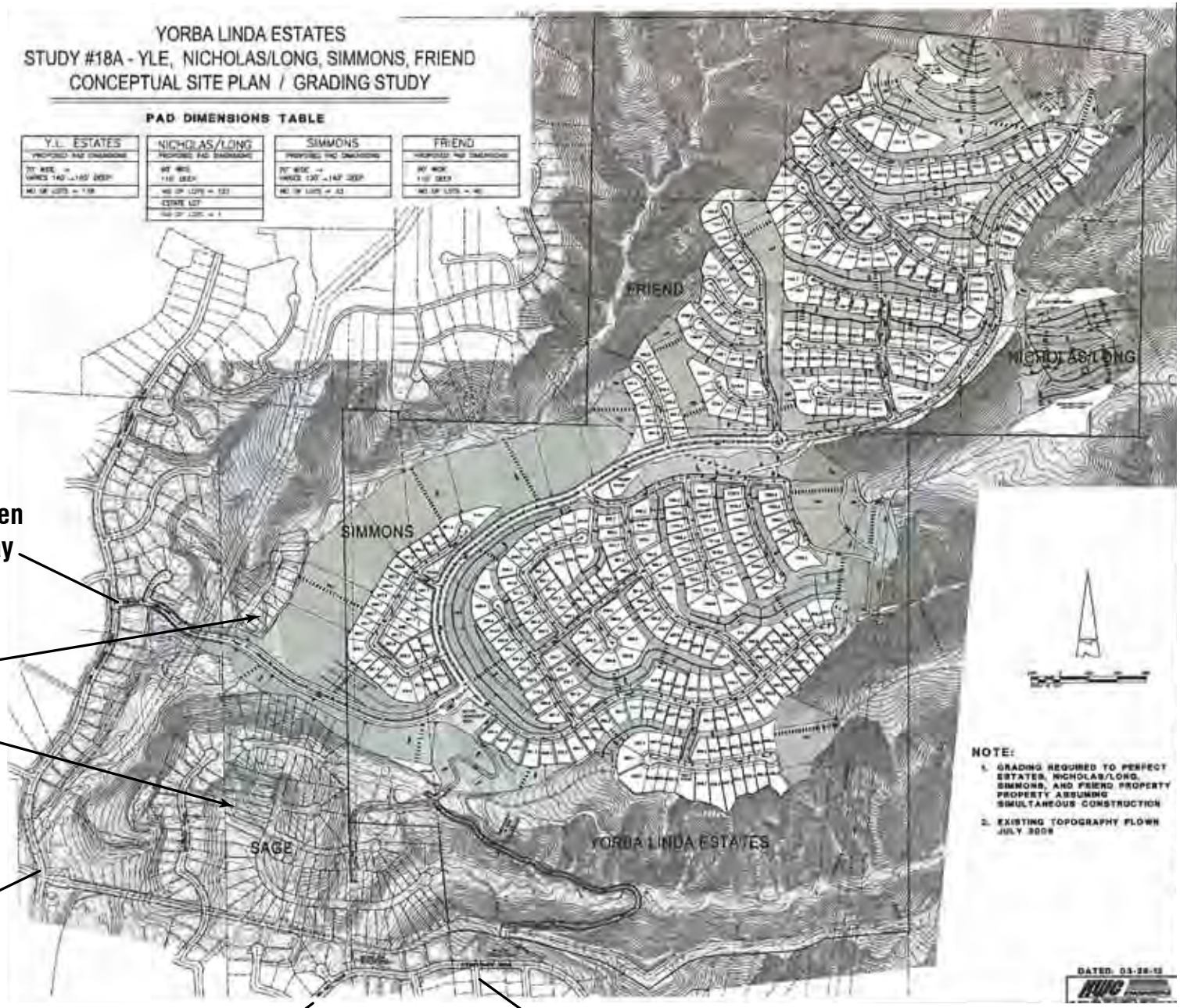
BehavePlus 3.0.1 Fri, Oct 27, 2006 at 00:01:35 Page 1

Modules: SURFACE, SIZE

Description		Fanita, under a 60 mph Santa Ana wind in an FM-4
Fuel/Vegetation, Surface/Understory		
Fuel Model		4
Fuel Moisture		
1-h Moisture	percent	2
10-h Moisture	percent	3
100-h Moisture	percent	5
Live Herbaceous Moisture	percent	
Live Woody Moisture	percent	50
Weather		
20-ft Wind Speed	mi/h	60
Wind Adjustment Factor		0.5
Direction of Wind Vector (from upslope)	deg	180
Terrain		
Slope Steepness	percent	45
Fire		
Elapsed Time	h	1.0

FPP II:6:2868-70

	# of Homes
Yorba Linda Estates	373
Sage Development	112
Total Homes	485



Aspen Way

Sage Development 112 Homes

San Antonio Road

Via Del Agua

Stonehaven Drive

Letter: Collinsworth2

9222 Lake Canyon Road
Santee, CA 92071

January 22, 2014

Mr. Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702-4048

RE: Cielo Vista Project EIR – Supplemental Comments

Dear Mr. Tippets,

Please consider the following supplemental comments upon the Cielo Vista Project EIR related to the Public Safety impacts of the Project.

State of Emergency Declaration by the Governor of California[1]

The EIR and CVFBAR should consider the State of Emergency as it relates to water supply for the Project, water supply for fire suppression, the expectation for more severe fire behavior and recirculate its findings.[2]

> **WHEREAS** the State of California is experiencing record dry conditions, with 2014 projected to become the driest year on record; and
>
> **WHEREAS** the state's water supplies have dipped to alarming levels, indicated by: snowpack in California's mountains is approximately 20 percent of the normal average for this date; California's largest water reservoirs have very low water levels for this time of year; California's major river systems, including the Sacramento and San Joaquin rivers, have significantly reduced surface water flows; and groundwater levels throughout the state have dropped significantly; and
>
> **WHEREAS** dry conditions and lack of precipitation present urgent problems: drinking water supplies are at risk in many California communities; fewer crops can be cultivated and farmers' long-term investments are put at risk; low-income communities heavily dependent on agricultural employment will suffer heightened unemployment and economic hardship; animals and plants that rely on California's rivers, including many species in danger of extinction, will be threatened; and the risk of wildfires across the state is greatly increased; and

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[1] http://gov.ca.gov/home.php
[2] California Drought Brings 'Unprecedented' Fire Danger, Joseph Serna, Los Angeles Times, January 18, 2014.

> **WHEREAS** extremely dry conditions have persisted since 2012 and may continue beyond this year and more regularly into the future, based on scientific projections regarding the impact of climate change on California's snowpack; and
>
> **WHEREAS** the magnitude of the severe drought conditions presents threats beyond the control of the services, personnel, equipment and facilities of any single local government and require the combined forces of a mutual aid region or regions to combat; and
>
> **WHEREAS** under the provisions of section 8558(b) of the California Government Code, I find that conditions of extreme peril to the safety of persons and property exist in California due to water shortage and drought conditions with which local authority is unable to cope.
>
> **NOW, THEREFORE, I, EDMUND G. BROWN JR.,** Governor of the State of California, in accordance with the authority vested in me by the state Constitution and statutes, including the California Emergency Services Act, and in particular, section 8625 of the California Government Code **HEREBY PROCLAIM A STATE OF EMERGENCY** to exist in the State of California due to current drought conditions

Within the context of Governor Brown's finding "*that conditions of extreme peril to the safety of persons and property exist in California due to water shortage and drought conditions with which local authority is unable to cope*", it is important to recognize that the Yorba Linda Water District could not provide sufficient reliable service during the Freeway Complex Fire prior to the current State Of Emergency. Furthermore, the Water District position was that the water system met standards and the size of the fire front was excessive.

> *"…water supply problems are not uncommon in catastrophic events such as the Freeway Complex Fire. It also is important to note that the vast majority of homes that were damaged or destroyed were in areas where water pressure and water flows were available during the firefighting activities…There is no way to guarantee that the magnitude of a natural disaster such as the Freeway Complex Fire will not overwhelm even the most robust water system."*[3]

---

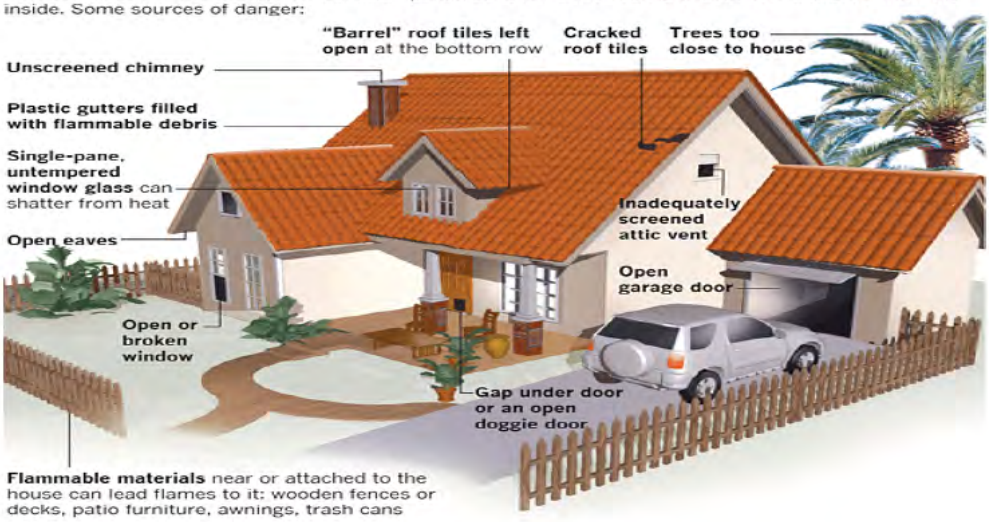
[3] Freeway Complex Fire Disaster Response & Water System Assessment, Yorba Linda Water District, January 8, 2009, pages 5 & 24. Report: Reservoir ran dry, pumps were shut down during fire, Erin Welch, Orange County Register January 8, 2009. Note that the fire was not "natural" as it was ignited by a vehicle malfunction.

Closer analysis of the 2008 Freeway Complex Fire incident needs to be provided to integrate measures that will avoid and mitigate fire impacts

The CVFBAR needs to provide a map of all the structures damaged and destroyed during the Freeway Complex Fire. The map should include fire points of origin, rates of spread and weather conditions during the most damaging burn periods. This information should be utilized to analyze the Project's impacts upon evacuation potential for the Project and its vicinity during Santa Ana wind driven fires originating from the most damaging points of origin at the most damaging time periods. The map should include the specifications for the fuel modification zones at the closest WUI for the damaged/destroyed structures. The CVFBAR is inadequate without providing more than just "worst scenario" for flame length. Even fire resistant homes with standard fuel modification zones are vulnerable to wildfire.[4]

Illustration 1: How Fire-Resistant Homes Can Burn

Building with stucco and tile and clearing nearby brush aren't enough to protect a home from wildfires. A hail of wind-driven embers can penetrate even a fire-resistant structure and burn from the inside. Some sources of danger:



Note: For more information, visit disastersafety.org/publications

Source: Times reporting. Graphics reporting by Ted Rohrlich, Joe Mozingo and Rong-Gong Lin II

Lorena Iñiguez Los Angeles Times

The damaged or destroyed homes in Yorba Linda had many of the more traditional features that protect homes from flames and radiant heat. In some cases, these features are also effective in protecting homes from embers. However, in a wind driven fire storm, additional protection is necessary.

The information compiled on the map should also be used to discuss prospective decisions to evacuate or "stay and defend" property – which is an issue of

[4] Freeway Complex Fire After Action Report, OCFA, Page 19.

controversy for the Project and its vicinity. This issue has been raised in the press and differing official positions have been reported. [5]

> *"Officials in Orange County began scaling back on their local version of the "Stay and Defend" plan and began focusing on early evacuation and fire prevention instead. On Feb. 10, OCFA Chief Chip Prather announced to residents of Silverado Canyon that the "Stay and Defend" policy would not work with Orange County."*

Firefighter Safety and Performance Expectations:

Considering that "*no structure in the path of a wildfire is completely without need of protection*,"[6] more analysis needs to be provided with a focus upon firefighter safety. Firefighter escape routes and safety zones, and their potential decisions to defend structures for the worst Santa Ana wind driven fire points of origin, time periods and worst weather conditions require analysis.

There have been at least 327 wildland firefighter fatalities in California since 1926.[7] Because of the social and political climate associated with expectations for firefighters to defend property during wildfires, the Project's configuration relative to topography should be analyzed and the conditions that firefighters are expected to engage, decline deployment or retreat from specific portions of the Project described.

> *"Wildland firefighters today are spending more hours fighting fires than ever before, and they are engaging fires of historic magnitude. The risk environment associated with wildland fire is being re- defined, and firefighters too have begun to redefine their own culture as a professional endeavor."*[8]

After a review of wildland firefighter fatality incidents, the CVFBAR should describe the conditions that would cause firefighters to reject assignment or retreat.[9] The "Lesson Learned" analyses of fire behavior and firefighter fatality incidents are

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[5] Fire Officials Shift from 'Stay and Defend' to 'Ready, Set, Go', Salvador Hernandez, Orange County Register, May 27, 2009. New County Plan Would Train Homeowners to Fight Fires, Salvador Hernandez, Orange County Register, January 15, 2009.
[6] Incident Response Pocket Guide, National Wildfire Coordinating Group, PMS461 NFES 1077, January 2010, page 12.
[7] Wildland Fire Accidents by State, National Interagency Fire Center, page 2. Wildland firefighter fatalities nationwide exceed one thousand since 1910, page 24. http://www.nifc.gov/safety/safety_documents/State.pdf
[8] Trends in Wildland Fire Entrapment Fatalities…Revisited, James R. Cook, National Wildland Firefighters Association, February 2013
[9] Reference Freeway Complex Fire Incident Narrative – Map 4 Corona Fire Engine 5—Near Miss Entrapment, Freeway Complex Fire After Action Report, OCFA, Pages 31 & 47.

relevant and available.[10] A firefighter near miss occurred on the Freeway Complex Fire.

> *"Approximately 9:27 a.m., a tragedy almost occurred when COR E5 became surrounded by fire and experienced a burn-over event. When the Freeway Fire began, COR E5 was on scene of a medical aid in a neighborhood less than a mile away. Once COR E5 cleared the medical call, it contacted COR Dispatch and was assigned to the fire. COR E5 chose to access the fire from a service road between the fire origin and the threatened homes. This decision put COR E5 in a dangerous position between the main fire and the threatened homes, with unburned vegetation between the crew and the fast moving head. Within minutes, the COR E5 Captain radioed they were being overrun by fire and were unable to escape. COR BR1, supported by multiple water drops from ORC HC41 and HC241, rescued the trapped firefighters and averted a tragedy. This event resulted in minor burns and smoke inhalation to two firefighters assigned to COR E5. Incident Narrative – Map 4 is a map showing the near miss entrapment."*

Convective Heat

The CVFBAR does not address safety issues related to convective heat transfers. Potential for convective heat transfers should be examined relative to topography, firefighter safety, evacuation and potential property location.

Thank you for considering these supplemental comments,

Van K. Collinsworth
Wildland Fire Expert / Natural Resource Geographer[11]

CC. Supervisor Todd Spitzer
Kevin K. Johnson, APLC

Attachment:
Freeway Complex Fire Disaster Response & Water System Assessment, Yorba Linda Water District
Freeway Complex Fire After Action Report, Orange County Fire Authority

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[10] http://www.youtube.com/user/WildlandFireLLC?feature=watch
[11] Van Collinsworth is a Natural Resource Geographer and former US-Forest Service Wildland Firefighter. Collinsworth has reviewed environmental documents during the last 20 years (including Fire Protection Plans) and provided expert depositions to the courts in regard to these documents.

Yorba Linda Water District

Freeway Complex Fire Disaster Response & Water System Assessment

January 8, 2009

A report of facts and findings of the November 15, 2008 Freeway Complex Fire

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Freeway Complex Fire Report

Chapter 1 - Purpose & Objective

The primary purpose and objective of this report is to provide information on the events and facts surrounding the Freeway Complex Fire as they relate to the Yorba Linda Water District (YLWD). This report was prepared internally by YLWD staff and includes information derived by multiple sources including the YLWD's Emergency Operation Center (EOC) log, employee interviews, employee logs, Supervisory Control and Data Acquisition (SCADA) logs, and other sources to ensure the facts contained herein are presented in as accurate a manner as possible.

Chapter 2 – Executive Summary

The Freeway Complex Fire was a fire storm like no other that the Yorba Linda area has ever experienced. The weather conditions including the wind speed and direction, temperature, and relative humidity were all contributing factors that along with the fire, formed a destructive combination. The fire burned 30,305 acres (at a rate of 1,000 acres/hour for the first 24 hours) in total, threatening some 9,500 homes, destroying 118 and damaging another 60 within the Yorba Linda Community.

Upon commencement of the Freeway Complex Fire, the staff of the Yorba Linda Water District responded by mobilizing and activating the EOC in a timely manner. During the EOC activation period, every effort was made to ensure water supplies were available within the areas with the highest water demands for firefighting activities. YLWD personnel were dispatched to various YLWD facilities throughout the event to confirm the operation of booster pump stations, to perform damage assessments of the water system and to make necessary repairs where possible.

During the fire emergency, YLWD staff skillfully managed the system's complex infrastructure to maximize water flow under extremely difficult circumstances. YLWD also requested and received assistance from Mutual Aid partners which supplied extra pumps that staff employed effectively in strategic areas of the water distribution system. Overall, water supplies were sufficient throughout YLWD's water system. The system as a whole delivered about 20 million gallons to the fire fight which primarily threatened the highest elevations and some service areas received six to nine times their normal volume of water within a very narrow time period.

However, YLWD's preliminary internal review conducted for this assessment determined that during the peak of the fire storm water service appears to have been interrupted in a limited number of streets in the Hidden Hills Upper Service Area.

All of these issues are discussed in more detail in the following report.

Chapter 3 - Water System Background

YLWD provides water service to over 24,000 homes and businesses within a 23 square-mile territory serving the cities of Yorba Linda, portions of Brea, Anaheim, and Placentia, and a small unincorporated area in the County of Orange. The elevations and topography within YLWD vary from approximately 250 feet above mean sea level to approximately 1,300 feet, thus creating the need for multiple water pressure zones (service areas) to ensure water flow and pressure are provided that meet general guidelines and standards developed by the American Water Works Association (AWWA). For the purpose of this report, 12 service areas, which overlie YLWD, will be discussed and referenced to. These areas are outlined in Table 3-1 and illustrated in Exhibit "A".

Table 3-1: Reservoir Service Areas

Area	Reservoir Areas	Elevation (ft)
1	Highland Reservoir	428
2	Lakeview Reservoir	570
3	Valley View & Fairmont Reservoirs	675
4	Bryant Ranch Reservoir	680
5	Gardenia Reservoir	780
6	Springview Reservoir	780
7	Elk Mountain Reservoir	780
8	Little Canyon Reservoir	1,000
9	Santiago Reservoir	1,000
10	Quarter Horse Reservoir	920
11	Chino Hills Reservoir	1,300
12	Camino de Bryant Reservoir	1,165

Water pressure and water flow throughout the distribution system are accomplished through the combination of storage reservoirs, which create a gravity-fed system, and booster pump stations, which pump water from one pressure zone to another. This movement of water is typically pumped from a lower elevation zone to a higher elevation zone. In all, there are 13 storage reservoirs within YLWD with a total capacity of 49.9 million gallons.

Water is supplied from two sources, imported water from Metropolitan Water District through three physical connections into the distribution system, and nine groundwater wells capable of

producing approximately 14,000 gallons per minute, cumulatively. Currently, YLWD uses both sources on an equal basis with approximately 50% imported water and 50% groundwater serving the needs of the residents.

Chapter 4 - Water System Design Standards

Water agencies within the United States typically use design standards established by the American Water Works Association (AWWA). These standards apply to the construction of storage reservoirs, installation of transmission and distribution pipelines, fire hydrants, valves, and other appurtenances. YLWD uses and conforms to these standards when designing and constructing water systems.

Chapter 5 - Mobilization of YLWD Personnel and EOC Activation

The Freeway Complex Fire began at 9:05 a.m., November 15, 2008 in Riverside County at the edge of the 91 Freeway at Green River, and expanded rapidly into Orange County. Shortly after reaching the Orange County boundary, the fire split into two separate paths; the first into the Santa Ana Riverbed, continuing west and south into Anaheim Hills, and the second west and north into the hills of Yorba Linda. The fire continued to Olinda Ranch along Carbon Canyon Road in Brea, burned through much of Chino Hills, then spread north into the Diamond Bar area.

A Red Flag Warning was issued by the National Weather Service for areas including Orange County and was in effect 24-hours preceding the start of the Freeway Complex Fire on November 15, 2008. This warning was then extended through 10:00 a.m. on the 15th. The Freemont Canyon Remote Automated Weather Station reported a wind speed of 43 mph, with gusts to 61 mph at 9:00 a.m., the day of the fire. The temperature was 75 degrees with a relative humidity level of 8%.

YLWD Staff became aware of the fire situation at 10:40 a.m. November 15, 2008, and mobilized the YLWD Emergency Operations Center (EOC). At 10:54 a.m., YLWD's Production Plant Operators, who have the responsibility of operating and controlling water supply throughout the distribution system, began overriding the normally automated water delivery system and reported directly to the EOC. At 12:00 p.m. the EOC was officially activated by the General Manager. Between 12:45 and 12:50 p.m. YLWD sent representatives to act as liaisons to the City of Yorba Linda's EOC and to the Orange County Fire Authority (OCFA) Incident Command Post, which was established at the Yorba Regional Park.

Throughout the day and into the evening, YLWD personnel continued to arrive at the EOC for duty. The EOC was active for a total of 26 hours and officially de-activated at 2:00 p.m. Sunday

November 16, 2008, by the General Manager. Documentation indicates a total of 659 hours were worked by YLWD personnel during the EOC activation period.

Chapter 6 - Incident Timeline Summary

YLWD compiled a detailed log of all activities that occurred on November 15 and 16, 2008. This log represents all EOC activities that transpired during the fire storm event. The complete EOC log is available from YLWD upon request.

The following timeline summarizes and highlights the significant events that transpired at the EOC.

Saturday, November 15, 2008

9:05 a.m. Commencement of the Freeway Complex Fire

10:40 a.m. YLWD Staff first became aware of the fire situation once the YLWD on-duty standby operator was notified that the fire had started in the Yorba Linda area.

10:54 a.m. The on-duty operator notified Metropolitan Water District and requested an additional 50% supply increase of imported water into YLWD's water system. Additionally, multiple pump stations were placed in manual mode and turned 'on' to further fill reservoirs in anticipation of additional water needs for fire fighting.

12:00 p.m. YLWD's EOC was officially activated at the Operations Center located at YLWD's headquarters. An evaluation of the entire water system for damage and water supply commenced immediately.

12:05 p.m. The Water Emergency Response Organization of Orange County (WEROC) was notified of YLWD's official EOC activation.

12:45 p.m. YLWD dispatched a supervisor to act as liaison at the City of Yorba Linda EOC.

12:50 p.m. A team of senior level operators were dispatched to act as liaisons with the Orange County Fire Authority's (OCFA) Unified Command established at the Incident Command Post located at Yorba Regional Park.

1:19 p.m. SCADA communications at Santiago Booster Pump Station (BPS) was disrupted due to the fire storm. Remote communications to the Hidden Hills Booster Pump Station (BPS) and Santiago Reservoir were also lost at this time.

1:30 p.m. An operator was dispatched to both the Hidden Hills BPS and the Santiago BPS. Upon arrival at the Hidden Hills BPS, the operator confirmed the pumps were running, and were providing water to the Santiago Lower Zone and up to the Santiago Reservoir as needed. The severity of fire storm prevented YLWD personnel from traveling to the Santiago BPS at this time.

3:20 p.m. At the EOC, unconfirmed reports were heard of water loss in the Hidden Hills area through the television media.

3:50 p.m. YLWD personnel were dispatched to the Hidden Hills area with a police escort.

4:00 p.m. A transmission pipeline (cross feeder) valve was opened by YLWD Operators to supplement the Santiago Lower Zone with water from Area 8 (Little Canyon Reservoir).

4:00 p.m. YLWD personnel arrived at the Hidden Hills BPS and confirmed all pumps were in operation.

4:15 p.m. YLWD personnel reached the Santiago BPS. They reported all pumps were shut down, including the gas engine pump, which had shut down due to overheating as indicated by a sensor on the engine. YLWD personnel manually started two electric motor pumps and the gas engine pump.

5:10 p.m. YLWD officials issued a Boil Water Advisory (Exhibit "E") for residents in the entire Hidden Hills area due to the temporary loss of water pressure in the Upper Zones and the rapid draw down of water in the Santiago Reservoir supplying both the Santiago Upper and Lower Zones.

6:10 p.m. Through WEROC and YLWD requests for mutual aid, a fire pumper truck from OCFA was dispatched to Mazanita and Smoketree to augment water supplies from Area 6 (Springview Reservoir) to Area 8 (Little Canyon Reservoir).

6:20 p.m. YLWD personnel arrived at the Santiago BPS to investigate and restore SCADA communications. Air in the pipelines at the pump station was observed and reported. This was an indicator that the Santiago Reservoir was being drawn down to a level that would not provide sufficient water to flood the booster pumps' suction tubes. As a protective measure to avoid damage to the pumps, the decision was made to shut down all pumps until such time as water levels were restored in the Santiago Reservoir.

6:22 p.m. A mobile water pump from Laguna Beach County Water District arrived at YLWD's EOC staging area and was dispatched to Pepper and Mazanita to

augment water supplies from Area 6 (Springview Reservoir) to Area 8 (Little Canyon Reservoir).

6:50 p.m. An additional fire pumper truck from the City of Garden Grove arrived at the District's Fairmont Booster Pump Station to augment water supplies from Area 6 (Springview Reservoir) to Area 8 (Little Canyon Reservoir).

7:00 p.m. A mobile water pump from Santa Margarita Water District arrived at YLWD's EOC staging area and was dispatched to Umbria and Trentino to augment water supplies from Area 10 (Quarter Horse Reservoir) to Area 8 (Little Canyon Reservoir).

11:00 p.m. YLWD personnel traveled to the Santiago BPS and reported the Santiago Reservoir remained empty.

Sunday, November 16, 2008

12:45 a.m. The cross feeder valve originally opened to supplement the Santiago Lower Zone with water from Area 8 (Little Canyon Reservoir) was closed allowing the Santiago Reservoir and the Little Canyon Reservoirs to operate independently and recover separately as needed.

8:00 a.m. YLWD personnel arrived at the Santiago BPS and reported a level of eight feet of water. All pumps were subsequently turned on and the Santiago Upper Zone was restored to normal water pressure shortly thereafter.

8:00 a.m. YLWD crews began shutting down water services to homes where damage or destruction had occurred or where water leaks were observed.

2:00 p.m. YLWD's EOC was deactivated.

Chapter 7 - Water System Demands

At 12:00 p.m., November 15, 2008, YLWD's EOC was officially activated. YLWD proceeded to complete an analysis of the water system, which included the evaluation of all the storage reservoirs and the amount of water available in storage. At 12:18 p.m., all reservoirs combined were at 56% capacity, which represented a total storage of 27.9 million gallons of water. Table 7-1 provides a detailed breakdown of each reservoir and its status at 12:18 p.m.

The water maintained in storage is typical as YLWD balances anticipated seasonal water demands with daily water quality requirements. YLWD operators must regularly cycle the water in storage to insure high quality drinking water is supplied throughout the distribution system at all times. An engineering study conducted in September 2002, entitled "Water Reservoir Nitrification Prevention and Control", by Corollo Engineers, recommended cyclical storage practices to prevent water nitrification from occurring in the chloraminated water supplies. Chloramination is the disinfection process typically used by the Metropolitan Water District in their imported water supplies. If chloraminated water remains in storage for an extended period of time, nitrification can occur, which potentially causes the presence of bacteria and could result in rapid degradation of water quality.

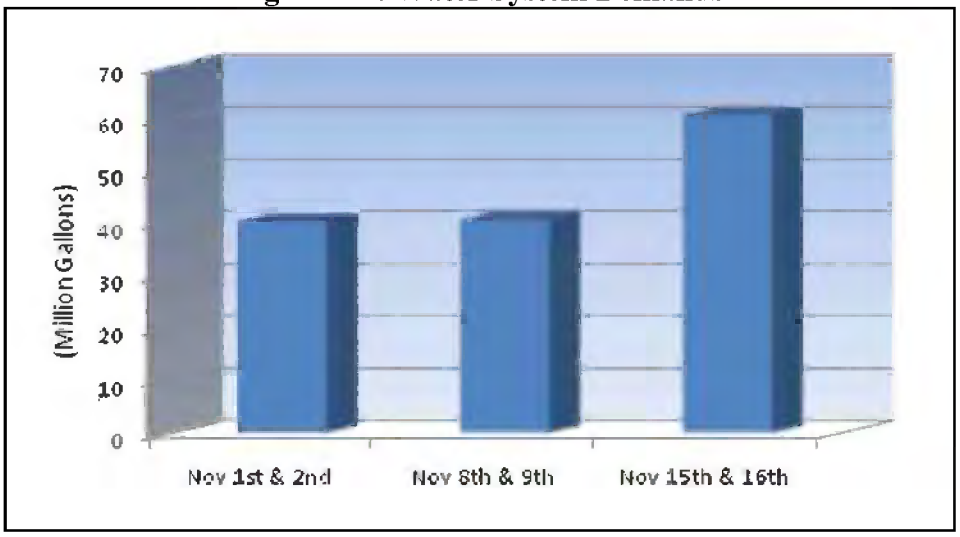
Table 7-1: Water in Storage

Reservoir Name	Total Capacity (mil. gallons)	Water in Storage (%)	Water in storage (mil. gallons)
Highland	4.6	68%	3.1
Lakeview	8.0	48%	3.8
Valley View	2.0	70%	1.4
Fairmont	7.4	66%	5.0
Bryant Ranch	2.5	58%	1.4
Gardenia	2.0	91%	1.8
Springview	8.0	56%	4.5
Elk Mountain	6.2	46%	2.8
Little Canyon	0.8	63%	0.5
Santiago	1.1	80%	0.9
Quarter Horse	3.5	49%	1.7
Chino Hills	0.6	42%	0.2
Camino de Bryant	3.2	23%	0.8
Totals	49.9 mg	56%	27.9 mg

During the two 24-hour periods of Saturday, November 15, and Sunday, November 16, the water demands combined for both days exceeded typical demands from the previous two weeks by over 20 million gallons. Figure 7-1 indicates that the combined water demand throughout the

water system on November 15th and 16th, encompassing all reservoir service areas, was approximately 60 million gallons. When compared to the previous two weeks for a combined total of 40 million gallons, this amounts to a 50% increase or 20 million gallons above normal.

Figure 7-1: Water System Demands



The demands experienced throughout the water system can be further evaluated and analyzed to determine which areas demanded higher water supplies for firefighting needs. Each reservoir service area was analyzed utilizing data from YLWD's SCADA system, which continued to gather data during the fire storm event, with the exception of the Hidden Hills area as addressed further in this report. This data was then compared to the previous two weeks, Table 7-2.

YLWD's SCADA system is a computerized network designed to operate and monitor the groundwater wells, import water connections, booster pump stations, and reservoirs. Each facility within YLWD is automated by its integration into the SCADA system. Operating within pre-programmed parameters, the system self regulates, monitors and notifies operators through a sophisticated alarm system controlling the amount of water to be pumped into each reservoir and service area. Conversely, all facilities may also be controlled remotely from YLWD's headquarters through the SCADA system. All SCADA transactions are logged into a database for future retrieval and analysis. This database was utilized in determining water demands during the fire storm event.

The magnitude of the impact for each area is best illustrated in the "% Increase" column of Table 7-2. This value represents the percentage increase of water demand for a particular area over and above the demand of the average from the previous two weeks. Figure 7-2, provides a graphical representation of these effects.

Table 7-2: Water Demands per Area (million gallons)

Area	Nov 1st & 2nd	Nov 8th & 9th	Nov 15th & 16th	% Increase
1 (Highland Reservoir)	4.6	4.7	5.2	12%
2 (Lakeview Reservoir)	10.7	10.5	12.1	15%
3 (Valley View & Fairmont Reservoir)	8.6	8.7	11.0	27%
4 (Bryant Ranch Reservoir)	3.0	3.1	4.8	57%
5 (Gardenia Reservoir)	1.7	1.6	2.3	39%
6 (Springview Reservoir)	3.6	4.2	5.9	51%
7 (Elk Mtn. Reservoir)	1.6	1.9	4.0	129%
8 (Little Canyon Reservoir)	2.0	2.0	4.2	110%
9 (Santiago Reservoir)	2.3	2.0	5.1	137%
10 (Quarter Horse Reservoir)	0.6	0.6	1.3	117%
11 (Chino Hills Reservoir)	0.7	0.7	1.8	157%
12 (Camino de Bryant Reservoir)	1.2	0.9	3.3	214%
Totals	**40.6 mg**	**40.9 mg**	**61.0 mg**	**50%**

Another key factor when evaluating system and pressure demands is peaking. Peaking is the maximum amount of water produced within a particular reservoir service area over a specified length of time. The top three reservoir service areas that displayed significant increase over normal are illustrated in Figure 7-2, identified as Areas 8, 9 and 12. The peaking data of these zones was further analyzed to determine the magnitude of demands placed on these particular areas:

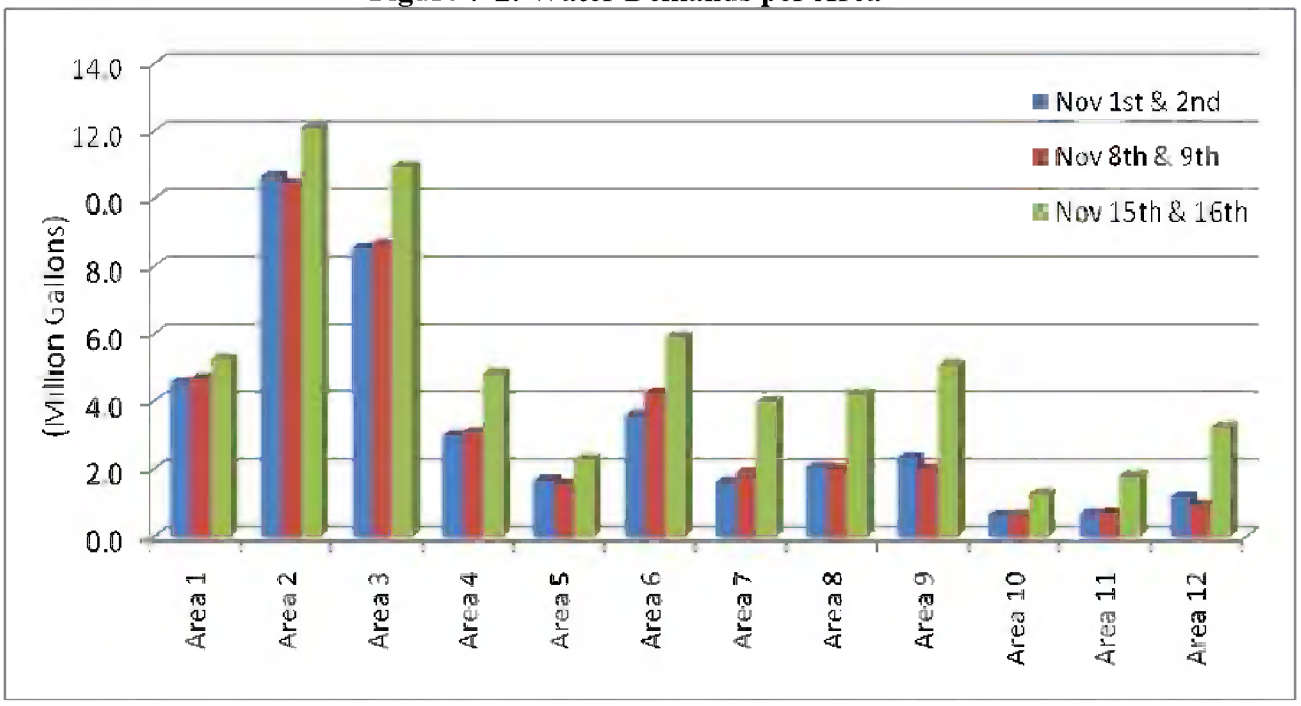
- **Area 8 (Little Canyon Reservoir)** - YLWD records indicate that peaking occurred between 4:30 p.m. and 8:30 p.m., November 15, with a total production of 686,820 gallons. The week prior, total production for this area between 4:30 p.m. and 8:30 p.m. was 108,978 gallons. The result is a peaking factor of 630% of typical demand.

- **Area 9 (Santiago Reservoir)** – While communications were severed with the Santiago Reservoir at 1:19 p.m., November 15, as discussed further in this report, YLWD personnel were able to confirm operation of the Hidden Hills BPS, which pumps to the Santiago Reservoir. All pumps within this pump station were in full operation during the fire storm event. Calculations therefore indicate that peaking occurred between 1:30 p.m. and 7:00 p.m., November 15, with a total production of 1,568,808 gallons. The week

prior, total production for this area between 1:30 p.m. and 7:00 p.m. was 261,294 gallons. The result is a peaking factor of 600% of typical demand.

- **Area 12 (Camino de Bryant Reservoir)** - SCADA records indicate that peaking occurred between 11:50 a.m. and 1:50 p.m., November 15, with a total production of 533,715 gallons. The week prior, total production for this area between 11:50 a.m. and 1:50 p.m. was 56,655 gallons. The result is a peaking factor of 940% of typical demand.

Figure 7-2: Water Demands per Area



The peaking demands described within these areas can be further correlated with Exhibit "B", which illustrates the number of fire crew dispatches/calls occurring between the hours of 10:20 a.m., November 15, 2008 and 4:00 a.m., November 16, 2008. These dispatched calls were derived by documents provided by OCFA. Table 7-3 provides the quantity of fire crew dispatches per area.

Table 7-3: Dispatches by Area

Location Areas	No. of Dispatches/Calls
Area 3 (Fairmont & Valley View)	4
Area 4 (Bryant Ranch)	16
Area 6 (Springview)	26
Area 7 (Elk Mountain)	8
Area 8 (Little Canyon)	23
Area 9 (Santiago)	22
Area 11 (Chino Hills)	9
Area 12 (Camino de Bryant)	9

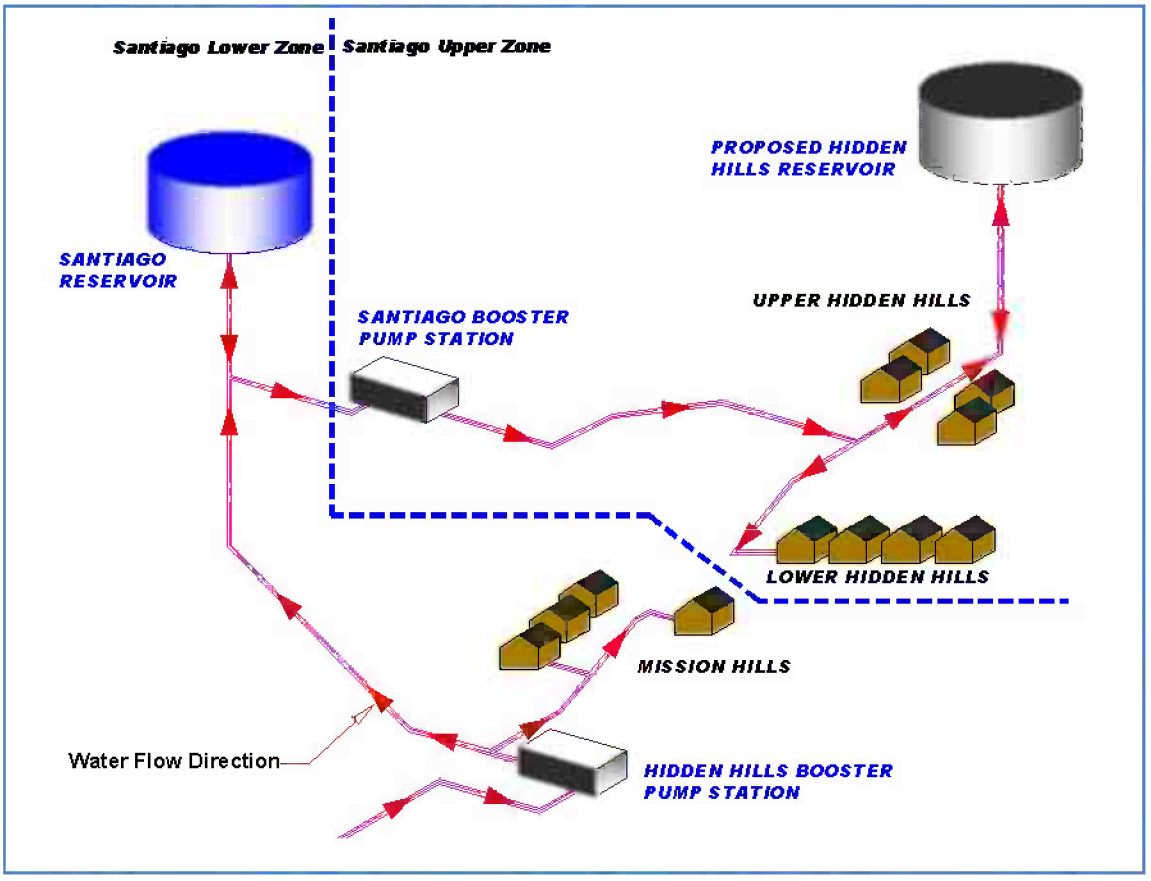
The number of fire hydrants used simultaneously during the fire storm, within each area, cannot be confirmed. Exhibit "B" is intended to illustrate the potential magnitude of the fire services required during the event. Each dispatch/call within Exhibit "B" reflects the areas most impacted by the fire storm as it continued to travel in a westerly direction. This is further evident as the dispatches/calls are at times clustered in certain areas.

Chapter 8 - Hidden Hills Area

The Hidden Hills area consists of approximately 240 homes and of those, approximately 180 homes are within Area 9 (Santiago Reservoir). This particular area can be further defined with two distinct pressure zones, which shall be referred to as Santiago Lower Zone and Santiago Upper Zone as illustrated in Exhibit "C".

Water pressure within the Santiago Lower Zone is maintained in combination by the Santiago Reservoir, with a capacity of 1.1 million gallons, through a conventional gravity-fed system and secondly through a series of four electric pumps at the Hidden Hills BPS. This pump station is capable of producing 1,900 gallons per minute fed from YLWD's connection with Metropolitan Water District and YLWD's Area 6 (Springview Reservoir). On the day of the fire, the Santiago Reservoir was approximately 80 percent full (See Table 7-1). Figure 8-1 provides a schematic diagram of the Hidden Hills area.

Figure 8-1: Hidden Hills Schematic Diagram



The Santiago Upper Zone's water pressure is provided by the Santiago BPS consisting of three electric pumps, capable of producing 900 gallons per minute, and one gas engine pump, with a capacity of 1,200 gallons per minute for a combined capacity of 2,100 gallons per minute. The Santiago BPS is located adjacent to the Santiago Reservoir. This particular upper zone area is a closed zone and water pressure is maintained by the pumps, specifically one with a Variable Frequency Drive (VFD), which continuously adjusts its flow to meet actual demands at any given time. On a typical day, e.g. prior to the fire storm, the maximum peak demand required in the Santiago Upper Zone is less than 500 gallons per minute.

Pumping water into this closed zone results in an elevation climb of approximately 300 feet from the base of the Santiago BPS to the north-east corner of this particular zone, which is illustrated in Exhibit "D". The Santiago BPS is located at an elevation of 1,000 feet, and is required to provide water pressure and flow to the highest home at approximately 1,310 feet in elevation.

At 1:19 p.m., November 15, the fire storm reached the Santiago Reservoir, where SCADA communications to the reservoir, the Santiago BPS, and the Hidden Hills BPS were lost. Cable damage from the fire created an electrical short, damage to a SCADA component known as a PLC and subsequently a power outage of SCADA equipment housed in the Santiago BPS. No pump damage occurred due to the fire.

The damaged SCADA PLC at the Santiago BPS forced a shut-down of all electric pumps providing water pressure to the Santiago Upper Zone. However, the gas engine has a mechanical pressure sensor, independent of the SCADA control system and may have continued to operate.

Immediately following the loss of communications, YLWD personnel were dispatched at 1:30 p.m. to both the Hidden Hills BPS and the Santiago BPS. Upon arrival at the Hidden Hills BPS, YLWD personnel confirmed all pumps were running and providing water to the Santiago Lower Zone and the Santiago Reservoir. YLWD personnel were not able to reach the Santiago BPS due to the life threatening conditions of the fire storm.

At 3:20 p.m. at the YLWD EOC, staff first heard unconfirmed reports of water loss in the Hidden Hills area through the television media. With the assistance of a police escort, YLWD personnel arrived at the Hidden Hills BPS at 4:00 p.m. and once again confirmed all pumps were in operation. YLWD personnel were finally able to reach the Santiago BPS at 4:15 p.m., and reported all pumps were shut down, including the gas engine pump, which had shut down between 1:19 p.m. and 4:15 p.m. due to overheating as indicated by a sensor on the engine. The exact time the gas engine shut down is unknown due to the loss of SCADA communications and it is not known how much water the gas engine pump was able to supply to the Santiago Upper Zone before it ceased operating. YLWD personnel started two electric and the gas engine pumps manually. The third electric pump, with the VFD, was not able to start due to the power loss of SCADA equipment at the time.

Following the manual startup of the pumps at the Santiago BPS, shortly after 4:15 p.m., YLWD personnel proceeded upwardly within the Santiago Upper Zone to bleed fire hydrants of entrapped air. Water pressure was noted on four fire hydrants located on Greencrest, leading over to Hidden Hills Road. At the top of Hidden Hills Road, water pressure was not yet present. It was also reported that multiple fire engines were located at Mission Hills and Skyline extracting water from fire hydrants.

At 6:20 p.m., YLWD personnel arrived at the Santiago BPS to investigate and restore communications. It was reported that air was present in the pump station, an indicator that the Santiago Reservoir was empty, although the Hidden Hills BPS continued to operate. As a protective measure to avoid damage to the pumps, YLWD decided to shut down all pumps at the Santiago BPS until such time water was restored in the Santiago Reservoir. YLWD proceeded to shift its focus and efforts westerly as water demands began to increase within Area 6 (Springview Reservoir) and Area 8 (Little Canyon Reservoir). The Santiago reservoir was drained completely some time between 4:15 and 6:20 p.m.

At 11:00 p.m., YLWD personnel once again traveled to the Santiago Reservoir and reported the reservoir remained empty. The water demands within the Santiago Lower Zone prevented the Santiago Reservoir from filling during the late hours of November 15. During this time, the demands placed on the Santiago Reservoir and the Hidden Hills BPS were a combination of fire fighting activities at the Santiago Lower Zone and Area 8 (Little Canyon Reservoir), as the cross feeder valve remained in the opened position until 12:45 a.m., November 16. The following day at 8:00 a.m., November 16, YLWD personnel arrived at the Santiago Reservoir and reported a level of eight feet of water, or approximately 376,000 gallons. All pumps were subsequently turned on and the Santiago Upper Zone was restored to normal water pressure shortly thereafter.

During the fire storm event, YLWD did not receive any reports of water loss within the Santiago Lower Zone. Water demands within this zone were met by both the Hidden Hills BPS and the water flowing from Area 8 (Little Canyon Reservoir) through the cross feeder valve.

Chapter 9 - Issuance of Boil Water Advisory

At 5:10 p.m., November 15, YLWD officials issued a Boil Water Advisory (Exhibit "E") for residents in the Hidden Hills area due to the loss of water pressure, for both the Santiago Upper and Lower Zones. Although no reports of water outages had been reported in the Santiago Lower Zone, this area was included as a precautionary measure. The media was contacted and asked to broadcast the Boil Water Advisory. The notice was also posted on YLWD's web site soon thereafter.

A Boil Water Advisory is a public statement advising customers to boil tap water before consuming it. Advisories are issued when an event has occurred, such as the loss of water pressure, allowing the possibility for the water distribution system to become contaminated. An advisory does not mean that the water is contaminated, but rather that the possibility exists.

As no other water outages were reported throughout other parts of YLWD's water distribution system, the issuance of additional Boil Water Advisories was not necessary. This was confirmed through routine water quality sampling taken throughout YLWD's distribution system the following week.

Following the issuance of the Boil Water Advisory in the Hidden Hills area, YLWD conducted multiple water bacteriological tests throughout the affected area as required by state law. Lifting of the Boil Water Advisory can only be approved by the State Department of Public Health with bacteria free results confirmed by a State certified third-party laboratory. YLWD collected water samples at 15 different locations on two separate occasions and were submitted to the laboratory for testing. Results are obtained following an incubation period of 48 hours, which is the required time for the sample to exhibit any possible contamination.

During the Boil Water Advisory period, as YLWD waited for the laboratory results, YLWD delivered bottled water to the residents affected by the Advisory. Bottled water was purchased and additionally donated by a bottled water supplier. Additional reserves of bottled water not needed during the Boil Water Advisory have been donated to local food banks and other non-profit organizations.

On November 20, 2008, the State Department of Public Health granted authorization to lift the Boil Water Advisory. Residents were notified by a reverse 911 system that contacts residents by telephone. Contact with 13,400 residential accounts reaching a population estimated at 42,900 (13,400 accts x 3.2 people/acct) was confirmed, Exhibit "F".

Chapter 10 - Fire Hydrant Preventative Maintenance & Servicing Program

YLWD has more than 3,850 fire hydrants located in both residential and commercial areas throughout its service boundaries. The district's preventative maintenance program requires that all fire hydrants be serviced on a yearly basis. This servicing encompasses flushing, testing water pressure, cleaning, and lubricating the hydrant threads. YLWD's Operations Department maintains records of these procedures and the maintenance performed on each hydrant.

During the fire storm event, it was reported that a number of fire hydrants were inoperable at the time, primarily in the Hidden Hills area. On November 16, 2008, YLWD personnel drove to the Hidden Hills area and observed that three fire hydrants were in a 'bagged' or 'taped' condition. These hydrants were placed into this condition by individuals other than YLWD crews. Two of the hydrants were located at 22476 Mission Hills Road and 22255 Mission Hills Road, and the third was located at 3510 Fairmont Avenue. The three hydrants were in need of repairs, which were completed the following day on November 17, 2008.

A fourth fire hydrant located at Juniper and Smoketree was also 'bagged' during the fire storm event by individuals other than YLWD personnel. Upon arrival on November 17, 2008, YLWD crews confirmed full operation of this particular hydrant and it was placed into operation immediately.

YLWD maintenance records confirm that the two fire hydrants on Mission Hills Road were serviced on January 22, 2008, and the fire hydrant at 3520 Fairmont Avenue was serviced on February 5, 2008. At that time, all three fire hydrants were completely operational.

All three fire hydrants are of a type known as "dry barrel". The advantage that this type of hydrant provides is that they restrict water loss and prevent a water geyser effect in the event the hydrant is severed from its base, as would occur if a vehicle strikes the hydrant. The design of these hydrants incorporate a type of coupling that can be damaged if inexperienced users attempt to open or close the hydrant incorrectly. Although only YLWD personnel and fire crews have

authorized access to hydrants, it is possible that unauthorized and inexperienced persons may have used and damaged the YLWD fire hydrants without YLWD's knowledge and not reported the damage to YLWD. It is also possible that the hydrants were damaged during the fire storm event.

Chapter 11 - Mutual Aid

During the fire storm event, YLWD submitted requests, through WEROC, for mutual aid on November 15, 2008. These requests, common practice in emergency situations of this magnitude, were for water pumps to augment certain areas of the water distribution system where demands began to compromise existing system capabilities. Figure 11-1 shows the locations of mutual aid, provided by the following:

1. **Laguna Beach County Water District** – At 3:00 p.m., YLWD officials requested a large capacity pump (2,000 gallons per minute) which arrived at 6:22 p.m. and was dispatched to Pepper and Mazanita to augment water supplies from Area 6 (Springview Reservoir) to Area 8 (Little Canyon Reservoir).

2. **Santa Margarita Water District** – At 4:45 p.m., YLWD officials requested a large capacity pump (2,000 gallons per minute) which arrived at 7:00 p.m. and was dispatched to Umbria and Trentino to augment water supplies from Area 10 (Quarter Horse Reservoir) to Area 8 (Little Canyon Reservoir).

3. **Orange County Fire Authority** – At approximately 5:30 p.m., YLWD officials requested a fire pumper truck from the Operation Area of WEROC which arrived at 6:10 p.m. and was dispatched to Mazanita and Smoketree to augment water supplies from Area 6 (Springview Reservoir) to Area 8 (Little Canyon Reservoir).

4. **City of Garden Grove Fire Department** – A secondary fire pumper truck arrived at 6:50 p.m. and was dispatched to Fairmont Pump Station to augment water supplies from Area 6 (Springview Reservoir) to Area 8 (Little Canyon Reservoir).

Figure 11-1: Mutual Aid Locations

Chapter 12 - Capital Improvement Program/Hidden Hills Reservoir Project

YLWD has a five year capital improvement program for fiscal years 2007-12 totaling $70.8 million. The following is a summary list of the projects and the current status for each:

Project Name	Cost Estimate
	$
Projects Completed:	
Lakeview Booster Pump Station (5000 GPM)	$4,500,000
Meter Replacement Program, Phase 1	$2,804,000
2005 C.I. Replace (Ohio/Buena Vista/Grandview)	$2,600,000
Zone 4 Transmission S&S, R 5 (36 inch)	$1,700,000

Project Name (con't)	Cost Estimate
Well No. 19 Long Term Storage Program	$1,200,000
Zone 3 Transmission S&S, R 5 (18 inch)	$1,000,000
Miraloma Storm Drain Pipeline	$525,000
Edison Power Pole Relocations	$250,000
Richfield Road Widening	$350,000
Miraloma Through Street Improvements	$250,000
S&S TTM 16209 Downstream Improvements (Rio del Oro)	$93,000
YLWD/S&S Kellogg Sewer Improvements	$1,500,000
Grandview Sewer	$260,000
New Administration Building	$7,700,000
Sub-total	**$24,732,000**
Projects in Construction Phase:	
Lakeview Reservoir (8MG) (90% complete and in service)	$11,500,000
Highland Reservoir Replacement (6MG) (30% complete)	$11,200,000
Zone 4C Reconfiguration	$2,070,000
Water Meter Replacement Project, Phase 2 (50% complete)	$1,000,000
GIS Implementation Project (95% complete)	$700,000
Radio Read Water Meter Conversion Project, Phase 1 (50%)	$160,000
Sub-total	**$26,630,000**
Projects in Design Phase:	
Fairmont Booster Pump Station Site Improvements	$300,000
OC-51 Upgrade	$242,000
Hidden Hills Reservoir (2MG) and Santiago Booster Upgrades	$9,000,000
Wells No. 20 & 21	$2,000,000
Lakeview Sewer Lift station Upgrades	$200,000
Groundwater Capacity Restoration	$1,000,000
Sub-total	**$12,742,000**
Projects not yet Started:	
Anaheim Intertie Connection Improvements	$500,000

Project Name (con't)	Cost Estimate
Highland BPS Replacement Project	$4,000,000
Zone 5 (1000) Booster Station	$1,080,000
Fairmont Booster Pump station Reconfiguration	$400,000
Foxtail Drive Pipeline	$245,000
Elk Mountain Res. Site Improvements	$300,000
Fire Flow Improvement (Via Sereno & Ohio)	$125,000
Sub Total	**$6,650,000**
Total Projects	**$70,754,000**

Among the top priority projects for the Five-Year Capital Improvement Plan is the Hidden Hills Reservoir Project. YLWD is now in the final permitting process for the project, which will supplement the existing water supply and provide reserve capacity to both the Santiago Lower and Upper Zones. The proposed project consists of a new two-million gallon capacity Hidden Hills Reservoir and improvements to the existing Santiago BPS at an estimated construction cost of $9 million dollars.

In 2000, Shapell Industries purchased nearly 1,300 acres in Improvement District No. 2, planning for further development. However, until developer design plans are finalized, the District is unable to determine either the size or the location of any necessary infrastructure, e.g. the reservoir.

YLWD's 2005 Master Plan identified fire flow requirements for the Hidden Hills area, specifically the Santiago Upper Zone based on the decision to serve the current population in that area, rather than waiting for the finalized housing tract plans for future development.

In 2006, Shapell Industries dedicated nearly 1,280 acres of its original planned development to the Chino Hills State Park. This allowed the District to confirm that the Hidden Hills Reservoir, initially designed to serve the entire track of homes with a capacity of 4 million gallons could now serve the existing area of Hidden Hills Estates, at half the size.

The re-design of the project is now essentially complete, and it is anticipated that the construction bidding process could take place in March 2009, with award of the contract in May 2009. Construction could be complete by September 2010.

However, in order to proceed with the bidding process and meet this proposed schedule, YLWD must secure two permits, one from a local private developer known as Shapell Industries, and a second from the State of California Department of Parks and Recreation. YLWD Staff is completing negotiations with staff of Shapell Industries and anticipates receipt of the required document by February 2009.

Concerning the second permit, YLWD Staff met on September 10, 2008 with staff of the State of California to discuss permit issues. The State requested additional design details concerning the access road and requested an updated biological survey of the proposed construction area. On October 31, YLWD submitted the new design drawings and the updated biological survey to the State. At a meeting on December 5, the State indicated that approval of the permit was contingent upon review and input by the State of California Department of Fish & Game and the U.S. Fish & Wildlife Service to ensure environmental compliance. By December 15, YLWD Staff had separate discussions with each of these two agencies and has provided follow-up information for their review. Additional discussions are planned with these state and federal agencies throughout January 2009.

Chapter 13 - Public Outreach and Communication

Following the fire storm event, YLWD focused on providing information to the public concerning the water system, the status of the Boil Water Advisory, and other news and information that was deemed pertinent. The primary means of communication was YLWD's web site. As information became available, the web site was updated on a timely basis as it provided the best means of communication under the circumstances. Additionally, YLWD utilized its electronic sign which was posted at the entrance of the Hidden Hills area to notify residents of the Boil Water Advisory and the subsequent lifting of the advisory.

As previously discussed, a reverse 911 system was also utilized to notify residents regarding the lifting of the Boil Water Advisory. Contact with 13,400 residents was confirmed from the reverse 911 system (Exhibit "F").

To date, the web site continues to be updated with the latest fire information which can be found at www.ylwd.com.

Chapter 14 - Damages & Cost Reimbursement

Physical damage to YLWD facilities from the fire storm event includes the following:

- (2) Air vac devices
- (3) Fire hydrants
- SCADA equipment at the Santiago Reservoir site
- Replaced damaged conduit
- Re-painting of the Quarter Horse Reservoir site fencing

YLWD officials are currently finalizing documents for submission to the Federal Emergency Management Agency (FEMA) for reimbursement for these losses. Additionally, other costs for which YLWD officials will be seeking FEMA reimbursement include the following:

- Incident Response $ 100,000
  - YLWD labor
  - General provisions for the EOC activation

- Water quality notification and support $ 60,000
  - Bottled water distribution
  - Communications expenditures
  - Reverse 911 notification

- Sand and erosion control for the following sites: $ 25,000
  - Gardenia Reservoir
  - Quarter Horse Reservoir
  - Little Canyon Reservoir
  - Chino Hills Reservoir
  - Copper Canyon Drive/Bryant Cross Feeder 16" and 24" pipeline
  - Santiago Reservoir and Santiago BPS

- Slope stabilization for the following sites: $ 23,000
  - Gardenia Reservoir
  - Quarter Horse Reservoir
  - Little Canyon Reservoir
  - Santiago Reservoir

As of the date of this Report, YLWD will be seeking a total of $236,000 from FEMA.

Chapter 15 – Conclusions

Based on objective measurements, the water system functioned well, given the demands placed on it. During the peak of the fire, when water was being drained from the system in extraordinary volumes, service was interrupted in a limited area of upper Hidden Hills. It should be noted that water supply problems are not uncommon in catastrophic fires such as the Freeway Complex fire. It also is important to note that the vast majority of homes that were damaged or destroyed were in areas where water pressure and water flows were available during the firefighting activities. (Attached are Exhibits "G", "G-1", G-2", and "G-3", which illustrates homes that were damaged or destroyed during the fire storm event within the boundaries of YLWD.)

Furthermore, though construction of the proposed Hidden Hills Reservoir will supplement water supplies in the Hidden Hills Upper Zone, the effects of the additional supply in that particular zone if the reservoir had been in operation, are difficult to assess with any certainty. There is no way to guarantee that the magnitude of a natural disaster such as the Freeway Complex Fire will not overwhelm even the most robust water system.

It has been the policy and practice of YLWD to continually upgrade and expand the water system in an effort to provide the best possible service to its customers. Consistent with that and with the findings of this assessment, YLWD is proceeding with the Hidden Hills Reservoir project, as well as the other above mentioned projects to maximize the capacity and efficiency of the water system.

Upon release of the OCFA final report, YLWD may amend this report or develop an additional report that may update information based on OCFA facts and analysis.

Acronym Definitions

AWWA – American Water Works Association

BPS – Booster Pump Station

EOC – Emergency Operations Center

OCFA – Orange County Fire Authority

PLC – Programmable Logical Control

PSI – Pounds per Square Inch

SCADA – Supervisory Control and Data Acquisition

WEROC – Water Emergency Response of Orange County

YLWD – Yorba Linda Water District

Exhibit "A" – Reservoir Zones Area Map (Attached)

Exhibit "B" – Dispatched Calls Area Map (Attached)

Exhibit "C" – Hidden Hills Water Pressure Areas

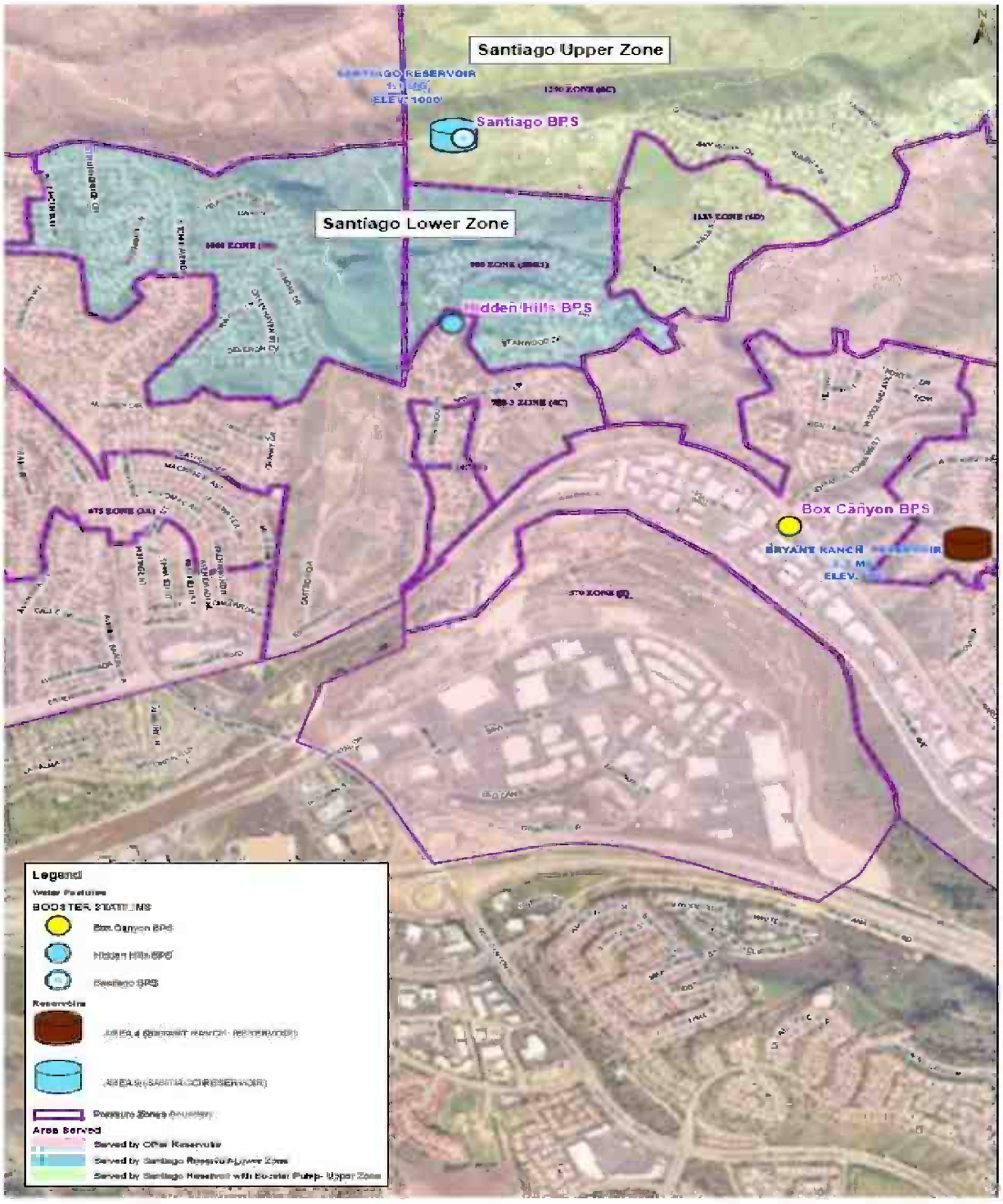


Exhibit "D" – Hidden Hills Contour Elevation Map

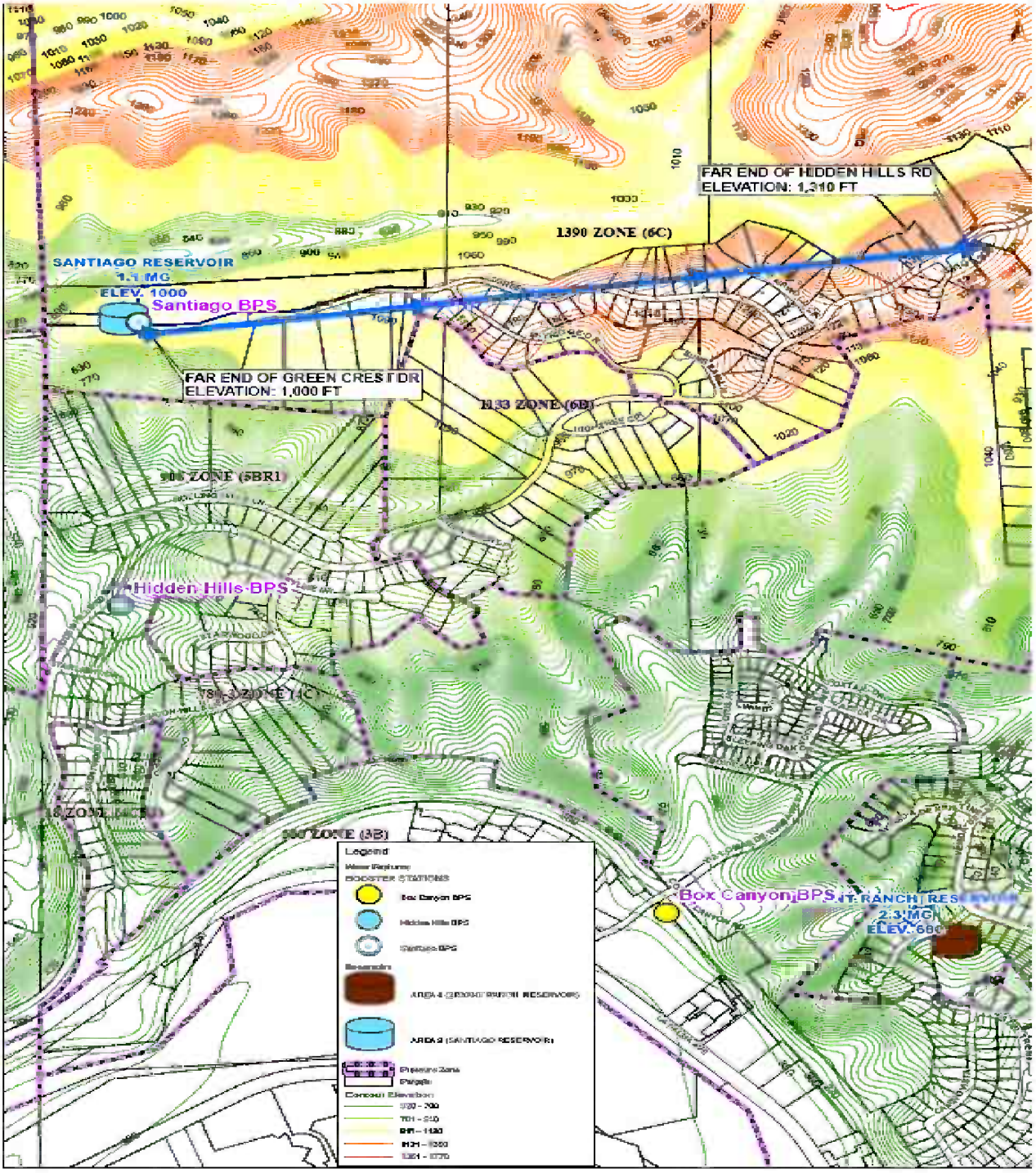


Exhibit "E" – Boil Water Advisory

For Immediate Release (addendum to the earlier press release)
November 15, 2008

WATER QUALITY ADVISORY

Due to the continuous drop in water pressure as a result of the fire-fighting efforts to extinguish the fire, the Yorba Linda Water District has issued a boil order of tap water to the residents located at:

Hidden Hills Estates ---ONLY,
in Yorba Linda, specifically the following streets:

• **Hidden Hills Road**	• **Green Mount Place**
• **Hidden Glen Lane**	• **Rolling Hills Drive**
• **Fairwood Circle**	• **Skyline Drive**
• **Greencrest Drive**	• **Starwood Place**
• **Sun Beam Lane**	• **Starlight Drive**
• **Sky Ridge**	• **Westwood lane**
• **High Tree Circle**	• **Brentwood**
• **Crescent Drive**	
• **Mission Hills**	

Methods of Disinfection
Chlorination: Add 1/8 teaspoon (~0.75 mL) of unscented household chlorine bleach to one gallon of clear water and mix. If the water is cloudy, add 1/4 teaspoon (~1.50mL) and mix. Chlorine bleaches are inexpensive and can be secured from most grocery, discount, or drug stores. However, check the label to ensure that the active ingredient, sodium hypochlorite, is 5.25 percent .

Wait thirty (30) minutes after adding chlorine before using the water for drinking or cooking purposes.

Boiling: The water used for drinking and cooking may also be purified by boiling. In this method, bring the water to a full boil for at least one (1) minute (at altitudes above one mile, boil for three minutes). Cool and aerate the boiled water by pouring it through the air from one clean container to another, or mixing rapidly with a clean utensil. Aeration will reduce the flat taste caused by boiling.

Water purification tablets may also be used by following
the manufacturer's instructions.

NOTE: Water filtering or treatment units may not remove all of the contaminants that the advisory or notice is targeting.

Failure to follow this advisory could result in stomach or intestinal illness.

The Yorba Linda Water District will notify residents as soon as can be determined that
the water is safe to drink.

For more information call YLWD at 714 701-3000 or 714 701-3100

California Department of Health Services: 714 558-4997 or 714 547-0430

Exhibit "F" – Reverse 911 Message

"Hello, this is Michael Payne, General Manager of the Yorba Linda Water District with a water quality and safety alert. The Yorba Linda Water District in conjunction with the California Department of Public Health has determined all Yorba Linda Water District water is safe to drink right out of the tap. As a safety precaution residents in a small portion of the Yorba Linda Water District service area Hidden Hills had been notified to boil tap water for drinking or cooking purposes. That order went into effect November 15 but has now been lifted. Again, all Yorba Linda Water District water is safe to drink right out of the tap. I also caution residents not to operate or tamper with fire hydrants. The District inspects and tests all fire hydrants annually. Improper operation can cause severe injury or death. It can also damage the water system. Thank you for allowing us to serve your community."

PROBOLSKY RESEARCH

STRATEGIC MEMORANDUM

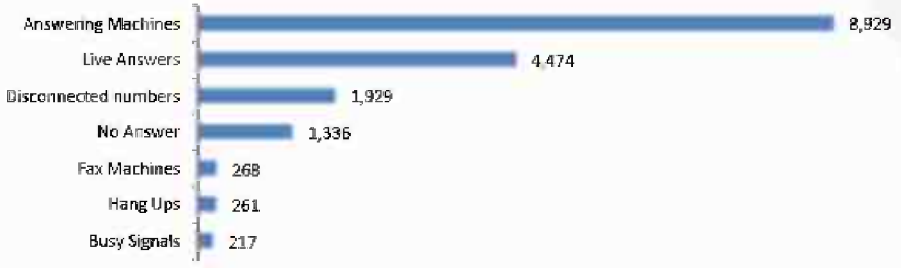
TO: Michael A. Payne
Yorba Linda Water District

FROM: Adam D. Probolsky
Probolsky Research LLC

SUBJECT: Water Alert Message Broadcast Calls

DATE: November 20, 2008

On Thursday November 20, 2008 Probolsky Research delivered water alert message broadcast calls on behalf of the Yorba Linda Water District (YLWD) to District customers. Out of 17,414 phone numbers that were dialed, 13,404 received the message either via answering machine or a live person answering the phone (representing a 77% message completion rate). The following graph illustrates a detailed distribution of activity:



STRATEGIC MEMORANDUM

Exhibit "G" – Area of Significant Structure Damages (Overall Map) (Attached)

Exhibit "G-1" – Area of Significant Structure Damages (West) (Attached)

Exhibit "G-2" – Area of Significant Structure Damages (Central) (Attached)

Exhibit "G-3" – Area of Significant Structure Damages (East) (Attached)

Orange County Fire Authority

After Action Report
Freeway Complex Fire

November 15, 2008

A Report to the
Orange County Fire Authority
Board of Directors

FREEWAY COMPLEX FIRE

AFTER ACTION REPORT

November 15, 2008

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Foreword

On November 15, 2008, our communities were impacted by what ultimately became one of the largest wildland fires ever to strike Orange County. The Freeway Fire, which started in the City of Corona on the border of Riverside and Orange Counties, was driven by fierce Santa Ana winds. It spread quickly on a massive fire front, causing widespread damage in the cities of Yorba Linda, Anaheim, and Corona, as well as to Chino Hills State Park. The fire merged with a second one-the Landfill Fire, that had started in the Carbon Canyon area. This caused further damage in the City of Brea and community of Olinda Village, ultimately threatening Chino Valley and driving into Los Angeles County, where it menaced the City of Diamond Bar. Miraculously, no lives were lost or major injuries occurred during this wildland/urban conflagration. However, 381 structures belonging to residents of all impacted jurisdictions were damaged or destroyed by these fires.

The Freeway Complex Fire tasked our fire and law enforcement personnel to extremes. They courageously fought to protect lives and as many homes as possible that were lying in the path of this fast moving firestorm. Ultimately, thousands of homes were saved. I am extremely proud of the heroic work of our fire and law enforcement personnel, the coordination among the many jurisdictions threatened by the fire, and the gallant efforts of hundreds of residents during and after this disaster.

Many of the homes saved were the result of fire-resistant construction features that had been put in place in recent years. The majority of the homes claimed by the fire were built prior to the newer wildland urban interface building requirements. In most cases, these homes succumbed to fires caused by the intrusion of embers driven by fierce winds. Like paper confetti thrown into a fan, these embers rained down on our communities well ahead of the fire.

This was not the first time a fast moving wildfire burned through these communities. In 1980, driven by Santa Ana winds, the Owl Fire (October 28, 1980) and the Carbon Fire (November 16, 1980) burned in the same areas. The difference 28 years later, with regard to structures taken by the fire, is the number of homes now located within this historic fire corridor.

As with any disaster, the lessons learned from this event will help better prepare our communities for the future as we collectively confront the all-too-frequent occurrence of these destructive "mega-fires." The Orange County Fire Authority's and my own renewed commitment is to (1) find additional measures we can implement to better protect our communities from these types of fires, (2) work continually toward enhancing our local capabilities to respond to major incidents of this type, and (3) find new ways for the residents in our communities to help.

Respectfully,

Chip Prather
Fire Chief

Executive Summary

In what has become a year-round occurrence for California firefighters, the 2008 fire season was one of the worst in the state's history—scorching roughly 1.4 million acres. It began in May when dry lightning storms in Northern California sparked over two thousand wildfires. In the fall of 2008, wildland fires threatened Southern California when the Santa Ana winds battered the region.

As the winds raised the temperature and lowered the humidity, the first of several significant wildland-urban interface fires began on October 12, 2008: the Marek Fire. Occurring in the Lakeview Terrace area of Los Angeles County, this fire consumed nearly 5,000 acres, destroyed 40 homes, and damaged 9 others. Then on October 13, the Sesnon Fire began in the Porter Ranch community of Los Angeles County. By the time it was contained, almost 15,000 acres had been scorched and 26 residences had been damaged or destroyed.

The fire siege continued in November as the Santa Ana winds returned. A moderate wind event had been forecasted for November 13–15 in the Southern California region. On the evening of November 13 at approximately 6:00 p.m., an unattended campfire sparked a blaze that was driven by 70 mph winds into the cities of Montecito and Santa Barbara. Known as the Tea Fire, it consumed nearly 2,000 acres and over 230 homes, as well as evacuating nearly 9,000 residents.

On November 14 at 10:29 p.m., only one day later, the fast-moving Sayre Fire broke out in Los Angeles County. Driven by 60 mph Santa Ana winds, it ripped through the northern San Fernando Valley burning all in its path. By the time the fire was controlled, 11,262 acres had been seared and more than 600 structures had been destroyed, including 480 mobile homes at the Oakridge Mobile Home Park. The *Los Angeles Times* called it "the worst loss of homes due to fire in the city of Los Angeles" and reported it "appeared to be the largest number of housing units lost to fire in the city of Los Angeles, surpassing the 484 residences destroyed in the 1961 Bel Air Fire."[1]

Due to extreme weather conditions and increased fire activity, the Orange County Fire Authority (OCFA) implemented an emergency staffing pattern on November 15. Additional resources—including one Type 3 strike team, a second helicopter, and increased personnel on engine companies located in the wildland interface areas—were put in place for the third day of strong Santa Ana winds.

On Saturday, November 15 at 9:01 a.m., the Corona Fire Department received the initial report of a vegetation fire at the westbound 91 Freeway and Green River: the Freeway Fire. Within minutes, the OCFA began receiving reports of the fire at its Emergency Command Center. Driven by hot Santa Ana winds in excess of 60 mph, combined with 8 percent humidity and long-range spotting of one mile or greater, this fire would cause the most catastrophic loss of homes in Orange County since the Laguna Fire in 1993.

The Freeway Fire marched quickly to the west and through the Green River Homes community, spotting far ahead of the main fire. From the onset, it was apparent this would become a rapidly

[1] Tami Abdollah and Howard Blume. November 16, 2008. *Schwarzenegger calls for review after Sylmar tragedy as blazes rage on*, Los Angeles Times. Accessed http://www.latimes.com/news/local/valley/la-me-firemain17-2008nov17,0,2305426.story on January 14, 2009.

spreading and significant conflagration. One hour after it was reported, erratic winds drove the fire in several directions, including north into the Chino Hills State Park, south across the 91 Freeway towards the City of Anaheim, and west into the hills of Yorba Linda. The fire then turned to the northwest, impacting the communities of Carbon Canyon and Diamond Bar.

At 10:43 a.m. on November 15, the OCFA Emergency Command Center received a report of a second fire: the Landfill Fire. This one was located in the area of the Olinda Alpha Landfill, near Valencia Avenue and Carbon Canyon. Fanned by the wind, it spread quickly toward the cities of Brea and Diamond Bar and the 57 Freeway. Borrowing resources from the Freeway Fire, the OCFA and the Brea Fire Department dispatched crews to fight the new threat. Around 5:30 p.m. on November 16, the decision was made to merge the Landfill Fire and the Freeway Fire into a Complex, due to their geographical proximity. By merging the two into the Freeway Complex Fire, it allowed for the sharing of incident management and logistical support and provided a single base of operations for continuity and efficiency.

The Freeway Complex Fire was contained on November 19, 2008, at 7:00 a.m. after consuming over 30,000 acres and impacting six cities in four counties. This was the largest fire in Orange County, since the Green River Fire in 1948. During the final stages of the fire, control lines were secured and aggressive restoration action and recovery efforts were initiated to protect burned areas from flooding and debris flows due to the winter rains.

The fire burned 30,305 acres and damaged or destroyed over 381 homes, commercial structures, and out-buildings. Numerous vehicles, city parks, and sensitive ecological areas in the Chino Hills State Park and the Santa Ana River riparian area were also damaged or destroyed. The impact to residents and businesses from smoke exposure or damage, as well as the economic impact, is difficult to calculate.

To date, the cost for fighting the Freeway Complex Fire is approximately $16.1 million. As a result of the Local Government Fiscal Responsibility Agreement made between OCFA, CAL FIRE, and FEMA/OES, the OCFA will be responsible for a percentage of the cost of fighting the fire on the first day. After reimbursement is received from federal and state resources, the OCFA cost share responsibility is approximately $33,000.

Thankfully, no deaths or serious injuries to residents or firefighters were attributed to the fire; however, 14 firefighters suffered minor injuries. At its height, the Freeway Complex Fire forced as many as 40,000 people from their homes across the four impacted counties: Orange, Los Angeles, Riverside, and San Bernardino.

A unified command and strong coordination between fire and law enforcement was the key to evacuating large numbers of residents and animals in the path of this rapidly burning fire. The efforts of firefighters and citizens and the existing fire prevention measures—those requiring defensible space, non-combustible roofs, fuel modification zones, and ignition resistant construction—were the major factors in saving hundreds of homes.

Ultimately, over 3,800 personnel from more than 260 fire agencies—with over 650 fire engines—were assigned to the incident. The Brea Police Department, which was tasked with large-scale evacuations over a widespread area as well as traffic and crowd control, received assistance from various Southern California law enforcement agencies. Approximately 375 officers from 19 local

police agencies, along with deputies from the Orange County Sheriff's Department, Los Angeles County Sheriff's Department, Riverside County Sheriff's Department, and the Department of Homeland Security responded to the call. The incident was managed by a unified command structure, which included the OCFA, Los Angeles County Fire Department, CAL FIRE, Corona Fire Department, Brea Fire Department, Anaheim Fire Department, Chino Valley Fire District, and the Orange County Sheriff's Department.

While the Freeway Complex Fire presented the OCFA with several difficult challenges, other factors contributed to its complexity. These included several years of drought that increased available dead fuels and lowered live fuel moistures resulting in intense fire behavior and burning conditions. The two fires—the Freeway and the Landfill—started less than two hours apart and placed a great demand on emergency response resources. The topography and the east-west alignment of the Santa Ana Canyon—together with offshore winds—resulted in extremely rapid fire spread, long-range spotting due to flying embers, large-scale evacuations, and the difficult task of deploying resources to protect lives and property over a broad and unpredictable area.

A number of the conclusions in this After Action Report point to things that went well such as OCFA's advance planning and additional staffing for the extreme weather conditions throughout the region. Additionally, OCFA's ongoing fire prevention efforts contributed directly to saving thousands of homes, by providing firefighters with defensible space to protect threatened structures. Other conclusions illustrate areas that can be improved or should be reviewed for follow-up action with the appropriate agency or policy group.

The recommendations contained in this report are intended to help the OCFA better prepare for this type of disastrous wildland fire in the future and improve local capability and surge capacity where possible. Some of these recommendations will require further study, review, and cost analysis to determine the feasibility of implementation. Others are no cost items to implement, or require follow-up action with the appropriate agency or group.

Historical Information

The Santa Ana Canyon has an extensive wildland fire history. The canyon's geographical location plays a major role in directing wildland fire into Orange County. Since 1980, the Santa Ana Canyon area has experienced 25 separate wildland fires, burning a total of 82,734 acres with the events ranging from 1 to 19,986 acres. Until the recent Freeway Complex Fire, the most notable and devastating events have been the 1980 Carbon Canyon Fire (14,613 acres), the 1980 Owl Fire (18,332 acres), the 1982 Gypsum Fire (19,986 acres), and the 2006 Sierra Peak Fire (10,506 acres).

The Santa Ana Canyon's steep topography and east-west alignment serve as a wind funnel. The geography increases the wind's speed and magnifies the effects of fire on the available fuel bed, contributing to the rapid rate of fire spread. Additionally, the encroachment of civilization into the wildland-urban interface (WUI) enhances the severity of wildland fires during Santa Ana wind conditions. The frequency of fire in this area has allowed non-native vegetation of volatile grass, weeds, and shrubs to become the dominant fuel type.

One particular fire of interest is the 1980 Owl Fire—given that several parallels can be drawn between it and the Freeway Fire. The weather, fuel conditions, and point of origin of the two were jarringly similar. Both fires began as Southern California was experiencing Santa Ana wind conditions. The forecast for the Owl Fire was for continued strong, dry winds blowing 15 to 50 mph with gusts to 60 mph. At the start of the Freeway Fire, wind speeds were sustained at 43 mph with gusts of 61 mph and extremely low humidity. The Owl Fire began on October 28, 1980, at 1:47 a.m. near Highway 71 and Prado Dam in Riverside County. The Freeway Fire started in nearly the same area on the north side of the 91 Freeway at Green River. Both fires, fanned by strong Santa Ana winds and fed by dry fuels, quickly burned into Chino Hills and marched west into Orange County.

The Santa Ana Canyon's steep topography and east-west alignment serve as a wind funnel—increasing the wind's speed and contributing to the rate of fire spread.

Initial Response

The Owl Fire After Action Report states, "The first arriving fire unit on scene reported the fire at five acres in size moving out." The fire's radio traffic was being monitored then by what was known as the Orange County Fire Department's Emergency Command Center. "Although the fire was over two miles away from the Orange County line, all who heard the report on conditions knew the potential that existed: historically, Orange County seems to be the recipient of major wildland fires that start outside its boundaries." Immediately, plans were put into effect to place resources ahead of the Owl Fire's arrival into Yorba Linda.

Familiar with the area's fire history, OCFA Battalion Chief Reeder ordered two Type 1 engine strike teams to stage at Fire Station 53 in Yorba Linda in anticipation that the Freeway Fire would eventually reach the City. However, after hearing requests for resources in Corona, the two strike teams responded to the 91 Freeway and Green River. Prior to arriving on scene, Chief Reeder also ordered fire attack aircraft.

Fire Behavior

As the 1980 Owl Fire's progress was monitored, it became obvious "this was a major fire and that it was spotting as much as a half-mile ahead of itself" and "thick volumes of smoke obscured the actual location of the fire line, further hampering firefighting efforts." Reports from the fire crews on the fire line "showed that the fire was gaining momentum and consuming at least 1,000 acres per hour. At 3:30 a.m. there was little doubt that no amount of effort would stop this blaze before it reached the highly populated areas of Orange County: this fire was going to hit the extreme eastern edge of Yorba Linda very, very hard."

This same extreme fire behavior was observed during the 2008 Freeway Complex Fire. The strong winds kept the thick column of smoke from rising. Instead, it stayed close to the ground, making it extremely difficult to see the fire's perimeter and progression. OCFA Helicopter 41 reported seeing spot fires from one to one and a half miles ahead of the fire front. These same winds pushed the Freeway Complex Fire at an incredible rate of spread. **Historical Information – Map 1** shows over 10,000 acres were consumed in the first 12 hours—roughly 14 acres per minute. That's nearly the length of 14 football fields every 60 seconds.

> The Freeway Complex Fire consumed over 10,000 acres in the first 12 hours—roughly 14 acres per minute. That's nearly the length of 14 football fields every 60 seconds.

Divided Fronts

The Owl Fire divided into two distinct fire fronts primarily due to wind and topography. One burned in a northwesterly direction into "Aliso Canyon in a largely uninhabited area, and never became a major problem." The second and main fire front continued towards Orange County, pushed by 50 mph winds.

The Freeway Fire also traveled in two different directions. One front headed in the direction of Chino Hills State Park, the cities of Yorba Linda and Chino Hills, and the community of Sleepy Hollow in Carbon Canyon. The other followed the Santa Ana River, crossed the 91 Freeway, and moved into the City of Anaheim.

Staging Areas

To prepare for the fire front's arrival, resources dispatched to the Owl Fire were staged in eastern Yorba Linda. "As the fire ate its way towards Yorba Linda, strike teams began positioning themselves along streets in the interface area … all of this complicated by smoky conditions so severe that it caused smoke detectors in many homes to activate." The fire arrived battering the area at the east end of La Palma Avenue and Esperanza Road and along the east side of Dominguez Ranch Road at about 11:00 a.m. This was nearly nine hours after the start of the fire. In 1980, these roads formed the eastern border of Yorba Linda. "Firefighters, along with residents that had elected to remain behind to hose down their roofs, were hit with a blinding gale of choking smoke and showers of burning embers."

By comparison, during the Freeway Fire, resources were ordered to stage at Station 53 located within the eastern border of Yorba Linda in anticipation of the threat. At about 10:00 a.m., the fire

was burning near the river bottom along the Green River Golf Course. At 10:08 a.m., OCFA Helicopter 41 reported a large spot fire one mile ahead of the main fire front. Immediately, additional engine strike teams, aircraft, and helicopters were ordered to augment the resources protecting the city. Additional orders were given at 10:20 a.m. to notify the Brea Police Department to begin evacuations in the area of Brush Canyon. The OCFA Emergency Command Center also telephoned the Yorba Linda City Manager. A message was left notifying him that the fire was now heading toward his city and would arrive in 30 minutes. At 10:39 a.m.—31 minutes later, the fire was threatening the communities of Big Horn and Evening Breeze. This occurred approximately 90 minutes after the start of the fire and less than 30 minutes since the report of the spot fire. The first structure fire was reported at 10:58 a.m. on Merryweather Circle—about three miles from the point of origin.

Fire Containment

The Owl Fire was 100 percent contained on October 30, 1980, at 5:00 a.m. after burning 18,832 acres and destroying 3 homes. Over 136 engines and 790 firefighters, along with 4 helicopters, battled the fire for two days to bring it under control. The Owl Fire After Action Report credits the subsiding winds for the ability of firefighters to stop the progression of the fire. Refer to the **Owl Fire After Action Report** at http://www.ocfamedia.org/_uploads/PDF/ofaar.pdf for more details.

The Freeway Complex Fire was declared under control on November 19, 2008, at 7:00 a.m. after consuming 30,305 acres and destroying 187 homes. More than 650 engines and 3,800 firefighters, with 17 helicopters and 12 air tankers, succeeded in keeping the loss of homes from being much worse.

Although the number of acres consumed is very different for each fire, what is rather striking is the final "footprint" or fire perimeter of both fires. **Historical Information – Map 2**, both followed the geographical contours as they were driven by the strong winds through the Santa Ana Canyon, resulting in nearly identical burn perimeters.

More than 650 engines and 3,800 firefighters, with 17 helicopters and 12 air tankers were assigned to the Freeway Complex Fire.

Summary

Traditionally, the fire season in Southern California has been from May through September. Over the past 15 years, a trend has emerged where Orange County—and Southern California—has experienced some of its most devastating wildfires from October through April. In fact, two major fires in Orange County in the past six years have occurred in February: the 2006 Sierra Fire and the 2002 Green Fire. Another occurred in March: the 2007 Windy Ridge Fire. Most recently, the Santiago Fire occurred in October 2007.

In the two-month period of October and November 2008, Southern California experienced several significant wind events sparking multiple wildfires. Five of these became major incidents resulting in thousands of acres burned, numerous homes destroyed, and countless people displaced. These fires shared several common denominators, including (1) Santa Ana winds; (2) competition for resources due to multiple, simultaneous fire activity throughout Southern California; and (3)

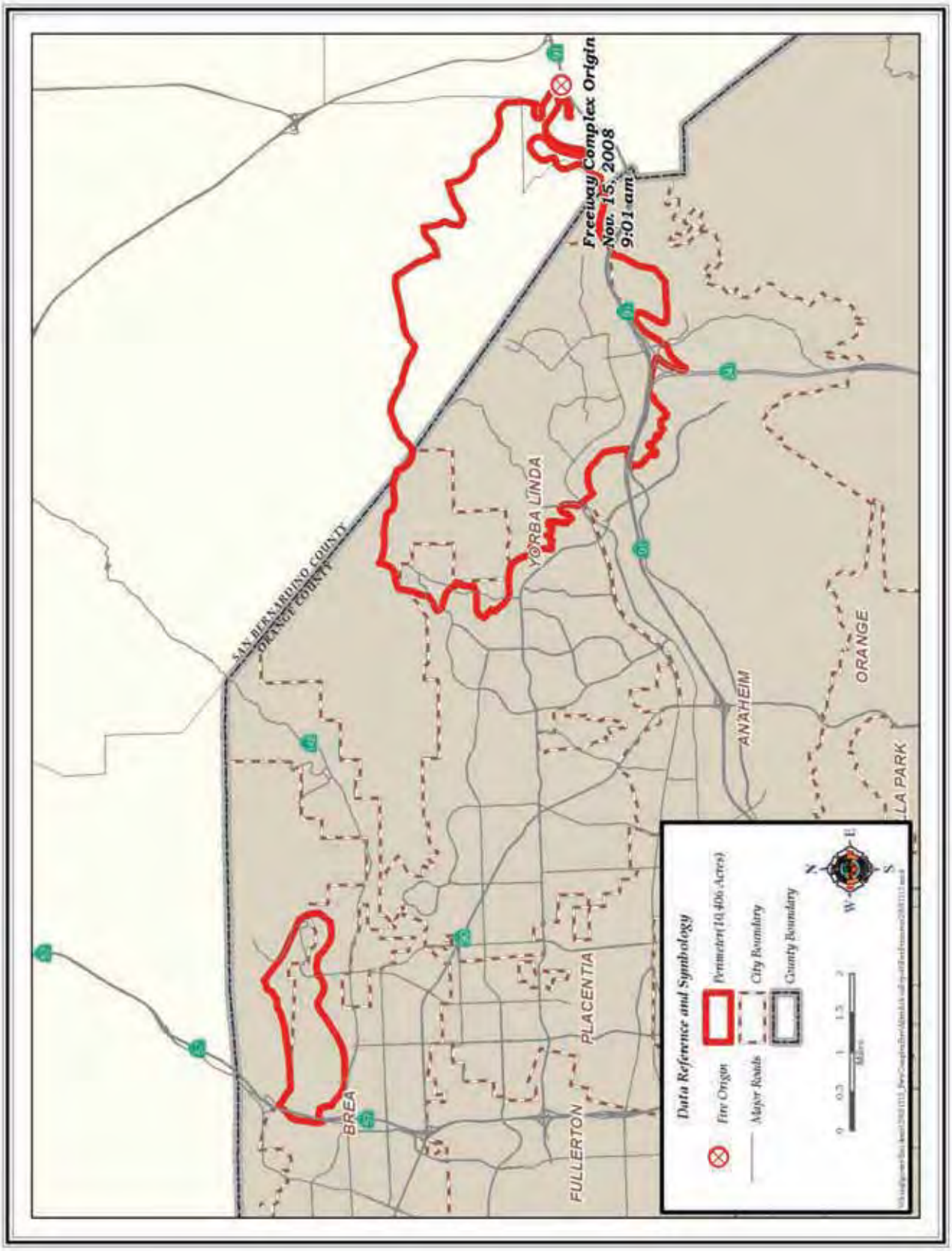
wildland fire occurrence late or outside the traditional fire season.

Over the past 60 years, Orange County has experienced a number of major wildland fire disasters. Table 1: Sixty-Year Major Fire History—Orange County, lists selected Orange County wildland fires that covered large geographic areas, burned out of control for an extended period of time, and/or resulted in extraordinary property loss—homes, businesses, and valuable watershed. The Freeway Complex Fire was the largest wildland fire in terms of acreage—over 30,305 acres—the OCFA has faced in the past 40 years. The fire was one of the most challenging and complex due to the rapid rate of spread, wildland-urban interface (WUI) encroachment, vast evacuations, and sustained Santa Ana winds.

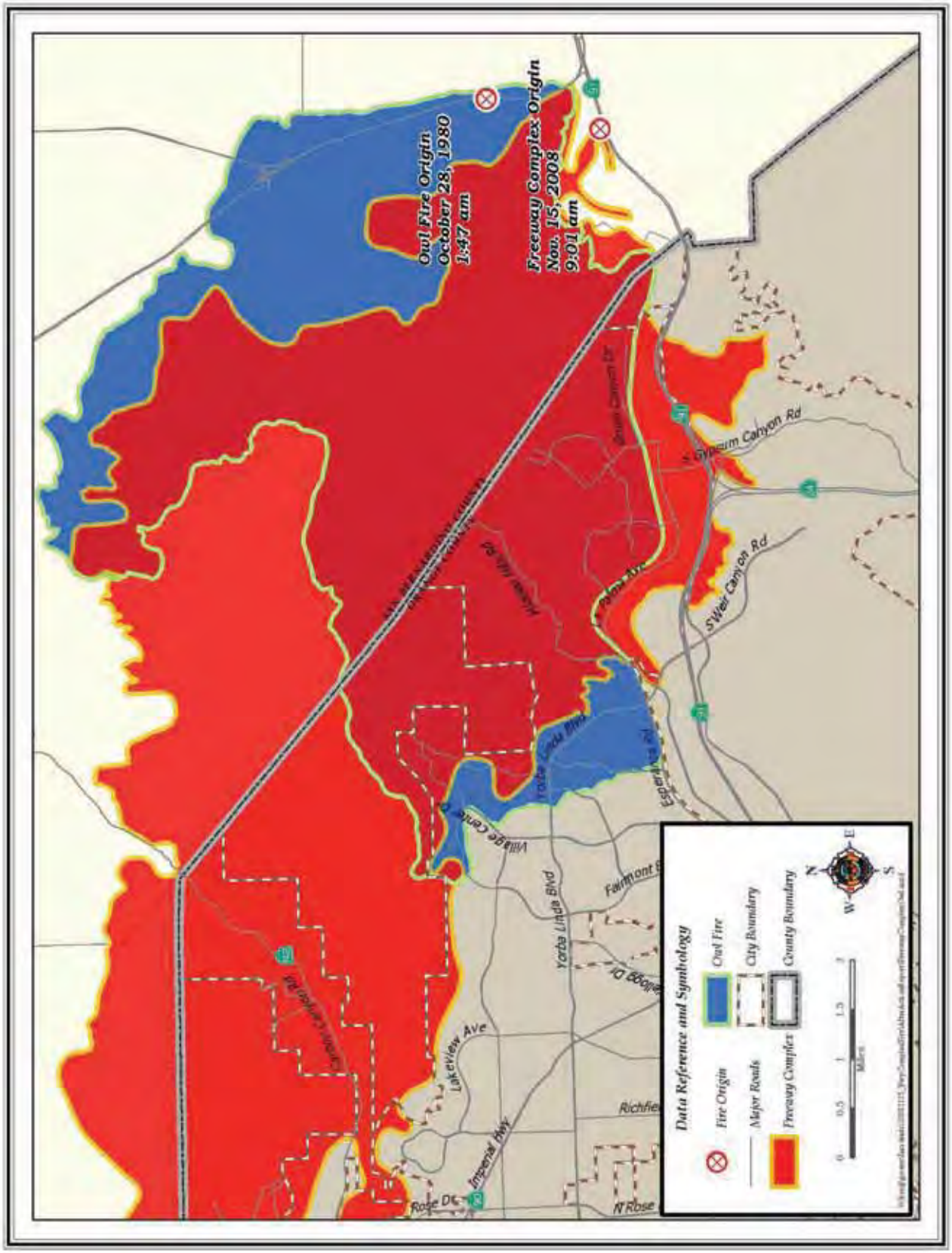
Table 1: Sixty-Year Major Fire History—Orange County

INCIDENT YEAR	INCIDENT NAME	ACRES CLAIMED	COUNTY(IES) INVOLVED
1948	Green River	53,079	Orange
1958	Steward	69,444	Orange/San Diego
1967	Paseo Grande	51,075	Orange/Riverside
1980	Indian	28,408	Orange/Riverside
1980	Owl	18,332	Orange/Riverside
1982	Gypsum	19,986	Orange
1993	Laguna	16,682	Orange
1993	Ortega	21,010	Orange
2007	Santiago	28,517	Orange
2008	Freeway	30,305	Orange/Riverside/San Bernardino/Los Angeles

Historical Information – Map 1
Freeway Complex Fire—12-Hour Perimeter 11-15-08 9:00 p.m.



Historical Information – Map 2
Owl Fire and Freeway Complex Fire—Fire Perimeter Overlay



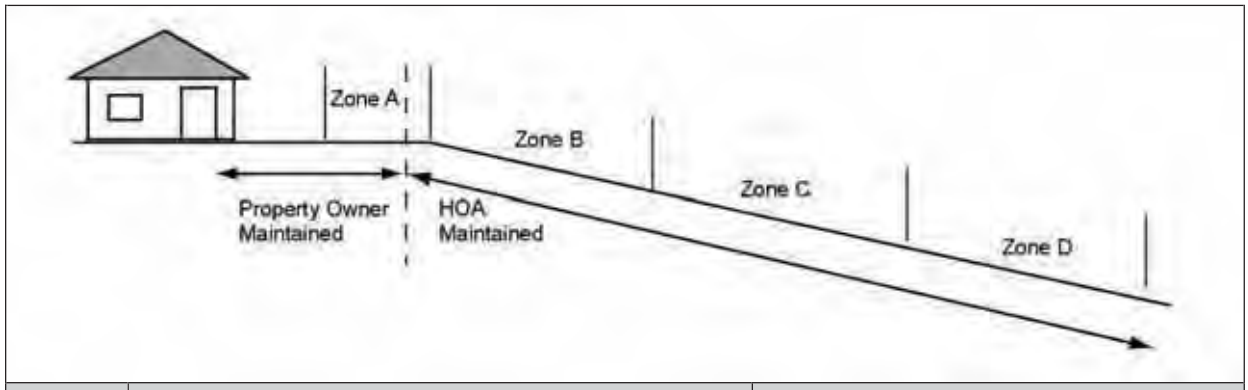
Fire Prevention

Land use planning and fire prevention play a key role in reducing the wildfire threat to communities in the wildland-urban interface (WUI). To adequately protect communities in WUI areas, a combination of brush clearance measures, ignition resistant construction of structures, and community preparedness and participation is necessary.

Brush Clearance

In 1979, Orange County adopted "fuel modification" provisions for new developments to protect homes in the WUI. The OCFA has enforced these requirements ever since. The provisions and requirements are also included in the local ordinances of the 22 cities protected by OCFA. Homes constructed in Yorba Linda since 1980 are most likely protected by a fuel modification program.

Table 2: OCFA Fuel Modification Program



ZONE	REQUIREMENTS	PURPOSE
A	• 20 feet wide and on level ground • Landscaped with approved plants • No combustible construction permitted	Limits direct flame impingement on structures and deflects radiant heat
B	• Minimum of 50 feet wide • Irrigated and landscaped with approved plants	Slows fire and reduces intensity
C/D*	• Minimum of 50 feet wide for each zone • All dead and dying materials are removed • Native vegetation thinned 50% in Zone C and 30% in Zone D	Slows fire and reduces intensity

*Some older areas may *only* have a Zone C.

The fuel modification program for OCFA communities requires the creation of a minimum of 170 feet of irrigated and non-irrigated zones and setbacks. Landscaping should include a selection of appropriate plant palettes for each zone. This is unlike State law that requires 100 feet of clearance—or to the property line if 100 feet is not available.

The OCFA fuel modification program also differs from State law by containing provisions to ensure adequate space is available to protect structures before building permits are issued. If 170

feet is not available, the landowner must either (1) obtain dedicated, legal off-site easements from the adjacent property owner or (2) mitigate the lack of defensible space with construction features that can withstand the anticipated radiant heat. Requirements for on-going maintenance are also included in the property deed and/or homeowner association by-laws.

Homes constructed in the WUI prior to 1980 are required to maintain "defensible space" between the home and the property line separating it from the WUI. Defensible space is less prescriptive than fuel modification and consists of thinning vegetation and ensuring tree branches are not within ten feet of chimneys.

Although fuel modification and defensible space provisions are typically applied at the perimeter of a development—the "edge" of the WUI, homes on or near interior slopes are also at risk. The vegetation in these areas should also be managed to reduce the risk of home loss from fires.

Arrow pointing to an overgrown interior slope prior to the Freeway Complex Fire

Arrow pointing to the same slope after the Freeway Complex Fire showing the tragic loss of homes along the ridge

The provisions for fuel modification and defensible space have evolved over the past 30 years. Although proven effective in protecting communities during wildfire incidents, the provisions are not without implementation challenges. The most significant of these is maintenance.

Maintenance of Brush Clearance

The OCFA does not have a formal WUI inspection program. As a result, if areas are not properly maintained and irrigated by the responsible landowner, overgrowth and/or plant death may occur. OCFA staff attempts to identify the worst cases and work with landowners to restore the land to an approved condition. In Yorba Linda, this is complicated since most fuel modification areas are on individual properties managed by a single homeowner. This is unlike most of Orange County where fuel modification zones are owned and maintained by a homeowners' association.

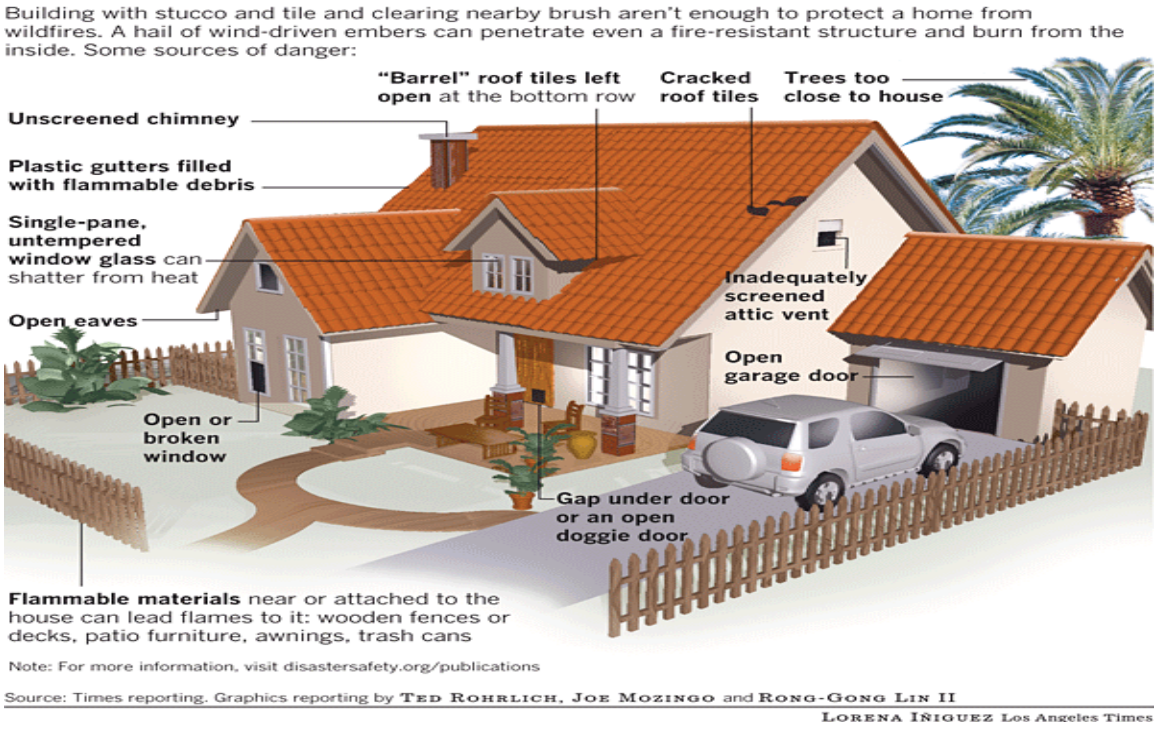
Despite the lack of a formal program, OCFA determined both the 2007 and 2008 fire seasons posed a significant enough risk to revise priorities and put efforts toward mitigation of this risk. Due to the severity of drought conditions and anticipated fire activity in 2008, the OCFA conducted inspections of all WUI properties in its jurisdiction. In Yorba Linda, the OCFA inspected the 589 parcels that are part of the defensible space program: homes/neighborhoods developed before 1979. The OCFA found only 16 out of compliance with minimum requirements

for defensible space. Additionally, 794 fuel modification parcels were inspected to ensure they were in "substantial compliance" with provisions of the post-1979 formal fuel modification program requirements. Of those inspected, 325 needed some type of corrective action. Prior to the start of the Freeway Fire, all but 25 had met the minimum requirements.

Ignition Resistant Construction

Properly established and maintained brush clearance is typically very effective in protecting homes from direct flame impingement and radiant heat. However, it does not provide additional protection from ember intrusion. Homes must be constructed to withstand ignition from embers that land on homes or enter through attics and other openings.

Illustration 1: How Fire-Resistant Homes Can Burn



The damaged or destroyed homes in Yorba Linda had many of the more traditional features that protect homes from flames and radiant heat. In some cases, these features are also effective in protecting homes from embers. However, in a wind driven fire storm, additional protection is necessary.

Following the disastrous 1993 Laguna Beach Fire, the Orange County Board of Supervisors commissioned a report to assess the damage and make recommendations to minimize the impact of future wildfires. The subsequent report, written in 1995, contained development requirements, including water supply, street design, brush clearance—current fuel modification provisions were found adequate, and construction features to "harden homes" from wildfire.

These requirements became effective January 1, 1996, as local amendments to the California building and fire codes that went into effect that date. The application of the requirements was limited to those County areas and cities that chose to adopt the Very High Fire Hazard Severity Zones mapped by CAL FIRE. Although Yorba Linda chose not to adopt the CAL FIRE maps, the

City Council did adopt and apply the local amendments in designated areas, referred to as Special Fire Protection Areas (SFPA).

Recently, the California legislature determined homes were not adequately protected since structure losses from wildfire continues to grow. Pursuant to that finding, the legislature charged the Office of the State Fire Marshal (OSFM) to take action to reduce the impact of future fires. The OSFM worked with stakeholders and University of California (UC) Berkley's fire lab to develop new "ignition resistant" building standards and material testing criteria. These standards—which dictate construction methods for roofs, eaves, vents, walls, doors, windows, and patio covers and decks—apply to all homes constructed in "Very High Fire Hazard Severity Zones" or locally designated wildland-urban interface areas, beginning in January 2008.

Homes must be constructed to withstand ignition from embers that land on homes or enter through attics and other openings.

Orange County has not received the final Very High Fire Hazard Severity Zone designation maps for adoption by the City of Yorba Linda. The County anticipates the maps will be released later in 2008. In the interim, the regulations are applicable in the SFPA adopted by the City in 1996. Many construction requirements of that 1996 ordinance are similar to the new statewide standards. Notably, improvements relative to application and protection of walls and vents were made to the new provisions. **Fire Prevention – Table 4** shows a comparison of OCFA's current requirements to the regulations adopted by the State Building Standards Commission in 2006, effective in 2008.

Access and Water for Firefighting

Brush clearance and "hardened"—ignition resistant—homes go far to increase the chances for a home's survival from a wind-driven WUI fire. However, intervention by firefighters is often necessary in saving a home determined to be defensible. Thus, emergency access and water availability play an integral part in aiding firefighters in these efforts.

OCFA's Planning and Development Services Section reviews all plans for new development to ensure adequate access and water supply is provided in accordance with the City-adopted Fire Code. Like all California jurisdictions, State law requires Yorba Linda to adopt the California Fire Code (CFC). The City adopted the 2007 edition in that same year.

Local amendments present in the CFC since 1996 require 28-foot wide roadways in high fire hazard areas, as well as a minimum of two ways into all communities with 150 or more homes.

The CFC also requires all structures to be within a specified distance to an "approved" water supply. An "approved" water supply can be defined by the adopting jurisdiction, or the jurisdiction may choose to adopt the water supply provisions found in Appendix B of the CFC. At OCFA's recommendation, Yorba Linda adopted the Appendix B provisions. One table specifies the water supply, known as "fire flow," based on the square footage of the structure and the construction type. Fire flow is comprised of the flow volume (gallons per minute [gpm]), residual pressure (pounds per square inch [psi]), and duration of flow (in hours). Another table indicates the number of fire hydrants that must supply this fire flow and their spacing relative to protected structures. (See the **OCFA Fire Master Plans for Commercial and Residential Development** at http://www.ocfa.org/_uploads/pdf/guideb09.pdf for additional CFC details.)

Using these tables, a typical street with homes not exceeding 3,600 square feet would be protected by hydrants that deliver 1,500 gpm each for a minimum of 2 hours at 20 psi residual pressure. For homes between 3,600 and 4,800 square feet, hydrants must deliver 1,750 gpm for 2 hours at 20 psi residual pressure. Locally adopted amendments require hydrant spacing of 300 feet along the street.

Getting water for structure protection

During the Freeway Fire, the demand for water by the structure protection engines exceeded the available supply. Areas of Yorba Linda, such as Hidden Hills, had loss of water pressure during which firefighters had to shuttle water from other areas. As defensible space and ignition construction have been studied over the years, so to have been the water needs in the WUI. New standards have been drafted and are available for local adoption.

Fire "Losses" and "Saves"

Although 117 homes were destroyed and another 77 were damaged—as well as 27 out-buildings and 22 vehicles, **Table 3** below shows the losses were a small percentage of the structures and vehicles threatened within the fire perimeter/evacuation zone. This was due to a combination of brush clearance, home construction, and aggressive firefighting.

Table 3: Fire Losses and Structures Saved Within the City of Yorba Linda

Category	Residential		Commercial/Industrial		Other	
	Total No.	Percentage of Total (%)	Total No.	Percentage of Total (%)	Vehicles	Out-Buildings
Threatened	9,525	100.00	126	100.00	N/A	N/A
Destroyed	117	1.22	0	0.00	45	10
Damaged	77	.80	2	1.59	22	27
Saved*	9,331	97.96	124	98.00	NA	NA
Dollar Loss	Structures: **$84,361,455** Contents: **$39,989,500** Total**: $124,350,955**					

*Does not include damaged structures considered as partial "saves." *Based on OCFA Fire Incident Reporting Data*.

An assessment of homes destroyed or damaged indicates they were victims of ember intrusion rather than direct flame impingement—suggesting brush clearance was adequate. The exceptions were instances where embers ignited one home and then burned the homes on either side in "cluster burns," which continued until firefighters stopped the spread.

Although the burned homes were somewhat "hardened" to embers, the construction was not adequate for the conditions presented with this fire. Embers entered homes—mainly through attics—as they penetrated roofs through the ends of barrel-shaped clay tiles, loose flashing at roof/wall interfaces, grooves at roof valleys, and combustible rain gutters—particularly those containing plant debris. Embers also entered attics through unprotected eaves and attic vents.

Several homes were lost to embers gathering under unprotected—exposed wood underside—balconies or wooden decks and patio covers. Once these ignited, the flames burned through walls and entered homes.

Notably, all the homes damaged or destroyed were constructed prior to 1996. Thus, they were not protected by the CFC provisions required by the City's ordinance for WUI areas. However, the homes in Casino Ridge met the requirements of the 1996 ordinance. They were also protected by a relatively new fuel modification program. Firefighters stated they were able to focus resources and efforts on other areas of the city as this community was developed to withstand a wildfire with little firefighting intervention.

Fire front approaching the Casino Ridge community

Challenges

The application of (1) ignition resistant construction requirements and (2) brush maintenance requirements are both critical to the survivability of homes subjected to intense heat and ember intrusion—even those located hundreds of feet from the interface. Although proven effective in protecting communities during wildfire incidents, these requirements are not without implementation challenges. The most significant are:

Maintenance of Fuel Modifications

Fuel modification requirements in communities developed after 1980 and brush clearance measures in those developed prior to 1980 must be maintained to be effective. Currently, OCFA does not have a formal inspection and enforcement program to ensure the over 14,000 parcels and lots are adequately maintained. As a result, areas can become overgrown and, in some instances, irrigation can be lacking due to cost or poor maintenance of water lines. OCFA staff attempts to identify the worst cases and work with landowners to restore the land to an approved condition. Due to the lack of penalties for failure to comply, sometimes several parcels/lots remain out of compliance for several years. This presents a hazard to community homes and adjoining lands.

> The most significant challenge is protecting the areas established prior to current fuel modification and construction requirements.

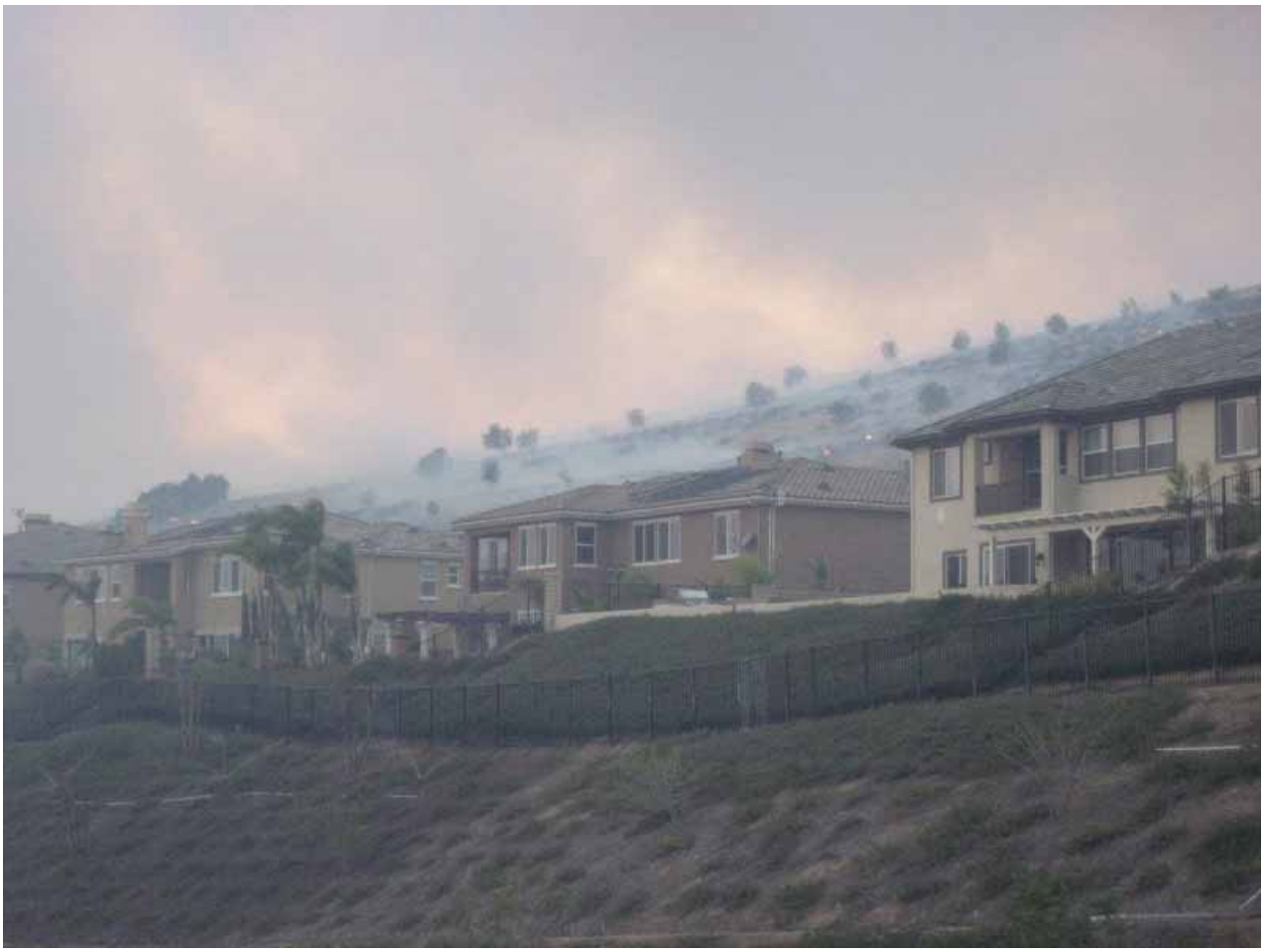
Application of Construction Requirements

Applying ignition resistant construction requirements is critical to the survivability of homes subjected to ember intrusion both at the interface and within a few hundred feet of the interface. Maps depicting impact areas must be locally adopted. This process is often controversial, since the development community typically expresses concern over rising costs, real estate disclosure, and insurance premiums. As a result, areas needing protection—based on topography, fuels, weather, and fire history—are often left unmapped due to local action/inaction.

Existing Communities

The most significant challenge is protecting the areas established prior to current fuel modification and construction requirements. The pre-1980 established areas lack adequate brush clearance, and

some have home lots that are too small to create adequate defensible space on the property. Homeowners often cannot obtain permission for off-site clearance from neighbors or government entities. Environmental restrictions also hinder the ability to create defensible space. State and Federal agencies have conflicting missions with the fire service relative to control of native vegetation, although this was not the case during the 2008 inspection cycle.



Casino Ridge area of Yorba Linda with current fuel modifications and construction requirements

Fire Prevention – Table 4
Comparison of Current OCFA Requirements and New State Regulations

California Building Code Requirements for "Hardening Homes" *Indicates more restrictive requirement if not equivalent.	
Former Yorba Linda Ordinance (January 1996–January 2008)	**New State Code (July 2008)**
Applies to structures located in Very High Fire Hazard Severity Zones and Special Fire Protection Areas that are within 100 feet of fuel modification zones. Most provisions apply only to structures having an exposed side. Exposed side is defined as an exterior wall of a structure within 100 feet of the fuel modification zone.	Applies to all structures located in Very High Fire Hazard Severity Zones and locally designated Wildland Fire Areas. All exterior sides—not just the exposed sides—shall meet the requirements of Chapter 7A.*
Exterior Wall: Exposed side of exterior wall shall be of non-combustible construction or 1-hour fire-resistive construction for the exterior portion.	**Exterior Wall:** Shall be of approved non-combustible or ignition resistant material or heavy timber.
Glazed Openings: Shall be multi-glazed with at least two panes.	**Glazed Openings:** Shall be tempered glass or glass block or have a fire resistive rating of not less than 20 minutes.*
Doors: Shall be minimum 1 3/8 inches thick solid core or metal non-combustible.	**Doors:** Shall be non-combustible or solid core or 20-minutes rated.
Attic Vents: Not allowed on exposed sides. Other sides must be protected by metal louvers and 1/4-inch mesh corrosion-resistant metal screen. Vents shall not exceed 144 sq. inch per opening.*	**Attic Vents**: Shall be covered with 1/4-inch corrosion-resistant metal screen; no size limit.
Eave or Cornice Vents: Not allowed on exposed sides.	**Eave or Cornice Vents**: Prohibited unless they can resist the intrusion of flame and burning embers into the attic.
Roof Valley: Flashing shall not be less than 26 gauge galvanized sheet installed over a 36-inch under layment consisting of one layer of No. 72 ASTM cap sheet running the full length of valley.	**Roof Valley**: Flashing shall not be less than 26 gauge galvanized sheet installed over a 36-inch under layment consisting of one layer of No. 72 ASTM cap sheet running the full length of valley.
Roof Gutters: Shall be provided with means to prevent accumulation of leaves and debris.	**Roof Gutters**: Shall be provided with means to prevent accumulation of leaves and debris.
Roof Assembly: New construction and reconstruction shall be fire retardant Class A roof assembly.	**Roof Assembly**: New construction and reconstruction shall be fire retardant Class A roof assembly.
Skylights: Shall have a non-combustible frame with dual glazing of heat strengthened or fully tempered glass or 3-rated assembly.*	**Skylights**: No requirements
Roof Covering: Where roof profile allows a space between roof covering and roof deck, the space shall be fire stopped with approved material or have one layer of No. 72 ASTM cap sheet installed over the combustible decking.	**Roof Covering**: Where roof profile allows a space between roof covering and roof deck the space shall be fire stopped with approved material or have one layer of No. 72 ASTM cap sheet installed over the combustible decking.
Decking: Those on exposed side to be 1-hour rated, non-combustible or heavy timber.	**Decking:** Specific requirement for decking surface shall be of ignition resistant material, heavy timber, or non-combustible material.
INTENTIONALLY LEFT BLANK	Ignition resistant material definition provided: Tested according to ASTM 84 for 30 minutes.
INTENTIONALLY LEFT BLANK	Flame spread less than 25 with evidence of no progressive combustion.

Advance Planning

Although a Red Flag Warning was not in effect for Orange County on November 15, 2008, it was in other Southern California counties. Due to these warnings, CAL FIRE requested a special staffing pattern be implemented across the region. The OCFA asked CAL FIRE to approve the staffing enhancements for implementation on November 14, 2008. The following staffing pattern was approved by CAL FIRE and in place the morning of November 15:

- One Type 3 strike team with four-person staffing—five engines and a Chief Officer
- The staffing of a second helicopter
- The increased staffing of five engine companies in the wildland interface areas—from three firefighters each to four—referred to as the "Grey Book" stations
- An additional fire dispatcher at the Emergency Command Center

A conference call with CAL FIRE, USFS, and multiple county fire agencies was conducted at 9:00 a.m., November 15. OCFA's Assistant Chief Kramer and Division Chief Fleming, the OCFA Duty Officer, attended the meeting. A briefing on the status of the Tea and Sayre fires was provided, as well as current weather for Orange and other counties. The forecast for Orange County did not include a Fire Weather Watch or Red Flag Warning. In fact, the predicted winds for the local area were supposed to be relatively light—diminishing by 2:00 p.m. that day. OCFA routinely monitors weather forecasts and takes appropriate action. When extreme winds and red-flag conditions do exist, the OCFA implements procedures established by Operations SOP 209.13, *Extreme Weather Plan Winds/Red Flag & Rain/Floods*.

As a cooperating member of the California Fire and Rescue Emergency Mutual Aid Plan, the OCFA committed three strike teams of engines out-of-county prior to the start of the Freeway Fire. The mutual aid system is founded on the principle of neighbor helping neighbor. When an emergency overwhelms an agency's ability to manage it on its own, other fire departments voluntarily provide resources, if possible. The system allows for an orderly escalation and distribution of resources.

Additionally, neighboring Orange County MetroNet fire agencies had committed four strike teams of engines to the Tea and Sayre fires, including an OES engine strike team. A total of 35 fire engines and 7 strike team leaders from the OCFA and other County fire agencies were assigned to fires outside the County at the start of the Freeway Fire.

As OCFA resources are committed on a mutual aid response, personnel are recalled to staff relief engines to ensure adequate station coverage. All OCFA stations vacated due to the deployment of units outside the County were covered either through the use of backfill (ten engines) or by the on-coming shift personnel (five engines). **Table 5** shows the commitment of strike teams on November 14, 2008, by the OCFA and MetroNet Out-of-County Strike Teams.

Table 5: OCFA and MetroNet Out-of-County Strike Teams
November 14, 2008

Fire	Strike Team	Day/Time Committed
Tea	ORC Strike Team 9328C and XOR Strike Team 1421A and 1422A	November 13, 2008
Tea	OES Strike Team 1830C, including one OCFA engine (OES-E303), as part of OES Type 1 strike team (1830C)	November 13, 2008, 11:47 p.m.
Tea	ORC Strike Team 1400A	November 14, 2008, 3:55 a.m.
Sayre	ORC Strike Team 1402A	November 15, 2008, 12:40 a.m.
Sayre	XOR Strike Team 1423A	November 15, 2008

Pre-planning for emergency events is routine for the OCFA. Operational plans exist or are under development for many high-risk areas. A few weeks prior to the Freeway Complex Fire, a tabletop exercise was conducted to bring stakeholder agencies (OCFA, LACO, Corona Fire Department, CAL FIRE RRU/BDU, San Bernardino CFD, Chino Valley IFD, Anaheim Fire Department, Orange Fire Department, USFS, and South Operations) together. The goal was to develop and review operational plans for the wildland-urban interface area along the 91 Freeway corridor. The exercise provided chief officers the opportunity to consider a variety of events to better understand fire progression and fire spread potential. Decision trigger points and a course of action were also developed for each event. This tabletop exercise proved to be highly beneficial; some of the first responding chief officers to the Freeway Fire had been exercise participants.

One trigger point and its course of action was demonstrated through by OCFA Battalion 2 while en-route to the fire. Based upon the radio traffic from the initial attack crews, Battalion 2 ordered two strike teams to report to OCFA Station 53 in east Yorba Linda. This was done to get ahead of the fire and place additional engines into Yorba Linda, which was in the direct path of the rapidly advancing fire from Corona.

When the Department Operation Center opened at 11:30 a.m., the call back of off-duty personnel was initiated to get all available relief and surge apparatus in-service.

As the request for resources at the fire increased, the OCFA needed to begin staffing uncovered fire stations, relief, and surge apparatus. When the Department Operation Center (DOC) opened at 11:30 a.m., staff was tasked to initiate the call back of off-duty personnel and to get all available relief and surge apparatus in-service as soon as possible. Battalion Manpower Coordinators were organized to handle the hundreds of telephone calls necessary to meet this goal. The majority of necessary staffing was achieved within eight hours. By 10:00 p.m. November 15, all critical staffing needs had been met.

On Sunday, November 16—with continued Santa Ana winds along with multiple fires burning in Southern California and the potential for area resource drawdown—the Duty Officer ordered all suppression personnel be held on duty. This action increased manpower available to staff emergency apparatus from normal daily staffing of 253 personnel to 462 suppression personnel. By noon on Sunday, all personnel who were not required were released.

In addition to the extra engines that were staffed by full-time firefighters, OCFA reserve firefighters staffed ten patrols, three squads, four water tenders, one helicopter support unit, and five engines. These units were assigned to stand-alone Reserve Stations 3, 11, 14, and 16 and combination Station 23. The staffing level in the Emergency Command Center (ECC) was augmented with two additional dispatchers and one additional dispatch supervisor. One Division Chief and two Staff Captains were recalled to begin staffing the DOC.

The advance planning accomplished early Friday, November 14, prior to the Freeway Fire and the following staffing actions proved to be key in OCFA's ability to engage the fire. As the fire rapidly spread into neighborhoods in east Yorba Linda and Anaheim Hills, the OCFA was still able to sustain response coverage for other portions of its service area.

Emergency crews from throughout the state respond to the request for mutual aid

Incident Narrative

Summary

The following is a chronological perspective of the firefighting efforts that took place in the cities of Corona, Yorba Linda, Anaheim, Brea, Chino Hills, and Diamond Bar on November 15 through 19, 2008. The event is now known as the Freeway Complex Fire. This report is as accurate and complete as possible. Since the specifics of this incident are complex and it occurred so rapidly, the actions of every fire company, the events that took place in every community, or the circumstances that surrounded every loss cannot be described in detail. Personnel from all ranks and assignments were interviewed, hundreds of documents were reviewed, and several hundred radio transmissions were listened to in the development of this narrative.

Though it started as a wildland urban interface fire, the Freeway Complex Fire quickly became an urban conflagration. Destroyed structures included 203 residences, 2 commercial structures (one in Yorba Linda and one in Brea), and 17 out-buildings. Damaged structures included 117 residences, 6 commercial structures, and 36 out-buildings. In total, 30,305 acres of watershed were consumed across six cities and four counties. Suppression costs exceeded $16.1 million, and property loss has been estimated at nearly $150 million.

Preplanning

The Freeway Complex Fire occurred in a designated mutual threat zone. The original vegetation fire in this jurisdictionally contiguous area received initial attack responses from multiple agencies, including the OCFA (ORC), Corona Fire (COR), Anaheim Fire (ANA), CAL FIRE, and the United States Forest Service (USFS). The high degree of coordination behind this emergency response was not accidental. Three weeks prior to the incident, a tabletop exercise scenario was conducted with these and other area responders. Predicted fire spread, values at risk, operational trigger points, communications, and other related issues were discussed and modeled. This tabletop exercise was greatly responsible for some of the quick decision making behind early resource ordering, including additional engine strike teams and aircraft.

The Freeway Complex Fire destroyed or damaged approximately 320 residences, 8 commercial structures, and 53 out-buildings.

Based upon the predicted weather patterns, which included strong Santa Ana winds and low humidity for the weekend, the OCFA had placed a special staffing pattern into effect on Friday, November 14, 2008. To prepare for the weather pattern, the OCFA had one Type 3 engine strike team (ORU 9329C), consisting of five wildland engines and a Chief Officer (Hawkins), staged at the OCFA Regional Fire Operations and Training Center (RFOTC). In addition to ORC Helicopter 41 (HC41) that was already on duty, ORC Helicopter 241 (HC241) was staffed with a pilot and crew chief. Also, five fire engines located at stations near wildland areas were up-staffed from three firefighters to four. An additional dispatcher was also added to the Emergency Command Center (ECC).

A day earlier, on November 13, ten engines from the OCFA (ORC Strike Team 1400A and ORU Strike Team 9328C) were sent to the Tea Fire in Santa Barbara County. In addition, the Office of

Emergency Services (OES) engine strike team based in Orange County was activated. It was sent to the Tea Fire along with three Type 1 engine strike teams from non-OCFA fire departments in Orange County. At 12:40 a.m. on November 15, five additional OCFA engines (ORC Strike Team 1402A) were sent to the Sayre Fire in Los Angeles County. Prior to the start of the Freeway Fire, all vacancies created within OCFA fire stations by these deployments were filled.

Day 1 - November 15, 2008

At 9:01 a.m. on November 15, the Corona Fire Department (COR) received reports of a vegetation fire on the north side of the 91 Freeway, east of Green River Drive. COR Dispatch sent units, including a Battalion Chief (COR B3 [Samuels]) and three engines (COR BR1, BR3, and E2).

At 9:03 a.m., the OCFA ECC received the first of many 911 calls reporting the same fire along the north side of the westbound 91 Freeway east of Green River Drive. The first caller reported the fire to be approximately one-half acre but building rapidly. Subsequent calls gave varying descriptions and locations, indicating to the dispatchers the fire was moving rapidly west along the freeway toward the Green River Golf Course. **Incident Narrative – Map 3** shows the point of origin of the Freeway Complex Fire

The ECC entered a *High Watershed Dispatch* into the Computer Aided Dispatch (CAD) system at 9:07 a.m., sending units to the fire's reported location. This initial dispatch was comprised of the following:

- One Division Chief (ORC D5 [Fleming])
- Three Battalion Chiefs (ORC B2 [Reeder], ORC B3 [Aubrey], and ANA B1 [Pilar])
- Seven, single increment engines (ORC E10, E15, E53, and E832 and ANA E8, E9, and E10)
- One ORU Strike Team 9329C (ORC B27 [Hawkins]; ORC E247, E250, E307, E318, and E339)
- Two hand crews (ORC Crew 1 and Reserve Crew 18)
- Three helicopters (ORC HC41 and HC241; OCSD Duke)
- Two patrols (ORC P10 and P32)
- One fire bulldozer (ORC Dozer 2)
- Three water tenders (ORC W7, W10, and W16)

In **Table 6**, Freemont Canyon RAWS indicated responding personnel had to contend with mild temperatures of 75°F, low relative humidity of 8 percent, and strong east/northeast winds sustained at 43 mph, gusting up to 61 mph. Winds were higher than expected based on the recent National Weather Service (NWS) predictions and morning briefing on statewide fire conditions.

Freemont Canyon RAWS

Table 6: Freemont Canyon RAWS—Santa Ana Mountains

Time	Temperature (°F)	Wind Speed/Gust Speed (mph)	Relative Humidity (%)
9 a.m.	75	43/61	8
3 p.m.	80	25 /45	7

ORC Battalion 2 (Reeder) was on the initial dispatch and, while responding to the fire, was monitoring the radio traffic of the COR units already on the scene. At 9:19 a.m., Battalion Chief Reeder relayed to the ECC that COR units were on scene and reporting an immediate threat to structures. Battalion Chief Reeder requested two Type 1 engine strike teams—ten engines and two Chief Officers—stage at OCFA Station 53 in Yorba Linda; this anticipated the fire's possible move into Orange County. He also requested fixed wing aircraft—air tankers—be dispatched.

The first order for air tankers was placed at 9:19 a.m. They were dispatched at 9:35 a.m. and arrived over the fire at 10:10 a.m.

The order for aircraft was placed by the OCFA ECC to the CAL FIRE Perris ECC; however, the order was not immediately filled. Shortly before 9:12 a.m., COR Dispatch contacted CAL FIRE Perris ECC and discussed the need for ground resources and a helicopter. Air tankers were not ordered by COR Battalion 3 (Samuels) when the initial equipment request was made. When Chief Reeder's order was delivered to CAL FIRE Perris ECC, there was some confusion regarding the actual need for fixed wing aircraft. More calls between COR Dispatch and CAL FIRE Perris ECC resulted in confirmation for the air tanker request only after COR E5 was reported to be surrounded by fire. The air tankers were dispatched at 9:35 a.m. out of San Bernardino Airport. The first air tanker arrived at 10:10 a.m.

Palm trees show how strong the wind blew during the fire

A minute after Battalion Chief Reeder made his requests, Anaheim Fire Engine 10 (ANA E10) reported COR was on scene. Approximately one acre of grass was burning along the north side of the 91 Freeway. At 9:21 a.m., two strike teams from OCFA were dispatched to stage at Fire Station 53. ORC Strike Team 1403A included ORC Battalion 44 (Cruz) and ORC E8, E23, E34, E35, and E53. ORC Strike Team 1404A included ORC Battalion 7 (Whitaker) and ORC E27, E31, E38, E55, and E826. While en-route to Station 53, the strike team leaders heard the requests for immediate need resources and diverted to the City of Corona with the hope to help stop the fire there. This decision left the original request unfilled—to have two strike teams stage at ORC Station 53.

COR Battalion 3 (Samuels) arrived on scene about the same time and assumed the Freeway Fire Incident Command. This information was provided to the ECC at 9:23 a.m. and was relayed to responding units. ANA Battalion 1 (Pillar) arrived a few minutes later and was assigned Structure Protection Group (SPG) responsibility. Around 9:30 a.m., Pillar placed an order to the Incident Commander for three additional engine strike teams—15 engines.

Firefighting resources arriving on scene experienced Santa Ana winds blowing between 40 to 60 mph. Homes located on Penny Royal Drive and Feather River Road in Corona were identified by ORC Battalion 2 (Reeder) as immediately threatened. Units on scene attempted to take tactical positions to best facilitate structure protection. Incident Commander Samuels faced a rapidly escalating wind-driven wildland fire that was extending into a nearby residential neighborhood. With limited resources on scene, he directed a flanking attack on the wildland fire. With assistance coming from CAL FIRE – Riverside County, the United States Forest Service (USFS), and Orange County, the opportunity for control was hopeful.

Approximately 9:27 a.m., a tragedy almost occurred when COR E5 became surrounded by fire and experienced a burn-over event. When the Freeway Fire began, COR E5 was on scene of a medical aid in a neighborhood less than a mile away. Once COR E5 cleared the medical call, it contacted COR Dispatch and was assigned to the fire. COR E5 chose to access the fire from a service road between the fire origin and the threatened homes. This decision put COR E5 in a dangerous position between the main fire and the threatened homes, with unburned vegetation between the crew and the fast moving head. Within minutes, the COR E5 Captain radioed they were being overrun by fire and were unable to escape. COR BR1, supported by multiple water drops from ORC HC41 and HC241, rescued the trapped firefighters and averted a tragedy. This event resulted in minor burns and smoke inhalation to two firefighters assigned to COR E5. **Incident Narrative – Map 4** is a map showing the near miss entrapment.

By 9:30 a.m., CAL FIRE Battalion Chief Deyo arrived on scene and briefly spoke with the Incident Commander. He also met with CAL FIRE Battalion Chief McBride, who had been sent to the fire as the CAL FIRE Agency Representative. Chief Deyo was directed to assume the role of Operations Section Chief for the Freeway Fire. Subsequently, he conducted a reconnaissance of the fire and established control objectives.

During Chief Deyo's reconnaissance, radio communication problems between agencies on two different radio systems became critical. CAL FIRE was operating on the statewide VHF frequencies, while COR, Anaheim Fire, and OCFA units were operating on their 800 MHz radios. Operating on a single compatible radio system is the safest and most preferred communication methodology. ANA Battalion 1 (Pilar) provided Chief Deyo with an 800 MHz portable radio, enabling him to communicate with other command-level personnel. Later that day, Orange County Communications (OCC) was asked to initiate a patch between the VHF and the 800 MHz systems to establish one common command frequency.

Aerial view of the fire's path along the Green River Golf Course and homes bordering the Santa Ana River riparian.

Around 9:30 a.m., the OCFA ECC became the Central Ordering Point for the fire. This was done to ensure all resource orders for personnel, supplies, and equipment were properly placed and tracked. The effectiveness of the central ordering point is crucial to the success of the fire control efforts. As the need grew, resource orders were entered into the Regional Ordering Support System (ROSS), which allowed access to firefighting and support resources from multiple regions in Southern California.

Shortly after assuming the Central Ordering Point responsibility, an order for additional aircraft was placed to South OPS. Orders for engine strike teams, hand crews, and bulldozers would soon follow. A recent change in the resource ordering rules, which was a result of lessons learned in the 2007 fire siege, allowed for 5 engine strike teams—25 engines—to be directly requested from neighboring mutual aid regions. These 25 engines from the CAL FIRE – Riverside County immediately responded without processing delays. Around 10:30 a.m., the first of these strike teams arrived at the fire. The others arrived around noon.

The first ORC fire engine arrived in Corona and moved into the fire area at 9:23 a.m. The fire was uncontrolled and unpredictable. In response, ORC Battalion 3 (Aubrey) directed ORC E27—assigned to ORC Strike Team 1404A—to take independent action upon arrival. Indicating the fire was moving rapidly, the threat to structures was such that individual company officers had to rely on their situation to dictate tactics and operational priorities. This is a departure from desired and normal command and control strategy, but it necessary when confronted with a wide and rapidly progressing fire front. For the next 30 minutes, resources responding into Corona were directed into the threatened residential areas between the fire origin and the Green River Golf Course.

OCFA helicopter makes a water drop over fire

The fire was bordered by a golf course, an active river, and a multi-lane freeway. All set up the best potential containment opportunity for the Freeway Fire. Unfortunately, at 10:00 a.m., a spot fire was reported west of the Green River Golf Course. Hand crews and bulldozers were staged nearby and quickly encircled the spot, containing it to a small area. At 10:08 a.m., while returning to the golf course to pick up a load of water, ORC HC241 noticed another spot fire west of the golf course, approximately 1.1 miles from the nearest burning structure. In less time than it took for HC241 to snorkel a load of water from the golf course pond—about 45 seconds, this spot fire, coupled with the topography and the wind, headed at high speed for the City of Yorba Linda. HC241 attempted to slow the fire by dropping its load of water, but the impact was negligible. When interviewed, a helicopter crew member described the water drop as “a thimble of water in a firestorm.” **Incident Narrative – Maps 5 and 6** are maps showing the multiple spot fires caused by erratic fire behavior.

ORC Division 5 (Fleming) arrived on the scene at 10:05 a.m. and proceeded to establish a unified command with Chief Officers from COR, CAL FIRE, Anaheim Fire, and Chino Valley Independent Fire District. The location of this initial command post, established at 10:12 a.m., was at the Jack in the Box parking lot at Crest Ridge and Green River Drive, Corona.

The BNSF railcars left on tracks were not threatened by fire and did not contain any hazardous cargo.

While firefighters were working near the railroad right-of-way, Burlington Northern Santa Fe (BNSF) Railroad was requested to stop all rail traffic through the fire area as a safety precaution. The outcome of the request inadvertently resulted in several railcars being abandoned on the tracks, prompting concerns from citizens and firefighters that some railcars may have been carrying hazardous materials. OCFA Safety Officer Hutnyan was sent to the area and tasked to examine the situation. He quickly determined the railcars were not directly threatened by fire and, in fact, did not have hazardous cargo. The railcars were eventually removed from the area by BNSF employees.

At 10:10 a.m., Air Attack and the first fixed wing air tanker were reported to be flying over the fire. This began the coordinated air assault to protect homes along the wildland interface. It also began establishing perimeter control lines to help direct the fire's spread away from other inhabited areas. Air assets would prove to be critical in establishing these control lines and protecting firefighters and threatened structures. In total, 17 firefighting helicopters flew approximately 108 hours and dropped in excess of 278,357 gallons of water. Twelve fixed wing air tankers and four lead airplanes fueled and re-supplied out of Hemet Ryan and San Bernardino Air Bases, flew approximately 110 hours and dropped 308,435 gallons of retardant on the fire. This figure includes the work of Tanker 910 (DC-10 aircraft). It made ten drops—eight on November 15 and two on November 16—in the Yorba Linda/Chino Hills area for a total of 109,445 gallons of retardant.

At 10:20 a.m., ORC Battalion 2 (Reeder) reported the fire would reach the city limits of Yorba Linda within 30 minutes. Recognizing the threat to Yorba Linda, Battalion Chief Reeder placed an immediate need request for four more Type 1 engine strike teams—20 engines and 4 Chief Officers—to stage at OCFA Station 53 in the City of Yorba Linda. He also requested the Brea Police Department and the City of Yorba Linda be notified of the impending arrival of the fire. They were to start evacuations. Battalion Chief Reeder predicted the fire would impact homes located in the Brush Canyon community within map page 741 grids E4, F4, and G5 (Thomas Brothers 2009 Edition). The ECC made contact with the Brea Police Department and City staff shortly thereafter.

Although a collaborative decision, the responsibility for evacuation is statutorily a law enforcement function. This allows fire departments to focus on control efforts. The number of citizens who evacuated at any one time in any single area of the City is unknown; however, nearly 9,000 dwellings were impacted in Yorba Linda by the evacuation order as a result of the Freeway Complex Fire. At the height of the firefight, an estimated 24,000 citizens of Yorba Linda were evacuated or kept from returning to their homes due to safety concerns.

Evacuations Underway

At the onset of the evacuation, traffic gridlocked in some areas as emergency apparatus tried to enter the neighborhoods while residents tried to exit. The Brea Police Department and other assisting law

enforcement agencies took control of the traffic flow, which helped firefighters gain access to threatened homes. In any firefighting effort, rescue is the first priority. However, in this case, resident self-evacuation was in effect assuring rescue from an active fire front would be minimized. Notably, with such an expansive and escalating evacuation boundary, the residents stayed calm and followed evacuation directions. Throughout the morning, reports of orderly—but slow—evacuations were relayed to the ECC.

ORC Assistant Chief 2 (Kramer) responded to the fire at 10:23 a.m. Assistant Chief Kramer assumed the role of ORC Incident Commander as part of the unified command. The responsibility of the Operation Section Chief position for the Freeway Complex Fire was assigned to ORC Battalion 2 (Reeder). To provide strong leadership and incident management, the fire area was divided into manageable geographical and functional areas of responsibility. The highest level of these responsibilities were branches, of which two were initially established for the Freeway Complex Fire. Branch I was the Yorba Linda Branch assigned to ORC Division 5 (Fleming) and included all structure threats in Yorba Linda. Within the Branch, smaller geographical divisions and functional groups were established. Several Structure Protection Groups were tasked first to protect those homes at the greatest threat of burning and second, wherever possible, to extinguish already established fires in structures, vehicles, and vegetation. **Incident Narrative – Map 7** shows a map of the Freeway Complex Fire Branch and Division boundaries.

Branch II was assigned to CAL FIRE Battalion Chief Deyo, who initially had been assigned Operations Section Chief when the fire was in Corona. Branch II included the wildfire control efforts that eventually burned through the Chino Hills State Park. This front raced into the City of Chino Hills through Tonner and Carbon Canyons to the Los Angeles County line—burning into the city limits of Diamond Bar. Divisions Y and Z were established within Branch II. The primary objective focused on establishing perimeter control to minimize the spread of the fire. Battalion Chief Deyo also faced the challenge of ensuring firefighting efforts were continuing in Corona, while trying to release as many resources back to Orange County.

With the fire burning out of Aliso Canyon and backing into Brush Canyon, it now headed toward Big Horn Mountain Way, Blue Ridge Drive, Merryweather Circle, Evening Breeze Drive, Pine Meadow Way, Camino de Bryant, Kodiak Mountain Drive, and Brush Canyon Drive. Any available fire units were moved to these and other threatened neighborhoods. The Operation Section Chief (Reeder) placed a call to the ECC ordering 20 engine strike teams—100 engines—of various configurations. Orange City Division Chief Eichoff assumed the Yorba Linda Structure Protection Group from ORC Battalion 3 (Aubrey), who was assigned to assist Branch I. Division Chief Eichoff recognized the community of Hidden Hills was going to be overrun by the fire and instructed unassigned units to move there.

With the fire advancing into the City of Yorba Linda, the Operations Section Chief ordered an additional 20 engine strike teams—100 engines and 20 Chief Officers.

At 10:43 a.m., a 911 caller reported a second fire to the ECC. This one was burning near the Olinda Alpha Landfill, located off Valencia Avenue near Carbon Canyon. The Brea Fire Department (BRE) confirmed they were responding to a fire reported near the landfill. The OCFA sent a modified high watershed dispatch response, including:

- Two Battalion Chiefs (ORC B23 [Phillips] and B8 [Wells])

- Four engines (ORC E47, E62, E223, and E817)
- One medic unit (ORC M26)
- Two patrols (ORC P23 and P26)

The same wind that was driving the Freeway Fire into Yorba Linda was now pushing the new fire through the east through the City of Brea toward Diamond Bar and the 57 Freeway. Brea Fire units arrived on scene at 10:49 a.m. and reported a one-acre fire moving quickly. ORC Battalion 8 (Wells) arrived on scene at 10:55 a.m. He reported the fire in Brea was two to three acres adjacent to the Olinda Alpha Landfill. He also reported there was a direct threat to structures and ordered three Type 1 engine strike teams—15 engines—and air support. Battalion Chief Wells assumed the Landfill Fire Incident Command and initiated communications with BRE units.

Within minutes, Battalion Chief Wells made contact with BRE Battalion Chief Montoya. A unified command, along with three structure protection groups, was established for the Landfill Fire. Additionally, units were assigned to begin perimeter control efforts. The highest concern was the Landfill Fire would eventually cross the 57 Freeway and destroy the homes west of it. The command post was subsequently moved to Brea Fire Station 3 at the intersection of Lambert Road and Kraemer Boulevard.

About 10:50 a.m., ORC Wildland 1 (Ewan) arrived at the Freeway Fire. To gauge the direction and speed of the wildland fire, he attempted to flank it and get far enough in front to predict its path. Ewan later reported he was unable to drive fast enough to keep up with the fire spread, which at times was estimated to be over 1,000 acres per hour. Motorists driving west on the 91 Freeway reported that at speeds of 50 mph, they were unable to stay ahead of the fire's main body.

The first two strike teams into Yorba Linda, XOR ST1424A (Espinoza) and XOR ST1425A (Hirsch), arrived about 10:56 a.m. They deployed along Alpine Lane, Big Horn Mountain Way, and Blue Ridge Drive. Facing fires driven by wind gusts up to 70 mph, these two strike teams and dozens of others moved from neighborhood to neighborhood throughout the day and into the night.

The Freeway Fire crossed the city limits of Yorba Linda at 10:58 a.m., destroying its first of hundreds of homes in Orange County. After racing through Brush Canyon, the fire burned the residence at 27185 Merryweather Circle before fire crews were able to mount a defense. At the same time, ORC HC241 reported seeing small fires in the area of the Black Gold Country Club. This was several miles downwind from the main body of the Freeway Fire and upwind from the Landfill Fire. Due to the location of the fires, HC241 reported these as new fires, not spot fires from either the Freeway Fire or the Landfill Fire. With a water drop from HC241, golf course personnel were able to contain the small spots with garden hoses. **Incident Narrative – Map 8** shows a map of the first homes impacted by the Freeway Fire in Yorba Linda.

At the same time, the ECC received multiple reports of a fire on the hillside below the Robert Diemer Water Filtration Plant. ORC E9, E37, and E61 and Staff 2 were deployed to that location. ORC E61 arrived at 11:13 a.m. and reported that this appeared to be a new vegetation fire. In less than 30 minutes, the units on scene were able to get the fire under control. These units were then redeployed to the Freeway Fire.

In Branch II, CAL FIRE Division Chief Toups was assigned Division Y at 11:30 a.m. Chief Toups was tasked to determine where control lines could be established and how firing operations might

be used to provide containment. Highway 71 was to be a key holding point, wanting to keep the fire south of Aliso Canyon. By noon, the wind had pushed the fire well past Aliso Canyon, heading for Chino Hills State Park and the thousands of acres of vegetation that would subsequently be consumed before any control was attained.

The fire moved through residential neighborhoods from Brush Canyon to the San Antonio neighborhood—a 5.5 mile span in less than five hours.

As the fire progressed into Yorba Linda and grew to be a threat to more neighborhoods, the unified command also grew. The unified command for the Freeway Fire now included representatives from OCFA, CAL FIRE, Corona Fire, Chino Valley Independent Fire District, Anaheim Fire, and the Brea Police Department.

The unified incident commanders established initial control objectives, which were to hold the fire east of Aliso Canyon and Yorba Linda Boulevard, south of North Ridge Trail, and north of the 91 Freeway. Initial objectives also were to evacuate east of Yorba Linda Boulevard and La Palma Avenue and to establish a Chino Hills State Park Contingency Plan.

Ember shower in advance of flame front.

In Yorba Linda, decorative vegetation, palm trees, and even ground cover on center medians served to fuel the fire's progression. Embers were driven into attic vents, underneath roof tiles, and into any unprotected openings. Firefighters employed a firefighting tactic known as "bump and run"— moving from home to home and street to street after knocking down visible fire. Dispatchers continued to relay reported structure threats to the Operations Section Chief, and available units were deployed.

With every major incident or disaster, the OCFA Department Operations Center (DOC) is activated. The DOC supports the needs and demands of the incident, directs the recall of personnel, coordinates the backfill of apparatus, and monitors other operational needs. At 11:30 a.m., ORC Division 3 (Robinson), who had assumed the Duty Officer assignment from Chief Fleming, arrived at the ECC. The DOC was activated and staffed by noon. Once opened and staffed, incident communications and incident ordering was moved into the DOC. As soon as was possible, Fire Management Activity Grants (FMAG) were submitted to the State of California Office of Emergency Services (OES) for each fire. Both were subsequently approved, thereby establishing reimbursement criteria for the cost of fighting the fires.

A primary function of the DOC was to ensure available relief apparatus were staffed and made available for emergency response and/or station coverage. The paramedic engine reconfiguration procedure was implemented. Twelve advanced life support (ALS) paramedic engine companies were divided and then reconfigured to either (1) a basic life support (BLS) engine company or (2) a paramedic assessment engine company (PAU), plus six paramedic vans. This allowed for more engines to be deployed, while maintaining ALS medical coverage in the unaffected areas.

Department manpower coordinators (MPC) were organized and directed to hire personnel for all un-staffed apparatus. During the incident, 36 relief/surge engine companies and a truck company were staffed and placed into service. Some of these units were sent to the incident, and others were used to provide station coverage. While searching for relief apparatus, several engine companies thought to be in reserve were discovered to have been placed into service by off-duty personnel. They were self-dispatched to the Freeway Fire. This was done outside the normal command and control systems. Personnel on these units injected themselves into the firefight without checking in with fire ground commanders or notifying them where they were operating. Some units also lacked proper communication equipment. These actions created serious personnel safety and fireground accountability concerns.

Critical decisions were made by the assigned Duty Officer regarding coverage of empty OCFA fire stations. Given the continued weather and an uncertainty as to the causes of the Freeway and Landfill fires—both of which were burning in the most northern portions of Orange County and directly upwind from structures—a conservative coverage pattern was maintained for all remaining OCFA response areas. All reserve companies were staffed, dispatch criteria was modified for selected call types, and surge apparatus was outfitted for service.

As the fire moved into Yorba Linda, the Incident Command Post (ICP) was relocated to Yorba Linda Regional Park. A Logistic Section Chief, ORC Battalion 13 (Runnestrand), was dispatched to the park to begin the establishment of a formal base camp. Later, the location and size of this park was determined to not be well suited to handle the necessary long-term logistical needs of an incident this size. The base camp was relocated to Irvine Regional Park at midnight the first day. This facility, better suited to support a large incident, was within a reasonable travel distance to the fire. Branch V was considered too remote to be adequately supported from the base, so a spike camp was established.

Palm tree ignites by flying embers.

By 11:30 a.m., ORU Strike Team 9329C – Hawkins had been released from the Corona area and was fully engaged in Box Canyon. As the fire moved toward the Hidden Hills community, these engines and others protected homes along Foxtail Drive and Via Lomas de Yorba. Because the fire had moved into the area so quickly and without warning, residents in these areas were trying to evacuate while firefighting resources were attempting to gain access. It soon became evident the residents were in significant danger from the fire. The Brea Police Department was called to expedite the evacuation. Reports were also received that fire was impacting homes near Los Monteros and Los Adornos. ORC Patrol 23 reported to the Incident Commander that the Archstone Apartments located at River Bend and Cross Creek Roads were also immediately threatened. The fire continued its rapid and uncontrollable assault on multiple fronts. **Incident Narrative – Map 9** shows a map of the Freeway Fire progression into the Hidden Hills community.

At approximately 11:45 a.m., several units were deployed into the Savi Ranch commercial district. The units followed up on numerous reports of automatic fire alarms and also extinguished fires that had moved into the trees and ornamental vegetation. Flying embers found openings and combustible material at several of the businesses. These fires were extinguished as they were found. For the next several hours, units were committed to the area to ensure commercial losses were kept to a minimum.

In Brea, at the Landfill Fire, additional structure protection groups (SPG) were established. Brea Battalion 2 (Wood) was assigned the Kraemer SPG and given engine resources (XOR ST 1427A) to protect the homes surrounding Brea Fire Station 3. Brea Engine 2 reported the fire was within 200 yards of Brea-Olinda High School, and a request was made to the Brea Police Department to close Wildcat Way to all public traffic. In Brea, four homes were destroyed; six others damaged. The Brea Olinda School District sustained major damage around its high school campus, including the loss of several secondary buildings at Brea Canyon High School. **Incident Narrative – Map 10** shows a map indicating the perimeter of the Freeway and Landfill Fires.

Los Angeles County Fire Department Assistant Chief Watson and Deputy Chief Bryant arrived at the Landfill Fire command post. They discussed their concern that the north flank of the fire presented a threat to the Tonner Canyon, Diamond Bar, La Habra, and Hacienda Heights communities. With limited available resources, Battalion Chiefs Wells and Montoya asked if Los Angeles County Fire Department would be able to provide tactical support to those communities.

Battalion Chiefs Montoya and Wells reorganized the Landfill Fire firefighting effort. They created two branches and four structure protection groups. Single increment initial attack resources were formed into a strike team to better coordinate firefighting efforts and fire ground accountability (ORC Strike Team 1406A [Brice]). During this meeting, Battalion Chief Reeder contacted Battalion Chief Wells and advised of the anticipated merging of the Freeway Fire and the Landfill Fire sometime that evening. The decision would ultimately be made to manage the two fires as a Complex, and establish the Landfill Fire as Branch III of the Freeway Complex Fire.

A Yorba Linda neighborhood as the fire consumed the hills nearby.

The unified incident commanders determined an Incident Management Team (IMT) would be required to assist in this emerging disaster. CAL FIRE IMT 6 was on standby in Riverside County and was activated at noon. Team members began to arrive at 1:00 p.m., with the team ultimately assuming full command of the fire at 7:00 p.m. on November 15.

The strong Santa Ana winds did not allow smoke from this massive fire to rise—rather, it created a shearing effect. This resulted in a thick, gray blanket of smoke cutting off aerial views and lowering the ground level visibility to just a few feet in front of firefighters. ORC Battalion 15 (Boyle), responding as part of CAL FIRE IMT 6, was assigned to provide an update on the fire

location and progression. Due to the smoke conditions and continued rapid rate of fire spread, Chief Boyle was unable to provide this valuable intelligence to the command team and commented, "It seemed like the fire was everywhere."

The main body of the Freeway Fire was preceded by a broad ember shower distributed by the Santa Ana wind.

The main body of the Freeway Fire was preceded by a broad ember shower distributed by the Santa Ana winds. Embers crossed the 91 Freeway into Anaheim Hills at 12:46 p.m. The Helicopter Coordinator (HELCO) reported the fire was well established within the vegetation south of the 91 Freeway. Wind driven, the fire flashed toward several residential streets in Anaheim, including Rimwood Road, Canyon Vista Drive, Larkwood Street, South Morningstar Drive, and Laurel Tree Drive. The fire reached East Whitewater Drive and the Cascade Apartments at approximately 1 p.m. Overall, the City of Anaheim sustained loss or damage to 25 single-family homes and 60 apartment units.

MetroNet Dispatch received 911 at 12:46 p.m. as the fire jumped the 91 Freeway. First reports questioned if this was a spot fire from the Freeway Fire or a new fire within the City of Anaheim. Initial attack resources were dispatched apart from the command and control of the Freeway Complex Fire. This limited the resources available for deployment into Yorba Linda as Anaheim Fire worked to control the new threat. Eventually, this fire would be identified as Branch IV in the fire organization, but was frequently referred to as the Anaheim Branch.

The fire's potentially devastating impact on Anaheim homes and businesses required the incident command's immediate attention. This historical fire corridor was well-known. Had the fire in Anaheim escaped containment, one flank potentially could have followed the path and eventually matched the destruction of the 1967 Paseo Grande Fire. This could have extended fire through Anaheim Hills and into the cities of Villa Park, Orange, and Tustin—devastating the communities of Orange Park Acres, Santiago Hills, and Cowan Heights.

To minimize the threat, most of the helicopters operating on the Freeway Fire were directed to concentrate control efforts on the Anaheim side of the 91 Freeway. Dozens of water drops were made and—in combination with the efforts of the assigned ground units—containment was achieved. **Incident Narrative – Map 11** shows a map of the spot fire across the 91 Freeway into the City of Anaheim.

Firefighters fill a Water Tender at a lower elevation to take to engines fighting fires at higher elevations due to the lack of hydrant pressure.

By 1:00 p.m., the fire was well established in the Yorba Linda community of Hidden Hills. Fire engines (ORC Strike Team 1403A), a Patrol/CAFS task force led by ORC Battalion 22 (Antrim), along with Water Tenders 16 and 40, and engines from Anaheim engaged in the fight. Fire units encountered low or no water pressure on Hidden Hills Road, Mission Hills Lane, High Tree Circle, Fairwood Circle, Green Crest Drive, Skyridge Drive, and other streets. With homes burning on multiple streets and no

water, strike team leaders directed engine companies to move to areas that had available water. However, because the Patrol/CAFS task force was supported by the water tenders, it was able to effectively operate with less water than that required by an engine. Unfortunately, due to rapidly diminishing water pressures, even the water tenders were driven further down the hill to be refilled. These resources remained in the Hidden Hills community to protect houses that had not burned and to ensure extinguished homes did not rekindle. The availability and use of the CAFS was a direct result of recommendations made in the 2007 Santiago Fire After Action Report.

The water supply issue was reported to the Yorba Linda Water District (YLWD) through the City of Yorba Linda EOC at approximately 2:00 p.m. YLWD personnel responded to the area and were able to make adjustments to improve the water delivery in several areas. Due to the fire threat, water district personnel were unable to access the Santiago booster pump station. When YLWD personnel were initially able to make access to the pump station, they determined there had been sufficient heat to cause the pump station for the Santiago Reservoir to automatically shut down. Once this occurred, the continued water use eventually drained the Santiago Reservoir responsible for supplying water to the Hidden Hills and other nearby communities. YLWD personnel spent several hours completing repairs. They worked into the night and the next day to ensure a steady supply of water.

Daytime seems like night under extreme smoke conditions.

The water supply for this area was further impaired—unknowingly—by fire suppression units and some of their fire control tactics. Faced with multiple structures fully involved in fire, many engines resorted to the use of master streams to contain the fire spread. This meant a single fire engine could have pumped more than 1,000 gpm. On some streets, multiple master streams were used. This limited water availability for engines arriving later. Additionally, the 4-inch diameter hose lines that were laid in the street to supply engines physically blocked later arriving units' access to neighborhood streets. These tactics were modified, and the master streams were shut down. Water tenders were also deployed into the impacted areas to help mitigate the water deficit.

In Branch II, plans were also underway to contain the fast-moving brush fire. Retardant drops from air tankers were directed along South Ridge Trail. They had a minimal effect, and the wind pushed the fire into Chino Hills State Park. A contingency plan was enacted in the likely case the fire would reach the community of Chino Hills. The Chino Hills Structure Protection Group was established, but it was not staffed until later that evening when more resources were available. The immediate goal was to keep the fire within the boundaries of South Ridge Trail, Water Canyon Ridge, and Slaughter Canyon. This plan was subsequently supported with the use of engines, bulldozers, hand crews, and aircraft.

Reports of the Landfill Fire crossing the 57 Freeway at Lambert Road east of State College Avenue were received at 1:21 p.m. A request was made to the California Highway Patrol (CHP) to close the freeway due to smoke and fire conditions. The fire was actively spotting in multiple directions, and on-scene resources moved from neighborhood to neighborhood protecting structures. By this time, Los Angeles County (LACO) Fire ground and air resources had been

moved into to reinforce the Tonner Canyon flank. These resources would eventually be used to support the contingency and control objectives for Branch V. LACO helicopters were used to suppress and contain the fire north of Brea Olinda High School and the neighborhoods west of the 57 Freeway.

At 1:30 p.m., homes adjacent to the Eastside Community Park located on Heatheridge Drive and Hidden Hills Road were reported to be burning. ORC Strike Team 1404A (Whitaker) and XOR Strike Team 1425A (Hirsch) had at least five, fully involved structures on Heatheridge Drive. Fifteen minutes later and a mile away, homes in the Village Center area on Willow Tree Lane, Ridge Park Drive, Juniper Avenue, Alder Avenue, and Deodar Drive were burning.

ORC strike teams assigned to the Tea Fire in Santa Barbara County and the Sayre Fire in Los Angeles County were reassigned to the Freeway Fire. ORC Strike Team 1400A (Valenzuela) arrived around 2:00 p.m. and joined the other units already engaged in Yorba Linda. ORC Strike Team 1402A (Kinoshita) returned at 4:30 p.m. ORU Strike Team 9328C (McCoy) was released late that evening from the Tea Fire and arrived sometime around midnight, the first day.

The three Orange County MetroNet strike teams (XOR) were also released from Tea and Sayre Fires and reassigned to the Freeway Fire. XOR Strike Team 1421A (Head) arrived about 3:45 p.m. and began working in the Anaheim Hills area. XOR Strike Team 1422A (Duncan) arrived at 3:30 p.m. and was assigned to structure protection in the community of San Antonio. XOR Strike Team 1423A (Thomas) started working in the Fairmont area soon after arriving at 4:45 p.m.

Aerial view of the fire's aftermath on a neighborhood in east Yorba Linda

A critical point in time for the Freeway Complex Fire was 2:30 p.m. No less than 15 homes were simultaneously burning on Juniper Avenue, Deodar Drive, and other streets in the San Antonio community. By this time, sufficient strike teams had arrived to allow a switch from the "bump and run tactic" to a more offensive "anchor and hold strategy." This ensured damage and loss of homes would be minimized.

At 2:30 p.m., Branch II (Deyo) and Division Y (Toups) met with Branch I resources in the San Antonio community. With numerous homes threatened, strike teams were requested to provide structure protection. By this time, several out-of-county strike teams had reported to the fire. As many strike teams as possible were directed into the area between Village Center Drive and San Antonio Road. **Incident Narrative – Map 12** shows a map of the Freeway Fire impacting the San Antonio community.

By 3:00 p.m., the weather began to change in favor of the fire control efforts. The temperature remained in the mid-70s and the relative humidity at 7 percent. However, the change in sustained wind speed to below 40 mph—sometimes as low as 10 mph in some areas—began to make the greatest difference. The advancing structure loss was stopped within the San Antonio neighborhood. Although a positive sign for fire ground commanders, the threat to—and the loss of—structures did not end. Over the next several hours, dozens of new fires were reported, or fires

thought to be extinguished rekindled within communities along the Freeway Complex Fire's path. Fire crews returned hours later to streets previously thought clear of fire, only to find multiple homes burning anew. Many of these latent fires occurred from embers intruding into concealed spaces within homes and smoldering undetected.

The change in sustained wind speed to below 40 mph—sometimes as low as 10 mph in some areas—began to make the greatest difference.

A reconnaissance flight was conducted for the Landfill Fire at approximately 3:00 p.m., and a decision was made to change strategy from a defensive posture to an aggressive offensive tactic. This resulted in controlling the spread of the fire and keeping it from repeatedly jumping the 57 Freeway and spreading uncontrolled into residential neighborhoods. The Landfill Fire would ultimately result in the loss of four homes and damage to six others. The Brea Canyon and Brea Olinda High Schools also sustained fire damage and 980 acres of vegetation were burned.

Sometime between 4:00 and 4:30 p.m., the fire in Branch II that was burning down slope against the wind into Yorba Linda became realigned with the topography and wind. Numerous spot fires were reported at Condor Ridge. Control efforts with retardant drops proved unsuccessful, and at 4:45 p.m., the fire continued driving westward into Telegraph Canyon.

Around 5:00 p.m., a second spot fire was reported on the south side of the 91 Freeway at Coal Canyon. ORC Superintendent 1 (Hanson) led an aggressive ground effort with bulldozers and handcrews to contain the new threat. Containing this fire closed the back door and kept the Freeway Complex Fire from reaching Sierra Peak and making the run at Windy Ridge, which could have threatened additional communities.

By 5:30 p.m., the wildland fire was continuing to move through Upper Waterman Canyon at an incredible rate. Within minutes, another tragic outcome was narrowly avoided. Earlier in the day, CAL FIRE Crew Strike Team 9387G was assigned to this area in Branch II. The crew buses were parked in an unburned area of San Juan Hill located in Upper Waterman Canyon. As the fire burned across the canyon, the crew buses were going to be overrun. The crew bus drivers took tried to relocate their vehicles ahead of the quickly approaching front. Orders were given for all personnel to seek safety by entering the already burned area—known as "entering the black." Eight of the inmate crew members inadvertently took off through the unburned fuel—known as "the green." Two firefighters assigned to CAL FIRE Strike Team 9410C were sent to retrieve and direct them into a safe area. After the fire front passed, all personnel were accounted for. No injuries were sustained, but the two crew buses sustained minor damage from being so close to the flames.

Cityscape of Yorba Linda during the first night

The decision to merge the Landfill and Freeway Fires into a Complex occurred between 5:00 and 5:30 p.m. A complex is comprised of two or more fires in a geographically adjacent area. When implemented, managing an incident as a complex allows for shared incident management and logistical support with a central base of operations for continuity and efficiency. As the fire grew, the

branch assignments expanded to accommodate the vast boundary of the fire. The Landfill Fire was subsequently identified as Branch III and assigned to BRE Battalion 1 (Montoya) and ORC Battalion 8 (Wells). Branch IV was established when the fire subsequently jumped the 91 Freeway and moved into the City of Anaheim. This branch was also referred to as the Anaheim Branch. With the addition of LACO to the unified command, Branch V was later identified to include parts of Tonner Canyon and the City of Diamond Bar. Additional control objectives were established including keeping the fire east of the 57 Freeway and south of the City of Diamond Bar. LACO units would establish in this area to help make a stand.

At 5:50 p.m., Incident Command received a request from YLWD personnel to provide engines to assist with water supply problems. Three engines—ORG E2, STA E2, and GGVE5—were assigned and were able to sustain water availability by pumping water from one supply grid of the system to another. These engines pumped through the night until the YLWD brought in a high-volume portable pump to take over for fire engines. According to the YLWD After Action Report, the water shortage was primarily caused by fail-safe actions of pumping equipment and the high demand on the system caused by firefighting efforts. These two situations resulted in a complete emptying of the Santiago Reservoir.

By 7:00 p.m., firefighters were advancing into all neighborhoods affected by the Freeway Complex Fire. Strike teams from all over Southern California were still arriving to help. CAL FIRE IMT 6 officially took responsibility for the management of the Freeway Complex Fire. Formal briefings were taking place, and logistical needs such as food and water were supplied to personnel. Fuel as ordered for vehicles that had been at working all day. A unified communication plan was initiated resulting in significant radio communication improvement by the following morning.

At an earlier briefing for the Landfill Fire, the Freeway Fire was predicted to burn into Carbon Canyon and make a direct run at the community of Olinda Village. Olinda Village sits in a confluence of canyon sides creating a “bowl” where residents have built homes, businesses, a church, and a school. Olinda Village is heavily lined with pine, eucalyptus, and a variety of ornamental vegetation. The Hollydale Mobile Estates is a large mobile home park where many village residents live.

At 8:30 p.m. on this first day, a strike team of engines—ORC Strike Team 1405A (Brown)—was assigned to the Olinda Village area. He developed control objectives to keep the fire south of Carbon Canyon Road, east of the eastern most boundary of Olinda Village, west of Copo de Oro, and north of Verbena Lane. Tactical priorities included the protection of the Hollydale Mobile Estates and the Carbon Canyon Christian High School. A special emphasis was placed on protecting the power lines along Carbon Canyon Road—as these supplied the main power to Olinda Village and the water supply pumps for the area.

At the same time, in Branch II, the perimeter control efforts remained active. The fire continued to burn on multiple fronts through canyons aligned with the wind. The Rolling M Ranch presented a new structure protection challenge. Two crew strike teams and a Chino Hills engine were assigned to this area. Other strike teams of bulldozers and hand crews were working to build a control line at Bane Canyon. However, at 9:00 p.m., the fire was spotted one-fourth of a mile away in Slaughter Canyon. The plan was abandoned. By midnight, the Freeway Complex Fire had reached the City of Chino Hills and was burning behind homes located near Butterfield Road and the Los Serranos Golf and Country Club. **Incident Narrative – Map 13** is a map of the local canyons.

On November 16 around 2:00 a.m., the wind direction shifted from off-shore to a sustained on-shore direction. This was reported by personnel at Olinda Village and Branch II in Aliso Canyon. At 3:30 a.m., the Freeway Complex Fire had progressed through the Chino Hills State Park into Telegraph Canyon. It then had moved into the Carbon Canyon area. Highly erratic burning conditions were seen with flame heights reported up to 50 feet and visibility at near zero. **Incident Narrative – Map 14** shows a fire progression map of the Freeway Fire advancing into Olinda Village.

As the Freeway Complex Fire moved toward the Olinda Village area, an evacuation plan was implemented. Engines were moved to protect structures as the fire was burning directly into the Hollydale Mobile Estates. Largely due to the significant amount of preparation made by engine crews earlier in the day, the flame front was repelled and the community of Olinda Village was spared significant loss. One mobile home in Hollydale and a home on Olinda Drive were destroyed. By 7:00 a.m. on November 16, the threat to Olinda Village had passed.

The wind shift had an impact on fire control actions in the Chino Hills area. At 3:00 a.m., the fire burned freely near the upper end of Aliso Canyon. Branch II ordered evacuations of hundreds of homes south of Soquel Canyon and west of Highway 71. An extensive firing operation was conducted as part of the structure protection effort. Fifteen engines worked until sunrise to ensure there were no losses. Another large firing operation from Euclid to Carbon Canyon Road was completed by 9:00 a.m.

Chief Toups (Division Y) was relocating Branch II resources into the Sleepy Hollow area off Carbon Canyon Road when he encountered engines assigned to Branch V. These local government engines had just completed a firing operation around homes bordering the Saint Joseph's Hill of Hope off Carbon Canyon Road in what they called a structure protection effort. Chief Toups asked the Strike Team Leader to cease from any additional firing as the wind direction and terrain were not properly aligned for this type of operation. The reason given for the firing operation was structure protection, but the unintended consequence was to create a condition which drew the main body of the Freeway Complex Fire deeper into Tonner Canyon. Once established within the canyon, the fire would be aligned and head toward the Los Angeles County line and the city limits of Diamond Bar. **Incident Narrative – Map 15** shows a map of the Freeway Fire progressing into Tonner Canyon.

Smoke column rising through the inversion layer

Day 2 - November 16, 2008

The Freeway Complex Fire was battled through the day on November 16. Aircraft, bulldozers, hand crews, and engine companies worked throughout the day to establish a control perimeter around the fire. By midnight on that second day, the goal was achieved. Overhaul and line improvement continued over the next couple of days.

The re-population of evacuated areas was a priority for Incident Command. Residents of areas that were not under mandatory evacuation were allowed to return to their homes at their choosing. Those under a mandatory evacuation order had to wait until a determination was made that the threat was fully abated. After conducting an aerial reconnaissance of the Complex, Incident Commanders decided at 3:00 p.m. on November 16 that most areas under the evacuation order could be repopulated. OCFA Occupant Liaison personnel assisted homeowners in gaining access to homes to recover personal property and by listening to and answering questions.

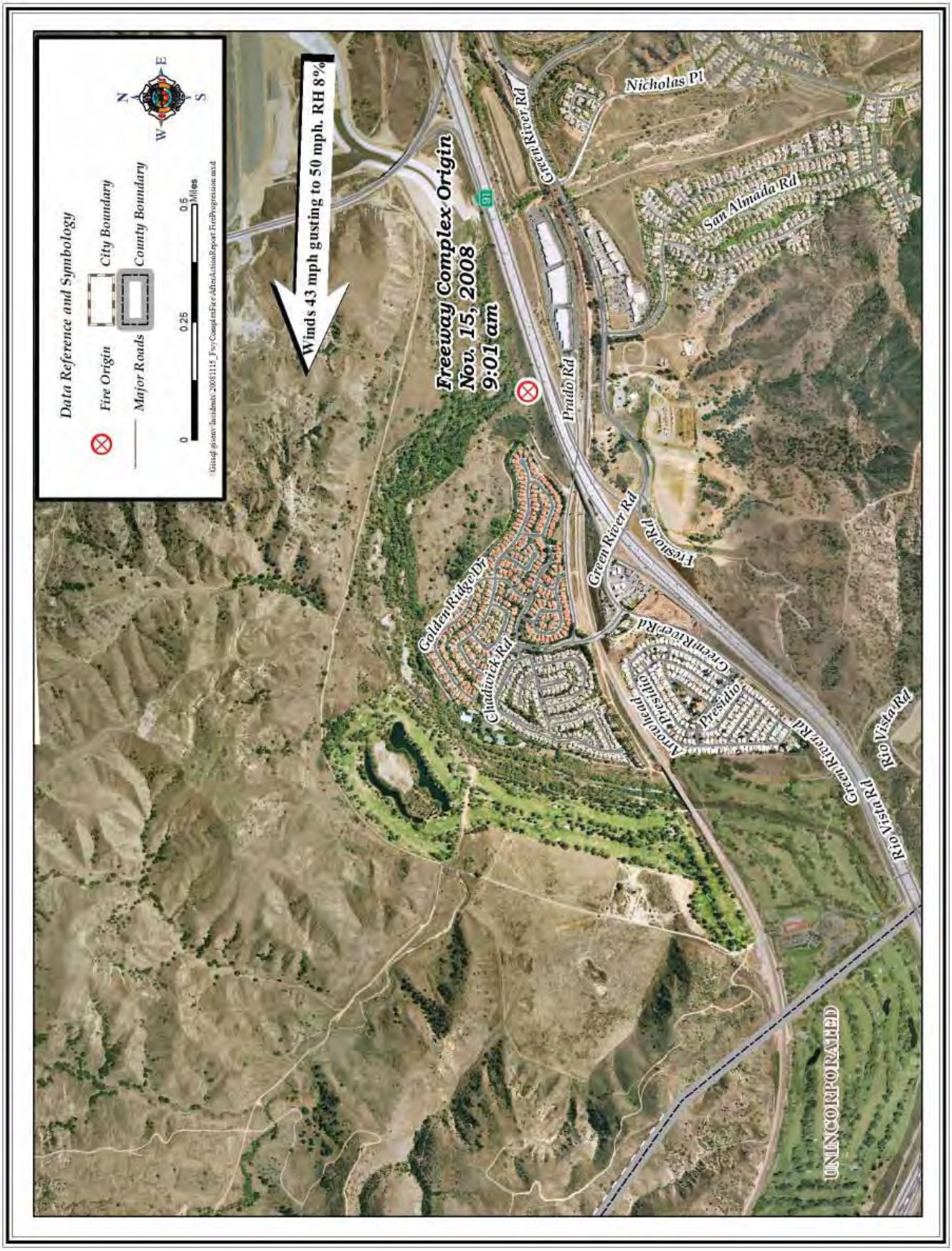
Days 3-5, November 17-19, 2008

Neighborhoods that had been impacted by the fire had fire companies assigned to ensure burned homes were properly overhauled and no new fires would occur as a result of hidden or smoldering embers. Neighborhoods, homes, and cars that were not burned—but may have received a covering of fire retardant—were washed to minimize damage.

On November 19, 2008, at 7:00 a.m., the Freeway Complex Fire was declared to be fully contained. At its peak, more than 3,800 firefighting and support personnel were assigned to the incident. More than 360 structures were destroyed or damaged, and over 30,000 acres of valuable watershed were consumed. The extinguishment effort for the incident is estimated to cost $16.1 million, with property loss exceeding $150 million. Injuries were few and relatively minor. Most importantly, no lives were lost to either civilians or firefighters.

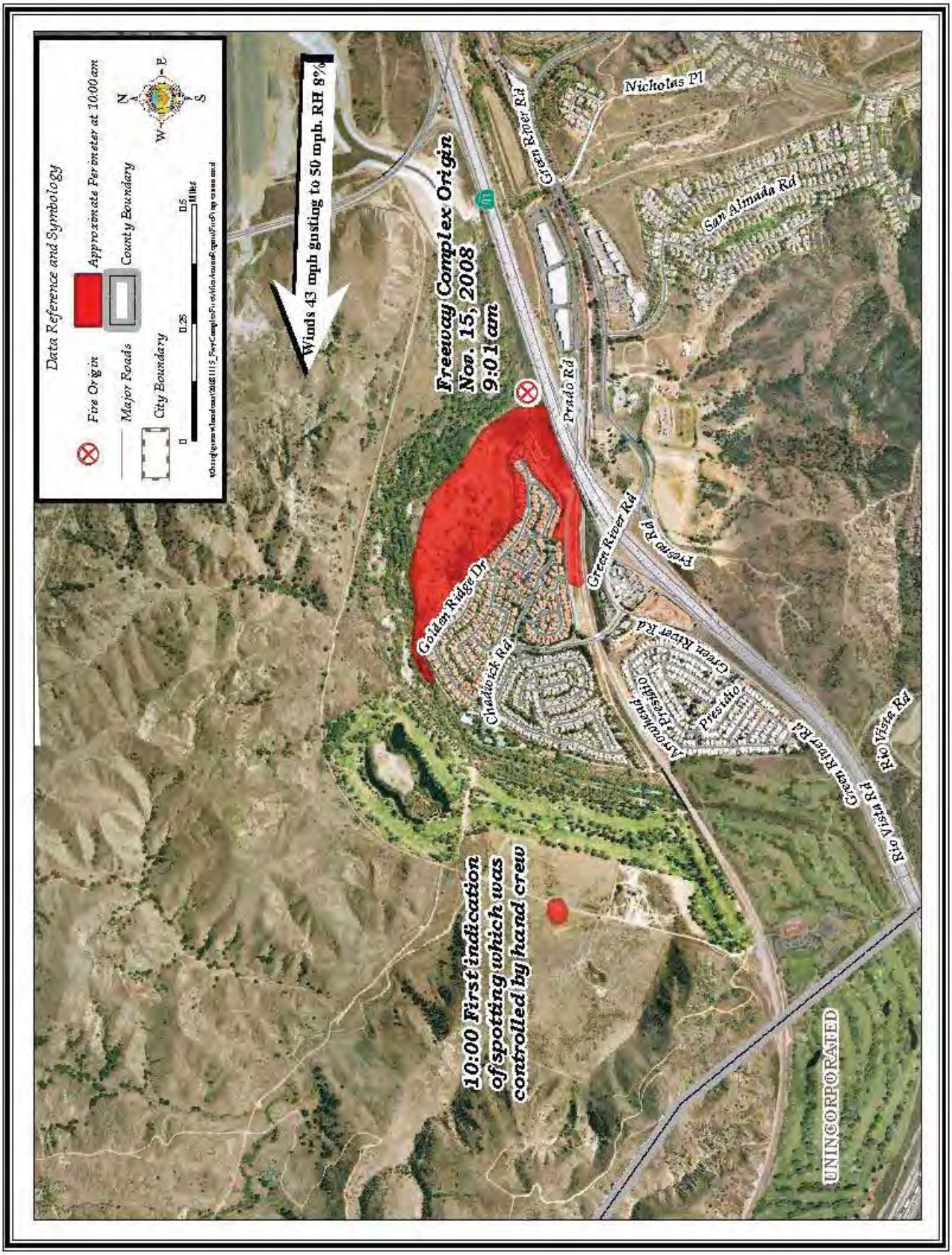
The fire contained; damage assessment begins in a Yorba Linda neighborhood

Incident Narrative – Map 3
Freeway Complex Fire—Origin 9:01 a.m.

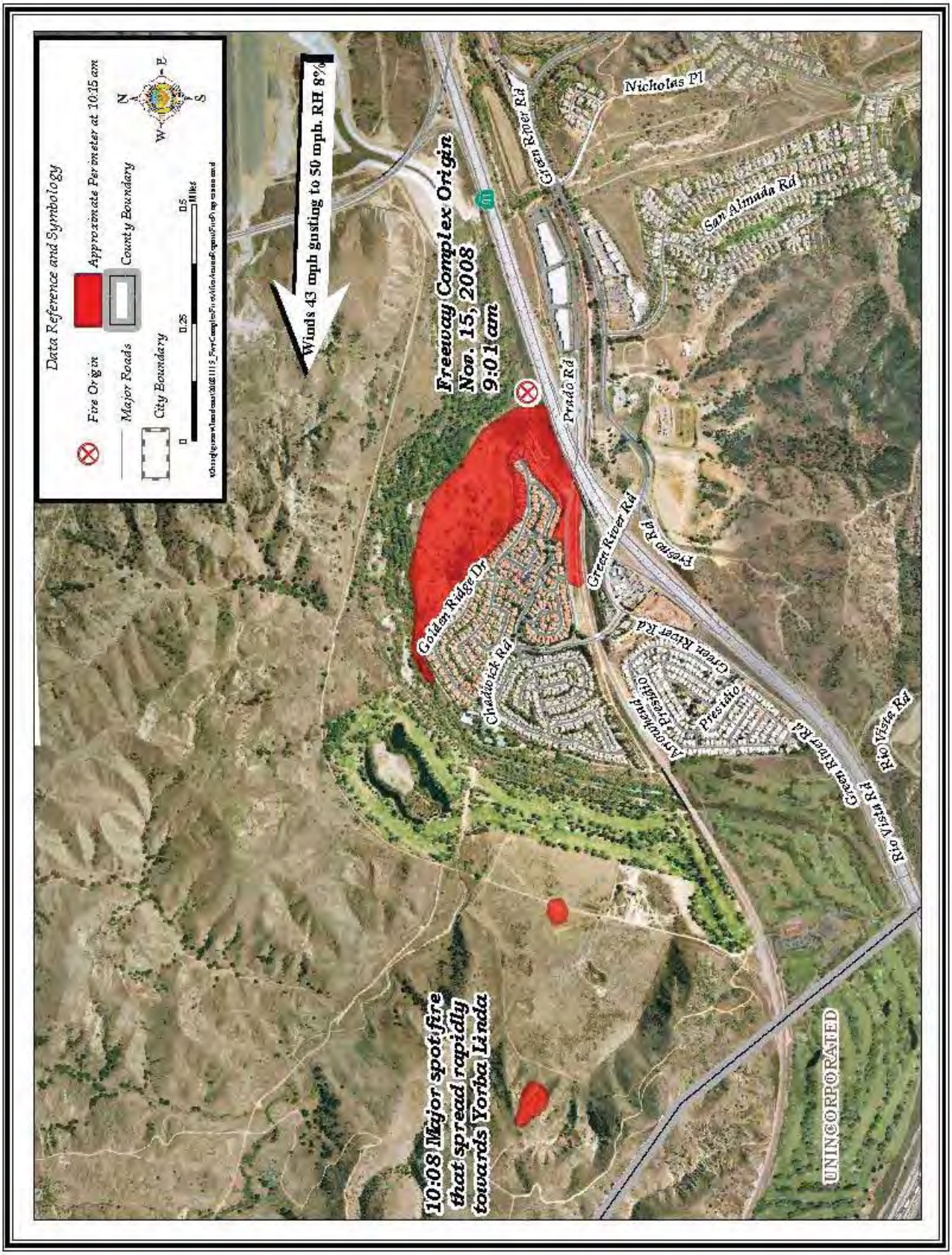


Incident Narrative – Map 4
Corona Fire Engine 5—Near Miss Entrapment

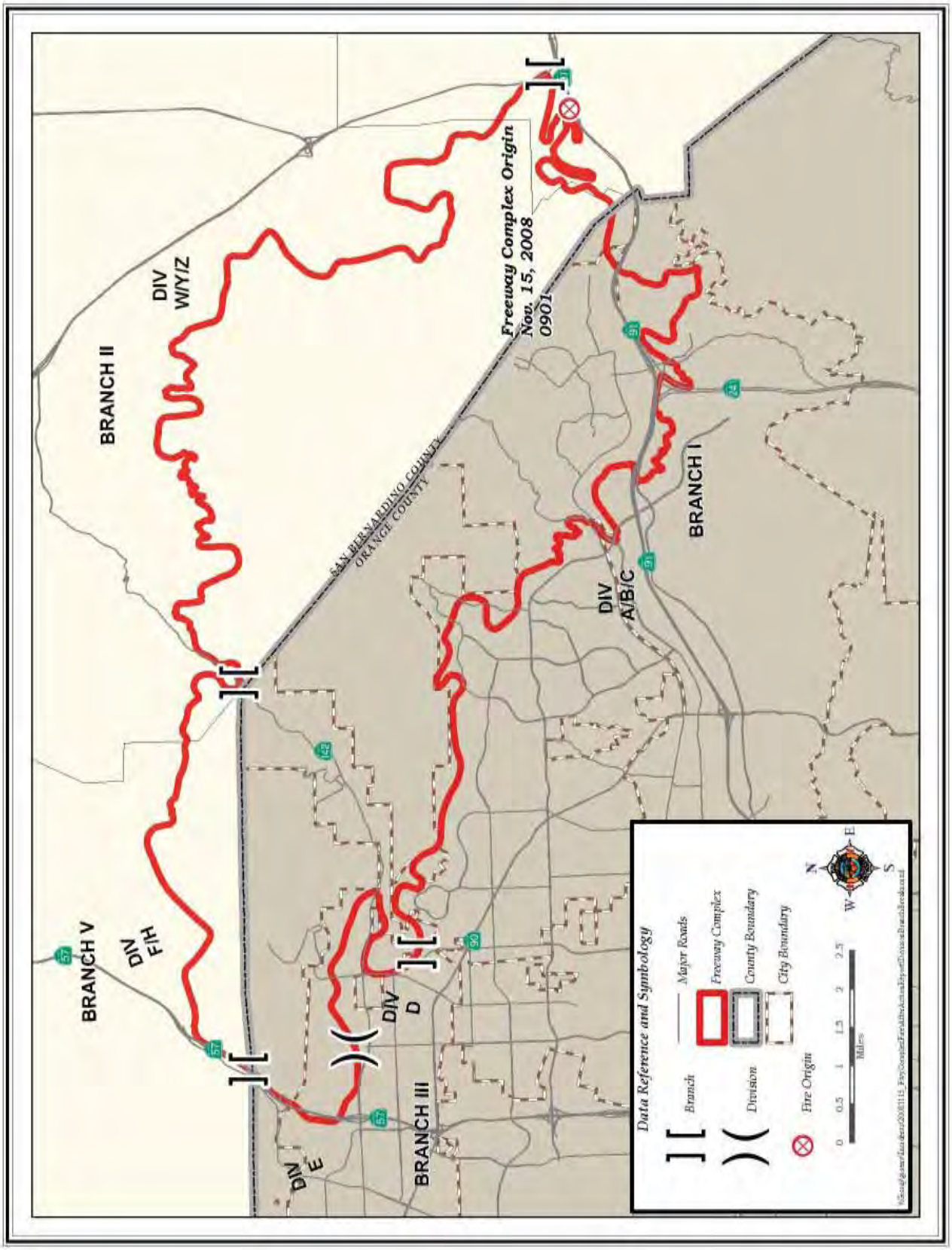
Incident Narrative – Map 5
First Indication of Spotting—10:00 a.m.



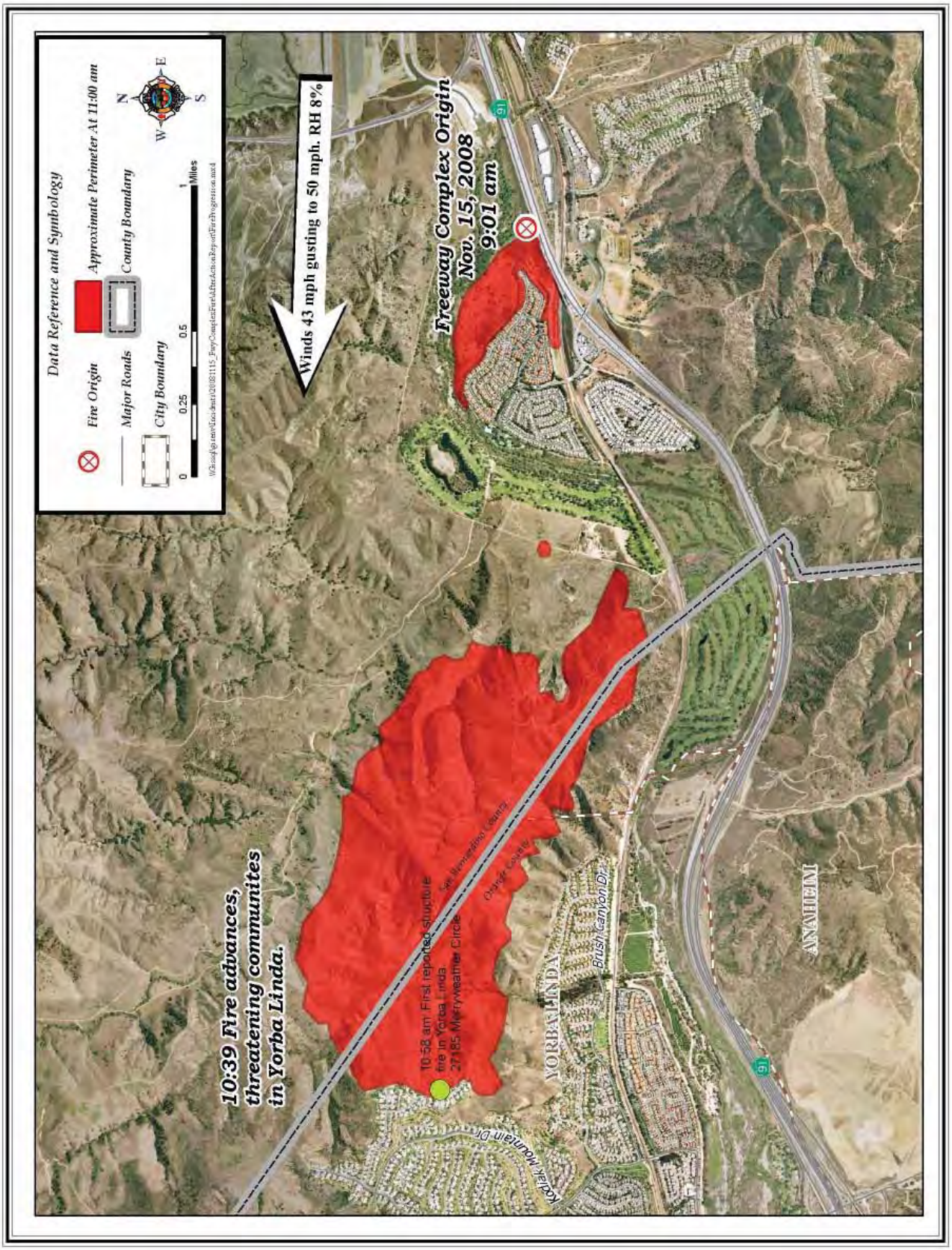
Incident Narrative – Map 6
Second Spot Sighted—10:08 a.m.



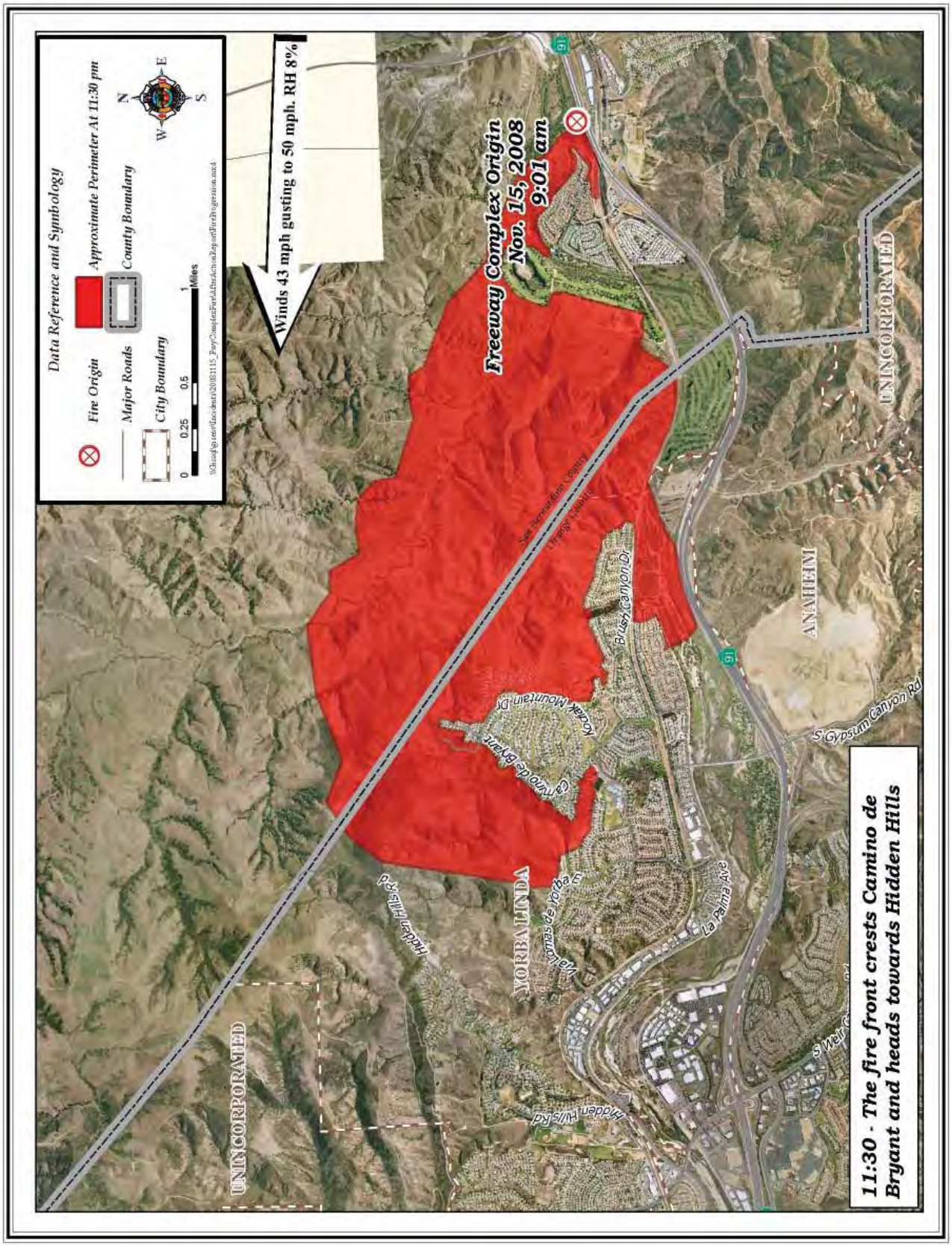
Incident Narrative – Map 7
Freeway Complex Fire—Branch and Division Map



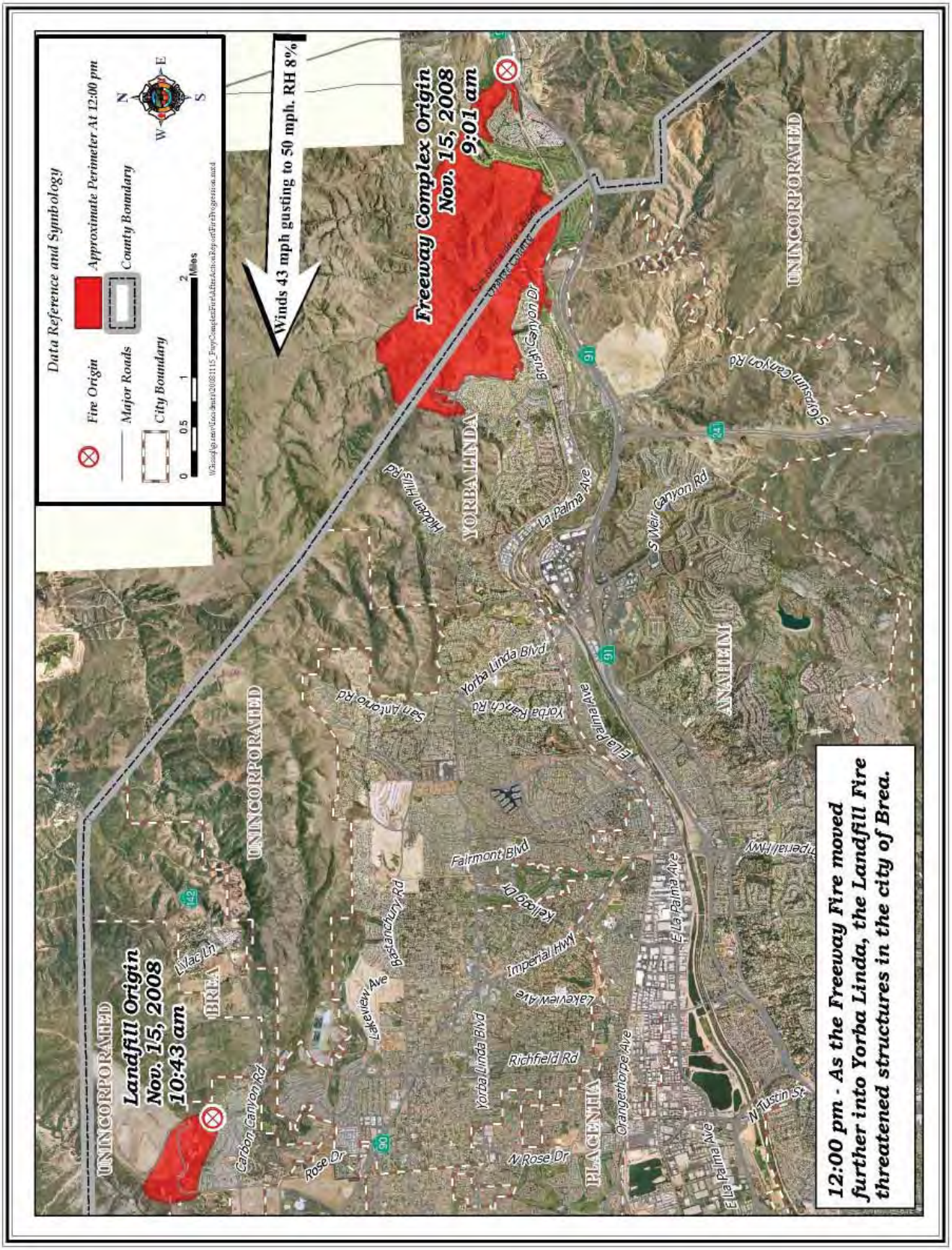
Incident Narrative – Map 8
Freeway Fire Reaches Structures in Yorba Linda—10:39 a.m.



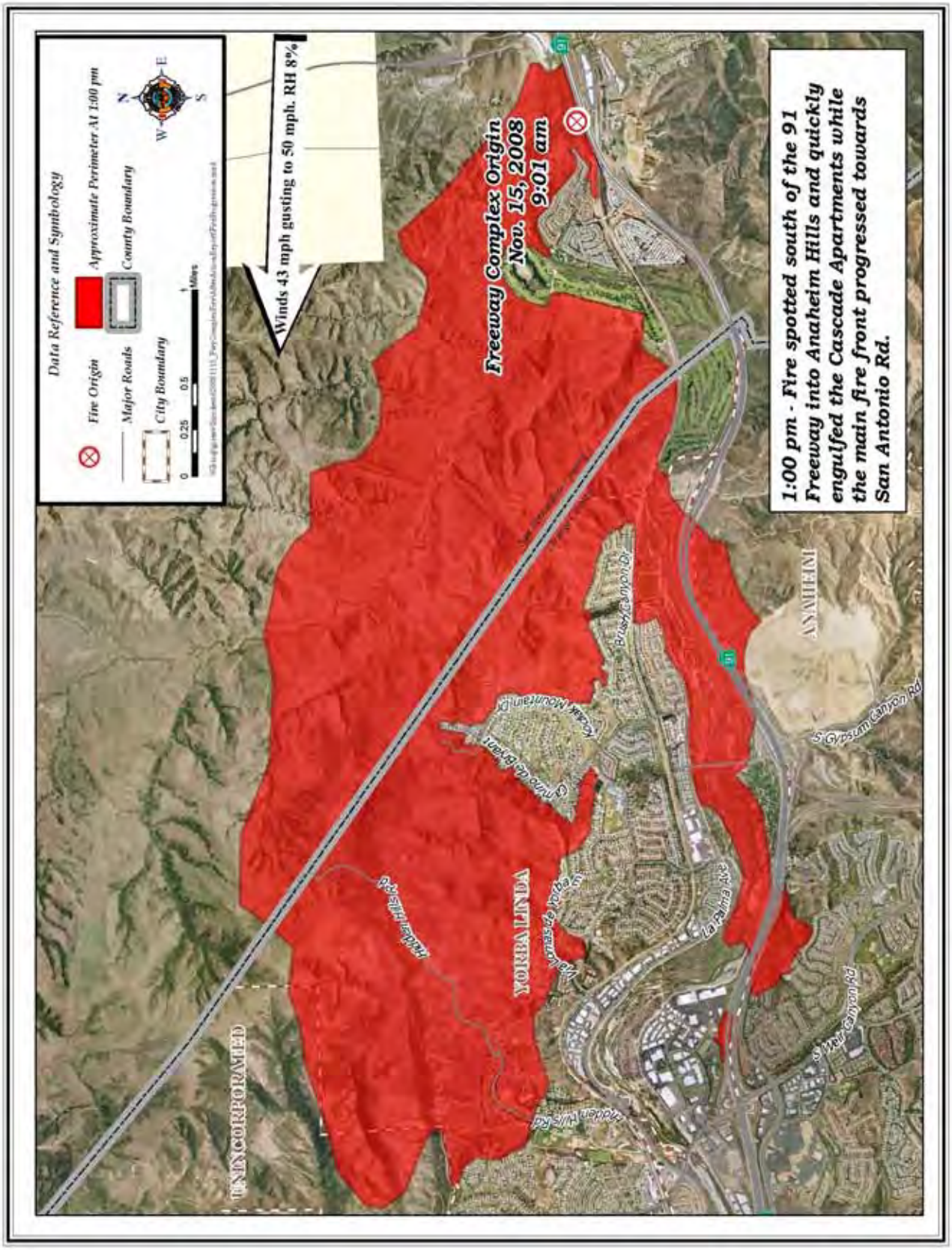
Incident Narrative – Map 9
Freeway Fire Moves Towards Hidden Hills—11:30 a.m.



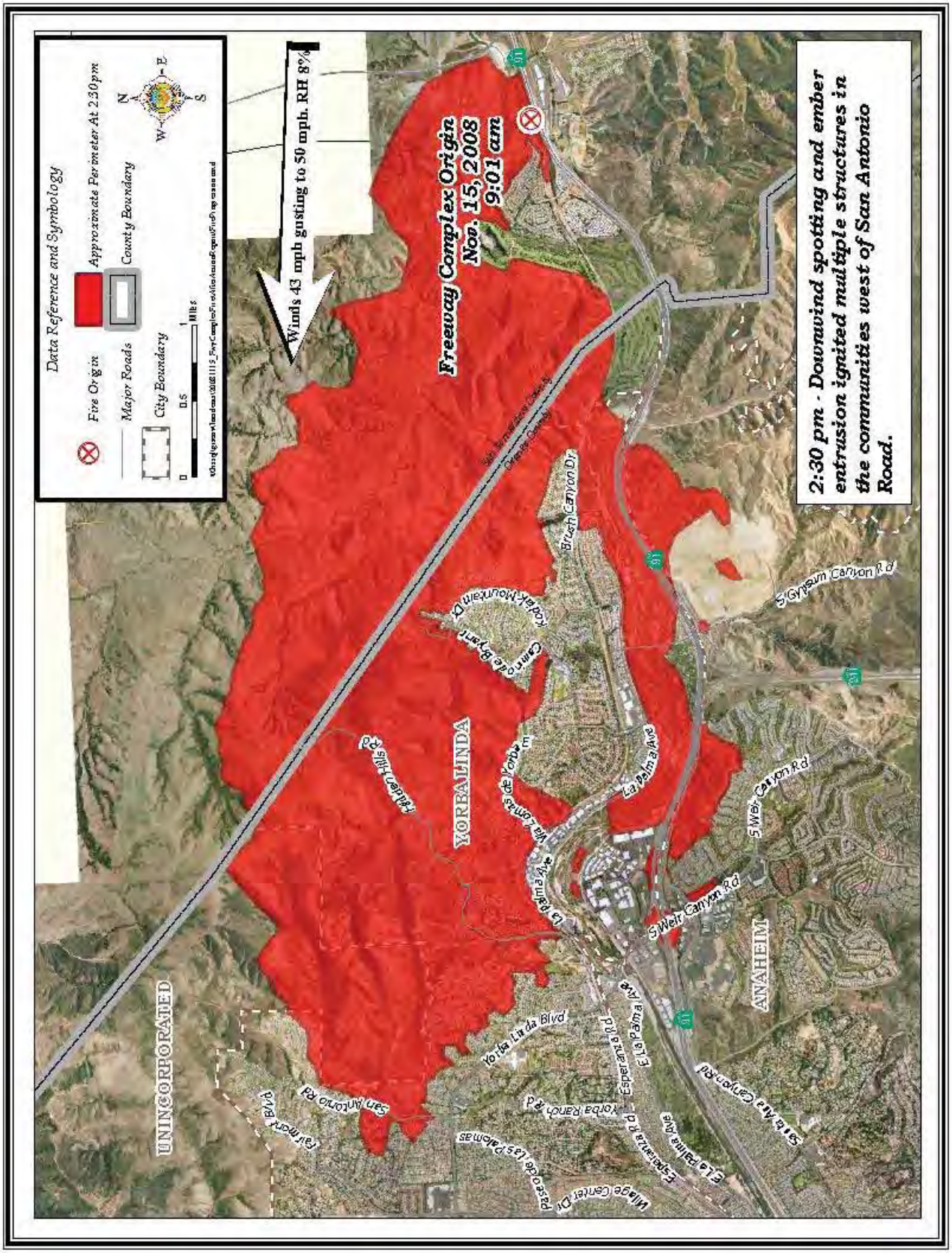
Incident Narrative – Map 10
Perimeter of the Freeway and Landfill Fires—12:00 p.m.



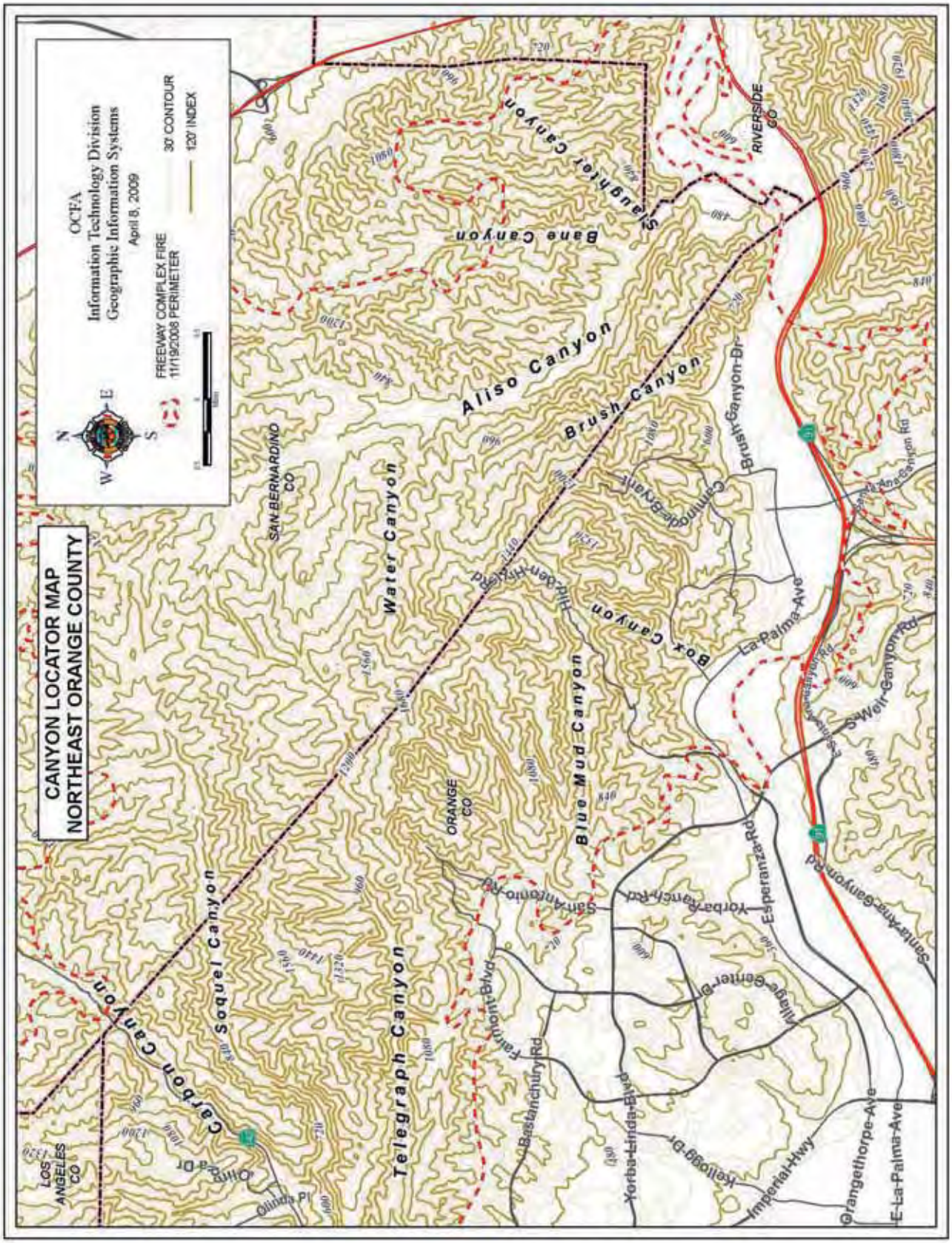
Incident Narrative – Map 11
Freeway Fire Spots Across the 91 Freeway into Anaheim—1:00 p.m.



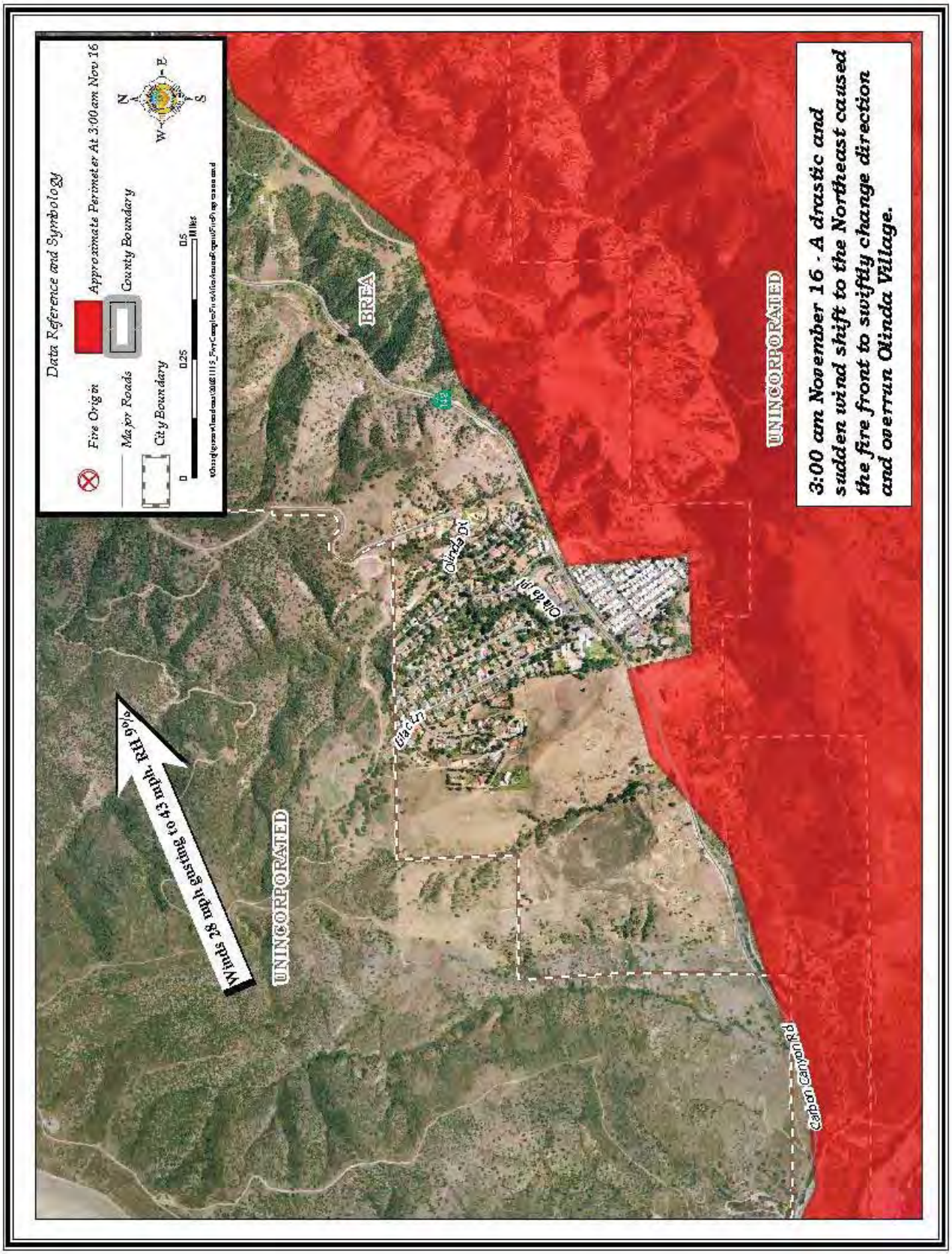
Incident Narrative – Map 12
Freeway Fire Reaches the San Antonio Community—2:30 p.m.



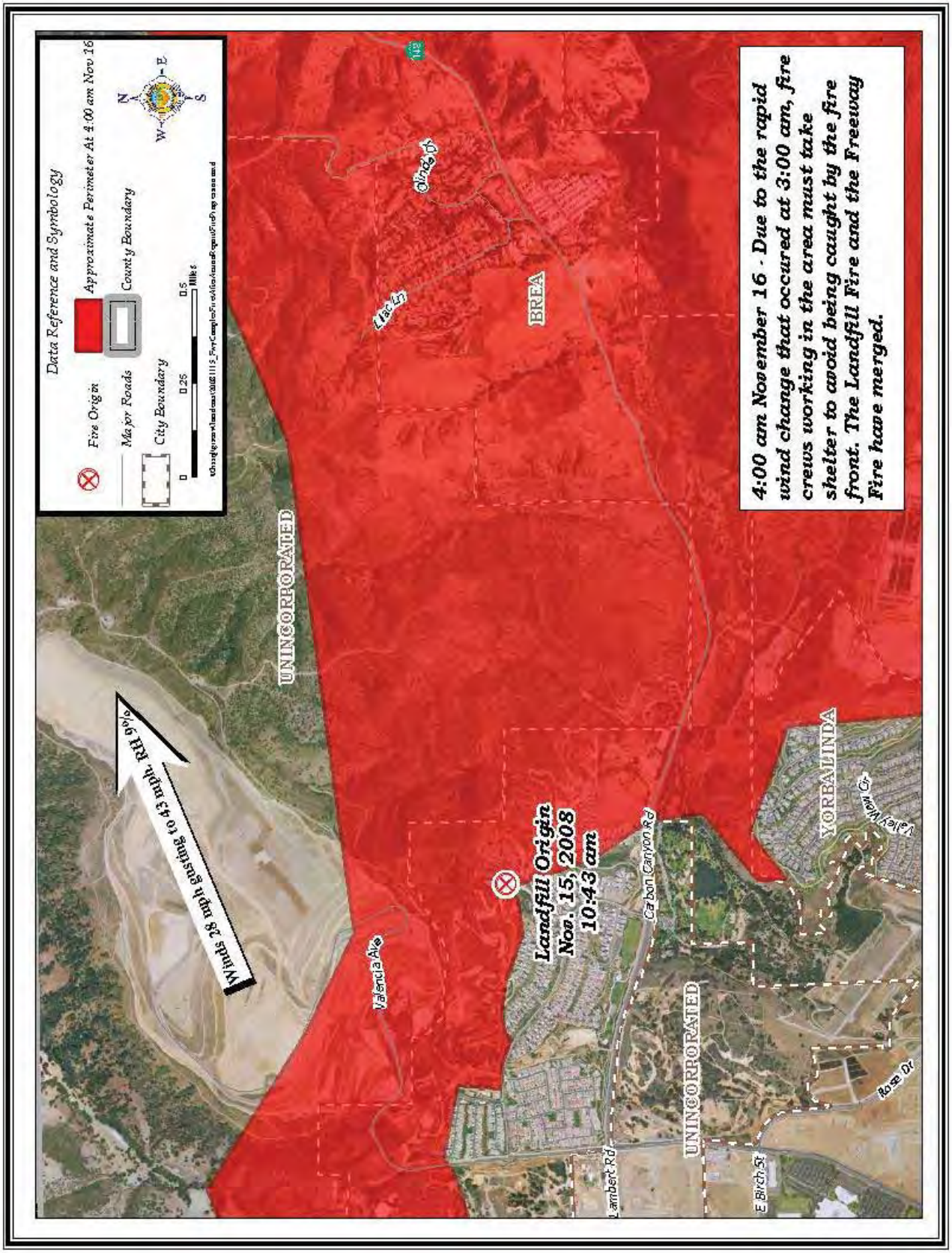
Incident Narrative – Map 13
Canyon Locator



Incident Narrative – Map 14
Freeway Fire Reaches Olinda Village—3:00 a.m.



Incident Narrative – Map 15
Freeway Fire Moves Towards Tonner Canyon—4:00 a.m.



Notification, Evacuation, and Repopulation

The first indication that residents of the City of Yorba Linda were about to be seriously threatened by the Freeway Fire came at approximately 10:20 a.m. on November 15. After estimating the fire's rate of spread, OCFA Battalion 2 Chief (Reeder) projected the fire would impact the community of Brush Canyon within 30 minutes. He directed the OCFA ECC to notify the Yorba Linda City Manager and advise the Brea Police Department to begin mandatory evacuations of the Brush Canyon area. At 10:22 a.m., Brea Police began evacuations of the eastern portion of Yorba Linda (Thomas Brothers Map page 741, grids E4, F4, and G5).

Ten minutes later, at 10:32 a.m., the Freeway Fire threatened the neighborhood of Big Horn Mountain Way in Yorba Linda. At 10:39 a.m., ORC Helicopter 41 confirmed homes on Bighorn Mountain Way, Blue Ridge Drive, and Evening Breeze Drive were under direct threat. Nineteen minutes later, the first of hundreds of homes lost in Yorba Linda burned on Merryweather Circle.

Although a collaborative decision, the responsibility for evacuation is statutorily a law enforcement function, which allows the fire department to focus on fire control efforts. Brea Police had a Supervisor assigned to the Unified Command early in the incident. One of their primary responsibilities was the rapid assembly of officers to meet the evacuation needs of this fast-moving fire. The Orange County EOC After Action Report estimates the evacuation orders impacted over 9,000 dwellings in the City of Yorba Linda. During the height of the fight, and estimated 24,000 citizens were evacuated or kept from returning to their homes in the City of Yorba Linda. The City of Anaheim began evacuations when the Freeway Fire crossed the 91 Freeway. A few miles away, the City of Brea initiated evacuations in residential areas in the path of the Landfill Fire. These extensive evacuation demands put a strain on local law enforcement, requiring mutual aid resources from agencies across the County to assist with evacuation needs. Refer to http://www.ocfamedia.org/_uploads/PDF/fcfaarybl.pdf for the **City of Yorba Linda After Action Report** for additional details.

Traffic gridlocked as evacuating residents and incoming emergency apparatus tried to access the same neighborhood streets. Officers at the various roadblocks and checkpoints took action to remedy the congestion—enabling fire apparatus to access the most impacted neighborhoods.

The weekend and mid-morning timing of the Freeway Fire were major factors complicating the evacuation. Since the Freeway Fire occurred on a Saturday—instead of a weekday—more residents were home, instead of at work or school. Notably, even with such a large and escalating evacuation boundary, the majority of residents remained calm and followed evacuation orders. Although slow, reports were received during the morning that evacuations were orderly and without incident.

Law enforcement agencies possess the legal authority to conduct evacuations of populated areas. However, even when a mandatory evacuation is declared, law enforcement does not have the legal authority to force residents from their homes. Officers may restrict the return of residents once they leave their property. Determining when and where to evacuate is often difficult since each evacuation decision brings with it a set of risks and rewards. The greatest risk to permitting residents to remain with their homes is the potential threat to safety.

Evacuation of residents is one of the challenges created by a wildland-urban interface fire. The Freeway Fire spread so rapidly emergency responders could only estimate the direction and the time of impact to a given neighborhood. Within minutes of ignition, spotting was reported one mile downwind from the main body. Although a fire's rate of spread is typically measured in acres per hour, the Freeway Fire was driven by 40 mph winds and required measurement in acres per minute. Motorists driving on the 91 Freeway reported they could not keep up with the fire as it spread through wildland areas—even while driving at speeds of 50 mph.

Simulation training conducted on October 27, 2008, for a WUI fire in the mutual threat zone along the 91 Freeway provided incident commanders some possible trigger points of when and where to call for evacuation. During the fire, these same trigger points were utilized to make the evacuation decisions. When the potential existed for the fire to escape planned, control boundaries, evacuations were ordered.

The Brea Police Department conducting evacuations.

The manner and timeliness in which residents were notified is being reviewed. After the 2007 Santiago Fire, the County of Orange led in the development and implementation of a public notification system. The AlertOC notification program has been adopted and implemented in many cities throughout the County. The City of Yorba Linda was in the beginning stages of implementing the program. Since the fire, the Alert OC program has moved into the next phase of implementation and is now capable of making public notifications.

Deciding when to repopulate an evacuated neighborhood is one of the most difficult made by law enforcement and incident commanders—given the unpredictable nature of a WUI fire. Although a frustrating ordeal for residents, evacuation orders are to prevent homeowners from entering the dangerous conditions usually present in fire-burned areas.

The OCFA uses an Occupant Liaison Program to keep homeowners informed; to assist them in retrieving items such as medication, money, or clothing left while evacuating; and to provide emotional support. When appropriate, Occupant Liaison Teams may escort residents to their property. These efforts are to prevent homeowners from independently returning to their property and into a potentially dangerous situation.

After a reconnaissance flight deemed most areas to be safe, the mandatory evacuations were lifted on November 16 at 3:00 p.m. Even then, law enforcement officers were directed to allow only verified residents or those who had legitimate business—insurance adjusters, clean-up crews, etc.—into the impacted neighborhoods.

Even though the fire was extinguished, fire crews needed to maintain a presence within the impacted neighborhoods for several days. Firefighters conducted patrols looking for new fire

starts, as well as overhauled burned structures. Fire apparatus needed to be able to move freely from street to street as crews cleaned off fire retardant that drifted onto unburned homes and vehicles. Wildland engines, handcrews, and helicopters conducted mop-up operations in the wildland and—where necessary—removed hazards adjacent to homes created by partially burned trees and vegetation.

The orderly evacuation of residents during a WUI fire can be challenging and may create delays for fire apparatus.

Water Supply

The demands of a single structure fire can tax a well functioning water system. Normal firefighting efforts often involve one fire engine connected to a fire hydrant. The water is supplied directly to the fire or to one or more fire engines. In contrast, in an urban conflagration such as the Freeway Complex Fire, multiple engines move into threatened neighborhoods to extinguish flames and defend multiple homes on numerous streets.

Water systems must incorporate "fire flow" as an element of system design and functionality. Needed fire flow is the amount of water available for providing fire protection at selected locations throughout a community. The OCFA Planning and Development Services Section reviews all plans for new development to ensure an adequate fire flow is provided according to the City's adopted Fire Code. Like all California jurisdictions, the City of Yorba Linda is required by State law to adopt the California Fire Code (CFC). The latest Fire Code edition was adopted in 2007. This newly adopted code allows for doubling of the required fire flow in areas where "conditions indicate an unusual susceptibility to group fires or conflagrations." This should be considered in all new developments within a city that is adjacent to a wildland-urban interface or within a designated High Hazard Zone.

Using the fire code tables, a typical street with homes not exceeding 3,600 square feet would be protected by fire hydrants capable of delivering 1,500 gpm for a minimum of two hours with no less than 20 pounds psi of residual pressure. For homes between 3,600 and 4,800 square feet, fire hydrants must deliver 1,750 gpm for two hours with no less than 20 pounds psi of residual pressure. Locally adopted amendments require fire hydrant spacing of 300 feet along the street. The typical fire flow demand is based on fighting a single structure fire and protecting the immediate exposures.

Faced with multiple structures, many fully involved in fire, some Company Officers resorted to the use of master streams to contain the fire spread. This meant a single fire engine may have pumped more than 1,000 gpm—affecting the available water supply. On some streets, multiple master streams were deployed. Once water demand issues were identified, tactics were modified. The master streams were shut down in favor of smaller hand lines.

Around 2:00 p.m. on November 15, several radio transmissions were received from fire companies reporting low or no water pressure in various sections of Yorba Linda. Some areas were Hidden Hills Road, Mission Hills Lane, High Tree Circle, Fairwood Circle, Green Crest Drive, and Skyridge Drive. With homes burning on multiple fronts, Strike Team Leaders had to make critical decisions. They directed fire companies to areas that had available water, thereby giving firefighters a chance to protect and save homes.

To provide structure protection and ensure rekindles were minimized, a Compressed Air Foam System (CAFS) Task Force with five Patrol units remained in the Hidden Hills area. The CAFS Task Force, under the direction of OCFA Battalion Chief Antrim, extinguished fires and laid protective foam on unburned structures for several hours. Two water tenders were ordered to the impacted area to shuttle water to the fire companies. These tenders systematically began checking fire hydrants until one was found with enough pressure to fill the tanks. Eventually, water tenders had to fall back to the hydrants at the lowest point in the system to refill.

According to the YLWD After Action Report, the water demand use for the first two days of the fire was nearly 20 million gallons above normal.

A request for service was placed to the Yorba Linda Water District (YLWD) through the Yorba Linda EOC about 2:00 p.m. YLWD personnel responded quickly and were able to make adjustments to improve the water delivery in several areas. According to the YLWD After Action Report, YLWD personnel were initially unable to access the Santiago Pump Station because of the extraordinary fire conditions. When they were able to make access, personnel determined there had been sufficient heat to cause the pump station for the Santiago Reservoir to automatically shut down. Once this occurred, the continued demand eventually drained the Santiago Reservoir, the supply for Hidden Hills and other nearby communities.

At 5:50 p.m., the YLWD requested three fire engines assist them in supplementing the water grid system at Manzanita Avenue and Smoke Tree Avenue. Additionally, two mobile water pumps were brought in from the Laguna Beach County Water District and the Santa Margarita Water District. They supplemented water supplies at the reservoirs serving the impacted areas. YLWD's efforts took several hours to complete; its personnel worked through the night and into the following day to ensure a secure water supply.

Water District Task Force

On January 20, 2009, the OCFA's Emergency Planning and Coordination Battalion Chief (Ferdig) attended the first meeting of a task force organized by the Water Emergency Response Organization of Orange County (WEROC). This organization coordinates and supports comprehensive emergency preparedness programs for the Orange County water industry.

The task force is to create a Water Utility and Fire Department Coordination Template for water agencies along the WUI. The template would include—but would not be limited to—areas such as water pressure zones, fire hydrant specifications, types of available equipment, necessary equipment, and identification of critical infrastructure in need of protection during a disaster. Some of the participating agencies on the task force are:

- Laguna Beach County Water District
- Yorba Linda Water District
- Moulton Niguel Water District
- South Coast Water District
- Irvine Ranch Water District
- City of Orange Water Department
- Orange County Fire Authority
- OC Emergency Management Bureau

The task force's goals are (1) to develop a stronger working relationship between water districts and fire agencies; (2) to develop implementation standards for use during red-flag conditions; (3) to develop a water district liaison program; and (4) to develop a standard template for providing fire agencies information about the water supply available during firefighting efforts.

The water supply template will assist each water district within the WUI to create an agency-specific plan. These plans will be tested using a tabletop exercise simulating multiple wildland fires impacting Orange County simultaneously. Refer to the **YLWD After Action Report at** http://www.ocfamedia.org/_uploads/PDF/fcfaarylwd.pdf for additional details.

Mutual Aid

The California Fire and Rescue Emergency Mutual Aid Plan is an extension of—and supportive document to—the California Emergency Plan. The plan provides for systematic mobilization, organization, and operation of necessary fire and rescue resources of the state and its political subdivisions in mitigating the effects of disasters, whether natural or man-caused.

Valley View Conservation Camp handcrew from Elk Creek, Ca

No community has the resources sufficient to cope with any and all emergencies. Thus, fire officials must preplan emergency operations to ensure the efficient use of available resources. Basic to California's emergency planning is a statewide system of fire service mutual aid. Each jurisdiction first relies upon its own resources with mutual aid resources being available from other agencies to augment local response when conditions warrant. The master Mutual Aid Plan outlines and governs what is commonly referred to as the Mutual Aid System for fire service in California.

The Mutual Aid System for fire service in California has been described by the United States Fire Administration as "unparalleled in the United States." The system is founded on the principle of fire departments providing resources to one another during times of major emergencies when a local agency is overwhelmed and does not have the ability to handle the incident on its own. The system allows resources committed to an incident to escalate from a few engines to hundreds. The State is divided into six mutual aid regions to facilitate coordination of mutual aid. Coordinators are identified at the local and national levels, under the umbrella of the Governor's Office of Emergency Services (OES) Fire and Rescue Branch.

Emergencies may reach such a magnitude as to require mutual aid resources from adjacent local, County, and State levels. Specific requests for mutual aid are processed from the local agency to the County Operational Area Coordinator. OCFA is the coordinator for the Orange County Operational Area. From the County, the request goes to the Regional Coordinator (LACO) and then to the State Coordinator (OES), if necessary. Each ascending level has access to greater numbers of firefighting resources from throughout the State.

During most wildland fires, mutual aid resources are requested and assembled in preparation for anticipated strategic actions. However, with fires that rapidly turn into WUI conflagrations—such as the Freeway Complex Fire—little time to plan for strategic actions is available, and resources are needed immediately. This is compounded further when multiple major fires occur simultaneously. Delays can be disastrous. Oftentimes, different fires are requesting the same resources.

When the Freeway Complex Fire began, only two fires of significance were blazing in Southern California: the Tea Fire in Santa Barbara County and the Sayre Fire in Los Angeles County. These fires were burning out of control, and numerous homes were already lost when the Freeway

Complex Fire began. Numerous mutual aid requests to both fires had been filled or were pending when the Freeway Complex Fire began. The OCFA had sent a Type 1 and a Type 3 strike team—10 engines—to the Tea Fire while MetroNet cities sent three Type 1 strike teams—15 engines. Additionally, the Orange County-based Office of Emergency Services (OES) strike team—5 engines—was activated and sent to Santa Barbara County. The OCFA staffs one of the OES engines with the other four being staffed by MetroNet cities. The Sayre Fire in Los Angeles County, having started after the Tea Fire, only received one Type 1 strike team from the OCFA and one Type 1 strike team from the MetroNet cities.

Riverside County fire crews protect homes in Yorba Linda

Prior to the Freeway Complex Fire being reported, all vacancies created by the deployment of OCFA fire engines to Santa Barbara and Los Angeles Counties had been filled. This was achieved by activating the OCFA relief engine fleet and "recalling" off-duty personnel or personnel reporting for normal duty at 8:00 a.m. on November 15.

At the onset of the Freeway Complex Fire, immediate resource requests were placed for Type 1 and Type 3 strike teams beyond what could be provided by the OCFA and local agencies. In total, 35 strike teams—175 engines—of various types were ordered within the first four hours of the incident. The OCFA and other Orange County cities provided seven Type 1 strike teams and one Type 3 strike team—40 engines total. By noon, six strike teams—30 engines—had arrived from Riverside County. By 1:30 p.m., a total of 19 strike teams—95 engines—and 1 task force—6 engines—were operating on the fire. This was in addition to the 58 engines, 3 trucks, 8 patrols, and 5 water tenders that responded as single increments to the Freeway and Landfill Fires. While some resources were coming from an extended distance, prior to 2:00 p.m., 159 engines were assigned to and operating on the Freeway Complex Fire.

The early ordering of resources made it possible for 159 engines, 3 trucks, 8 patrols, and 5 water tenders to be operating on the Freeway Fire by 1:30 p.m.

The availability of resources was largely due to the lack of competition for resources from other fires. A change in the resource ordering policy after the 2007 fire siege also proved to be beneficial. This change allowed for Operational Area and Regional Coordinators to directly request up to five strike teams—25 engines—across operational area boundaries based on the closest resource concept. This was in contrast to the previous rule that permitted only one strike team to be obtained outside the regional ordering system.

Air Resources

Unless owned and operated by local government, air resources—helicopters, fixed wing air tankers, lead planes, and air attack platforms—are coordinated by CAL FIRE and the United States Forestry Service (USFS). In Southern California, the Southern Region Operations Center in Riverside is the base for this joint operation.

Air resource requests are prioritized based on factors, including threat to life and property. New fire starts receive the highest priority for aircraft, because the greatest opportunity for control is during the initial attack phase. Aircraft assigned to active fires may be diverted to a new incident unless a "no divert" order has been established. No divert orders are only established when aircraft are on fires where structures are burning or immediately threatened and there are no higher priority fires in the region.

On Friday, November 14, 2008, CAL FIRE pre-positioned four air tankers, two helicopters, and two air attack aircraft in Southern California. These aircraft augmented CAL FIRE resources of two air tankers, one helicopter, and one air attack already in place at the Hemet and Ramona airbases. The net effect of the pre-positioning of Northern California-based aircraft to Southern California was to double the number of available aircraft at each airbase.

Air Tanker dropping retardant along a ridgeline

To prepare for the Red Flag Warning expected across parts of Southern California, CAL FIRE signed a one-week contract for the DC-10 Air Tanker 910 based out of the San Bernardino International Airport. The Federal airbase in San Bernardino was also up-staffed with four air tankers, two lead planes, and two air attack aircraft. On Saturday, November 15, all State and Federal aircraft were assigned an 8:00 a.m. start time. The initial attack aircraft for the Freeway Complex Fire were dispatched at 9:35 a.m. with the first aircraft arriving at 10:10 a.m.

OCFA Helicopters 41 (HC41) and 241 (HC241) were dispatched to the Freeway Complex Fire from Fullerton Airport at 9:08 a.m. on November 15. The winds at Fullerton Airport were light and blowing offshore. After lift-off, the flight crews saw the smoke column rising from the fire in Corona was building and beginning to bend. The Santa Ana wind was having a strong influence. A 30–40-knot headwind was measured by an airspeed indication of 110 knots and a ground speed reading of 70 knots. Wind turbulence, coupled with the building low level smoke, made it difficult for the helicopter pilots to maintain visual flight conditions and make effective water drops.

Orange County Sheriff's Department (OCSD) helicopter Duke 1 also responded on the initial dispatch with the ORC helicopters. Duke 1 arrived over the fire about 9:30 a.m. but had to land to

deploy its 170-gallon bucket prior to engaging in the firefight. Duke 1 and the ORC helicopters were initially using the lake and water hazards of the Green River Golf Course as their water source. The buffeting wind soon made hovering to fill the bucket and water tanks too hazardous. A ground-based water point was established, so the helicopters could land and be filled safely.

OCFA helicopter uses a snorkel to refill its water tank.

Incident commanders on the ground quickly recognized the need for additional aircraft. At 9:19 a.m., they ordered one air attack, two air tankers, and two additional Type 2 helicopters. At 10:10 a.m., these air resources arrived over the Freeway Complex Fire. The aircraft order was augmented once again at 10:10 a.m., with an order for one lead plane, three air tankers, and four Type 2 helicopters.

Helicopters may fly at sunrise and up to 30 minutes after sunset. On the first day, all initial attack aircraft flew the maximum possible hours. Around 8:30 p.m., the aircraft were released to their home bases. Mandatory work-rest cycles for pilots demand they receive eight hours of uninterrupted rest before flying again. This meant the earliest a pilot could take off to return to the fire on Sunday, November 16, was about 6:00 a.m. With the preflight inspection time, flight time to the helibase, and briefing time once there, an 8:00 a.m. start time was projected for all assigned helicopters. By 9:00 a.m., all assigned helicopters were flying over the fire.

OCFA helicopter coming in for another load of water.

By the conclusion of the Freeway Complex Fire, 17 firefighting helicopters had been assigned. These were supplied from local, state, and federal agencies, as well as helicopters from private vendors that were on a call when needed (CWN) contract basis. During the first six hours of the Freeway Complex Fire, OCFA helicopters dropped 48,400 gallons of water and foam. By the end of the second day, a total of 88,000 gallons had been dropped. During that same two-day period, 12 fixed wing air tankers with four lead planes operating from the San Bernardino and Hemet air bases dropped 208,791 gallons of retardant. The DC-10, Air Tanker 910, made a record-setting ten air drops applying a total of 109,445 gallons of retardant in the Yorba Linda and Chino Hills areas.

All aircraft orders were filled for the Freeway Complex Fire. However, one Federal helicopter was diverted to a new fire start while it was awaiting demobilization from its base. The availability of air resources greatly differed in comparison to the 2007 Santiago Fire, where much of California's airborne fire suppression resources were already actively engaged in firefighting efforts—or were grounded due to severe wind conditions.

Air tanker lays a retardant line in front of the fire to slow its forward progress.

Logistics Support

The Incident Command System (ICS) has proven itself valuable in managing emergency incidents worldwide. ICS is a flexible, scalable response framework where firefighters from various agencies, who may not routinely work together, can fight major incidents through standard response and operation procedures. A critical component of ICS is the logistical support function. This effort can be compared to establishing and maintaining a small, temporary city designed for the sole purpose of supporting all the needs of an incident. In the case of the Freeway Complex Fire, the proximity of the fire to several hundred Yorba Linda homes and the near 70 mph winds made it apparent that the logistical needs for this incident were going to be significant and challenging.

The Incident Base takes shape in Irvine Park.

The extreme weather conditions and the potential for loss of lives and structures made it clear full implementation of the Logistics Section (LOGS) would be required. ORC Battalion Chief Runnestrand was ordered as the Logistic Section Chief for the Freeway Complex Fire. Personnel from the OCFA Service Center provided much-needed logistical support with water, food, and deployment of a logistical cache that is stocked and ready for immediate use. The cache included 10,000 feet of wildland hose, foam, tools, and medical supplies. Within the first hour, an order was placed for 500 sack lunches. This order was increased to 2,000 within the next hour.

The Logistics Section from CAL FIRE Incident Command Team 6 eventually assumed all logistical needs for the Freeway Complex Fire. The Logistics Section Chief, his Deputy, and the leaders for each of the six logistics units blended effortlessly with OCFA personnel who had already begun the logistic coordination. The decision was made to keep this blended effort throughout the fire, which was another lesson learned from the 2007 Santiago Fire.

Initially, the Yorba Regional Park was designated as the incident base due to its proximity to the fire. As the fire threatened the City of Yorba Linda, and before the base had been completely established, the decision was made to move it to Irvine Regional Park. This facility had been used in previous incidents and was familiar to the OCFA logistics team. Additionally, the park's size, parking, and convenient access to major freeways better met the demands of the nearly 4,000 personnel and equipment assigned to the incident. Overall, the support needs were met in an effective and efficient manner.

The success of LOGS on the Freeway Complex Fire was largely the result of the support, cooperation, and hard work of individuals representing the Orange County Sheriff's Department, Irvine Regional Park staff, Citizens Emergency Response Teams (CERT), and numerous vendors

and businesses throughout the area, along with the exemplary training and professionalism of the firefighting personnel.

The following six units combine to make the Logistics Section for a major incident such as the Freeway Complex Fire:

The **Food Unit** set up a mobile kitchen, allowing the serving of breakfast by the second morning. Until that was established, a mobile catering vendor was used to provide hot meals. Separate contract vendors provided sack lunches to meet the demand for on-the-line feeding of suppression crews and base personnel. Due to the more than 3,800 firefighters needed for this fire, the kitchen was unable to meet the meal demands in a timely manner and was augmented by the catering vendor. This solution met the needs of the incident efficiently and effectively.

The **Medical Unit** is tasked with providing everything from basic First Aid to advanced life support for incident personnel. A Medical Plan was published in the Incident Action Plan (IAP) and was followed successfully. No deaths or major injuries were reported on this incident. Contributing to the smoothness of this operation was the proximity to urban medical facilities and the training of many firefighters as Emergency Medical Technicians or Paramedics.

The **Communication Unit** provides the radio, pager, and Internet communication needs of the incident. Because of the mix of resources from within the County and beyond, a communications radio frequency patch was established allowing for shared radio communications with those having VHF radios and those with 800 MHz radios. This greatly enhanced communications and contributed to the safety of on-the-line resources in the early portion of the incident. Once the radio cache of 200 radios from the National Interagency Fire Cache (NIFC) arrived, the communication plan was transitioned to VHF radios for the remainder of the incident. The OCFA Logistics/Communications trailer was useful as a mobile office space to secure, protect, and deploy the equipment. Later, it became the on-site dispatch facility for the incident.

The OCFA Communications trailer supports incident communications.

The **Supply Unit** orders and disburses supplies necessary for the incident. Everything from the requests for fire engines and aircraft to the purchase of sleeping bags and batteries is funneled through this unit. Staff from the OCFA Service Center was invaluable in providing early support and assistance. The wildland cache—a predetermined complement of tools, equipment, and supplies stocked by the OCFA and available for immediate use—was brought to the base. It provided needed resources until the larger cache from South Operations arrived.

The **Facilities Unit** creates and maintains the physical layout of the incident base camp. Consideration must be given to all aspects of supporting the incident. Included are the staging of operations; maintaining and repairing of apparatus; feeding and housing of assigned personnel,

including the special needs of inmate crews; providing suitable working space for the administrative and support positions including—but not limited to—the Incident Command Post (ICP); and providing showers, laundry, and other support functions for personnel assigned for extended periods.

The Facilities Unit on the Freeway Complex Fire benefited from several factors in creating an efficient base camp. A pre-existing agreement with Irvine Regional Park and the familiarity with the layout coupled with the outstanding cooperation with the park staff, made for a quick and painless setup. The close proximity to the OCFA's RFOTC allowed for a sharing of assets—especially early on—that normally would not be considered. The CERT personnel filled many roles within this unit and clearly contributed to its success. Finally, the Orange County Sheriff's Department's command vehicles (Samantha 1 and 2) were put to good use and were greatly appreciated.

The Facilities Unit on the Freeway Complex Fire created an efficient base camp to support the needs of more than 3,800 personnel.

Incident Communications

During the first 24 hours of the Freeway Complex Fire, incident radio communications were initiated using the County of Orange 800 MHz Countywide Coordinated Communications System (CCCS). The fire service in Orange County has been on the 800 MHz System for the past 20 years. Since 1999, it has been the countywide network shared by all public safety agencies in Orange County. Over 16,000 mobile, portable, and base station radios are on the system servicing fire, law, public works, and lifeguard agencies throughout the County. All mobile and portable radios have common channels for inter-agency communications.

The 800 MHz CCCS has proven to be a highly sophisticated and reliable communications system for the public agency users in Orange County. Several other fire and law agencies throughout Southern California use radios with common national 800 MHz frequencies—the same as those used on the Orange County system.

The 800 MHz radio system was well-used by all first responders. A total of 78,892 transmissions were conducted midnight-to-midnight on November 15. This represents the seventh busiest day in the history of the 800 MHz CCCS. Only one "busy" event—all channels were busy—occurred during this time. On November 16, usage dropped to about 63,000 transmissions, as fire agencies transitioned much of their radio communications to the VHF (Very High Frequency) radio channels provided by the CAL FIRE IMT. All 800 MHz radio systems remained operational, although some fire damage was sustained at two radio sites.

During the fire, the 800 MHz system was never at full capacity. Despite the intense communication needs, the 800 MHz system's design assured excess capacity was always available. The system was designed and built to handle high volume radio traffic as experienced during the 2007 Santiago Fire. **Table 7** below provides a comparison of a normal daily 800 MHz radio system number of transmissions. The comparison date of November 15, 2007, was chosen simply as the same time of year and a non-major fire day.

Table 7: Total Number of 800 MHz CCCS Transmissions
(All Disciplines Countywide)

Date – 2008	Number of Transmissions	Date – 2007	Number of Transmissions
November 15	78,892*	November 15	57,184
November 16	63,719	November 16	56,522
November 17	58,099	November 17	52,601
November 18	57,552	November 18	44,703
November 19	58,474	November 19	50,141
November 20	54,951	November 20	53,615
November 21	59,878	November 21	52,769

*This day represented the seventh busiest day in the history of the 800 MHz CCCS.

As indicated in the table above, the first 24 hours of the incident were the busiest. An approximate 38 percent increase in radio traffic occurred on the 800 MHz Radio system as compared to the

same dates in 2007. This activity level started to decrease as the CAL FIRE IMT arrived. The IMT used the VHF radio system for major incident radio communications. As the incident continued to expand, an order was placed for the National Incident Fire Cache (NIFC) to support the large number of resources responding from various agencies throughout the state.

The NIFC cache includes radios, repeaters, and common frequencies standard to all fire agencies throughout the country. All Orange County fire agencies maintain radios common to the system used with the NIFC radios on VHF spectrum. The NIFC cache maintains over 40,000 radios available for use during major incidents, such as Hurricane Katrina, earthquakes, and multiple fires as in the October 2007 fire siege. Resources responding are also required to have VHF radios as part of their mutual aid response equipment. Standard training on the operation and support of the NIFC system assigned to major incidents is provided throughout the year and throughout the country. The change in radio systems occurred on Sunday, November 16, at 7:00 a.m., the second day of the fire, during the morning shift change.

As of Sunday, November 16, 800 MHz radio transmissions were slightly higher than normal and remained at that level throughout the duration. As the fire progressed and more out-of-area resources arrived, most of fire communications had been moved to the VHF radio channels. Although, the 800 MHz radios was still being used by the OCFA and other Orange County agencies for supplementary communications.

A radio “patch” had been initiated between the VHF “Orange County Access” channel and the 800 MHz “4C” talk group on November 16. Radio patches connects two different radio systems operating on different frequency bands, allowing for seamless communication. This allowed any VHF radio being used at the incident to communicate with command staff operating on the Orange County 800 MHz system (Channel 4C). This patch remained operational on the command channel until the end of incident. Feedback from communications staff assigned to the incident indicated this worked well, including in places where the incident radio repeaters did not work.

Personnel using VHF radios made early reports indicating they were unable to make contact with those using 800 MHz radios. This was mainly due to the radio “patch” frequencies not yet being in place. The problem was corrected once the patch was established. This concern and others regarding user familiarity and training are being addressed by an After Action Communications Committee comprised of representatives from CAL FIRE and OCFA.

Additionally, a number of reports of VHF radios not being able to cover specific areas in Carbon Canyon were received by the communications staff. This problem is inherent in the area for all wireless communications, due to the deep and narrow canyons. This problem was corrected by placing a manual repeater in the Carbon Canyon area of Sleepy Hollow. Coverage and interoperability is always a safety concern when mixing radios from different systems with different users. Commanders and supervisors had to take extra precautions to ensure any emergency radio traffic would be heard and acknowledged.

Several of the 2007 Santiago Fire After Action Report communications recommendations were implemented for the Freeway Complex Fire with good success:

- A total of 32 relief engine/strike team communications kits were in place. Each kit contained the necessary radios and pagers for use by emergency crews assigned to surge fire engines activated during the incident.
- Every OCFA first responder apparatus was provided with VHF radios compatible with state and federal resources communications.
- An 800 MHz to VHF radio patch was set up on the Command Channel for interoperable communications among all agencies responding.
- Satellite data communications was set up at the incident base in the early stages of the incident.

Emergency Operations Center

The Freeway Complex Fire impacted a vast geographical area, including several cities and counties. The cities of Anaheim, Brea, Chino Hills, Diamond Bar, and Yorba Linda activated their Emergency Operations Centers (EOC) as the fire moved into their communities.

The Yorba Linda Assistant City Manager activated the EOC at approximately 12:45 p.m. on November 15. City personnel with EOC responsibilities were called back to help staff the center. The OCFA dispatched Battalion Chief Valbuena to the Yorba Linda EOC at 12:30 p.m. to serve as an Agency Representative to provide fire information and situation status in support of EOC operations. Two OCFA Fire Prevention personnel were also sent to assist the Agency Representative and help with structure damage assessment. Additionally, the Yorba Linda Water District (YLWD) sent a representative to act as liaison to the City of Yorba Linda's EOC. Both OCFA and YLWD representatives worked jointly to address the water supply problems that occurred during the fire. These jurisdictional EOCs assisted with coordinating local issues in cooperation with the County EOC, such as evacuation of residents, coordination of evacuation centers, street closures, coordination with school districts and businesses, and coordination of local government resources.

With the initial activation of the City of Yorba Linda and the City of Orange EOCs, and the predicted fire activity of the Freeway Fire, the County of Orange Operational Area EOC was activated on Saturday, November 15, 2008, at 11:00 a.m.

Early in the incident, the Operational Area EOC was activated to support the roles and responsibilities of the County of Orange. This activation requires personnel pre-identified to the policy group and other personnel trained in support functions to be contacted. The personnel responds to the EOC located at the Orange County Sheriff's Department's Loma Ridge Communications Facility near the City of Orange. Representatives from the County Executive Office, Orange County Public Works, Orange County Sheriff's Department, Probation, OCFA, Orange County Waste and Recycling, Health Care Agency, Social Services Agency, and the County Emergency Manager make up the policy group. An EOC Liaison, Public Information Manager, and various staff supported the policy group. This group was faced with several decisions during the EOC activation, including health issues related to air quality, evacuation of residents, closure of major roadways, and identification of shelter needs.

The County EOC- Policy Room

One of the first tasks completed by the Emergency Management staff was to notify the Chair of the Board of Supervisors, the Emergency Management Council, the Operational Area Executive Board, Operational Area Members, County agencies, and the State Office of Emergency Services of the incident.

The general public was kept informed through press releases, media interviews, and jurisdictional websites. This was the first test of the new Operational Area EOC website. The website served as a critical point for information distribution. Public information was actively managed via the website, including the dissemination of 25 news releases and/or media advisories and regular press briefings.

An additional method of releasing pertinent information to the public was the new County mass notification system, AlertOC. AlertOC was used during the EOC activation on behalf of the City of Yorba Linda. The request for the County to activate this system came at 3:52 p.m., and the message was issued at 4:09 p.m. The system was used to alert residents in the immediate path of the fire to evacuate the area.

The Orange County Social Services Agency, American Red Cross, and the Orange County Department of Education all collaborated and helped coordinate the opening and management of evacuation shelters for residents affected by the fire. The shelter locations included Katella High School, Valencia High School, and the Brea Community Center. Two other shelters—Travis and Esperanza—were initially opened, but they had to be closed due to the impact of smoke. Over the three days these shelters were opened, they registered over 919 individuals—with 229 evacuees staying in the shelters overnight and nearly 1,320 meals provided.

A Local Assistance Center was established near the affected population of the Freeway Complex Fire. The City of Anaheim graciously hosted the Local Assistance Center at the East Anaheim Gymnasium. This location was large enough for public, private, and non-profit agencies to come together and provide assistance to the local residents and businesses.

Orange County Community Resources, Animal Control Division, assisted with the establishment of animal shelters. The Orange County Animal Shelter was opened to accept small animals, while the Los Alamitos Race Course and the Huntington Beach Equestrian Center were opened to accept large animals.

Early on, the EOC Manager requested County counsel to create an emergency proclamation in accordance with County of Orange ordinance and the Operational Area Emergency Plan. The local proclamation was signed on Saturday, November 15, 2008. The State of California was informed of the signed emergency proclamation and that Orange County was requesting a State Gubernatorial Proclamation and Federal Declaration of Emergency. The Governor issued a State Proclamation late Saturday, November 15; however, a federal declaration was not issued until Monday, November 17.

Governor Schwarzenegger receives a briefing.

The 2008 Freeway Complex Fire challenged the County Emergency Operations Center on a different level than the 2007 Santiago Fire. During the Freeway Complex Fire, the County's main responsibility revolved around operational area coordination and mutual aid support. The lessons learned during the Freeway Complex Fire will improve the County's coordination of information

and resources during a major incident or catastrophic event. As staff to the Emergency Management Council and the Operational Area Executive Board, the Sheriff's Department Emergency Management Bureau will ensure enhancement of existing plans, procedures, training, and response.

By the end of the incident, the cities of Yorba Linda, Brea, Anaheim, and Chino Hills and the County of Orange Operational Area had all declared a local emergency. Additionally, due to fire and/or smoke conditions, the Brea Olinda Unified School District, Placentia Yorba Linda School District, Anaheim Hills Montessori, Calvary Christian School, St. Angela Merici Catholic School, St. Francis of Assisi Catholic School, Christian Preschool and Elementary School, and the St. Joseph Catholic School and Preschool were closed for one or more days.

The cost for the response to the Freeway Complex Fire for the County's EOC, Orange County Sheriff's Department field response, and Orange County Public Works Storm Center and field response along with the damages sustained to the Brea Olinda Landfill are currently estimated at $3,585,000. The Operational Area EOC was officially deactivated at 7:00 p.m. on Monday, November 17. Refer to the **Orange County Sheriff's Department After Action Report** at http://www.ocfamedia.org/_uploads/PDF/fcfaarocsd.pdf for additional details.

Media and Public Communications

The Corporate Communications Section was responsible for disseminating information and handling public relations during the Freeway Complex Fire. This included the responsibility for the activation of the Media Center, conducting the Public Information Officer (PIO) function for the incident command, updating of the OCFA website, and handling inquiries from elected officials. OCFA Board of Directors and City Managers were issued advisories via email. The advisories kept board members informed and allowed them to make inquiries to the Corporate Communications Battalion Chief. With the extreme fire behavior, rapid spread, and threat to homes, the OCFA new there would be great media interest.

The OCFA Media Center was activated soon after the start fire. Personnel were called back to duty and were answering telephone calls by 10:00 a.m. Staffed by four personnel from Community Relations and Education in the first couple of hours, additional professional staff from Finance, Fire Prevention, and Human Resources were put into service answering calls by noon the first day. The Media Center staff was further supplemented with two personnel from CAL FIRE. Their PIO experience was invaluable as they were able to assist OCFA personnel in handling media inquiries and by answering calls from the public. From the onset on November 15 until the fire was declared fully controlled on November 19, the Media Center received over 6,000 calls from the public and the media.

Communications between the OCFA Media Center and the Orange County Emergency Operations Center (EOC) was efficient throughout the incident. A total of 25 press releases and media advisories with information on evacuations and road closures were issued in a coordinated fashion between the Media Center and the EOC.

Reporting the Fire

OCFA was able to assign a Community Education Specialist to the Disaster Center established for Yorba Linda residents. The Education Specialist distributed informational fliers and was able to answer questions from the community. On the third and fourth day of the incident, the Community Education Specialists also conducted school programs for the entire school population of two of the elementary schools in Yorba Linda. The programs educated the children on the disaster in their community and helped to allay their fears. The school programs were very well received by the students and faculty.

The OCFA website (www.ocfa.org) received almost 1.4 million inquiries during the first day of the incident. Nearly 5 million inquiries were made from November 15 through November 25, 2008. Prior to November, the average number of inquiries to the website was 25,171 per day. The website was a key source of information about the fire. OCFA personnel provided updates to the website as often as possible. A fire progression map was uploaded every 12 hours. Only a small number of personnel were available to perform website updates, and the updating was a slow and cumbersome process. At times, fire and evacuation information needed updating, but qualified personnel were not available. Complaints were received about the freshness of website

information and the difficulty of navigating through the site as well as conducting information searches.

OCFA was also in the midst of a PIO transition at the time of the Freeway Complex Fire. The newly selected PIO was not scheduled to start his assignment and was on vacation at the beginning of the incident. The Corporate Communications Battalion Chief served as the initial point of contact for media inquiries. To gather information, he responded directly to the Incident Command Post that had been established at the Green River Golf Course. All media inquiries were referred to him, and the number of cell phone calls being received was overwhelming. This made it extremely difficult to communicate with the Media Center and delayed getting updated information relayed. Around noon, a Fire Prevention Specialist was assigned to answer calls and handle all communication with the Media Center—while the Battalion Chief provided media interviews.

OCFA Assistant Chief of Operations
Mark Kramer briefs news crews.

The rapid spread of the incident and the difficulty in communications between the field and the Media Center lead to some confusion. Incongruent information ended up being disseminated to the media. Additionally, the media became aware of water supply issues on the incident prior to field PIOs and the Media Center; this contributed to the confusion and inaccurate information.

The Incident Management Team PIO arrived early in the afternoon the first day. The PIO transition meeting was attended by the Chino Hills Fire District PIO, CAL FIRE – Riverside County PIO, Anaheim City PIO, and Anaheim Police Department PIO. Coordination between CAL FIRE – Riverside County, the IMT PIO, and OCFA was good throughout the incident.

The OCFA PIO returned from vacation upon learning of the Freeway Fire and arrived at the incident at around 10:00 p.m. the first day. Since the incident had already been transitioned to the IMT, the OCFA PIO was assigned to the base camp and worked with the pool of PIOs who were already assigned. The OCFA PIO worked the night shift. However, it would have been more advantageous to have the OCFA PIO work during the day because of his knowledge and familiarity with the local media. After the first day, most of the media inquiries came during the day.

Fire Investigation

The Freeway Fire originated in Riverside County near the 91 Freeway and the Green River off-ramp in the City of Corona. The area of origin is the jurisdiction of CAL FIRE; therefore, CAL FIRE investigators assumed the responsibility for the fire investigation. The preliminary fire cause is reported as accidental. The preliminary cause may be the result of a vehicle exhaust system igniting roadside vegetation. The fire investigation report is expected to be complete by the end of March 2009.

CAL FIRE arson investigators search the area of origin of the Freeway Fire for evidence.

The Landfill Fire, investigated by the Brea Police Department along with investigators from the OCFA, was determined to have been caused by inadequate maintenance of power lines supplying electricity to equipment in an oil field. The electrical lines are owned by Breit-Burn Management Company in Los Angeles. Investigators believe arcing or a discharge of current from the power lines caused the brush near the lines in the fields northeast of Valencia Avenue and Carbon Canyon Road to ignite.

The origin of the Landfill Fire is seen behind the homes in the City of Brea.

Volunteer Groups and Resources

Many volunteer groups assisted during the Freeway Complex Fire in various capacities. Major volunteer groups included:

- American Red Cross
- Salvation Army
- Community Emergency Response Team (CERT)
- OCFA Chaplains
- Trauma Intervention Program (TIP)

These volunteer groups provided invaluable assistance to a wide variety of non-suppression and incident support activities. The positive attitude, helping nature, and initiative of these groups were recognized and appreciated by OCFA staff, the Incident Command staff, and those who responsible for supervising and managing various support functions.

The American Red Cross is the lead agency responsible for establishing and staffing evacuation centers during disasters and other major emergencies requiring evacuation of large numbers of residents. During the Freeway Complex Fire, three evacuation shelters were established. The first was at Valencia High School in the City of Placentia; the second at Katella High School in the City of Anaheim; and the third at the Brea Community Center. While these shelters were in operation, 202 volunteers and staff worked, 919 people registered, and 1,320 meals were served—along with numerous snacks. All three shelters were opened Saturday, November 15 and closed Monday, November 17.

Evacuated residents are served dinner at one of the local high school evacuation centers.

The Community Emergency Response Team (CERT) Program educates people about disaster preparedness for hazards impacting their community. CERT trains people in basic disaster response skills such as fire safety, light disaster and rescue, team organization, and disaster medical operations. Using classroom and field exercise training, CERT members assist others in their neighborhood or workplace following an event when professional responders are not immediately available to help. CERT members also are encouraged to support emergency response agencies by taking a more active role in emergency preparedness projects in their community. CERT is part of the Federal Government's Citizen's Corp Program. More than 150 volunteers and 38 partner agency staff assisted with the American Red Cross response.

The CERT Mutual Aid Program (CMAP) is an organization of Orange County CERT jurisdictions and citizen volunteers. They are dedicated to collaboration and coordination of volunteer activities in a disaster response. Jurisdiction coordinators and volunteers are governed and supported by a mutual aid agreement, approved in August 2008 by the Orange County Executive Committee and

added to the County's emergency response plan. The mutual aid agreement identifies the CMAP organization and outlines the course of action to be taken to activate Orange County volunteers.

The request for the activation of CERT volunteers for the Freeway Complex Fire was based on a previous use of volunteers during the October 2007 Santiago Fire. In the early morning hours of Sunday, November 16, a request from the Orange County EOC was received to activate mutual aid volunteers to the Irvine Regional Park base camp. Calls were made to CMAP Coordinators to begin the process of volunteer and equipment activation. Agencies affected by the fires (Anaheim, Fullerton, and Placentia) activated CERT members within their own jurisdictions.

CERT volunteer assists in directing resources at the Freeway Complex Fire Incident Base.

During the Freeway Complex Fires, 254 civilian volunteers covered 168 hours of activation at the Irvine Regional Park base camp. Volunteers worked shifts ranging anywhere from 4 to 12 hours. Coordinators were present for all shifts. Support roles included traffic safety management at base camp and assisting in strike team demobilization. A request was made to fill CMAP volunteer shifts from Sunday, November 16, to Wednesday, November 19, with a possibility of expanded volunteer coverage to Friday, November 21. CMAP operational periods were selected by CERT Coordinators. The CERT Coordinators worked 12-hour shifts (4:00 p.m.–4:00 a.m. and 4:00 a.m.–4:00 p.m.), and the CMAP volunteers were assigned 12-hour shifts (5:00 p.m.–5:00 a.m. and 5:00 a.m.–5:00 p.m.), with an additional 4-hour shift in the morning and evening to assist with volunteer changeover.

CMAP representatives from Newport Beach, Seal Beach, Garden Grove, San Juan Capistrano, Huntington Beach, Costa Mesa, and Anaheim responded as Technical Specialists from November 16 to November 21. Coordinators from Newport Beach, Seal Beach, San Juan Capistrano, Huntington Beach, and Garden Grove filled the 12-hour on-site shifts. Huntington Beach and Costa Mesa representatives coordinated volunteer scheduling.

Representation of CERT members included Costa Mesa (43); Newport Beach (34); Garden Grove (60); San Juan Capistrano (22); Irvine (11); Huntington Beach (24); Dana Point (10); Santa Ana (2); Anaheim (1); and West Orange County CERT, which included the cities of Seal Beach, Westminster, Cypress, Los Alamitos, La Palma, and Buena Park (47).

The CMAP organization has worked with the Urban Area Security Initiative (UASI) Grant Program since 2005. Its goal is to create regional equipment caches to support CERT programs countywide and to respond upon request. The cities of Seal Beach, Dana Point, Fullerton, and Anaheim have dedicated supplies for CMAP response. Seal Beach provided the response equipment trailer and tow vehicle for this activation—while the Garden Grove CERT program provided a volunteer rehab vehicle and radios.

On Sunday, November 16, OCFA implemented its Occupant Liaison Program. OCFA personnel with fire department vehicles were assigned to the American Red Cross Centers and went into the fire areas to support the citizens of Yorba Linda. The Occupant Liaison Program provides customer service for information, coordination, and comfort to individuals experiencing emergency incidents such as fires, floods, mudslides, or any other type of incident resulting in the displacement of the occupants from their residences or places of business. Four Occupant Liaison Teams—comprised of an OCFA Fire Prevention Inspector, a Trauma Intervention Program (TIP) representative, and an OCFA Chaplain were available.

The Trauma Intervention Program (TIP) is a non-profit volunteer organization of specially trained citizen volunteers. They provide immediate emotional and practical support to victims and their families following a tragedy or traumatic event. TIP provided volunteers to the OCFA Occupant Liaison Teams. They were invaluable in assisting with counseling residents who had been evacuated or whose homes were damaged or destroyed.

The Salvation Army is a non-profit organization with a history of providing services and programs during times of disaster in Orange County over the last 100 years. Its community services also include transitional housing, emergency shelters, counseling, and responding to emergency disasters. Over the last couple of years, the Salvation Army has responded to many local disasters including the Santiago and Freeway Complex Fires. Through the mobilization of over 100 volunteers, the Army provided assistance to those affected by the disasters with food, clothing, and counseling, as well as services provided to first responder fire and law enforcement personnel. The Army mobilized its Emergency Disaster Canteens providing food, beverages, water, and a variety of personal items. The Salvation Army responds to emergency disaster events by providing a myriad of equipment, supplies, and volunteers.

OCFA has a long-standing and very active volunteer Chaplain Program. Members of the Chaplain Program were an important piece of the Occupant Liaison Team. They were on-hand and available to support and assist residents with their spiritual needs during this crisis. They also helped with other non-suppression support duties.

Many other accounts of individual volunteers providing assistance during the Freeway Complex Fire abound. Having trained, qualified, and eager volunteers who are capable of assisting in non-suppression activities freed up full-time firefighting personnel. In turn, they could focus solely on fire suppression efforts. Additionally, they assisted in providing human services, aid, and comfort to evacuated residents and those whose homes were damaged or destroyed. The contributions and assistance of all volunteer groups and the individual volunteers were invaluable.

Fiscal Impacts

Each year, the OCFA establishes cost reimbursement rates. They are used to bill for personnel and equipment resources requested on an assistance-by-hire basis by state, federal, and other agencies needing OCFA services. The personnel rates are based on budgeted salary and benefit costs. Also included are indirect costs such as financial services, purchasing, and human resources. Equipment rates are based on rate schedules provided by CAL FIRE and the Federal Emergency Management Agency (FEMA). These rates recover OCFA's costs when assisting other agencies or when an OCFA incident is declared a major incident subject to public assistance funding.

Public assistance funding is authorized by the Stafford Act and funded through FEMA. The Stafford Act:

- Gives the President the authority to administer federal disaster assistance.
- Defines the scope and eligibility criteria of the major disaster assistance programs.
- Authorizes grants and direct assistance to the states.
- Defines the minimum federal cost-sharing levels.

As of January 31, 2009, OCFA's costs from the Freeway Complex Fire are estimated at $2.3 million. Due to the magnitude of the fire, both FEMA and the State's Office of Emergency Services (OES) declared the Freeway Complex Fire as a major incident. They offered to provide public assistance funding to the participating agencies.

Following guidelines for federal public assistance, on November 20, 2008, a Local Government Fiscal Responsibility Agreement was made between CAL FIRE, FEMA/OES, and OCFA concerning reimbursement of resources for the Freeway Complex Fire. Based on the Local Government Fiscal Responsibility Agreement, OCFA expects reimbursement of approximately 94 percent of costs associated with the fire. **Table 8** below shows costs and the source of anticipated reimbursements.

Table 8: OCFA Cost Reimbursement

Reimbursement	FEMA	CAL FIRE	OES	Total
Claim Submitted	$527, 210.20	$1,575, 775.84	$184,670.07	$2,287,656.08
Estimated Percent of Reimbursement (%)	93.80	100	100	
Estimated Total Reimbursement	$494,523.17	$1,575,775.84	$184,670.07	$2,254,969.08
OCFA's Share	**$32,687.03**	**$0.00**	**$0.00**	**$32,687.03**

Recovery Efforts

As the Freeway Complex Fire was being controlled, efforts began to address the post-fire risk to lives and property that could arise during the coming rainy season. The combined effects of vegetation loss and the effect on soils from fire, created conditions greatly increasing the threat of floods, erosion, and debris flow in the impacted areas.

To prepare for the winter, the OCFA, along with the California State Office of Emergency Services (OES), coordinated assessments of the burned areas with Burn Area Recovery Teams (BART). These teams consisted of representatives from CAL FIRE, California Geological Survey, Department of Water Resources, Department of Fish and Game, Department of Parks and Recreation, and Regional Water Quality Control Boards. Refer to the **Burn Area Recovery Team Report** for more details— http://www.ocfamedia.org/_uploads/PDF/fcfaarbart.pdf.

The BART members conducted a rapid assessment of the fire area to identify hazards and subsequent mitigations including:

- Identifying on-site and downstream threats to public health or safety from land sliding, debris torrents, flooding, road hazards, and other fire-related problems.
- Identifying threats to watershed resources, including excessive erosion; impaired water quality; threats to wildlife, fisheries, and botanical values; and cultural resources.
- Determining measures needed to prevent or mitigate identified threats.

Sand bags in place west of Banyon Rim.

The BART report provides mitigations to reduce—but not entirely eliminate—risk from the identified hazards. Suggestions such as straw mulching and erosion control fabric or blankets, straw wattles to provide a mechanical barrier to water flow and trap sediment, hydro-mulching in selected areas, and K-rails to direct water run-off, if used properly, are very effective.

The following are some of the recommendations for specific areas from the BART report:

- Where possible, drainage basins be expanded and cleaned of all debris. Adequately sized culverts should be placed within the debris basins so flood waters will be discharged effectively. Residents are discouraged from using plastic ground covers: they cause an acceleration of water runoff within the burn area.

- The Ranch in the Olinda Village area will require a large soil berm, K-rail, or rip-rap to direct watershed discharge around the threatened property.

- In general, residences located at the base of the hills in Chino Hills, Yorba Linda, and Brea should take precautions to limit impacts of future rainfall through the use of K-rail,

sandbags, or other flood prevention barriers. Additionally, keeping existing culverts free of debris would be a priority to ensure proper drainage.

- Expect higher than normal watershed discharges with possible debris flow in all rain events for the next two or more rain seasons.

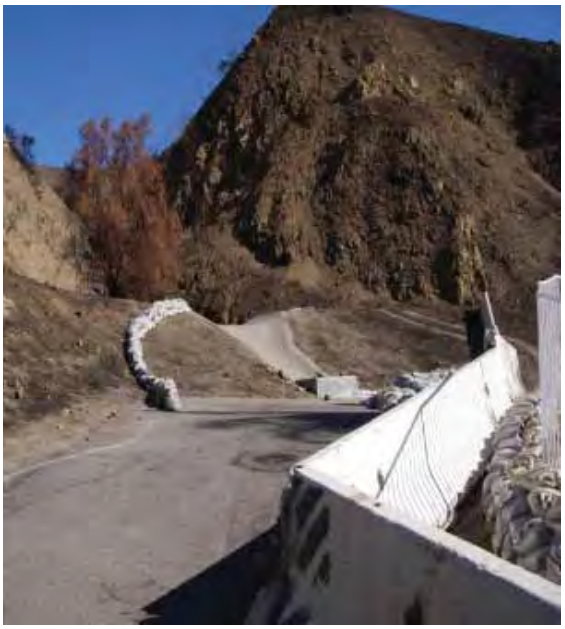
- Specific areas along the BNSF railroad were addressed: Box Canyon and Horse Shoe Bend. An early warning monitoring system with various monitoring points along the hillside above the railroad is advised. Additionally, a minimum of three debris basins should be constructed around Horse Shoe Bend. This will ensure debris is collected prior to making contact with the railroad tracks.

- Emergency evacuation plans should be implemented for all communities within the burn area.

- Any dead/fire burned trees and vegetation and live standing trees that could cause damming or choking of debris in creeks or drainage basins should be removed immediately. A plan should be developed and approved by appropriate agencies to remove problem vegetation for any remaining downstream areas.

- All county, private, and state roads and trails should be monitored for washout and debris flow during and after precipitation events.

- The Chino Hills State Park should be monitored for debris and sediment flows during and after rain events, as large amount of debris may flow into the sediment basin reservoir and cause erosion along roads, bridges, and trails.



Use of K-rail to channel future debris flow around homes.

Resident's preparation for possible mud and debris flow proved to be beneficial.

A moderate to heavy rainstorm was predicted for the Orange County area on November 26–27, 2008. Predicted rainfall amounts ranged from 1.5 inches to 2.5 inches. The OCFA began preparations for the possibility of mud and debris flows by working closely with the local communities of Yorba Linda, as well as the Santiago Fire areas. Evacuation plans were coordinated with local government and law enforcement in the areas directly impacted by fires.

The three main objectives for the OCFA were to (1) provide incident management and support if significant flooding and debris flow occurred in the burn areas, (2) coordinate weather-related calls for service with the City of Yorba Linda, and (3) assist with the timely and orderly evacuation of residential areas as necessary.

The following OCFA resources were pre-staged to reduce reaction time and get needed help to any impacted areas quickly. The augmented resources were staged at the Yorba Linda Community Center.

- An Incident Management Team
- One Bulldozer
- Two Swift Water Rescue units
- One Handcrew
- One Type 3 Strike Team
- Two Reserve Patrols: 10 and 32

Dozer clearing mud off the street following the rains that hit the fire consumed areas of Yorba Linda.

The City of Yorba Linda and its residents played a significant role in preparing for the rain event. While fire crews were continuing to overhaul the burn areas, community efforts were underway to fill, distribute, and place sandbags, straw bales, and other mitigation efforts. This effort also drew volunteer participation from across the city, as well as from other cities across the county.

Major Challenges

- Over the last decade, Southern California has experienced eight years of drought conditions, contributing to an increase in dead fuels, explosive and dryer fuels, and more intense fire behavior.[2]

- A sustained Santa Ana wind event contributed to two significant fires starting less than two hours apart in the same area of Orange County. The extreme winds, rapid fire spread, and urban interface environment created a wide fire front. This had a major impact on resource availability.

- Houses with unprotected vents and other openings became vulnerable to ember intrusion. Raging winds turned burning fuel into an "ember-storm," threatening at-risk homes in the fire's path.

- The OCFA, pursuant to a Board-adopted policy, dispatches a minimum of 18 firefighters to a single "working structure fire" (4 engines, 1 truck company, and 1 paramedic) as the necessary "Effective Firefighting Force." That ratio of firefighters to working structure fire was not possible to achieve during the Freeway Complex Fire.

- While conducting structure protection during the Freeway and Landfill Fires, interior firefighting was often needed. A Federal mandate and best practice, the "Two-in and Two-out Rule" demands that in the absence of a life safety or rescue scenario, two or more firefighters are required to conduct interior firefighting with a minimum of two additional firefighters on standby outside the occupancy ready to conduct firefighter rescue. To comply with this safety rule, four-person staffing is required on a single engine company. Since most OCFA engines are staffed with three firefighters, they were not safe nor within legal guidelines to conduct interior operations without support from a second company.

- Wind blown embers, carried aloft by the fire's thermal column, created spot fires more than a mile ahead of the main fire front. These spot fires then merged with the main flame front. This rapidly compressed the transformation time from brush fire into urban conflagration.

- The Freeway Fire and the Landfill Fire began in rapid succession and made resource tracking, command and control, and communications more difficult during the initial attack phase. Many responding agencies converged on the incident simultaneously making resource accountability extremely difficult.

- Two additional brush fires—the Landfill and Diemer Fires, in western Yorba Linda—along with the Freeway Complex Fire jumping the 91 Freeway in two places, further stretched the already taxed resources.

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[2] US Geological Survey. *Water Watch Past Stream Flow Conditions*. Accessed http://water.usgs.gov/waterwatch/?m=statesum&r=ca&w=statesum%2Cmedian on March 6, 2009.

- Two strike teams were requested by ORC Battalion Chief Reeder to stage at Station 53 in preparation of the fire's arrival to Yorba Linda. These strike teams self-diverted to Green River and the 91 Freeway.

- The incident impacted two Office of Emergency Services regions, four counties (Los Angeles, Orange, Riverside, and San Bernardino), and five emergency dispatch centers. Impacting these major geographical areas created communication, operational, and command challenges.

- The lack of common radio communications presented significant challenges. Some local agencies do not have VHF high band capability as required by FIRESCOPE. Many agencies continued to use their own radio systems or failed to follow the established communications plan. This further exacerbated the fire-ground communications problem. Additionally, the terrain in the fire area was extremely broken and mountainous--hampering radio transmissions.

- Self-dispatching of off-duty firefighters on relief apparatus to the fire presented challenges to personnel accountability and safety. In some instances, these resources were not discovered to be at the fire for 12 hours or more.

- Many mutual aid resources had difficulty navigating through unfamiliar local communities. Resources lacked a reliable mapping method of locating specific fire-impacted areas.

- The incident was run as a unified complex. It started as two fires in the same general area, and a central ordering point was established for both fires through the OCFA. The large incident culture and command structure are unfamiliar to many local agencies, creating confusion.

- An initial challenge occurred in working with law enforcement to form a unified command structure and to have a single decision maker. Prior experience on the part of the participating agencies facilitated this process.

- The conflict between state (SEMS) and national (NIMS) definitions for evacuation terminology continues to cause confusion for the media and public (mandatory vs. order/warning).

- The loss of water pressure in the Hidden Hills community and in other neighborhoods was a major challenge for the ground forces protecting threatened structures.

- More than 375 law enforcement personnel from various agencies assisted the Brea Police Department during the fire. Providing them with accurate and timely information on areas to be evacuated or repopulated was challenging.

- A rapidly developing fire that stretched over a large urban area made it difficult for the OCFA Media Center to stay current on fire conditions and information.

- Fire extinguishment efforts placed an extreme demand on the water system. Whether due to the use of master stream devices, the numerous firefighting hose lines, and/or the scores of garden hoses left running at individual homes, the demand on the system taxed the water capacity and deliverability.

- Homeowners—those remaining within the fire perimeter and those who evacuated—created traffic challenges inhibiting the movement of fire apparatus.

- The speed and unpredictability by which the fire moved through the urban interface made it challenging to stay ahead the fire and rapidly identify areas to be evacuated.

- Ornamental vegetation provided an unexpected source of fire brands the wind was able to carry deep into residential neighborhoods. Palm trees were a significant contributor to this problem.

- Wooden decks, balconies, and other unprotected structures provided an entry way for embers and flames to enter homes.

- Due to the demand to keep pace with a rapidly moving fire, a "bump and run" tactic was employed. In some cases, structures had to be left unattended after initial extinguishment, resulting in some rekindles and the loss of structures. This may not have occurred had there been sufficient units to employ an "anchor and hold" strategy.

- Fire retardant "drift" from air tankers created a major safety and post-fire clean-up challenge. Large amounts of fire retardant from aircraft was either dropped on homes or drifted far from the target due to the winds.

- The Department Operation Center (DOC) was not established until OCFA Division Chief Robinson arrived at the OCFA Emergency Command Center (ECC) at approximately 11:30 a.m. on November 15. This led to difficulty in receiving, placing, and tracking orders early in the fire.

- The presence of private fire protection services created operational challenges and a level of confusion among residents. These resources, normally sponsored by homeowners' insurance companies, currently have no operational guidelines, certification standards, and no common communications with the incident commanders.

- A Red Flag Warning or a Red Flag Fire Weather Watch had not been issued for Orange County. Wind prediction for the day was significantly different than experienced. This resulted in the OCFA not implementing its Extreme Weather Plan (SOP 209.13) or the Red Flag Alert Program (SOP 209.12). Either or both would have increased public awareness and implemented operational procedures in response to the extreme weather conditions.

- Due to the size and rapid growth of the incident, meeting all logistical needs in the early stages was challenging.

Successes

- Importantly, no loss of life occurred. Reported injuries were few and considered minor.

- Hundreds of structures were successfully protected. Low humidity and high winds made this a very dangerous time for fires in the wildland urban interface (WUI). Although structures were lost and damaged, if not for the excellent work of the firefighters and citizens who protected their homes, the losses would have been greater.

- The Unified Command Incident Management Team worked well together. Although the team was large, each agency was mindful of the others' needs. This helped create common ground on difficult issues. As challenges arose, all the agencies worked toward the common goal of meeting the incident needs.

- Coordination with law enforcement was excellent. The early integration proved to be extremely advantageous for citizen evacuation. Additionally, the placement of law enforcement personnel within Operational Branches helped reduce the lag time for evacuations.

- The advance planning and tabletop exercise given in preparation for an incident in the mutual threat zone provided for a more effective command and control.

- A smooth transition occurred from the initial attack incident commanders and the incident management team. This can be attributed to an attitude of cooperation and respect.

- Despite the radio communication problems, water supply issues, and the time required to assemble the required firefighting assets to meet the demand of this urban conflagration, personnel worked hard to contain this incident and to minimize loss.

- Interagency cooperation was effective in solving issues and obtaining necessary resources. Operationally-related activities such as traffic control, evacuation, and repopulation were easy to implement due to the close coordination between the involved agencies.

- The integration of OCFA personnel into all general staff positions provided the CAL FIRE IMT 6 with local knowledge and expertise essential to the successful conclusion. Local agency participation in strategy meetings helped obtain agency support and "buy in" for the operational plan.

- The Orange County Access Channel was used as the Incident Command Net. Thus, all ORC 800 MHz radio users, and VHF high band users, could communicate on one common channel.

- The use of OCFA's new Compressed Air Foam System (CAFS) units was highly successful. The high mobility of the units allowed for quick pick-up and redeployment. The foam lasted longer than expected and freed other resources for other assignments.

- The OCFA was able to quickly provide representatives to the County and City Emergency Operation Centers. This enabled a direct line of communication between the impacted jurisdictions and the incident command team.

- Using Community Emergency Response Team (CERT) personnel—to perform various functions within the incident base—freed fire personnel for other assignments.

- The incident was able to provide three structural engines to support the local water supply system.

Recommendations

Mitigation and Preparation

1. Continue regional planning efforts. Establish interoperable communication plans for mutual threat zones. *In Progress*

2. Develop regional operating plans (similar to Silverado Canyon Fire Plan) for high fire severity zones. *In Progress*

3. Develop a rapid attack mobilization plan that facilitates dispatch, mobilization, and situation management practices during major emergencies or Red Flag Warning conditions. *In Progress*

4. Work with local water agencies to evaluate potential threats and weaknesses to the water distribution systems and facilities housing critical infrastructure. Assist in the development of a mutual aid plan between water agencies permitting inter-agency cooperation during major emergencies. Develop contingency plans and practical exercises to test for vulnerabilities. *In Progress*

Prevention and Public Education

1. Facilitate the development and enforcement of applicable building and fire codes for fuel modification and building construction in the wildland-urban interface (WUI) environment. *In Progress*

2. Develop informational material for ornamental vegetation planting and maintenance to reduce flame spread and ember production.

3. Provide sufficient Occupant Liaison personnel to assist residents when returning to evacuated areas. Selected OCFA professional staff, when trained, may fit this role appropriately.

4. Ensure the terminology used in regard to public evacuation is commonly understood and is in conformance with SEMS/NIMS and/or FIRESCOPE to minimize confusion between public agencies.

Operations and Response

Resources

1. Complete development of a formal plan for placing “surge capacity” engines in service. The plan should address storage of the units, outfitting, communications, and staffing. *In Progress*

2. Complete the modification of five patrols to compressed air foam system (CAFS) units. Develop use and response configuration plans. *In Progress*

3. Establish a full-time fire handcrew. Handcrews are needed to meet our wildland fire suppression mission. Fire crews are consistently listed as critical resource needs during every wildland fire. *Delayed due to budget*

4. Develop and consider alternatives for staffing additional fire bulldozers when needed.

5. Develop internal staffing criteria for water tenders, patrols, and other critical resources when Reserve personnel are unable to respond. *In Progress*

6. Develop a policy pertaining to the use of privately-owned resources such as water tenders, earth moving equipment, and other support resources that may be used when offered during emergency situations.

7. Follow through with the staffing recommendations from the Santiago Fire to increase the staffing at stations with a Type III engine to four personnel. In the interim, achieve this through the use of back-fill for two months during the peak of fire season as a reasonable stopgap until this can be achieved. *In Progress*

8. Work with law enforcement to develop more effective evacuation and repopulation procedures.

Communications

1. Increase CAL FIRE Command Net radio coverage in Orange County by adding two or more additional radio repeaters. *In Progress*

2. Exercise radio interoperability in Orange County regularly. Radio users must be familiar with VHF radio operations.

3. Establish a VHF frequency group for State Responsibility Areas (SRA) in Orange County, so all responding units can operate on this group. The command and tactical nets should be established before an incident occurs. *Complete*

4. Continue efforts to equip all resources in Orange County with VHF radio capability per FIRESCOPE. *In Progress*

Incident Command/Management

1. Develop a program to increase the availability of Incident Management Team(s) for year-round response within Orange County.

2. Continue to evaluate ICS training needs and offer appropriate courses to all personnel including Command staff. *In Progress*

3. Provide periodic refresher training on the use of firing operations to all chief officers.

4. Review and consider currently available technology, such as Toughbook laptop computers, for use in all command vehicles and eventually on every fire engine. These computers

should have mapping software installed and maintained. These tools have proven to be invaluable resources on fires and provide critical information for planning and firefighting purposes.

5. Continue the development and use of ICS trainee positions to facilitate succession planning and the development of incident management teams. *In Progress*

6. Identify additional potential assignments for OCFA professional staff on major incidents. *In Progress*

7. Develop a policy for interacting with private fire protection resources.

Air Operations

1. Develop best practice staffing and deployment model for the OCFA helicopter program.

2. Develop a policy on first and best use of law enforcement helicopters. Where appropriate, assist local law enforcement agencies to obtain red-card certification for pilots, fueling operations, and helicopter use on local government fires.

3. Train and qualify additional OCFA personnel as Air Ops Branch Director (AOBD), Air Support Group Supervisor (ASGS), Helicopter Coordinator (HLCO), and Helibase Manager (HEMB).

4. Complete night vision goggle training to provide night flying capability. *In Progress*

5. Research the feasibility and local use of unmanned aerial vehicles (UAV) to facilitate mapping during smoky conditions.

6. Pre-identify helispots and water source dip sites in fire prone areas.

7. Increase mobile refueling capability for helicopters.

8. Establish a land use agreement with Corona Airport for future deployments.

9. Develop best practices for aircraft use on wildfires. Aircraft are a proven asset and, unlike ground forces, are limited by daylight flying time. Practice and policy should be developed to ensure “first light” use of all air assets.

10. Provide periodic training to Chief Officers on the use of interagency radios and communications with the aircraft command and control elements (ATGS and HLCO).

Emergency Command Center

1. Develop an operations manual for the OCFA Department Operations Center (DOC). The manual should identify critical positions within the DOC and outline critical tasks needing to be completed during a major emergency or event. *In Progress*

2. Order ECC support personnel to support incident command teams and expanded dispatch as needed. This will help with ensuring orders are placed correctly and assist the plans section on arriving resources.

3. Provide managerial support in the absence of the ECC Chief. The DOC Manager must be able to provide managerial support and operational and tactical guidance to the ECC Supervisor.

4. Empower ECC Supervisors to modify normal dispatch procedures to meet operational needs and station coverage during major emergencies.

Logistics

1. Ensure adequate fuel and equipment support is available during major emergencies.

2. Identify and pre-plan additional base camp locations for WUI fires. *In Progress*

Training

1. Provide *S-215 - Fire Operations in the Wildland/Urban Interface* course to all OCFA company officers. Include annual refresher on the use of firing operations. *In Progress*

2. Continue to train with law enforcement personnel in the complexities of extended attack incidents and unified command procedures.

3. Conduct on-site training of the Freeway Complex Fire for Chief Officers of the affected agencies.

4. Train OCFA Fire Prevention personnel to be able to function as a City EOC Agency Representative.

5. Provide training to selected professional staff to assist the Public Information section.

6. Provide WUI structure protection tactics training to all operations personnel.

7. Initiate a training program with the water districts that includes ICS/NIMS/SEMS, and with tabletop exercises.

Volunteer Groups

1. Continue the use of Community Emergency Response Teams (CERT) for logistical support. Seek additional duties they may safely perform during major emergencies.

2. Develop a policy and procedure for accepting community support and offers to help or provide resources.

Public Information

1. Improve the OCFA website so incident information is easily and readily available. The site should incorporate technology to allow for interactive maps and data search.

2. Develop procedures for initiating frequent community briefings. Topics should include incident status, evacuation information, repopulation expectations, and other relevant information of interest.

3. Conduct training with Cities regarding Emergency Operations Center activities such as evacuation and repopulation procedures, media information distribution, and public notification.

As a result of the 2007 Santiago Fire, a detailed After Action Report was written that included its own set of recommendations. Prior to the Freeway Complex Fire, many of these recommendations had been implemented and proved to be beneficial. Others are being developed and worked on by established work groups. The use of these work groups should continue, and the recommendations within this report should be distributed among them.

Glossary

AGENCY REPRESENTATIVE – Individual assigned to an incident from an assisting or cooperating agency. He/she has been delegated authority to make decisions on matters affecting that agency's participation at the incident. Agency Representatives report to the Incident Liaison Officer.

AIR ATTACK – Airplanes flying over an incident, providing tactical coordination with the incident commander on the ground, and directing air tankers and helicopters to critical areas of a fire for retardant and water drops.

ANCHOR AND HOLD STRATEGY – Structure protection tactic often used in a wildland urban interface fire. Firefighting forces engage the fire and then remain in selected areas to ensure no or limited fire starts after the passing of the fire front.

ARCING – Luminous discharge of current—formed when a strong current jumps a gap in a circuit or between two electrodes.

BASE CAMP – Location at which primary logistics functions for an incident are coordinated and administered—only one base camp per incident.

BRANCH – Organizational level having functional or geographic responsibility for major parts of incident operations. The Branch level is organizationally between Section and Division/Group in the Operations Section, and between Section and Units in the Logistics Section. Branches are identified by the use of roman numerals or by functional name (e.g., medical, security).

BUMP AND RUN STRATEGY – Structure protection tactic often used in a wildland urban interface fire where firefighting forces must keep moving ahead of the advancing fire. They attempt to control spot fires and/or provide initial knock-down of fires established within a structure.

BURN AREA RECOVERY TEAM (BART) – Team comprised of multi-agency and multi-disciplined resource specialists assembled to assess fire damage and suppression effects and to prepare mitigation measures. Upon development of a rehabilitation plan, the team makes recommendations on hazard mitigation.

BURN OVER – Wildfire situation where—because of wind-shift, topography, and/or poor planning—a person (firefighter) is caught in an inescapable fire and literally has fire burn over, under, and around him/her; this is the leading cause of firefighter deaths during wildfires.

CENTRAL ORDERING POINT – Facility or dispatch center where all personnel, supplies, and equipment requests are placed and tracked.

CHIEF OFFICERS – Agency Administrators, Fire Chiefs, Deputy Chiefs, Assistant Chiefs, Division Chiefs, and Battalion Chiefs with executive and/or management-level responsibilities.

COMPLEX – Two or more individual incidents located in the same general area that is assigned to a single Incident Commander or to Unified Command.

COMPRESSED AIR FOAM SYSTEM (CAFS) – Used in firefighting to deliver fire retardant foam for the purpose of extinguishing a fire or protecting unburned areas from becoming involved in flame. CAFS units are effective when used to pre-treat structures and vegetation with foam in advance of the fire to protect it from heat and flames.

CONFLAGRATION – Uncontrolled burning or fire that moves across natural and man-manmade barriers and threatens human life or property and the environment.

CONTAINMENT – Fire is contained when it is surrounded on all sides by some form of boundary, line, or clearance but is still burning and has the potential to jump or escape the containment line.

CONTROLLED – Fire is controlled when no further threat of it escaping outside the containment line exists.

COOPERATING AGENCY – Agency supplying assistance including—but not limited to—direct tactical or support functions or resources to the incident control effort.

DEFENSIBLE SPACE – Creating a fire safe landscape for at least 30 feet around homes—out to 100 feet or more in some areas—to reduce the chance of a wildfire spreading to structures. – Essentially, an area helping to protect a home and provide a safety zone for the firefighters battling flames.

DEFENSIVE – Firefighting mode primarily focusing on the protection of exposures through the confinement of the fire to a selected area.

DEPARTMENT OPERATIONS CENTER (DOC) – DOC provides agency dispatching capability independent and separate from routine emergency dispatch. The DOC is activated and staffed for large or complex incidents allowing personnel to focus efforts solely on the incident: maintaining situation status, processing orders for resources, and maintaining a direct link with EOCs.

EMERGENCY COMMAND CENTER (ECC) – Dispatch Center, an ECC is the center of an agency's information and communication capability. It is tasked with receiving and processing incoming calls for help. ECC personnel determine the nature of the request and forward it to the appropriate resource.

EXTREME FIRE BEHAVIOR – "Extreme" implies a level of fire behavior characteristics ordinarily precluding methods of direct control action. One or more of the following is usually involved high rate of spread, prolific crowning and/or spotting, presence of fire whirls, and/or strong convection column. Predictability is difficult since such fires often exercise some degree of influence on their environment and behave erratically and dangerously.

FIRE LINE – Area where the vegetation has been removed to deny the fire fuel—or a river, a freeway, or some other barrier expected to stop the fire. Hose lines from fire engines may also contribute to a fire being surrounded and contained.

FIRE MANAGEMENT ASSISTANCE GRANT (FMAG) – Federal assistance program

managed by FEMA through the State Office of Emergency Services (OES). Program is designed to help state and/or local jurisdictions impacted by high cost, high damage wildland fires.

FIRE PERIMETER – Entire outer edge or boundary of a fire.

FIRING OPERATIONS – Setting a controlled fire with the intent to create a fire break so the path of the fire will be impeded.

FIXED WING AIRCRAFT (AIR TANKERS) – Aircraft designed for the purpose of picking up and depositing fire retardant on a fire while in mid-air.

FUEL MODIFICATION – Modification and irrigation of combustible vegetation to reduce fuel energy output. Highly flammable wildland vegetation is replaced with managed areas of light or fire resistive fuels and thereby allowing firefighters the ability to control a fire while relatively small.

FUELS – Combustible material or vegetation.

GREY BOOK – Agreement between CAL FIRE and the six contract counties that addresses direct fire protection of State Responsibility Area (SRA) within each of the contract counties. Orange County, along with the other contract counties, receives funding from the state to provide protection to the SRA

HANDCREW – Team of wildland firefighters primarily assigned to fire line construction activities. Handcrews also mop up hot-spots, burn out vegetation to provide fuel free zones, and assist with hose lays.

HIGH WATERSHED DISPATCH – Level of dispatching ensuring the appropriate type and number of wildland firefighting resources based on current weather conditions.

INCIDENT COMMAND SYSTEM (ICS) – Standardized on-scene emergency management concept specifically designed to allow its user(s) to adopt an integrated organizational structure equal to the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries.

INCIDENT COMMANDER – ICS position responsible for overall management of the incident. Reports to the Agency Administrator for the agency having incident jurisdiction.

INCIDENT MANAGEMENT TEAM (IMT) – Incident commander and appropriate general and command staff personnel assigned to an incident. Also known as an Incident Command Team.

INITIAL ATTACK (IA) – Aggressive suppression action taken by first arriving resources with the priorities of protecting life, property, and the environment.

INTERFACE ZONE – Area where the wildland comes together with the urban areas. This is often referred to as the I-Zone or the Wildland Urban Interface (WUI).

MASTER MUTUAL AID SYSTEM – Creates a formal structure in which a jurisdictions

personnel, facilities, and equipment can voluntarily assist other jurisdictions when capabilities are overwhelmed.

MASTER STREAM – Controllable, high-capacity water jet used for manual firefighting or automatic fire protection systems; also known as a monitor, deluge gun, or deck gun.

MUTUAL THREAT ZONE – Area in which two or more jurisdictions have responsibility to protect in case of a fire, flood, or other emergency.

OFFENSIVE ATTACK – Putting water directly on the flames with the intent to extinguish.

OFFICE OF EMERGENCY SERVICES (OES) – The California Governor's Office of the Emergency Services.

PATROL UNIT – OCFA fire apparatus designed for wildland firefighting built on a heavy-duty passenger crew-cab truck chassis. It carries 100 gallons of water in a pressurized tank. OCFA Patrols are assigned to fire stations adjacent to wildland interface areas.

RATE OF SPREAD (ROS) – Relative activity of a fire as it extends from the point of origin and the total perimeter of the fire. Usually expressed in acres per hour.

RED FLAG WARNING – Term used by fire weather forecasters to alert users to an ongoing or imminent critical fire weather pattern.

REGIONAL ORDERING SUPPORT SYSTEM (ROSS) – Computer software program, which automates the resource ordering, status, and reporting process during a wildfire; tracks all tactical, logistical, service, and support resources mobilized by the incident dispatch community.

REHABILITATION – Activities necessary to repair damage or disturbance caused by wildfire or the wildfire suppression activity.

REKINDLED – Act of catching on fire once again; usually caused by a fire not fully extinguished.

RIPARIAN AREA – Interface between land and a stream—usually an ecological area with the abundance of both plants and animals.

SANTA ANA WINDS – Type of Foehn wind—a warm, dry, and strong general wind that flowing down into the valleys when stable, high pressure air is forced across and then down the lee side slopes of a mountain range. The descending air is warmed and dried due to adiabatic compression producing critical fire weather conditions. Locally, it is called by various names such as Santa Ana and Sundowner winds.

SOUTH OPS – Formally known as the Southern California Geographic Area Coordination Center (OSCC), it is the focal point for coordinating the mobilization of resources for wildland fire and other incidents throughout the Geographic Area. Located in Riverside, the Center also provides Intelligence and Predictive Services.

SPECIAL STAFFING – Persons put in place on assigned fire apparatus in addition to the normal staffing—usually done in case of an emergency such as a fire, wind event, or flood.

SPIKE CAMP – Remote camp usually near a fireline and lacking the logistical support a larger fire camp would have.

SPOT FIRE OR SPOTTING – Small fire ahead of the main fire—caused by hot embers being carried (generally by winds) to a receptive fuel bed or structure. Spotting indicates extreme fire conditions.

STATE RESPONSIBILITY AREA (SRA) – The California Board of Forestry and Fire Protection classifies areas in which the primary financial responsibility for preventing and suppressing fires is that of the state. CAL FIRE has SRA responsibility for the protection of over 31 million acres of California's privately-owned wildlands.

STRIKE TEAM – Engine strike team consisting of five fire engines of the same type and a lead vehicle. Strike team leaders are usually a Captain or a Battalion Chief. Strike teams can also be made up of bulldozers and handcrews. A strike team comprised of structure engines is designated with the letter "A"; i.e., 1400A. A strike team comprised of wildland engines is designated with the letter "C"; e.g., 9329C.

STRUCTURE PROTECTION GROUP – Two or more fire apparatus capable of pumping water for the purpose of preventing homes in a designated area from being burned by wildfire nearby.

UNIFIED COMMAND – Unified team effort allowing all agencies with jurisdictional responsibility for the incident, either geographical or functional, to manage an incident by establishing a common set of incident objectives and strategies.

WATER TENDER – Specialized firefighting apparatus capable of transporting a minimum of 1,000 gallons of water from a water source directly to the fire scene.

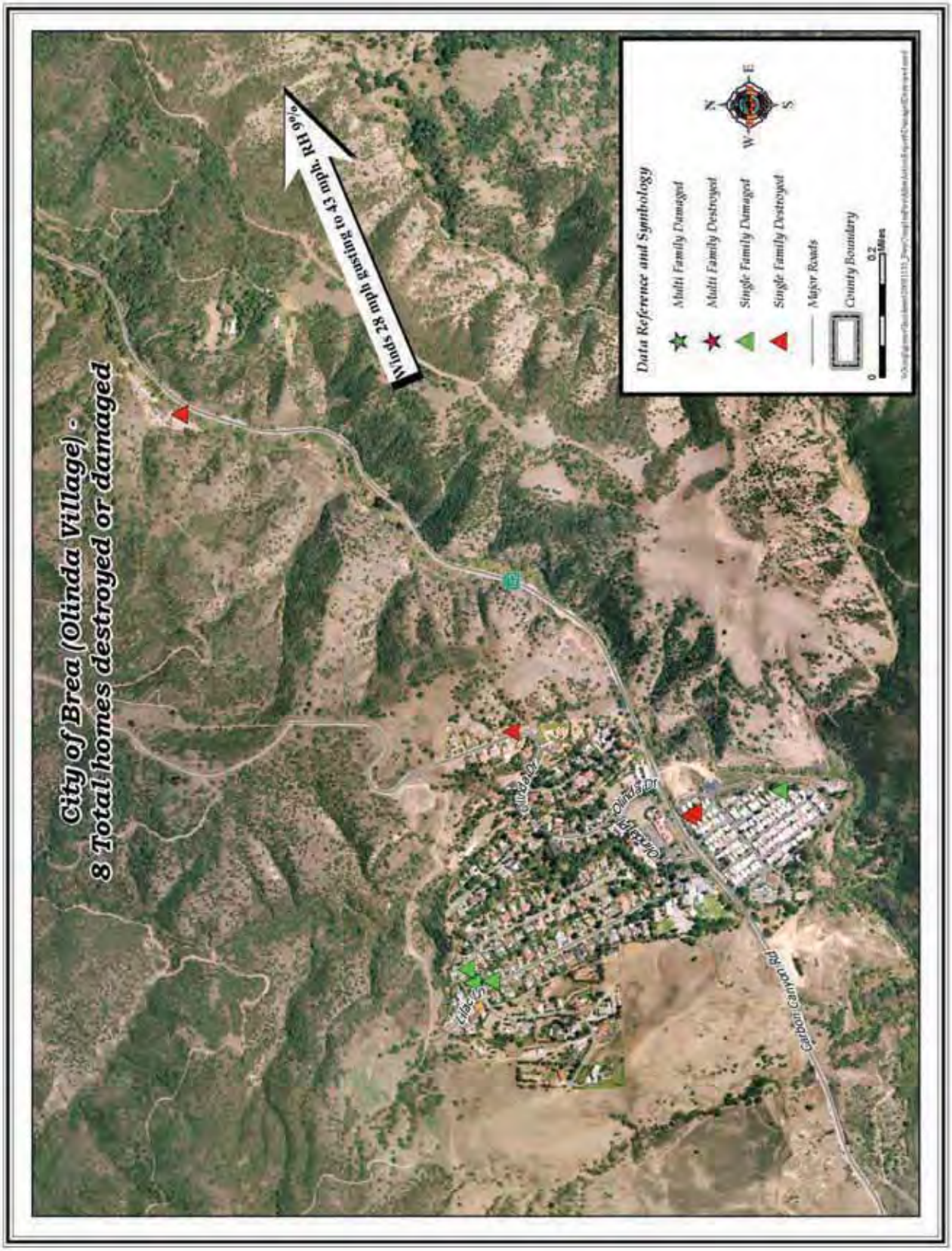
WILDLAND ENGINE (Type 3) – Fire engines designed for the wildland firefighting environment. Constructed on heavy-duty commercial truck chassis with high ground clearance and often equipped with four wheel drive. Type 3 engines carry 500 gallons of water and have a minimum pump capacity of 120 gpm at 250 psi.

WILDLAND URBAN INTERFACE (WUI) – Line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

Appendix–Homes Destroyed or Damaged

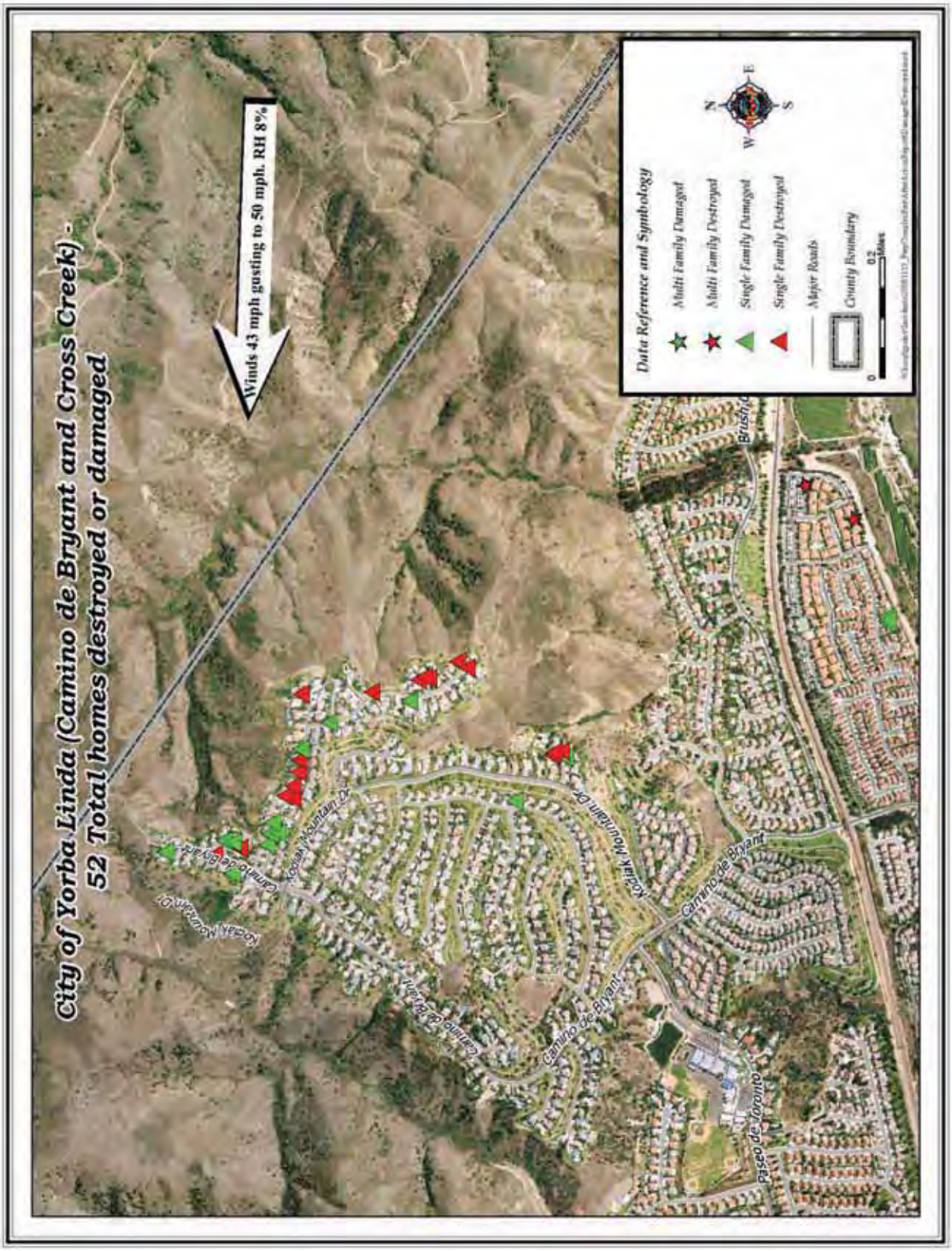
Map 16: City of Anaheim—Homes Destroyed or Damaged

Map 17: City of Brea—Homes Destroyed or Damaged

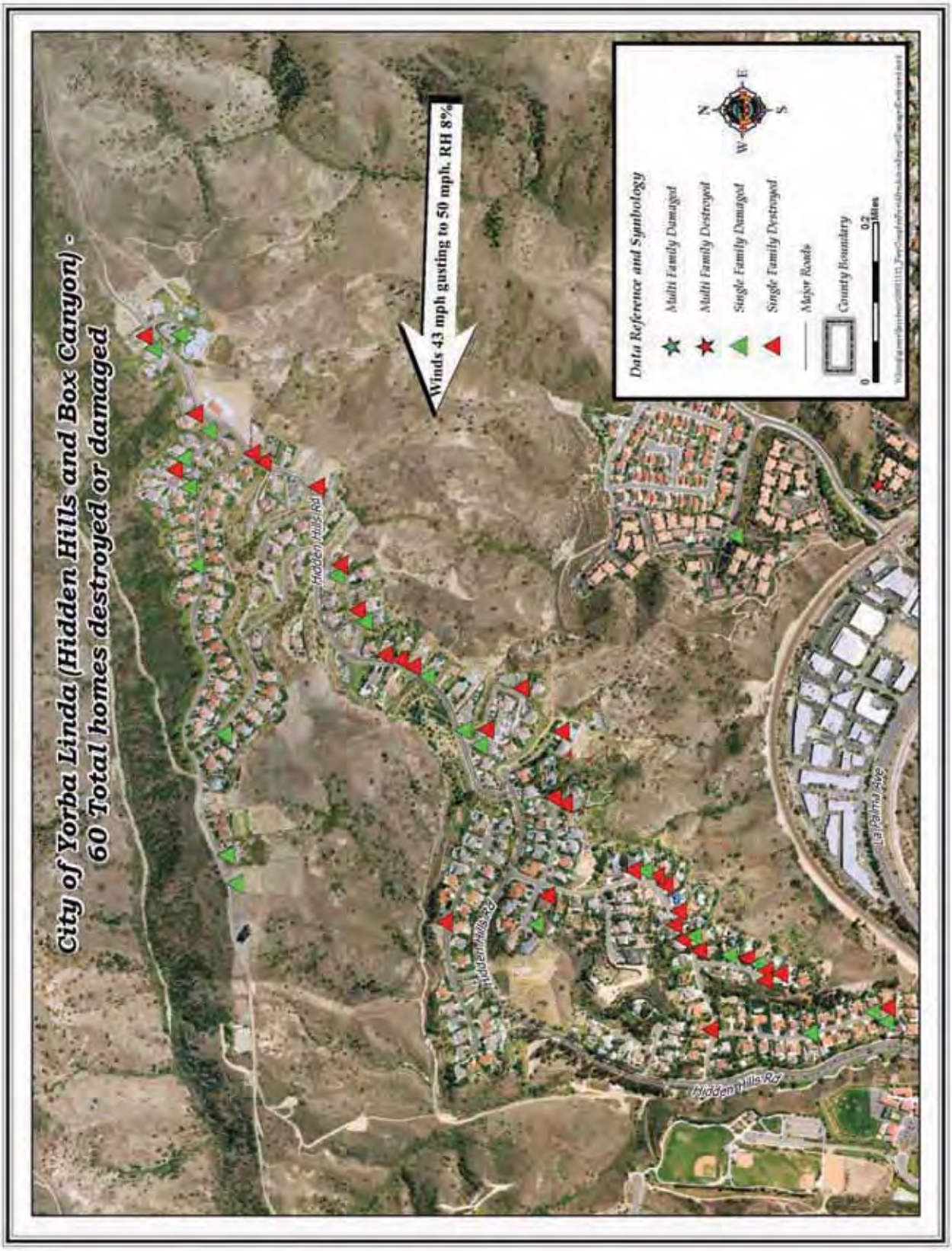


Map 18: City of Corona—Homes Destroyed of Damaged

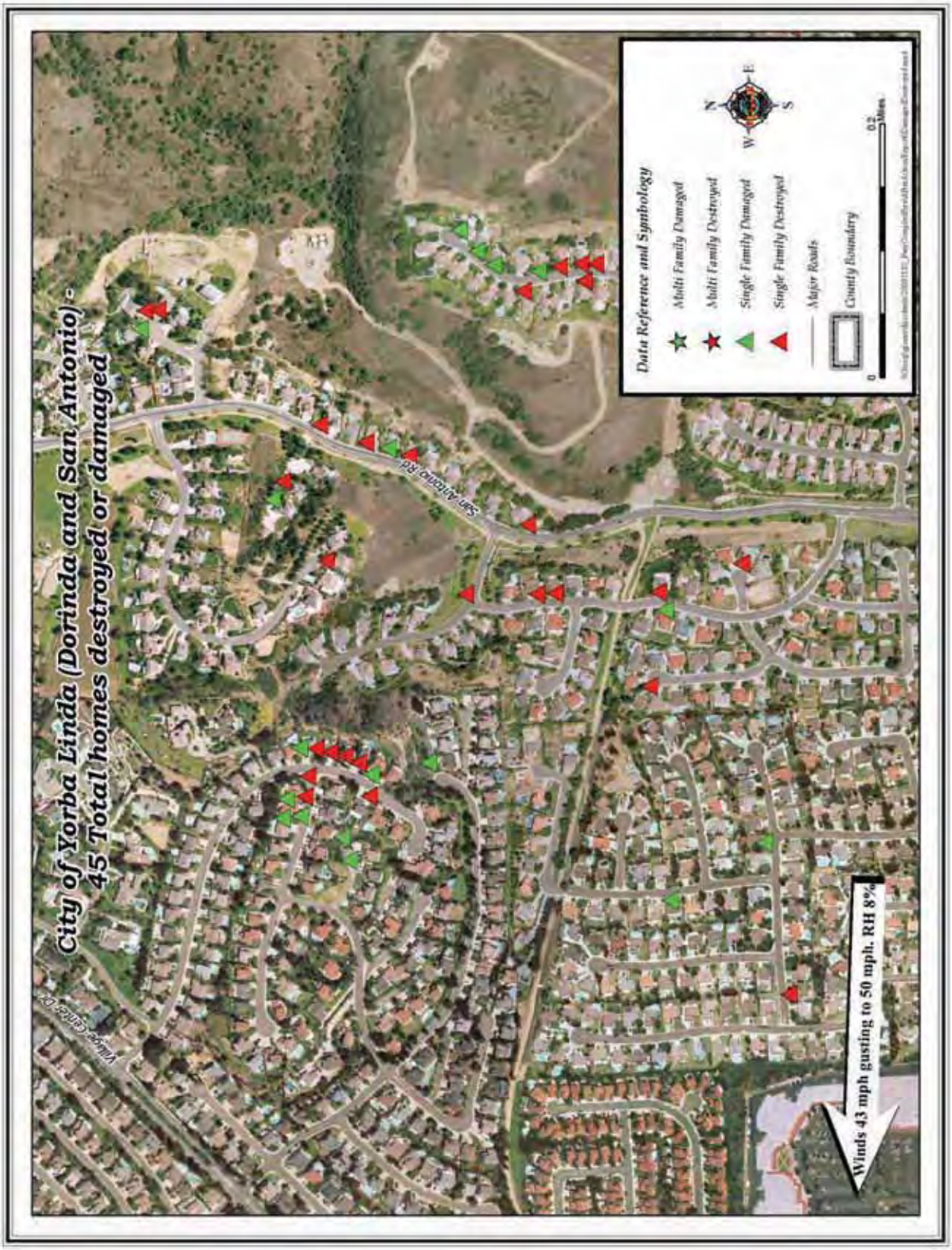
Map 19: City of Yorba Linda—Camino de Bryant and Cross Creek



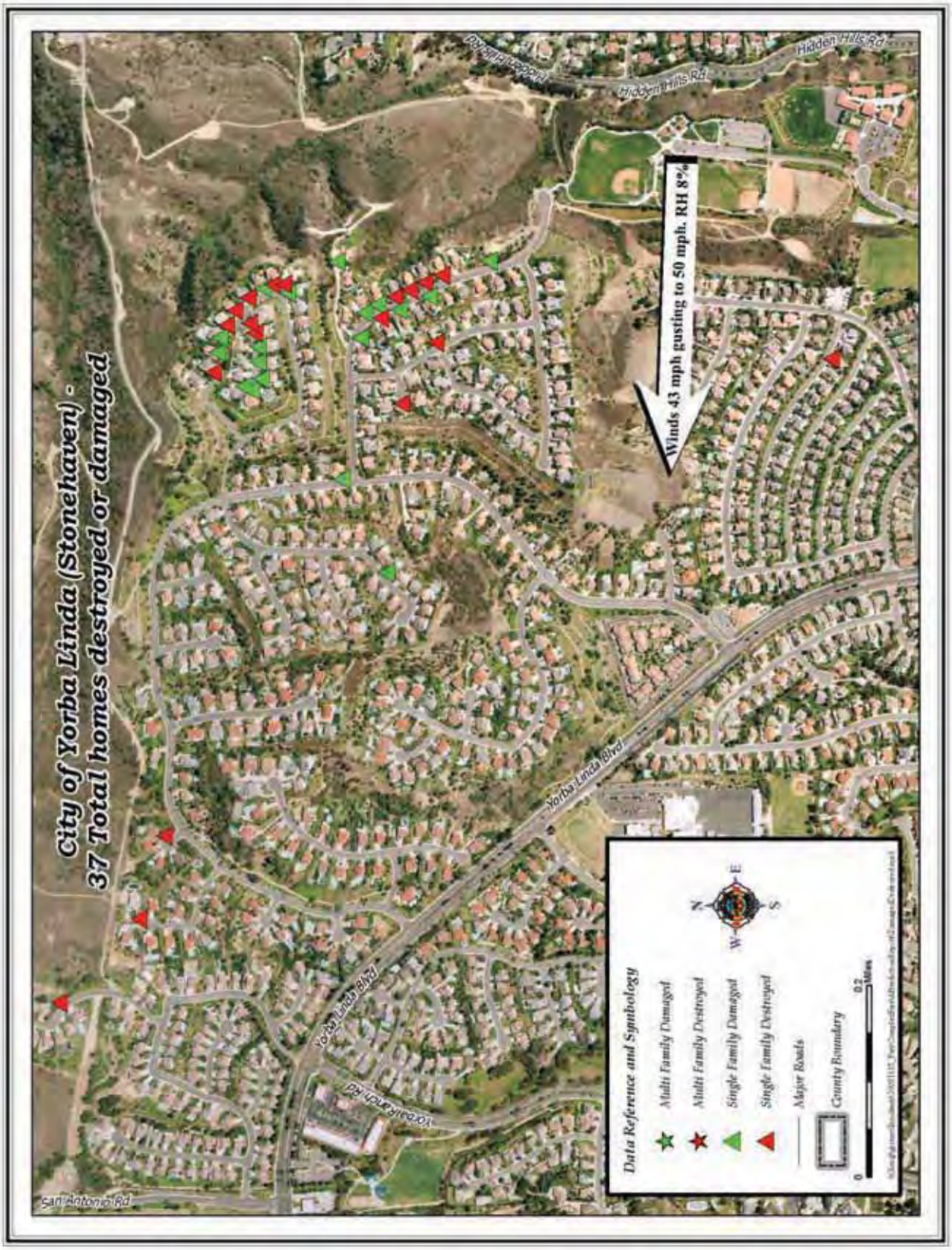
Map 20: City of Yorba Linda—Hidden Hills and Box Canyon



Map 21: City of Yorba Linda—Dorinda and San Antonio



Map 22: City of Yorba Linda—Stonehaven



Acknowledgements

A work of this type cannot be put together without the help and support of many people. The development and writing of this After Action Report has been a collaboration, drawing on the time and talents of personnel from every department within the OCFA. It is not possible to name every individual who played a role in the development of this document; however, it is appropriate to mention some of the key tasks and to thank those who are responsible for the the final outcome.

The following are thanked and commended for their contributions to this project. Those who completed After Action Surveys and documented their actions and observations. The Team Leaders who coordinated the gathering of information and compiling of data. The OCFA members who went into the impacted communities and spoke with residents and evaluated the damage to ensure accurate save and loss data. Those who listened to hours upon hours of radio traffic and phone calls to capture fire ground activity. The writers of the various report sections, and then to those who edited and proof read the Report over and over until it was just right. Technical specialists who created maps, charts, pictures, and graphics to support and to make the writing come alive. Allied agencies who provided critical review and submitted to interviews to ensure all actions were taken into account. Managers who provided oversight and ensured that personnel were always available to assist at a moment's notice and to those employees who had to carry an extra load so that a co-worker was able to help with the development of this document. The detail oriented people who worked on the layout of the final document, ensuring that indexes, pages and tabs all corresponded to each other. The OCFA Board Members and elected officials who took the time to provide critical review and commentary to ensure anticipated questions would be answered. The highly talented experts who worked to incorporate available technology to support the written document with an audio-visual record. The consultants and vendors who provided needed technical support, review, and publication of the final document.

A special thank you is extended to all those who responded to or supported the fire fighting and recovery actions that took place between 9:00 a.m. on November 15, and 7:00 a.m. November 19, 2008. The Fire Chief and the Executive Management Team are equally thanked for their leadership and guidance.

A most important thank you to the readers of this Report, who by taking time to study the actions and outcomes of the Freeway Complex Fire will be better prepared to respond to, support and manage emergency incidents that threaten communities, disrupt lives, and consume natural and financial resources.

A final thank you and acknowledment to all of the citizens who were affected by the Freeway Complex Fire. The men and women of the Orange County Fire Authority sincerely thank you for allowing us to be your fire department.

Letter: Dayles

From: Paul Dayles [mailto:pdayles@earthlink.net]
Sent: Friday, December 27, 2013 3:22 PM
To: Kim, Judy
Subject: Cielo Vista Project, att. Ron Tippets

This letter is directed to Mr. Ron Tippits, reg. Publ. Notice of Draft Environ. Impact Report

This letter is in response to the planned building of approx. 500 homes named the Cielo Vista Project, directly and dramatically impacting not only the many hundreds of people nearby but also most of the people of Yorba Linda.

My wife and I strongly oppose this project because it will very seriously impact us for ENVIRONMENTAL, ECONOMIC, PERSONAL, LIFE ENDANGERMENT AND LIFESTYLE reasons.

Please do not let this happen. Those investors can make their money other ways without causing so much havoc on the lives of all of us here. Let them create their wealth elsewhere. They can move, we cannot.

Below are our reasons and sentiments in detail. You may not need / want to read all this if you only need to know that we are opposed to this outrageous project, which will also set a precedent if approved.

We find it **incomprehensible** how Orange County OC Planning Services can state: ***Based on the analysis in the Draft EIR the Project will not result in any significant and unavoidable environmental impacts.***

How can anyone who makes such a statement believe for a second that if a couple of thousand cars start going by his/her own house each day that the air quality, noise, pollution, life style, home value etc. is not going to affect him/ her and his/her family dramatically? Either this person is totally ignorant, intentionally lying, or making this statement for monetary gain or political power gain. I cannot fathom any other reason.

The statement totally ignores the impact that thousands of

additional car/trips a day are now going to use streets that were never meant to accommodate this kind of traffic. Stonehaven is a two lane residential street, never meant to accommodate thousands of car trips a day.

It is criminal that a couple of very wealthy people could be allowed to destroy the life of hundreds and hundreds of people who made the largest investment of their life expecting to be able to enjoy the safety, beauty, quality of life of this Yorba Linda area. **Only so these developers can increase their wealth.**

They claim they have a right to exploit their investment. They knew full well the problematic issues when they did but obviously expected to get around them by convincing Orange County of the windfall for them at the expense of the citizens of Yorba Linda. Damn the proven safety issues, life threatening conditions when another fire hits the area, destroying the wildlife, plant life and beauty of the hills, AND the enormous negative economic impact on each one of us.

No governmental organization representing its citizens should allow this project to go forward. If they do, they obviously are not representing and looking out for their constituents but are thinking of the aforementioned "special" interests.

Environmental Impact

Air: thousands of car trips will leave their air pollution foot print, impacting the people living on the streets such as Stonehaven. We strongly object to have Orange County tell us that I have to accept the exhaust gasses from all these cars going by our house. Since

we live near the intersection with Y.L. Boulevard, countless cars will sit at the intersection idling their engines while waiting for the lights or waiting in long, long lines to drop off their children at school. No impact you say? Would you like to see the daily soot already being deposited on our house and us by the traffic on Yorba Linda Boulevard?. **Have you observed the traffic jams when parents bring their kids to school in the morning, the almost endless line of cars during the peak hours??**

When you look around Yorba Linda Streets, most homes have three to four cars in the driveway. Even though some of the homes in the Cielo Vista projects may start out with 2 cars, within a few years traffic will quadruple in number of trips per day.

Traffic: if anyone evaluated the situation without bring predisposed to OK the project, he/she would see there is already a very, very difficult situation with the traffic at Stonehaven/Y.L. Blvd. at certain times of the day. Adjusting the traffic lights (as one totally idiotic spokesperson gave as a solution at one of the meetings) is too silly for a serious response.

Y.L. Boulevard has already been enormously impacted over the last few years since another politician, then mayor Mr. Gullixson lied to

everyone in Yorba Linda by claiming that if we OK'd Shell's proposal to widen and "beautify" Imperial Highway, traffic on Yorba Linda Boulevard would be dramatically reduced. What a lie, but it worked, people were taken in by the slick commercials and voted for it. The same is happening again. A very intensely and well funded campaign ousted two of the strong opponents to the project on the Yorba Linda city council and were replaced by two very "pro" people. "Damn the consequences" for the people who will be impacted, the people whose interests they are supposed to represent.

Safety: As those of us who have lived and gone through the fires in 2008 know, traffic on Y.L. Blvd. and all streets leading to it, where a total disaster. Evacuation was a huge problem then and some of us lost our homes and belongings because of it. I was one of the lucky ones who was able to save my house because I knew how to get there through side streets not yet closed or totally obstructed.

Don't tell us that a thousand additional cars trying to come down the hill in panic via Stonehaven are not going to make a difference. Totally irresponsible. People will die, as anyone who was closely involved at the previous fire, will

attest to the danger you are putting is in. How can you ignore this, allowing this to take place?

Economic Impact

City:

Orange County wants to approve the project for obvious reasons: they will reap the profits but do not have to fund the additional police, schools, fire protection, water, traffic control, street maintenance etc. etc. The need for additional school(s), fire protection, water etc. will economically impact every citizen of Yorba Linda. Just look what already has happened during the past ten years. Simple example: to provide the thousands of new homes built during the last 10 years, our water costs has gone up by almost 150 percent!!

Personal :

Because of the difficult overall economic situation, most of us now have less money to spend and still we are asked to approve **the building of 1 to 2 million-dollar homes and in order to accommodate them, the present residents will face higher costs for their utilities and taxes (water imports, schools etc.). Additionally, the values of our properties nearby will go down substantially** because who will want to buy property that faces very heavy traffic on their street, impossible situations at the nearby intersections, noise levels like a highway, air pollution, no open windows at night, overcrowded schools etc. We will be taking a financial hit. Do you care?

Lifestyle Impact

Just so that a couple of wealthy investors can make more money, is Orange County going to allow them to destroy the lifestyle and endanger the lives of all the people who already

live there and have spent their life-time investments on their homes?

These investors obviously do not care that they will very negatively impact the lives of all the people already there. After they make their money, they will go elsewhere and will not have to deal with what they did to us. We however, will lose the quiet around our houses, the beauty of the hills behind us, will have to pay more for living here even though our property value will seriously decline and now also, and most importantly, will have to live with the fear that when the next fire hits us, as it will, we may not survive or our home may not. **And your approval of their plans will set a precedent for even more homes to be built there in the future, obviously.**

Why do we, long-time citizens of Yorba Linda have to give up so much because a couple of shrewd investors want to make a lot more money? What rights do they have because they simply had the money to buy land that should have been designated a wild life protected area in the first place?

Do they, because of their well-calculated investment, have the right to endanger the lives and of the citizens already living there? Does their well financed and well organized campaign to minimize the negatives have preference over the well being and rights of the hundred upon hundreds of the citizens of Yorba Linda?

I hope that each of you responsible for the final decision, reflects seriously on how he/she personally would feel if this would happen to them, reflects on suddenly having your quiet residential street turn into a highway, having to live with the noise and

pollution suddenly upon you, facing long lines of cars getting out of your house, worrying about the devaluation of your property, losing the peace and quiet that you bought your house for, the danger of where you will be when the fire hits and how you or your family can or cannot reach safety.

Please do not let this happen. Those investors can make their money other ways without causing so much havoc on the lives of all of us here. Let them create their wealth elsewhere. They can move, we cannot.

Signed: Mary Ann and Paul Dayles
21730 Allonby Circle
Yorba Linda, CA 92887

Letter: Ebinger

From: Kent Ebinger [mailto:kebinger@lee-associates.com]
Sent: Tuesday, January 21, 2014 2:00 PM
To: Tippets, Ron
Cc: Spitzer, Todd [HOA]
Subject: Cielo Vista project

Ron;

The EIR that was done for the Cielo Vista project, is full of PHD, BA & BS experts, with their study and data. Like CPAs, it proves figures lie, and liars figure. I hope you are not expecting the homeowners to get technical, and respond to these elaborate figures? I am taking the practical approach, and with that I ask the following questions:

1) What benefit besides more traffic congestion, is Yorba Linda and/ or its current residents, receiving from this project? Please be specific.
2) Has a traffic study been done, when a reverse 911 evacuation is ordered?
3) If not, does that not place a huge question, on the traffic study methodology?
4) If not why, and be specific?
5) Are not the residents of Yorba Linda (that experienced this "mass exodus" during the complex fire), the best judge of what should or should not be done, for their wellbeing?
6) If not why? Please be specific.

I look forward to your response.

Respectfully

Kent Ebinger | Senior Vice President
License ID# 01078237
Lee & Associates | Industry, Inc.

Direct: 562.568.2031
Fax: 562.568.2081
Mobile: 714.334.1462

13181 Crossroads Pkwy N, Suite 300
City of Industry, CA 91746

Letter: Ensign

William Ensign
4805 Via Del Corral
Yorba Linda, CA. 92887

January 21,2014

Ron Tippets/OC Planning
300 No. Flower St. 3rd Floor
Santa Ana, CA. 92702

RE: Proposed Cielo Vista Development

Mr. Tippets:

After attending EIR Community Open House's for Cielo Vista (Dec. 16,2013) and Esperanza Hills (Jan. 16,2014) it is our belief these two projects must be addressed as ONE! (They work very hard at distancing themselves from one another.) Cielo Vista is proposing 112 homes, Esperanza Hills (a possible) 380 homes. These 500 homes will use the same ingress, egress that connect with Via Del Aqua, a small 2 lane street, which would be expected to carry 4,000 to 5,000 cars per day, over and above the existing residents. This does not even begin to address emergency situations. Could the fault be with Yorba Linda planning, who have known of these future projects since the mid 90's. and took NO ACTION?

Has the county (that professes to be neutral) done a traffic study? Has the Yorba Linda Traffic Commission done a study? Any kind of study? The only studies done, including traffic, fire(emergency response and evacuation), water and flood control (this is important to us because there is a flood control easement on our property) have been done by developers! We would welcome independent studies. Developers can buy experts to say what they want. As taxpaying residents we lack funds, and it appears we have no ally in this endeavor. Our city supervisors are not neutral, and have gone against the will of the people.

In closing, Cielo Vista hopes to annex into Yorba Linda upon completion, however the project does not comply with Measure B, voted on by the citizens. In this current environment, is bad behavior once again going to be rewarded?

Enclosed is a letter written Aug. 6, 2012 addressing the concerns(many listed on the comment form) that we STILL have regarding Cielo Vista.

Thank you for your consideration,

William Ensign
lynnbeefbill@roadrunner.com

Ms. Channary Lang

OC Public Works/OC Planning

300 N. Flower St.

Santa Ana, CA. 92702-4048

Cielo Vista Project (Project No. PA 100004)

1. Aesthetics

Our homes have 1/2 - 1 acre lots. The proposed homes have small lot sizes that are inconsistent with our existing neighborhoods. Second concern: The land will be developed and the economic downturn (especially in housing) still continues. Will we have empty pads, unfinished houses and streets to plight the neighborhood?

2. Biological Resources

Protection and active management of wetland and wildlife communities for hundreds of dependant species. CA has lost approximately 95% of these types of habitats.

3. Cultural Resources

The change in topography will destroy the reason why we chose to live in this area of Yorba Linda rather than an urban one.

4. Geology/Soils

We are nearly on top of the Whittier Fault (earthquake July 2008). Can the movement of large amounts of earth contribute to seismic activity?

In the last 26 years we have experienced vibrations throughout our home. Could this be low level seismic activity? Would that increase by large amounts of earth being relocated?

5. Hazard/Hazardous Materials

The Sage property has several (or more) producing oil wells. How will these existing wells and storage be effected when earth is being moved and housing is in place? (Could spillage and seepage be an issue?)

6. Hydrology

We have a natural flow of water across the lower part of our property. For 26 years we have never had a flooding issue. Will the reformation of the hills have an impact on the natural water flow thus creating a heavier flow(of water) undermining the slope to the higher section of our property?

7. Land Use and Planning

Lack of parks and other recreational areas for high density housing.

8. Population/Housing

The proposed entrance off of San Antonio/Aspen Way only provides entrance/exit to a very few homes. The burden will be on Via Del Aqua. During certain times of the day it is impossible to exit onto Yorba Linda Blvd. An additional traffic light would only increase congestion on Yorba Linda Blvd.

9. Public Services

On November 15,2008 there was a total lack of police and fire department to assist in evacuating the area. Since this was the case, how will existing public services (in this age of cut-backs) cope with public safety in an increased population?

Increased burden on our already overcrowded schools.

10. Utilities and Service Systems

During the Freeway Complex Fire of 20008 many in the area encountered water shortages which led to the loss of many homes. How does the county intend to address this issue? We live in a high fire danger area. Additional housing will increase this danger.

William H. Ensign

4805 Via Del Corral

Yorba Linda, CA. 92887

Letter: Fried

From: Irwin Fried [mailto:irwinfried3@gmail.com]
Sent: Thursday, January 23, 2014 10:57 AM
To: Tippets, Ron
Cc: cyoung@yorba-linda.org
Subject: cielo vielo and esperanza hills developments in yorba linda

Dear Mr. Tippets,

I am writing with respect to the above identified developments.

I write from the perspective of an individual who has served as a Planning Commissioner (4 years) and a City Councilman (16) years. During that time I have participated or observed the intense conflict between cities over the acquisition of territory lying in "spheres of influence" adjacent to both of them.

The developments under discussion do not adjoin any other city, only Yorba LInda. Under that unique circumstance, in my opinion, to ignore the standards of zoning, density, grading, ingress of emergency vehicles, water resources adequate to deal with fires, and other issues normally associated with the development within a city, when the development has no place to go other than Yorba Linda is somewhat unusual, and unfair.

I assume that the developers wish to develop under County of Orange standards in order to escape standards of the Yorba LInda which they consider more onerous, affecting their bottom line. This is understandable.

However, the County of Orange has a duty and responsibility to recognize the interests of the citizens of Yorba LInda.

I hope that the County of Orange will help the City of Yorba LInda to maintain the standards which have made the City the "Land of Gracious LIving".

Irwin M. Fried

Letter: Friend

From: Lawrence Friend [mailto:lfriendcpa@yahoo.com]
Sent: Wednesday, January 22, 2014 8:43 AM
To: Tippets, Ron
Subject: Cielo Vista, Esperanza Hill

Ron,

The Friend family has owned our parcel since the mid 50's. As a point of interest 160 acres of the Chino Hills State Park was once owned by the Friend Family. We believe the Chino Hills Park provides more than enough open space in the area. The Chino Hills State Park has created a financial burden on the state and has been on the state closure list in the past.

We currently hold title to our land in Bridle Hills Estates, LLC. We are in favor of the Esperanza Hills project and view it as the highest and best use of the land.

Bridle Hills Estates, LLC submits the attached comment letter on behalf of the entire Friend family.

Sincerely, Richard L Friend

Kevin Canning
Ron Tibbets
Contract Planners
County of Orange
300 N. Flower
Santa Ana, CA

Re: Cielo Vista and Esperanza Hills Proposed Developments

Dear Kevin and Ron:

Bridal Hills Estates, LLC owns approximately 47 acres situated north and east of the Cielo Vista project site, and north and east of the Esperanza Hills project site. Cielo Vista, Esperanza Hills and our land is part of the 630 acres referred to in the City of Yorba Linda General Plan as the "Murdock Property".

This comment letter applies to both projects.

Historical access to our site has come from both the Cielo Vista site and the Esperanza Hills site, over roads that still exist today or roads to be constructed in the future. Our family is familiar with and has used these roads for decades, as we leased much of this land for ranching for years. We believe that the County should ensure that our site will have continued access over these roads, or roads to be constructed in the future, and proper planning principles, common sense, and the responsibility of being a good neighbor should apply to both projects, so that access and utilities are provided for in their respective project designs.

We have worked with the Esperanza Hills developers on their project design, and they have accommodated our request for access and utilities to be run to southern boundaries of our site. We have a Cut/Fill Agreement in place with Esperanza Hills that should benefit both of our properties, and we have approved their current design, but want to ensure that if there are any design changes it does not adversely affect access or utility service to our land.

It is our understanding that the Cielo Vista project has included a potential access corridor in their Area Plan, on page 33, and that the Esperanza Hills project has designed two access options, 2A and 2B over this area, and that Esperanza Hills has also identified two other access options, Options 1 and 2, which provide for primary access from Stonehaven and Aspen Way, respectively.

It is our belief that all of these options are consistent with the City of Yorba Linda General Plan, which was adopted in 1993. It provides that access to our property and the properties owned by the Nicholas Long family, which is currently part of the proposed Esperanza Hills project and the Yorba Linda Land, LLC property, which lies to the north of our land, are to be served by access from the south and west, via easements to be given by the property owners to the south and west of us, which would include land included in the Cielo Vista and Esperanza Hills projects.

We also agree with the August 2, 2012 NOP comment letter issued by the Yorba Linda Water District on the Cielo Vista project, which is the sewer and water utility provider for this area, that the Cielo Vista

project should provide an easement for gravity flow sewer through the Cielo Vista project for both the Cielo Vista and Esperanza Hills project, and we further request that accommodation be made for extension of this sewer service to our property, as is currently provided for in the Esperanza Hills project.

We further understand that the Yorba Linda Water District has completed its Northeast Area Planning Study, which provides for the installation of underground water reservoirs on sites located on the Esperanza Hills project site, at the 1200' and 1390' elevations, which will eventually provide water gravity fed water storage for all properties in the 630 acre unincorporated area referred to above, and we will, at some point, enter into an agreement with the Yorba Linda Water District and/or the Esperanza Hills developers for the water storage necessary to serve our property should we decide to develop it in the future.

We oppose any effort by the Cielo Vista developers or property owners to entitle their land without providing access to our property through the Esperanza Hills property, as they have stated they would do in their NOP public meeting, and request that the County require that they provide access as part of the approval for their Area Plan. If Cielo Vista is denied approval of their entitlement request, we request that the County use its eminent domain powers to obtain a right of way easement over the Cielo Vista project for use by our property and the Esperanza Hills development as currently designed, which provides access to our property.

We believe that the County has a responsibility under the Subdivision Map Act to ensure that both Cielo Vista and Esperanza Hills provide access and utility access through their properties to all of the unincorporated areas east of the City of Yorba Linda and west of Chino Hills State Park, so that future development of our property and any other properties are properly planned, taking into account future development. The Esperanza Hills developers have agreed to make this access part of their existing design and the Cielo Vista owners and developers should be required to as well.

Finally, we support the fire staging areas, emergency ingress and egress plan, fuel modification and trail system designs for the Esperanza Hills project, which we believe benefit our property and the surrounding existing neighborhood, particularly from a fire safety standpoint.

Should you have any questions, please contact me directly.

Richard L. Friend

Richard L. (Larry) Friend
Manager
Bridal Hills Estates, LLC
13301 Flint Drive
Santa Ana, CA 92705
714 809-3873

Letter: Gass

January 16, 2014

Ron Tippets
Orange County Public Works
Environmental Planning Division

Dear Mr. Tippets,

I recently moved my family to Yorba Linda from Anaheim. I was born and raised in the shadow of Disneyland my entire life. For the last 45 years, I could set my watch and know exactly when the fireworks show starts at 9:35pm. After living in our first home for 12 years in Anaheim, we made a large investment and bought a home in Yorba Linda for a better life for my family. Quality of life is important to us.

When searching for a home in Yorba Linda, the first thing that we noticed while looking for our home was that we loved that we could see the stars at night. That was the one thing that really stood out to us that set our home apart from our home in Anaheim. WE COULD SEE THE STARS AT NIGHT! We have serious concerns about the aesthetics of the proposed Cielo Vista Project and one of them is that if these houses are built we will no longer enjoy our Dark Skies that we love. The Cielo Vista Draft Environmental Impact Report clearly states that there is no light or glare currently generated in this area. The sheer amount of ambient light that this project, as well as the Esperanza Hills project, will diminish our night sky views. In no portion of the Cielo Vista Draft Environmental Impact Report does it address the impact that the amount of ambient light from these homes will have. The DEIR states "there would be for the most part no potential issues for light spill" but, has ZERO factual support to back up this summary conclusion. Where is the empirical data to support the developer's claims?

In reviewing the Cielo Vista Draft Environmental Impact Report, it appears that there are further gaping holes and lack of information supplied by the developer. The wildlife in the area in nearby Chino Hills State Park will most certainly be affected by the introduction of brighter LED style lights that will certainly cause a shift in the predator/prey balance. If coyotes, owls, bobcats and mountain lions can no longer hunt effectively because they do not have the cover of darkness, how does that affect our delicate ecosystem here on the edge of Chino Hills State Park. The developer of the proposed Cielo Vista Project does not address how this will affect the wildlife. If the predator/prey balance shifts will I see more predators in my backyard looking for food? How safe will my family be? How safe will my animals be? This is an imperative piece of information and, frankly, has not even been addressed in the Cielo Vista Draft Environmental Impact Report. Light intrusion and it's affects on nocturnal animals MUST be addressed by the County and the Developer.

Aesthetics are a key element to any development, however, it should be known that the proposed Cielo Vista development and it's various plantings of vegetation will certainly create ladder fuels . Currently, there are no large street or shade trees in the areas as outlined by the DEIR. This makes a ladder fuel situation impossible once the houses are built. As the trees and shrubs that the developer plants mature and grow, this will allow the next fire that comes through the canyon to spread much more rapidly … endangering my home. At no point in the Cielo Vista Draft Environmental Impact Report does the developer address possibility of creating a ladder fuel situation throughout their proposed development. This is a large concern for citizens of Yorba Linda, especially during Santa Ana Wind conditions.

It is very clear to me that the Cielo Vista Draft Environmental Impact Report makes many summary conclusions with no factual support. With a project that is this large and impacts not only the residents, but the wildlife, the County of Orange cannot approve the Cielo Vista project without requiring the developer to provide factual support on the environmental impact.

Best Regards,

Brian Gass
21180 Ridge Park Drive
Yorba Linda, CA 92886

Letter: Hamilton

From: Ron Hamilton [mailto:ron@tuffermfg.com]
Sent: Tuesday, January 14, 2014 8:52 AM
To: Tippets, Ron
Subject: Cielo Vista

Dear Mr. Tippets,

I'm writing to you as I would like to be added to the list of Yorba Linda residents that have serious reservations about this project and its impact on our city and our way of life. I hope that you would step in and support myself and all of the Yorba Linda residents that oppose this project going forward.

Sincerely,

Ron Hamilton

Letter: Holbrook

From: Holbrook Floyd [mailto:f-holbrook@sbcglobal.net]
Sent: Thursday, November 07, 2013 7:51 PM
To: Tippets, Ron
Subject: Cielo Vista Project

Mr. Tippets,

It is my understanding that you are conducting an Environmental Impact Study for the Cielo Vista Project in Yorba Linda. As an OC planner, I am sure you will never make everyone happy. Positions of leadership are wonderful aren't they?

I hope that your analysis will include a "walk through" the area. When you do, I know the study will not favor the developer's plan. Why do I say that? Because, without more infrastructure (roads) the entrée project will put countless people's safety at risk.

As we all know, it's not a matter of if, but a matter of when the next fire will occur. If you have not seen the pictures of the November 15th fire that made our neighborhood look like a "war zone," then let me know and I will send them to you.

The addition of this number of homes, without more exit points is a DISASTER waiting to happen. Obviously, that is not what you or I would ever wish for.

As an California businessman, I do not want more government involvement and regulation. However, as an American citizen, I expect my government leaders to protect our communities and make sure that nobody puts us at risk. You cannot have an accident on the 91 and expect to get anywhere quickly. The same will hold true with this project. Add more traffic and not create any more exit points??? Even to a casual observer, that does not make sense.

Anyway, I do not want to send you a long, threatening or disrespectful letter, but rather a very simple email that says: **"…please come look at the site and ask yourself if you would make the same decision if you lived in this neighborhood."**

Thank you for your time and for your leadership,

Floyd Holbrook

Letter: Holzner

From: sdbphd@aol.com [mailto:sdbphd@aol.com]
Sent: Tuesday, January 14, 2014 4:22 PM
To: Tippets, Ron
Subject: RE: Cielo Vista Project

Dear Sir,

As a long time Yorba Linda resident, I would like to add my voice to the concerns about traffic ingress/egress for the Cielo Vista Project. Please consider the traffic flow very carefully, particularly in a crisis situation.

During the 2008 Freeway Complex Fire, even Imperial Highway, a large several lane street, was heavy with traffic.

I urge you to reconsider the safety of a plan to put in 500 homes with so few avenues for access.

Thank You,

Stephanie Holzner

Yorba Linda Resident

Letter: Horton

From: Jan Horton [mailto:jan@horton4yl.com]
Sent: Wednesday, January 22, 2014 1:56 PM
To: Tippets, Ron
Subject: Ceilo Vista Project in Yorba Linda - EIR Response

Pleas be advised that I oppose continuing with this project until the following conditions are met:

The plan of the entire area with the multiple property owners is vetted. Developing this area piece meal is poor planning and only will result in significant impacts on the City's ability to respond to disaster and the comfort of the existing homeowners.

Any project in this area, needs to include two ingress and egress points that do not rely solely on Via del Agua, Stonehaven and San Antonio. In 2008, we experienced the Freeway Complex Fire and that particular area had an impossible time evacuating the area. Avoiding loss of life during that disaster was only by the Grace of God. Adding additional homes to the already overloaded streets without a secondary outlet is poor planning. It appears the developers in the area are addressing traffic patterns for everyday life. I and the community are VERY concerned about the ability to safely evacuate in the next disaster. This area is adjacent to the State park that has become seeded with non-native, highly flammable vegetation. It is also riddled with Earthquake fault lines. It is not about if there will be another disaster, it is about When will there be another disaster.

You need to make sure that when planning for evacuation, a complete plan is in place including evacuation of large animals and residents with special needs. If the roads are clogged with cars descending, how do expect emergency personnel to reach the animals or residents with Special needs? Does any of these plans have a method of identifying which homes house Seniors/ individuals with special needs or those with large animals? How will you keep lookie loos out of the area from the various access points. People were using Bastanchury road up the back way to access these disaster areas.

Please place this project on hold until all proposed projects including Esperanza Hills and other sites being considered for development are included in the analysis. Do not piece meal this project and allow the City of Yorba Linda to have a greater say in the development standards and planning.

Sincerely

Jan Horton

Letter: Hosford

January 4, 2014

Mr. Ron Tippets
Planning Services Director
300 North Flower Street, 3rd Floor
Santa Ana, CA 92702-4048

Re: Cielo Vista Project

Dear Mr. Tippets:

I have reviewed the EIR for the Cielo Vista Development Project and have a number of concerns after attending the Community Open House. We appreciate the efforts of you and your staff to document the impact this development will have on our daily lives but there are a number of flaws in the assessments of traffic, public safety, emergency access, density and environmental impact to the community.

The Traffic/Transportation assessment 4.14 did not include the intersection of La Palma and Yorba Linda Blvd, which is a high traffic intersection due to congestion on the 91 freeway and motorists taking side streets to avoid the gridlock. In addition, the major flaw of the traffic assessment is that it did not take into account the evacuation of all residents in the event of a fire. With only one access road out of the development, it will be a deathtrap for residents when the next fire occurs. We experienced this situation first hand in 2008 and adding 450 more homes to the hillsides evacuation will be impossible. In fact, the access roads for ingress and egress into the developments are the property of the City of Yorba Linda, but our city is not a party to the approval of this project, which is a major concern to the residents of Yorba Linda since the City of Yorba Linda will ultimately be responsible for providing access to the development through Aspen Way or Via Agua, as these are city streets and will be under the purview of the city of Yorba Linda.

Public Safety should be a major concern of the Planning Committee, the County of Orange, and the City of Yorba Linda. The way in which this development and the sister development of Esperanza Hills are being submitted, is an outrage to the citizens of Yorba Linda. It is appalling to us as lifelong residents of the County of Orange, that this development can circumvent the City of Yorba Linda's authority by submission to the County. In essence, the City of Yorba Linda will be responsible for these residents in terms of public safety, so the County has the ability to approve these two development projects and walk away and leave the City of Yorba Linda liable for the protection and welfare of the inhabitants. When the next fire occurs, it will be impossible to evacuate all the residents in time to avoid fatalities as there will be an additional 1500 residents in the hills. We experienced this first hand in November 2008, when residents are evacuating, there was no emergency access for fire, ambulance, or police as the access roads are filled with cars exiting the hills. Without additional access roads that will be utilized by emergency vehicles, it will be impossible to gain access to San Antonio Road and Via Agua during a fire. Not to mention the gridlock on Yorba Linda Blvd, La Palma, and Fairmont.

The EIR does not address how an additional 119 homes will be serviced by the existing 1 fire engine and 3 fire fighters at station 32. The mitigation measures in 4.7-11 do not address the fire hazards or safety of the existing residents, only the fact that the existing one engine will be able to handle the needs of

the additional homes in Cielo Vista. It fails to mention the impact of the additional 350 homes being built in the sister development Esperanza Hills. Fire station 32 cannot handle the expansion of 450 homes and would require a secondary fire station to be built to support these developments near La Palma and Yorba Linda Blvd.

Section 4.7 with Hazards and Hazardous Materials Mitigations 4.7.1-6 indicate that there is an extreme hazard due to the oil drilling and oil impact to the soil surrounding these hills. The grading of this area will cause significant harm to the air quality and the impact on the residents during this extensive grading process. Although, there are steps taken to mitigate the impact, it is not stringent enough to protect the residents from the health impact of breathing this contaminated air and pollution. Due to the Santa Ana Winds which blow through the canyon at speeds of over 30 miles an hour, there must be additional mitigation includes daily air quality readings and discontinuance of grading if the air quality is impacted. The SCQMD Rule 1166 should be monitored daily to ensure the project complies with the AQMD regulations and an AQMD assessor should be at the Cielo Vista site daily to take readings to ensure enforcement of satisfactory air quality. If the air quality does not comply with regulatory limits then the construction process must cease until the ACMD readings are compliant. In addition, if wind speeds are over 5 miles per hour on any day during the grading or construction period, the process should be halted until wind speeds decrease to prevent additional contamination to the surrounding areas. The ACMD assessor should validate this on a daily basis.

Another concern of this project is the density and zoning considerations. This property is zoned R1 and would require a zoning change to allow construction in the density indicated. I am opposed to this zoning change and want to keep the hills undeveloped. The impact on wildlife and vegetation will be severe. We want to protect Yorba Linda from the overdevelopment and overcrowding of surrounding areas. Protect the wildlife and open undeveloped space.

Respectfully,

Karen Hosford
21155 Ridge Park Drive
Yorba Linda, Ca

Letter: Houshan

From: iyad houshan [mailto:ihoushan@hotmail.com]
Sent: Wednesday, January 08, 2014 2:41 AM
To: Tippets, Ron
Cc: iyad houshan
Subject: Draft of EIR

I am a new resident in Yorba Linda, I purchased my home at 21562 Saddle Ridge way November of 2012. Since I moved in, I heard all the " Fire" stories, it seems to have a lasted effect on the neighborhood and the City, everyone has a story to tell about that November 15, 2008 fire. The stories are so impactful it reminded me of the 9-11 stories I still hear when I go to New York City.

I am very concerned that the new development will add HAZARD of fire and congestion that can hinder fire fighting efforts in the event of a fire. I am intending to spend the rest of my life in this current home. Adding 500 homes will increase the chance of a fire similar to the 2008 fire, the current congested roads that did not support evacuation in the 2008 fire will certainly not support it with hundreds of homes, cars and families added.

I don't wish to experience what my neighbors have gone through, I have now experienced first hand the Santa Anna Winds and realized how damaging they can be especially in the event of a fire, it takes minutes to destroy a neighborhood and peoples livelihoods.

Thank you,

Iyad Houshan

21562 Saddle Ridge Way

Yorba Linda, CA 92887

Letter: Joiner

From: Brent [mailto:peetie1@roadrunner.com]
Sent: Sunday, January 05, 2014 9:17 AM
To: Tippets, Ron
Subject: Cielo Vista's Draft Environmental Impact Report

Ron Tippets,

Hello, my name is Brent Joiner and I have been a Yorba Linda resident for 43 years. I live near the Cielo Vista proposed project and I would like to make some comments/concerns about the impact this project will create to the city.

First, I would like to mention the traffic impact this project will create. In the environmental impact draft report 4.14, the draft specifically states: " b. Existing Conditions (1) Regional and Local Access: Regional access for the project site is provided by a system of freeways, highways and local arterials. Most notably, the 91 freeway" Why didn't this environmental impact report include Yorba Linda Blvd leading to the 91 freeway from this project site? This report actually only includes an "Intersection Analysis" of intersections located in the opposite direction from the freeway. I travel this route to and from the 91 freeway each day & I can tell you that traffic in this location is already jammed. I would also like to know how this report calculates how many extra vehicles will be on the streets? Each household usually has a spouse and 3 children. When these children grow up, they will likely or already are driving and that could ultimately increase the traffic by: 112 houses x 5 residents per house = 560 automobiles on the highways. Traffic of this level should have a planned dedicated road to ingress and egress from. Using existing residential streets for this overload in traffic is a failure of planning by the county. This is certainly unfair to make existing homeowners deal with traffic flows comparable to highway size proportions on existing residential streets.

The second comment is regarding the "Open spaces preserved in northern portion of site". Why isn't the "open spaces" being used throughout the project ? Instead, the builder is creating high density home building in the southern portion of the land. The report lists minimum lot sizes are 7,500 sqft, yet the average lot sizes in the neighboring areas are twice that. This will have is a significant financial impact to existing homeowners. This land is currently being used for hiking and bicycle riding and for the few remaining wildlife that call this area home. Pushing this open space to steep hilltops and unusable land which most of the public will not want to use, will diminish the outdoor activities that this area was known for.

Finally, I would like to mention the most concerning issue coming from this project, which is the potential loss of life by building residential homes in a High Fire Zone. This has to be one of the most blatant disregards for safety in the county's history and those involved in this decision should be held responsible if a tragedy ever occurs on this site, due to fire. I witnessed the 2006 Yorba Linda fire in this area and I can tell you it was pure luck that lives weren't lost. The egress on these residential streets and boulevard routes were at a complete standstill. To further create a more dangerous area by

creating more congestion after knowing this fact, should be considered as a blatant act of disregard for safety and human life.

Thank you for your time,

Brent Joiner

Letter: Kamen

From: wynnk52@aol.com [mailto:wynnk52@aol.com]
Sent: Monday, January 06, 2014 2:34 PM
To: Tippets, Ron
Subject: New Homes Propsed

Hello Ron,

The idea of building new homes North of Yorba Linda Blvd. is totally ridiculous. With the fire we had in 2008 may people couldn't leave their home in a timly manner. I know one family that couldn't even get of her driveway because of the traffic backup on a street called Via Del Agua to leave her two already packed cars in the driveway because the fire moved so fast because of the heavy winds, not only her home complety burned down but her two cars also burned to the ground because she couldn't leave because of the traffic. This area will burn again in the future and absoulutly no homes should be built.

Wynn Kamen

Letter: BKanne

From: hikerbob@aol.com [mailto:hikerbob@aol.com]
Sent: Tuesday, January 21, 2014 10:55 PM
To: Tippets, Ron
Subject: Cielo Vista comments by Bob Kanne

Dear Mr. Tippets,

I have been disappointed by the documentation of the Cielo Vista project. The information is not presented in a way that lends itself to informed public comment. There is a lot of data and verbage, but it is hard to find the useful and relevant information.

For example, one of the biggest impacts of this project is on the traffic usage of Via Del Agua, particularly its junction with Yorba Linda Blvd. But when I looked through the traffic section I could not find what I was looking for. There was no summary that helped me understand the impacts. And I could not find any information about traffic accident history at that intersection. When I asked about that at the public meeting, I was told that the Cielo Vista traffic engineer did not even attempt to find out the history of accidents at the intersection of Via Del Agua and YL Blvd!! I am shocked. Is it true that the traffic counts were done on just one day? If so, that is also shocking. How can you possibly draw conclusions about traffic impacts if the analysis is really so lacking in depth?

The remainder of my comments are about the recreation section of the proposal.

I have several concerns about the Recreation portion of the Cielo Vista DEIR.

INCONSISTENT WITH YORBA LINDA GENERAL PLAN

The table on page 4.13-18 shows the project to be “Potentially Consistent” with the Yorba Linda General Plan. One of my main concerns is that county development standards are lower than the City of Yorba Linda. The applicant wishes to have this development eventually annexed to the city, so it should be built to city standards and the DEIR should spell out where the proposed development is inconsistent with city standards. Saying “Potentially Consistent” is vague wording that misleads the reader.

For example, the “Riding, Hiking, and Biking Trails Component Map” (Fig 4.13-2) shows a trail connecting trail 35a to the Planned Staging Area (large orange star). It follows northern half of the western boundary of the project area. Yet it seems that it would be impossible to build this trail because the first part of it (adjacent to lot 96) would be crossing sideways across a steep manufactured slope as shown in Figures 2-9 and 2-10. It appears that the grading plan (Figure 2-9) makes it impossible for this trail to be a reality unless part of the slope at least 6 feet wide is left in a level configuration suitable for a trail. The visual simulation of this area (Figure 4.1-6) also does not show the trail. Incidentally, the visual simulation also appears to be very deceiving regarding the appearance of the lot 96 area. The visual simulation shows a backyard wall/fence running diagonal to the project boundary whereas the Conceptual Fuel Modification diagram (Fig 4.7-2b) shows the property line of lot 96 running parallel to the project boundary, what should be directly away from the viewer in Fig 4.1-6. This leads me to believe that the “Planned Earthen Multipurpose Trails” shown in Fig 4.13-2 are not “consistent” with the city’s general plan and may be impossible to build as a result of this project.

Here is another example from the Trails map (Fig 4.13-2). There is an existing Earthen Multipurpose Trail adjacent to the project which is correctly shown in yellow on the map as running along the eastern half of the southern boundary of the project area. There is an existing EMT along Via Del Agua from the project entrance to Via Del Puente that is correctly shown on the map in yellow. Fencepost to fencepost, these trails are 11 and 13 feet wide, respectively. The Trails Map (Fig 4.13-2) shows a Planned Earthen Multipurpose Trail (in purple) which connects these two existing trails (and also extends westward as trail 35b). Yet the proposed south entrance to the project specifically excludes the possibility of this connecting trail as shown in Figure 2-12 “Primary Entrance at Via Del Agua”!! The cross-section at the top of Figure 2-12 shows no Earthen Multipurpose Trail at all, which is inconsistent with the Trails Map! The cross-section shows two four-foot “walks” just four feet from the street, and it appears that both are standard paved sidewalks.

Finally, Trail 35b is shown as a purple line (EMT) on the Trail Map (Fig 4.13-2) running east-west from Aspen Way to the eastern boundary of the property. But the grading plan seems to make it impossible to build this trail because the only place that this trail could begin is shown as private property (lots 111 and 112) or steep manufactured slope with no level area for a trail (see lower left corner of Fig 4.7-2b for example, or Fig 2-9).

Although Mitigation Measure 4.13-2 (page 4.13-16) says that “the Project Applicant shall coordinate with the City” to “identify potential planned trail alignments” prior to grading, this is too vague given that the existing proposed grading plan seems to preclude the completion of any of the proposed trails on Trail Map 4.13-2.

I do not understand why the last line of Mitigation Measure 4.13-2 says that trail alignments will be defined by the “City and/or County”, but that the alignments shall be dedicated only to “the City”.

INADEQUATE MITIGATION OF PARKLAND ACQUISTION AND IMPROVEMENT

The key phrase is “fees shall be paid to the OC Parks” (middle of page 4.13-16 under Mitigation Measure 4.13-1). There is no way that fees paid to the County of Orange can properly mitigate the impacts of this project unless the money is transferred to the City (or Chino Hills State Park) to be spent on projects in our immediate area. Although the Mitigation Measure says “to the benefit of the northeastern Yorba Linda community near the project site”, I do not see a discussion of how this could be accomplished through county processes.

The document says on page 4.13-15 (middle paragraph) that the developer would rather pay fees than provide 1.43 acres of parkland (due to the topographic relief of the property and scarcity of flat land). The document also says that “the city is approximately 167 acres deficient in meeting its recommended standard of a total of 4 acres per 1,000 residents for mini, neighborhood, and community parks” (end of fourth paragraph page 4.13-6). Existing county parks at Featherly and Yorba Regional are over a mile away and require an admission fee of about five dollars, so improvements or acquisition for these parks would not be of direct benefit to the neighborhoods around Cielo Vista. The Esperanza Hills project proposes parks on county land, but they would be behind private gates and unavailable to existing residents or the new residents of Cielo Vista. It is absurd when the DEIR says that the 12.6 acres of parks proposed in Esperanza Hills would be accessible to Yorba Linda residents “by pedestrian, bicycle, or equestrian access from existing or proposed trails” (third paragraph on page 4.13-19). The primary users of parks are families with young children and they need to drive to community parks, which makes the Esperanza Hills proposed parks inaccessible since they can only be accessed by pedestrians with a walk of thousands of feet horizontally and hundreds of feet vertically.

Those are the only parks under current or potential county control, so I do not see a way for parks mitigation money to be used by the county for the benefit of Cielo Vista families or residents near Cielo Vista. The parks money should be spent on existing city parks (one is .17 miles away, another .34 miles away), city park acquisitions, or Chino Hills State Park (.50 miles away).

The document says that the “park most likely to be used by future Project residents is San Antonio Park”. I think that is factually incorrect. Although the 17 homes in the northern half of Cielo Vista are near San Antonio Park, the residents of the 95 homes in the southern half would actually have to go south to YL Blvd and drive directly past Arroyo Park to get to San Antonio Park. So I think that the future residents would have a greater impact on Arroyo Park than San Antonio, and that the second sentence on page 4.13-12 is incorrect.

I look forward to major revisions of the proposal, or a denial. Sincerely, Bob Kanne 4825 Via Del Corral, Yorba Linda, CA 92887 hikerbob@aol.com

Letter: DKanne

Diane D. Kanne

4825 Via del Corral• Yorba Linda, CA 92887
Phone: 714-779-2803 • E-Mail: ddktec2000@aol.com

Date: January 21, 2014

Ron Tippets
300 North Flower Street
Santa Ana, California 92702-4048
Ron.Tippets@ocpw.ocgov.com

RE: Cielo Vista Project

Dear Mr. Tippets:

Outlined below are my comments on the Draft Environmental Impact Report (EIR No. 615) for the Cielo Vista Project dated November 2013.

Summary of Comments

This Draft Environmental Impact Report (DEIR) is totally inadequate at addressing the severe environmental impacts from the rezoning and development of the proposed Cielo Vista Project. All of these impacts need to be fully analyzed and avoidance migration strategies fully addressed.

County representatives told us that both the Cielo Vista and Esperanza Hills DEIRs would address the combined impact of the two developments. That has not been done in this Cielo DEIR. Without an analysis of the combined impacts of these two projects, the County of Orange, City of Yorba Linda, and the various regulatory agencies responsible for protecting resident health and safety and avoiding irreparable environmental damage cannot adequately assess the environmental impacts of turning a natural area teaming with wildlife into relatively high-density housing. **This DEIR should be revised to include the combined impact of both Cielo Vista and Esperanza Hills developments.**

Moreover, even without the combined impacts of the two projects being evaluated in this Draft EIR, the Report does not adequately address environmental impacts in several key areas. The most egregious of these are:

- **Scenic Vista, Visual Character, and Visual Quality**
- **Scenic Resources**
- **Consistency with Air Quality Plan**
- **Compliance with Emissions Standards**
- **Sensitive receptor Exposure to Pollutants**
- **Odors**
- **Seismic and Geologic Stability Hazard**
- **Emergency Response Plan**
- **Wildland Fires**
- **Provision for Public Services**
- **Park and Recreation Facilities**
- **Circulation System**
- **Emergency Access**

General Comments:

This project should never be built. The enormous impact of this project on public safety, traffic, air quality, biological resources, geology and soils, greenhouse gas emissions, and increased exposure to hazardous materials cannot be ignored and should not be ignored.

Additionally, the scope of the project, including the enormous amount of earth moving, rearrangement of the landscape to make a mountainous area flat enough for house to be built, and grading required to complete this project would significantly impact property

owners directly behind or next to this property. The owners of Cielo Vista are asking you to ignore the substantial impact this earth rearranging will have on property owners abutting their property on three sides. **This massive earth moving and its environmental impacts cannot and should not be ignored.**

The Cielo Vista Project is surrounded by the city of Yorba Linda **on three sides**. The project site is within the City of Yorba Linda Sphere of Influence. There is no other city that this project could join. **This land should be annexed into the city of Yorba Linda before it is developed.** All of the services that will be provided to the residents of any new development, including roads, schools, police, the fire department, libraries, and commercial businesses are located in the city of Yorba Linda yet the residents of this new development will not be equally financial responsible for these services. For example, Travis Ranch Elementary and Middle School is a joint use facility with the City of Yorba Linda, yet the residents of this proposed development would not financially support the City's obligation to this joint facility. **The residents of any new development will be using facilities in Yorba Linda that they will not pay for equally with their Yorba Linda neighbors right next door. This inequity should not be ignored.**

Moreover, the proposed development is not congruous with the surrounding community. Homes in the surround community have lot sizes of about 15,000 square feet or greater. None are as small as 7500 square feet. The proposed homes in this Cielo Vista development are located on smaller pads than any of the surrounding community. The Yorba Linda General Plan for the Murdock Property is low use residential and is designed to have one dwelling unit on large lots up to one acre in size. These proposed Cielo Vistas homes are high density for the surrounding area and are not in keeping with our Yorba Linda community. **This attempt to avoid Yorba Linda's planning process cannot and should not be ignored.**

The EIR states that the project will be completed on 47.7 gross acres in two planning areas. These numbers ignore that the actual project is 84 acres. The owners of Cielo Vista appear to be attempting to avoid several regulations, including air quality regulations, that require extensive remediation when the project is 50 acres or larger. They plan to build homes on pads that are half the size of the adjacent homes on Via del Corral and Via del Roca. This will result in approximately two homes being built for every existing home on Via del Corral and Via del Roca that is directly adjacent to the proposed development. **This attempt to avoid regulations by grading 47.7 acres of a 84-acre project, then cramming homes on lot sizes about half the size of lots in the adjacent community cannot and should not be ignored.**

The owners of the Cielo Vista Project want to have "their cake and eat it, too." After years of drilling for oil and gas on this property, they now want to develop homes on top of old oil wells while maintain oil and gas production next to the new development. These oil and gas activities are suspected to be responsible for many recurring environmental impacts on the existing neighborhood. For example, unexplained oil and gas odors regularly emanate from this site. As recently as mid-December, during a mild Sana Ana event, our neighbors at 4835 Via del Corral noticed the strong odor of petroleum oil in their backyard downwind of the current oil and gas facilities. It was evident when standing on their master bedroom balcony as well as when exiting their family room sliding doors. When our neighbor tried to determine its origin, it appeared to be emanating from the Cielo Vista property. The petroleum oil odors were so strong that one of our neighbors acquired a headache from the odors and could not allow their 11-year-old children to play in their backyard. **The DEIR should complete a comprehensive study addressing oil and gas air emission in the adjacent community and propose appropriate mitigation measures.**

Additionally, after 15 years of residence on Via del Corral, we have noticed recent, unexplained lifting of our driveway at 4825 Via del Corral that prevents us from opening our garage door, cracks in our hardscape that have become more plentiful over the past two years, unexplained cracks in our street that crisscross the entire street and formed within a month of the most recent street repaving. Also, an unexplained water leak that was not caused by a broken water pipe or other infrastructure malfunctions emanated from under the street at the bottom of Via del Corral and continued for more than one year. Residents suspected that this water may be the result of an undiscovered underground spring or along with the street cracks and other recent earth shifting, the water is a direct result of the oil and gas development above our properties. Both current and future residents can expect similar impacts on their properties if the county approves the rezoning of this property to joint use: Single Family Residential District and Joint Use Overlay. **The county should not subject more residents to the environmental damage, property damage, and health dangers of living next to oil and gas facilities. The DEIR should address the impact of oil and gas development on existing residential property, including the potential impact of earth movement and water leakage on existing and future residents.**

The greatest hazard is to the safety of current and future residents during emergencies. This property lies near or on the Whittier Earthquake Fault, an offshoot of the San Andreas Fault. The Whittier fault has been active in the past 40 years and can be expected to be active in the future. On Wednesday evening, January 15, 2014, scientists at the California Institute of Technology were interviewed on the CBS evening news about the likelihood of a major earthquake in Southern California in the next 20 years. Their estimate was that it

is 99.9% likely that Southern California will have a major event in the next 20 years. **It is unconscionable to build more homes near a known active fault that is tied to the San Andreas, the major fault expected to produce our next major earthquake**. **The DEIR should be revised to adequately determine the impact of building homes next to an active earthquake fault.**

This property is located at the bottom of a canyon where Santa Ana winds blow at speed higher than most areas of Yorba Linda or the surrounding communities. Wind speeds can reach up to 75 miles per hour (mph) during the most severe Santa Ana events. For example, the After Action Report on the Freeway Complex Fire prepared by the Orange County Fire Authority states that sustained wind speeds at the start of the Freeway Complex Fire were 43 mph and gusts reached 61 mph. Also, an article in the Orange County Register dated April 9, 2009 stated that wind speed reached 75 mph in Yorba Linda during the Freeway Complex Fire. Even without construction upwind of our homes, these winds generate enough dust and particulate matter to cover plants, structures, and cars left outside during an event. Particulate matter seeps into homes leaving a layer of dust on inside surfaces and dirtying indoor air filters. The winds can be so strong that they knock over anything smaller than a car, including the large industrial-sized trashcans now being used in Yorba Linda. These winds are directly responsible for the **Freeway Complex Fire** spreading into the community of Yorba Linda, destroying or damaging more than 130 homes, including two that are adjacent to this proposed new development. **With the canyon upwind of this proposed development, these new, homes would be directly in the path of the next fire.**

The next fire will happen and will endanger lives and property. As I am writing these comments, every major station on television is showing the January 16, 2014 fire in the Glendora and Azusa hills. As I write, 1,709 acres have burned and at least five structures have been destroyed. Embers travel for miles causing spot fires and burning homes nowhere near the actual flame front. No fire resistant plantings will be able to stop the next fire during these high wind conditions. Property was lost during the Freeway Complex Fire because structures caught fire and the winds carried embers from these structures to other structures. **Building new homes will not, in fact, protect existing homes from the next fire. They will actually provide new fuel that could result in more damage in existing communities during the next fire. This fire hazard to new and existing residents should not be ignored. The DEIR should be revised to adequately address the danger to lives and property from inevitable wildfires.**

Moreover, Via del Agua did not accommodate the emergency traffic during the Freeway Complex Fire and could not accommodate more homes during a future fire emergency.

During the Freeway Complex Fire, vehicles were exiting onto Yorba Linda Boulevard in three traffic lanes coming out of Via del Agua, three lanes created by residents during the panic, but many at the top of the hill were still unable to exit the community for more than an hour. These three traffic lanes also left a very narrow lane for emergency vehicles to go up the hill. A light at Via del Agua and Yorba Linda Boulevard would not solve this problem. **Lives will be put in mortal danger during the next fire if new homes are built that can only leave the area during an emergency by Via del Agua. This road is not built to accommodate traffic from any new homes in these hills. The DEIR should be revised to show how Cielo Vista plans to mitigate the inadequate emergency evacuation infrastructure for their project and the surrounding community.**

Comments on Specific Sections of the EIR

Executive Summary, Section 3: Environmental Impacts

I respectfully disagree with the comment that the project would not result in any significant, unavoidable impacts. I will address these impacts specifically in the following sections.

Table ES-1

Scenic Vistas/Visual Character and Visual Quality

The Cielo Vista developers claim that this project would not alter the views of and across the project site with the development of the proposed residential uses. This statement is absolutely incorrect. This project is directly uphill of the streets Via del Aqua and Via del Roca and adjacent to Dorinda on the western border. At least 20 residences on these streets have impressive views of the local hills and canyons. Certainly the houses that are adjacent to the proposed development on Via del Agua, Via del Roca, and Dorinda would have their views of the natural area completely blocked by the new homes. Our home at 4825 Via del Aqua has impressive views from our second story of the natural hills up the street. One reason for building bay windows in homes such as ours is to take advantage of those views. If Cielo Vista is developed, the view outside our bay window would be of houses crammed together on small pads, incongruous with the surrounding community, instead of hills covered with grass, shrubs, trees, and wildlife. **This is a significant impact. We would completely lose all views north of our home. The DEIR**

should address the loss of these natural scenic vistas and the destruction of the visual character and quality of our community.

Scenic Resources

By its very nature, building on a natural, undeveloped area, home to wildlife, including bunnies, roadrunners, quail, orioles, hawks, owls, and other large birds that frequent our community, would significantly impact the scenic resources. We moved to our home to enjoy the scenic views of the hills and chaparral native to our California semi-arid climate and to enjoy the wildlife that frequents our community. Our yard is visited by hawks, owls, roadrunners, quail, ducks, migrating orioles, towhees, hummingbirds, finches, bunnies, and coyotes, just to name a few of the variety of wildlife. **Building Cielo Vista would have a major impact on the Scenic View across this property that cannot be mitigated. Building Cielo Vista would destroy all of this scenic beauty and severally impact the lives of various wildlife species**. **The DEIR should adequately address the impact of this development on the wildlife in this area, including all migrating and residential birds, reptiles, and mammals as well as the native plant life.**

Emergency Response Plan

This project would most definitely affect the emergency response plan in the City of Yorba Linda. The Freeway Complex Fire amply demonstrated the inadequacy of the existing roads to handle traffic during an emergency. Adding more than 100 new homes to an area already unable to handle traffic during an emergency would endanger both the lives of new residents and those of current residents uphill of this development who expect the city street that they have paid for with their tax dollars to provide them an adequate exit during emergencies. The current ingress and egress from Cielo Vista is inadequate to meet the needs of both current and future residents during an emergency. **For the sake of public safety, this land should not be rezoned and development of over 100 new homes should not be approved. The DEIR should address the inadequate infrastructure needed for emergency evacuations and provide mitigation measures that sufficiently protect existing and future residents lives.**

Park and Recreation Facilities

This is a county project surrounded by the city of Yorba Linda. **No new parks or recreational facilities are planned in this development.** Paying fees for county parks that these new residents will not use seems ridiculous. These residents will be using recreational facilities in the city of Yorba Linda. **Cielo Vista should be annexed into the**

City of Yorba Linda to allow fees for parks and recreation to be collected by the city for maintaining city parks and recreational facilities these new residents will use. The DEIR should be revised to show the impact of building 112 new residences on Yorba Linda city parks and recreational facilities and provide sufficient financial resources and mitigation plans for the impact of these new homes.

Circulation System

Our **quiet city residential street will be inundated with construction traffic.** These roads are not designed as main thoroughfares for trucks and construction equipment. Who will pay for the extra police officers, crossing guards, road paving, etc. that will be required when this quiet residential street located in the city is taken over every morning by construction traffic? **Cielo Vista developers should be required to pay for the cost of increased construction traffic on our city streets. These payments should be made to the city of Yorba Linda where the expenses will be incurred. The DEIR should be revised to adequately address the impact of constant construction traffic on the safety and health of existing residents.**

Section 4.2: Air Quality

(1)(b)(3) Wind Patterns and Project Location

The DEIR's explanation of local wind patterns at the Cielo Vista Project's location is extremely general and not at all applicable to the actual wind patterns. While the general wind patterns in the South Coast Air Basin may be accurately described, the wind patterns at the project site are totally misrepresented. For example, the DEIR states, "Winds are characteristically light, although the speed is somewhat greater during the dry summer months than during the rainy winter season." **The wind patterns at the project site are typically the opposite of this description. Winds are greatest during Santa Ana events in the winter as this project is located at the bottom of a canyon where wind speeds can be reach speeds greater than 60 mph. Cielo Vista developers should be required to study the actual local climate conditions rather than the general conditions for the entire South Coast Basin. The DEIR should be revised to include a study of local wind patterns at the project site.**

(1)(4)(b) Local Air Quality

While the project site is located in Source receptor Area 16 (North Orange County), the monitoring station for this area is located at the opposite end of North Orange County, in La Habra. The conditions in La Habra would not and do not represent the conditions in Yorba Linda, especially those located in a mountain and canyon area where pollutants can be trapped, oil development is currently underway, and future oil and gas development is planned. The wind conditions can generate local ROG, NOx, SOx, PM10 and PM2.5 conditions not seen at the Pampas Lane monitoring station in Anaheim which is located in a relatively flat, residential and commercial area far from the hills and canyons of Yorba Linda. **Cielo Vista developers should monitor actual conditions in the area to determine how their development would impact actual local conditions. Relying on monitoring in La Habra and Anaheim is unacceptable. The DEIR should be revised to require local monitoring of local air quality for all pollutants, including ROG, NOx, SOx, PM10, PM2.5 and toxic air contaminants to determine actual concentration before project development and to determine the actual expected impacts from the Cielo Vista development both during construction and after completion.**

As shown in Table 4.2-2 of the DEIR, the South Coast Air Basin is designated as nonattainment for state PM10 standards and serious non-attainment for federal PM10 standards. This project would generate significant PM10 and PM2.5, especially if the developers are not required to meet the requirements for Large Operations pursuant to SCAQMD Rule 403. Relying on a generalized model, CalEEMod, developed for all small projects located in the South Coast Air Basin is not sufficient for describing the local impacts from this project. While Cielo Vista proposes to grade only 4 acres per day and thus used only the look up tables to determine local emissions from construction activities, this project is just under the threshold for using the table and is proposed to be developed at the same time as the much larger Esperanza Hills development. Given this fact and the special location of the project downwind of a canyon and upwind of adjacent homes, t**he Cielo Vista developers should be required to meet the requirements of a large project and complete dispersion modeling to determine localized pollutant concentrations. This dispersion modeling should then be used to determine the required mitigation of air quality impacts. The DEIR should be revised to require the project to complete dispersion modeling of localized air pollutants and to suggest mitigation measures for impacts on local residents.**

This is particularly relevant as the air quality impacts of Cielo Vista cannot be separated from those that will be generated by the proposed Esperanza Hills development. **As the South Coast Air Basin is in serious non-compliance with federal PM10 standards,**

Cielo Vista should not add to the PM10 loading in the Basin by developing this land for residential use. At a minimum, Cielo Vista developers should be required to meet all the requirements of a Large Operation for the mitigation of Fugitive Dust Emissions pursuant to SCAQMD Rule 403.

Once again, **we cannot separate the air quality effects of Cielo Vista from Esperanza Hills. These two projects should be reviewed together and their effects mitigated together**. The environmental justice guidelines issued by the SCAQMD are designed to protect the heath and safety of **local residents**. Cielo Vista's proximity to houses on three sides and its location downwind of a canyon and the proposed Esperanza Hills development makes it a unique situation that is extremely different from the Source Receptor Area (SRA) 23 in Riverside that was used to determine Localized Significance Thresholds (LST's). Even without using the more accurate dispersion modeling for determining localized pollutant effects, Table 4.2-7 clearly shows that Cielo Vista construction would generate daily emissions that are near or exceed the recommended daily maximums for PM10 and PM2.5**. Add to these projected emissions the emissions from Esperanza Hills and the combined projects may not meet LST's even after mitigation. The DEIR should be changed to require Cielo Vista developers to more accurately determine localized emissions using the recommended and more accurate localized dispersion modeling and mitigate any non-compliance using the measures for Large Operations, such as those required in Table 2 of the SCAQMD's Rule 403.**

(5) Existing Project Site Air Quality Conditions

This project site is not vacant! It is the site of current oil and gas development and planned future oil and gas development. As described above, as recently as December, residents in the area detected strong oil odors emanating from the site. It is also located in a hill and canyon area that can trap pollutants locally or generate significant PM10 and PM 2.5 emissions during Santa Ana conditions. **The DEIR should be revised to require Cielo Vista developers to monitor actual local air quality conditions to determine the actual impact of their development on local air quality.**

(2)(1)(b) Localized Construction Emissions

There is an environmental justice concern with this development. While the development operation would result in ROG, NOx, CO, SOx, PM10 and PM2.5 emissions from combustion associated with vehicles and construction equipment, fugitive dust from vehicular travel, landscape maintenance equipment, emissions from consumer products, and architectural

coatings, the greatest concern should be from generation of fugitive dust emission from the actual grading and dirt moving. Residents live directly downwind of this construction. Winds are common in this area and will generate significant PM10 and Pm2.5. In fact, without even considering the local geography and the proposed constructions location relative to local residents, Cielo Vista recognizes that their development will exceed recommended local PM2.5 levels (Table 4.2-6). There is no way that this construction can occur so close to and downwind of local residents in a canyon area where winds are common and not significantly adversely affect local PM10 and PM2.5 conditions, resulting in health hazards for local residents with lung conditions, such as our son. **Cielo Vista should not be allowed to construct on this site until they can show that their development would not severely impact the health of local residents downwind of their property. The DEIR should be revised to require Cielo Vista to adequately determine the health impacts of fugitive dust emissions, especially during Santa Ana wind conditions, and recommend appropriate mitigation measures that protect the health of local residents.**

Additionally, this project should not be looked at as the only one affecting the health and safety of local residents. As a larger development, Esperanza Hills, would generate even greater emissions in the local area, these combined emission, including PM10 and PM2.5 would significantly impact the health of local residents. **Neither Cielo Vista nor Esperanza Hills should be approved until the combined local health affects of emissions from these two developments are determined.**

(2)(3)(d) Analysis of Project Impacts

Cielo Vista developers are claiming that they **project** they will only disturbing 47.7 acres of soil on a 84 acre site; thus, they are not subject to the mitigation measured required in the South Coast Air Quality Management District's rule 403, Fugitive Dust, for Large Operations. The unique features of this project's location (downwind of a canyon where wind speed can exceed 60 mph and upwind of an existing residential community) coupled with the size of the project being just under the Large Operation acreage of 50 acres and its proximity to the Esperanza Hills development that is well over 50 acres should require Cielo Vista to meet the particulate matter mitigation measures for large operations. This land is surrounded by homes on three sides, many directly downwind of the proposed development. Existing residents will be significantly impacted by any development on this property, let alone substantial earth moving on lands just under the Large Operations limit.

My teenage son regularly walks and plays outdoors, both in our backyard and in our cul-de-sac, just downwind of this project. My son also has asthma. The amount of particulate

matter that this project will generate, especially during the frequent Santa Ana Wind conditions, will significantly affect my son's health and well-being. It is totally unreasonable to ask my son to stop using our property so that the Cielo Vista developers can first rezone and then build high-density housing in our neighborhood.

Cielo Vista developers should be required to meet all the requirements of a Large Operation, most specifically hiring a dust control supervisor and complying with the dust control measures required of Large Operations and outlined in Table 2, DUST CONTROL MEASURES For LARGE OPERATIONS, in SCAQMD's Rule 403.

Hazards and Hazardous Material

Existing Conditions – Methane Gas (1)(b)(1)(a)

Methane gas is currently generated on this property and will be generated by oil and gas development. Oil and gas production is the unequivocal major source of methane gas on this site. To imply that biogenic sources are significant is ludicrous. In fact, Cielo Vista's own preliminary study detected potentially hazardous levels of methane gas on the site. Methane is a health hazard, is extremely flammable, and is a significant contributor to greenhouse gases. These properties make methane gas emissions from future, current, and former oil and gas development a significant concern. **The DEIR should be revised to include a complete study of actual and proposed methane gas emissions and measures to mitigate the health, safety, and environmental impacts of these emissions.**

Areas of Fire Hazard/Wildfire (1)(b)(2)

The DEIR suggests that Santa Ana Wind conditions occur only during the fall. This is not accurate. Santa Ana Winds blow during both fall and winter and occasionally in the spring. We are experiencing severe drought conditions in California. These conditions are becoming more frequent and with the unpredictability of climate change, can be expected to become the norm throughout California. Coupling these drought conditions with the more frequent Santa Ana Winds will likely lead to more frequent wildfires. The DEIR barely mentions the most recent Freeway Complex Fire that came roaring through Blue Gum Canyon upwind of Cielo Vista burning all the vegetation on the Cielo Vista site, and burning numerous homes adjacent to the proposed development and more than 100 homes in Yorba Linda. The fact that this fire was caused by man and not nature is irrelevant. The destruction caused by this fire cannot be ignored. **The DEIR should be**

revised to include a study of the effects of building 112 new homes on the health and safety of current and future residents during a fire emergency.

Analysis of Project Impacts (2)(d)

This project site has had oil and gas development for more than 30 years. As with all oil and gas development in the Basin, abandoned wells and oil and hazardous material spills can and do lead to contaminated soils. The Cielo Vista project preliminary studies confirm that there is significant soil contamination from prior oil and gas development. New homes should not be built on the site of old wells without significant soil remediation. **The DEIR should be revised to require Cielo Vista developers to complete an extensive study of both surface and subsurface soils to determine the extent of hazardous material contamination before the project commences. Additionally, the DEIR should include proposed remediation of this contaminated soil.**

Wildland Fires

As discussed above, natural and manmade fires will occur on this project site. The proximity of this project site to Blue Gum Canyon, a natural funnel for winds in the area coupled with frequent Santa Ana Wind conditions make this particular project a unique site where no amount of fire retardant vegetation or specialized driveways will prevent homes from burning or releasing embers that will cause homes far away from the flame front to burn. **Property and future residents' lives will be put in the path of the next wildfire in this area. The DEIR should be revised to recognize the sever impact on the community of the Freeway Complex Fire and the inadequacy of emergency measures to protect both current and future residents. The DEIR should be revised to include adequate ingress and egress into both the existing community and the proposed project during an emergency, such as a wildfire.**

Summary

<u>This Draft Environmental Impact Report (DEIR) is totally inadequate</u> at addressing the severe environmental impacts from the rezoning and development of the proposed Cielo Vista Project. <u>All of these impacts need to be fully analyzed and avoidance migration strategies fully addressed.</u>

Additionally, this DEIR should be revised to include the combined impact of both Cielo Vista and Esperanza Hills developments.

As outlined above, the DEIR should be revised to include further studies on the impacts of Scenic Vista, Visual Character, and Visual Quality, Scenic Resources, Consistency with Air Quality Plan, Compliance with Emissions Standards, Sensitive Receptor Exposure to Pollutants, Odors, Seismic and Geologic Stability Hazard, Emergency Response Plan, Wildland Fires, Provision for Public Services, Park and Recreation Facilities, Circulation System, and Emergency Access on the local environment.

Very truly yours,

Diane Kanne

4825 Via del Corral

Yorba Linda, CA 92887

(714) 779-2803

ddkanne@gmail.com

Letter: Katzmann

From: S. Katzmann [mailto:s.squared@att.net]
Sent: Saturday, January 11, 2014 9:06 PM
To: Tippets, Ron
Subject: Comments on the Draft EIR for Esperanza Hills and Cielo Vista in Yorba Linda

To Whom It May Concern:

My wife and I live on Heatheridge Drive - near the proposed sites for both the Cielo Vista and Esperanza Hills proposed housing projects. We've lived here for 16 years. Although our house was spared, the Freeway fire five years ago destroyed eight houses on our street and nearby Cardiff. We barely escaped with a few of our possessions. The evacuation was frightening. This was because there were too many vehicles trying to escape the flames at the same time. In fact, the fire was coming down the hill towards us on Stonehaven drive as we were sitting in traffic trying to get out to Yorba Linda blvd. It is insane to think that anyone would consider increasing the number of homes here, in high fire danger area (as rated by the insurance industry), without first considering additional fire egress availability for the current residents of the area.

We hope that if these projects allowed to proceed, that they proceed with added traffic handling capabilities as a primary requirement.

Please also consider all of our concerns listed in the attached document.

Sincerely,

Mr. & Mrs. S. Katzmann

Yorba Linda Residents

Risks	Benefits
Increased property damage & loss from fires	The developer profits (money)
Potential injuries or death due to fires	Increased OC County property tax base (money)
More traffic congestion during fire evacuations - inadequate egress routes	Increased customer base for local businesses (money)
Increased traffic accidents	
Increased work commute times for residents	
Police, Fire & Paramedic resources spread thinner	
More frequent and longer lasting electrical power outages	
More stringent water conservation restrictions	
Increased State requirement to provide affordable lower-income housing	
Construction traffic, debris, and damaged city roads and infrastructure	
Construction adverse impacts on noise level, air quality, and environment	
More school classroom crowding = higher student-to-teacher ratios	
More crime	
Reduced Yorba Linda aesthetic appeal - natural surroundings gone	
Less "Land of Gracious Living"	
Frustrated Yorba Linda residents	
Yorba Linda refuses to incorporate the County land	

FACTS:

- Due to a lack of planning and resources, the disastrous November 2008 fire destroyed eight homes and damaged several others in our neighborhood, before any firefighting resources arrived on scene. Some of our neighbors did not evacuate and risked their lives by staying and fighting the fires with garden hoses.
- The area being considered for the new homes is an extremely high fire-risk area, especially during Santa Ana wind conditions (like in 2008).
- Our evacuation during the '08 fire was too close for comfort. As fire approached us from the hillsides east of Stonehaven/Via Del Agua, our evacuation traffic was blocked from entering YL blvd for some time. Until someone (no police presence) physically stepped out into YL blvd and stopped the traffic to let our side street proceed. There have been no added or improved traffic routes since the fire.
- The fire destroyed eight of our neighbors homes on Heatheridge/Cardiff. Two properties were never rebuilt and remain as eyesores and neighborhood blight. The city has since done nothing to force owners to improve these lots.
- Electrical power in our area has gone out 3 or 4 times in the past 13 years for an hour or more (in one case more than 8 hours). Not aware of any permanent repairs or preparation for increased demand? In contrast, the power never went out for any length of time when we lived on the west side of San Antonio for 12 years prior to our current location.

Mr. & Mrs. Katzmann
Heatheridge Drive, Yorba Linda

01/31/2013

Jan. 3, 2014

Letter: Keuilian

TO: OC Planning
Attention: Ron Tippets

This letter is in response to the community open house meeting that was held on December 16, 2013 regarding the Cielo Vista Project. Our family lives on San Antonio Road which will be directly impacted by the additional traffic that this proposed new development will create. We are greatly concerned with the process by which this important decision is being made. Anybody who has been on San Antonio Road knows that this two way street is already congested with cars. Most mornings there is a considerable wait just to be able to back out of our driveways. We have been to several Yorba Linda City Council Meetings as well as the community open house meeting. There seems to be a common theme occurring in that the citizens of Yorba Linda are not being heard or respected. To be more specific, the Draft EIR does not logically address the concerns that we have with regard to additional traffic flow down San Antonio Road as well as evacuation plans for the next fire. **These proposed new single family homes do not become more important than the existing homes and family's that will be negatively impacted by this development, regardless of the financial gain to the City of Yorba Linda**. I would like to be informed as to what other roads are being considered as a means to access this new housing development as well as a more realistic emergency evacuation plan for the next fire. If you have not heard this loud and clear by now, we do not plan on standing by and allowing our neighborhood to become a freeway.

Keuilian Family
email katszsz@aol.com

Letter: Kirby1

Cielo Vista Project – Proposed Single-Family Residential Development
Community Open House
Comment Form

The County of Orange welcomes your comments on the environmental review process. Your comments will assist us in better understanding your concerns regarding the proposed Project.

You may submit your comments to County staff at the Community Open House on December 16, 2013, or if you prefer, you can mail, FAX, hand deliver, or e-mail your comments to OC Planning, attention Ron Tippets, Project Planner, **by January 7, 2014**.

Mail: P.O. Box 4048
Santa Ana, CA 92702-4048

Hand Delivery: 300 North Flower Street, 3rd Floor
Santa Ana, CA 92702-4048

Fax: (714) 796-0307

E-mail: Ron.Tippets@ocpw.ocgov.com

Telephone: (714) 667-8856

1. What specific comments do you have on the issues analyzed in the Draft EIR?

Aesthetics: LOOKS NICE NOW BUT THIS DEVELOPER COULD SELL OFF ITS RIGHTS TO DEVELOP AND WHO KNOWS WHAT WE REALLY GOT DOWN THE ROAD.

Air Quality:

Biological Resources:

Cultural Resources: GATED COMMUNITY? HOW DO I DRIVE IN?

Greenhouse Gas/Climate Change:

Geology and Soils: EARTH MOVEMENT FOR TWO YEARS

Hazards/Hazardous Materials: OIL WELLS?

Hydrology/Water Quality:

Land Use/Planning: - OPEN LAND MUCH OF WHICH IS NON-MAINTAINED
- THE IMPROVED OPEN LAND IS NOT ACCESSIBLE TO PEOPLE IN CARS OUTSIDE THE DEVELOPMENT

Noise:

Population and Housing: DOES NOT FIT ORIGINAL PLAN OF DEVELOPMENT WITH CLUSTERING OF HOMES

Public Services: NONE

Recreation: NOT AVAILABLE TO RESIDENTS DOWN THE HILL VIA AUTOMOBILE.

Traffic/Transportation: TRAFFIC STUDY DID NOT INCLUDE MASS EVACUATION SITUATION

Utilities: NO WATER IN THE LAST FIRE

Alternatives:
BRAND NEW INGRESS / EGRESS ROADS BESIDE EXISTING SAN ANTONIO & JAGUA & STONEHAVEN WHICH COULD NOT EVACUATE EXISTING RESIDENTS IN 2008 FIRE!

2. What specific comments do you have regarding the proposed Cielo Vista project?

— TOO BIG FOR EXISTING INFRASTRUCTURE OF ROADS, CHAINED EMERGENCY ROADS WILL NOT SUFFICE IN TRUE EMERGENCY WITH SMOKE, CHAOS, WINDS, FIRE, DARK WHO WILL MAINTAIN? WHO WILL OPEN GATES IN EMERGENCY? LAST TIME NOBODY WAS THERE, SOME WILL DIE IN NEXT FIRE.

Please provide your name and contact information below:

Name: SCOTT KIRBY Email: SMKIRBY@CISCO.COM

Address: 4785 VIA DE LA ROCA
YORBA LINDA, CA
92887

If you are mailing your comments, please fold the paper in half and place first class postage in the upper right corner before dropping in the mail box. **Please submit your comments** as soon as possible, but **no later than** the close of the Draft EIR public comment period on **January 7, 2014, 5:00 p.m.**

RUTH SANDMEIER
714 667 3217

OC Public Works
OC Planning Services
300 North Flower Street
P. O. Box 4048
Santa Ana, CA 92702-4048

ATTN: Mr. Ron Tippets, Project Planner

Letter: Kirby2

From: Scott Kirby [mailto:scotty_kirby@yahoo.com]
Sent: Wednesday, January 15, 2014 2:38 PM
To: Tippets, Ron
Cc: Spitzer, Todd [HOA]
Subject: Comments on draft EIR for Cielo Vista and Esperanza Hills Development proposals Yorba Linda, CA

NOA Purpose: The purpose of this NOA UPDATE is to inform local residents, responsible agencies, institutions, and other interested parties that the Draft EIR is available for review and comment during the Public Comment Period (Thursday, **November 7, 2013** through Wednesday, **January 22, 2014**. Written comments to the Draft EIR must be submitted no later than Wednesday, January 22, 2014 to: Ron Tippets, Planner, Current & Environmental Planning Section, OC Planning Services, P.O. Box 4048, Santa Ana, California 92702-4048 or via email at: Ron.Tippets@ocpw.ocgov.com.

My name is Scott Kirby and I have lived at 4785 via de la Roca in Yorba Linda for over 15 years.

When the freeway complex fires hit Yorba Linda I was out of town and received a call from a friend that "Yorba Linda was on fire". It was mid morning. My son was still home in Yorba Linda at my house. He was working the night shift at UPS so I knew that he would be sleeping.

I woke him up on his cell phone and asked him about the fires. He of course knew nothing and heard nothing from anyone else about it. I asked him to look out the window. He did and saw a large amount of smoke coming over the hill towards our cul de sac. I told him to hang up and go check it out and call me back.

Five minutes later he called back out of breath and asked me what I wanted out of the house because it was surely going to burn down. I asked him if he had talked to the crowds of police and firemen in the area that surely were there. He said that NOBODY was there. I told him to grab some pictures / videos and leave immediately which he tried to do.

By the time he got his car onto Via Agua the road was blocked with exiting residents as they could not manage to get off of Agua onto Yorba Linda Blvd because of all the traffic. With the chaos there was no Police or Fire Dept. staff directing any traffic anywhere. Finally my son drove on the other side of the road to get off the hill. I cannot imagine the fatality rate when the next fire hits those same hills now occupied higher up with 500 more homes and the same egress and ingress streets in place. This is a death warrant for whoever purchases those homes.

At the same time, my neighbor on the cul de sac was sitting in his living room with friends. He saw the same fire coming over the same hill. He went to get his camera to take a picture of the fire. By the time he returned the fire was almost on top of them having moved a quarter mile in just a minute. He dropped the camera and told everyone to get out of the house and into their cars in the driveway. With their hands on their cars and loading, the fire was on top of them having blown over the house. They immediately abandoned plans to drive and ran screaming down the street. Their two cars are shown in the driveway attached here.

His house was destroyed as was one other directly next to my property. Only the actions of my next door neighbor who stayed to fight and 10 other neighbors who came into my yard saved my house after fighting fires in the yard for hours with water from my pool. We never saw a fireman or policeman.

Some 114 houses burned down that day in Yorba Linda...many because the water pipelines providing water to the hydrants were destroyed and there was no water higher up.

I don't see how anyone that approves this scale of project on existing streets in those hills will be able to live with themselves. It is not a question of whether a fire will ever hit those hills. It has happened and will happen again. Orange County Fire Authority and responders were and will continue to be helpless in fighting fires in that area when the wind blows like it did that day.

Sincerely,

Scott Kirby

4785 via de la Roca

Yorba Linda, CA

Letter: Kirby3

From: Scott Kirby [mailto:scotty_kirby@yahoo.com]
Sent: Wednesday, January 15, 2014 2:41 PM
To: Tippets, Ron
Subject: Cielo Vista Draft EIR comments

NOA Purpose: The purpose of this NOA UPDATE is to inform local residents, responsible agencies, institutions, and other interested parties that the Draft EIR is available for review and comment during the Public Comment Period (Thursday, **November 7, 2013** through Wednesday, **January 22, 2014**. Written comments to the Draft EIR must be submitted no later than Wednesday, January 22, 2014 to: Ron Tippets, Planner, Current & Environmental Planning Section, OC Planning Services, P.O. Box 4048, Santa Ana, California 92702-4048 or via email at:Ron.Tippets@ocpw.ocgov.com.

Date: Monday, August 6, 2012 3:54 PM
To: "Channary.Leng@ocpw.ocgov.com" <Channary.Leng@ocpw.ocgov.com>
Cc: rebelwoof <rebelwoof@att.net>
Subject: Cielo Vista Enviromental Impact Report Submission: Written Comment form

Ms. Channary Leng

OC Public Works

OC Planning

300 North Flower Street

Santa Ana, CA 92702 92702-4048

Subject: Draft Enviromental Impact Report for Cielo Vista Project

Written Public Comments for the Scoping Meeting for the Draft Environmental Impact Report for the Cielo Vista Project are due to the County of Orange NLT August 6, 2012

Please leave this form in the box provided at the Scoping Meeting or deliver or mail it to: Ms. Channry Lang, OC Public Works/OC Planning, 300 N. Flower Street, Santa Ana, California 92702-4048. This form can simply be folded and placed in a mailbox. Please remember to add postage. Alternatively, you may e-mail your comments to Channary Lang at: Channary.Leng@ocpw.ocgov.com

Dear Ms. Leng;

The following are my comments regarding the Cielo Vista Project under the County of Orange jurisdiction in Yorba Linda. Please include them in your EIR study:

1.Any approval of the plans submitted by the developer for Cielo Vista and approved by the County of Orange should include a death certificate for some future resident of that development. One ingress and one egress point for up to 500 homeowners and their families will without a doubt lead to deaths in the next fire similar to the Freeway Complex fire already experienced in 2008. I live in this area, and the evacuation of existing residents on existing streets onto Yorba Linda Blvd was backed up and three abreast on a two lane street during those fires.

2. Any proposal by the developer should be reviewed in context with both the Cielo Vista Project of 100 plus homes and the Esperanza Hills proposal of homes which is directly attached and would use the same streets , ingress and egress, as well as the same fire and water safety concerns.

3. The proposal submitted by the developer includes no schools and would dump 500 homes full of children into the schools that are maxed out at the bottom of that hill (Travis Ranch Elementary and Middle School).

4.The proposal includes "open space" that already exists but does not make any provision for landscaping or maintenance or water of the same open space. What we learned in the freeway complex fire was that the open space in hidden hills as provided by that developer, was actually the perfect kindle for that fire and led directly to the destruction of many homes in that area. (114 homes burned in Yorba Linda during that fire. It is not a question of IF there will be a fire again in this area, but when. So it is incumbent on the County of Orange to make sure that all means of protection of residents and property is accounted for by the developer who's interest is strictly monetary and will provide the minimum of safety tools to get his proposal approved and developed.

5. The proposal includes the covering of an open spring and creek with some sort of bridge at the ingress point off of Via Agua/Stonehaven. This is a collection point for wildlife as well as for mudslides. Please see attached pictures of mud slides and fire damaged home that backs up to that very location.

Thank you for your time and consideration of this material.

Sincerely,

Scott

Scott Kirby
4786 via de la Roca
Yorba Linda, CA

92887
smkirby@cisco.com
Phone: 714-970-6334

Letter: Kloman

From: Jim Kloman [mailto:JKloman@brfa.com]
Sent: Thursday, December 26, 2013 8:44 AM
To: Tippets, Ron
Subject: Cielo Vista's Environmental-Impact

Dear Ron,

My concern is the impact of all the extra cars on Stonehaven Dr. As it is as many as 8-12 cars line up at the light on Stonehaven to the Yorba Linda light. When you edouble th,triple and quadruple the number of cars more than a traffic jam will exist. People that live on the Stonehaven or bring theit children to the pre-school on the corner will not be able to get in and out of their own driveway.

I think it is paramount that the developer should be required to build additional roads to get these cars for the new home owners out of these developments some other way then using existing streets.

As you should be aware that during the fire that went through this area Yorba Linda Blvd. wqas impossible to get to for the existing home owners and any addition homes would make thigs worse and more than likely a death trap for which you would be responsible and charge.

Jim Kloman

President/Owner

Brenner-Fiedler & Associates, Inc. - ISO 9001:2008
Phone: 951-299-4100 x-219
Fax: 562-404-7975
Email: JKloman@brfa.com

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BF & Associates
Building Futures Through Automation

TRAFFIC CONTROL ENGINEERING, INC.

January 22, 2014

Mr. Ron Tippets
OC Planning Services
County of Orange

Re: Response to Draft EIR on Cielo Vista Project

Dear Ron:

Thank you for the opportunity to submit our responses to the above Draft EIR. I am a resident of City of Yorba Linda.

One major consideration that has not been mentioned in the previous open house, public meetings... is that the additional traffic generated by the proposed development should call for a "Traffic Calming" study in an effort to slow down the traffic, especially down-hill direction on both Via Del Aqua and Stonehaven Dr.. Mitigations from similar studies include landscaped raised median, neighborhood traffic circles, diagonal diverters, half street closure, stop signs, traffic humps., chokers, … Some of the mitigation measures may involve on-street parking restrictions and possibly street closures. Therefore, it is imperative that an in-depth neighborhood public workshop program be developed to solicit residents' input for the final traffic calming study recommendations.

Further, the proposed development should also consider widening the intersection of Yorba Linda Blvd. and Via Del Aqua to accommodate added traffic due to the development. Via Del Aqua should have a landscaped raised median and an outbound right turn lane and a left turn lane. Northbound Yorba Linda Blvd. should be widened to accommodate a new right turn lane and a continuous bike lane. Southbound Yorba Linda Blvd. has a vertical and horizontal curve approaching Via Del Aqua. It is critical that southbound left turn traffic shall not be allowed to back up onto the southbound through lane due to the limited sight distance. Therefore, the southbound left turn lane should also be lengthened to ensure that such a problem will not occur.

We appreciate your consideration of our responses and all your hard work on this project.

Sincerely,

TRAFFIC CONTROL ENGINEERING, INC.

David Kuan, T.E.,P.E.

2687 Saturn St.
Brea, Ca 92821

TEL (714) 447-6077
FAX (714) 447-6081

Letter: Levine

From: Maureen A. Hatchell Levine [mailto:maureenlevine@klplaw.com]
Sent: Monday, January 13, 2014 6:14 PM
To: Tippets, Ron
Subject: Cielo Vista Project Above Yorba Linda

Hello Mr. Tippetts,

My name is Maureen Levine, and I am a 27-year resident of Yorba Linda. I live in the older part of Yorba Linda, near Imperial and Kellogg, not close to the hills where the Cielo Vista project is proposed.

Nevertheless, I have very strong concerns about burdening the hills with more housing. I know that whenever new projects are proposed in an area, existing residents feel threatened and do not want further crowding in their area. However, in this situation it is not just a selfish concern over space and ethics. The hills in general are very susceptible to wildfire, and we experienced the devastation of a substantial amount of land near the subject area in the 2008 fires. I have read Supervisor Spitzer's letter to residents, and he is correct that the County should be assured that the development should be allowed only after the county is convinced that living up in those hill would be safe for the residents of the new homes.

However, I go a step further and ask that the County also consider the safety of the existing residents, who did not have sufficient egress to evacuate at the time of the fires, and did not have sufficient water. And water pressure. Supposedly the water issue has been resolved, but was it resolved with an eye for all these additional homes? Further, if the egress was already insufficient for the existing homes, one can only imagine the life-threatening situation with thousands more residents trying to evacuate.

Additionally, aside from safety, what about the mental health that space promotes? I know we live in a capitalistic democracy, and we all benefit from it. However, government officials do not have to cow-tow to developers every time developers lick their chops over a lucrative opportunity. One of the most appealing aspects of Yorba Linda is that it has preserved space throughout all the

years, and to the people to whom space is important, that is extremely valuable, and the main reason those people want to live in Yorba Linda. Yet Yorba Linda residents are continually threatened by high density development, developers from out of the area proposing high density, using the value of the spacious environment the residents have fostered, to maximize developer profits without contributing to the value of the area; instead detracting from property values by inflicting crowding.

Please do not give in to developer influence. As an objective entity, the government must fully review the impact of this proposed development with eyes wide open. The developer certainly cannot be trusted to fully disclose any danger it has discovered about putting the development in the hills. The citizens are counting on you to fully weigh the pros and cons, not as a token gesture, but in a genuine effort to determine whether this development should be allowed.

And another issue: isn't this land county land? So where does the developer get off burdening the City of Yorba Linda with county residents' use of Yorba Linda infrastructure? Too many developers have been allowed to exceed low density requirement without contributing any valuable offset to the City of Yorba Linda.

Thank you for considering the foregoing.

Maureen Levine

Letter: Lopez/Martin

From: Venessa Lopez [mailto:vw2000@sbcglobal.net]
Sent: Tuesday, January 21, 2014 6:46 PM
To: Tippets, Ron
Subject: Ergent!!

To Ron Tippets and

whom this may concern,

This is a matter of life and death. It's important that the County of Orange and developers of the Cielo Vista Project know, and be aware that I represent the homeowners that live on and near my street, approximately 50+ taxpayers. The homeowners that live on Alder Ave. (adjacent to San Antonio Blvd.) we are OPPOSED to this project for many significant reasons. The first and most obvious is the impact on the reemerging wildlife in that is still in recovery process due to the fires that devastated that area in November of 2008. These are the last hills that remain in Orange County and need to be preserved for that very reason. These indigenous animals may not be on the endangered list now, but they will be extinct to this area if you continue to build and develop homes in and on their habitat.

During the "open house" with the Ceilo Vista developers on January 16th they acknowledged that they are going to preserve a very small area on the west side of the development for a bird sanctuary, and in the same breath explained how they would have to remove the trees, bushes and plants in that area, in order to plant the new bushes and plants they want the birds and other wildlife to nest and reside in. I feel that this is a fine example of the doubletalk that they have used to get the permits for building approved, and the County has for some reason forsaken us and signed off on these permits for no benefit to

the city and the taxpayers who are already living here. In fact it's to the detriment of the existing homeowners and wildlife.

The developers want to utilize our water resources! They want to add an additional 500 homes to a existing water reserve in the midst of a drought that may last decades! We are currently being asked to cut back on our daily water usage by 20% a day! How is adding an additional 500 homes to tap from our water reserve going to help to accomplish this? In addition to the Ceilo Vista development there are two more developments that will be encroaching upon all our reserves in addition to that post the completion of the 1st development, why would the County of Orange approve these developments without taking any and all these aspects into consideration?

These developments are large in scale and do not fit in to the community. The proposed project is on such a grand scale that it will impact our already overcrowded schools and existing shopping centers. It will potentially impact local traffic as well as increasing the risk of fire / safety hazards.

During the fire in Nov. of 2008 we almost lost our home and all of our belongings because we had left town that morning with only an overnight bag. The only reason our house was not burned and a complete loss was because our neighbors stayed and fought the flames armed only with garden hoses and shovels, and it's by the grace of God that no lives were lost in that process. There was no help in my neighborhood from the local fire dept. that is located at the end of San Antonio! There was no help from law enforcement who were virtually absent with the exception of the two officers that were posted at he end of San Antonio Ave., they were there keeping the home owners

from returning to their homes to rescue their loved ones, pets and prized possessions. Since this time there has only been a few sheriffs added to increase the protection of our community, not enough to make a significant difference in the event of a real emergency.

My husband and I spent the better part of the day trying to get home to rescue our dog, and the freeway system was so Impacted we were stuck in a traffic gridlock for better that eight hours and we were unable to return home until the next day. During that time we were exposed to toxic fumes and I am still experiencing respiratory problems. The closest we got to home was approximately 15to 20 miles! We had to check into a hotel for that night and the closest room that was available was in Anaheim, near Disneyland! This was due to all the evacuations that had occurred.

In the event of another fire, or an earthquake or some other unforeseen catastrophic event, the safe evacuation of all the people who live here and are going to be living here pending the completion of these projects will be impossible. Lives will be lost so that the developers can make money! Not if but when the next fire occurs. It's wrong for so many reasons. We implore you to stop these developments and please save our lives and Save our Hills!

Sincerely,

Venessa Lopez & Wayne Martin

4610 Alder Ave.

Yorba Linda, Ca. 92886

Letter: Macheel

January 10, 2014

Orange County Planning services
Attention: Ron Tippets

Subject: Response to Cielo Vista Draft EIR

We have reviewed the document as best we are able, considering the size and the amount of information.

We would like to start by saying that we are not anti-development. The homes we live in, were obviously once open land. It is difficult to say that once we have ours, it is time to stop development.

That said, there are things about Cielo Vista and proposed other developments in the adjacent area that do raise a large degree of concern in our minds.

There are two main areas of the EIR that are of special concern. They are:

Section 5.7 Hazards and Hazardous Materials

Section 5.14 Transportation and Traffic.

5.7 HAZARDS AND HAZARDOUS MATERIALS

5.7.9 Community Evacuation Planning

The key premise of this section seems to be that the majority of residents will dutifully follow an evacuation plan. Further, this plan will be initiated early enough to support a structured and orderly evacuation. As was noted in the general comments in this document, this did not go well with the Freeway fire. Residents will naturally want to stay at their homes, assessing what might be done to protect them. We find it improbable that residents will now leave their homes early, before they have some ability to assess the risk to their property and to themselves. In the event that the fire does become more threatening and it does seem prudent to leave, there will very likely be the same situation, but with significantly more persons attempting to leave (do to the added number now included in the area of concern). This evacuation will again be attempted using a very limited number of egress options. Having seen that process happen first-hand, we feel that this issue is not as easily passed over as is implied in this study. Additionally, If we read the document correctly, these plans are still “in-process”, so it is difficult to really evaluate the potential for being effective.

5.7.5 Project Impacts Prior To Mitigation

Section g.

This discussion suggests that Emergency Ingress/Egress Plans for Evacuation have been incorporated into the circulation design of the project. Have any real-world simulations been done showing that these plans have some credibility? That would, of course, include a **realistic** assessment of the time residents would **actually** have when they try to evacuate.

Throughout this section, the Home Owners Association bears a significant responsibility to ensure that all the planned mitigations are done properly and kept maintained. Having had some experience with HOAs, they do not always function in the orderly and strictly proper manner that will be needed. Is there a requirement that the HOA report to some Agency on the status of their mitigation efforts/programs?

i. Project Emergency plan

Again, it is noted that allowance for adequate time will be key in formulating an effective evacuation plan, so that roads do not become congested. Looking ahead to the later section on traffic, we find that the plans for egress are still quite indefinite, and those proposed options do not really address the traffic flow leaving the streets such as Via Del Aqua onto Yorba Linda Blvd.

Further, it is noted that if alternative measures, other than evacuation are required, the ***Proposed Projects residents would receive an alert and the community's pre-planned and practiced emergency response would be initiated*.** We find that level of community involvement prior to an emergency, difficult to imagine. Is it realistic to assume that this Community will hold **practice evacuation drills**? What system would be in place outside the community that would monitor this "readiness"?

A key intersection that will be crucial in any evacuation is that of Via Del Agua and Yorba Linda Blvd. We personally witnessed the incredible congestion there during the Freeway fire, since we live very near that intersection. As noted in the Traffic Section, the actual eventual outcome for that area is not determinate because of the uncertainty of the implementation of a traffic signal and other mitigations. However, even assuming that something will be done to improve access to Yorba Linda Blvd, it is difficult to see how this much larger traffic load will transfer smoothly to Yorba Linda Blvd. Even without this large additional traffic load, it was virtually impossible to get onto Yorba Linda Blvd. during the Freeway fire due to the congestion on Yorba Linda Blvd.

5.14 Transportation and Traffic

As noted in **5.14.1.5 Existing Level of Service Results**, the intersection 10, Yorba Linda at Via Del Agua receives an **F** rating in the AM.

As noted in **5.14.3.4.d. Peak Hour Intersection Capacacity Analysis section 1) Existing Plus Option 1,** Project Traffic Conditions, at both the AM and PM hours will degrade to LOS F status.

In section **5.14.4.4.e Area-Wide improvements**, a proposed mitigation would be the installation of a three-phase traffic signal at Yorba Linda Blvd and Via Del Agua. This study totally ignores a situation that will severely impact traffic flow from the homes (including ours) that are on Via Del Cerro. There is also one home on Via Del Puente affected as well. These homes normally access Yorba Linda Blvd by going West on Via Del Puente to Via Del Agua, then making a left turn onto Via Del Agua proceeding to Yorba Linda Blvd. The proposed traffic solution will create either a solid line of cars waiting for the light to change to access Yorba Linda Blvd, or solid traffic flow when the light is green. In addition, this will be aggravated by traffic entering Via Del Agua heading North from Yorba Linda Blvd. While the traffic study personnel may not consider the fact that 20-30 or so impacted homes are significant, we residents do. Unfortunately this situation is likely to negatively impact our home prices significantly, as well. In an emergency it would virtually ensure that there would be no exiting the tract via Via Del Agua.

Looking at **5.14.4.5 Option 2 Project Analysis,** once again Via Del Agua is a level F in the AM and E in the PM. Once again, the traffic signal is indicated as the mitigation. The concerns with that solution are, of course, the same as with Option 1.

5.14.4 Mitigation Measures

As noted, the Mitigations are "recommended" measures. There is no assurance they will be implemented.

Other Traffic Concerns

One issue that we were not able to find addressed, is the school-related traffic. Presently, when children are being taken to and from Travis Ranch School, there is a significant amount of congestion. This often involves parents going out of their way to make U turns and various other maneuvers to attempt to negotiate this busy area. The change in traffic flow due to the "surges" in traffic due to the high-load traffic signals, will likely severely worsen this problem. Also the simple addition of a large number of parents/students will have a major impact as well. This is a problem that is presently being "struggled with" every day. We have not seen any mitigation plans to address this problem and prevent it from getting significantly worse.

SUMMARY

In summary, the build-out and eventual sale of this proposed tract of homes will have a significant and negative effect on many homes. The largest impact is likely to be to those homes that front, or require access to Via Del Agua. This impact causes two areas of concern. First, there is a clear increase in the chance of homes lost or damaged by fire in the event of another situation such as the Freeway Fire. This is due to the traffic congestion on Via Del Agua making fire-fighters access to homes along that route difficult or impossible. In addition, the safety of the residents themselves may be jeopardized by the inability to readily exit their neighborhoods.

Secondly, this development will have a very detrimental effect on everyday living to a large number of existing residents. We believe representatives of the County should be sensitive to these effects on their constituents, and would appreciate their honest evaluation of the impact this, and other proposed projects will have on this community.

Thank you,

Gary and Jacquelynn Macheel
5040 Via Del Cerro
Yorba Linda, CA.

PS:

We would like to offer a suggestion to the preparers of this report and reports to follow. The practice of omitting the full paragraph description number with each referenced paragraph (number or letter), makes referencing sections very difficult. For example, on page 5-553, we have sections d. e. and f. If we as the reader want to reference something in one of those sections, we must go back page by page until we finally trace down the rest of the reference. In this case we have to go back to page 543 to see that it relates to section 5.14, then we must note that it is 5.14.1. Further research leads us to page 548 where we find it is 5.14.1.4, which now allows us to note that there are no new paragraphs in between. We then conclude that those of interest must be section 5.14.1.4 d e or f. It is true that there are page numbers associated with these paragraphs. It seems to us, that these numbers would tend to change often with revisions. That would make it difficult to use them as long-term references.

Letter: Magsaysay

Ron and Judith Magsaysay
21230 Twin Oak
Yorba Linda, CA 92886
714.801.6757

January 20, 2014

Cielo Vista Project – EIR Comments

Hazards/Hazardous Materials:

Our first and foremost concern is for the safety of residents during a fire emergency in this area. Wild land fires follow a pattern and this area is an historical fire corridor. These homes are right in the line of future fires. The developer states that these new homes will be "hardened and fire-safe." As a 32 year veteran firefighter, engineer, captain and brush fire crew supervisor with LA County Fire Department, I can state unequivocally, that no matter what a developer states, you cannot fireproof a home. Any exposed wood or glass window will make a home susceptible to fire. A burning bush near a structure can raise enough heat to cause glass to break or wood to burn, allowing fire to enter.

The evacuation plans will not work. During the 2008 fire, traffic was backed up San Antonio for ¾ mile. Additional homes will only create more congestion, especially during an evacuation. There is no way for San Antonio to support the number of evacuees. The developer stated that the sheriff will control the intersections to avoid back-up. With so few (6?) officers on duty, how long will it take to get additional officers out to control the impacted intersections for traffic to flow? It is our concern that by the time the intersections are controlled, lives may lost due to the backup.

On San Antonio the homes are on the east side of the street and the fire hydrants are on the west side of the street. With hoses stretched across San Antonio, the evacuation route is lost. Also, with fire engines along the street, there will not be sufficient room for San Antonio to serve as a main road of egress.

During the 2008 fire, the 91 Fwy. was closed, resulting in no space for evacuated traffic to move. With the proposed plan, there is no way to lessen traffic on YL Blvd., Imperial or La Palma. Y. L. Blvd and Imperial are the only ways out of the city. Additional cars will only exascerbate the problem.

We were fortunate that the 2008 fire took place on a Saturday. During a weekday fire, Bryant Ranch, St. Francis, Travis Ranch, Fairmont and Y.L. High School evacuations would greatly impact traffic flow and egress.

High pressure gas line runs directly behind our property. With extensive movement and vibration of earth and the possibility of the pipes getting disturbed or bumped, we are fearful of a San Bruno type explosion/disaster. We are aware of the danger of this high pressure line. The EIR does not sufficiently address this danger.

During the 2008 fires, the oil wells on this property were compromised. The vapor exhaust systems failed and flammable vapors were released into the atmosphere and were burning.

Around these oil pumps, there are above ground oil lines which will be disturbed, increasing potential danger to homes, people and wildlife. That danger is not sufficiently addressed within the current EIR.

Air Quality:

With lengthy land grading and construction, the air quality will suffer for an extended period of time. Particulate matter will cover our homes, yards, plants, animals, streets, cars, etc. and enter our respiratory system as well as that of the local wildlife. When our kids were small and construction pollution was still evident around us, one-third of the kids on this cul-de-sac had asthma. Will our asthma count go back up due to the pollutants and particulate matter with this lengthy process?

With the protracted drought, we know that water will be restricted and rationed for everyone. Will there be sufficient water to tamp down the dirt and dust? We are concerned that the builders will also have to lessen their water usage for this purpose. The developer says that watering down will mitigate. Will there be sufficient water to tamp down the dirt and dust? Will their use impact our water use? They will be creating a mess on our city streets.

Diesel exhaust and other greenhouse gas emissions will be extreme due to massive amt. of earth moving equipment. According to the EIR, over 200,000 cubic yards of earth will be moved directly behind our home. 1.5 million cubic yards will be moved throughout Cielo Vista alone and we are concerned about the cumulative effect as Esperanza Hills and other developments come into play, with even more particulate matter and greenhouse gas emissions.

Noise:

Being adjacent to the project, we will have constant noise from tractors, earthmovers and power equipment.

Aesthetics:

Property value and enjoyment of nature will be greatly diminished due to loss of our unobstructed views of natural hillsides with all of their accompanying sights, sounds and smells. This project will be an aesthetically negative experience from start through and after completion. Viewing a 100+ acre construction site over several years will negatively impact the local peaceful aesthetic....including sights, sounds and odors.

Biological Resources

This area serves as a wildlife corridor, regardless of the fact that the city and or county never formally designated it with the title of "wildlife corridor." Therefore, we urgently request that the County of Orange and/or any authority with the power to do so, designate the entire area (formerly known as the Murdoch Property) as a wildlife corridor to be protected and preserved as such. We see the wide variety of wildlife; deer, coyote, raccoons, rabbits, squirrels, opossum, hawks, owls, numerous variety of hummingbirds, woodpeckers, egrets, heron, geese, lizards, snakes, tarantulas, bobcats, and yes,

occasionally mountain lions. A family of mountain goats has lived or hung out nearby. Least Bell's Vireo, labeled federally and at state level as endangered, will be disrupted by the noise and pollution if it survives construction. All of these creatures will be disturbed and displaced. If they survive, they will be forced all the way back to the Chino Hills State Park, where they will have less access to water supplies as well as less land for survival. Currently, many animals creep down to the ravine/culvert below us for life saving water which they won't be able to access. This corridor serves as an ecological escape or overflow valve that construction will close off.

Hydrology/Water Quality:

During construction, the runoff will overly impact our flood control system with dirt, dust, oils and diesel pollutants which will flow directly to the ocean.

The natural water run-off that feeds the Blue Mud Canyon aquifer will be altered, even with the proposed mitigation.

Geology and Soils:

The loss of vast amounts of topsoil and subsequent soil erosion is a major concern. We will be highly impacted by extensive runoff, pollutants, and overloading of existing drainage systems.

Cultural Resources:

Our local schools and public library will need to absorb the added student population. Travis Ranch (K-8) currently uses 28 portable classrooms in addition to its permanent structures. Its K-5 school is currently 88 students over capacity. Yorba Linda Middle School and Yorba Linda High School are close to capacity now and may exceed capacity as the elementary schools feed into them.

While the new homeowners will be able to access any and all of our parks, fields, community centers, the new park within the development can only be accessed by foot, bike or horse due to it being located behind gates.

Traffic/Transportation:

Mitigation Measure 4.12-5 states that construction vehicles shall not haul past Travis Ranch School during school arrival and dismissal times. We are concerned that this may not address all of the varying schedules between the elementary, middle school grades and the "Early Bird" and "Lator Gator" kinder students. There are 4 different start times: 7:59 a.m., 8:35 a.m., 8:46 a.m., and 10:15 a.m. Then the dismissals include 1:55 p.m. 1:37 p.m. and 2:52 p.m., and 3:35 p.m. Please see the Travis Ranch School's website as there are different times for early dismissal days (Wednesdays) and for minimum days.

This project will dramatically alter the open space and wild landscape which we all sought when moving into this area. Please respect the city of Yorba Linda's no ridgeline building and lower density policies as you make recommendations to the Board of Supervisors regarding this and other future projects as this county land is surrounded by Yorba Linda and may very well become part of our city.

We are hopeful that the many safety and environmental concerns raised with the development of this last remaining parcel of open land here in the Yorba Linda area will result in the protection of this natural resource.

Respectfully,

Ron and Judith Magsaysay
jrsay2@gmail.com
714.801.6757

Letter: Mahony

From: Michael A. Mahony [mailto:MMahony@Dynamic-Plumbing.com]
Sent: Monday, January 13, 2014 1:53 PM
To: Tippets, Ron
Subject: Cielo Vista Project
Importance: High

Mr. Tippets,

The statement that "the analysis of the Draft EIR would not result in any significant and unavoidable environmental impacts" is ludicrous. The fire dangers, dust and pollution are significant and putting the additional homes in the path of wildfires is grossly negligent and putting all of the existing families in harms way. It is avoidable by severely reducing the number of homes to be built or not building at all and making it a sanctuary.

During the most recent fires my family was STUCK in our car on Via del Aqua trying to escape, but could not because of the mass exodus taking place. Our car was licked by the flames on both sides of the road. There is absolutely no way to evacuate the existing homeowners on the roads, REGARDLESS OF WHAT YOUR TRAFFIC STUDIES REPORT states, as the proof is in the last attempted evacuation WHICH FAILED. Adding 1000 additional cars deeper into the hills utilizing the same exit roads WILL NOT WORK as it did not work without the proposed homes. Your studies are flawed and the County and City, along with all personnel IGNORING the recent events that were opposite of the reports will make each and all liable for the damage and destruction of property and lives.

I believe in property rights and ownership rights, however the original plan created years and years ago could not have foreseen the fire and congestion impacts. The plan should be changed immediately. It is not safe for the new residents, and increasing the already existing dangers to the existing residents. The county and city officials are making their decisions based on sheer greed for monies from the development without regard to public safety due to all the budget shortfalls existing at government level.

Michael A. Mahony, resident 13 years at 6030 Rockhampton Court, Yorba Linda

Letter: Mak

From: Lana Mak [mailto:lanawmak@att.net]
Sent: Monday, January 06, 2014 8:20 AM
To: Tippets, Ron
Subject: San Antonio Road Yorba Linda

Dear Mr. Spitzer,

My home was on the path of the Freeway Complex fire in 2008. Six homes were destroyed on my block alone including my neighbors next to me and across from me. I was spared. I lived here since 1988.

The fire spread so fast that morning that I had very little time to evacuate. My neighbor and I had no warning to leave but when we saw orange flames towering the top of the hills across San Antonio we got as much as we can and tried to leave via San Antonio. We were able to leave because it was still fairly early about 1 PM. Cars were leaving, using San Antonio the only road out of our neighborhood. Traffic got much congested on San Antonio with dense smoke blowing making visibility minimum. I was lucky to get out early using a side street off San Antonio, Alder street which winds it way back to Yorba Linda Blvd.

I am writing to you to consider what it would be like if cars from **500 more houses tries to leave our neighborhood via San Antonio Road when another such fire sweeps through.**

Please put our lives and safety first before any other considerations.

Thank You

Lana Mak

Letter: Marshall

From: Olynn [mailto:olynn@roadrunner.com]
Sent: Tuesday, January 21, 2014 2:49 PM
To: Tippets, Ron; Spitzer, Todd [HOA]
Subject: Cielo Vista project

Ron & Todd,
Myself & many of our neighbors are concerned with the following:

The EIR that was done for the Cielo Vista project, is full of PHD, BA & BS experts, with their study and data. Like CPAs, it proves figures lie, and liars figure. I hope you are not expecting the homeowners to get technical, and respond to these elaborate figures? I am taking the practical approach, and with that I ask the following questions:

1) What benefit besides more traffic congestion, is Yorba Linda and/ or its current residents, receiving from this project? Please be specific.
2) Has a traffic study been done, when a reverse 911 evacuation is ordered?
3) If not, does that not place a huge question, on the traffic study methodology?
4) If not why, and be specific?
5) Are not the residents of Yorba Linda (that experienced this "mass exodus" during the complex fire), the best judge of what should or should not be done, for their wellbeing?
6) If not why? Please be specific.

I look forward to your response.

Respectfully

Olynn Marshall

5010 via Alvarado

Letter: Miller

LINDA AND DALLAS MILLER

4550 Via Corzo
Yorba Linda, CA 92886 Phone: (714) 695-9778 email: miller_linda@yahoo.com

January 13, 2014

OC Planning Services
300 North Flower Street
P.O. Box 4048
Santa Ana, CA 92702-4048

Attention: Ron Tippets, Project Planner

Dear Mr. Tippets:

RE: CIELO VISTA PROJECT CONCERNS

I am writing to you to outline concerns that my husband, Dallas and I have with the above noted proposed project, currently being considered for the Yorba Linda area.

Sir, as you are well aware, this development along with the proposed Esperanza Hills development have embroiled the residents of Yorba Linda. The passion and determination shown by area residents is brought about due to the fact that we, experienced firsthand, the devastating fire of 2008. Unless you were there; panicked, terrified, trapped and desperate, you cannot possibly understand the full catastrophic impact these projects could have on our City.

I have a most interesting fire story that I would like to share with you, so that you can understand where I am coming from. My home is located on the corner of Via Corzo and Alder and my back hillside reaches down to San Antonio. On that fateful day, we were watching the fire creep toward our community from Corona on the television. At one point we went over to Dorinda to see the fires ravaging the Hidden Hills area. We determined right then that we needed to get back to the house to pack a few bags, our valuables and paperwork and get ready for evacuation.

We were afforded approximately 4 minutes before ash started to rain down. The sky went from sunny and blue to grey and orange and ominous peril enveloped our street. Neighbors were fleeing. We saw the hillside across San Antonio catch fire from our back windows and at that point, all level headedness left and we piled into our vehicles.

As I approached the three way stop sign at Alder and San Antonio, I saw the house located at 4660 San Antonio burst into flames. My son screamed. The fire jumped San Antonio and set the hillside beneath our home on fire. There were cars everywhere trying to get out to Yorba Linda Blvd and I made the choice to instead of going south on San Antonio, to go north, UP San Antonio and out the back way. Turns out this decision played a huge part in the fate dealt to us that day.

...../2

You see, one block up on San Antonio we came upon a loaded horse trailer on their way down. I slowed to scream at the driver to turn around as she was driving straight into the flames. She took my advice. But in her panic got stuck making the u turn, now blocking all traffic from going up or coming down San Antonio. The first vehicle that was trying to make his way up San Antonio when it was blocked, immediately turned west onto Alder and south onto my street, Via Corzo. The house next door to me, 4580 Via Corzo was now ablaze and the driver of that vehicle, Mr. Mark Tayler, made a decision that saved our home. Mr. Taylor was in the Yorba Linda area hanging Christmas lights for friends. He was in his company vehicle. He happened to work for OC Fire Prevention. He had firefighting equipment in his truck; including a fire hose and respirator. There was a hydrant on our property. He didn't hesitate and the rest is a miracle.

Four homes in the immediate area of our home burned; three of them to the ground. Mr. Taylor shared with us how scared he was. Two hours into the fight, he realized that if his hose caught fire, he would be a goner. His life flashed before his eyes....but he stayed put, turning around and spraying the homes across the street when burning embers would land. Four hours passed before firefighters actually made their way up our street. And the only reason they were there - because Mr. Taylors wife was terrified he had perished (his cell phone died) and had OC Fire Authority ping his truck GPS to get a location. That location, my address, was passed on to the fire department who made their way to check on him. It was the first fire truck in the area. Not acceptable, but understandable, given the situation.

Mr. Tippets, this Freeway Complex Fire was an anomaly. Triangle Complex Fire is the more appropriate name for this fire. Catastrophic. Fire in Corona, fire in Yorba Linda, fire in Anaheim Hills, fire in Brea, fire in Chino and fire in Diamond Bar. Tens of thousands of acres burned. Hundreds of buildings and homes lost. Resources including water and firefighters were stretched to their limits and inadequate. People trapped and panicked. What stands out in my memory so vividly was calling my sister in Kansas as we were fleeing. I was crying. I stammered out that we were surrounded by fire and trying to get out and that my home was likely burning. She said "Linda, follow your evacuation plan!! Follow your plan"! To which I responded "our plan is on fire, as is our back up plan, we're just trying to survive"! The silence that followed haunts me to this day.

In summary, here are our concerns:

1. The proposed Cielo Vista development is planned for a high risk fire area. While fire fighting and water issues will always be inadequate in the event of a catastrophe, the safety of the lives of the residents of Yorba Linda will be put in even more danger than what currently exists with the addition of traffic and population. The residents of this development will be further impacted, as there is only one proposed way in and out for them. As evidenced by my story, people panicked. And regardless of fire, earthquake, toxic train derailment; all the preparation in the world by fire and police will be for naught. All it takes is one horse trailer to block their exit.....

...../3

2. While Cielo Vista and Esperanza Hills are two separate projects, the Planning Commission must keep both projects in mind, as Esperanza Hills has only one egress and ingress and that has to go through the Cielo Vista area. How on earth can the Planning Commission think that it's acceptable for hundreds of homes to have to enter and exit through one little side street. It's preposterous on all levels, even with fire and earthquake danger aside.

3. Actual experience proves that "the best laid plans" cannot be relied upon and adding any new traffic patterns to the current infrastructure is like cramming a square peg into a round hole.

What's the solution? I'm not naive. I understand that development is progress. But progress should not be at the expense of others. If the developers want to proceed with these projects, then now is the time to force them to spend the money to upgrade the roadways that are going to be affected. Perhaps they'll have to cut back on their proposed number of lots to make way for wider and additional roadways. Force the Developers to figure out how to work with the terrain to allow the prospective residents of these developments better options for getting in and out. Should these developers not be willing or able to meet your demands, then shut them down. But they cannot be allowed to proceed as currently planned.

And as an aside, has anyone actually checked into whether or not homeowners insurance will be available for these new developments? AAA, Mercury, Allstate and Safeco will NOT write insurance on homes within 1500 feet of brush. That pretty much leaves only Non-Admitted Insurance Company options for these residents. If insurance companies see the danger and won't take the risk, why would Orange County?

Please Mr. Tippets, listen to us. Hear us. Help us!

Kind regards,

Linda Miller

cc: Todd Spitzer, Orange County Supervisor
Shane L. Silsby, Director - OC Public Works

Letter: Monroe

From: Bill and Diana Monroe [mailto:billanddianamonroe@msn.com]
Sent: Thursday, December 12, 2013 10:28 PM
To: Canning, Kevin
Subject: Environ. Impact Rept.-Esperanza Hls/Cielo Vista Development

Hello Kevin,

We would like to comment on the Esperanza/Cielo Vista Developments.

We witnessed and were affected by the 2008 Freeway Fire, and we wouldn't wish that nightmare on anyone. There are two exit streets leading out of our tract and everyone was praying that their cars would not explode, while they dangerously waited with their families, in bumper to bumper traffic and with flames encompassing them, to reach the bottom of the hill. But, of course, once they got to the bottom of the hill, the streets were so overcrowded that they did not move for what seemed like an eternity. Even fire trucks could not access our development, and many, many other developments in our hills, due to the traffic caused by the mandatory evacuation.

As you are aware, approx 125 homes in the area burned to the ground. The home across the street from ours burned to the ground and a home behind us burned to the ground, and many additional homes experienced tremendous fire damage. We personally suffered over $100,000 in damages. And yet, developers and the County of Orange are turning a blind eye and deaf ear on that very serious and costly disaster. They still are attempting to push and shove it down our throats. Their only interest is the income/revenue a 500 plus development would produce. They would build approximately 500 homes in the hills in some of the same area that was affected by that fire.

In addition, we, who live here, cannot even begin to imagine or conceive of how the developers, The City of Yorba and the County of Orange could even remotely consider proceeding with developing these homes, if they seriously take into consideration the risk they would put residences in by building additional homes on the hillsides, knowing full-well that there is a huge concern for the limited ingress and egress should another fire or earthquake hit that area...and they will! Earthquakes are just as concerning and potentially dangerous, as they have the potential to cause fires, which could also force evacuation.

And then there is, of course, the tremendous concern for the excessive traffic that would be added to an already overly-crowded area. That's all we need is additional traffic on our already congested surface streets and 91 freeway!!!!

We all know that developers build and then walk away and leave their mess behind. Again, they only are concerned about the money it would make for them, not how homeowners' quality of life would be affected or the fact that they intentionally are putting lives and homes at risk by cramming additional homes into an already crowded area, that does not have the ability to handle the

overcrowding and excess traffic it currently is experiencing -- let alone adding another 4,000 plus vehicles traveling the local streets and freeways on a daily basis.

At what cost is enough, enough? Won't someone please stand up to these developers and governmental agencies before it is too late. What government entity or developer, in their right mind, would subject homeowners to this very real risk, and would ever approve and proceed with these developments, as it borders on insanity. Are they really ready to be hit with another huge lawsuit should this development be approved and then afterwards when another disaster hits the area. It is a tremendous liability and a potential disaster-in-the-making.

We are letting you know ahead of time that there would be a class action lawsuit filed should these projects proceed, as everyone involved in these projects is well-aware of the risk they are taking should they move forward with this insane proposal.

The Land of Gracious Living is becoming anything but...

Bill and Diana Monroe
Successful Homebuyers Realty, Inc.
5220 Avenida De Kristine, Yorba Linda, CA 92887

Letter: Murphy

Tippets, Ron

From: Carla Murphy <carmurf@pacbell.net>
Sent: Friday, December 13, 2013 2:39 PM
To: Tippets, Ron; Canning, Kevin
Subject: new development

My family and I are very much opposed to the additional homes and development. We are original owners and were at our current address when the fires hit and it was extremely stressful to wonder if my husband had been able to get out. I took the first group of children and pets and took nothing from my home. The streets were totally stopped and blocked and it was by the grace of God that the fire did not overtake all those that were sitting still on San Antonio Road. This is going to be a huge increase in traffic and in an emergency I can not even imagine what would have happened with 112-340 additional homeowners trying to get out. For this reason we are opposed to this new construction. There are already additional homes being occupied near Fairmont which is the only upward access.
Thank you.

Carla and Mark Murphy and family
21295 Clear Haven Dr.
Yorba Linda CA92886

Letter: Nakayama

From: Ted Nakayama [mailto:tednakayama@me.com]
Sent: Monday, January 06, 2014 9:06 AM
To: Tippets, Ron
Cc: Bridgett ❤
Subject: Cielo Vista Project Draft Environmental Impact Report comment

Dear Mr. Tippets,

My name is Ted Nakayama and we live at 4465 San Antonio Road, Yorba Linda CA 92886.

We are one of the homes that were lost in the Freeway Complex fire on Nov. 15th, 2008.

We strongly vote against adding these new homes at Cielo Vista Project for the main reason of San Antonio Road cannot absorb additional traffic coming down the street to get out to Yorba Linda Blvd.

It is hard enough now to turn on San Antonio Road now with so many cars coming down the hill to get to Yorba Linda Blvd on normal days during traffic hours.

I, myself thought I was going to die stuck on San Antonio Road on that day of the fire. As fire approached behind the east side homes of San Antonio, I made a right on San Antonio from our drive way to try to escape via Yorba Linda Blvd. As I approached Alder which is the first stop sign before Yorba Linda Blvd, I realized the traffic is completely back up on San Antonio because Yorba Linda Blvd was backed up and not moving. I sat still in the traffic in dark smoke around me, I saw a fire on the left side of the Street hop over the cars in front of me and landed on the hill on the right side of the San Antonio and ignited and fire raced up the hill toward the houses on the top of the hill. I imagined myself getting burned to death right there, I made a split second decision to turn the car around and go back up San Antonio Rd and I was able to escape from Fairmont St. At that time I realized a few of the cars behind me followed me out as well.

There is no way San Antonio can handle additional 500 + homes which could easily have 1000 more cars without causing major traffic on the street.

Next time we have another fire in the area like the one we had, someone will die getting stuck on San Antonio Road because they cannot get out.

Yorba Linda Blvd. will become a parking lot and therefore no one from San Antonio could get out and traffic will be backed up all the way to Aspen.

Last fire happened on Saturday. Can you imagine what could happen on weekday during rush hours and 1000 more cars from the new development try to get out at the same time?

If the development must happen, developer needs to figure out a way to make Esperanza Rd the only access Road to the new development. Esperanza Road never ever have any traffic and it is a straight shot to Imperial Hwy to hop on the freeway which makes it an easy route to escape in case of another fire.

Thank you for listening my story and I am available anytime if you would like to speak to me.

Sincerely,

Ted Nakayama

4465 San Antonio Road

Yorba Linda, Ca 92886

Letter: Newman

Mr. Tippets

Draft EIR – Cielo Vista Project

Comment request: 1/22/2014

This project should not be built as described in the Draft EIR.

This EIR needs to be combined with all the adjoining projects proposed in the nearby area. It is obvious that the developers are trying to pull a fast one over the local residents in staggering the request submittals and rushing comments during the holiday period. This creates a trust issue. All the projects need to be reviewed together as one combined environmental impact.

We are hearing that there are multiple developments of 500 homes. This area cannot absorb them for reasons stated by this memo and comments from the general population living in the area.

It will negatively affect my family's life style and my neighbors as well.

Prices of our San Antonio property will decrease and I will have difficulty selling, now that this development is being proposed, as well as others planned.

San Antonio Road is already heavily travelled and making the traffic light in one or two cycles is impossible on school / work mornings.

There continues to be excessive speed on San Antonio and high traffic noise. I cannot open my front windows without the constant sound of traffic traversing up and down the street and interrupting conversation and television viewing. Therefore instead of naturally cooling our home, I turn on the Air Conditioner; another negative environmental impact.

Backing out of our driveway continues to be a challenge for the 14 homes along San Antonio and nothing is mentioned in the EIR about traffic control mediation for San Antonio, except add to the problem with more homes and cars.

Yorba Linda Blvd. in the evenings is highly congested leaving the 91 Freeway.

On weekends, we can hardly get to Costco, Savi Ranch, and Home Depot. Adding 500 homes doesn't help the traffic situation.

San Antonio Rd. leads right into a Santa Ana driven fire and that will not change, due to the geographic terrain and wind tunnel effect in the canyon. Why are we adding more cars to an already congested exit from an emergency? In the 2008 fire, I found the only way out was by going up to Fairmont, since flames were blowing across the road at the lower part. The smoke was so thick on San Antonio that it was like a heavy foggy day with intense fire and heat. I could not even see the median islands recently installed for speed control and had to turn around to get out. This is setting the residents up for a death wish.

During a fire, there was a discussion in one of the EIR review meetings about getting residents out and keeping residents from getting back in. This was a sheriff solution to moving traffic. We were lucky that the fire occurred in early afternoon on a Saturday. The scenario would be quite different had it occurred on a work and school day. Residents need to be able to retrieve their family, kids, and pets, so they need a safe way back in to do this. We were so lucky that there wasn't a loss of life. The thought process is incomplete on the proposed remediation.

On the day of the fire, the fire station was empty as they were miles away fighting the fire. All fire protection for our area was from outside the area. We were not given any fire help and I was left to fight off the fire myself as my neighbor's home burnt to the ground. There must have been over 50+ fire trucks that went up the street and none stopped to help us fight the fires on our properties. A few neighbors and I were up over 24 hours with garden hoses that had only a few pounds of pressure.

The fire hydrants are on the wrong side of San Antonio Rd. to fight off a fire. If this is going to be an egress, then how are the cars going to travel over the fire hoses from the hydrants to the trucks? There is nothing in the EIR that discusses how San Antonio homes are to be protected, when cars, and now more cars, are going down the hill, and fire equipment is coming up the hill with fire hoses strung across the road to the hydrant.

I am also concerned about the loss of our wildlife population and natural rural settings, in addition to endangering protected birds found in the canyon area behind our home.

Travis Ranch Elementary and Middle School are already overcrowded in class rooms. Everyone has to drop off and pick up children, as the bus system was done away with years ago. This creates heavy traffic and contributes to pollution. Nothing is mentioned in the EIR about the additional school trips with new homes built.

The traffic study was very light. Was it done on only one day on a school holiday?

The developers need to build roads directly to Fairmont and Esperanza Roads to:

1) **Provide travel away from the path of a fire with winds.**
2) **Alleviate the traffic jams on Yorba Linda Blvd.**
3) **Get the traffic off over crowded neighborhood residential roads.**

The only one benefitting is the developer, who doesn't live in the area.

Thanks for the opportunity to comment.

I can be reached by telephone if clarification is needed.

Ken Newman

4580 San Antonio Rd.
Yorba Linda, CA 92886
562-676-6176

Letter: Paul

January 21, 2014

Mr. Ron Tippets
OC Planning Contract Planner
300 N. Flower St.
Santa Ana, California 92702-4048

RE: Cielo Vista Project

Letter is 4 Pages including map & Notebook containing pictures, reports, articles, misc.

The primary area of concern regarding any and all residential developments in any of the proposed developments (Cielo Vista, Esperanza Hills, Bridal Hills, and Yorba Linda LLC) is first and foremost – **PUBLIC SAFETY** and the very real risk of **LOSS OF LIFE** any additional homes would bring to the existing residents of Yorba Linda, as well as futures residents.

We feel it's important NOT to look at these developments as a standalone project, when they ALL will rely on the same streets and roads for evacuation. These proposed developments, cumulatively, would add over 500 new homes that will burden the same residential streets that proved over capacity in the 2008 Freeway Complex Fire for evacuations that were both chaotic and sporadic, since there was never an alert to evacuate "at once" put in place and that there were no pre-existing evacuation plans made by the city.

There are no new proposed streets for entering or exiting these projects, and the major arterial streets throughout the city are the same as in November of 2008 during the evacuations. **All of these proposed developments SIT BEHIND TWO SMALL RESIDENTIAL STREETS, at the very top of the hill, and require all future residents to enter and exit off of these two streets, in addition to the existing residents using them as well.**

The DEIR is required to specifically address how the existing, limited street system, will or will not function in another wildfire event. If the system will not function, and I see no reason to believe it would, either new streets need to be added or new homes should not be built.

In 2008, on a Saturday, the fires moved at an alarming rate, 100 feet per minute, and embers carried over a mile and a half during the firestorm, with random house's turning into infernos all at once throughout multiple neighborhoods. Thousands needed to evacuate immediately, many leaving with just the clothes they had on.

Schools, such as Bryant Ranch, Travis Elementary/Jr High, St. Francis Elementary, Kindercare, as well as a senior apartment complex, were affected by the fire in a very small window of time on that Saturday, November 15, 2008, as reported in the After Report by the city. At 10:57 reports of fire at Bryant Ranch Elementary (pg 46), and by 1:17 homes had already burned on streets off Stonehaven and emergency crews, upon arriving, called for help indicating homes burning and "large chucks dropping on houses" and people trapped (pg 49) At 1:33 Emergency response indicated fire at St Francis School. (Please refer to the map following this letter).

Assuming the exact same conditions repeated itself on a WEEKDAY, instead of a SATURDAY, I would like the following questions to be addressed and answered, since this issue was NOT ADDRESSED in the EIR:

- What would the evacuation procedure be for Bryant Ranch elementary (691 students), Travis Ranch Elementary/Jr High (1371 Students), St Francis of Assisi Catholic School (475 students), Kindercare (65 very small children all requiring car seats), and Vintage at Stonehaven (a senior low income apartment complex, 350 residents, most who do not drive, and may need extra physical assistance)
- How exactly would these 2,693 children be evacuated?
- Where will they go and who will take them home?
- Many of the small children need car seat type equipment, will such equipment be available? Will buses be available to service these many children at one time?
- How will communication to the parents of these children be handled?
- If the evacuation plan calls for only outgoing traffic, because Yorba Linda arterial streets cannot support any incoming traffic except for emergency vehicles, how would the city handle the thousands of parents desperately trying to get back INTO the evacuated neighborhoods to find, or get information about their child? And that's assuming just ONE parent is trying to get to their child.
- How would you avoid the incoming cars trying to get to the schools, when that was not an issue on Saturday, November 15, 2008?
- How would you avoid the probable chaos with people trying to exit the city as well as desperate parents trying to get INTO the city with emotions running even higher?
- How will the evacuation plan be implemented if the orders come immediately before school starts or immediately after, with hundreds of school age children walking to or from school?
- How long will it take to conduct the evacuations? What are the chances of delays occurring affecting any time estimates? What are the time scenarios for when a fire will reach housing? How much warning time will there be of an approaching fire? When will there be insufficient time to evacuate? Who will make the decision and will they have plans in place to know when it is too late to evacuate?
- If children are removed and taken to a different location, who would determine who the child could be released to? And if that person is allowed to take custody of that child?
- Who would help the seniors living in the low cost apartment complex evacuate?
- If there are wildfires burning in other areas in the County or elsewhere in California, will there be Firefighting and Sheriff Personnel available to assist in evacuations?

FIRES OR EARTHQAKES - OR FIRES FROM EARTHQUAKES and how it relates to Gas Lines that are adjacent to the proposed development with only two ingress and egress points:

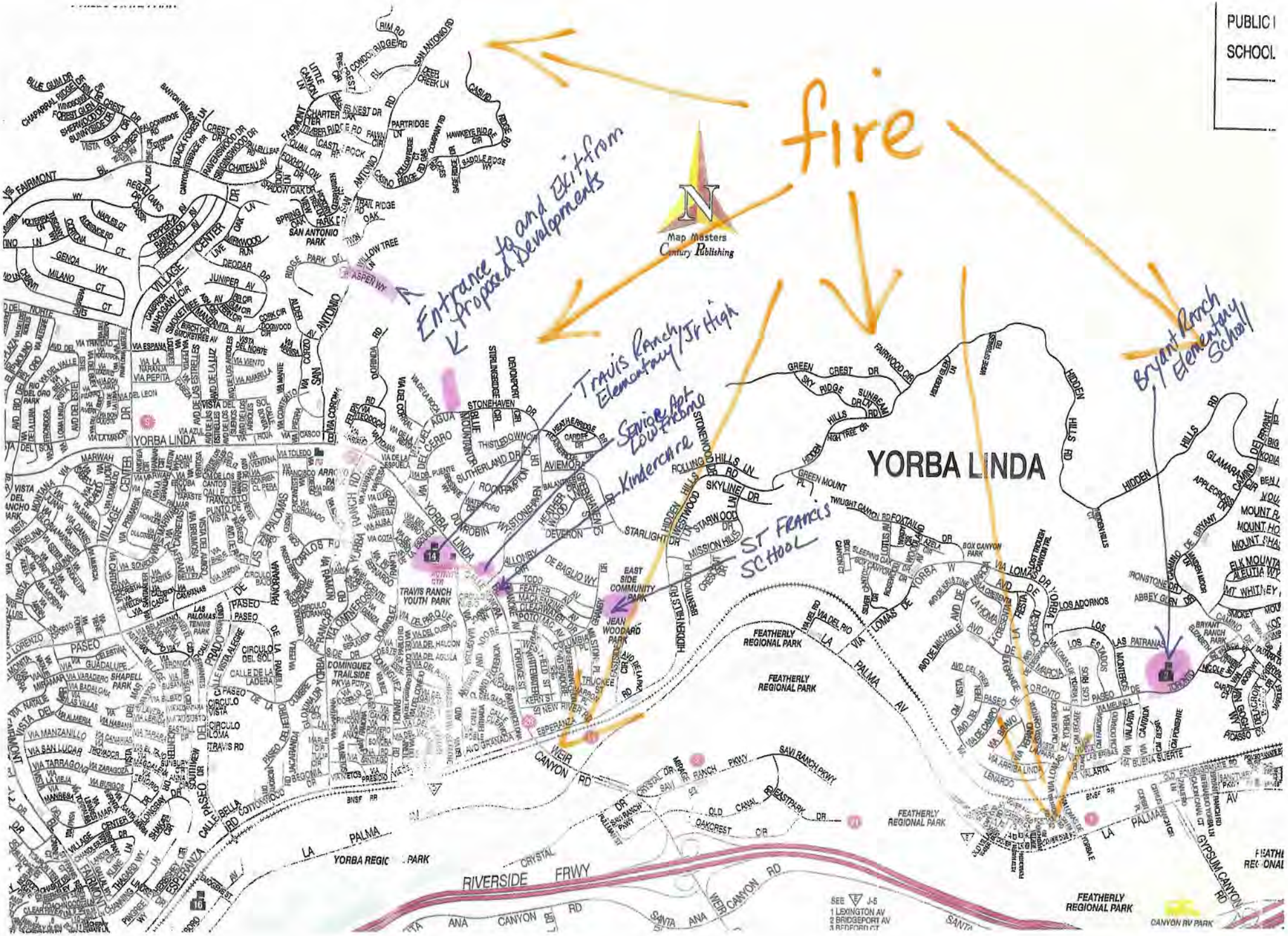
- If there is a mandatory evacuation in the neighborhood of the proposed development from a wildfire, or fire resulting from an earthquake, what would the evacuation route be if one, of the only two ingress or egress openings, are blocked and unable to be accessed, either by fire, quake damage, or possible gas explosion?

The State of California is now under a drought emergency plan declared by the Governor. Because of mandatory requirements to reduce water use, I am asking the following:

- The EIR does not take into consideration reduced rainfall, water supply and reduced water usage due to drought conditions. Since dry hillsides played a part contributing the firestorm in November 2008, due to city's mandatory restriction against watering slopes for fear of further land movement, the EIR needs to fully analyze what impacts reduced rainfall and water supplies will have on vegetation, both inside and outside of buffer areas.
- How will reduced mandatory water usage impact any wildfires, small or large? Does dryer slopes result in how a fire reacts? Or how fast it spreads?
- How will the reduced rainfall impact water supply to fight fires?
- What measures will be put in place during a mandatory water use reduction usage to prevent the occurrence and spread of wildfires?

The DIER is remarkably insufficient in addressing these and other related wildfire prevention, wildfire fighting, and evacuation challenges. It needs to be revised and recirculated.

Danny and Kim Paul
4820 Stonehaven Drive
Yorba Linda, Ca 92887
714-244-5341
Kimjpaul@aol.com



PUBLIC
SCHOOL
fire
Entrance to and Exit from Proposed Developments
Travis Ranch Elementary/Jr High
Senior Apt Low Income
Kindercare
ST Francis School
Bryant Ranch Elementary School
Map Masters
Century Publishing
YORBA LINDA
YORBA LINDA
TRAVIS RANCH YOUTH PARK
JEAN WOODARD PARK
EAST SIDE COMMUNITY PARK
FEATHERLY REGIONAL PARK
RIVERSIDE FRWY
LA PALMA AV
WEIR CANYON RD
SAN ANTONIO PARK
CANYON RV PARK

letter from Danny + Kim Paul
RE: Cielo Vista Project

On Saturday, November 15, 2008 the City of Yorba Linda and its residents, experienced a firestorm that tore through its hills and neighborhoods at an unimaginable rate. During an interview, Fire Authority Battalion Chief Michael Boyne indicated that the fire moved at 100 feet per minute. The high winds carried embers over a mile and a half in the air, and random houses became infernos. The majority of residents, which lived near the proposed development sites of projects Esperanza Hills, Cielo Vista, and Bridal Hills, fled with only their families, clothes on their backs and their family pets. Everything else had to be left behind. On that weekend day, at 1:35 PM the fire had reached Stonehaven and Heatheridge, and by 2:15 (within 40 minutes), 100 homes were reported on fire at Stonehaven, between Heatheridge and Via de La Roca, per the After Action Report drafted by Yorba Linda Police Services/Brea Police Department.

Trying to get to any point of safety was nearly impossible as residents, exiting the few residential streets that dump into Yorba Linda Blvd, found themselves in gridlock as they tried to access any street that would allow them to exit the imminent danger. During the last year and a half, we have witnessed many of those residents relive that Saturday afternoon, in front of the Yorba Linda City Council and staff, recalling the chaos and fear, and, in an effort to escape the fire, having to choose between being trapped in their car, or wondering if they could out run the fire on foot in hopes of finding a way down their street. Fires not only came from the hills, but the embers flying through the air that set houses on fire, both in front of them and behind them, as they tried to flee. They were grateful to have escaped with their lives, but heartbroken to have lost their homes, or to have returned to their house still standing, but witnessing the rubble of their neighbors' homes next door, or across the street.

The opposition to the proposed developments is not about new development for the city, or about the property rights of a landowner. It's simply about saving lives, by not adding more homes to existing streets that cannot support the homes that are already there. There are no new proposed streets, because there are no streets that can support them, so the only decision that should be made is a No Project Option. Anything else would be putting lives in danger.

Yorba Linda streets, both residential streets and city streets, were not designed to handle an immediate evacuation that we experienced on Saturday November 15, 2008. It could not handle the homes that were there in 2008, it can't handle the homes that have since been built, and it certainly can't handle one more house in the proposed developments. There has not been one single street added, or proposed, to help with all the cars and people required to evacuate. These proposed developments are using the existing streets, Stonehaven/Via Del Aqua and Aspen, as the only ingress and egress options. It was proven that these streets couldn't handle the evacuation in 2008, who could possibly come to conclusion that it could accommodate 500 more homes now?? Whoever would suggest the solution is a new evacuation plan, better emergency resources, a new alert system, more water, "fire proof" homes, or anything else is ignoring the obvious; our streets cannot handle it. Not every evacuation could come from a fire. Mother Nature, as well as man, can create other havoc that we mustn't ignore as well.

The residents of Yorba Linda have raised their voices, repeatedly. Our "words" seem to fall on deaf ears, so it is my hope that the story can be told through the "words" of the Brea Police Department, the Orange County fire Authority, the Orange County Sheriff's Department and the Emergency Management Bureau. Perhaps they said it best on Saturday November 15, through their actual, documented transmissions.

Following is copies of pictures of houses and streets directly adjacent to the proposed developments, as well as complete newspaper articles of interviews, and a copy of the Freeway Complex Fire After Action Report prepared by Jack Conklin, Captain, Yorba Linda Police Services Brea Police Department dated January 29, 2009 with actual transcript of the Incident Detail Report between Police/Fire and dispatch. (Each page has been numbered and referenced where needed).

As devastating as the fire was on Saturday, November 15, 2008, the majority residents were fortunate enough to be home with their families. Not at work, not at school, but home, able to quickly put their kids and family members in the car and leave. Nowhere is this fact taken into consideration.

Now picture what that day could have looked like if it was a weekday:

Imagine the fear and panic of parents trying to get to Bryant Ranch Elementary, Travis Ranch Elementary/Jr High, St Francis Catholic School, Kindercare, not to mention the new Yorba Linda High School, under the same scenario we experienced on that Saturday.

The chaos certainly would have proved deadly, whether it had been from the added traffic congestion, causing more people to be trapped, unable to exit as people are trying to enter, traffic accidents involving cars and people, to smoke inhalation and of course, being burned by the fire itself. As taxed as the police, fire departments, and dispatchers were that day, even with all the additional help from surrounding cities, this extra burden would have certainly resulted in tragedy. Imagine having your child in the path of a fire and not being able to get to them. The 911 emergency lines were flooded, how could you communicate with the school? How would you know if they are safe, or even where they are? This would not affect a few hundred children, but if the fire would have been on a weekday, instead of that Saturday, it would have affected thousands of children.

- **Bryant Ranch Elementary** – Located on Paseo De Toronto (east Yorba Linda near La Palma) Grades K-5 Approx. 691 Students (Page 22-23)

  The Following is Actual Communication from Emergency Personnel to Dispatch
  10:57 AM REPORTS OF FIRE AT BRYANT ELEM (Page 46)

- **Kindercare** – At the corner of Stonehaven Drive and Yorba Linda Blvd. Approx. 65 children enrolled from infants to Pre School – Kindercare's evacuation "plan" is to contact parents to come pick them up (page 17)

  The Following is Actual Communication from Emergency Personnel to Dispatch
  13:17 NEED FIRE...ON STONEHAVE, HAVE LARGE CHUCKS DROPPING ON HOUSES (Page 49)

- **Travis Ranch School Elementary/Jr High** - Located on Yorba Linda Blvd between Stonehaven and Via Del Agua. Grades K-8. Approx. 1371 Students (Page 20-21)

  The Following is Actual Communication from Emergency Personnel to Dispatch
  13:30 WILL HAVE PEOPLE TRAPPED....STILL HAVE PEOPLE TRAPPED (Page 49)
  13:31 NEED FIRE ON STONEHAVEN (Page 49)

- **St Francis of Assisi Catholic School** – Located on Eastside Circle (between Hidden Hills and Stonehaven Dr) Grades K-8 Approx. 474 Students (Page 24-25)

The Following is Actual Communication from Emergency Personnel to Dispatch
13:33 3L1, FIRE AT ST FRANCIS SCHOOL (PAGE 50)

- **Vintage at Stonehaven** – At the corner of Stonehaven Drive and Yorba Linda Blvd. This is a low income, over 55, senior apartment complex. Many are Section 8 participants. The majority of residents do not drive or own vehicles, they rely on public transportation. Approx. 350 residents. No evacuation plan is currently in place. (Page 18-19)

The Following is Actual Communication from Emergency Personnel to Dispatch
14:03 7S1, STONEHAVEN/YL ....NEED TO EVAC WHOLE COMPLEX (Page 51)

Possible Additional Cars for children at the above schools (not counting teachers and personnel):

- Bryant Ranch – 690
- Kindercare -65
- Travis Ranch Elementary/Junior High -1370
- St Francis – 475

Total additional cars added during the evacuation racing ***TOWARD*** the evacuated area:

2,600 Cars – That is assuming only ONE parent is heading toward the school(s)

This is not taking into consideration the new Yorba Linda High School – which is located on the other side of the proposed developments. YLHS currently has 1,800 students attending.

When you consider 500 new homes (which is likely to add an additional 1,500 cars) the additional cars that are associated with the houses that have been built since 2008, the likelihood of thousands of cars pouring into the evacuated area to reach their children, there is no possible solution or reasonable explanation on how the streets, that proved unable handle the number of cars evacuating in 2008, could support thousands more. It's absolutely indisputable.

OTHER EVACUATION CAUSES:

Earthquake –

As reflected in the EIR report, maps provided by American Geotechnical show the Whittier Fault Line going through the proposed developments. (Page 104)

The Whittier fault runs for about 25 miles through Yorba Linda, Hacienda Heights and Whittier. It is considered to be among the more dangerous because the Whittier fault moves relatively fast, with a slip rate of 2 millimeters a year – faster than the Newport-Inglewood, Hollywood or Santa Monica faults. (Page 105)

- **On July 29, 2008 5.4 Earthquake** – The Chino Hills earthquake was caused by oblique slip faulting, with components of both thrust and sinistral strike-slip displacement. Preliminary reports cited the Whittier fault as the active cause, but the quake was later determined to have been generated by the "Yorba Linda trend" as identified by Caltech seismologist Egill Hauksson. It was the strongest earthquake to occur in the greater Los Angeles area since the 1994 Northridge Earthquake. (Page 100)

- **On Aug 8, 2012 a 4.1 Yorba Linda Earthquake** – According to U.S. Geological Survey seismologist, Lucy Jones, indicated that the Yorba Linda earthquake occurred near the Whittier fault, which has a potential of creating a magnitude 7 quake. (Page 105)

TRAIN ACCIDENT OR DERAILMENT

The railroad track runs at the base of Yorba Linda, near La Palma, before the freeway. Recent reports in the news indicate that more hazardous materials, including oil, is being transported on the railway system.

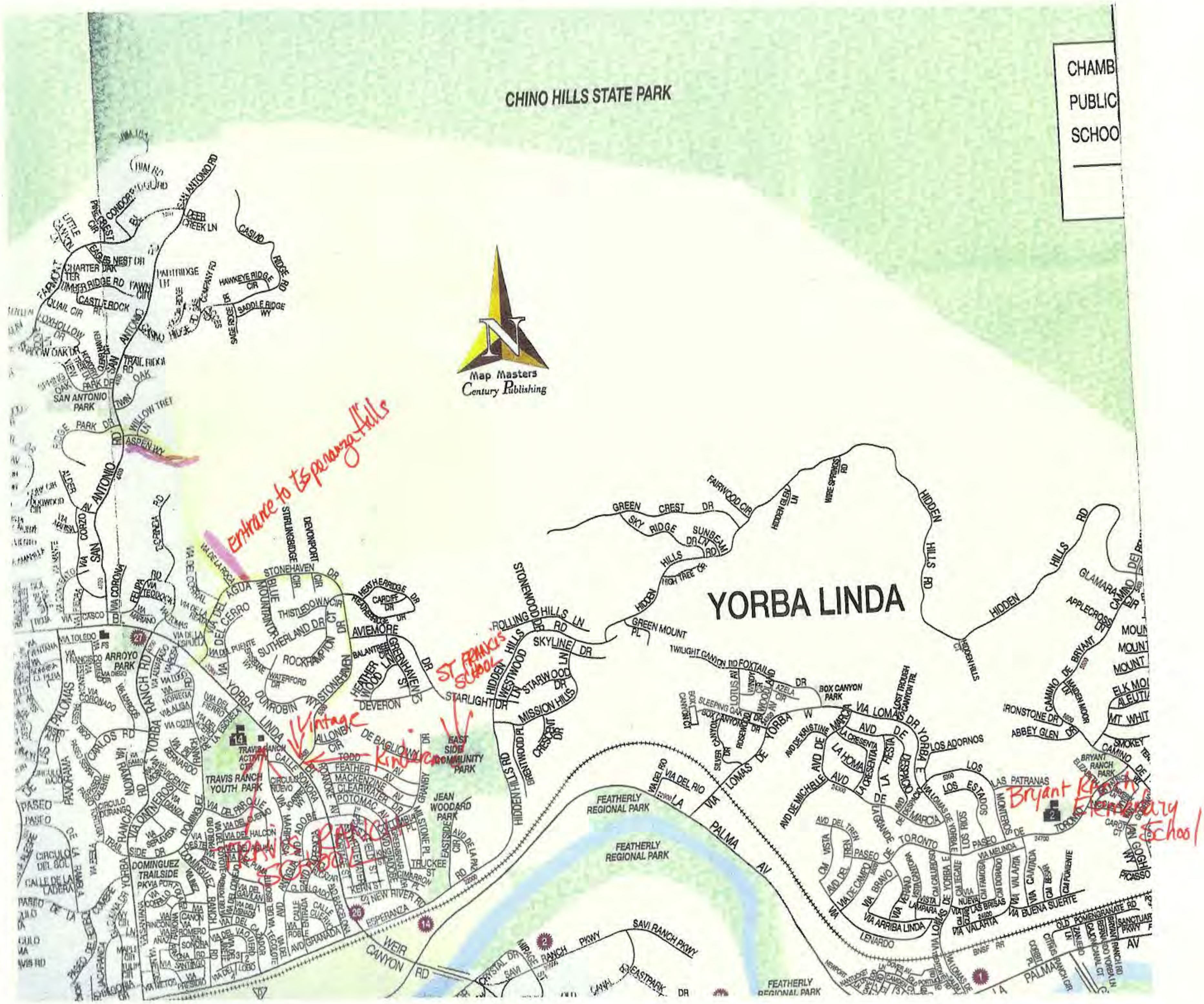
- On Saturday, November 15, as the fire approached the east end of Yorba Linda, emergency transcripts reflect the following:

12:18 ***TRAIN AT WEST CAMINO DE BRYANT.....TRAIN HAS HAZARDOUS MATERIAL IN IT**********

MUDSLIDES

- On November 26, 2008, at approx. 1:00 AM, Yorba Linda was hit by a rainstorm which necessitated the activation of the EOC. At approx. 1:45 AM, began mandatory evacuations of three evacuation areas previously identified by the public works department. (Page 33)

These are the neighborhoods that surround the proposed developments


CHINO HILLS STATE PARK
CHAMB
PUBLIC
SCHOO
Map Masters
Century Publishing
YORBA LINDA
Entrance to Esperanza Hills
ST FRANCIS SCHOOL
Vintage
Kindercare
TRAVIS RANCH SCHOOL
Bryant Ranch Elementary School
TRAVIS RANCH YOUTH PARK
SAN ANTONIO PARK
ARROYO PARK
EAST SIDE COMMUNITY PARK
JEAN WOODARD PARK
FEATHERLY REGIONAL PARK
BOX CANYON PARK
BRYANT RANCH PARK
YORBA LINDA
HIDDEN HILLS RD
GREEN CREST DR
SKY RIDGE
STONEWOOD DR
ROLLING HILLS LN
SKYLINE DR
STARLIGHT DR
VIA LOMAS DE YORBA
VIA DEL AGUA
STONEHAVEN DR
DEVONPORT
STIRLINGBIDGE
BLUE MOUNTAIN DR
SUTHERLAND DR
ROCKHAMPTON CT
AVIEMORE
DEVERON CV
CALLE SONORA
DE BAGLIO
FEATHER AV
MACKENZIE
CLEARWATER
POTOMAC AV
ESPERANZA
WEIR CANYON RD
SAVI RANCH PKWY
LA PALMA AV
SAN ANTONIO RD
YORBA RANCH RD
DOMINGUEZ TRAILSIDE
TORONTO
LOS ESTADOS
LAS PATRANAS
VIA BUENA SUERTE
LOS ADORNOS
IRONSTONE DR
ABBEY GLEN
CAMINO DE BRYANT
APPLECROSS
GLAMARA
FAIRWOOD CIR
WIRE SPRINGS RD
HIDDEN GLEN LN
GREEN MOUNT PL
TWILIGHT CANYON RD
FOXTAIL
LOTUS AV
MISSION HILLS
WESTWOOD
STARWOOD
CRESCENT DR
BRENTWOOD PL
CASINO RIDGE RD
HAWKEYE RIDGE CIR
SADDLE RIDGE WY
DEER CREEK LN
EAGLES NEST DR
CHARTER OAK
TIMBER RIDGE RD
CASTLE ROCK
QUAIL CIR
FOXHOLLOW
TRAIL RIDGE
PARK DR
ASPEN WY
WILLOW TREE LN
VIA CORONA
VIA TOLEDO
PANORAMA
CIRCULO DEL SOL
CALLE DE LA LADERA
NEW RIVER RD
TRUCKEE
MILSTONE PL
AVD DE LA PAZ
PASEO
VIA VALARTA
VIA ARRIBA LINDA
BNSF RR
OLD POMEGRANATE RD

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Orange County Register Article- **Yorba Linda Water District, Criticized After Fire, Considers Pay Raises** 91-92

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2008 Chino Hills Earthquake Report 99-103

Whittier Fault Runs Through Proposed Esperanza Hills/Cielo Vista Projects
Map from EIR Esperanza Hills 104

Los Angeles Times Article (Yorba Linda Earthquake August 8, 2012) - **Bigger Earthquake Could Hit After Yorba Linda Temblor** 105

OCFA Fire Chief Chip Prather confirmed his firefighters indeed did have problems navigating crowded Yorba Linda Boulevard and La Palma Avenue. He was frustrated with the problems of the reverse 911 system and said that was an issue that should be reviewed by all of the agencies that responded to the fire.

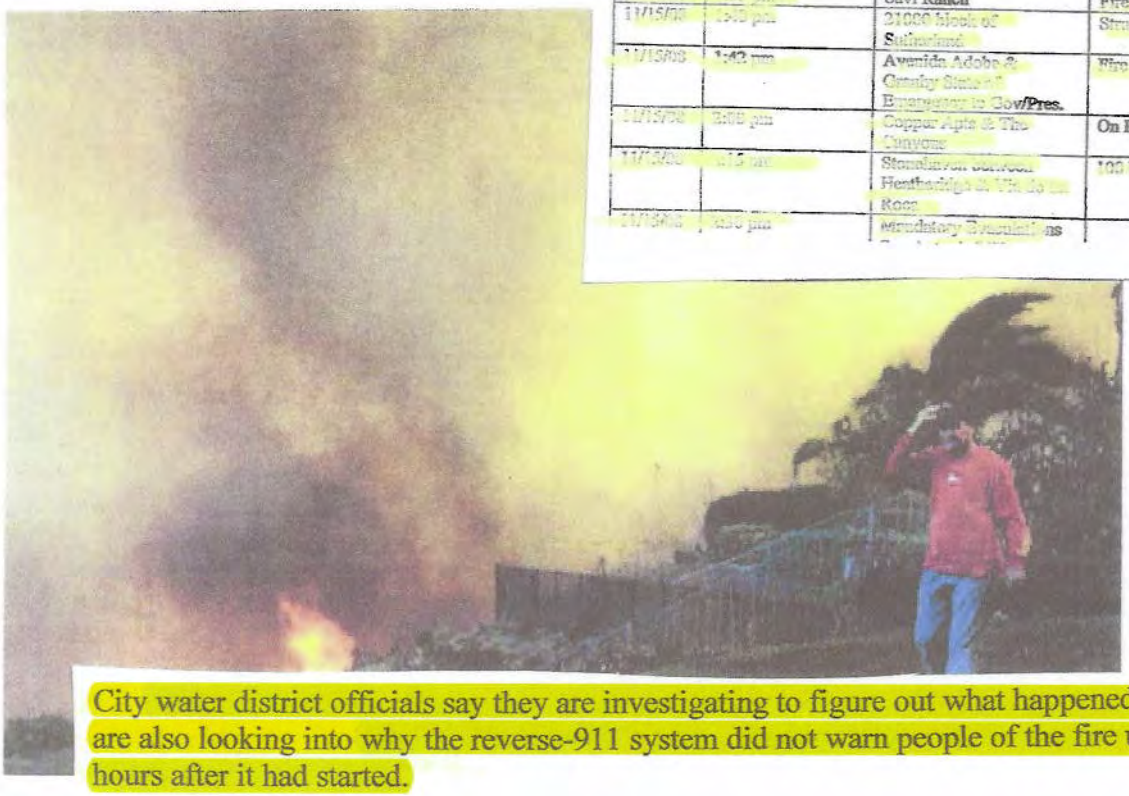
Amanda Derse tries to shield herself from the smoke as she sits in the freeway after a brush fire shut down west bound Interstate 91 in Yorba Linda, Calif., Saturday, Nov. 15, 2008. (AP Photo/Mark Avery)

Home > Local News> Special Reports> Inland Wildfires> Inland Wildfires Headlines

Human error, confusion, wind cited in report on Freeway Complex Fire

FROM CITY'S REPORT →

11/15/08	1:35 pm	Stonehaven & Heatherridge	Fire reached
11/15/08	[illegible]	Savi Ranch	Fire reached
11/15/08	[illegible]	21000 block of Sulmeland	Structure fire
11/15/08	1:42 pm	Avenida Adobe & County Station 7 Emergency to Gov/Pres.	Fire reached
11/15/08	3:00 pm	Copper Apts & The Canyons	On Fire
11/15/08	[illegible]	Stonehaven [illegible] Heatherridge & [illegible] Road	100 homes reported [illegible]
11/15/08	[illegible]	Mandatory Evacuation [illegible]	



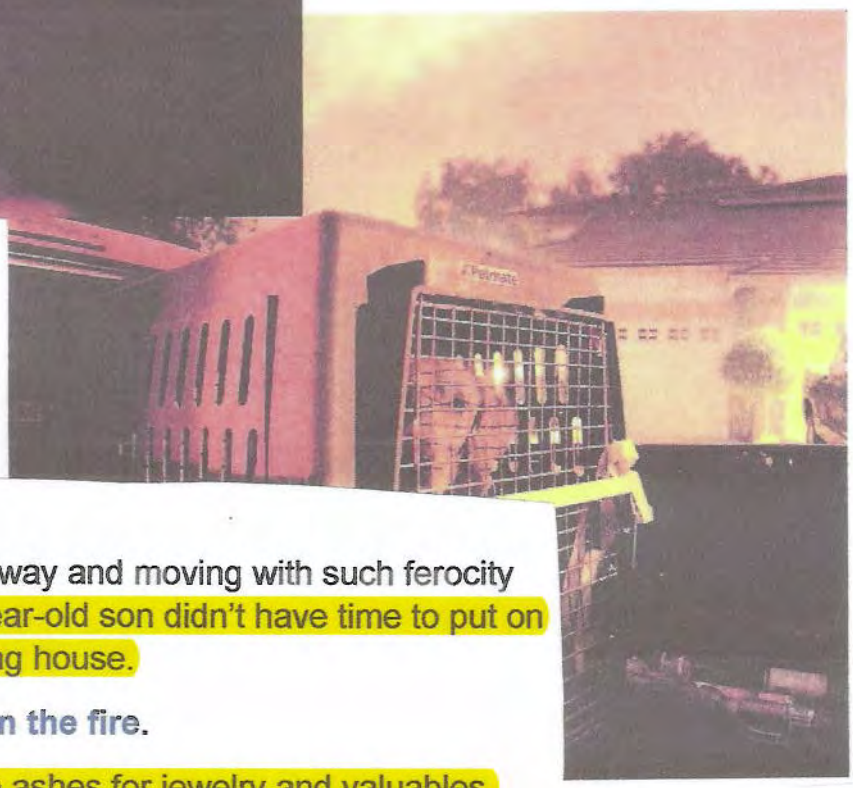
1:35 Stonehaven + Heatherridge fire reported

2:15 100 Homes on Fire (this is project site)

This is the back of Heatherridge and Stonehaven

City water district officials say they are investigating to figure out what happened. Authorities are also looking into why the reverse-911 system did not warn people of the fire until several hours after it had started.

"The resources to make sure everybody knew, we fell short of doing that," said Yorba Linda Mayor Jim Winder. "We'll look at doing better in the future."



ORANGE COUNTY REGISTER

By JESSICA TERRELL

First came the fire, jumping the freeway and moving with such ferocity that Brian Stanley and his then-4-year-old son didn't have time to put on shoes as they ran out of their burning house.

Click here to review a database on the fire.

The looters came next, combing the ashes for jewelry and valuables, ripping copper piping from the rubble of burned-out homes.

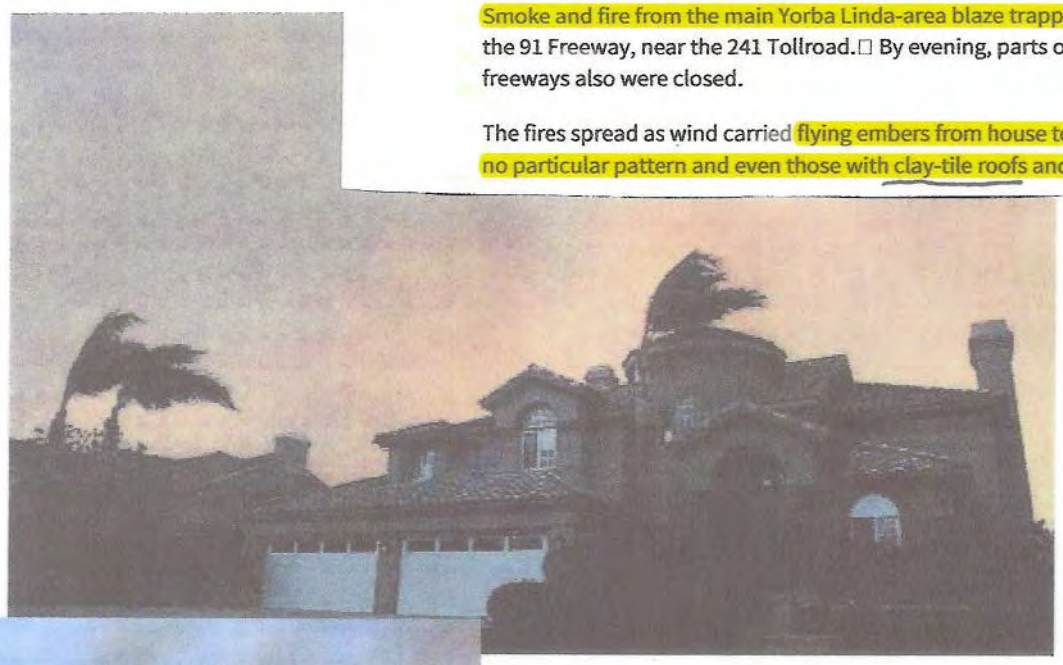
Fire consumes a house and car in the driveway on Dorinda in Yorba Linda

Steve Zylius, The Orange County Register

"We just started losing homes. We didn't have enough units," said Mickey Hansen, a safety officer with the Orange County Fire Authority. "There were just so many fires. There wasn't enough (resources) to go around."

Smoke and fire from the main Yorba Linda-area blaze trapped scores of motorists on the 91 Freeway, near the 241 Tollroad.□ By evening, parts of the 57, 241 and 55 freeways also were closed.

The fires spread as wind carried flying embers from house to house, igniting homes in no particular pattern and even those with clay-tile roofs and clear of brush.

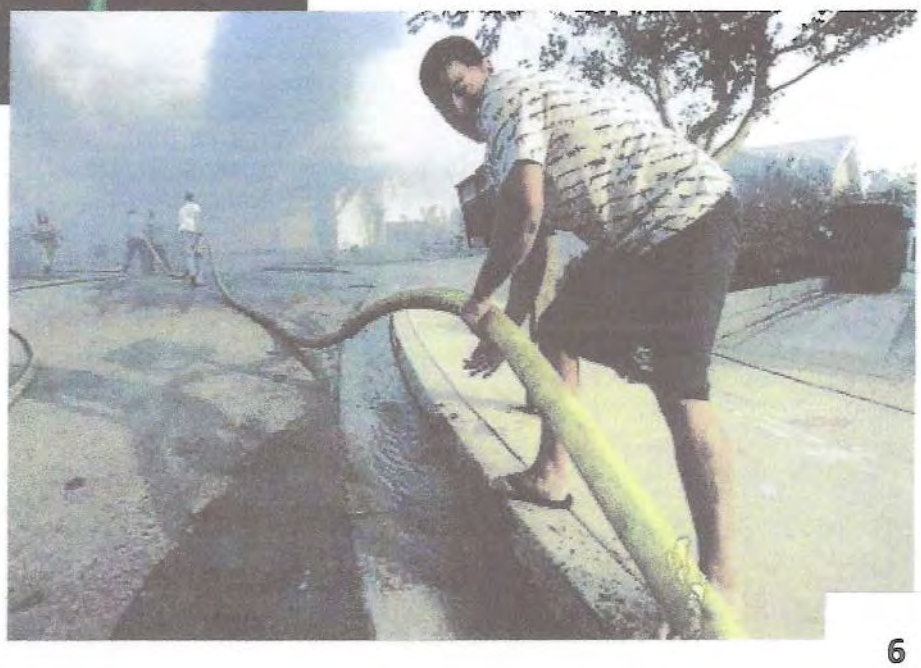


the flames
Are the proposed
Developments
sites

reverse 911 calls FAILED & NOT USED

Hoses were needed but not Available - fire fighter using residents garden hose

neighbors trying to save houses



At about 5:30 p.m. Saturday, Yorba Linda residents gathered near the intersection of Bastanchury Road and Fairmont Boulevard to watch the fire burning in Chino Hills State Park on the city's northern border.

BRUCE CHAMBERS, THE ORANGE COUNTY REGISTER

YORBA LINDA, Calif. (KABC) -- The areas burned in last weekend's wildfires are now facing another serious threat. Rain is in the forecast for next week, and that could mean major mudslides. Yorba Linda residents are being warned to take precautions now.

Mudslide warning in wake of Complex Fire

Aviemore is side street OFF Stonehaven

Chaplain Keith Stiles, right, of the Billy Graham Rapid Response Team, consoles Vivian Vargas, left, after she lost her home on Aviemore Drive in Yorba Linda in the Freeway Complex fire. Stiles gave them a Bible and prayed with them. (Allen J. Schaben / Los Angeles Times / November 24, 2008)

Residents paid for but didn't get Yorba Linda reservoir

By TONY SAAVEDRA and KIMBERLY EDDS

YORBA LINDA - A sorely needed second reservoir for Hidden Hills Estates has been on the books for 30 years - and residents even paid for the $9 million project - but it was never built.

NEWS

Yorba Linda to fire victims: Go ahead and sue

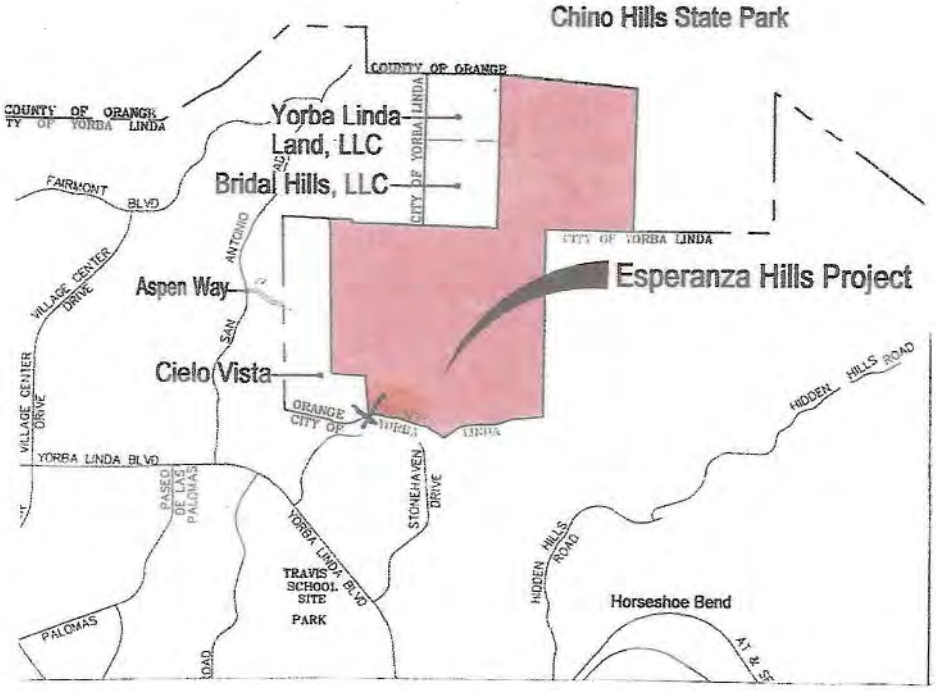
City rejects $43.6 million in claims from Freeway Complex fire, allowing residents to file lawsuits.

+1 Share Tweet 0

By MICHAEL MELLO / The Orange County Register

Published: July 21, 2009 Updated: Aug. 31, 2011 1:17 p.m.

Local fire victims awarded $70 million



With the embers flying and homes burning, traffic quickly backed up to a standstill on the narrow winding residential streets. Traffic evacuation traped some in their vehicles for more than two hours as they tried to escape onto densely crowded Yorba Linda Blvde. In some cases, homeowners–like Tommy Emeterio whose home and cars were destroyed on Via De La Roca, just off Via Del Agua at Stonehaven—were unable to flee in vehicles and helped direct Yorba Linda Blvd. traffic in an effort to help neighbors.

YOU ARE HERE
This is the entrance to proposed
DEVELOPMENTS

this is the cul-de-sac OF Via DeLa Roca and Stonehaven Drive

11/15/08	[illegible]	Mountain [illegible] Stonehaven & Heatheridge	Fire reached
11/15/08	[illegible]	Savi Ranch	Fire reached
11/15/08	[illegible] pm	21000 block of Sutherland	Structure fire
11/15/08	1:42 pm	Avenida Adobe & Grandview State of Emergency to Gov/Pres.	Fire reached
11/15/08	[illegible] pm	Copper Apple & The Canyons	On Fire
11/15/08	[illegible]	Stonehaven [illegible] Heatheridge & [illegible] Road	100 homes reported on fire
11/15/08	[illegible] pm	Mandatory Evacuation [illegible] San Antonio Village Center/[illegible]	

ACTUAL EXERPT FROM CITY REPORT BETWEEN 1:35 FIRE HAD REACHED WITHIN 40 MINS 100 HOMES ON FIRE ON THIS SITE

Canyon B crosses the western portion of the site (northern portion of the Yorba Trails property) and is currently used for hiking and equestrian purposes and extends north to the Bridal Hills, LLC land through the Yorba Linda Land, LLC land and then into Chino Hills State Park. The intermittent drainages and related site features are illustrated on Exhibit 4-8 – Physical Characteristics.

The Whittier Fault runs along the southern portion of the site. Testing shows that no northern fault traces extend into the development planning areas. The property has been utilized historically for animal grazing and is currently used for oil production (three working wells), water line transmission (Metropolitan Water District and Yorba Linda Water District), and energy transmission (Southern California Edison). Oil production is anticipated to continue on the Project Site at existing locations. Access to these existing uses is via dirt roads on the site off Stonehaven Drive. Exhibit 4-8 – Physical Characteristics depicts the location of the oil wells and utility easements.

Table 4-2-1 below depicts the existing land uses surrounding the Project Site.

Table 4-2-1 Surrounding Land Uses

Location	Description
North	Chino Hills State Park
East	Chino Hills State Park
North/northwest	Yorba Linda Land, LLC and Bridal Hills, LLC
West	Amos Travis Trust Property (proposed Cielo Vista project)
Southwest	Virginia Simmons Trust property (proposed Cielo Vista project)
South	Dedicated open space (City of Yorba Linda)

The entire Project Area was burned in the 2008 Freeway Complex Fire that occurred in the fall of 2008. The fire burned over 30,000 acres, with 381 structures lost or damaged, including 187 residences[1]. Because of the potential fire hazard represented by the wildland/open space areas in Chino Hills State Park along the northern and eastern boundaries of the Proposed Project, special fuel management practices have been incorporated into the project in addition to the standard fuel modification zones required by the Orange County Fire Authority (OCFA).

The Bridal Hills property adjacent to the Project Site is a reasonably foreseeable development and will gain access through the Proposed Project Site. Therefore, Bridal Hills has been included in the Project analysis.

[1] Orange County Fire Authority "After Action Report, Freeway Complex Fire, November 15, 2008," page 12; http://www.wildlandfire.com/docs/2008/lessons-learn/freeway-cplx-aar.pdf (accessed July 2013)

Residential

The residential areas will have an average lot size of 18,553 square feet. Lots range from 12,044 square feet to 39,354 square feet (exclusive of estate lots). The two estate lots in Planning Area 2 are custom building sites with their design theme to be determined by lot purchasers. The estate lots are 21.78 acres with a building pad limited to 2.65 acres and 2.08 acres with building pad limited to 1.11 acres. The Proposed Project is designed to cluster residential pads to maximize open space preservation and preserve the natural ridgelines and topography to the greatest degree possible, including all major ridgelines bordering Chino Hills State Park.

Access

Two options for roadway access to the Proposed Project have been designed.

1. Option 1 would provide a primary connection going south to Stonehaven Drive following an existing dirt road that has been used for oil well and utility access purposes. A separate ingress/egress road for emergency purposes only would extend south along the western edge of the project through the adjacent Cielo Vista property. This access will pass through the adjacent Cielo Vista project via a 50-foot roadway and utility easement and may impact that project's lot design.
2. Option 2 would provide a primary connection going west from the site to Aspen Way, which then connects to San Antonio Road. This is the primary access that was contemplated in the 1993 Yorba Linda GP, but will require an access and grading easement over the Cielo Vista property or other legal entitlement. Option 2 provides a separate ingress/egress exit for emergency purposes only, exiting south from the Proposed Project to Stonehaven Drive and following the existing road currently used for oil well and utility access purposes.

The access options are detailed below in the Project Entry section of this chapter (page 4-19). Depending upon which access option is approved, the approximate acreages will be developed as follows:

1. 112 to 114 acres for useable residential pad area
2. 129 acres as natural open space
3. 13 acres with landscaped parks/water quality detention basins
4. 126 to 135 acres for landscaped and irrigated slopes

The remainder of the site acreage will be developed with streets, sidewalks, bench drains, water reservoirs, and associated uses.

City of Yorba Linda
SITUATION AND STATUS BOARD
(November 15-16, 2008 Brush Fire)

Date	Time/Reported By	Location	Description and Resources Assigned
11/15/08	11:30 am	Blue Ridge	8 Homes Burned. Esperanza H.S. was Evacuation site. Red Cross operating this site.
11/15/08	12:00 Noon	River Bend Drive	Homes burned undetermined (est. 2) – 16 Units lost.
11/15/08	12:00 Noon	Kodiak Mountain/Alpine	2 Homes burned. Threatening Apt. Complex
11/15/08	12:45 pm	YL EOC	Yorba Linda EOC activated at Level 2 at 1245 hrs. Control One advised. J-1 Notice faxed to Operational Area.
11/15/08	12:50 pm	RR Tracks along Esperanza	20-30 RR Cars on Track w/no Engine. Strong Possibly of Hazard Material Containers.
11/15/08	12:50 pm	Savi Ranch State of Emergency Faxed to Control	Fire moving to Commercial area. Fire Personnel deployed from San Diego & Moreno Valley
11/15/08	12:50 pm	Camino De Bryant & Hidden Hills Road	Evacuating 5,000 Homes.
11/15/08	12:50 pm	Riverbed	Fire started in Riverbed OCFA said fire jumped 91 Freeway near 241 Pwy
11/15/08	1:15 pm	Starwood & Mission Hills	Structure Fire
11/15/08	1:25 pm	Livestock Evacuated	Must take themselves and must take their own food. 2 Sites Los Alamitos Race Track & Anaheim Equestrian Center (See Logistics)
11/15/08	1:30 pm	Hidden Hills, Green Mountain & Hightree	Attic Fires (27 Homes Lost)
11/15/08	1:35 pm	Stonehaven & Heatherridge	Fire reached
11/15/08	1:35 pm	Savi Ranch	Fire reached
11/15/08	1:40 pm	21000 block of Sutherland	Structure fire
11/15/08	1:42 pm	Avenida Adobe & Granby State of Emergency to Gov/Pres.	Fire reached
11/15/08	2:00 pm	Copper Apts & The Canyons	On Fire
11/15/08	2:15 pm	Stonehaven between Heatheridge & Via de La Roca	100 homes reported on Fire
11/15/08	2:30 pm	Mandatory Evaculations San Antonio/Village Center/Fairmont	
11/15/08	2:45 pm	Police Resources Checking in at Community Center	
11/15/08	2:45 pm	Via Corzo	Structure Fire

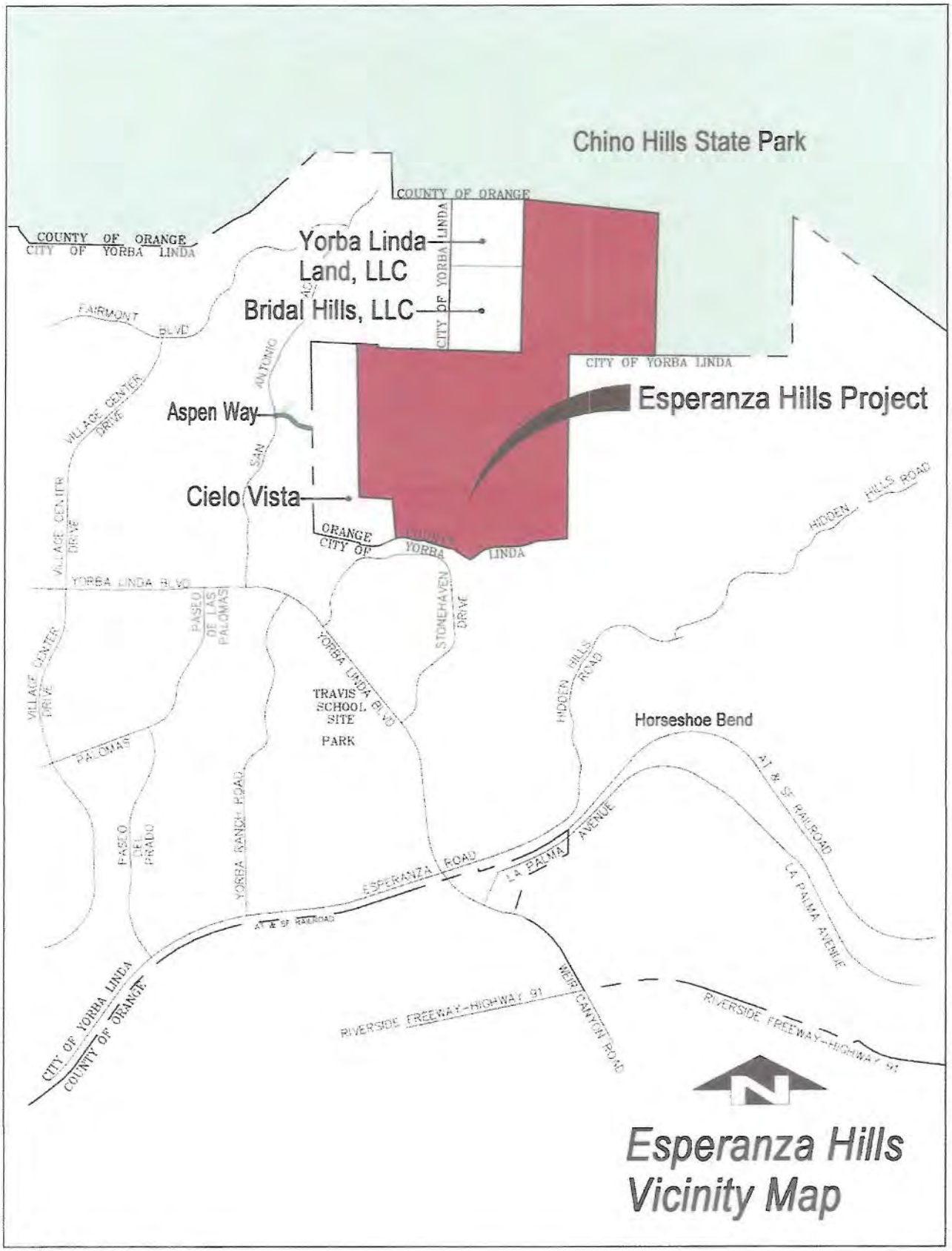
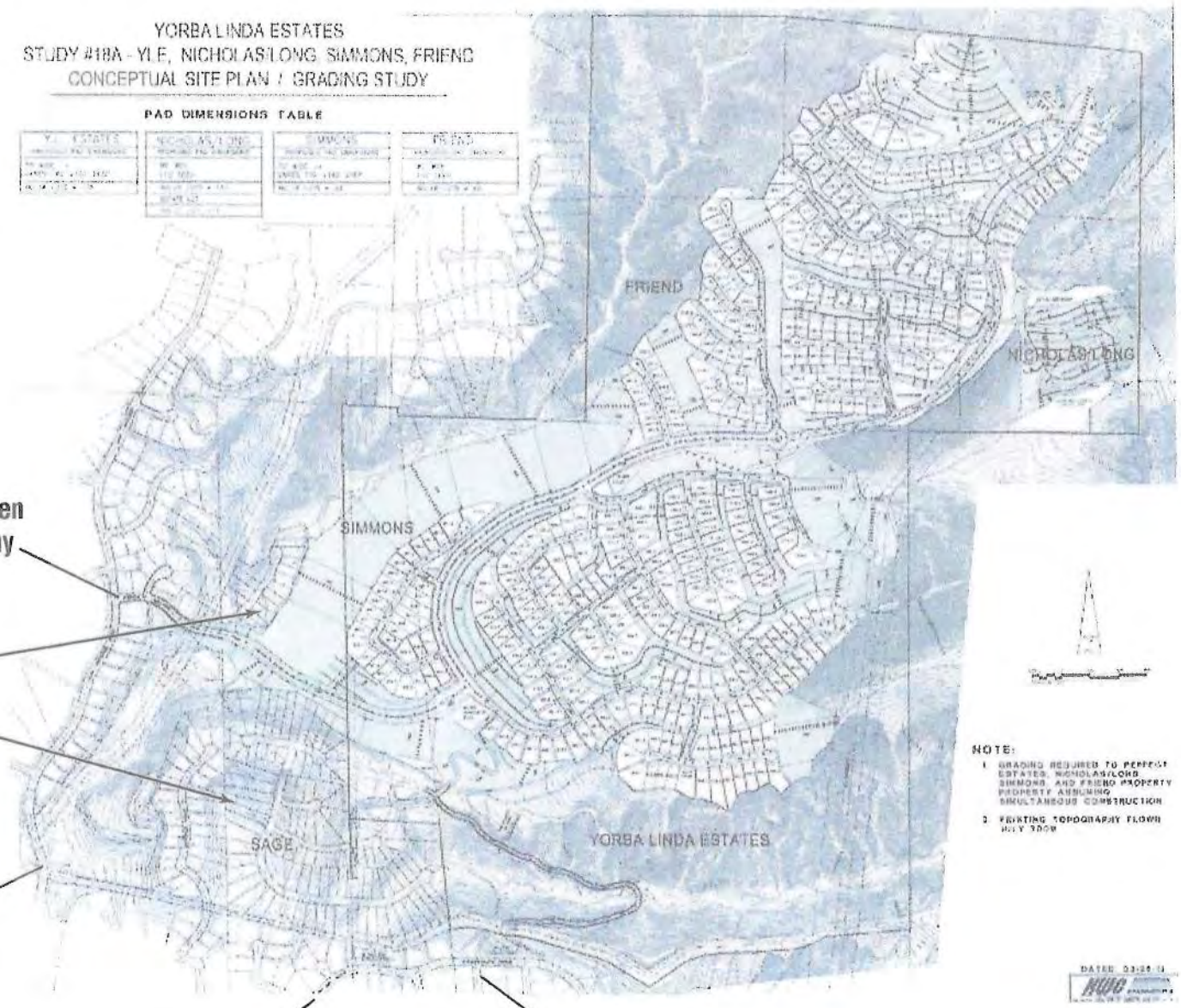


Exhibit 2 – Vicinity Map

	# of Homes
Yorba Linda Estates	373
Sage Development	112
Total Homes	485



Aspen Way

Sage Development 112 Homes

San Antonio Road

Via Del Agua

Stonehaven Drive

Stonehaven Drive KinderCare

Meka Myers, Center Director
5360 Stonehaven Dr., Yorba Linda, CA 92887

Phone: (714) 777-7782
Fax: (714) 777-8706

Open: 6:30 AM to 6:30 PM, M-F
Ages: 6 Weeks to 12 Year-Olds

MAP & DIRECTIONS

Maps & Directions

Stonehaven Drive KinderCare
5360 Stonehaven Dr.
Yorba Linda, CA 92887
Get directions »

SPECIAL DIRECTIONS: Off of Yorba Linda Blvd N. of Albertsons

ELEMENTARY SCHOOLS BUSED TO: Travis Ranch and Fairmont. Running Springs (Kindergarten only)

Nearby Centers

Imperial Rose KinderCare — Contact this Center
Distance from address: 5.4 miles

Higgins Ranch KinderCare — Contact this Center
Distance from address: 6.5 miles

North Fullerton KinderCare — Contact this Center

Chat with Us

We are available to answer your questions Monday-Friday, 5AM-7PM PST

Online Now

Contact this Center

If you have questions about tuition and openings tell us about yourself and we will contact you shortly.

First Name Last Name

Email Address

Confirm Email Address

Phone Number

Contact me by: Either Phone or Email

About My Child

Birthdate: Month Year

Select desired Kindercare start date

Add another child

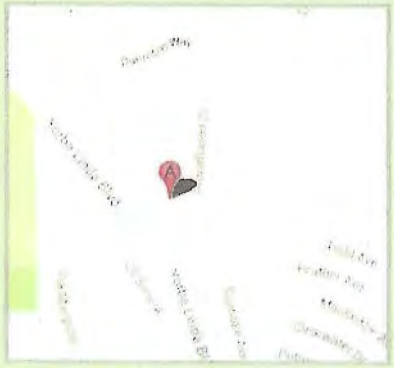
Comments or Questions:

Keep me informed about KinderCare programs.

Contact Me

KinderCare respects your privacy.
Read our Privacy Policy

Vintage at Stonehaven



5303 Stonehaven Dr.
Yorba Linda, CA 92887
(714) 695-0500 Office
(714) 695-0037 Fax

vintagestonehaven@usapropfund.com
www.usapropfund.com

HUD Table Date 12/4/2012

MULTIFAMILY MANAGEMENT

Welcome to
Vintage at Stonehaven Apartments

Our community is operated under Section 42 of the Internal Revenue Code. This special financing program is designed to facilitate the housing needs of moderate and middle-income households. Residency at this community requires that applicants meet certain qualifying standards established by the government. This program is **not** connected with Section 8 or HUD; however, we do accept Section 8 participants.

Residency at this community is limited to those households having moderate incomes as shown below. In this county, the maximum allowable incomes (by household size) are as follows:

	Maximum Allowable Income		
Household Size	40%	50%	60%
1 Person	$27,000	$33,750	$40,500
2 Person	$30,840	$38,550	$46,260
3 Person	$34,680	$43,350	$52,020
4 Person	$38,520	$48,150	$57,780
5 Person	$41,640	$52,050	$62,460

In addition to standard wages, income includes monies received from all sources such as alimony, child support, pensions, social security and asset income.

All information on income provided by applicants must be verified before occupancy. The certification process must also be completed annually.

The rents are limited by statute. Currently, the maximum allowable rents are as follows:

	Monthly Rents		
Apartment Size	40%	50%	60%
1 Bedroom	$728	$860	$1,041
2 Bedroom	$912	$1,032	$1,249

EQUAL HOUSING OPPORTUNITY

12/01/2013

WEDDING INVITATIONS

schools

Schools | Search for school, district, or city | State

Hot Topics | Worksheets & Activities | Homework Help | Parenting Dilemmas | Learning Difficulties | Health & Behavior | Common Core

Home > California > Yorba Linda > Placentia-Yorba Linda Unified

Travis Ranch School

Public K-8 1371 students

Add to My School List | Send me updates | Rate & Review

GreatSchools Rating

5280 Via de la Escuela
Yorba Linda, CA 92887
Phone: (714) 986-7460
Nearby homes for sale

Get directions »

Overview | Reviews | Test scores | Students & teachers | Programs & culture | Enrollment

About the school

Yorba Linda's Travis Ranch School is a public school serving 1371 students in grades K-8.

What does this school offer?

Arts? Sports?

Share what you know »

What schools are available to you?

Find attendance zones for your address »

ADVERTISEMENT

Community ratings

4 stars

Community reviews

This school is failing like a lead balloon. There are a group of teachers...

Compare this school to nearby schools

Compare schools »

Student diversity

69% of students at this school are White

Special education

The school has not provided this information yet.

Extended care

After school

Average class size

26
students

Nearby schools

Woodsboro Elementary School
Anaheim, CA

Coram Deo Academy
Yorba Linda, CA

Calvary Chapel of Yorba Linda School
Yorba Linda, CA

20
Martin Luther King Day

Be sure to visit

Take along one of our checklists.

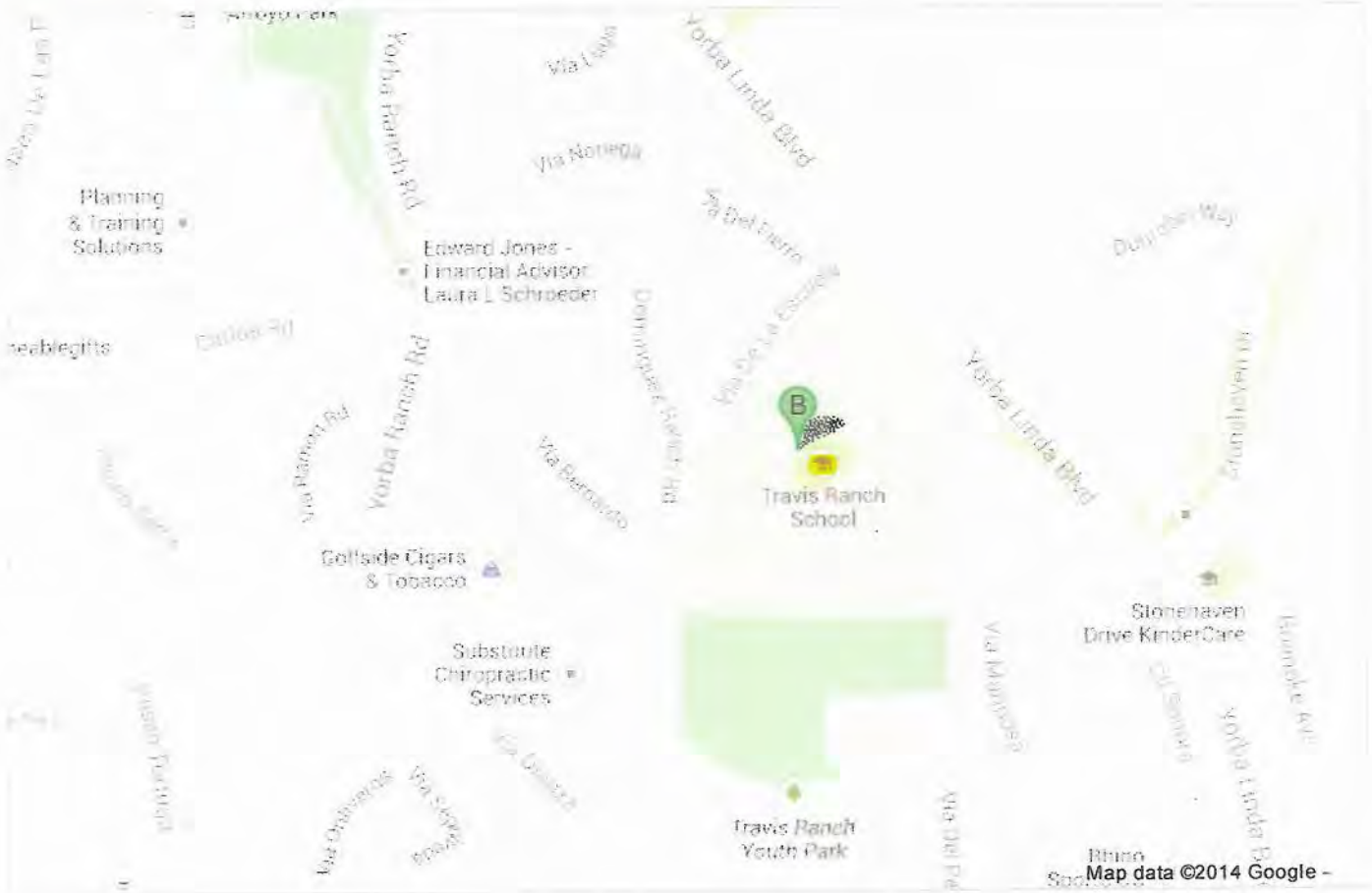
- Elementary school
- Middle school

Finding the right school

What to look for in an elementary school

To see all the details that are visible on the screen, use the "Print" link next to the map.

Google



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WEDDING INVITATIONS
magnetStreet.

schools

Schools | Search for school, district, or city | CA

Hot Topics | Worksheets & Activities | Homework Help | Parenting Dilemmas | Learning Difficulties | Health & Behavior | Common Core

Home > California > Yorba Linda > Placentia-Yorba Linda Unified

Bryant Ranch Elementary School

Public | K-5 | 691 students

Add to My School List | Send me updates | Rate & Review

GreatSchools Rating

24895 Paseo De Toronto
Yorba Linda, CA 92887
Phone: (714) 985-7120
Nearby homes for sale

Get directions »

Overview | Reviews | Test scores | Students & teachers | Programs & culture | Enrollment

About the school

Yorba Linda's Bryant Ranch Elementary School is a public school serving 691 students in grades K-5.

What does this school offer?

Arts? Sports?

Share what you know »

What schools are available to you?

Find attendance zones for your address »

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psprint.com
Get Consistent Quality Every Time. Official Site. Regular 60% Sales.

Community ratings

4 stars

Community reviews

We've had a very good experience while attending this school. Kids receive a...

Rose Buds Wedding Invitation
5x7 Flat Wedding Invitation
Local Daycare Listings
Private Local Tutors
Math Games
Elementary Math Tutoring
3rd Grade Common Core
Rent to Own Homes

Student diversity

61% of students at this school are White.

Finding the right school

What to look for in an elementary school

District information

Placentia-Yorba Linda Unified

Number of schools:	34
Grades:	K-12

See district boundaries

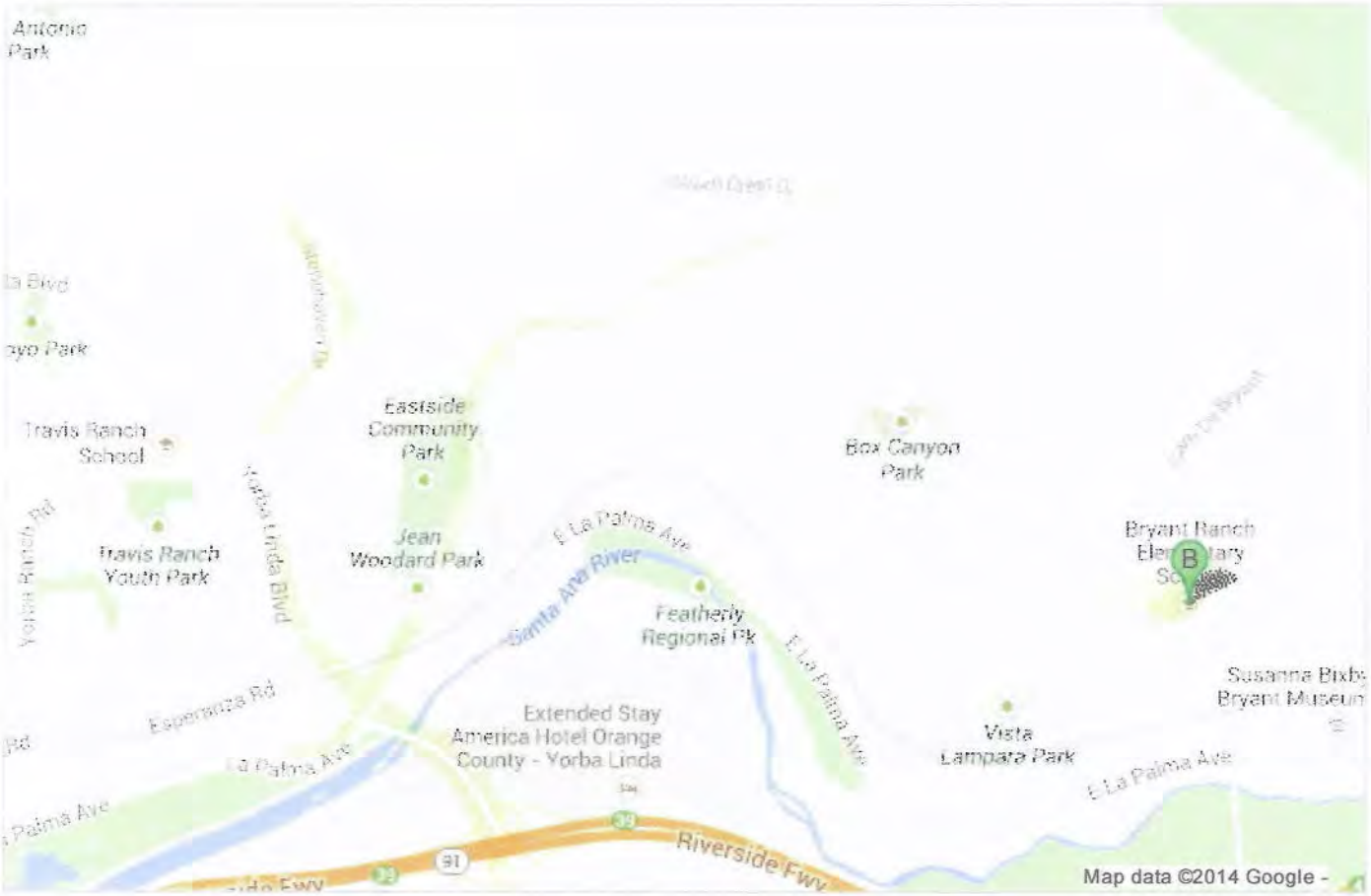
In the know: Get our expert advice on schools

School choice terminology
7 Common Core questions
Private versus public
Public vs. private vs. charter
How to spot a world-class education
Public schools: fact and fiction

Compare this school to nearby schools
Compare schools »

Nearby schools

To see all the details that are visible on the screen, use the "Print" link next to the map.



Ⓐ Enter location or right-click on map

Map data ©2014 Google

Our School

St. Francis of Assisi Catholic School was founded in September 1998 and has been providing outstanding Catholic education for pre-school through eighth grade students for over a decade. St. Francis School is accredited by the Western Catholic Educational Association (WCEA) and co-accredited by the Western Association of Schools and Colleges (WASC).

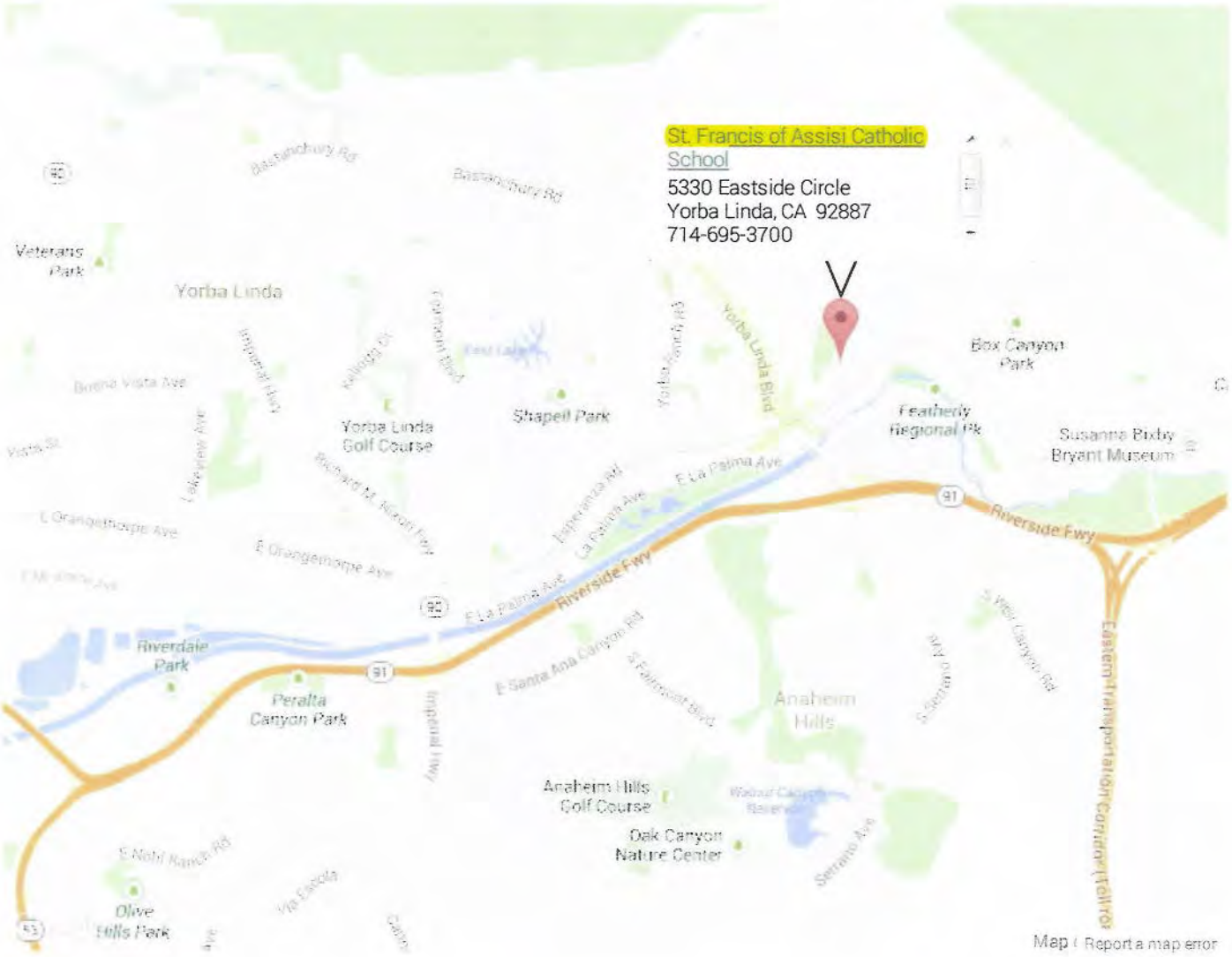
Our enrollment currently consists of 474 students from 320 families within the community. Our beautiful facility is made up of 20 classrooms, a networked computer lab with internet access, a multi-volumned, computerized library with research capabilities and internet access, extended care classrooms, a multi-purpose center, and an amphitheater. We also enjoy two playgrounds, a junior high wing, science lab, music room, advanced math lab, and a Learning Lab.

We also have staff and facilities available to provide extended care for registered school children of working families in Grades Pre-Kindergarten through 8th grade.

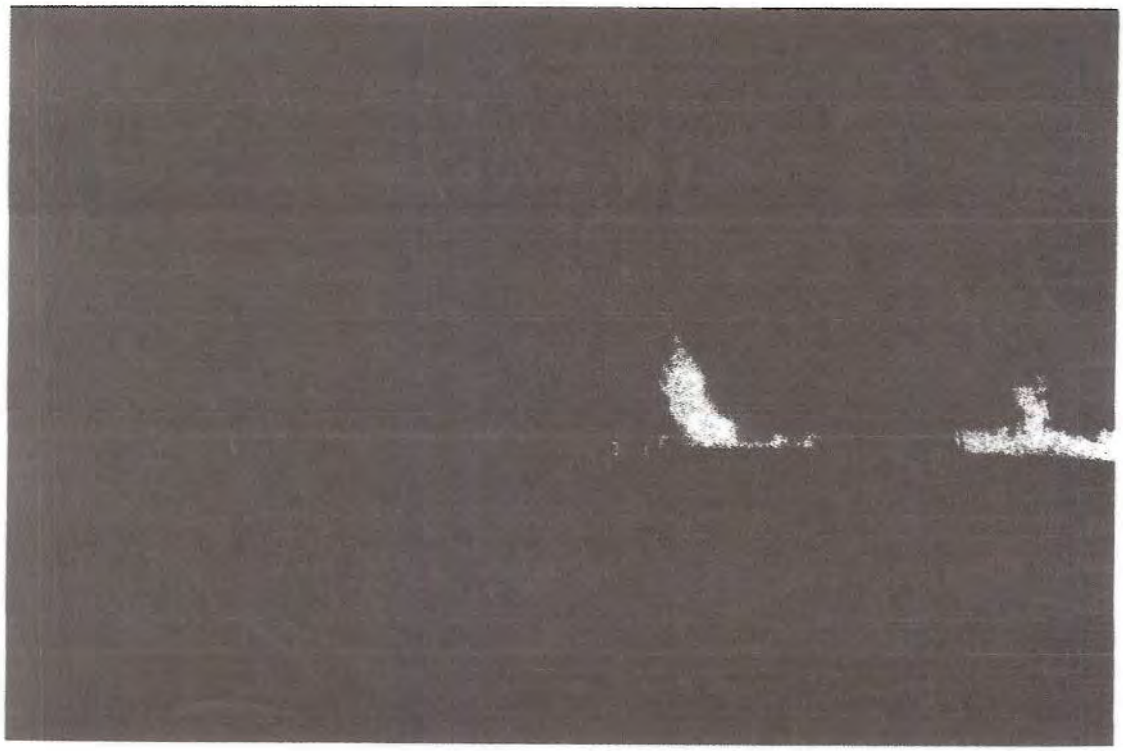
Click here to view our campus photos.

Maps

Start St. Francis of Assisi Catholic School Get Directions



Freeway Complex Fire
November 15-16, 2008
After Action Report



ACKNOWLEDGEMENTS

This after action report was completed with information submitted by members of Yorba Linda City Staff, the Brea Police Department, the Orange County Fire Authority and the Orange County Sheriff's Department, Emergency Management Bureau.

Prepared by:
Jack Conklin, Captain
Yorba Linda Police Services
Brea Police Department
January 29, 2009

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Preface

The purpose of this After Action Report is to document the City of Yorba Linda's response efforts during the Freeway Complex Fire beginning on November 15, 2008. The report will discuss the City of Yorba Linda's Emergency Operations Center's efforts to support field response activities during the fire. The report will also analyze the overall effectiveness of the Emergency Operations Center. Other agencies' response, including, but not limited to the Orange County Fire Authority (OCFA), Yorba Linda Water District and the Orange County Emergency Operations Center will be addressed in those agencies' respective reports.

Background

On November 15, 2008, the City of Yorba Linda was devastated by a major firestorm that burned over 30,000 acres, destroyed 118 homes, and damaged dozens more. Approximately 25,000 residents were evacuated from their homes, and thousands of vehicles and pedestrians were re-routed through the city. Throughout this two day event, over 375 police officers from Orange County and throughout the southland were utilized.

On the date of the fire, a Red Flag Warning was in effect for Southern California. A Red Flag day is characterized by periods of strong Santa Ana winds coupled with relatively low humidity. The high winds experienced on November 15, 2008 were a major contributing factor for rapid progression of the fire. The Fremont Canyon Remote Automated Weather Station (RAWS) site which is located on a Santa Ana Mountain ridge above the origin of the fire recorded the following information on the day of the fire:

Freemont Canyon RAWS-Santa Ana Mountains

Time	Temperature	Wind Speed	Humidity
9:00 A.M.	75°	43 mph, Gusts to 61 mph	8%
3:00 P.M.	80°	25 mph, Gusts to 45 mph	7%

The second RAWS is located at the Corona Airport and is approximately 3 miles east of the fire's origin, near the entrance to Santa Ana Canyon.

Corona Airport RAWS-Santa Ana Canyon

Time	Temperature	Wind Speed	Humidity
9:00 A.M.	83°	20 mph, Gusts to 24 mph	6%
3:00 P.M.	90°	29 mph, Gusts to 37 mph	4%

Summary of Operations

I. Brea Police Department

On Saturday, November 15, 2008 at approximately 9:15 A.M., the Brea Police Department was notified that a vegetation fire was burning east of the City of Yorba Linda adjacent to the Green River Golf Course in the City of Corona. The Brea Police Department immediately sent officers to the east border of the city to monitor the fire and prepare to conduct evacuations if deemed necessary. At approximately 10:22 A.M. officers determined the fire was threatening the east end of the city and began proactive evacuations of residences in the Brush Canyon and Bryant Ranch areas of the city. At the time of the outbreak of the fire, there were approximately 5 uniformed officers and one sergeant working in Yorba Linda.

At approximately 10:31 A.M. the Brea Police Department assigned a supervisor to the incident command post which was established at a shopping center in Corona near Green River Drive and the 91 Freeway. This supervisor became part of the unified command which would dictate the response to the fire incident. The unified command was made up of representatives from the Orange County Fire Authority, Brea Fire Department, Corona Fire Department , Cal-Fire, Chino Valley Fire, Corona Police Department and Brea Police Department. A unified command allows all agencies with responsibility for the incident, either geographical or functional, to manage an incident by establishing a common set of incident objectives and strategies. The concept of unified command means that all involved agencies contribute to the command process by:

- Determining overall objectives.
- Planning jointly for operational activities while conducting integrated operations.
- Maximizing the use of all assigned resources
- Shared decision making.

The Incident Command Post was later moved to Yorba Regional Park and ultimately Irvine Regional Park. The Brea Police Department kept a constant presence at the Incident Command Post throughout the first two days of the incident.

Evacuations continued at the direction of the unified command as the fast moving fire, estimated by OCFA officials to be moving at 100 feet a minute, moved north west through the city. Having exhausted our local resources, a call for mutual aid was made. As a result, approximately 375 officers from 19 different agencies (Huntington Beach, Irvine, Orange County Sheriff, Fountain Valley, Westminster, Buena Park, Los Angeles County Sheriff, Dept of Homeland Security, Seal Beach, Garden Grove, Newport Beach, Placentia, La Habra, La Palma, Cypress, Fullerton, Los Alamitos, Riverside Sheriff and Tustin) would ultimately respond to help conduct evacuations during the first 36 hours of the fire.

Notification of evacuations were done in a traditional manner utilizing the media and law enforcement personnel in marked police units equipped with sirens and public address systems. The fast moving fire did not allow time for door to door notifications. AlertOC, the county's mass notification system was not considered. At the time of the fire it was the police department and city staff's understanding the system was not available. Although initial user agreements had been signed, the cities of Yorba Linda and Brea were still in the implementation planning stage. Per an email dated October 10, 2008 from the County's AlertOC Program Manager the system was only functional in the County areas and the cities of Buena Park and San Juan Capistrano.

At approximately 12:45 P.M., the City of Yorba Linda activated their Emergency Operation Center (EOC) located in the Yorba Linda Community Center. The police department assigned one captain to the EOC who remained in the center until he was relieved by a lieutenant at approximately 11:00 A.M. on 11-16-08.

During the same time period a staging area to check in Brea and allied agency officers responding to the request for mutual aid was established at the Yorba Linda Police Annex located at the intersection of Yorba Linda Blvd. and San Antonio Road. The staging area was supervised by a lieutenant who was assisted by three officers. The staging area was ultimately moved to the Yorba Linda Community Center after the annex was threatened by the approaching fire. The captain assigned to the EOC ultimately partnered with the staging area lieutenant to help facilitate the evacuation as directed by the unified command established at the incident command post.

The mandatory evacuations which were conducted throughout the entire northern portion of the city necessitated the establishment of several ingress and egress control points. These checkpoints were manned by dozens of law enforcement officers and remained in place until the mandatory evacuation was downgraded to a voluntary evacuation at approximately 3:30 P.M. on November 16, 2008.

Following the lifting of the mandatory evacuation, a decision was made to continue to maintain checkpoints in five neighborhoods which were particularly hard hit by the fire. The officers manning these checkpoints were instructed to allow only residents or those who could provide a legitimate reason for being in the fire area access to these neighborhoods. The decision was made in an attempt to discourage potential looters and unscrupulous contractors from accessing the site. In addition, the checkpoints provided the residents victimized by the fire the opportunity to salvage their personal property from their homes with a minimum of disruption. These five checkpoints remained in effect for two weeks and were held over for an additional week (three total) in two neighborhoods.

During the three day period beginning on November 15, 2008 the Brea Police/Fire Communications Center received over 26,800 calls, 6,800 of them were made via the 911 system. For comparison purposes, Brea Communication generally receives about 1,000 calls during a three day period. In addition to answering the numerous telephone calls, dispatchers also responded to thousands of radio transmissions by police and fire personnel.

The week following the fire, City Staff, OCFA and Brea Police Department personnel participated in several disaster relief and rain storm mitigation meetings. These meetings were held with local, regional and state agencies in Yorba Linda and at the Operational Area located at Loma Ridge in preparation of an impending storm. In addition to manning the aforementioned checkpoints, police personnel assisted the Public Works Department by providing for traffic control at those locations where storm mitigation efforts (the placing of K rail and sandbags) were taking place.

On November 26, 2008 at approximately 1:00 A.M., Yorba Linda was hit by a rainstorm which necessitated the activation of the EOC. As a result, the police department assigned one Captain to respond to the center and direct the police department's activities. At approximately 1:45 A.M. Brea Police Officers began mandatory evacuations of three evacuation areas previously identified by the public works department. Once completed, officers established and maintained checkpoints at the entrances/exits of each of these areas. These checkpoints remained in effect until approximately 8:30 A.M. on November 27, 2008 when the evacuation order was lifted.

What Worked Well

- Police department personnel monitored the movement of the fire and initiated evacuations rather than waiting for direction from OCFA.
- The police services agreement between the cities of Brea and Yorba Linda provided the ability to draw immediate resources in the form of additional police officers from Brea to assist with the initial evacuations.
- The Orange County Sheriff and Chiefs of Police Association's Mutual Aid Agreement provided for the swift mobilization of law enforcement mutual aid.
- The assignment of a supervisor to the Unified Command provided the police department a direct link and shared decision making responsibilities at the Incident Command Post.
- The establishment of a staging area for responding allied law enforcement agencies provided for the check-in and deployment of resources to assist with evacuations and scene security.
- The assignment of the Captain/ Yorba Linda Liaison to the Yorba Linda EOC provided for a communication and information link between personnel in the field, the staging area and EOC personnel.
- The previously existing familiar relationship between the Yorba Liaison and Yorba Linda City Staff resulted in an open exchange of information, planning and collaborative decision making.
- Evacuations were conducted systematically at the direction received from the Unified Command at the Incident Command Post.
- There was no loss of life to either the public or emergency personnel.
- There were no reported serious injuries to either the public or emergency personnel.
- The police department communication center answered approximately 20,680 calls from the public.
- Checkpoints were established to restrict public movement into evacuation areas which assisted the fire departments' response to combat the fire without interruption.
- After fire checkpoints provided security to the hardest hit neighborhoods, discourage looters and provided for a safe respite for fire victims.

- Officer assigned to provide security and answer questions from those utilizing the mass shelter site at the Lasorda Field House.

Areas for Improvement

- Capture law enforcement activities and assignments via the computer aided dispatch system which will provide a documented timeline and account of activities.
- Clearly define the mission to personnel conducting evacuations. In some instances, individual officers halted evacuation efforts to assist victims with fire suppression efforts resulting in the delay of evacuations to other neighborhoods. Although the decision to halt the evacuations to assist with firefighting is left to the discretion of each individual officer, it should be the exception rather than the rule.
- Additional training on the AlertOC system is needed for police personnel (completed).
- Utilize the AlertOC system to supplement traditional forms of notification during an evacuation.
- When possible/practical, partner mutual aid agency responders who are not familiar with the city with Brea Police Officers.
- Provide regular/updated information to officers working checkpoints as to the status of the emergency in an effort to disseminate accurate information to the public.
- Provide for regular breaks, food and water to field personnel.
- Stress the importance of opening evacuation areas that are deemed safe as soon as possible to the Unified Command in an effort to mitigate inconvenience to residents.

II. Yorba Linda Emergency Operations Center

At approximately 12:45 P.M., the Yorba Linda Assistant City Manger activated the Emergency Operation Center (EOC) located in the Yorba Linda Community Center to Level 2 status. Once the decision was made to activate the Emergency Operations Center, city staff with EOC responsibilities staff were notified and reported to the Emergency Operations Center.

The Emergency Operations Center was organized in accordance with the Standardized Emergency Management System and the National Incident Management System. This system is based upon functional responsibilities and is organized by sections: Policy/Management Group, Operations Section, Planning and Intelligence Section, Logistics Section and Finance Section.

The Emergency Operations Staff worked well with each other and there was an open, respectful exchange of information. The goal of the EOC to support responders in the field and provide them with the equipment and resources they needed to complete their mission was successfully met.

However, the staff also faced several significant challenges. Most of the challenges faced in the EOC dealt with a lack of trained personnel and the inability of staff to effectively communicate with the public. At the time of the fire, key city personnel were out of town and unable to respond to the EOC. The absence of key information technology staff left the city without the ability to post critical information on the city's website. Due to the same absence, city staff was unable to create a hotline which contained a regularly updated recorded message providing public information regarding the fire's progress, evacuations and sheltering locations. This forced the city to depend primarily on the news media to relay our message. Unfortunately, the city's press information officer had recently retired and the management analyst who assumed the PIO responsibilities was out of town fulfilling his military reserve commitment. This left the press information responsibilities in the hands of the EOC Coordinator, who was already overtaxed. Ultimately, the EOC Coordinator solicited assistance from the OCFA's PIO who worked diligently to communicate both the fire authority and city's public messages to the media. This was certainly an improvement, but the reliance on the news media to deliver accurate, city specific messages was not an optimal situation and was marked by the delivery of some misinformation regarding a sheltering site at Travis Ranch School. The lack of accurate, timely public information resulted in hundreds of calls from the public being fielded by EOC personnel which took time away from their assigned duties.

The physical layout of the EOC with the tables lined up against the perimeter of the room made it difficult to meet by operational section and discuss our individual responsibilities as it related to the overall mission. Reports of faulty and/or non-operational equipment including telephones also added to our problems. Finally, the location in the EOC in Yorba Linda Community Center, a public building with public access, created security issues.

What Worked Well

- Excellent cooperation among Emergency Operations Center Staff despite a high stress situation.
- EOC workers remained calm and were clearly problem solvers.
- Communication between the functional sections was efficient.
- Prior training prepared some Emergency Operations Center responders for their responsibilities.
- The creation of a Logistics Section Status Board provided easy access to resource phone numbers, status on the shelter operations, and an account of work completed while the EOC was activated.
- The YLCC provided resources such as a copier, additional computers for mutual aid, offices, phones and resting areas for the public safety officers.
- Meals were readily available for EOC staff and police in the staging area.

- City Staff partnered with the Red Cross to insure the shelter was operating efficiently.

Areas for Improvement

Action

1. Proper level activation of the EOC. The Level 2 activation of the EOC precluded the notification/involvement of important personnel with specific responsibilities from participating in the decision making process in the EOC (example, Placentia-Yorba Linda Unified School District).
2. Standardize the method of notification to personnel assigned to the EOC in the event of an activation as to insure all are notified.
3. All doors of the EOC must stay locked throughout activation. Only one door will be allowed for entry and exit. This door will be tightly controlled during activation by a designated sworn Brea Police Officer.
4. EOC access will be limited to members of the Emergency Management Team and specific external agency representatives displaying their "emergency I.D. badges." Those without their badge will not be admitted.
5. Distribute vests which are color coordinated by ICS section to personnel as they report to the EOC. This will enable EOC personnel to readily identify each other and their respective function within the EOC.
6. Provide the appropriate Incident Command System training to those employees assigned to the EOC.
7. Train key EOC positions three to four persons deep to account for absences and provide for shift relief during long term activations.
8. Identify, properly equip and train a City Press Information Officer(s).
9. Additional training on the AlertOC system is needed for responders to the City Emergency Operations Center.
10. Identify a team of information technology staff responsible for updating the City website with critical public information during an emergency.
11. Identify a team of information technology staff responsible for creating a hotline which a recorded message which is regularly updated with critical public information during an emergency.
12. A separate briefing room should be established for the purpose of providing regular updates regarding the status of the emergency to the City Council and members of the press. The updates should be conducted regularly by the PIO, EOC commander or their designee.
13. Establish a separate room staffed by volunteers or city staff to answer emergency related information telephone inquiries/questions.

14. Telephone and computer jacks need to be routinely tested. Some were inoperable.
15. The telephones are archaic as the dial pad was on the receiver and there was no way of knowing that you were dialing the correct number. The system also did not take messages so if a resource person was trying to return a call; they often got a busy signal. Telephones also were set to "roll" during initial phases of the EOC. This created a difficult situation as many calls ended up at the director's station.
16. Provide several laptop computers in the EOC which are equipped with USB ports and the proper disaster related software, including, but not limited to all the NIMS/SEMS required forms to manage and track the disaster response.
17. Maintain the Situation/Status board on a laptop computer. Eliminates the duplication of work and provides for a retrievable, electronic copy.
18. Project the Situation/Status Board on a screen by use of a video projector.
19. Reconfigure the physical layout of the EOC as to provide better communication between the functional sections.
20. Copies of keys to Community Center doors/cabinets should be maintained in a centralized place accessible to EOC personnel.
21. The EOC was organized to have the Mass Care Shelter Branch work under the Operations Chief. This was inefficient and was moved since the staff trained in shelter care and operations are Parks and Recreation Employees were assigned to the Logistics Section.
22. Improve the City's GIS capabilities to provide for data, mapping systems and aerial photographs of the City which can then be projected on screens located within the EOC.
23. Conduct EOC activation/simulation exercises twice a year.

Conclusions

The November 2008 Freeway Complex Fire was a catastrophic event which challenged all those who were involved in the response effort. The lessons learned during the fire response greatly improved the city's response during the subsequent rain event. In particular, huge strides were accomplished in the area of public education and mass public notification.

EOC IMPROVEMENT IMPLEMENTATION SCHEDULE

Action Number	Actions To Take	By Who	When to be Completed
1-2	Standardize method of notification to EOC assigned personnel	- Emergency Coordinator - City Clerk	Completed
3-5,12,13,19	Change certain policies, procedures, and layout of EOC	- Emergency Coordinator - City Manager	March 1, 2009
6-7,9	Train EOC employees and support	- Emergency Coordinator	June 30, 2009
8	Equip and train a new City PIO	- City Manager - Assistant to the City Manager	May 31, 2009
10	Identify I.T. staff to update website during emergency	- City Manager - MIS Manager	Completed
11	Identify I.T. staff responsible for creating a recorded hotline with critical information during emergencies	- City Manager - MIS Manager - PIO	March 1, 2009
14	Routinely test telephone and computer jacks. Replace where needed	- MIS Manager - MIS Technician	Every two months, starting March 2009
15	Replace EOC phones	- MIS Manager - MIS Technician	April 1, 2009
16	Designate a laptop computer for EOC with appropriate USB and software	- Emergency Coordinator - MIS Manager	April 30, 2009
17-18	Buy a projector and projector screen for EOC to display Sit. Stat. Board	- Emergency Coordinator - Parks and Rec. Director	July 1, 2009
21	Reassign "Mass Care Shelter Branch" to Logistics Section	- Emergency Coordinator	March 1, 2009
22	Improve GIS capabilities	- MIS Manager	June 1, 2009
23	Bi-yearly EOC simulation	- Emergency Coordinator	May and November, each year

City of Yorba Linda
SITUATION AND STATUS BOARD
(November 15-16, 2008 Brush Fire)

Date	Time/Reported By	Location	Description and Resources Assigned
11/15/08	11:30 am	Blue Ridge	8 Homes Burned. Esperanza H.S. was Evacuation site. Red Cross operating this site.
11/15/08	12:00 Noon	River Bend Drive	Homes burned undetermined (est. 2) – 16 Units lost.
11/15/08	12:00 Noon	Kodiak Mountain/Alpine	2 Homes burned. Threatening Apt. Complex
11/15/08	12:45 pm	YL EOC	Yorba Linda EOC activated at Level 2 at 1245 hrs. Control One advised. J-1 Notice faxed to Operational Area.
11/15/08	12:50 pm	RR Tracks along Esperanza	20-30 RR Cars on Track w/no Engine. Strong Possibly of Hazard Material Containers.
11/15/08	12:50 pm	Savi Ranch State of Emergency Faxed to Control	Fire moving to Commercial area. Fire Personnel deployed from San Diego & Moreno Valley
11/15/08	12:50 pm	Camino De Bryant & Hidden Hills Road	Evacuating 5,000 Homes.
11/15/08	12:50 pm	Riverbed	Fire started in Riverbed OCFA said fire jumped 91 Freeway near 241 Pwy
11/15/08	1:15 pm	Starwood & Mission Hills	Structure Fire
11/15/08	1:25 pm	Livestock Evacuated	Must take themselves and must take their own food. 2 Sites Los Alamitos Race Track & Anaheim Equestrian Center (See Logistics)
11/15/08	1:30 pm	Hidden Hills, Green Mountain & Hightree	Attic Fires (27 Homes Lost)
11/15/08	1:35 pm	Stonehaven & Heatherridge	Fire reached
11/15/08	1:35 pm	Savi Ranch	Fire reached
11/15/08	1:40 pm	21000 block of Sutherland	Structure fire
11/15/08	1:42 pm	Avenida Adobe & Granby State of Emergency to Gov/Pres.	Fire reached
11/15/08	2:00 pm	Copper Apts & The Canyons	On Fire
11/15/08	2:15 pm	Stonehaven between Heatheridge & Via de La Roca	100 homes reported on Fire
11/15/08	2:30 pm	Mandatory Evaculations San Antonio/Village Center/Fairmont	
11/15/08	2:45 pm	Police Resources Checking in at Community Center	
11/15/08	2:45 pm	Via Corzo	Structure Fire

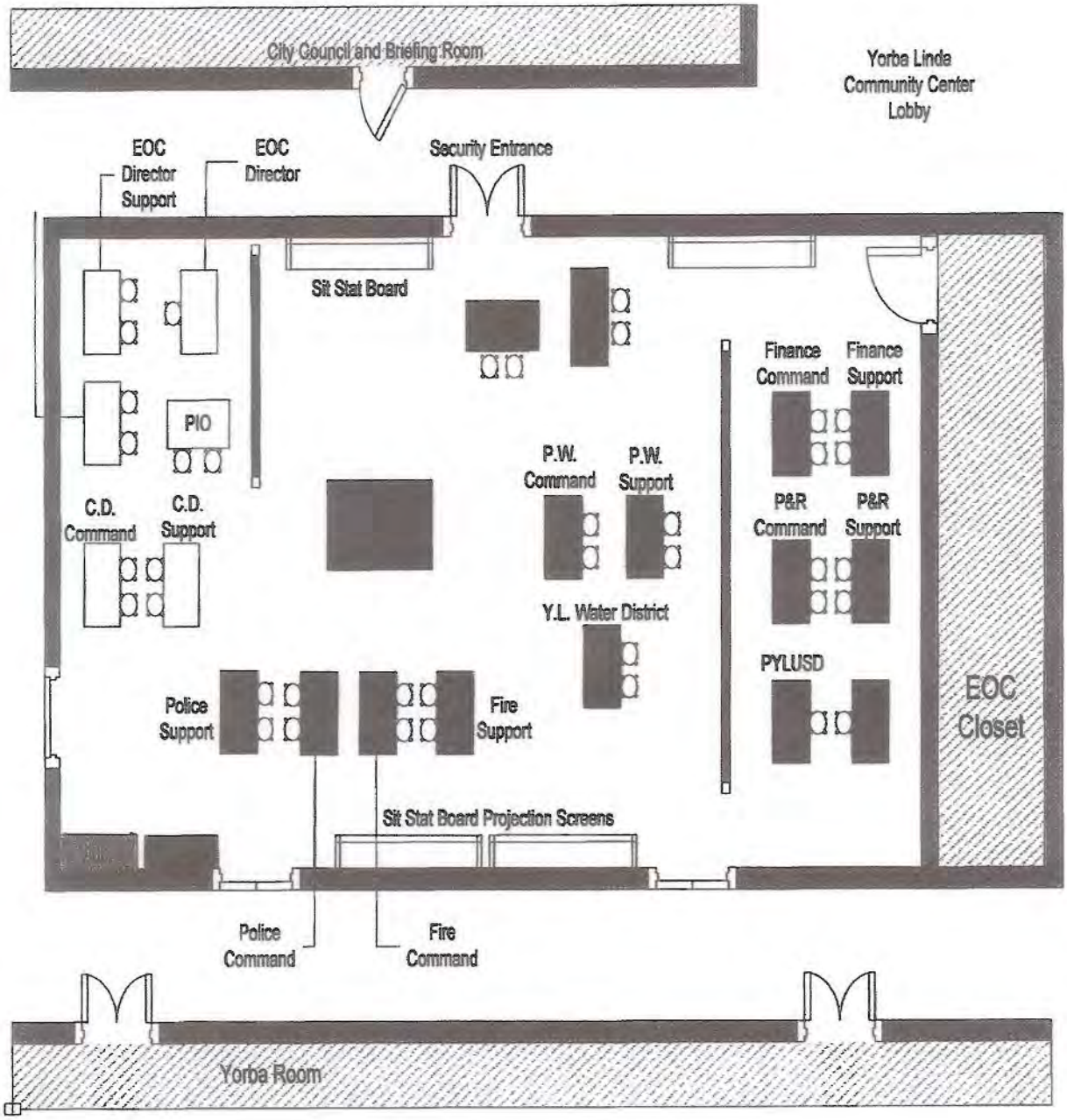
Date	Time Reported By	Location	Description and Resources Assigned
11/16/08	6:45 pm	EOC	EOC Deactivation J-5 form faxed to OA, Control 1 notified

City of Yorba Linda
SITUATION AND STATUS BOARD
(November 25-28, 2008 Potential Mud & Debris Flows)

11/25/08	8:00 am	Box Cyn, Brush Cyn, North Fairmont/San Antonio	Voluntary evac ordered (AlertOC messages sent at 7:50 pm on 11/24 and at 9:30 am on 11/25)...PYLUSD phone alert sent to parents at 7:45 pm on 11/24 advising that school would not be cancelled
11/25/08	8:11 am	EOC	Level 1 EOC activation (J-1 form faxed to OA)
11/25/08	5:00 pm	Meadowlands & Bluegrass Streets	Reported evacuated voluntarily
11/26/08	12:45 am	OCFA/BPD	Nat'l Weather Service issues flash flood warning...OCFA recommends mandatory evac
11/26/08	1:00 am	EOC	EOC goes to Level 2 activation
11/26/08	1:45 am	Box Cyn, Brush Cyn, North Fairmont/San Antonio	Mandatory evac order issued
11/26/08	2:30 am	Lasorda FH	15 evacuees registered
11/26/08	2:35 am	EOC	Estimated ±3,486 residents subject to evac order in 3 at-risk areas
11/26/08	2:40 am	Box Cyn, Brush Cyn, North Fairmont/San Antonio	Evac notifications complete...checkpoints established
11/26/08	2:55 am	Lasorda FH	40 evacuees registered
11/26/08	3:45 am	Lasorda FH	50 evacuees registered (some early evacuees left to seek hotel)
11/26/08	3:45 am	EOC	Nat'l Weather Service extends flash flood warning to 4:30 am
11/26/08	4:10 am	Lasorda FH	74 evacuees registered...OC Animal Control arrived...Red Cross arrived
11/26/08	4:30 am	EOC	Nat'l Weather Service extends flash flood warning to 5:30 am
11/26/08	8:00 am	EOC	Stowell & Gruchow conduct aerial recon...fissures at North Fairmont noted
11/26/08	9:40 am	Box Cyn & Brush Cyn	Mandatory evac downgraded to voluntary
11/26/08	11:00 am	5 miles ESE of YL	3.1 earthquake reported by USGS...new OCFA aerial recon
11/26/08	2:00 pm	North Fairmont/San Antonio	Mandatory evac downgraded to voluntary...duplex at 3615-3625 Banyon Rim yellow-tagged due to nearby slope danger
11/26/08	2:00 pm	LaPalma Commercial Complex (w/o Via Lomas de Yorba West)	Commercial buildings added as 4th at-risk area due to observed slope instability in Hidden Hills...BPD to hand deliver voluntary evac notices
11/26/08	2:10 pm	Brea PD Watch Cmdr.	BNSF advised of Hidden Hills slope instability

11/26/08	2:35 pm	EOC	EOC downgraded to Level One activation
11/27/08	8:30 am	YL City Hall	All voluntary evac orders lifted
11/27/08	9:00 am	Lasorda FH	Lasorda shelter closed
11/28/08	7:00 pm (approx)	Banyon Rim	State Caltrans engr advises Stowell that Banyon Rim slope has continued to move and recommends red-tag. Red tag issued and owners notified by Stowell.

PROPOSED EOC ROOM CONFIGURATION



INCIDENT HISTORY DETAIL: B083200140

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INITIATE: 10:10:37  11/15/08   CALL NUMBER:     B0140
ENTRY:    10:10:37             CURRENT STATUS:  CLOSED
DISPATCH: 10:10:37             PRIMARY UNIT:    835
ONSCENE:  10:10:37             CASE NUMBER:     PD0800010982
CLOSE:    21:40:33  11/16/08   DISPOSITION:     CM



LOCATION: 91/GREEN RIVER
LOCATION COMMENTS:
DAREA:    P2                                    GEO OVERRIDE
BEAT:     Y24                   OLD TYPE: PC      FINAL: 904 FIRE UNKNOWN
RD:                             PRIORITY: 1


10:10:37 PD01 ONVIEW    124
10:10:37 PD01 ID        124 <1584>WAMBAUGH,JASON
10:10:53 PD01 BACKUP    124 1S2
10:10:53 PD01 ID        1S2 <1353>HALL,ROGER
10:13:17 FD01 MISCX     DEVEREUX NOTIFIED...WILL SEND OUT ADMIN MESSAGE
10:13:24 PD01 MISC      124, ATC WITH FIRE B/C
10:14:09 PD01 ENROUTE   1S2
10:19:49 PD01 CHGLOCOS  124 GREEN RIVER GOLF COURSE
10:20:27 PD01 MISC      124, IS THE SAM UNIT WITH YOU?
10:22:17 FD01 MISCX     NEED EVACUTAIONS.....BRUSH CANYON THOMAS BROS 741F4 E4
                        G5...FIRE IS MOVING FAST....ETA OF 20-30 MINS FOR IT
                        TO BE THERE
10:23:21 PD01 BACKUP    124 121
10:23:21 PD01 ID        121 <1577>STIEFEL,SHAYNE
10:23:23 PD01 ONSCENE   1S2
10:23:25 PD01 ENROUTE   121
10:23:28 FD01 MISCX     1S2, NEED 122 TO CLEAR FROM THE RANGE
10:24:53 PD01 MISC      124, IMMEDIATE EVACS
10:25:23 PD01 CHGLOC    124 E/END OF BRUSH CYN
10:25:29 PD01 MISC      124, 87 WITH SAM UNIT
10:25:36 PD01 BACKUP    1S2 C96Y 223
10:25:36 PD01 ID        C96Y <1579>MOC,STELLA
10:25:36 PD01 ID        223 <1461>ZEEB,ROBERT
10:25:40 PD01 ENROUTE   223
10:25:40 PD01 ENROUTE   C96Y
10:26:17 PD01 MISC      223, C3
10:26:29 PD01 MISC      1S2, C3
10:26:43 PD01 CHGLOC    1S2 YORBA LINDA BL/YORBA RANCH RD ,Y
10:26:54 PD01 MISC      1S2, FIND OUT WHERE TO SEND PEOPLE WHO ARE EVACUATING
10:27:07 PD01 CHGLOC    124 YORBA LINDA BL/YORBA RANCH RD ,Y
10:27:25 PD01 CHGLOC    223 YORBA LINDA BL/YORBA RANCH RD ,Y
10:27:50 PD01 CHGLOC    121 YORBA LINDA BL/YORBA RANCH RD ,Y
10:30:19 PD01 ONSCENE   124
10:31:37 SUP1 MISCX     NEED SGT GREEN RIVER GOLF COURSE FOR INCIDENT COMMAND
                        ****
10:33:11 PD01 ONSCENE   1S2
10:34:10 CT01 ONSCENE   121
10:34:20 PD01 MISC      124, STARTING TO KNOCK ON DOORS
10:35:04 CT01 CHGLOCOS  1S2 EST END BRUSH CYN
10:36:04 CT01 CHGLOCOS  121 EST END BRUSH CYN
10:36:53 CT01 MISCX     1S2, 11 YR OLD AT 28655 BRUSH CYN.. BABYSITTING AND
                        NOT ABLE TO LEAVE..
10:37:29 SUP1 MISCX     NEED SOMEONE TO BRUSH CNY PARK FOR HELI PAD
10:37:43 SUP1 MISCX     NEED ONE OFFICER THERE
10:38:58 PD01 MISCX     1S2, PER OCFA, THEY DO NOT HAVE EVAC INFO YET...ARE
                        DOING SUPPRESSION AT THIS TIME
10:39:20 PD01 ONSCENE   223
10:39:20 PD01 ONSCENE   C96Y
10:40:35 PD01 MISC      1S2, FLAMES ON TOP OF THE HILL E/OF EVENING BREEZE
                        NEAR EVENING STAR
10:42:41 PD01 CHGLOC    121 ALPINE LN/KODIAK MOUNTAIN DR ,YB
10:42:56 PD01 BACKUP    121 747Y
10:42:56 PD01 ID        747Y <1505>BAKER,STEPHEN
10:43:07 PD01 CHGLOCOS  747Y ALPINE LN/KODIAK MOUNTAIN DR ,YB
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10:43:21	PD01	CHGLOC	121 ALPINE LN/KODIAK MOUNTAIN DR ,YB
10:44:00	PD01	ONSCENE	121
10:44:44	PD01	MISC	1S2, SEE IF WE CAN GET TRAVIS RANCH ELEM TO OPEN
10:45:02	PD01	MISC	1S2, WILL POSS NEED YL COMMUNITY CENTER
10:45:52	PD01	CHGLOCOS	124 MORNING VIEW
10:46:07	SUP1	MISCX	CLOSE DOWN LP BY GYPSUM CANYON (BY FIRE STATION)
10:47:26	PD01	MISC	747Y, FIRE CROSSING OVER KODIAK
10:47:59	PD01	MISC	C96Y, EVAC SOUTHWIND/BRUSH CYN
10:49:58	PD01	MISC	124, NEED UNIT WITH WATER
10:50:17	PD01	MISC	124, REQ C96Y TO EVENING BREEZE/MORNINGVIEW
10:50:27	PD01	CHGLOC	C96Y EVENING BREEZE DR/MORNING DEW WY
10:50:40	PD01	CHGLOCOS	124 EVENING BREEZE DR/MORNING DEW WY
10:52:40	PD01	MISC	121, KODIAK MTN/EOF ALPINE...FULLY ENGULFED
10:53:10	PD01	MISC	124, EVENING BREEZE/EVENING STAR...HOMES ABOUT TO GO UP
10:53:33	SUP1	MISCX	PER ST 26... CLOSE LP/GYP... AND GYP CAN OFF RAMP
10:53:45	PD01	MISC	124, 87 ON EVENING STAR NOW...FOR C96Y
10:55:11	PD01	CHGLOCOS	C96Y EVENING STAR
10:56:31	PD01	MISC	.140, BLUE 7 ENR TO FIRE TO ASSIST...C3 PER W/C
10:56:47	PD01	MISC	.140, BLUE 1 ENR TO ASSIST
10:57:02	CT01	MISCX	1S2, REPORTS OF FIRE AT BRYANT ELEM
10:59:03	PD01	MISC	1S2, MOVE BREA FIRE TO GRN 2...KEEP YL FIRE ON GRN 1
10:59:28	PD01	MISC	124, CLEAR TO USE THE PA
11:01:04	SUP1	MISCX	STA 18 IS AVAILALE TO ASSIST PER LAURA
11:01:59	PD01	MISC	121, BLUERIDGE IS FULLY ENGULFED
11:02:13	PD01	BACKUP	C96Y 122
11:02:13	PD01	ID	122 <1601>JOHNSON,JASON <1348>GOGERTY,SHAWN
11:02:24	PD01	CHGLOCOS	122 EAST YL AREA
11:03:14	PD01	MISC	.140, BLUE 7 97 AREA...STARTING DOOR TO DOOR
11:03:44	PD01	MISC	124, 28675 BRUSH CYN...ABOUT TO GO UP
11:05:05	PD01	MISC	1S2, START REVERSE 911 TO EVAC HOMES
11:08:34	PD01	MISC	.140, BLUE 7 ADV 27830 TAMARA....VACANT HOUSE CATCHING ON FIRE NOW
11:09:00	PD01	MISC	124, 28535 EVENING BREEZE...OPEN DOOR...CHECKING INSIDE...DO NOT SEND UNIT YET
11:09:07	PD01	CHGLOCOS	124 28535 EVENING BREEZE DR ,YBL
11:09:53	PD01	MISC	1S2, FIRE ON PICASSO/CAMINO DE BRYANT
11:11:53	CT01	MISCX	1S2, TRAFF BACKED UP AT RIVERBEND
11:13:04	PD01	MISC	.140, OCFA, NEEDS 909C AT CAMINO DE BRYANT
11:13:34	PD01	MISC	1S2, WILL START PUSHING ALL TRAFFIC DOWN THE HILL FROM LA PALMA AT CAMINO DE BRYANT
11:14:06	CT01	MISCX	1S2, RPS CANT GET HER DAD JIM HENNAMAN.. 6161929 AT 28215 PINE MEAD .. SUBJ WENT BACK TO RES
11:14:22	PD01	MISC	1S2, BLUE UNITS HANDLING 909C
11:15:23	PD01	MISC	1S2, ATC OCFA...FIND OUT WHERE B/C IS FOR YL FIRE
11:16:34	PD01	MISC	1S2, PER OCFA...DIVISION COMMANDER AT JIB PKG LOT AT 91/GRN RIVER
11:18:37	PD01	MISC	121, HAVE 4 TRUCKS ON BLUERIDGE WITH ME
11:18:46	PD01	CHGLOCOS	121 BLUERIDGE
11:20:34	PD01	MISC	124, HOUSES GOING DOWN ON BLUE RIDGE.. DOING DOOR KNOCKS
11:20:49	PD01	BACK-OS	1S2 BLUE1
11:20:49	PD01	ID	BLUE1 <1372>CARPENTER,KELLY
11:21:00	PD01	CHGLOCOS	BLUE1 EB LP AT GYP
11:21:37	PD01	CHGLOCOS	223 TORONTO/CDB
11:22:40	PD01	CHGLOCOS	122 CDB/PATRANASA
11:24:29	PD01	BACKUP	1S2 7L1
11:24:40	PD01	CHGLOC	7L1 GREEN /91
11:25:52	PD01	CHGLOCOS	1S2 PICASSO DR/DELACROIX WY ,YBL
11:27:08	PD01	INSRVICE	1S2
11:28:17	PD01	CHGLOCOS	122 CAMINO DE BRYANT/LA PALMA AV ,YB
11:29:16	PD01	MISC	.140, BLUE 1 ADV ETA STA 10 SHUTTING DOWN GYPSUM CYN FROM THE 91
11:30:52	PD01	MISC	.140, FIRE MOVING RAPIDLY W/B TWDS LOMAS EAST AND LOS MEDRANOS AREA
11:31:45	PD01	MISC	.140, BLUE 1, IF STA 26 HAS UNIT AVAIL...NEED TO SHUT DOWN EB LA PALMA AT WEIR CYN
11:32:44	PD01	ONSCENE	7L1
11:33:02	PD01	MISC	7L1, 97 THE COMMAND POST
11:34:23	CT01	MISCX	RICK FROM SCHOOL DISTRCIT WILL BE OPENING UP TRAVIS FOR EVACUATION
11:35:05	PD01	BACKUP	7L1 1S2

11:35:05	PD01	ID	1S2 <1353>HALL,ROGER
11:35:17	PD01	ONSCENE	1S2
11:35:41	PD01	MISC	1S2, FIRE TO THE REAR OF BRYANT RANCH SCHOOL...BUT BLDG IS IN TACT
11:36:36	PD01	MISC	.140, COMMAND POST LOCATED AT GREEN VALLEY RIVER GOLF COURSE...IN THE W/END PKG LOT
11:36:55	CT01	MISCX	CAPP CALLED OUT
11:39:36	PD01	MISC	1S2, ADVISE WHO IS IN CHARGE OF BREA FIRE?
11:41:15	PD01	BACKUP	1S2 326
11:41:15	PD01	ID	326 <1574>GILBERT,CYNTHIA
11:42:45	PD01	MISC	124, REQ MASKS FROM THE CAPP UNIT
11:43:00	PD01	CHGLOCOS	124 BLUERIDGE
11:43:32	U957	MISC	122, 5655 REFUSAL TO LEAVE PER A NEIGHBOR...NO RESPONSE AT DOOR
11:43:41	PD01	MISC	1S2, CONTINUE EVACS...ONE REFUSAL
11:43:54	PD01	MISC	.140, HOUSES BURNING ON BLUERIDGE
11:44:19	PD01	MISC	.140, BLUE 1 ADV AT ALPINE/KODIAK MTN....HOUSES BURNING
11:44:57	U963	ENROUTE	326
11:46:51	PD01	MISC	.140, BLUE 1 ADV 3 HOUSES FULLY ON ALPINE...FIRE ONSCENE
11:47:10	PD01	MISC	.140, BLUE 4 FIRE STARTING AT RIVERBED E/OF GYPSUM
11:48:05	PD01	MISC	.140, BLUE 1 GET ETA FROM STA 26 AND STA 10
11:48:29	PD01	MISC	1S2, FYI...RSO UNITS TO BOX CYN TO START EVACS
11:50:16	PD01	MISC	.140, BLUE 1, FIRE IN THE RIVERBED....150 YRDS EOF GYPSUM BRIDGE
11:50:30	PD01	MISC	.140, BLUE 1 ADV FIRE PERSONNEL 97 WITH THEM
11:50:49	CT01	MISCX	ETA FOR ANA.... BEEN ER FOR 10 MINUTES
11:52:35	PD01	MISC	124, REQ MASKS AND WATER FROM THE CAPP UNITS
11:53:08	PD01	MISC	.140, STA 10 ADV THEY HAVE TWO UNITS W/B OFFRAMP AT GYPSUM
11:54:26	PD01	MISC	.140, NEED GYPSUM BRIDGE SHUT DOWN...NB TRAFFIC...PREVENTING FIRE PERSONNEL FROM COMING THRU
11:55:06	PD01	MISC	1S2, 746 ENR TO ASSIST BLU 1 AT LA PALMA
11:56:57	PD01	MISC	124, HOUSES FULLY ENGULFED ON BIG HORN
11:57:08	PD01	MISC	.140, BLU1 FIRE 20 YDS EOF..NEED STA 26 C3 TO SHUT DOWN S/B CAMINO DE BRYANT/ LA PALMA
11:57:21	SUP1	MISCX	PER LT RODRIGUEZ 2ORANGER1 FOR CORDINATION OF THE BREA FIRE ..
11:57:23	PD01	MISC	.140, 747Y ENR C3
11:58:49	PD01	MISC	124, FYI...WITH 121 ARE RETREATING A BIT
11:58:59	PD01	CHGLOCOS	124 BIG HORN
11:59:04	PD01	CHGLOCOS	121 BIG HORN
11:59:28	PD01	MISC	.140, BLU1 ADV FIRE REACHED THE GYPSUM CYN BRIDGE
11:59:52	PD01	MISC	223, AT LA PALMA AND LOMAS DE YORBA EAST...BLOCKING TRAFF
12:00:24	U963	ONSCENE	326
12:00:27	PD01	CHGLOCOS	223 LA PALMA/LOMAS DE YORBA EAST
12:00:37	PD01	MISC	.140, BLU1 ADV FIRE W/OF GYPSUM BRIDGE
12:04:16	PD01	MISC	1S2, RESIDENT ADV ANOTHER HOT SPOT AT 24673 LAS PETRANAS
12:06:01	PD01	MISC	.140, T39 OCFA REF HOT SPOT ON LAS PETRANAS
12:08:13	PD01	MISC	.140, 746Y ADV STA 26 HAS LA PALMA/WEIR
12:09:40	PD01	MISC	1S2, 746Y STARTING EVACS
12:10:42	CT01	MISCX	****70 YR OLD AT LOC..2790 MT HOOD.... CONFUSED. NOT ANSWERING PHNE..... RP IS SON IN LAW.. RYAN GRANU..336 8339
12:10:44	PD01	MISC	1S2, NEED UNIT TO BLOCK LA PALMA/LOMAS EAST
12:12:02	CT01	MISCX	CALLER ADVISING ARAGON ON FIRE.. 25592 ARAGON. HOUSE ON FIRE
12:12:10	PD01	MISC	1S2, FYI...LOT OF RSO UNITS AT THE CP AT BRYANT RANCH SCHOOL
12:12:25	PD01	MISC	1S2, BLU7 TO HANDLE THE WELF CHECK AT 2790 MT HOOD
12:13:01	PD01	CHGLOCOS	326 WEIR/LA PALMA, GRID LOCKED...UNABLE TO SEND ANYONE ANYWHERE
12:15:19	PD01	MISC	124, REF WELF CHECK NO SUCH ADDR...WILL START AT 27900 AND WORK MY WAY EAST
12:15:54	PD01	MISC	1S2, NEED CAPP TO RESPOND TO BRYANT RANCH ELEM
12:17:14	PD01	MISC	.140, BLU4 ADV VEHS BACKED UP TO LA PALMA/CAMINO DE BRYANT
12:18:07	PD01	BACKUP	122 746Y
12:18:07	PD01	ID	746Y <1382>JOHNSON,DARYL

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12:18:30 PD01 MISC      1S2, SEND RSO UNITS TO S/B YL TO NEW RIVER FOR TRAFF
                        CONTROL
12:18:40 SUP1 MISCX     ******TRAIN AT WEST CAMINO DE BRYANT .. TRAIN HAS
                        HAZARDOUS MATERIAL IN IT*******
12:18:54 PD01 CHGLOCOS  122 CAMINO DE BRYANT/DAISY CI ,YBL
12:19:18 PD01 MISC      1S2, KILO TO CAMINO DE BRYANT/TORONTO
12:20:00 CT01 MISCX     **** EVACUATION CENTER MOVED TO ESPERANZA HIGH SCHOOL
12:20:19 U982 BACK-ER   1S2 382K
12:20:19 U982 ID        382K <1497>BRINTLE,GREG
12:20:21 CT01 MISCX     NEW COMMAND POST FOR OCFA.. YORBA REGIONAL PARK
12:20:53 PD01 MISC      .140, NOW W/B FROM BRIDGE...100 YDS EOF LOMAS EAST
12:21:11 PD01 MISC      1S2, NOTIFY BNSF
12:22:53 PD01 MISC      .140, MAJORITY OF FIRE MOVED INTO RIVERBED
12:26:36 PD01 MISC      1S2, CHECK WITH OFCA...FFIRE IN THE RIVERBED...CHECK
                        WITH OCFA IF HOUSES ARE COMPROMISED
12:29:35 PD01 CHGLOCOS  121 CAMINO DE BRYANT/APPLECROSS LN ,
12:29:42 CT01 MISCX     PER OCFA HOUSES THAT ARE ENGULFED 24673 LA PATRANAS..
                        25592 ARAGON... 25686 CRSCREEK
12:30:00 PD01 MISC      1S2, CANNOT USE BRIDGE TO CROSS...UNSURE IF
                        STRUCTURALLY STABLE
12:31:53 PD01 MISC      223, HAS DEAD PORTABLE BATTERY
12:32:04 PD01 CHGLOCOS  326 YORBA LINDA BL/NEW RIVER ,YBL
12:32:24 PD01 MISC      1S2, SPOKE WITH FIRE...BRIDGE IS SOUND...USE THAT TO
                        SEND TRAFFIC S/B OVER TO GYPSUM
12:32:48 PD01 CHGLOCOS  746Y WIER/LA PALMA
12:33:40 PD01 BACKUP    1S2 702
12:33:40 PD01 ID        702 <1561>SANCHEZ,MICHELLE
12:34:05 PD01 MISC      7L1, CP IS LEAVING GOLF COURSE AND HEADING TO YORBA
                        REGIONAL PARK OFF OF LA PALMA
12:34:14 PD01 CHGLOC    702 ESPERANZA RD/NEW RIVER ,YBL
12:34:53 FD01 MISCX     NEED A UNIT TO RESP TO 5670...90 YR OLD PARENTS CANT
                        GET OUT..CANT DRIVE...NEED A UNIT
12:35:36 PD01 MISC      1S2, 5670 PICASSO REF ELDERLY COUPLE
12:36:04 PD01 MISC      .140, BLU7 SMOKE TWDS HIDDEN HILLS
12:36:50 PD01 MISC      .140, BLU7 ENR TO HANDLE 5670 PICASSO
12:37:27 PD01 CHGLOCOS  747Y GAS STA BY ICE PALACE
12:37:52 PD01 CHGLOCOS  C96Y BRUSH CANYON DR/CAMINO DE BRYANT
12:38:08 PD01 CHGLOC    747Y 5670 PICASSO DR ,YBL
12:38:12 PD01 BACKUP    747Y BLUE7
12:38:12 PD01 ID        BLUE7 <1457>HARVEY,CHRISTOPHER
12:38:16 PD01 ENROUTE   BLUE7
12:39:12 PD01 MISC      7L1, W/B 91 AT THE 241...FIRE IS BURNING
12:40:28 PD01 MISC      .140, 26905 APPLE CROSS ABOUT TO GO UP
12:40:46 PD01 MISC      7L1, ON THE SOUTH SIDE OF THE W/B 91
12:42:12 PD01 MISC      .140, T39 OCFA
12:43:04 PD01 CHGLOCOS  124 APPLECROSS LN/CAMINO DE BRYANT ,
12:43:37 PD01 BACKUP    1S2 V1Y
12:43:37 PD01 ID        V1Y <5010>CORNELL,WILL
12:43:42 PD01 ENROUTE   V1Y
12:44:11 PD01 MISC      .140, 5655 CAMINO DE BRYANT...FIRE TO THE REAR
12:44:22 PD01 MISC      .140, V1Y HAS WATER AND MASKS
12:44:27 PD01 ONSCENE   747Y
12:46:12 PD01 MISC      .140, RESIDENT TRAPPED ON VIA LOMAS EAST...NEED UNIT
                        FOR TRAFF CONTROL TO GET THEM OUT.
12:47:25 PD01 CHGLOCOS  122 VIA LOMAS DE YORBA E/LA PALMA AV
12:47:58 PD01 MISC      122, RESP C3
12:49:16 PD01 MISC      1S2, ALREADY 97 LOMAS EAST...NEG 122 C3
12:49:18 CT01 MISC      .140, IRVINE POLICE SENDING UNITS.. 2 ANIMAL CONTROLS
                        OFFICERS ALSO ER..
12:49:35 CT01 MISC      .140, LHABRA ER TO STA 27 FOR EVAC
12:49:50 PD01 MISC      .140, T39 OCFA REF 5605 CAMINO DE BRYANT
12:51:15 U982 ONSCENE   382K
12:51:57 PD01 MISC      .140, 24-SAM15, 24-218, 24-237 97
12:52:07 PD01 MISC      .140, 24 UNITS AT ARROYO PARK
12:52:12 U957 MISC      122, ENOUGH UNITS AT LP/YORBA EAST..CLEARING
12:52:20 CT01 MISCX     TUSTIN SENDING ONE UNTI
12:53:05 PD01 MISC      .140, T21 FOR 26970 APPLE CROSS...MULT CARS IN THE
                        DRIVEWAY, NO ANS AT THE DOOR
12:56:16 PD01 MISC      121, HEADING TO ARCO LA/LOMAS EAST
12:56:25 PD01 CHGLOC    121 LA PALMA AV/VIA LOMAS DE YORBA E
12:56:59 PD01 ONSCENE   702
12:58:10 SUPV MISCX     124, ANS MACH ON T21 TO 26970 APPLECROSS, MSG LEFT TO
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			EVAC
12:58:27	PD01	MISC	.140, PER 756Y, BRUSH FIRE REAR OF GREEN CREST...200 YDS FROM COMMUNICATION TOWER
13:00:02	PD01	MISC	.140, HAVE OCFA COME UP HIDDEN HILLS TO GRN CREST
13:04:29	PD01	MISC	1S2, MAP BOOK...START WITH HIDDEN HILLS, SAN ANTONIO
13:05:18	PD01	MISC	1S2, START ON ALL DIRECTIONS FOR THE REVERSE 911 PHONE CALLS....NEED TO T21 FOR EVACS
13:06:30	PD01	BACKUP	1S2 001
13:06:30	PD01	ID	001 <1295>CONKLIN,JACK
13:06:44	PD01	CHGLOCOS	001 CP/YORBA REGIONAL PARK
13:08:40	PD01	MISC	1S2, CHECK WITH STA 10...SEE IF THEY HAVE FWY BLOCKED OFF AT THE 91 FWY
13:10:09	SUP1	MISCX	STA 18 HAS 20 UNITS ER.. DO WE NEED MORE
13:10:48	PD01	MISC	1S2, PER STA 10...91 FWY CLOSED OFF AT BOTH DIRECTIONS AT IMP
13:12:13	PD01	MISC	7L1, START WITH 20 STA 18 UNITS...
13:12:43	PD01	BACKUP	1S2 3L1
13:12:43	PD01	ID	3L1 <1181>BRAKEBILL,JERRY
13:12:47	PD01	ONSCENE	3L1
13:12:54	PD01	MISC	3L1, HAVE WILSON WITH ME...START EVACS ON HIDDEN HILLS ALL THE WAY DOWN
13:13:45	PD01	MISC	3L1, FIRE NOW AT RES ON HIDDEN HILLS
13:14:11	PD01	CHGLOC	C96Y ESPERANZA RD/NEW RIVER ,YBL
13:14:57	PD01	MISC	.140, T39 WESTMINSTER PD TO RESPOND TO BREA COMM CENTER
13:15:11	PD01	MISC	.140, 10-33....CAUGHT ON FIRE...PUT MYSELF OUT
13:15:40	PD01	MISC	.140, HIDDEN HILLS/STONEWOOD...3L1 NEEDS TO GET OUT...TOO DANGEROUS
13:15:57	PD01	CHGLOC	124 HIDDEN HILLS RD/STONEWOOD DR ,YB
13:16:03	PD01	MISC	124, ENR C3
13:16:28	CT01	MISCX	415 RP CALLED AND SAID EB YORBA LINDA//VILLAGE CENTER.. HB UNITS.. OTHER EMER GENCY UNITS STUCK IN TRAFF. RP ADV.. WE NEED TRAFF STOPPED BEFORE VC
13:17:39	PD01	MISC	.140, 756Y, NEED FIRE...ON STONEHAVE, HAVE LARGE CHUCKS DROPPING ON HOUSES
13:18:43	PD01	CHGLOC	382K STONEHAVEN
13:19:44	PD01	MISC	.140, 756Y, HAVE HB FIRE B/C WITH NO HOSES...TOP THE REAR OF HEATHER RIDGE...ALL HOMES EVACUATED...NEED STONEHAVEN, ROCK HAMPTON
13:20:06	CT01	MISCX	****5390 LA CRESCENTA.. 65 YR OLD MALE.. PARTIALLY DEAF.. MAYBE STILL IN RES.. RP IS NEIL MERCHANT 562 818 1628
13:20:40	PD01	MISC	V1Y, 4885 GREEN CREST DR...ASSIST WITH EVAC OF AN ELDERLY PERSON
13:20:52	PD01	MISC	3L1, TO HANDLE GREEN CREST
13:21:34	PD01	ONSCENE	124
13:22:05	PD01	MISC	124, NEED HIM WEST
13:22:27	CT01	MISCX	VILLAE CENTER ... MALE SUBJ IN A SILVER JEEP CHER.. IN LANES SIDE WAYS.. SUBJ IS OUT OF VEH IN RED SHIRT.. STOPPING TRAFF
13:24:06	CT01	MISCX	RP IS CALLING 21880 DEVERON COVE ADV FIRE ACROSS STREET
13:25:57	PD01	MISC	3L1, UL ANYONE AT 4885 GREEN CREST
13:26:16	CT01	MISCX	4 CAPP MEMBERS CAN BE DEPLOYED.. THEY ARE AT VAL/LAM
13:26:29	PD01	BACKUP	1S2 7S1
13:26:29	PD01	ID	7S1 <1177>WILSON,MICHAEL
13:26:34	PD01	ONSCENE	7S1
13:26:48	PD01	CHGLOCOS	7S1 HIDDEN HILLS
13:27:18	U982	ONSCENE	382K
13:27:36	PD01	CHGLOC	BLUE7 5390 LA CRESCENTA ,YBL
13:27:41	U992	ONSCENE	C96Y
13:28:14	PD01	BACKUP	1S2 756Y
13:28:14	PD01	ID	756Y <1395>BLOCK,ROBB
13:28:30	PD01	MISC	.140, FIRE AT LOMAS WEST/AVE DE MARCIA
13:29:34	PD01	MISC	746Y, STOP TRAFF AT PALOMAS...NOT GO S/B
13:29:53	PD01	MISC	BLUE7, NO ANS AT DOOR ON LA CRESCENTA
13:30:03	PD01	MISC	7S1, WILL HAVE PEOPLE TRAPPED...STILL HAVE PEOPLE TRAPPED
13:31:03	PD01	MISC	756Y, NEED FIRE ON STONEHAVEN
13:31:26	PD01	MISC	756Y, NEED FIRE AT STONEHAVEN/ROCK HAMPTON
13:32:17	PD01	MISC	.140, RESIDENCE AT 24410 LOMAS WEST FULLY ENGULFED
13:32:24	PD01	CHGLOC	124 STONEHAVEN DR/ROCKHAMPTON CT ,YB

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13:33:10 CT01 MISC      .140, RP FROM 17277 BRAMBLE.....MALE SUBJ IN ALL
                        BLACK.. WAS UP IN HILL NEAR VALLEY VIEW.. 714
                        5241395.. BILL FOSTER.. RP TOOK A PICTURE..
13:33:18 PD01 MISC      3L1, FIRE AT ST FRANCIS SCHOOL
13:33:28 CT01 MISC      .140, PER RP THE SUBJ HAD BACK PACK AND WALKED INTO
                        THE HILLS
13:34:48 PD01 MISC      BLUE7, UL ANY RESIDENT ON LA CRESCENTA
13:34:51 PD01 INSRVICE  BLUE7
13:35:04 PD01 ONSCENE   756Y
13:35:13 PD01 CHGLOCOS  756Y STONEHAVEN DR/ROCKHAMPTON CT ,YB
13:35:51 PD01 MISC      .140, T39 OCFA REF FIRE APPARATUS NEEDED AT THE SCHOOL
13:38:36 PD01 MISC      124, NEED FIRE ON ABBEYMORE...WHOLE BLOCK UP
13:39:00 PD01 MISC      756Y, NEED FIRE....NEIGHBORS HOUSE ON FIRE ON
                        SOUTHERLAND
13:42:24 PD01 MISC      756Y, NEED OCFA AT 21735 SOUTHERLAND....CORNER OF
                        ROCKHAMPTON/SOUTHERLAND
13:42:51 PD01 BACKUP    001 2S2
13:42:51 PD01 ID        2S2 <1090>MESA,LESTER
13:42:54 PD01 ONSCENE   2S2
13:44:03 PD01 BACKUP    1S2 BLUE7
13:44:03 PD01 ID        BLUE7 <1457>HARVEY,CHRISTOPHER
13:44:06 PD01 ONSCENE   BLUE7
13:45:12 PD01 MISC      .140, CHECK ADDRESSES....22540 ROLLING HILLS LN AND
                        22655 HIDDEN HILLS...ASSIST WITH EVACS
13:45:37 SUP1 MISCX     FIRE SEEN BEHIND 4460 SAN ANTONIO....AND 4336
                        BOBWHITE.
13:45:47 SUP1 MISCX     XFR TO OCFA.
13:45:49 PD01 MISC      .140, BACK SIDE OF YORBA WEST...COMMERCIAL BLDGS
13:46:10 CT01 MISCX     ****TRAFFIC CONGESTION ON SAN ANTONIO
13:49:33 PD01 MISC      C96Y, REQ WELF CHECK 5345 BRENTWOOD
13:49:45 PD01 MISC      1S2, TRY TO HANDLE BRENTWOOD
13:50:16 PD01 MISC      7S1, SEVERAL HOUSES ON FIRE GREENHAVEN
13:51:34 PD01 CHGLOC    223 22540 ROLLING HILLS LN ,YBL
13:51:52 PD01 MISC      223, LA ROCCA/AGUA...STRUCTURE ON FIRE
13:52:13 PD01 MISC      1S2, START REVERSE 911 TO EASTLAKE VILLAGE
13:53:21 PD01 CHGLOCOS  1S2 5345 BRENTWOOD PL ,YBL
13:53:36 PD01 MISC      .140, FROM 758...22205 HIDDEN HILLS
13:53:49 PD01 MISC      .140, CORRECTION 22205 ROLLING HILLS
13:54:17 PD01 MISC      7S1, SEVERAL HOUSES FULLY ENGULFED ON ABBEYMORE
13:54:42 PD01 MISC      .140, NOTIFY SBSO TO SHUT DOWN THEIR SIDE OF CARBON
                        CYN
13:56:01 PD01 MISC      BLUE7, APT BLDG ON FIRE ON COPPER CYN
13:56:38 PD01 MISC      .140, 4BCY0PD0100 ZAQ.IV DATE: 11/15/08 TIME: 13:56
                        INSURANCE INFORMATION ON FILE POSSIBLE FILE CODES:
                        A(5CLT882) S(5CLT882) REG VALID FROM: 04/24/08 TO
                        04/24/09 LIC#:5CLT882 YRMD:03 MAKE:FORD BTM :4D VIN
                        :1FAFP34Z53W206793 R/O :CUTHBERT EDWARD J, OR CUTHBERT
                        DOROTHY A, 5430 COPPER CANYON RD A CITY:YORBA LINDA
                        C.C.:30 ZIP#:92887 SOLD:00/00/03 RCID:08/19/08
                        OCID:01/06/07 LOCD:9 TYPE:11 POWR:G VEH :12 BODY:0
                        CLAS:DJ REC STATUS: 05/29/2008 DELINQUENT NOTICE
                        EXTRACTED 06/13/03 SMOG DUE 04/24/09 06/11/03 PREV LIC
                        390331P CLEARANCE INFORMATION RECORDS: OFFICE WORK
                        DATE TECH/ID SEQ # VALUE FICHE DATE TTC C37 06/07/04
                        6R 0012 00221.00 00/00/00 H05 C37 03/09/05 6H 0003
                        00136.00 00/00/00 H05 C37 02/23/06 QA 0010 00129.00
                        00/00/00 H05 N06 12/29/06 BA 0000 00000.00 00/00/00
                        Z01 C37 01/12/07 6U 0006 00000.00 00/00/00 H00 RI5
                        06/12/07 40 7548 00185.00 00/00/00 POT VFR 08/14/08 VA
                        7937 00014.00 00/00/00 FR3 607 08/[11/15/08135638001]
13:56:38 PD01 MISC      .140, 19/08 K2 0003 00169.00 08/21/08 H00
                        04/23/2003-ODOMETER: 10 MILES ACTUAL MILEAGE END
                        [11/15/08135638002]
13:56:58 PD01 MISC      BLUE7, APPEARS WHOLE BLDG HAS BEEN EVAC
13:57:19 PD01 MISC      1S2, NO RESPONSE AT THE DOOR
13:57:24 SUP1 MISCX     FIRE IN BKYARD 4700 VIA CORZO...CELL 390 9789
13:58:07 PD01 CHGLOC    326 22205 ROLLING HILLS LN ,YBL
13:59:05 PD01 MISC      223, AT 22205 ROLLING HILLS...HAVE MALE SUBJ REFUSING
                        TO LEAVE
13:59:50 PD01 MISC      1S2, 10-33...EVAC HILLS NOW...FIRE ABV ME
14:00:49 PD01 MISC      1S2, 22305 MISSION HILLS...GOT SUBJ INTO VEH
14:01:19 PD01 MISC      124, 22700 HIDDEN HILLS
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14:02:03	PD01	MISC	1S2, NEED AMB NEW RIVER/ESPERANZE
14:02:39	PD01	MISC	1S2, NEED MEDICS AND AMB NEW RIVER/ESPERANZE
14:03:07	PD01	MISC	7S1, STONEHAVE/YL....NEED TO EVAC WHOLE COMPLEX
14:03:20	SUP1	MISCX	XFR TO OCFA...REF FIRE ON HILLSIDE ON VIA CORONA
14:03:35	PD01	CHGLOC	326 STONEHAVEN DR/YORBA LINDA BL ,YB
14:04:09	PD01	MISC	223, 22540 ROLLING HILLS...CHECKS C4...HE IS REFUSING TO EVAC
14:05:15	SUP1	MISCX	FIRE BROKE OUT NEAR YL WATER DISTR...RP CALLING FROM 870 BUCHANON CT
14:05:17	PD01	MISC	.140, PER758....4930 FAIRWOOD CIRCLE
14:05:54	PD01	ONSCENE	326
14:05:59	PD01	ONSCENE	223
14:06:33	FD01	BACK-ER	122 415
14:06:33	FD01	ID	415 <1482>MAYO,JOSEPH
14:06:52	PD01	MISC	3L1, ADVISE UNITS AT STONE/YL...TEAM OF 3 HB OFCR TO ASSIST WITH EVACS
14:08:09	PD01	MISC	124, 4320 WILLOW TREE...NEED UNIT FOR WELF CHECK
14:08:20	PD01	CHGLOCOS	124 YORBA LINDA BL/PASEO DE LAS PALO
14:08:26	U982	MISC	382K, STIRLINGBRIDGE CIRCLE EVACUATED - NO ANSWER AT ANY OF THE RESIDENCES.
14:08:54	PD01	MISC	756Y, 2 1/2 IN LINE...JUST NEED A HOSE
14:09:38	PD01	CHGLOCOS	121 STONEHAVEN DR/BLUE MOUNTAIN DR ,
14:10:31	PD01	MISC	.140, NEED CAPP TO HOME DEPOT FOR MASKS AND GOGGLES
14:10:54	PD01	BACKUP	1S2 758
14:10:54	PD01	ID	758 <1291>KANE,MARK
14:11:00	CT02	MISC	.140, , EVACUATIONS ... THEY HAVE GOT AS FAR AS HIDDEN HILLS AND VIA DEL AGUA... THEY ANTICIPATE GOING AS FAR AS FAIRMONT/VC.... EVACUATION CENTER IS STILL ESP HIGH .. WILL PROBABLY MOVE
14:11:13	CT01	MISCX	RES ON FIRE ON GRANDBY .. OCFA ER
14:11:39	PD01	BACKUP	415 481K
14:11:39	PD01	ID	481K <1510>LEKANDER,GEORGE
14:11:46	PD01	MISC	481K, RES FIRE 4695 VIA MONTE...HOUSE NEXT DOOR
14:12:23	PD01	CHGLOCOS	481K 4695 VIA AMANTE ,YBL
14:13:00	PD01	MISC	001, EVAC FOR YL...ESPERANZA HS
14:13:29	PD01	MISC	.140, 610...RAVINE TO THE REAR OF FORBES AND CARMICHAEL IS ON FIRE
14:14:30	PD01	ONSCENE	758
14:16:12	PD01	MISC	C96Y, RES ON GRANDVIEW ON FIRE
14:16:29	CT01	MISCX	FIRE ON DEODAR..
14:16:49	PD01	MISC	756Y, NEED WATER...WATER WAS TURNED OFF IN THE STREET...T21 WATER DEPT
14:17:16	PD01	CHGLOCOS	756Y SOUTHERLAND
14:17:24	CT01	MISCX	HOUSE IN FLAMES ON VISTA DEL SOL
14:17:35	PD01	MISC	.140, FIRE TO THE REAR OF 4945 STONEHAVEN
14:18:18	PD01	MISC	758, WEL CHECK FOR 22255 ROLLING HILLS
14:19:56	PD01	MISC	.140, HOUSE ENGULFED AT DE LAS ARBOLES/ROJO
14:20:17	PD01	MISC	.140, NEED WELF CHECK AT 3981 HOLLOW RIDGE
14:20:33	PD01	MISC	.140, PAGED WATER DISTRICT
14:21:11	CT01	MISC	.140, PER CAPT BURKS .. MANDATORY EVACUATIONS IN BREA .. NORTH OF SCB AND EAST OF BREA BLVD... PLEASE TELL PD AND FIRE IF THEY DO NOT ALREADY KNOW[11/15/0814211-1001]
14:21:17	PD01	BACKUP	1S2 3S2
14:21:17	PD01	ID	3S2 <1145>COOVERT,DAVID
14:21:26	PD01	CHGLOC	3S2 1830 KELLOGG DR ,ANA
14:21:52	CT01	FNLTYPE	FINALTYPE:PC-->904 PRI:5-->1
14:22:18	PD01	CHGLOCOS	1S2 STONEHAVEN DR/YORBA LINDA BL ,YB
14:22:29	CT01	MISCX	RP HOUSE ON FIRE ON DORINDA..
14:23:39	PD01	CHGLOC	223 22255 ROLLING HILLS LN ,YBL
14:25:16	PD01	MISC	.140, RES REFUSING TO EVAC...21535 DUNROBIN
14:26:13	PD01	MISC	124, OPENING FACILITY...ROSE DR CHURCH
14:29:03	PD01	MISC	.140, PER 741, 25517 ARAGON WAY...FAMILY MEMBERS ADV 92 YR OLD GRANDMOTHER POSS 97...NEED EVAC
14:29:36	SUP1	MISCX	20760 FERN CIR, PALM TREE ON FIRE
14:30:21	PD01	CHGLOC	122 BAST/FAIRMONT
14:30:31	PD01	MISC	122, WILL HANDLE ESCORT FOR YL WATER DISTRICT
14:31:21	SUP1	MISCX	HOUSE NEXT DOOR TO 543 BRENTWOOD, ON FIRE
14:32:34	PD01	MISC	481K, WELF CHECK AT 5380 VIA MARIPOSA...DISABLED MALE WAITING FOR ASSIST
14:32:46	PD01	MISC	.140, 816 AT ABBEY/STONE...WITH MASKS & GOGGLES
14:36:31	PD01	MISC	756Y, STRUCTURE ON FIRE ON ROCKHAMPTON...NEED FIRE

			ASAP
14:36:40	PD01	CHGLOC	1S2 4930 FAIRWOOD CI ,YBL
14:36:51	PD01	CHGLOC	223 4320 WILLOW TREE LN ,YBL
14:37:43	PD01	CHGLOCOS	121 4765 DEVONPORT CI ,YBL
14:41:35	PD01	MISC	3L1, MOVING CP FROM STA 27 TO YL COMM CENTER
14:44:23	PD01	MISC	758, WELF CHECK 22370 STARWOOD...EMPLOYEE IN THE BACKYARD
14:45:11	SUP1	MISCX	6 HOUSES AWAY FROM 20659 DEODAR, HOUSE IS ON FIRE...RP 693 1033, XFR TO OCFA
14:46:24	PD01	MISC	121, FIRE IN THE BACKYARD OF 4770 STERLING RIDGE
14:47:26	PD01	MISC	756Y, T39 REF FULLY ENGULFED HOUSE ON ROCKHAMPTON
14:47:37	PD01	CHGLOC	747Y 22255 ROLLING HILLS LN ,YBL
14:47:45	PD01	ONSCENE	1S2
14:48:04	PD01	MISC	1S2, FYI...HOUSE NEXT TO 4930 FAIRWOOD IS FULLY ENGULFED
14:48:26	PD01	MISC	.140, FLAMES TO THE REAR OF ....5105 STONEHAVEN
14:48:48	CT02	MISCX	ALL ADDITIONAL PERSONNEL RESPONDING TO YL FIRE NEED TO GO TO YL COMM CENTER .. SUB STATION IS IN THE PATH OF THE FIRE
14:49:09	PD01	MISC	.140, HOUSE ON FIRE AT 5030 ROCKHAMPTON
14:49:20	CT01	MISC	.140, TO COMM ALL ADDITIONAL PERSONNEL RESPONDING TO YL FIRE NEED TO GO TO YL COMM CENTER .. SUB STATION IS IN THE PATH OF THE FIRE (ALSO PUT INFO IN THE YL FIRE CALL) [11/15/08144920001]
14:49:28	PD01	MISC	.140, FIRE NEED TO CRESCENT CUL DE SAC
14:49:52	PD01	MISC	702, WELF CHECK TO 4740 VIA CORZO...ELDERLY MALE
14:50:19	PD01	MISC	.140, FIRE NEEDED AT 5125 STONEHAVEN
14:50:33	PD01	MISC	223, MALE HALF CONTACTED AND LEFT
14:50:39	PD01	ONSCENE	223
14:50:58	PD01	CHGLOC	223 3981 HOLLOW RIDGE CT ,YBL
14:51:58	PD01	CHGLOC	BLUE7 25517 ARAGON WY ,YBL
14:54:02	SUP1	MISC	.140, PER OCFA, WANTED TO KNOW IF CIVILIAN BURN VICT WAS HELPED, THEY RECVD CALL AT 1403HRS. ANNOUNCEMENT MADE OVER GRN 1 NO ACKNOWLEDGEMENT. T39 OCFA.
14:54:09	PD01	CHGLOCOS	122 4740 VIA CORZO ,YBL
14:55:07	PD01	ONSCENE	BLUE7
14:56:36	PD01	MISC	.140, PER KILO UNIT...5 HOUSES ON SAN ANTONIO FULLY ENGULFED
14:58:25	PD01	CHGLOC	747Y 5380 VIA MARIPOSA ,YBL
14:58:51	PD01	MISC	223, NO ONE HOME AT HOLLOW RIDGE
15:01:29	PD01	MISC	758, FIRE MOVING TOWARD NR/ESP
15:04:41	SUP1	MISC	.140, HOUSE ON FIRE...4395 DEODAR, XFR TO OCFA.
15:04:51	U957	INSRVICE	122
15:06:39	PD01	CLEAR	1S2 CM
15:07:18	PD01	CLEAR	223 CM
15:09:50	PD01	MISC	758, BURNING FAST NR/ESP
15:18:26	PD01	MISC	758, FIRE BURNING ON THE S/SIDE OF HONDA DEALERSHIP
15:20:40	PD01	MISC	.140, FIRE NOW AT WEIR/LA PALMA
15:23:08	PD01	MISC	746Y, STOP ALL W/B LA PALMA TRAFF FROM LOMAS WEST
15:24:48	PD01	BACKUP	7L1 112 1S2
15:24:48	PD01	ID	112 <1408>CONNER,ROBERT
15:24:48	PD01	ID	1S2 <1353>HALL,ROGER
15:25:37	PD01	MISC	.140, RESIDENTS ON MCKINNLEY STILL STAYING..REFUSING TO EVAC
15:27:54	PD01	MISC	481K, START AT FAIRMONT/VC
15:28:57	PD01	MISC	1S2, WATER CAUGHT THE PALMS NEAR THE HONDA CENTER
15:29:23	PD01	MISC	758, HOUSE ON FEATHER FULLY ENGULFED
15:29:44	PD01	MISC	.140, FIRE JUMPED TO THE W/SIDE OF STONEHAVEN
15:30:18	PD01	MISC	.140, FIRE GOING TO JUMP OVER AT WEIR/LA PALMA
15:30:38	PD01	MISC	.140, UNABLE TO GET FIRE APPARATUS IN THERE...BRUSH AREA
15:31:32	PD01	MISC	746Y, E/B TRAFF ON LA PALMA SHUT DOWN...JUST OVERFLOW...TRYING TO CLEAR IT
15:32:51	PD01	MISC	746Y, FIRE BURNING W/B THRU THE RIVERBED...GETTING READY TO JUMP OVER YL BL ON THE NORTH SIDE OF LA PALMA
15:33:20	PD01	MISC	BLUE1, NEED YL BL SHUT DOWN AT NEW RIVER... NO S/B TRAFF
15:33:32	PD01	MISC	BLUE1, ALL TREES IN HONDA DEALERSHIP ON FIRE
15:34:26	PD01	CHGLOCOS	481K YORBA LINDA BL/NEW RIVER ,YBL, SHUTTING DOWN S/B TRAFF
15:34:30	PD01	ONSCENE	112
15:34:32	PD01	ONSCENE	1S2

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15:35:00 PD01 MISC      756Y, NEED FIRE PLUGS ON SOUTHERLAND... NO FIRE UNITS
                        97
15:35:13 SUP1 MISC      .140, PER 4S TO 2L, STA 21 SENDING 4 UNITS TO CP
15:36:19 PD01 MISC      758, CONFIRM WE HAVE E/B SHUT DOWN NEAR THE BRIDGE ON
                        ESPERANZA
15:36:50 SUP1 MISCX     21667 CASINO RIDGE, HOUSE ON FIRE, XFR TO OCFA.
15:38:30 PD01 CHGLOCOS  756Y 21735 SOUTHERLAND
15:39:26 PD01 BACKUP    7S1 751Y
15:39:26 PD01 ID        751Y <1519>BLAKE,JASON
15:39:30 PD01 BACKUP    7L1 122
15:39:30 PD01 ID        122 <1601>JOHNSON,JASON <1348>GOGERTY,SHAWN
15:39:31 PD01 BACKUP    7L1 223
15:39:31 PD01 ID        223 <1461>ZEEB,ROBERT
15:39:38 PD01 CHGLOCOS  223 NEW RIVER/YORBA LINDA BL ,YBL
15:39:46 PD01 CHGLOCOS  751Y NEW RIVER/YORBA LINDA BL ,YBL
15:40:58 PD01 MISC      .140, OCFA...ASKING TO EVAC NORTH OF YL BTWN VILLAGE
                        CENTER & LAKEVIEW...[11/15/08154058001]
15:41:48 PD01 CHGLOCOS  112 LA PALMA AV/MERCADO DEL RIO ,YBL
15:42:19 PD01 MISC      112, 12 RIVERSIDE FIRE TRUCKS ENR TO YL COMM CENTER
15:42:51 SUPV MISCX     8 STA 18 UNITS AND 4 STA 21 UNITS
15:44:00 PD01 MISC      .140, BLU4...FIRE MOVED INTO SAVI RANCH COM
                        22951...THERE IS AN AUTO SUPPLY BLDG ON FIRE
15:44:04 PD01 BACKUP    382K BLUE4
15:44:04 PD01 ID        BLUE4 <1490>HAEFNER,ROBERT
15:44:17 PD01 MISC      BLUE4, BUSHES NEAR KOHLS ON FIRE
15:44:35 PD01 CHGLOCOS  122 ESP/BRIDGE, SHUTTING DOWN E/B TRAFF
15:45:11 PD01 CHGLOCOS  BLUE4 22951 SAVI RANCH PY ,YBL
15:45:32 PD01 MISC      1S2, INFO FIRE STRIKE 97 AT COSTCO
15:46:07 PD01 CHGLOCOS  1S2 22951 SAVI RANCH PY ,YBL
15:47:14 PD01 MISC      122, REF SHUT DOWN...ARE RESIDENT ALLOWED IN W/OF THE
                        BRIDGE...RESIDENTS CANNOT GO E/B
15:47:55 PD01 CHGLOCOS  382K NEW RIVER/YORBA LINDA BL ,YBL
15:48:48 PD01 MISC      .140, NEED UNIT TO DO WELF CHECK AT 25609 ARAGON WAY
15:49:37 PD01 INSRVICE  BLUE7
15:49:41 CT01 MISC      .140, *** VEH LOOKED OUT OF PLACE.. FRMT/ YLINDA.. RP
                        JUST SAW VEHS WITH COUPLD MALE BLKS WITH SCRAFS..
                        L/5YEH594.. SILVER TOY.. .. RP JOHN RYAN 5160 VIA
                        MARGARTIA... 777 2708.. CELL 396 7159
15:50:45 PD01 CHGLOCOS  382K 22951 SAVI RANCH PY ,YBL, ASSIST WITH EVAC
15:51:07 U957 INSRVICE  122
15:51:56 PD01 MISC      1S2, CONTACTED BY STA 18 DEPUTY...JOSH VERNON 13 YOM
                        WAS EVAC FROM EXTENDED...MOM NOTFIED...JOSH WENT TO
                        ESP HS
15:52:38 PD01 MISC      .140, NEED UNIT FOR TRAFF CONTROL....YL/STONEHAVEN
15:54:29 PD01 MISC      .140, MOST OF RETAIL HAS BEEN EVAC AT SAVI
15:57:20 PD01 MISC      .140, 814, ADDRESSES OF HOMES DESTROYED...4985
                        ABBEYMORE...4980 PARTIALLY DAMAGED...4990 COMPLETELY
                        GONE
15:59:12 PD01 CHGLOCOS  121 21915 HEATHERIDGE DR ,YBL
15:59:43 PD01 MISC      7S1, HOUSE ON FIRE ON VIA DEL CORAL...IT IS GOING TO
                        SPREAD AT THE END OF THE CUL DE SAC
16:02:06 PD01 MISC      .140, KILO ADV FIRE AT THOMASVILLE HOME FURNISHINGS...
                        23061 SAVI RANCH
16:02:30 PD01 CHGLOCOS  326 25609 ARAGON WY ,YBL
16:02:42 PD01 MISC      326, CONTACT WITH FEMALE RES...C4...SHE REMAINED IN
                        HER HOUSE
16:03:06 PD01 MISC      112, ALL E/B TRAFF ON LA PALMA FROM WEIR
                        STOPPED...POWER LINES ABOUT TO GO DOWN
16:05:11 PD01 MISC      1S2, ELDERLY RES ON HEATHER RIDGE WAS REFUSING...GRAN-
                        DSON 97 TRYING TO GET HIM OUT NOW
16:07:09 PD01 MISC      .140, FRONT YARD OF RES BURNING...TIMBER
                        RIDGE/FAIRMONT
16:08:26 PD01 MISC      .140, ESP AND NEW RIVER...OKAY FOR W/B UNTIL FIRE
                        CROSSES LA PALMA
16:12:39 PD01 CHGLOCOS  747Y NEW RIVER/ESPERANZA RD ,YBL
16:12:44 PD01 CHGLOCOS  758 NEW RIVER/ESPERANZA RD ,YBL
16:14:47 PD01 MISC      .140, 4800 VIA DEL ROCCA...OPEN GAS PIPE BURNING
16:16:15 PD01 MISC      415, FAR EAST RESIDENCES OF JUNIPER ON FIRE
16:17:23 PD01 CHGLOCOS  415 20856 JUNIPER AV ,YBL
16:17:32 PD01 MISC      415, SEVERAL RESIDENCES ON FIRE
16:20:33 PD01 CHGLOCOS  7L1 CP/YORBA REGIONAL PARK
16:22:44 U752 MISC      702, CDL INQUIRY DL/C1456164
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16:23:07	PD01	BACKUP	1S2 821
16:23:07	PD01	ID	821 <1312>ALONZO,RUBEN
16:23:13	PD01	CHGLOCOS	821 YORBA REGIONAL
16:23:43	PD01	CHGLOCOS	702 PASEO DE LAS PALOMAS/YORBA LINDA
16:23:49	PD01	MISC	702, REQ UNIT REF 415 SUBJ
16:23:58	PD01	MISC	702, BLUE1 TO FOLLOW 702
16:24:46	PD01	MISC	124, EVERYTHING EVAC ON V/C....E/OF
16:25:18	CT01	MISCX	AT ARCHSTONE .. FIRE TRICK OS FIGHTING FIRE AND THR ARE LOOTERS TAKING THINGS FORM APTS.. NEAR FIRE TRUCK
16:25:56	PD01	MISC	415, EVERYONE ADVISED TO EVAC...ON SMOKETREE FROM MANZANITA TO JUNIPER
16:26:26	PD01	MISC	223, EVAC NOF BAST BETWEEN VC/FAIRMONT
16:27:34	PD01	MISC	124, WITH KILO...EVAC W/OF V/C STARTING WITH PEPPER AND BEACH
16:28:56	PD01	MISC	.140, KILO ADV EVAC ON PEPPER SOF CASIO...TEAM OF 3 HEADED S/B FROM THERE
16:32:07	PD01	CHGLOCOS	7S1 CASINO RIDGE
16:33:21	PD01	MISC	481K, IRVINE PD EVAC EVERYTHING ON W/SIDE OF VC
16:34:04	PD01	MISC	758, FIRE JUMPED LA PALMA...NOW ON ESP SIDE OF THE TRACKS
16:35:32	PD01	MISC	415, NEED UNIT ON SINGINGBIRD TO ASSIST WITH EVAC
16:36:34	PD01	MISC	415, SINGINGBIRD LOC LEFT ON FAIRMONT FROM VC...FIRST RIGHT
16:37:57	PD01	MISC	223, 3590 VISTA GLEN...GARAGE DOOR OPEN ...BOX OF DYNAMITE
16:38:58	PD01	MISC	.140, T39 STA 18
16:41:49	PD01	MISC	.140, 825...STA 18 SENDING UNITS TO CHECK THE DYNAMITE
16:45:07	PD01	MISC	BLUE1, 97 VISTA GLEN AND RIDGE CREST
16:46:31	PD01	CHGLOCOS	BLUE1 VISTA GLEN CI/RIM CREST DR ,YBL
16:46:42	PD01	MISC	BLUE1, CORRECTION 97 VISTA GLEN/RIM CREST
16:50:33	PD01	MISC	.140, PER BLUE 7..FIRE BURNING UP TO RIM CREST..UNITS DONT RESPOND TO RIM CREST
16:50:50	PD01	MISC	.140, PER BLUE 9...NEED A UNIT TO MOVE THE MOTORISTS FROM
16:51:14	PD01	CHGLOCOS	481K TOP/RIM CREST, STUCK...CANT COME DOWN FROM THE TOP....STUCK BY FIRE
16:51:17	U957	BACK-OS	1S2 122
16:51:17	U957	ID	122 <1601>JOHNSON,JASON <1348>GOGERTY,SHAWN
16:51:49	PD01	CHGLOCOS	382K STUCK/RIMCREST
16:51:55	PD01	CHGLOCOS	124 STUCK/RIMCREST
16:53:19	PD01	MISC	758, HAVE EAST BOUND CONED OFF....
16:54:17	PD01	MISC	C96Y, FIRE COMING DOWN BRIDGE
16:54:53	PD01	MISC	758, WILL T23 AS LONG AS I CAN..THEN WILL LEAVE TO THE CONES
16:55:49	PD01	BACK-PRE	124 7S1Y
16:55:55	PD01	CHGLOCOS	7S1Y WEIR CANYON RD/ESPERANZA RD ,YBL, ...FIRE INTO HONDA DEALERSHIP....
16:56:02	PD01	MISC	7S1Y, AFRIAD CARS WILL EXPLODED
16:56:29	PD01	MISC	223, ROAD FLARES IN GARAGE CK'D C4
16:56:45	PD01	BACKUP	#083200140 BLUE10 BLUE3 BLUE6 BLUE7 BLUE8 BLUE9 BLUE5
16:56:45	PD01	ID	BLUE10 <1512>ALFARO,LUIS
16:56:45	PD01	ID	BLUE3 <1379>PETRONELLA,MICHAEL
16:56:45	PD01	ID	BLUE6 <1569>BARSLUND,CHRISTOPHER
16:56:45	PD01	ID	BLUE7 <1457>HARVEY,CHRISTOPHER
16:56:45	PD01	ID	BLUE8 <1483>WOOD,CHRISTOPHER
16:56:45	PD01	ID	BLUE9 <1486>MONTALVO,WILLIAM
16:56:45	PD01	ID	BLUE5 <1513>FERRARO,SCOTT
16:56:56	PD01	ONSCENE	BLUE10
16:56:56	PD01	ONSCENE	BLUE3
16:56:56	PD01	ONSCENE	BLUE5
16:56:56	PD01	ONSCENE	BLUE6
16:56:56	PD01	ONSCENE	BLUE7
16:56:56	PD01	ONSCENE	BLUE8
16:56:56	PD01	ONSCENE	BLUE9
16:57:39	SUP1	MISCX	T39 OCFA REF FIRE JUMPING OVER INTO THE HOND DLRSHIP
16:58:18	PD01	PREEMPT	326
16:58:32	PD01	PREEMPT	7S1Y
16:58:34	U952	MISC	121, REG INQUIRY LIC/8R11098
17:00:26	PD01	MISC	121, GAS PIPES BROKEN
17:01:08	PD01	CHGLOCOS	BLUE7 TROTTER LN/QUARTER HORSE DR ,YBL, STARTING EVACS
17:01:17	PD01	MISC	BLUE7, PER 836..HAVE ALRADY BEEN EVACKED
17:02:27	PD01	PREEMPT	122

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17:03:21 PD01 CHGLOCOS 751Y YL/NR AREA
17:03:31 PD01 CHGLOCOS 756Y YL/NR
17:04:32 PD01 CHGLOC   481K FAIR/QUARTER, MADE IT OFF RIMCREST AFTER FIRE
                       PAST
17:04:42 PD01 CHGLOC   382K FAIR/QUARTER, MADE IT OFF RIMCREST AFTER FIRE
                       PAST
17:04:47 PD01 CHGLOC   124 FAIR/QUARTER, MADE IT OFF RIMCREST AFTER FIRE PAST
17:10:05 PD01 ONSCENE  3S2
17:11:53 PD01 MISC     C96Y, STILL TURNING AROUND TRAFFIC
17:12:08 U959 PREEMPT  223
17:12:24 PD01 CHGLOC   BLUE7 VIA CONTENTO, CK ON FIRE
17:13:29 PD01 MISC     BLUE7, HOUSE ALL BURNED DOWN...GUY TRYING TO PUT OUT
                       EMBERS
17:17:10 PD01 BACK-OS  112 412
17:17:10 PD01 ID       412 <1377>MOON,DANIEL
17:17:14 PD01 CHGLOCOS 412 OHIO
17:19:36 PD01 BACK-ER  412 311
17:19:36 PD01 ID       311 <1578>HOLMES,NEAL
17:19:45 PD01 CHGLOC   311 YORBA LINDA BL/OHIO ST ,YBL
17:19:54 PD01 CHGLOCOS 415 OHIO ST/YORBA LINDA BL ,YBL, AS WELL
17:20:42 PD01 CHGLOC   382K 2445 E IMPERIAL HY #K ,BEA, FIRE WANTS IT SHUT
                       DOWN
17:20:46 PD01 CHGLOC   382K QUARTER HORSE, FIRE WANTS IT SHUT DOWN
17:21:06 PD01 CHGLOC   415 QUARTER HORSE/BAST
17:21:41 PD01 BACK-OS  415 327
17:21:41 PD01 ID       327 <1501>TRENT,RYAN <1570>KUNZE,ALFONS
17:22:40 PD01 ONSCENE  415
17:22:46 PD01 CHGLOCOS 311 OHIO/NO YL
17:23:39 PD01 BACK-OS  311 416, EVAC OHIO
17:23:43 PD01 ONSCENE  382K
17:25:30 PD01 MISC     415, FM BLOCKED AT BAST GOING NB...ALSO WANT BAST
                       BLOCKED OFF GOING TO VC...
17:25:37 PD01 CHGLOCOS 481K FM/BAST
17:25:57 PD01 MISC     415, FM BLOCKED AT BAST GOING NB...ALSO WANT BAST
                       BLOCKED OFF GOING TO VC...
17:26:05 PD01 CHGLOCOS 124 EB BAST/FM
17:27:41 PD01 MISC     1S2, MAIN CP FOR FIRE....IS YR PARK
17:28:31 PD01 INSRVICE BLUE7
17:29:18 PD01 INSRVICE BLUE1
17:30:05 PD01 MISC     .140, PER 8S2 M, HILLSIDE BEHIND COMM BUILDINGS ON LP
                       ARE ON FIRE...AND HEADING TOWRDS TRAIN..JUST WEST OF
                       OLD VILLAGE
17:30:50 PD01 MISC     .140, T39 OCFA
17:31:01 PD01 MISC     .140, 230001 LP
17:31:14 PD01 MISC     .140, TRAIN MOVING WEST NOW
17:39:35 PD01 BACK-OS  3S2 833
17:39:41 PD01 CHGLOC   833 21850 FEATHER AV ,YBL, HOUSE BURNT TO
                       GROWUND...GAS STILL GOING....NEED GAS CO TO SHUT OFF
17:46:14 PD01 INSRVICE 112
17:46:47 PD01 INSRVICE 121
17:46:49 PD01 INSRVICE 124
17:49:03 RC01 MISC     .0140, CITIZEN CALLED AND SAID HE THEY WERE BEING
                       EVACUATED ON PEPPER ST IN YL AND A 925 WHI FORD F150
                       WAS CASING THE NEIGHBORHOOD IT HAD THE WORDS CUSTOM
                       TILE AND GROUT ON SIDE OF TRUCK
17:50:35 PD01 MISC     833, SIT AT 20098 LIVORNIO.,..BAST/FM...NEW
                       COMPLEX...FLAMES COMING DOWN .....2 ELDERLY PEOPLE
                       THAT CANT GET OUT WITH OUT AMBULANCE...REQ CODE 3
17:50:39 SUP1 MISC     .140, PER CHP -NB 57 N/O IMP, DIVERTING OFF IMP. SB
                       SIDE CLOSED AT THE 60FWY...E&W 91 CLOSED TO 71...NB
                       241 CLOSED FROM SANTIAGO.
17:52:16 PD01 MISC     .140, ESP/DOMINGUEZ....WB TRAFFIC COMING
17:52:24 PD01 MISC     758, NEG EB STILL CLOSED...WB ALLOWED
17:53:50 PD01 INSRVICE BLUE3
17:54:13 PD01 BACK-OS  3S2 121
17:54:13 PD01 ID       121 <1577>STIEFEL,SHAYNE
17:54:20 PD01 CHGLOCOS 121 SH/AVIE MORE
17:54:49 SUP1 MISCX    833, T39 GAS CO, REF 21850 FEATHER, UNK ETA.
17:55:42 PD01 BACK-OS  311 112
17:55:42 PD01 ID       112 <1408>CONNER,ROBERT
17:55:50 PD01 CHGLOCOS 112 VIA LOMAS DE YORBA E/LA PALMA AV
17:58:39 PD01 PREEMPT  747Y
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18:00:26 PD01 PREEMPT   702
18:00:53 PD01 PREEMPT   121
18:04:58 PD01 BACK-OS   382K 124
18:04:58 PD01 ID        124 <1584>WAMBAUGH,JASON
18:05:59 PD01 CHGLOCOS  124 FAIR/BAST
18:07:39 PD01 MISC      416, EVERY THING ON ORIENTE BTWN PALM AND ORIENTE
                        EVAC'D VIA PA
18:08:32 PD01 BACK-PRE  .140 326
18:08:32 PD01 ID        326 <1574>GILBERT,CYNTHIA
18:08:43 PD01 CHGLOCOS  326 STONEHAVEN DR/YORBA LINDA BL ,YB, BLKIN ALL NB
                        TRAFF
18:10:07 PD01 MISC      311, LA CACITA EVAC NOW
18:10:21 PD01 MISC      1S2, ATC ANYONE OUT WITH MY UNIT
18:11:26 PD01 MISC      833, NEED PACKSET BATTERIES TO CP
18:13:13 PD01 MISC      7S1, NEED 926 ON STOVE HAVEN 1/2 WAY UP VEH PARKED
                        BLKIN SB TRAFF
18:13:35 PD01 MISC      7S1, CORR SAN ANTONIO
18:13:43 PD01 QUERY     7S1 XL L/4HCX097
18:13:48 PD01 MISC      7S1, 4BCY0PD0100 ZAQ.IV DATE: 11/15/08 TIME: 18:13
                        INSURANCE INFORMATION ON FILE POSSIBLE FILE CODES:
                        A(4HCX097) S(4HCX097) REG VALID FROM: 07/26/08 TO
                        07/26/09 LIC#:4HCX097 YRMD:99 MAKE:VOLK BTM :4D VIN
                        :3VWSC29M6XM109861 R/O :ABDOLLAH TAMAR, 2402 22ND ST
                        CITY:SANTA MONICA C.C.:19 ZIP#:90405 SOLD:00/00/99
                        RCID:10/05/08 OCID:10/29/06 LOCD:3 TYPE:11 POWR:G VEH
                        :12 BODY:0 CLAS:AN *-YR:06 REC STATUS: 10/02/08 SMOG
                        DUE 07/26/10 09/16/99 PREV LIC R618655 CLEARANCE
                        INFORMATION RECORDS: OFFICE WORK DATE TECH/ID SEQ #
                        VALUE FICHE DATE TTC C45 08/27/04 5M 0014 00192.00
                        09/02/04 H00 C45 08/26/04 5I 0008 00192.00 PRIOR
                        SUSPENSE 515 08/02/05 N7 0011 00128.00 08/04/05 H05
                        515 08/02/05 N7 5011 00063.00 08/04/05 H05 C45
                        11/11/05 5Z 0007 00000.00 11/17/05 H00 C45 09/26/06 5U
                        0007 00165.00 09/30/06 H05 616 10/19/06 E4 0011
                        00180.00 10/21/06 F00 RI9 05/25/07 40 7041 00063.00
                        05/25/07 POT RI9 10/02/08 40 7339 00102.00[11/15/0818-
                        1348001]
18:13:48 PD01 MISC      7S1, 10/02/08 POT 10/18/2006-ODOMETER: 105,613 MILES
                        ACTUAL MILEAGE END [11/15/08181348002]
18:16:42 PD01 MISC      7S1, 926A BREA TOW
18:21:25 PD01 MISC      7S1, CX SAN ANTONIO T39 926
18:25:32 PD01 MISC      833, REQ 100 PACSET BATTEROIES
18:27:30 PD01 INSRVICE  412
18:27:40 PD01 BACK-ER   751Y 412, ERT TO RELIEVE 751
18:27:40 PD01 ID        412 <1377>MOON,DANIEL
18:31:08 PD01 PREEMPT   311
18:32:18 PD01 BACK-ER   124 121, ERT TO CP ON CASA LOMA PER 1S2
18:32:18 PD01 ID        121 <1577>STIEFEL,SHAYNE
18:33:32 PD01 PREEMPT   BLUE4
18:33:43 PD01 CHGLOCOS  112 CP
18:35:42 PD01 BACK-ER   .140 122, ERT WITH BATTERIES AND CHRGR
18:35:42 PD01 ID        122 <1601>JOHNSON,JASON <1348>GOGERTY,SHAWN
18:35:49 PD01 CHGLOC    122 4501 CASA LOMA AV ,YBL
18:37:48 PD01 ONSCENE   412
18:41:10 PD01 MISC      746Y, PPL SAYING LP IS NOW OPEN EB FROM WEIR CAN WE
                        CONFIRM?
18:42:51 PD01 MISC      3L1, REF EB LP AT WEIR IT NEEDS TO REMAIN CLOSED
18:43:49 PD01 MISC      746Y, IT IS STILL CLOSED.....T22 ANY FURTHER ....IT
                        NEEDS TO REMAIN THAT WAY
18:44:37 U957 ONSCENE   122
18:46:05 PD01 MISC      481K, WESTMINSTER PD IS 97 AT BAST/FAIR FOR RELIEF
18:46:08 PD01 ONSCENE   121
18:46:25 PD01 CHGLOCOS  121 YL COMM CENTER
18:49:43 PD01 CHGLOC    415 CASALOMA CP, RELIEVED FAIR/BAST BY WESTMINSTER
18:49:59 PD01 CHGLOC    481K CASALOMA CP, RELIEVED FAIR/BAST BY WESTMINSTER
18:50:03 PD01 CHGLOC    382K CASALOMA CP, RELIEVED FAIR/BAST BY WESTMINSTER
18:51:13 PD01 PREEMPT   BLUE6
18:51:13 PD01 PREEMPT   BLUE9
18:51:13 PD01 PREEMPT   BLUE10
19:00:16 PD01 MISC      3L1, T39 ANAHEIM PD REF WEIR/LP
19:02:45 PD01 MISC      416, FLAMES GETTIN CLOSE TO BLK GOLD PRO SHOP....DOES
                        FIRE WANT US TO EVAC HOUSES ON SOUTH SIDE OFF LAKEVIEW
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19:04:22 U982 ONSCENE   382K
19:04:35 PD01 MISC      416, ON HOLD WITH OCFA COMMANDER
19:09:53 PD01 CHGLOCOS  416 17683 LAKEVIEW AV ,YBL
19:10:54 PD01 MISC      327, EVAC'G SARAZEN ST NOW
19:12:33 PD01 BACKUP    416 747Y
19:12:33 PD01 ID        747Y <1505>BAKER,STEPHEN
19:13:02 PD01 CHGLOCOS  416 LV/JNO BASTANCHURY
19:17:27 SUP1 MISCX     V1Y NEEDS RELIEF AT PALOMAS/YL...
19:17:42 PD01 CHGLOCOS  V1Y PASEO DE LAS PALOMAS/YORBA LINDA
19:17:58 PD01 MISC      416, 327 EVAC AREA NEAR GOLF COURSE FLAMES 100 YDS
                        AWAY
19:18:45 PD01 BACK-OS   .140 BLUE3
19:18:45 PD01 ID        BLUE3 <1379>PETRONELLA,MICHAEL
19:18:46 PD01 MISC      BLUE3, RPTS THAT RIVERBEND IS GOING UP IN FLAMES AGAIN
19:19:14 PD01 MISC      3L1, ALSO HAVE INFO OF ACTIVE LOOTING AT RIVERBEND
19:19:23 PD01 MISC      3L1, HOETKER AND VANAGS ALSO ERT
19:20:00 PD01 MISC      416, NEED 2 UNITS UP TO HOGAN TO CLEAR OUT LOOKY LOOES
19:21:00 PD01 CHGLOCOS  BLUE3 RIVERBEND
19:21:08 SUP1 MISCX     BLUE3, 1039 OCFA REF RIVERBEND ON FIRE..
19:21:39 PD01 BACK-OS   .140 311
19:21:39 PD01 ID        311 <1578>HOLMES,NEAL
19:21:41 PD01 CHGLOCOS  311 17051 VISTA MORAGA ,YBL, EVAC
19:22:00 PD01 MISC      416, T22 HAVE MOTOR HELPING HOGAN
19:22:18 PD01 CHGLOCOS  416 HOGAN JSO CLUBHOUSE, LARGE AMT OF LOOKY LOOES
19:22:34 PD01 BACK-PRE  416 215
19:22:34 PD01 ID        215 <1459>MULLINS,DALE <1580>SEAMANS,MARK
19:22:35 PD01 ENROUTE   215
19:25:43 PD01 MISC      V1Y, ANYONE BEING ALOWED INTO VIA CORZO TO EVAC?
19:28:09 PD01 BACKUP    BLUE3 BLUE7
19:28:09 PD01 ID        BLUE7 <1457>HARVEY,CHRISTOPHER
19:28:57 PD01 ONSCENE   BLUE7
19:29:27 PD01 CHGLOCOS  BLUE3 CP
19:29:59 PD01 MISC      .140, SEVERAL VEHS GOING UP THE ACCESS ROAD BAST/LV
                        PER OFFICER SALCIDO
19:30:28 PD01 PREEMPT   BLUE7
19:30:53 PD01 CHGLOCOS  416 3840 WATSON
19:31:06 PD01 CHGLOC    416 CP, TRANSPORTING 2 J'S
19:32:59 U966 PREEMPT   112
19:33:46 PD01 MISC      BLUE3, HAVE 2 4 MAN TEAMS ON HIDDEN HILLS NOW
19:36:01 PD01 MISC      746Y, ARE WE STILL ALLOWING NB VV? WE HAVE LOTS OF
                        PPL.....PER 3L1 NEG WE DONT WANT ANYONE GOING UP
                        THERE.....46 COPIES WILL START RE-EVAC THESE PPL
19:36:10 PD01 ONSCENE   215, EM 1.3
19:37:49 U957 INSRVICE  122
19:38:10 PD01 CHGLOCOS  746Y LAKEVIEW AV/VALLEY VIEW AV ,YBL, BLKIN ALL NB
                        TURNING ALL AROUND SB .....ALSO ALLOW NO EB TRAFF AT
                        BAST
19:38:26 PD01 MISC      746Y, CORR EB LV
19:38:39 PD01 MISC      311, VISTA MORRAGA IS CLEAR......WILL BE CHKING OTHER
                        AREAS NOW
19:41:28 PD01 MISC      746Y, NEED UNIT TO ASSIST BLK NB TRAFF VV/BAST
19:43:57 PD01 MISC      V1Y, T39 3L1 REF RELIEF......PER 3L1 APPROX 15 MIN ETA
19:44:27 PD01 CHGLOCOS  7S1 PASEO DE LAS PALOMAS/YORBA LINDA
19:46:14 U955 MISC      311, REG INQUIRY LIC/3GTD89
19:46:14 U955 MISC      311, REG INQUIRY LIC/3GTD897
19:46:18 PD01 CHGLOC    382K VALLEY VIEW AV/BASTANCHURY RD ,Y
19:46:27 PD01 CHGLOC    481K VALLEY VIEW AV/BASTANCHURY RD ,Y
19:47:48 PD01 INSRVICE  V1Y
19:53:21 PD01 MISC      7S1, YL/PALOMAS......LOTS OF 415 PPL.....1 ATTD TO RUN
                        ME OVER....PER 3L1 DONT LET THEM IN .....EVAC TILL AT
                        LEAST TOMORROW MORN.....THESE PPL ARE TRYING TO TO GET
                        THRU AND ALMOST RAN ME OVER.....NEED MORE OFFICER
19:53:30 PD01 CHGLOC    747Y YORBA LINDA BL/PASEO DE LAS PALO
19:53:39 PD01 CHGLOC    415 YORBA LINDA BL/PASEO DE LAS PALO
19:53:56 PD01 MISC      7S1, NEED UNITS CODE 3 MAJOR 415
19:54:04 PD01 BACK-OS   7S1 BLUE1
19:54:04 PD01 ID        BLUE1 <1372>CARPENTER,KELLY
19:54:55 PD01 ONSCENOK  BLUE1
19:55:05 PD01 MISC      BLUE1, 747 415 REDUCED
19:55:07 PD01 ONSCENE   415
19:58:45 PD01 MISC      746Y, NEED ADDL CONES
19:59:25 PD01 MISC      746Y, ALL VEHS BACKED UP ON VV.....NEED ADDL TO GET
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			PPL OUT OF HERE AND SHUT DOWN.....HAVE K9 UNITS ADV HOW MANY
19:59:40	PD01	MISC	382K, ADV 1 PERSON WILL BE SUFF.....NEED CONES
19:59:46	CT02	MISC	.140, T39 CHP TO SHUT DOWN BOTH SIDES OF 57/TONNER - LAMB
20:00:01	PD01	ONSCENE	481K
20:00:01	PD01	ONSCENE	382K
20:00:06	PD01	CHGLOC	311 VALLEY VIEW AV/BASTANCHURY RD ,Y
20:01:12	PD01	MISC	481K, TO 311 TAKE SOUTH OF THE INTERSECTION DONT LET ANYONE THRU
20:01:22	PD01	INSRVICE	121
20:01:22	PD01	INSRVICE	124
20:03:35	PD01	MISC	7S1, TO 3L1 T21 MY CELL
20:04:09	PD01	ONSCENE	311
20:05:15	PD01	MISC	481K, TO CP DO WE HAVE ANY BATTERIES MINE IS DEAD
20:06:23	PD01	CHGLOC	416 VALLEY VIEW AV/BASTANCHURY RD ,Y, ERT TO 481K'S LOC REA PACSET BATT
20:07:06	PD01	MISC	481K, NEED ANOTHER UNIT TO BLK #1 EB LANE TO GO SB
20:07:37	PD01	MISC	1S2, TO 481K 2 ADDL UNITS ERT TO VV/BAST
20:07:47	PD01	MISC	382K, HAVE FOUNTAIN VALLY 97
20:08:13	PD01	MISC	382K, TO 481K SWITCH IT TO FLASHING RED
20:09:19	PD01	CHGLOCOS	311 IMPERIAL HY/VALLEY VIEW AV ,YBL, STA 25 SHUTTING DOWN NB VV FROM IMP.....WILL BE PUT ON FLASHING RED
20:09:58	PD01	MISC	326, CONTACT RED CROSS.....THEY ARE TELLING PPL TRAVIS RANCH IS EVAC SITE
20:10:27	PD01	BACK-OS	.140 8L1
20:10:27	PD01	ID	8L1 <1178>TIBBETTS,JAMES
20:10:34	PD01	INSRVICE	BLUE1
20:14:58	PD01	MISC	382K, NEED SOMEONE TO SHUT DOWN EB BAST FROM IMP
20:15:06	PD01	CHGLOC	416 BLKIN EB BAST/IMP
20:17:24	PD01	ONSCENE	416
20:17:42	PD01	BACKUP	416 834
20:17:42	PD01	ID	834 <1576>BRIOSO,OMAR
20:17:46	PD01	ENROUTE	834
20:21:34	PD01	CHGLOC	327 SAN ANTONIO RD/VIA CORZO ,YBL, ERT FOR 909C
20:22:39	PD01	BACK-OS	#083200140 BLUE1 BLUE10 BLUE4 BLUE6 BLUE9
20:22:39	PD01	ID	BLUE1 <1372>CARPENTER,KELLY
20:22:39	PD01	ID	BLUE10 <1512>ALFARO,LUIS
20:22:39	PD01	ID	BLUE4 <1490>HAEFNER,ROBERT
20:22:39	PD01	ID	BLUE6 <1569>BARSLUND,CHRISTOPHER
20:22:39	PD01	ID	BLUE9 <1486>MONTALVO,WILLIAM
20:22:52	PD01	CHGLOC	BLUE1 LAKEVIEW AV/VALLEY VIEW AV ,YBL
20:27:47	PD01	MISC	382K, LA CONCETTA OFF BAS/VV NEEDS PA ANNOCE FOR EVAC
20:30:30	PD01	CHGLOC	215 BASTANCHURY RD/IMPERIAL HY ,YBL, ERT TO ASST WITH SHUTDOWN
20:31:50	PD01	ONSCENE	834
20:38:00	PD01	MISC	382K, NEED UNIT TO SHUT DOWN NB LV AT BAST
20:38:53	PD01	CHGLOC	215 LV/BAS, TAKING THE NB CLOSURE
20:39:53	U992	PREEMPT	C96Y
20:41:52	PD01	MISC	327, KIDS DRIVING AROUND IN A BLK FORD RANGER ON CASINO RIDGE
20:42:15	PD01	CHGLOCOS	327 SAN ANTONIO RD/ALDER AV ,YBL
20:42:37	PD01	MISC	746Y, FIND OUT IF DRAKE HAS BEEN EVAC
20:45:03	PD01	MISC	746Y, PER 1S2 AFFIRM
20:45:52	PD01	CHGLOCOS	7S1 91/GREEN RIVER, T8 FROM YL/PALOMAS
20:48:52	PD01	CHGLOC	215 3700 N ROSE DR ,YBL
20:56:41	PD01	BACK-OS	8L1 836
20:56:41	PD01	ID	836 <1516>GREEN,TERRANCE
20:56:45	PD01	CHGLOCOS	836 CP
20:59:24	PD01	MISC	3L1, 18 HANDING PATROL CALS ON GRY 6 5 DEPS AND 1 SGT2100-0900....AT 0900 WE'LL HAVE ANOTHER 5 DEPS AND SGT COMING ON.....CONTACT SGT WREN AT THE CP AT YORBA REGIONAL
21:01:45	PD01	PREEMPT	BLUE1
21:04:11	U964	ONSCENE	215
21:06:23	PD01	MISC	326, AND JUST FYI THEY R ALL GOING AROUND ME AND BACK UP TO STONEHAVEN THE BACK WAY OFF OF VIA AGUA, SO UNLESS U POST THERE THERE GOING UP TO STONHVAEN ---------- PD01 WROTE MESSAGE FROM TERM/UNIT: PD01 OPER: C042 11/15/08 20:51 YES [11/15/08210623001]
21:06:36	PD01	BACK-ER	326 325

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21:06:36 PD01 ID        325 <1258>FLEIG,DEAN <1028>VUKELICH,WILLIAM
21:06:43 PD01 CHGLOC    325 VIA DEL AGUA/YORBA LINDA BL ,YBL
21:11:49 PD01 INSRVICE  7S1
21:12:28 PD01 MISC      327, NEED DOR/YORBA RANCH SHUT DOWN
21:14:08 PD01 MISC      .140, *** 91 STILL CLOSED IN ALL DIRECTIONS ***
21:15:32 PD01 BACK-ER   326 425
21:15:32 PD01 ID        425 <1492>SALCIDO,RICHARD
21:16:19 PD01 CHGLOC    425 DORINDA RD/YORBA RANCH RD ,YBL
21:18:37 PD01 ONSCENE   425, BLKIN EB YL AT YORBA RANCH
21:20:25 PD01 BACK-OS   415 702
21:20:25 PD01 ID        702 <1561>SANCHEZ,MICHELLE
21:21:21 PD01 MISC      3L1, T39 702 NEEDS TO BE RELEIVED YL/PALOMAS
21:22:32 PD01 BACK-OS   .140 826
21:22:32 PD01 ID        826 <1393>VANAGS,MICHAEL
21:23:09 PD01 MISC      3L1, NEED UNIT TO ASSES YL/PALOMAS.....DO WE NEED THAT
                        CLOSURE?
21:23:56 PD01 INSRVICE  1S2
21:26:42 PD01 CHGLOC    215 VIA DEL AGUA/YORBA LINDA BL ,YBL
21:27:02 PD01 ONSCENE   325
21:37:56 PD01 ONSCENE   215
21:49:12 PD01 CHGLOCOS  311 VALLEY VIEW AV/BASTANCHURY RD ,Y
21:49:23 PD01 CHGLOC    702 CP
21:53:03 PD01 MISC      382K, ALL 909C CLEARED BAS/VV DO WE NEED TO HOLD
                        POSITION
22:03:35 U955 MISC      311, REG INQUIRY LIC/DLEE07
22:03:37 U955 MISC      311, REG INQUIRY LIC/DLEE07
22:04:38 PD01 CHGLOC    BLUE9 21785 HEATHER WOOD LN ,YBL, CHECKING FOR
                        RESIDENTS
22:07:21 PD01 PREEMPT   415
22:07:29 PD01 PREEMPT   747Y
22:08:54 PD01 BACK-PRE  8L1 BLUE1
22:08:54 PD01 ID        BLUE1 <1372>CARPENTER,KELLY
22:08:56 PD01 ENROUTE   BLUE1
22:13:24 SUP1 CHGLOCOS  821 YL CP W/2S2-TILL 2300
22:13:44 PD01 MISC      758, 758 IS NO ACK WAS AT THE CP APPRXO 1/2 TO 1 HR
                        AGO.....CP WILL CHK AROUD
22:17:07 PD01 MISC      311, POSS HEARD 758 GO 107 1 HR AGO
22:18:25 PD01 INSRVICE  758
22:19:07 PD01 MISC      325, CIT JUST ADV 3 MALES VIA DEL AGUA NORTH OF YL
22:19:42 PD01 INSRVICE  BLUE1
22:20:16 PD01 MISC      3L1, NEW RIVER/ESP STA 25 UNITS NEED RELIEF BY 2300 IF
                        POSSIBLE
22:20:31 PD01 MISC      3L1, CP WILL HANDLE MIN OF 2 PREFER 3
22:25:28 PD01 CHGLOCOS  BLUE9 91/GREEN RIVER, 98 COMPLETED FROM HEATHERWOOD
22:30:21 PD01 BACK-OS   .140 BLUE1
22:30:21 PD01 ID        BLUE1 <1372>CARPENTER,KELLY
22:32:58 PD01 PREEMPT   311
22:40:12 PD01 CHGLOC    BLUE4 CP, ERT CP TO 911 WITH 3L1
22:40:54 PD01 MISC      .140, CAP# 5015 AT ESP/DOMIGUEZ RANCH
22:41:59 PD01 BACK-OS   702 311
22:41:59 PD01 ID        311 <1578>HOLMES,NEAL <1580>SEAMANS,MARK
22:43:53 PD01 PREEMPT   826
22:43:53 PD01 PREEMPT   382K
22:43:53 PD01 PREEMPT   481K
22:54:54 PD01 BACK-OS   .140 747Y 415
22:54:54 PD01 ID        747Y <1505>BAKER,STEPHEN
22:54:54 PD01 ID        415 <1482>MAYO,JOSEPH
22:55:05 PD01 CHGLOC    747Y GYPSUM CANYON RD/W 91 FY ,YBL, ERT FOR THE
                        CLOSURE
22:55:18 PD01 CHGLOC    415 GYPSUM CANYON RD/W 91 FY ,YBL, ERT FOR THE CLOSURE
22:55:22 PD01 CHGLOC    425 GYPSUM CANYON RD/W 91 FY ,YBL, ERT FOR THE CLOSURE
22:55:44 PD01 MISC      3L1, T39 REF GYPSUM CLOSURE
22:59:10 U966 INSRVICE  325
23:00:35 PD01 ONSCENE   747Y
23:01:33 PD01 ONSCENE   425
23:01:40 PD01 CHGLOCOS  747Y GYPSUM CANYON RD/LA PALMA AV ,YB
23:01:45 PD01 CHGLOCOS  425 GYPSUM CANYON RD/LA PALMA AV ,YB
23:03:45 U983 ONSCENE   415
23:04:27 PD01 BACK-OS   .140 8S2
23:04:27 PD01 ID        8S2 <1343>PORTO,SANTO
23:04:28 PD01 CHGLOCOS  8S2 AV DE CHRISTINE, RES FULLY INVD 91 OS
23:09:22 PD01 MISC      746Y, I NEED RELIEF SUPPOSED TO BE EOW AT 2300
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23:10:14 PD01 MISC      746Y, T39 3L1
23:11:20 U955 MISC      311, REG INQUIRY LIC/4LKL694
23:11:42 PD01 MISC      416, OCBC IS SAYING WE CAN LET RESIDENTS IN ON
                        VC.......BC FORSYTHE IS THE ONE THAT SAID ITS
                        OK.....3L1 WILL HAVE TO CONFIRM THAT
23:13:39 PD01 MISC      833, TO 746Y WE'RE SENDING SOMEONE FOR RELIEF
23:16:23 U955 MISC      311, REG INQUIRY LIC/5DVH542
23:16:40 U955 MISC      311, REG INQUIRY LIC/5DVH542
23:16:45 PD01 CHGLOCOS 834 91/GREEN RIVER, T8 ROVER
23:16:47 PD01 MISC      834, CONES PUT UP AT MY INTERSECTION..IM T8
                        ROVING[11/15/08231647001]
23:17:53 PD01 MISC      415, NUMEROUS FOUNTAIN VALLEY UNITS AT GYP AND LP
23:18:32 PD01 CHGLOCOS 215 LV/BAS
23:18:54 PD01 CHGLOC   415 LV/BAS
23:19:06 PD01 CHGLOC   425 LV/BAS
23:19:46 PD01 PREEMPT  702
23:20:42 PD01 INSRVICE BLUE10
23:20:42 PD01 INSRVICE BLUE9
23:20:42 PD01 INSRVICE BLUE6
23:20:42 PD01 INSRVICE BLUE5
23:24:21 PD01 CHGLOCOS 415 91/GREEN RIVER
23:26:18 PD01 INSRVICE 747Y
23:27:36 PD01 PREEMPT  311
23:28:59 PD01 INSRVICE 746Y
23:28:59 PD01 INSRVICE 751Y
23:31:22 PD01 MISC      833, NEED ADDL FLAIRS FROM 661....T39
23:32:47 SUP1 MISC      756Y, EOW 0600
23:34:14 PD01 MISC      833, AT 4785 SKY RIDGE .....HAVE STA 21 CHKIN 925 CIR
                        OPEN GARAGE WITH BROKEN WINDOW
23:36:42 PD01 MISC      415, NUM FLAREUP 22345 LP ADV FIRE
23:36:46 PD01 PREEMPT  215
23:41:20 PD01 INSRVICE BLUE1
23:45:32 SUPV INSRVICE 756Y
23:45:57 PD01 CHGLOCOS 833 CP
23:46:38 PD01 CHGLOC   416 CP, ERT CP FROM NEWRIVER/YL
23:47:28 PD01 INSRVICE 412
23:53:22 PD01 MISC      833, STA 21 UNITS ARE 98 FROM SKY RIDGE.....NEIGHBORS
                        ADV THEY KICKED THE DOOR TO SEE IF ANYONE WAS HOME
23:57:11 PD01 MISC      425, ATC CADET NEED MASKS AND 2 GOGGLES
23:57:18 PD01 ONSCENE  425
23:57:28 PD01 MISC      425, 661 IS ERT

11/16/08
00:05:03 SUPV MISCX     BRUSH FIRE SAN ANTONIO/CASINO RIDGE AREA...RP XFR TO
                        OCFA.
00:06:06 PD01 PREEMPT  415
00:10:30 PD01 ONSCENE  416
00:19:36 PD01 MISC      833, ****RESIDENTS ARE NOW ALLOWED IN FAIRMONT TO SAN
                        ANTONIO NORTH OF YL.....WITH ID*****
00:21:57 PD01 CHGLOC   326 CP
00:22:53 PD01 BACK-OS  .140 412
00:23:02 PD01 CHGLOCOS 412 YORBA LINDA BL/NEW RIVER ,YBL, NEED RELIEF FOR T56
00:23:17 PD01 INSRVICE 834
00:23:19 PD01 BACK-ER  412 834
00:23:19 PD01 ID       834 <1576>BRIOSO,OMAR
00:24:36 PD01 MISC      833, UNDERCOVER CAR BLU HONDA ACCORD DRVING AROUND
                        FAIR/BASTANCHURY INCASE WE GET CALLS
00:26:31 PD01 BACK-OS  .140 415
00:26:31 PD01 ID       415 <1482>MAYO,JOSEPH <1377>MOON,DANIEL
00:26:39 PD01 CHGLOCOS 415 CDB, CHKIN HOUSES
00:33:19 PD01 CHGLOCOS 416 NORTH SIDE OF THE COMMUNITY CEN
00:38:23 PD01 MISC      2S2, RE-ESTABLISHING CP AT IRVINE PARK WILL ADV WHEN
                        WE'RE 97
00:38:32 PD01 CHGLOC   2S2 IRVINE PARK/CP
00:41:12 PD01 MISC      3L1, TO 001 HAVE ODEN T21 MY CELL
00:41:26 U963 PREEMPT  326
00:49:34 PD01 CHGLOCOS 834 ROVER
00:52:39 U963 INSRVICE 416
00:55:33 PD01 MISC      425, CAN YOU SEND OVER SOMEONE WITH JUMPER CABLES...A
                        UNIT BATTERY OUT HERE WENT KAPUT. THNX!![11/16/080055-
                        33001]
00:56:27 U983 CLEAR    415 CO
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00:56:50 PD01 MISC      833, CHKIN FOR CABLES
01:07:19 U959 MISC      327, REG INQUIRY LIC/7B51763
01:10:56 PD01 BACK-OS   412 837
01:12:01 PD01 BACK-OS   .140 415
01:12:01 PD01 ID        415 <1482>MAYO,JOSEPH <1377>MOON,DANIEL
01:12:05 PD01 CHGLOCOS  415 ROVER E/END
01:12:28 PD01 INSRVICE  412
01:13:08 PD01 CHGLOCOS  425 BAS/LV
01:13:10 PD01 MISC      425, 926, FOR JUMP AND GAS BAST AND LAKEVIEW[11/16/08-
                        011310001]
01:13:55 PD01 MISC      425, 926A BREA TOW3.
01:21:07 PD01 MISC      425, THIS UNIT HAS SOME SPECIAL MECHANIZM ON IT MIGHT
                        HAVE TO TOW
01:21:25 PD01 PREEMPT   834
01:23:01 SUP1 INSRVICE  3L1
01:24:33 SUPV MISCX     BRUSH FIRE AT 13TH GREEN OF BLACK GOLD ON FIRE. T39
                        OCFA
01:25:16 PD01 MISC      833, HAVE STA 21 UNITS CHKING 27005 BIG HORN
                        MOUNTAIN.....ATL T21
01:26:32 PD01 MISC      833, PER PRIORS 714 692 9621
01:26:58 PD01 MISC      833, ANS MACHINE ON T21
01:39:04 PD01 PREEMPT   415
02:07:00 SUP1 ONSCENOK  3S2
02:44:35 CT01 BACK-OS   837 328
02:44:35 CT01 ID        328 <1570>KUNZE,ALFONS <1501>TRENT,RYAN
02:44:45 CT01 CHGLOCOS  328 BAST/LAKEVIEW
02:46:54 PD01 CHGLOCOS  836 YORBA LINDA BL/NEW RIVER ,YBL
02:47:04 PD01 BACK-OS   836 661
02:47:04 PD01 ID        661 <1571>ISHIDA,NATHAN
02:47:19 PD01 PREEMPT   836
02:47:27 PD01 PREEMPT   837
02:51:20 PD01 MISC      327, OCFA GOING 98 FROM SAN ANTONIO 913 TO LET
                        RESIDENTS BACK IN
02:51:24 PD01 CHGLOC    327 CP
03:05:21 U959 ONSCENE   327
03:15:20 PD01 INSRVICE  821
03:15:28 PD01 CHGLOCOS  7L1 IRVINE/CP
03:15:45 PD01 CHGLOCOS  8S2 CP
03:17:43 PD01 ONSCENE   2S2
03:18:39 PD01 BACK-OS   .140 848
03:18:39 PD01 ID        848 <1406>MCKENNEY,DARRELL
03:18:51 PD01 CHGLOCOS  848 VALLEY VIEW AV/LAKEVIEW AV ,YBL
03:19:14 PD01 CHGLOC    327 BASTANCHURY RD/VALLEY VIEW AV ,Y
03:21:41 PD01 CHGLOCOS  001 CASALOMA/CP
03:22:43 PD01 INSRVICE  BLUE3
03:22:43 PD01 INSRVICE  BLUE4
03:23:27 PD01 ONSCENE   327
03:25:07 PD01 CHGLOCOS  833 CASA LOMA COMMAND POST
03:25:16 PD01 CHGLOCOS  8S2 CASA LOMA COMMAND POST
03:29:16 PD01 BACKUP    #083200140 836 837
03:29:16 PD01 ID        836 <1516>GREEN,TERRANCE
03:30:20 PD01 MISC      836, TO ROVER UNITS VEH SEEN CASING THE AREA RED
                        NISSAN SMALLER OLDER P/U NEAR ADOBE/FEATHER
03:30:41 PD01 BACK-OS   836 813
03:30:41 PD01 ID        813 <1455>NEEL,SHAWN
03:31:12 PD01 CHGLOC    813 AV ADOBE/FEATHER
03:31:31 PD01 CHGLOCOS  836 NEW RIVER/YORBA LINDA BL ,YBL
03:31:35 PD01 CHGLOCOS  837 NEW RIVER/YORBA LINDA BL ,YBL
03:31:59 PD01 BACK-OS   .140 326
03:31:59 PD01 ID        326 <1574>GILBERT,CYNTHIA
03:32:18 PD01 CHGLOCOS  326 PASEO DE TORONTO/CAMINO DE BRYAN
03:32:20 PD01 MISC      326, 10 39 FIRE, PASEO DE TORONTO, CAMINO DE BRYANT
                        THE PLAY GROUND EAST OF THE SCHOOL, EMBERS ARE STILL
                        BURNING AND ARE BLOWING TOWARDS THE SCHOOL, SMALL
                        FIRES THROUGH OUT PLAYGROUND, WIND BLOWING[11/16/0803-
                        3220001]
03:33:44 PD01 ONSCENE   813
03:36:25 PD01 BACK-OS   813 325
03:36:25 PD01 ID        325 <1258>FLEIG,DEAN
03:37:19 PD01 MISC      326, T39 OCFA
03:40:40 PD01 CHGLOCOS  326 24695 PASEO DE TORONTO ,YBL
03:42:34 PD01 DUP-OF    083210046 TO 083200140, 326 OS
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03:45:03 U966 CLEAR      325 GA
03:49:08 PD01 MISC       327, HAVE STA 17 RESPOND FOR 2 LOOSE DOGS
03:50:11 PD01 MISC       327, L/S SB VV TWDS BAST
03:52:03 PD01 MISC       327, T39 STA 17
03:58:55 PD01 BACK-OS    .140 834
03:58:55 PD01 ID         834 <1576>BRIOSO,OMAR
03:59:08 PD01 CHGLOCOS   834 21514 HAWKEYE RIDGE CR ,YBL
03:59:22 PD01 MISC       326, FIRE OS
04:00:07 PD01 MISC       834, JUST SPOT FIRES ON THE SLOP.....T39 OCFA
04:04:44 PD01 CHGLOC     326 24674 LAS PATRANAS ,YBL
04:04:47 PD01 MISC       326, 4BCY0PD0100 ZAQ.IV DATE: 11/16/08 TIME: 04:04
                         INSURANCE INFORMATION ON FILE POSSIBLE FILE CODES:
                         C(7R95194) S(7R95194) REG VALID FROM: 12/31/07 TO
                         12/31/08 LIC#:7R95194 YRMD:96 MAKE:FORD BTM :PK VIN
                         :1FTCR14U5TPA29706 R/O :BROWN JJ JEFFERY, 6477 KAISHA
                         ST CITY:CORONA C.C.:33 ZIP#:92880 RCID:01/05/08
                         OCID:03/12/05 LOCD:9 TYPE:31 POWR:G AXLE:2 WGHT:03264
                         VEH :37 BODY:P CLAS:BE *-YR:05 REC STATUS: 10/08/2008
                         RENEWAL NOTICE EXTRACTED 01/10/07 SMOG DUE 12/31/08
                         03/01/05 PREV LIC 957919P CLEARANCE INFORMATION
                         RECORDS: OFFICE WORK DATE TECH/ID SEQ # VALUE FICHE
                         DATE TTC 586 03/01/05 38 0026 00617.00 00/00/00 B00
                         586 01/15/05 37 0020 00309.00 PRIOR SUSPENSE 143
                         01/06/06 36 5658 00105.00 00/00/00 POT 143 01/10/07 51
                         8953 00117.00 00/00/00 POT V32 01/05/08 J9 0002
                         00099.00 00/00/00 H00 142 12/21/07 51 8254 00099.00
                         PRIOR SUSPENSE 12/04/2004-ODOMETER: 50,971 MILES
                         ACTUAL MILEAGE END [11/16/08040447001]
04:14:09 PD01 ONSCENOK   326, UF ON THE M/C
04:14:42 U953 CLEAR      326 UF, SUBJ SAW ME WITH FLASHLIGHT, NO MC
04:23:02 PD01 CHGLOCOS   834 91/GREEN RIVER, 98
04:38:54 PD01 PREEMPT    834
04:44:45 SUP1 MISC       8L1, CHECK WITH STA 17..TO ASSIST WITH INJURED
                         HORSE... CC/BREA HILLS
04:47:40 PD01 PREEMPT    836
04:56:15 PD01 MISC       833, T39 OCFA EOC REF LP/VSU EVACS
05:14:39 PD01 BACK-ER    001 2L1
05:14:39 PD01 ID         2L1 <1376>DEVEREUX,DARRIN
05:15:47 CT01 MISC       .140, 3 BUSES AND ONSITE COORDINATOR FROM GG AND
                         ANAHEIM AREA ER[11/16/08051547001]
05:26:36 PD01 BACK-ER    001 3L1
05:26:36 PD01 ID         3L1 <1181>BRAKEBILL,JERRY
05:28:08 PD01 MISC       425, ADV IF THEY ARE LETTING TRAFF THRU FAIR/BAS
05:28:26 PD01 MISC       833, THEY CAN HEAD EB BUT NOT NB
05:36:44 PD01 ONSCENE    2L1
05:38:31 PD01 BACK-ER    001 7S1
05:38:31 PD01 ID         7S1 <1177>WILSON,MICHAEL
05:38:48 PD01 CHGLOC     7S1 IRVINE REGIONAL CP
05:43:56 PD01 CHGLOCOS   837 CDB, LARGE FLAREUP VISIBLE FROM NEW RIVER/YL
05:44:55 PD01 MISC       837, T39 OCFA3.
05:47:21 PD01 BACK-ER    2S2 8S1
05:47:21 PD01 ID         8S1 <1342>LEEVER,RICHARD
05:47:55 PD01 ONSCENE    7S1
05:49:24 PD01 MISC       2S2, AT THE STA 18 COMMAND POST.....MAKE A LEFT WHEN U
                         ENTER THE PARK AND COME AROUND THE CIRCLE
05:51:19 PD01 BACK-ER    .140 746Y
05:51:23 PD01 CHGLOC     746Y NEW RIVER/YORBA LINDA BL ,YBL
05:57:51 PD01 INSRVICE   BLUE8
06:03:31 PD01 BACK-ER    .140 824
06:03:31 PD01 ID         824 <1456>HAWLEY,ADAM
06:03:40 PD01 BACK-ER    .140 812
06:03:40 PD01 ID         812 <1401>RODRIGUEZ,PHILLIP
06:04:00 PD01 CHGLOC     812 YORBA LINDA BL/STONEHAVEN DR ,YB
06:04:05 U959 MISC       327, REG INQUIRY LIC/6T935547
06:04:08 PD01 CHGLOC     824 YORBA LINDA BL/STONEHAVEN DR ,YB
06:06:34 PD01 INSRVICE   837
06:07:37 PD01 BACKUP     #083200140 751Y
06:07:37 PD01 ID         751Y <1519>BLAKE,JASON
06:08:11 PD01 CHGLOC     751Y IMPERIAL HY/VALLEY VIEW AV ,YBL
06:09:11 PD01 BACK-ER    .140 821
06:09:11 PD01 ID         821 <1312>ALONZO,RUBEN
06:09:15 PD01 MISC       821, PER PORTO, HAVE 821 GO TO E EAST OF YL RELIEVE
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                                SHAWN NEEL[11/16/08060915001]
06:09:18 SUP1 BACKUP    824 819
06:09:18 SUP1 ID        819 <1402>BARBOSA,TONY
06:09:40 SUP1 CHGLOC    819 YL CP, WITH OFCR FRANK
06:11:30 SUP1 MISC      327, ADV T21 FOR ROAD CLOSURES
06:14:40 U959 INSRVICE  327
06:14:50 PD01 MISC      .140, PER IRENE NO YL SO BASTANCHURY EO LV ALL THE WAY
                        TO SAN ANTONIO RESIDENTS ABLE TO GET TO RES W/ ID
                        ONLY[11/16/08061450001]
06:16:10 PD01 INSRVICE  328
06:16:10 PD01 INSRVICE  425
06:16:10 PD01 INSRVICE  813
06:16:45 PD01 BACK-OS   .140 328 425
06:16:45 PD01 ID        328 <1570>KUNZE,ALFONS <1501>TRENT,RYAN
06:16:45 PD01 ID        425 <1492>SALCIDO,RICHARD
06:17:50 PD01 CHGLOCOS  328 BAS/LV
06:17:58 PD01 CHGLOCOS  425 BAS/LV
06:20:06 PD01 ONSCENE   812
06:20:13 PD01 CHGLOC    824 YORBA LINDA BL/FAIRMONT BL ,YBL
06:24:59 PD01 ONSCENE   3L1
06:27:46 PD01 CHGLOCOS  821 23001 LA PALMA AV ,YBL, ADV OCFA GETTIN FLAREUP
                        BTWN THE TRACKS AND RES
06:28:25 PD01 MISC      821, T39 OCFA
06:30:39 PD01 MISC      833, ON BASTANCHRY EVERYTHING IS RESIDENCE
                        ONLY.......WEST OF SAN ANTONIO IS OKAY......EAST OF IS
                        RES ONLY
06:30:44 PD01 BACK-OS   .140 742Y
06:30:44 PD01 ID        742Y <1347>JAMES,THOMAS
06:33:05 PD01 BACK-OS   661 756Y
06:33:05 PD01 ID        756Y <1395>BLOCK,ROBB
06:36:47 PD01 PREEMPT   833
06:37:13 PD01 CHGLOCOS  819 CASALOMA COMMAND POST
06:39:08 PD01 CHGLOCOS  742Y VISTA GLEN, SPOT FIRES WITH OCFA OS
06:39:50 PD01 MISC      756Y, STA 32 HAS UNITS AT YL/STONEHAVEN AND ALSO 2
                        UNITS ON YORBA RANCH THAT NEED RELIEF.....125 WILL
                        CONTACT CP 97 IN 1
06:41:15 PD01 BACK-OS   425 123, 97 WITH OFFICER BARSLUND
06:41:15 PD01 ID        123 <1584>WAMBAUGH,JASON
06:41:38 SUP1 INSRVICE  8L1
06:41:43 PD01 MISC      756Y, STA 32 UNITS CAN GO T8 PER VAUGHN
06:41:51 PD01 CHGLOCOS  756Y STONEHAVEN DR/YORBA LINDA BL ,YB
06:42:32 PD01 CHGLOCOS  824 N/END FAIR JNO BASTANCHURY, FULLY INV'D HOMES PER
                        STA 18
06:43:20 PD01 MISC      824, PER 724Y....THATS THE ONE THAT I WAS REPORTING
                        OCFA IS OS
06:45:31 PD01 BACK-ER   001 210
06:45:31 PD01 ID        210 <1459>MULLINS,DALE
06:45:44 PD01 BACK-OS   .140 125
06:45:44 PD01 ID        125 <1601>JOHNSON,JASON <1348>GOGERTY,SHAWN
06:45:49 PD01 CHGLOCOS  125 YORBA LINDA BL/VILLAGE CENTER DR
06:45:51 PD01 MISC      125, WE'RE 97 VC @ YL. TRAAFIC COTROL[11/16/080645510-
                        01]
06:47:48 PD01 PREEMPT   328
06:47:51 PD01 PREEMPT   425
06:48:09 PD01 BACK-OS   001 127
06:48:09 PD01 ID        127 <1580>SEAMANS,MARK <1578>HOLMES,NEAL
06:51:21 PD01 MISC      819, NEED EB AND WB TRAFF ON YL FLOWING FOR THE 91
06:51:32 PD01 MISC      746Y, AT THIS TIME EB LP IS STILL CLOSED
06:52:38 PD01 MISC      756Y, DOESNT APPEAR YL/VIA DEL AQUA IS COVERED.....2L1
                        IS WORKING ON IT
06:53:35 PD01 BACK-OS   .140 816
06:53:35 PD01 ID        816 <1500>HOETKER,JOHN
06:53:39 PD01 CHGLOCOS  816 ESPERANZA RD/NEW RIVER ,YBL
06:54:12 PD01 BACK-OS   816 826
06:55:25 PD01 MISC      742Y, GG UNITS AT YL/YORBA RANCH......CAN THEY GO T7?
06:55:32 PD01 MISC      742Y, NEED A UNIT TO BLK NB
06:56:00 PD01 MISC      819, HAVE 2 GG UNITS ERT TO DORINDA/YORBA RANCH
06:56:11 PD01 MISC      742Y, T4 WILL OPEN YL AND RELESE 1 OF THEIR UNITS
06:56:17 CT01 INSRVICE  3S2
06:58:17 PD01 MISC      819, NB FROM YL IS NOW OPEN TO RESIDENTS
                        ONLY........THAT INCLUDES SAN ANTONIO EAST
06:58:42 PD01 MISC      742Y, 2 WESTMINSTER UNITS JUST TOOK OFF FROM DORINDA
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07:00:09	PD01	MISC	7S1, PER FIRE NO ONE SHOULD BE ALLOWED INTO THESE CLOSED AREAS.....FIRE CHIEF WITH 3L1 IS TELLING HIM THE OPPOSITE
07:00:23	PD01	MISC	7S1, HOLD OFF ON ALLOWING ANYONE IN FOR RIGHT NOW....STARTING FIRE BRFG
07:01:11	PD01	ONSCENE	8S1
07:03:27	PD01	MISC	742Y, TO 819 JUST CONFIRM WE WANT YL OPEN ALL THE WAY TO THE FRWY AND WHAT ABOUT LP? SHOULD THAT STILL BE CLOSED?
07:05:25	PD01	MISC	751Y, ANYONE AT VV/LAKEVIEW
07:08:14	PD01	MISC	751Y, TO COMMAND POST...ARE DIEMER WATER PLANT EMPLOYEES GOING UP THERE OR NOT?
07:10:24	PD01	MISC	751Y, FRM CP...UR 913 TO SEND EMPLOYEES UP
07:10:51	PD01	MISC	751Y, TO CP...NEED ANOTHER PACSET BATTERY
07:11:25	PD01	CHGLOCOS	751Y VALLEY VIEW AV/BASTANCHURY RD ,Y
07:12:01	SUPV	INSRVICE	7L1
07:13:29	PD01	MISC	746Y, NR IS NOW OPEN...IS THERE A NEW POST OR SHUD I HELP WITH THE RESIDENTS
07:13:48	PD01	MISC	756Y, STILL NOONE AT DEL AGUA....CUD USE THEM THR
07:14:09	PD01	CHGLOCOS	746Y WEIR/LA PALMA
07:14:34	PD01	MISC	826, IS THE PRESS ALLOWED TO GO UP INTO HIDDEN HILLS
07:15:03	PD01	MISC	826, FROM CP...AFFIRM THEY CAN GO UP
07:16:45	PD01	MISC	742Y, NO TRAFFIC NB YL ALLOWED IN AT YL/LA PALMA
07:20:32	PD01	MISC	821, INFO ONLY..HAVE A LOT OF LOOKIE LOOS TRYIN TO GET INTO CBD/BIG HORN MTN...MOVING THEM ON THO
07:20:54	PD01	MISC	2L1, TO 821 DO WE NEED SOMEONE TO BE PUT AT WEIR/SAVI
07:21:18	PD01	MISC	821, TO 2L1...HAVENT BEEN OUT THERE TO ASSESS...BEEN UP ON LA PALMA
07:21:28	PD01	MISC	742Y, ARE THOSE BUSINESSES GONNA BE OPEN?
07:21:37	CT01	INSRVICE	826
07:21:45	PD01	MISC	821, TO 2L1...GIVE ME 5 AND I CAN LET U KNO BOUT THAT
07:22:40	CT01	BACK-OS	816 826
07:23:04	PD01	MISC	.140, NO NB TRAFFIC ALONG YL
07:23:29	CT01	INSRVICE	826
07:23:37	CT01	BACK-OS	816 826
07:23:37	CT01	ID	826 <1393>VANAGS,MICHAEL
07:24:45	PD01	MISC	819, NO NB TRAFFIC ALONG YL...
07:25:25	PD01	MISC	812, HAVE A UNIT 87 AT YL/FAIRMONT FOR TRAFFIC CONTROL
07:25:41	PD01	MISC	746Y, STA 26 ADVS THEY WILL HANDLE WEIR/LA PALMA
07:26:03	PD01	CHGLOC	746Y YORBA LINDA BL/FAIRMONT BL ,YBL
07:26:36	PD01	MISC	746Y, SOME CONES SITTN AT NR/YL
07:27:00	PD01	BACK-ER	746Y C93Y
07:27:00	PD01	ID	C93Y <1545>GLOMBOSKE,JERRY
07:27:04	FD01	CHGLOC	123 LAKEVIEW AV/YORBA LINDA BL ,YBL
07:27:28	PD01	MISC	819, TO 746Y TRYIN TO GET THE YARD TO HANDLE THE CONES....
07:28:55	PD01	MISC	821, GYPSUM BRIDGE IS FILLED WITH RESIDENTS
07:29:57	PD01	BACK-OS	210 121
07:29:57	PD01	ID	121 <1577>STIEFEL,SHAYNE
07:30:00	PD01	MISC	121, TO 819...AT LA PALMA/GYPSUM...STA 18 LEFT US...WE ARE ALONE OUT HERE
07:30:12	PD01	CHGLOCOS	121 LA PALMA AV/GYPSUM CANYON RD ,YB
07:31:07	PD01	MISC	746Y, TO CP...UNITS HERE AT YL/FAIRMONT WILL BE C4 ONCE CONES ARE HERE
07:31:32	PD01	CHGLOC	C93Y YORBA LINDA BL/OHIO ST ,YBL, FOR TRAFFIC CONTROL
07:32:13	PD01	CHGLOC	746Y LA PALMA/GPSUM
07:32:46	CT01	BACK-OS	2S2 184716
07:32:55	CT01	CHGLOCOS	184716 DORINDA/YL
07:33:31	PD01	BACK-OS	123 745Y
07:33:31	PD01	ID	745Y <1408>CONNER,ROBERT
07:33:37	PD01	CHGLOCOS	745Y PALM AV/YORBA LINDA BL ,YBL
07:34:16	PD01	MISC	819, GET AHOLD OF STA 10 ...GET OFF RAMPS AT BOTH EB AND WB FROM GYPSUM/91
07:34:24	PD01	INSRVICE	2S2
07:35:02	PD01	MISC	819, T39 TO STA 10 FOR OFF RAMPS
07:35:49	SUP1	INSRVICE	848
07:36:31	PD01	MISC	821, TO CP...APPEARS THAT SAVI RANCH WILL BE OPEN TODAY
07:36:46	PD01	MISC	819, TO 742Y ...CONES ARE ER
07:37:26	PD01	CHGLOCOS	742Y VALLEY VIEW AV/LAKEVIEW AV ,YBL
07:39:26	PD01	MISC	819, EVEN TO RESIDENTS...FROM NB YL ALL INTERSECTIONS ARE LOCKED DOWN...JUST ADVSD BY FIRE

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07:40:51 U995 ONSCENE   C93Y
07:40:58 PD01 MISC      751Y, TO CP...NB VV CLOSED AT BASTANCHURY
07:41:51 CT01 MISC      .140, STA 10 CLOSING OFF THE OFFRAMP GYP AND 91 PER
                        OUR REQUEST
07:44:13 PD01 MISC      123, TO CP...ARE WE ALLOWED TO LET RESIDENTS IN FROM
                        BASTAN/LAKEVIEW
07:45:43 PD01 MISC      123, NOONE ALLOWED NORTH OF THAT AREA
07:48:42 PD01 MISC      819, NO TRAFF EB AT NR
07:49:45 PD01 MISC      826, IS NR AND PREFABS OPEN TO TRAFF
07:52:50 CT01 MISC      .140, PER STA 18 OFFICER.. FIRE IN REAR.. 3870 STONE
                        HAVEN .. ADV OCFA
07:54:47 PD01 MISC      756Y, TO CP...BY RESIDENTS....AGUA IS STILL OPEN
08:01:06 PD01 MISC      819, STA 39 UNITS AT YL/AGUA
08:06:13 PD01 CHGLOCOS  742Y NEW RIVER/ESPERANZA RD ,YBL
08:06:35 PD01 MISC      742Y, STANDING BY FOR LASO...HOETKER AND VANAGS DOING
                        THEIR SURVEY OF HIDDEN HILLS AREA
08:13:07 PD01 MISC      819, NEED STA 26 TO SHUT DOWN LA PALMA EB
08:13:24 PD01 MISC      819, NEED THEM TO CALL US BEFORE THEY CLEAR AGAIN
08:14:51 PD01 CHGLOC    742Y LA PALMA/YL
08:15:34 PD01 MISC      742Y, ENTRE INTERSECTION IS OPEN IN ALL 4DIRECTIONS
08:15:36 PD01 ONSCENE   742Y
08:16:08 PD01 MISC      742Y, NEEDS TO BE SHUT DOWN AND HAVE STA 26 TO SHUT
                        DOWN
08:16:25 CT01 BACK-OS   661 18A41
08:16:30 PD01 MISC      742Y, HAVE NB YL SHUT DOWN
08:16:55 PD01 CHGLOCOS  746Y WEIR/LA PALMA
08:17:04 PD01 MISC      746Y, SHUTTING DOWN
08:20:01 PD01 MISC      121, NEED ANOTHER UNIT AT GYPSUM/LA PALMA...LOT OF
                        GRIDLOCK
08:20:43 PD01 MISC      746Y, ITS SHUT DOWN AGAIN
08:20:55 CT01 CHGLOCOS  18A41 IMP/EUREKA
08:20:57 PD01 MISC      812, NEED A UNIT AT YL/FAIRMONT
08:21:44 CT01 MISC      .140, T39 TO STA 26 TO SHUT DOWN THE INTERSECTION OF
                        LP/WEIR
08:21:50 PD01 BACK-OS   121 122
08:21:50 PD01 ID        122 <1590>TINNIN,LAMARR
08:29:44 PD01 MISC      751Y, CONF A STA 18 GOING TO VV/LAKEVIEW... LOTS OF
                        VEHS GETTING THRU..
08:29:56 PD01 MISC      751Y, PER THE CP..THEY ARE WORKING ON GETTING A UNIT
                        OUT THERE..
08:37:34 PD01 CHGLOC    742Y GYPSUM CANYON RD/LA PALMA AV ,YB
08:37:42 PD01 CHGLOC    821 91/GREEN RIVER
08:37:56 PD01 MISC      7S1, NEED A T21 FOR THE COMMAND POST THAT SOMEONE WILL
                        ANSWER
08:38:30 PD01 MISC      819, CP T21 714 961 7189
08:39:29 PD01 MISC      812, STILL NEED A UNIT HERE
08:39:44 PD01 CHGLOC    746Y GYPSUM CANYON RD/LA PALMA AV ,YB
08:47:30 PD01 CHGLOCOS  210 CONDUCTING SURVEY/BAST-LAK
08:50:53 PD01 CHGLOC    742Y CHKG THE AREA
08:52:17 SUPV MISCX     ***WELFARE CHECK***3760 BLUE GUM...STA 18 STATES
                        PEOPLE AT THE BARRIERS STATING THEY HV NOT HEARD FROM
                        2 FEMALES SINCE YESTERDAY...UNKN ON RES NAMES..
08:57:01 PD01 CHGLOCOS  742Y STONEHAVEN
08:58:00 PD01 MISC      210, CALL OCFA BEHIND 3718 WELSH PONY
08:58:21 PD01 MISC      3L1, ON FEATHER T39 TO OCFA
08:59:10 PD01 MISC      210, T39 TO OCFA REF WELSH PNY
08:59:51 U995 MISC      C93Y, REG INQUIRY LIC/R4RGR8
09:02:48 PD01 MISC      756Y, NEED A UNIT AT YL/STONEHAVEN....WITH 415S
09:04:07 PD01 MISC      125, TO CP...TRAFFIC CONTROL UNIT AT MNZANIT/VC
                        ...WHAT RADIO FREQ HE ON?
09:04:38 PD01 MISC      3L1, TO CP...HAVE A UNIT AT NR/ESPERANZA...SEND THEM
                        TO HIDDEN HILLS TO LOCTE FIRE PERSONNEL
09:05:59 PD01 CHGLOCOS  125 BASTANCHURY/VILLAGE CENTER
09:07:30 PD01 MISC      756Y, 415 PLATE 8K23852
09:07:39 PD01 QUERY     756Y XL L/8K23852
09:07:54 PD01 MISC      756Y, 4BCY0PD0100 ZAQ.IV DATE: 11/16/08 TIME: 09:07
                        INSURANCE INFORMATION ON FILE POSSIBLE FILE CODES:
                        C(8K23852) S(8K23852) REG VALID FROM: 05/31/08 TO
                        05/31/09 LIC#:8K23852 YRMD:07 MAKE:FORD BTM :4C VIN
                        :1FTPW14597KC52286 R/O :MILLER KASEY, 5015 AVIEMORE DR
                        CITY:YORBA LINDA C.C.:30 ZIP#:92887 SOLD:00/00/07
                        RCID:08/26/08 OCID:06/09/07 LOCD:4 L/O :FORD MOTOR
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                                CRDT CO, PO BX 105704, ATLANTA CITY:GA ZIP :30348
                                TYPE:31 POWR:G AXLE:2 WGHT:05327 VEH :32 BODY:P
                                CLAS:MC REC STATUS: 06/01/07 SMOG DUE 05/31/13
                                CLEARANCE INFORMATION RECORDS: OFFICE WORK DATE
                                TECH/ID SEQ # VALUE FICHE DATE TTC 191 05/29/07 K2
                                0617 00506.00 00/00/00 A00 143 08/15/08 43 9589
                                00753.00 00/00/00 POT 05/09/2007-ODOMETER: 137 MILES
                                ACTUAL MILEAGE END [11/16/08090754001]
09:12:57 PD01 MISC              821, TWO NC SWAT PERSONNEL AT NORTH END OF CDB...FOR
                                THE LOOKIE LOOS
09:13:25 PD01 MISC              819, HIDDEN HILLS IS FLARING UP
09:14:11 PD01 MISC              819, OCFA HAS BEEN NOTIFIED ALREADY
09:15:18 PD01 MISC              123, NEED SUPERVISOR TO BASTANCY/LAKEVIEW
09:15:43 PD01 CHGLOCOS          123 BASTANCHURY/LAKEVIEW
09:16:02 PD01 CHGLOC            742Y BASTANCHURY/LAKEVIEW
09:16:28 PD01 MISC              123, SUBJ AT LOCATION IN BLK MERCEDES THREATENING TO
                                RUN ME OVER
09:16:48 PD01 MISC              742Y, ER C3
09:17:40 PD01 MISC              123, SUBJ IS APPEARIN TO COMPLY L/6BOE592
09:17:47 PD01 QUERY             123 XL L/6BOE592
09:18:03 PD01 MISC              123, UNITS CAN REDUCE AND T22....SUBJ IS DRIVING AWAY
09:18:13 PD01 ONSCENE           742Y
09:18:42 PD01 MISC              .140, PER CP...STA 23 UNITS CHKG 932 AT 5005 HIDDEN
                                GLEN
09:18:55 PD01 MISC              742Y, C4
09:20:13 PD01 MISC              756Y, HAVE TW OSTA 18 DEPUTIES
09:20:26 PD01 BACKUP            001 835
09:20:26 PD01 ID                835 <1461>ZEEB,ROBERT
09:20:30 PD01 ENROUTE           835
09:22:47 PD01 MISC              812, WESTMINSTER UNIT IS 97 WITH US ..C4 NOW
09:23:23 PD01 MISC              .140, PER CP...RES IS CLEAR PER STA 23 OFFCS AT 5005
                                HIDDEN GLEN
09:23:50 PD01 MISC              812, WESTMINSTER IS NOT STAYIN ....NEED A UNIT STILL
09:23:57 PD01 CHGLOCOS          812 YORBA LINDA BL/FAIRMONT BL ,YBL
09:26:08 CT01 MISCX             ***CHECK ON ELEDERLY COUPLE AT 4580 VIA KORZO. RP
                                THINKS HER PARENTS ARE STILL THR
09:27:12 PD01 MISC              .140, POSSIBLE LOOTING AT 3167 GOLDEN WILLOW....17285
                                BRAMBLE CT....17163 BIG OAK COURT....ALREDY HAVE UNITS
                                ER TO CHK THAT
09:27:29 PD01 MISC              742Y, PARTY ADVSD AND SENT ON HIS WAY
09:29:19 PD01 CHGLOCOS          210 FAIRMONT BL/CONDOR RIDGE RD ,YBL, WILL CALL WITH
                                UPDATE
09:29:40 PD01 MISC              .140, STA 18 IS 97 AT BRMABLE CT...AND C4
09:32:38 PD01 MISC              .140, CALLER COMPLAINING A LOT OF FOOT TRAFFIC IS
                                GOING INTO VISTA DEL VERDE THE BACK WAY. SHE IS SEEING
                                PEOPLE WALKING AND ON BIKES AT LABASH AND
                                PROSPECT.[11/16/08093238001]
09:32:42 PD01 MISC              .140, T39 TO CP
09:32:56 PD01 MISC              812, IS TRAFF ALLOWED E AND W ON BTWN FAIRM/BAST
09:33:09 PD01 MISC              125, SOME OF THE RESIDENTS ARE GOING SON VC AND W ON
                                BAST...
09:33:34 PD01 MISC              .140, NOONE ALLOWED WB ON BASTANCHURY
09:33:52 PD01 MISC              125, NEED BARRICADES FOR VC AT BASTANCHURY TO KEEP
                                PEOPLE FROM COMING IN
09:33:59 PD01 MISC              .140, BARRICADES ER
09:34:13 PD01 MISC              .140, 17163 BIG OAK IS C4
09:34:35 PD01 MISC              .140, GOLEN WILLOW C4
09:36:44 PD01 MISC              125, AS FAR AS BARRICADES....NEED SHUT OFF AT VC.YL
                                WHICH WILL ALLEVIATE THIS ENTIRE ZONE
09:39:04 PD01 MISC              3L1, CANCELLED THE HELICOPTER AT THS POINT
09:40:28 PD01 MISC              819, ALL UNITS 98 FROM THE LOOTING CALLS...3 ROVING
                                STA 18 UNITS PC IN THE AREA
09:44:29 PD01 MISC              C93Y, NEED A UNIT FOR A SUBJ REFUSING TO TURN HIS CAR
                                ON
09:45:07 PD01 MISC              123, PER RESIDENT....BLACK GOLD IS FLARING UP
09:51:53 U995 MISC              C93Y, REG INQUIRY LIC/6CRA471
09:52:58 PD01 CHGLOC            835 YORBA LINDA BL/OHIO ST ,YBL
09:53:03 PD01 CHGLOCOS          210 YORBA LINDA BL/OHIO ST ,YBL
09:53:50 PD01 MISC              746Y, FLAMES BACK UP BEHIND ARCHSTONE IN THE EAST END
09:56:07 PD01 ONSCENE           835
09:57:09 PD01 MISC              125, YL CITY CREW HAS WB LANES OF VC/BASN...WILL SHUT
                                DOWN NB LANES OF YL IN THE LEFT TURN POCKET FOR EB TO
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			NB
09:57:13	PD01	QUERY	835 XL L/6CRA471
10:02:12	PD01	CHGLOC	210 91/GREEN RIVER
10:02:39	PD01	MISC	3L1, SANFILIPO IS ER TO VALENCIA HIGHSCHOOL TO ASSIST
10:03:15	PD01	BACKUP	3L1 855
10:03:15	PD01	ID	855 <1524>SANFILIPPO,VALERIE
10:03:25	PD01	CHGLOC	855 VALENCIA HIGH SCHOOL
10:14:50	PD01	CLEAR	835 CO, SUBJ LEFT
10:19:29	PD01	MISC	.140, STA 18 IS DOING RES CHK AT 3353 GARDNIA
10:22:13	PD01	MISC	.140, REPORTS OF 901 AT IMP/YL....AT EL POLLO...STA 18 ONSCENE REQUESTING MEDICS AND A UNIT FOR
10:23:25	PD01	MISC	125, T39 TO YL CITY YARD TO CHK ON BARRICADES
10:23:51	PD01	MISC	125, TO ANY UNIT AT FAIRMONT/BASTANCHURY
10:28:36	PD01	CHGLOCOS	821 22560 SKYLINE DR ,YBL, CHKG 925SUB IN A BURNED DOWN RESIDENCE
10:30:46	PD01	MISC	121, ALL THREE LANES HERE BACKED UP ALL THE WAY TO SANTA ANA CANYON...PEOPLE GETTING OUT OF THEIR CARS WALKING UP TO ME
10:30:58	PD01	MISC	.140, RET21 STA 10 AND HAVE THEM STAY AT GYPSUM EXITS
10:31:14	PD01	ONSCENOK	821
10:31:38	PD01	MISC	.140, T39 TO CHP
10:31:50	PD01	MISC	812, BRUSH FIRE AT QUEATER HORSE/TROTTER LANE
10:39:03	PD01	MISC	812, FAIRMONT/YL...STILL NEED SOMEONE
10:44:02	PD01	MISC	.140, NEED YLCY TO CLOSE GYPSUM CANYON BRIDGE WITH BARRICADES
10:45:17	PD01	MISC	742Y, NEED STA 26 TO SHUT DOWN SAC...MOST TRAFFIC IS COMINGFROM THERE
10:45:43	PD01	CHGLOCOS	742Y SANTA ANA CANYON RD/GYPSUM CANYO
10:47:48	PD01	MISC	742Y, NEED IT CLOSED WOF SAC ...TURN THEM AROUND THERE
10:48:51	PD01	MISC	742Y, OFF RAMPS SHUT DOWN....ON RAMPS ARE OPN TO THE FRWY
10:53:22	PD01	MISC	.140, STA 26 SHUTTING DOWN SAC
10:59:19	PD01	MISC	.140, TO 746Y....LET NB YL GO MAKE SURE EB LA PALMA IS STILL CLOSED
11:21:56	PD01	MISC	.140, NEED STA 17 UNITS TO RESPOND TO LOS ANGELES AND IMPRIAL TO ASSIST STA18 DEPUTIES
11:22:01	PD01	MISC	.140, TO TO STA 17
11:27:42	PD01	BACK-ER	125 651
11:27:42	PD01	ID	651 <1028>VUKELICH,WILLIAM
11:30:30	PD01	MISC	7S1, NO AREAS AHAVE BEEN OPENED TO THE RESIDENTS
11:31:11	PD01	MISC	812, SEND STA 17 TO FAIRMONT ELEMENTARY 87 WITH CITIZENS IN A GLD FORD WINDSTAR REF THEIR PIG3
11:32:12	PD01	MISC	812, T39 TO STA 17
11:34:50	PD01	CHGLOC	816 LAKEVIEW/BASTANCHURY, TO RELIEVE BARSLUND AND WAMBAUGH
11:36:52	PD01	MISC	.140, TO 835, FEMALE JUMPING THE FNCE AGAINST THEIR ORDERS
11:41:44	PD01	CHGLOCOS	210 ROAMING
11:42:56	PD01	MISC	.140, NO PED OR VEH TRAFF ALLOWED NORTH
11:43:13	PD01	MISC	.140, ALL EVAC AREAS NOF YL/NOF IMP
11:43:34	PD01	MISC	125, YL SET UP BARRICADES AT YL/VC...BUT NOT MANNED ...PEOPLE KEEP GOIGN AROUND THEM
11:43:53	PD01	MISC	125, TRAFFIC KEEPS COMING THRU...IF SOMEONE MANS THEM THEN ITLL HELP
11:48:12	PD01	CHGLOC	651 YL
11:53:12	PD01	CHGLOC	742Y BASTANCHURY RD/CLYDESDALE DR ,YB
11:53:49	PD01	BACK-OS	001 835
11:53:49	PD01	ID	835 <1461>ZEEB,ROBERT
11:53:52	PD01	CHGLOCOS	835 5601 WESTFIELD ST ,YBL
11:54:12	CT01	MISCX	RP GOT A CALL FROM A NEIGHBOR ADVISING THAT HIS RES AT 3825 WELSH PONY IS BEING LOOTED.. MARK FRIES 714 777 4930
11:54:18	PD01	CHGLOC	742Y VALLEY VIEW AV/BASTANCHURY RD ,Y
11:55:44	PD01	CHGLOC	123 91/GREEN RIVER
11:59:06	U953	ONSCENE	123
12:01:17	PD01	CHGLOC	210 17123 BIG OAK LN ,YBL, DOING A WELFCK
12:01:49	PD01	MISC	210, LOOKING FOR SUBJ BY NAME OF GLEN..
12:03:34	PD01	MISC	.140, NEED UPDATED ETA FOR STA 17 AT IMP/LOS ANGELES....
12:06:13	PD01	ONSCENE	210
12:06:35	PD01	MISC	.140, PER STA 17 10 MINS ETA LOS/IMPERIAL
12:08:07	PD01	MISC	210, GLEN IS HOME...WILL CALL RP

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12:11:48 PD01 CHGLOC    210 ROAMING
12:14:08 PD01 MISC      756Y, POSSIBLE LOOTER AT ROCKHAMPTON/THISTLE DOWN IS
                        C4...HE IS HOMEOWNER
12:14:25 PD01 MISC      756Y, WAS WRG RED TSHIRT/CAMELBACK
12:21:00 PD01 CHGLOC    756Y 5601 WESTFIELD ST ,YBL
12:23:11 PD01 INSRVICE  835
12:23:53 PD01 CHGLOCOS  756Y YORBA LINDA BL/STONEHAVEN DR ,YB
12:24:03 PD01 MISC      812, NEED A SUPERVISOR YL/FAIRMONT
12:24:11 PD01 CHGLOC    742Y YORBA LINDA BL/FAIRMONT BL ,YBL
12:25:03 PD01 BACK-ER   125 835
12:25:03 PD01 ID        835 <1461>ZEEB,ROBERT
12:27:37 PD01 INSRVICE  210
12:29:09 PD01 ONSCENE   742Y
12:41:24 PD01 INSRVICE  742Y
12:46:20 PD01 CHGLOCOS  123 BASTANCHURY/LAKEVIEW
12:47:30 PD01 CHGLOC    816 CP FOR CHOW
12:47:31 FD01 MISC      826, 1039 TO 826 TO CALL ROMAN ARELLANO REF POSS
                        THREAT MGMT TEAM INFO.... 714 529 6502
13:13:33 PD01 BACK-OS   816 759
13:13:33 PD01 ID        759 <1498>FALLON,TERRY
13:14:04 PD01 CHGLOCOS  759 YORBA LINDA BL/VIA DEL AGUA ,YBL
13:19:28 PD01 CHGLOC    756Y B FOR CHOW
13:26:43 PD01 CHGLOC    835 VALLEY VIEW AV/YORBA LINDA BL ,Y
13:29:00 PD01 MISC      3L1, T4
13:41:00 PD01 CHGLOCOS  835 VALLEY VIEW AV/IMPERIAL HY ,YBL
13:53:14 SUP1 CHGLOC    821 BOXCAR LN/TROLLEY CT ,BEA
13:53:18 SUP1 MISC      821, FOR ARSON INVEST
14:01:52 PD01 CHGLOC    746Y CP
14:02:05 PD01 MISC      746Y, RELIEVED BY STA 18
14:04:30 PD01 CHGLOC    121 CP
14:04:35 PD01 CHGLOC    122 CP
14:04:39 PD01 CHGLOC    746Y CP
14:06:23 PD01 CHGLOCOS  756Y STONEHAVEN DR/YORBA LINDA BL ,YB
14:08:25 PD01 CHGLOC    745Y CP, RELIEVED BY STA 18
14:12:55 PD01 BACK-OS   745Y 742Y
14:12:55 PD01 ID        742Y <1347>JAMES,THOMAS
14:13:05 PD01 CHGLOCOS  742Y EAST END CHKG FOR POWER
14:13:46 PD01 MISC      751Y, TO CP...RESIDENTS COMING TO VV/BAST...OCFA
                        STATNG THEY CAN GO UP TO VV CIRCLE
14:18:19 PD01 MISC      123, TO CP....OC SHERIFF GO TO EUREKA SPOT TO ADVS
                        NOONE IS ALLOWED TO COME THUR
14:23:48 PD01 MISC      756Y, RETIREMENT HOME TO THE REAR OF THIS
                        LOCATION....HAS A WALK PATH THAT RESIDENTS ARE PARKING
                        THEIR CARS AND WALKING INTO THEIR HOMES...
14:27:15 PD01 MISC      742Y, DO HAVE POWER AT LOS ADORNOS...SHOPPING CENTER
                        AT LOMAS E DOES TOO...
14:27:40 PD01 CHGLOC    742Y CHKG BRUSH CANYN AREA/CDB
14:30:52 PD01 MISC      3L1, ****PER OCFA...AT 1400 HRS...WE WERE TO HOLD ALL
                        POSITIONS AND NOT ALLOW ANYONE INTO THEIR
                        HOMES***********
14:31:40 PD01 MISC      3L1, ****WAS PER THE OCFA BATALLION CHIEF HERE AT THE
                        YL EOC*******
14:32:46 PD01 MISC      7S1, *************AERIAL SURVEY WAS CONDUCTED...NEED
                        TO RETURN TO THE IC AND MAKE SURE ALL THE OTHER
                        UTLITIES HAVE SIGNED OFF... WE ARE HOPEFULLY GONNA
                        OPEN HERE SHORTLY ***************
14:42:17 PD01 MISC      742Y, POWER ON ENTIRE EAST END HAS POWER
14:42:27 PD01 CHGLOC    742Y CHKG HIDDEN HILLS
14:57:54 PD01 MISC      7S1, ******FROM ROSE/VESUVIUS TO EAST END OF YL....NO
                        RESTRCTIONS...OK TO LET ANYONE IN...AS OF 1530
                        HRS******
15:16:14 SUP1 MISC      127, ROSE/YL WILL BE OPEN AT 1530
15:30:04 PD01 INSRVICE  C93Y
15:32:06 U967 INSRVICE  835
15:35:43 PD01 INSRVICE  812
15:35:59 PD01 INSRVICE  123
15:36:17 PD01 INSRVICE  826
15:36:43 PD01 CHGLOCOS  121 EAST END FOR ROVING PATROL
15:36:48 PD01 CHGLOCOS  122 EAST END FOR ROVING PATROL
15:36:50 PD01 INSRVICE  745Y
15:37:18 PD01 BACK-OS   121 745Y
15:37:18 PD01 ID        745Y <1408>CONNER,ROBERT
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15:37:24 PD01 CHGLOCOS 745Y ROVING PATROL
15:37:40 U957 INSRVICE 125
15:38:08 U753 CLEAR    759 CM
15:38:10 PD01 CHGLOCOS 816 ROVING PATROL IN YL
15:38:22 PD01 BACK-OS  816 826
15:38:22 PD01 ID       826 <1393>VANAGS,MICHAEL
15:39:16 PD01 BACK-OS  121 128
15:39:16 PD01 ID       128 <1513>FERRARO,SCOTT <1298>VAUGHAN,MARIO
15:39:36 PD01 BACK-OS  121 125
15:39:36 PD01 ID       125 <1601>JOHNSON,JASON <1348>GOGERTY,SHAWN
15:39:38 PD01 CHGLOCOS 125 ROVING BEAT 23 AND 24
15:47:33 PD01 CHGLOCOS 746Y ROVING PATROL
15:54:53 PD01 BACK-OS  121 C93Y
15:54:53 PD01 ID       C93Y <1545>GLOMBOSKE,JERRY
15:54:58 PD01 CHGLOCOS C93Y ROVING IN YL
15:55:08 PD01 CHGLOCOS C93Y ROVING IN WEST YL
15:59:27 U995 MISC     C93Y, REG INQUIRY LIC/6BLD542
16:03:54 PD01 BACK-OS  121 835
16:03:54 PD01 ID       835 <1461>ZEEB,ROBERT
16:10:05 PD01 INSRVICE 127
16:31:45 PD01 PREEMPT  128
16:32:44 PD01 CLEAR    742Y CM
16:43:48 PD01 PREEMPT  821
16:54:57 U995 MISC     C93Y, REG INQUIRY LIC/1046828
16:56:26 PD01 PREEMPT  835
16:58:19 PD01 CLEAR    651 CM
17:00:54 PD01 BACKUP   122 835
17:00:54 PD01 ID       835 <1461>ZEEB,ROBERT
17:01:04 PD01 CHGLOCOS 835 CAMINO DE BRYANT/KODIAK MOUNTAIN
17:08:09 PD01 BACK-OS  835 651, ROVING PATROLS
17:08:09 PD01 ID       651 <1028>VUKELICH,WILLIAM <1580>SEAMANS,MARK
17:08:34 PD01 CHGLOCOS 651 ROVING PATROLS EAST END
17:13:31 PD01 INSRVICE 18A41
17:13:31 PD01 INSRVICE 184716
17:14:05 PD01 INSRVICE 001
17:18:43 PD01 CHGLOC   651 4501 CASA LOMA AV ,YBL
17:26:43 PD01 BACK-OS  835 128
17:26:43 PD01 ID       128 <1513>FERRARO,SCOTT <1298>VAUGHAN,MARIO
17:26:49 PD01 CHGLOCOS 128 4501 CASA LOMA AV ,YBL
17:28:21 PD01 INSRVICE 8S2
17:29:15 PD01 CHGLOCOS 121 4501 CASA LOMA AV ,YBL
17:31:26 U953 BACK-ER  121 123
17:31:26 U953 ID       123 <1584>WAMBAUGH,JASON <1569>BARSLUND,CHRISTOPHER
17:31:35 PD01 INSRVICE 651
17:32:15 PD01 PREEMPT  756Y
17:34:34 PD01 CHGLOC   835 4501 CASA LOMA AV ,YBL
17:37:35 PD01 BACKUP   824 651
17:37:35 PD01 ID       651 <1028>VUKELICH,WILLIAM <1580>SEAMANS,MARK
17:37:43 U951 MISC     651, REG INQUIRY LIC/HGSKESE
17:38:19 U951 ENROUTE  651
17:39:30 PD01 CHGLOCOS 128 4501 CASA LOMA AV ,YBL
17:39:43 PD01 CHGLOCOS 123 4501 CASA LOMA AV ,YBL
17:40:34 PD01 CHGLOC   824 4501 CASA LOMA AV ,YBL
17:40:54 PD01 CHGLOCOS 746Y 4501 CASA LOMA AV ,YBL
17:41:20 PD01 ONSCENE  651
17:43:09 U995 INSRVICE C93Y
17:47:28 PD01 PREEMPT  123
17:49:29 PD01 PREEMPT  824
17:51:06 PD01 PREEMPT  651
17:57:27 U963 PREEMPT  128
17:57:41 PD01 PREEMPT  125
18:01:24 PD01 INSRVICE 121
18:01:24 PD01 INSRVICE 122
18:05:06 PD01 INSRVICE 751Y
18:09:46 FD01 INSRVICE 855
18:17:50 PD01 INSRVICE 8S1
18:20:47 PD01 INSRVICE 745Y
18:28:44 PD01 INSRVICE 826
18:28:46 PD01 INSRVICE 819
18:28:49 PD01 INSRVICE 746Y
19:23:05 PD01 INSRVICE 2L1
20:34:15 CT01 INSRVICE 816
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20:35:20 PD01 INSRVICE 3L1
20:35:23 PD01 INSRVICE 661
20:35:28 PD01 INSRVICE 7S1
20:35:49 PD01 ONSCENE  835
21:40:33 SUP1 CLEAR    835 CM
21:40:33 SUP1 CLOSE    835 CM

11/19/08
16:47:47 SUPV CASE     PD0800010982 Assigned

OPERATOR ASSIGNMENTS:  PD01  C045   PASINO,ADRIANA
                       FD01  C033   BERNATOWICZ,APRIL
                       SUP1  C025   DISTLER,WENDY
                       CT01  C024   MEYER,TINA
                       U957  1601   JOHNSON,JASON
                       U963  1574   GILBERT,CYNTHIA
                       U982  1497   BRINTLE,GREG
                       SUPV  C037   KRUSE,LUCY
                       U992  1579   MOC,STELLA
                       CT02  C025   DISTLER,WENDY
     AS OF 15:35:13:   SUP1  C037   KRUSE,LUCY
     AS OF 15:42:51:   SUPV  C011   MCEVILLY,CYNTHIA
                       U752  1561   SANCHEZ,MICHELLE
     AS OF 16:50:33:   PD01  C029   SAUNDERS,TERI
                       U952  1577   STIEFEL,SHAYNE
                       U959  1461   ZEEB,ROBERT
                       RC01  1480   HOVLAND,JODY
     AS OF 18:04:58:   PD01  C042   FLATTUM,CHAD
                       U966  1408   CONNER,ROBERT
                       U955  1578   HOLMES,NEAL
     AS OF 19:59:46:   CT02  C029   SAUNDERS,TERI
                       U964  1459   MULLINS,DALE
     AS OF 22:59:10:   U966  1258   FLEIG,DEAN
                       U983  1482   MAYO,JOSEPH
     AS OF 23:45:32:   SUPV  C031   HADDAD,ANGELA
     AS OF 00:05:03:   SUPV  C037   KRUSE,LUCY
     AS OF 00:52:39:   U963  1193   JONES,DAVID
     AS OF 01:07:19:   U959  1507   HADDAD,CHRIS
     AS OF 01:23:01:   SUP1  C038   LEKANDER,LAUREN
                       SUPV  C014   BORUNDA,SANDRA
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Report: Crews ignored orders during Freeway Complex fire

View Photo Gallery

By KIMBERLY EDDS

Email Article

Despite countless hours of practice and planning by the Orange County Fire Authority before last November's devastating Freeway Complex fire, firefighters disregarded orders and put others and themselves at risk, a report released Thursday said.

In the midst of a fire that raced through three canyons and directly into Yorba Linda, off-duty crews commandeered fire engines, driving engines into the firefight without telling superiors what they were doing or where they were going.

Firefighters put themselves and others at risk and handcuffed firefighting options when they failed to follow their chain of command, the report said.

The revelations are part of a 128-page report by the Fire Authority that looks at the successes

and failures during the Freeway Complex fire and suggests how the county's largest firefighting agency can improve its capabilities in the future.

A total of 203 homes - 117 in Yorba Linda - were destroyed, in the "most catastrophic loss of homes in Orange County since the Laguna Fire in 1993," the report said. An additional 117 residences were damaged, and more than 40,000 people were forced from their homes in the largest fire in Orange County since 1948.

But no one died or was seriously injured, and hundreds of homes were saved by the efforts of more than 3,800 firefighters, the report said.

Three weeks before the Freeway Complex fire broke out Nov. 15, local firefighters held a tabletop exercise that closely resembled the actual fire, giving officials a jump on strategy and tactics.

When the real blaze struck, Battalion Chief Rick Reeder raced from his fire station in Placentia to the fire, calling for extra engines and aircraft miles before he saw flames. Traffic along the 91 freeway could not keep up with the fast-moving head of the fire. A second blaze broke out in Brea less than two hours later, creating a monster.

Four days later, firefighters had reigned in the 30,305-acre blaze.

Of $16.1 million spent to fight the fires, all but $33,000 was reimbursed by state and federal funds. The fires caused an estimated $150 million in damage. The cause of the Corona end of the fire was ruled an accidental spark from a car exhaust along the 91 freeway at Green River. The Brea fire had been sparked by downed powered lines.

Fire officials credited staging of equipment and crews ahead of time, recent tabletop exercises and changes in the state's mutual aid system for a quick response. Within the first four hours of the fire, 159 engines, three trucks, five water tenders, eight helicopters and 10 air tankers were attacking the flames. Forty-one engines were there within the first hour, the report said. But issues with communication and water supply hampered firefighting efforts.

After hundreds of interviews and reviewing hundreds of documents and thousands of radio transmissions, the authors of the postmortem report came up with a wish list of 56 changes, improvements and upgrades.

The major recommendations include improving radio communications, training crews in battling house fires near wildland areas, working with local water agencies to identify and rectify weaknesses in water systems, and developing a rapid-mobilization plan in large-scale emergency situations.

Nearly 18 months after the Santiago fire raced through Orange County's canyons, tight economic times have forced the Fire Authority to postpone several major recommendations after that fire, including replacing its part-time hand crew with a full-time crew and adding a fourth firefighter to wildland engines to meet federal standards. The same recommendations were echoed in the Freeway Complex review.

While several recommendations have been completed or are under way, the ones that cost

money, including staffing increases, will likely have to wait. But Fire Chief Chip Prather implored the Fire Authority's board of directors to approve funding as soon as funding was available for the fourth-man staffing and a hand crew, staffing increases he said are imperative to maintaining firefighting safety and effectiveness.

"We have to balance out our No. 1 responsibility, which is public safety, with our responsibility to the taxpayer," Battalion Chief Kris Concepcion said. "As soon as it is economically feasible, we will implement them."

Problems plagued the firefighting effort from the start.

The plan was to pinch off the fire early. But hundreds of gallons of water destined to be dropped by helicopters on the fire had to be diverted and dropped on a Corona fire engine crew that had been overrun by flames after going off-road to try to fight the flames. The Corona crew's decision placed them in a "dangerous position," between the fast-moving fire and unburned brush, the report said. The crew was saved, but flames raced west toward Yorba Linda, throwing embers more than a mile in front of the fire.

"It's an angry fire, and it's not getting any happier," Reeder said. "Are we going to stop it? No. How do we want it and what can we do to make it come into Yorba Linda the way we want it to?"

Two strike teams - a total of 10 fire engines - were ordered by Reeder to stage at Station 53 on East La Palma in Yorba Linda to get ahead of the fire. "In my mind, what was burning in Corona was already done," Reeder said. "It was not the piece to worry about."

Strike team leaders ignored Reeder's order, self-dispatching instead to Corona, the report said. With the original order unfilled, strike teams did not arrive into Yorba Linda until 11 a.m. - nearly 2 hours later. The first Yorba Linda house was already burning.

Command officers have a "certain amount of latitude," Concepcion said. "They must have thought there was something more pressing in Corona," he said.

Fire stations were emptied to fight the Laguna fire in 1993, but entire OCFA battalions were left fully staffed during the Freeway Complex fire, officials said.

"We had two fires burning close to each other, and we didn't know what caused them," Concepcion said. Extra strike teams were ordered from other counties, but it took time for them to arrive.

Off-duty Fire Authority crews were mounting their own defenses, hijacking three engines and heading to the firefight, creating serious safety and accountability issues. Command staff scrambling for extra engines to send to the firefight spent up to 12 hours trying to find the maverick engines, the report said.

"These firefighters are heroes," Fire Authority union President Joe Kerr said. "These firefighters came in off-duty to try to do everything they could to save homes. A lot of homes were saved because of them. You're not going to find more dedication than that."

"We take crew accountability very seriously," Concepcion said. "We want to make sure this never happens again."

The involved firefighters have been interviewed but were not disciplined, Kerr said.

The fire chief and the union plan to send a letter to its employees reminding them that department rules and regulations need to be followed, even during a disaster. Even though the crews were not assigned to work, they were paid, Concepcion said.

Wages are paid at time and a half for nonscheduled workdays. A preliminary report made no mention of the rogue crews.

The fire moved fast.

Santa Ana winds up to 60 mph sent flames hurtling over steep, dry hills - and on a direct path to Yorba Linda. The fire consumed the length of nearly 14 football fields every 60 seconds. More than 10,000 acres burned in the first 12 hours, taking with it hundreds of homes and buildings.

City and county officials failed to activate an automatic telephone alert system. The first calls telling residents to flee the fire didn't go out until after 4 p.m., nearly three hours after the Fire Authority issued a news release stating a "raging wildfire" had destroyed homes in Anaheim Hills, Brea and Yorba Linda.

Dozens of homes continued to burn in Yorba Linda around 2 p.m. as firefighters were also forced to battle low water pressure and dry hydrants on Hidden Hills Road and surrounding streets, the report said.

One strike team leader told Fire Authority Chief Prather that his crews could have saved five to six homes of the dozens of homes burned in the Hidden Hills neighborhood. But without water, the team's five engines were forced to move to lower ground. There, they found hydrants with water and made a stand against the blaze.

Fire Authority water tenders were called in to shuttle water to crews. But the pressure problems also hindered the tenders' efforts, Prather said. Some of the depletion of water pressure was directly attributed to engines drawing thousands of gallons of water a minute from hydrants simultaneously as they desperately dumped water on dozens of homes burning at once, Prather said. It took more than three hours for water pressure to improve enough for water tenders to continue filling up, the report said.

Fires outnumbered fire engines. Fire crews snuffed out flames before moving to the next burning home but returned to neighborhoods hours later to find dozens of new fires, sparked by embers unknowingly inhaled into attics. Four days later, the fire was reigned in.

"We want to improve. We want to get better," Kerr said. "What we need to work on is command and control and proper staffing and deployment so we can keep small fires small."

Fire routes

In the event of an evacuation, major arterial streets can become congested. The Sheriff's Department plans to redirect drivers onto less-traveled streets to speed up traffic.

The Register

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Why weren't the fires snuffed out immediately?

By TONY SAAVEDRA and ERIC NEFF

FIRE CENTRAL: Complete fire coverage

Email Article

From the beginning Saturday, the cards were stacked against firefighters when the so-called Freeway Complex fire erupted in Corona soon after 9 a.m.

Hot winds, resources swallowed up by fires in Santa Barbara and Sylmar, low water pressure - in almost no time, the flames sprinted west to Yorba Linda, burning down high-priced houses in the Blue Ridge Drive area. With gusts of 30 mph, firefighters in Corona and neighboring Yorba Linda had little chance of stamping out the blaze, which grew in size and ferocity. Gov. Arnold Schwarzenegger declared a state of emergency for Orange and Riverside counties, as well as for Los Angeles County.

"We just started losing homes. We didn't have enough units," said Mickey Hansen, an Orange County Fire Authority safety officer. He said there were nine firefighting units in the neighborhood when the flames arrived. They immediately called for more units but were outrun by the fire.

"There were just so many fires," Hansen said. "There wasn't enough to go around."

Little more than a year ago, the Santiago fire bedeviled Orange County for nearly a month, charring Santiago Canyon and fueled by winds and slow-to-arrive state resources. Orange County spent the following year trying to beef up and prepare for the next disaster. It had virtually the same results.

The Freeway Complex fire was too quick for Orange and Riverside county firefighters.

"This was a fast-moving fire - at times moving at 100 feet per minute - and more and more resources are constantly needed," said Fire Authority Battalion Chief Michael Boyne.

Helicopters and water tankers flew over the sizzling terrain, drenching areas before the flames could reach them. Firefighters sprayed homes with water to make them more resistant to the flames. But in Yorba Linda, the water supply wasn't up for the job.

In the afternoon, a pump in the Yorba Linda Water District system broke. A replacement was found in Laguna Beach, officials said. But even with the repair, the water system couldn't handle the blaze. The problem was especially evident in the uppermost reaches of Yorba Linda, in Hidden Hills Estate. The water was coming with too little force and was also undrinkable. District officials advised residents to boil their water or mix it with a few drops of bleach.

DISCOVER MD
MATER DEI HIGH SCHOOL
Information Night Tuesday, January 14, 2014
TAP FOR MORE

Emergency phone notification not activated in Yorba Linda fire

View Photo Gallery

By NORBERTO SANTANA JR., KIMBERLY EDDS, DOUG IRVING and MICHAEL MELLO

Email Article

FIRE CENTRAL: Complete fire coverage >>

Even as wind-swept flames roared toward the hillside neighborhoods of Yorba Linda, city and county officials failed to activate a telephone-alert system that would have given thousands of residents early warning of the fast-approaching threat.

In fact, the first automatic calls warning people to flee the onrushing fire went out shortly after 4 p.m. - nearly three hours after the county had declared an official emergency. By then, fire authorities had issued a news release warning that a "raging wildfire" had destroyed homes in Anaheim Hills, Brea and Yorba Linda.

"It's a brand-new system," said David Gruchow, Yorba Linda's assistant city manager. "I think we suffered a little bit that the procedures that are used in activating it are still being worked through."

The failure of the alert system - often called "reverse 911" - has set off finger-pointing between city and county officials. Yorba Linda Councilwoman Jan Horton, who also sits on the Orange County Fire Authority's executive board, said the evacuation of hillside neighborhoods could have gone more smoothly if residents had early notification.

Instead, she said, fleeing residents used both sides of the road in their rush to get down the hills. "Had the calls come earlier," she said, "firefighters wouldn't have had to fight their way upstream."

OCFA Fire Chief Chip Prather confirmed his firefighters indeed did have problems navigating crowded Yorba Linda Boulevard and La Palma Avenue. He was frustrated with the problems of the reverse 911 system and said that was an issue that should be reviewed by all of the agencies that responded to the fire.

"Whether it's us or the police in the unified command, clearly something didn't go right," Prather said. "It needs to go better next time."

The alert system automatically calls residents to warn them of danger or tell them to evacuate. San Diego officials used the system during last year's wildfires to alert nearly 600,000 residents of nearby fire threats.

Orange County has only recently installed the system, finalizing procedures for its use in late July. Since then, officials have been working with most Orange County cities to get user agreements signed and local officials trained to use it.

Yorba Linda signed on as a user at the end of September and held an implementation meeting with county officials Oct. 20.

Orange County supervisors have touted the recent installation of the phone-alert system, saying that it sent out several thousand phone calls to residents. But Horton and other residents said those phone calls came too late in Yorba Linda.

The OCFA incident commander issued the call to evacuate east Yorba Linda at 10:22 a.m., triggering an old-fashioned mandatory evacuation by Brea police, with officers going door-to-door and using loudspeakers to get the word out. Orange County's emergency operations center geared up at 11 a.m. Saturday as the Freeway Complex wildfire blustered toward the county. A public-information hotline was up by 12:40 p.m. The county declared an official emergency at 1:35 p.m., and federal and state declarations followed, along with nearly a dozen news releases.

But nobody called to activate the phone-notification system.

"There was no request for it to be activated," said Donna Boston, a sheriff's official who acts as the county's emergency incident manager. "That (request) came in the neighborhood of 3:50 p.m., and that was from a Sheriff's Department person in the field."

Once that call set the system in motion, Boston said, a flurry of phone calls went out automatically to homes in Yorba Linda. The first messages were left at 4:09 p.m. Within 9 minutes, 7,000 warning calls had been made.

But it was too late.

"Any city that has a threat needs to alert that," Boston said. "They are the alert and warning point for their city. They are responsible for public safety in that community."

The fire destroyed at least 177 homes in Orange County and damaged 114 others. Yorba Linda was hit the hardest, losing 118 homes.

In the city's Hidden Hills neighborhood, fire crews tapped into some fire hydrants to find nothing but air. Homes continued to burn as they fought low water pressure and dry hydrants; complaints about the system run by the Yorba Linda Water District are being examined.

One fire strike team leader told Prather that five to six homes in the Hidden Hills neighborhood burned to the ground simply because of the lack of water.

Those kinds of losses, especially since they could have been averted, brought Prather to tears as he discussed it Friday afternoon.

"We are certainly responsible for the lives of the people in the community," Prather said.

Ken Hertzberg lives on Stonehaven Drive, just down the street from homes that burned. He said the only warning he had was "police ... just zigzagging in and out of people's driveways telling people to 'Get out, don't try to save your homes.' "

He ignored the warning, turned on a neighbor's sprinkler and doused spot fires with a hose.

A few homes away, Dan Henry said he did receive a message on his answering machine telling him to evacuate. He got the message when he returned home, long after the fires had passed. "It probably called as we were loading cars," he said.

But his wife, Lisa, said there was no way the city could get the word out quickly enough. The fire, she said, "moved so fast, nobody could warn us. ... It may make people feel better to put blame on people, but this was a natural disaster."

Horton, the Yorba Linda councilwoman, drew attention this week to the failure of the phone-notification system. She said the late warnings contributed to traffic jams on Yorba Linda's winding roads, complicating the efforts of firefighters to get heavy equipment up the hills.

Horton has asked for a preliminary report on the fire within 10 days. She also asked for a complete after-action report within a month, along with a complete accounting and timeline of where firefighting resources were - and

when - during Saturday's fire fight in Yorba Linda.

"Undeniably, we are so grateful to the people who came to our aid," she said. "But there were some great, great failures."

Even Prather, who has said he is not looking to expand OCFA authority over water districts, said his department may look at ways to ensure that water hydrants work.

"That's what our job depends on," he said.

"It's ridiculous to think that a firefighter could tap into a hydrant and it doesn't work," Horton said.

The same irony hits her over the phone-notification system. Yet above anything else what Horton wants is accountability. "We're looking into whose responsibility it was. If it turns out it was ours, then we will take responsibility for it."

But she added: "I don't think it should be any one person's responsibility. There should be checks and balances."

The county has established a Web site - www.alertoc.com - that gives a broad overview of the alert system and lists participating cities. Residents can also enter their phone numbers to the county's notification database through the site.

A script for reverse 911 calls has already been written in case the rain forecast for Orange County next week sets off mudslides.

If you saw the fire start, call us at 949-454-7361.

Numerous staff writers contributed to this report, including Dena Bunis, Serena Maria Daniels, Eugene W. Fields, Doug Irving, Marilyn Kalfus and Sarah Tully.

FIRE CENTRAL: Complete fire coverage >>

If you saw the fire start, call us at 949-454-7361.

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FIRE CENTRAL: Complete fire coverage >>

DISCOVER MD
MATER DEI HIGH SCHOOL
Information Night Tuesday January 14, 2014
TAP FOR MORE

Chief: Homes could have been saved from fire, but there was no water

By KIMBERLY EDDS

Email Article

Five to six Yorba Linda homes that burned to the ground by a quick-moving brush fire last weekend could have been saved if only firefighters had the water they needed, Orange County Fire Authority Chief Chip Prather said. The revelation comes as residents and city officials continue to demand answers for why the city's water district had insufficient water pressure and dry hydrants during the 30,000-acre firestorm that destroyed 118 homes in Yorba Linda.

In the city's Hidden Hills neighborhood and highest reaches of Yorba Linda, fire crews facing advancing flames tapped into some fire hydrants to find nothing but air. Homes continued to burn as they were also forced to battle the dismally low water pressure and dry hydrants.

One fire strike team leader told Prather that his crews could have saved five to six homes of the nine homes burned in the Hidden Hills neighborhood. But without water, the team's five engines were forced to move to lower ground. There, they found hydrants with water and made a stand against the blaze.

The Freeway Complex fire, which broke out just after 9 a.m. Nov. 15, destroyed at least 177 homes in Orange County and damaged 114 others. Yorba Linda was hit the hardest, losing 118 homes.

Water district officials have said their system met the minimum requirements of the OCFA and the state fire code.

"It was a problem of too much fire, not a problem of not enough water," said water district spokesman Laer Pearce.

There is little doubt water from the Santiago Reservoir was desperately needed in Hidden Hills. But flames scorched an electronic sensor that kept district officials from being able to tell whether it was feeding the system. Communication was restored by Sunday afternoon, but there was no way to determine the flow a day earlier, water officials said.

OCFA water tenders were called in to shuttle water to crews, driving up and down to the hills. But the water pressure problems also hindered the tender's efforts, Prather said.

Watching the desperate water situation from its emergency operations center, water district officials asked OCFA for three fire engines to pump water from one side of Village Center Drive to the other as a way to increase water pressure. The engines sat on the street pumping water between two of the district's water grids for nearly eight hours, forcing their fuel tanks to be refilled twice, Prather said.

Residents packed a Yorba Linda City Council meeting Tuesday, voicing frustration over a lack of water. Resident after resident said they watched as firefighters drove by, explaining there wasn't much that could be done without water.

Fire and water district officials laid out their case in PowerPoint presentation, explaining that they did everything they could. Mutual aid requests sent dozens of engines roaring toward the fire within half an hour. Air resources were called in and evacuation plans worked, officials said. But sometimes Mother Nature packs a powerful punch.

Complaints about the system run by the Yorba Linda Water District are being examined by the OCFA and the Yorba Linda City Council. Jan Horton, a Yorba Linda city councilwoman and member of the OCFA executive board, has asked for a timeline accounting of firefighting resources in her community during the first 12 hours of the fire. She has also requested water district's hydrant maintenance and inspection records.

The water district, not the Fire Authority, maintains and inspects the approximately 4,000 fire hydrants within its district. The Fire Authority, responsible for putting out fires in Yorba Linda and Placentia, operates in good faith that those hydrants will work when they are needed for firefighting, Prather said. But it has never been an issue - until now.

"It is something exceptionally important to our job," Prather said. "We can't have this situation again."

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Mobile Auto Detailing

Residents paid for but didn't get Yorba Linda reservoir

By TONY SAAVEDRA and KIMBERLY EDDS

Email Article

YORBA LINDA - A sorely needed second reservoir for Hidden Hills Estates has been on the books for 30 years - and residents even paid for the $9 million project - but it was never built.

The need for the 2 million gallon reservoir became evident Nov. 15 when the Freeway Complex fire destroyed or damaged 19 view homes in the Hidden Hills area - at least five of which burned because fire hydrants went dry, fire fighters said.

Yorba Linda residents and fire officials have been demanding to know why the city's water district had insufficient water pressure and dry hydrants during the 30,000-acre firestorm that destroyed 118 homes in Yorba Linda alone.

Yorba Linda Water District officials said the Hidden Hills reservoir was stalled over the years by indecision among residential developers, competing water district projects and negotiations with environmentalists.

"Obviously (the reservoir) is an important component, but we just couldn't do all (the improvements) at one time," said Ken Vecchiarelli, assistant general manager.

The 100-home Hidden Hills Estates is now served by the Santiago reservoir, the only one in the city operated by pumps that push the water up to the houses sitting on the highest peak in Yorba Linda. During the fire, the reservoir stopped pumping water to the highest homes as flames rushed through the neighborhood.

District officials have determined that the Santiago reservoir's three electric pumps malfunctioned and a backup, gas-powered pump was damaged by the heat, a graphic illustration of the need for another reservoir.

It turns out that the Hidden Hills reservoir project has sat on a shelf for years.

First, development plans for the hilly area kept changing. Then developer Shapell Industries submitted plans for a housing project and deeded land for the reservoir to the district in 2004. But the housing project was abandoned and the area was turned over to the state park.

The district decided to proceed with a smaller reservoir in 2006 and proceeded to seek the necessary easements from the developer and the park, Vecchiarelli said.

At the time of the fire, the district was in negotiations with state park officials and developer Shapell Industries for the easements needed to build a Hidden Hills reservoir, with a plan to break ground in mid-February.

But Vecchiarelli said the project was held up by environmental concerns over endangered habitat.

In September, state officials met with the water district to discuss the effects a reservoir would have on Chino Hills State Park and its visitors. The district took another two months to provide the requested information, said John Rowe, the superintendent of the Chino Hills State Park.

"It's improper planning on their part," Rowe said. "If this was a priority to them, they should have expedited their package to us."

The district - which uses a computerized network of sensors and monitors to watch the system - first learned that they had a water pressure problem from a television report the day of the fire.

An electric sensor was overrun by flames at a pump station that sends water up to the Santiago reservoir, blocking the district's ability to determine whether water was being sent to north Hidden Hills. The answer wouldn't come until a week later, after the district studied computer printouts and interviewed employees.

Water district officials have said their system met the minimum requirements of the OCFA and the state fire code.

"It was a problem of too much fire, not a problem of not enough water," said water district spokesman Laer Pearce.

But residents packed a Yorba Linda City Council meeting last week, voicing frustration over the lack of water and pointing fingers at the district. Resident after resident said they watched as firefighters drove by, explaining there wasn't much that could be done without water.

Complaints about the Yorba Linda water system are being examined by the OCFA and the Yorba Linda City Council. Jan Horton, a Yorba Linda city councilwoman and member of the OCFA executive board, has asked for a timeline accounting for firefighting resources in her community during the first 12 hours of the fire. She has also requested the water district's hydrant maintenance and inspection records.

The water district maintains and inspects the approximately 4,000 fire hydrants within its district. The fire authority, responsible for putting out fires in Yorba Linda and Placentia, operates in good faith that those hydrants will work when they are needed for firefighting, Prather said. But it has never been an issue - until now.

"It is something exceptionally important to our job," OCFA Chief Chip Prather said. "We can't have this situation again."

Contact the writer: 714-796-7829 or kedds@ocregister.com

Claim: Slopes left dry fueled Freeway Complex fire

View Photo Gallery

By ERIN WELCH

Email Article

YORBA LINDA - About a month before the Freeway Complex fire tore through homes, the city stopped watering four landscape easements near and around some homes in Hidden Hills.

Almost 10 homes near the dry easements were destroyed and residents are angry.

Paul and Gillian Johnson, who lost their home, filed a $1.8 million claim against the city and the Yorba Linda Water District on Dec. 3.

They claimed that the city is liable for the loss of their home at 22540 Green Mount Place because the city ordered residents to stop watering easements near their homes, which had previously been kept watered.

"There is a lot of disappointment and anger," attorney Eric Traut said. "A lot of heirlooms and war medals were lost."

The Johnsons' claim sought "special damages" and additional general damages, such as temporary housing and inconvenience.

Assistant City Manager Dave Gruchow said: "We will process the claim and evaluate its merit. It's too soon to make a stance of liability or of any facts at this point."

Gruchow declined to comment about the easements, until the claim was completely reviewed.

In October, the city sent out two notices to the 13 homes that were directly affected by the dry easements - spanning parts of Hidden Hills Road, Green Mount Place and High Tree Circle. The first notice told residents the water was already off and the second stated the city's intention to completely abandon the easements.

Why? To prevent any more lawsuits against the city for land movement and inverse condemnation in the Hidden Hills area, officials said.

"The city is liable because we maintain the easements by watering them," interim City Manager Bill Kelly said in October. "Water may not have been the issue in those suits, but because of that we still get sued. The city is the closest deep pocket."

During the past four years, the city spent $4.8 million on litigation costs, according to the city attorney. To cut costs and eventually lift its responsibility of the slopes, the city started taking steps to completely abandon the easements.

Residents were also told they could not water the easements. If they did, they would be violating municipal code.

"We're asking residents not to water. If vegetation starts to die we will clear the area of dead plants to prevent a fire hazard," Mark Stowell, the public works director and city engineer, said in October.

The Johnsons' claimed the city did not clear the dead brush around the easement, according to Traut.

Orange County Fire Authority and city staffers were checking on the slopes frequently before the fire, Stowell said.

"Nothing had died out yet, and there was no need to clear brush," he said. "The easements up there now are green. In fact, it was the easements we kept watering that got completely burned."

About two weeks before the fire, OCFA did not declare the easements as a hazard, officials said.

"We were monitoring those slopes regularly," Stowell said.

Hidden Hills resident Eve Tibbs saw an immediate fire hazard, back in October, if the vegetation was left un-watered.

"The city has to immediately return the water," she said before the Freeway Complex firestorm. "I can understand wanting to release responsibility, but the water needs to go back...what happens if the city gets sued if there's a fire because of the slopes?"

The city and the residents acknowledged that if the easements were left dry, the risk for fire hazards would increase, but if left maintained by the city, could leave the door open to further litigation.

It's a risk residents take when they choose to live up in the hills, officials said.

A November meeting with council members and Hidden Hills residents to discuss some easement solutions was postponed as fire burned through the area and destroyed nine homes near the dry easements.

A suggestion from the city attorney - during an October meeting where the abandonment of the easements was discussed - was to have all residents in the Hidden Hills area sign a hold harmless agreement, saying they wouldn't sue the city for inverse condemnation.

Residents in the Hidden Hills area have been paying annual fees for the city to maintain slopes, including the four slopes the city allowed to dry out.

"I think the council would like a win-win situation," Kelly said in October. "To preserve what's up there is not a win-win situation. Something must change. To continue what we're doing up there now is not acceptable knowing we could continue to face more lawsuits and knowing we must cut back on water. ... We have to change how we do landscape maintenance in the city - there is no alternative."

Contact the writer: ewelch@ocregister.com or 714-704-3719

So Orange County Garages

Editorial: Government should be liable for its failures

By An Orange County Register editorial

Email Article

Some observers have been critical of a lawsuit filed by victims of the recent Freeway Complex Fire, who are seeking damages for the destruction of their home. A lawsuit filed by Paul and Gillian Johnson, for instance, seeks damages of more than $1.8 million from the city of Yorba Linda and the Yorba Linda Water District after their home was destroyed. Other lawsuits are sure to follow, and while the Johnsons have fire insurance, they are seeking damages for what they call irreplaceable heirlooms, personal documents and other losses.

Critics took the "you knew this was coming" approach, but we find the suit to be perfectly reasonable. The couple's home was in Hidden Hills Estates, which had a lack of water the day of the fire. It was, indeed, one of the most frustrating aspects of that wildfire, as residents in the area watched helplessly as their homes burned. The couple also complained that city officials did not keep dry easements near their home watered and, in fact, forbade local homeowners from watering them.

There's no question the water district had inadequate water pressure in the neighborhood. Fire officials had said there was enough pressure to put out one fire in the area, but not to deal with a large-scale problem. Well, the neighborhood backs into a canyon so it's reasonable to build a system that could accommodate such a common wildfire scenario.

The water district was full of excuses for why it failed to do its job, but those excuses are insufficient, given how many years officials there knew about the problem.

"A sorely needed second reservoir for Hidden Hills Estates has been on the books for 30 years - and residents even paid for the $9 million project - but it was never built," the Register reported. "The need for the 2 million-gallon reservoir became evident Nov. 15 when the Freeway Complex fire destroyed or damaged 19 view homes in the Hidden Hills area - at least five of which burned because fire hydrants went dry, firefighters said."

It's also right to question the city's role in approving homebuilding projects, given the inadequate water situation.

Why should government agencies, which always spend taxpayer money on the promise of "protecting" the public, not be held accountable when they so miserably fail at offering promised protections?

Let's say a consumer buys a new car, whose maker boasts of its many potentially lifesaving airbags, but then those airbags don't deploy in an accident. No one would complain for a

moment if the injured party filed a lawsuit seeking damages because the airbags didn't function as promised. Governments, for some reason, often get a pass when they fail to live up to their promises. In this case, the failure seems very real and the damages quite direct. There's no reason not to try to hash this one out in court.

Perhaps the legal action will push the district and the city to design and maintain better systems so we don't get a repeat of the "fiddling while Hidden Hills burns" situation.

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Information Night Tuesday, January 14, 2014
TAP FOR MORE

Yorba Linda water district, criticized after fire, considers raises

By ERIC NEFF and ERIN WELCH

Email Article

PLACENTIA - The Yorba Linda Water District, heavily criticized after some firefighters couldn't draw water during the recent Freeway Complex fire, has proposed raises for 16 of its 84 full-time employees, including several top administrators.

The raises, water district officials say, are needed to bring the employees' salaries up to the proper levels.

The water districts' salary proposal comes in the wake of scrutiny from Yorba Linda residents and that community's City Council after the Hidden Hills community was left without water during last month's fire. Orange County Fire Authority Chief Chip Prather said a strike-team leader told him five to six homes could have been saved; 118 were lost in Yorba Linda.

A water district spokesman said the area was overcome by too much fire as opposed to suffering from a lack of water.

Councilwoman Jan Horton, a vocal critic of the water district after the fire, said it was too early to comment about the pay increases.

"But the community may have something to say about it," she said.

The raises will be considered by the water district board on Tuesday.

The Yorba Linda Water District is based in Placentia. It serves Yorba Linda and parts of Placentia, Brea, Anaheim and unincorporated Orange County.

The raises are proposed for employees whose salaries are 10 percent or more below the median salary for the same position countywide. The raises are projected to cost the district $106,000 annually.

"We are obligated to adjust salaries to be comparable to employee salaries in other positions at other agencies," General Manager Michael Payne said. "Comparatively, our staff is under paid. We are obligated to staff and to our customers that we attain good, quality personnel."

The engineering manager position, to be filled by January, would receive the largest annual increase: $17,040. That would boost the salary 16 percent to $125,172.

The largest percentage increase would go to executive secretary Annie Alexander. Alexander is poised to receive a 21-percent increase in salary, to $66,384.

Assistant General Manager Ken Vecchiarelli would receive a raise of $10,980 to $156,144.

Vecchiarelli is expected to replace Payne, who is retiring Dec. 30. The general manager salary of $157,200 is determined by a separate board action.

Payne's retirement has been in the works since January, he said. The salary adjustments, he said, have been in the works since July.

That month, all of the employees received a 3-percent, cost-of-living increase.

"We kept going back and forth to really verify the salaries from other agencies to ensure the results were substantiated," Payne said. "It should have been done in July."

The board will meet to consider the propposal at 8:30 a.m. Tuesday at the district headquarters at 1717 E. Miraloma Ave.

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Information Night Tuesday, January 14, 2014
TAP FOR MORE

Report: Reservoir ran dry, pumps were shut down during fire

View Photo Gallery

By ERIN WELCH

Email Article

YORBA LINDA The Santiago Reservoir ran dry during the Freeway Complex Fire, leaving about 180 homes in the Hidden Hills area without water, according to the after action report released by the Yorba Linda Water District Thursday.

The water district's report comes nearly two months after the 30,305-acre fire burned 118 homes and damaged 60 others here. The report outlined the actions, deployment and a timeline of events and facts that took place during the fire.

The actions of the water district were under strict scrutiny after residents in Hidden Hills were left with no water pressure and after the Orange County Fire Authority stated in its preliminary report that some homes in the area could have been saved if the water had been available.

The report addressed the anticipated low water pressure issues, fire hydrants and the future Hidden Hills reservoir project.

The water district officially activated its emergency operation center at noon Nov. 15, 2008 - about three hours after the fire started in Riverside County at the edge of the 91 Freeway at Green River Road.

About an hour after the water district set up the operations center, staff lost communication with the Santiago booster pump station, which pumps water from the Santiago Reservoir to about 240 homes in the Hidden Hills area. Communication was also lost to the Hidden Hills booster pump station which gets water from the Springview Reservoir and supplies water to homes in Mission Hills.

According to the report, at 1:30 p.m. operators were able to confirm that the pumps at the Hidden Hills booster pump station were working. But operators could not get to the Santiago booster station because fire in the area was too severe.

At 4 p.m. the Hidden Hills booster station was still in operation and supplying water to homes. Fifteen minutes later, operators reported all pumps at the Santiago booster station had been shut off automatically because the fire had overheated at least three of the pumps.

The report stated water district personnel manually turned on the useable pumps again at 4:15 p.m.

According to the report, when operators made it to the Santiago booster station at 6:20 p.m. air was present in the pipelines, which indicated the Santiago Reservoir was drying up.

All pumps at the Santiago booster station were shut down to prevent damage to the pumps, but the Hidden Hills pump station stayed on to feed water into the Santiago Reservoir and to the homes around Mission Hills.

"The Santiago reservoir was drained completely some time between 4:15 and 6:20 p.m.," according to the report.

Between 3 and 6:50 p.m. four outside agencies supplied water to the Springview, Little Canyon and Quarter Horse Reservoirs, according to the report.

The decision to provide water to those reservoirs and not the Santiago Reservoir was made to sustain the biggest reservoir in the system - Springview Reservoir.

"The decision to move those agencies to those reservoirs and not Santiago was to do the most good for the most amount of people," said Cindy Botts, spokeswoman for the water district. "Supplying Santiago at that time would not have been as successful."

The Santiago pump station, served by the Santiago reservoir, is the only booster station in the city operated by pumps that push the water up to the houses sitting in Hidden Hills.

According to the report the 2 million gallon Hidden Hills Reservoir Project - originally proposed in 2000 - is a top priority for the district.

The re-design of the reservoir is now finished and the bidding process should start in March.

During the fire fight the report stated a number of fire hydrants were reported inoperable at the time. The district says all fire hydrants were up to code and checked before the fire. Hydrants that were inoperable were bagged and marked to district standards.

In conclusion, the water district stated the entire system met the standards it was supposed to during the Freeway Complex Fire, and the Freeway Complex Fire was a matter of too much fire.

"Water supply problems are not uncommon in catastrophic events such as the Freeway Complex Fire. It also is important to note that the vast majority of homes that were damaged or destroyed were in areas where water pressure and water flows were available during the firefighting activities," according to the report. "There is no way to guarantee that the magnitude of a natural disaster such as the Freeway Complex Fire will not overwhelm even the most robust water system."

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TAP FOR MORE

New county plan would train homeowners to fight fires

View Photo Gallery

By SALVADOR HERNANDEZ

Email Article

It was like a meteor shower - countless embers flying toward his neighborhood, setting houses ablaze around him. Armed with two garden hoses - 1 inch in diameter each - Dan Nunley kept his Anaheim Hills home from ending up in ashes.

When the Freeway Complex fire tore through the county in November 2008, Nunley ignored a mandatory evacuation and decided to fight.

"My house would have been gone had I not stayed," Nunley said.

Now, Orange County Fire Authority officials said they are rolling ahead aggressively with a plan to educate homeowners on how to protect their homes if they ignore evacuation orders. Dubbed "Leave Early or Stay and Defend," officials said the plan would deal with an already existing fact - some homeowners ignore evacuation orders. Residents working to extinguish

embers would help protect structures when firefighters are stretched thin.

But officials of the county's largest firefighters union, the Orange County Professional Firefighters Association, which represents firefighters in 24 Orange County cities and unincorporated areas, said they are concerned about the speed at which the plan is being implemented, and that by teaching residents how to protect their home, the department might be encouraging people to place themselves in harm's way. If more people decide to ignore evacuation orders, firefighting resources might have to be diverted to save people instead of fighting fires, officials said.

YORBA LINDA TEST SITE

Fire Authority officials have scheduled a meeting at the Yorba Linda Community Center for Feb. 11, at which residents will receive an instructional video and information on how to protect their homes. The meeting will include vendors that provide equipment and materials to help fight fires, said Kris Concepcion, battalion chief. Residents will also have to create a plan on what to do before, during, and after a fire. A plan will then be implemented in the communities of Portola Hills, Foothill Ranch and Laguna Niguel.

A similar plan has been enacted in Ventura County, Concepcion said. Last year, the agency hosted a summit with neighboring firefighting agencies - Ventura County, Los Angeles, Los Angeles County, San Bernardino County, the state firefighting agency and Riverside County, to discuss the plan, he said.

Officials are not looking to replace firefighters, Concepcion said, but homeowners protecting their homes could help prevent destruction. During the Freeway Complex fire, the peak of the firefighting force reached more than 400 engines, but most of the structures had been lost by the time it was in place.

During the freeway complex fire, most homes that were lost were burned because of embers about a half-mile ahead of actual flames, Concepcion said. While other agencies are still considering detail, chief Chip Prather decided to move ahead and implement a pilot program in Yorba Linda.

FIREFIGHTERS WORRIED

Joe Kerr, president of the Orange County Professional Firefighters Association, said that while the association has not taken an official position on the plan, it could create conflicts as firefighters try to extinguish fires. Some residents might want to protect their property, but they might not be prepared for it mentally or physically.

"I think most people don't have an idea how bad a fire can become," Kerr said.

Residents will be told what type of stress they'll likely face, Concepcion said, such as smoke, difficulty in breathing, hot temperatures and embers that singe the skin. Such information might deter some.

"If you are not mentally and physically prepared for what's coming, it's not for you," Concepcion said. Residents are still encouraged to adhere to evacuation orders.

Concepcion said the plan would mainly be put in place in case of fires and communities similar to those affected by the Freeway Complex fire. But if residents are told how to fight fires, whether they will be able to make that distinction is questionable, Kerr said.

"There is a stark difference between preparing people who have to stay and enticing," Kerr said. "How we deal with that is going to be difficult. Now there is a huge assumption on risk that we've never had before."

MORE DISCUSSION NEEDED?

Improving staffing, deployment and fire prevention should be discussed first before adopting the new policy, Kerr said.

"People are going to be put in harm's way," he said. "(The Freeway Complex fire) was devastating because of the amount of homes that were destroyed. It was a success that nobody died. I'd like to keep it that way."

Some details have not yet been worked out, Concepcion said. Officials are talking with Brea Police and the Orange County Sheriff's Department on how this type of policy would affect evacuation orders. Questions such as whether residents will be allowed back in if they were not home when a fire began, but want to return after an evacuation order has been given, have yet to be answered.

Though he would ignore evacuation orders again if another occurred, Nunley said he would not encourage his neighbors to stay.

"It's insanity to fight something if you don't have the right tools," he said.

Union officials will be meeting with the Fire Authority on Friday to discuss this and other issues.

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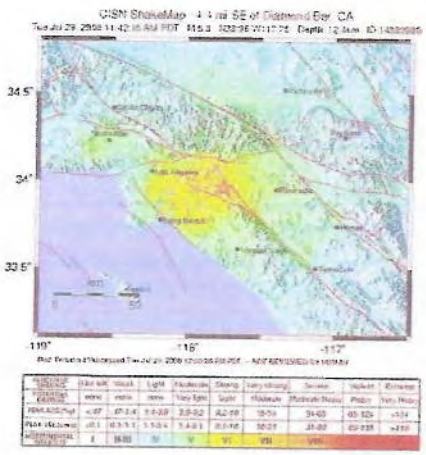
2008 Chino Hills earthquake

2008 Chino Hills earthquake



Date	July 29, 2008
Magnitude	5.5 M_w
Depth	9.1 miles (14.6 km)
Epicenter	33.953°N 117.761°W

Countries or regions	United States (Southern California)
Max. intensity	VIII - Destructive
Aftershocks	~100

The **2008 Chino Hills earthquake** occurred at 11:42:15 a.m. PDT (18:42:15 UTC) on July 29, 2008, in Southern California.[1] The epicenter of the magnitude 5.5 earthquake was in Chino Hills, approximately 28 miles (45 km) east-southeast of downtown Los Angeles.[1]

Though no lives were lost during the earthquake, it caused considerable damage in numerous structures throughout the area and caused some amusement park facilities to shut down their rides. The earthquake led to increased discussion regarding the possibility of a stronger earthquake in the future.

Tectonics

The Chino Hills earthquake was caused by oblique slip faulting, with components of both thrust and sinistral strike-slip displacement.[1] Preliminary reports cited the Whittier fault as the active cause, but the quake was later determined to have been generated by the "Yorba Linda trend," as identified by Caltech seismologist Egill Hauksson.[2] Its epicenter was within 3 miles (4.8 km) of Chino Hills and its hypocenter was approximately 9.1 miles (14.6 km) deep.[1] Initial estimations of the moderate main shock reported it as magnitude 5.8, but this was later revised to magnitude 5.4[3][4] and in later months to a 5.5.[5] The main shock was reportedly felt as far south as San Diego, and Tijuana, Mexico,[3][6] and as far east as Las Vegas, Nevada.[1][7] It was the strongest earthquake to occur in the greater Los Angeles area since the 1994 Northridge earthquake.[6][8]

As reported by *The Orange County Register*, three microquakes, all less than magnitude 3.0, occurred in Anaheim Hills, 7 miles (11 km) southwest of Chino Hills, two months before the Chino Hills earthquake.[9] There was an unusually low amount of seismic activity in Southern California in the week prior to the quake. Between July 20 and July 26, 2008, there were no earthquakes in Southern California exceeding magnitude 3.0, thus there was speculation that the wane in seismic activity was a precursor to a possible larger event.[10]

Impact

The earthquake knocked down merchandise inside buildings such as this Yorba Linda grocery store.

The Chino Hills earthquake caused no deaths or significant damage due to the physical location of its epicenter.[11] Most of the infrastructure in the Chino Hills area is relatively new and well suited to withstand a large quake.[4][7][12] Unlike previous earthquakes in the region—such as the 1994 Northridge earthquake and the 1987 Whittier Narrows earthquake, which caused serious structural damage and fatalities—this quake caused only minor damage.[7] However, the high volume of telephone use following the shock overloaded provider capacity and disrupted service into the afternoon.[13]

Amusement rides at Disneyland, Six Flags Magic Mountain, Universal Studios Hollywood and Knott's Berry Farm were evacuated and temporarily shut down.[14][15] California State University, Fullerton suffered some damage in its older, inadequately engineered buildings.[14] In Orange, the Chapman University School of Law was evacuated after a water pipe was ruptured.[15][16] Pipes on a Macy's department store in Westfield Topanga ruptured during the tremor flooding the store which closed for a couple of days in order to be repaired. A light fixture damaged by the shock started a small fire in the Westfield MainPlace Mall in Santa Ana; since the fire was in an empty movie theater, nobody was harmed.[15]

A gap was reported on California State Route 91 near Anaheim Hills, approximately 7 miles (11 km) southwest of the epicenter, but the California Department of Transportation concluded that the gap did not pose a danger.[15] A minor landslide near the freeway caused some traffic congestion, but no injuries or structural damage were reported.[15] Caltrans replaced an expansion joint on an Interstate 5 truck overpass at the El Toro Y Interchange.[15] The roof of Placentia's public library nearly collapsed; afterwards, the building was closed for repairs.[15]

Earthquake damage at South Coast Plaza in Costa Mesa.

Damage in a shopping center.

Electrical outages were reported in Chino, Chino Hills, Diamond Bar and Pomona.[17][18] Over 2,000 people lost power after a fire broke out at a La Habra power station, but electricity was restored that afternoon.[15] Los Angeles International Airport reported a ground radar system outage along with a broken water heater, causing flooding in the checked luggage preparation area of Terminal 7.[7][19] Minor injuries from falling ceiling tiles were reported at a medical clinic in Brea.[20]

The quake also interrupted a videotaping of Judge Judy,[21] causing commotion in the audience and almost making the security guards evacuate the courtroom.

^ Aftershocks

Approximately 100 minor aftershocks and one presumed foreshock were reported within two days after the earthquake,[22] 27 of which occurred within an hour after the earthquake.[23] Four aftershocks of at least 3.0 in magnitude were reported—the first, nine minutes following the initial earthquake, was the largest at magnitude 3.8;[22] and two others, occurring over two hours later, were recorded at magnitude 3.6.[24] Twenty-eight aftershocks of at least 2.0 were reported.[24] One presumed foreshock, magnitude 1.3, occurred sixteen hours prior to the earthquake in the same location as the main shock.[25]

Response

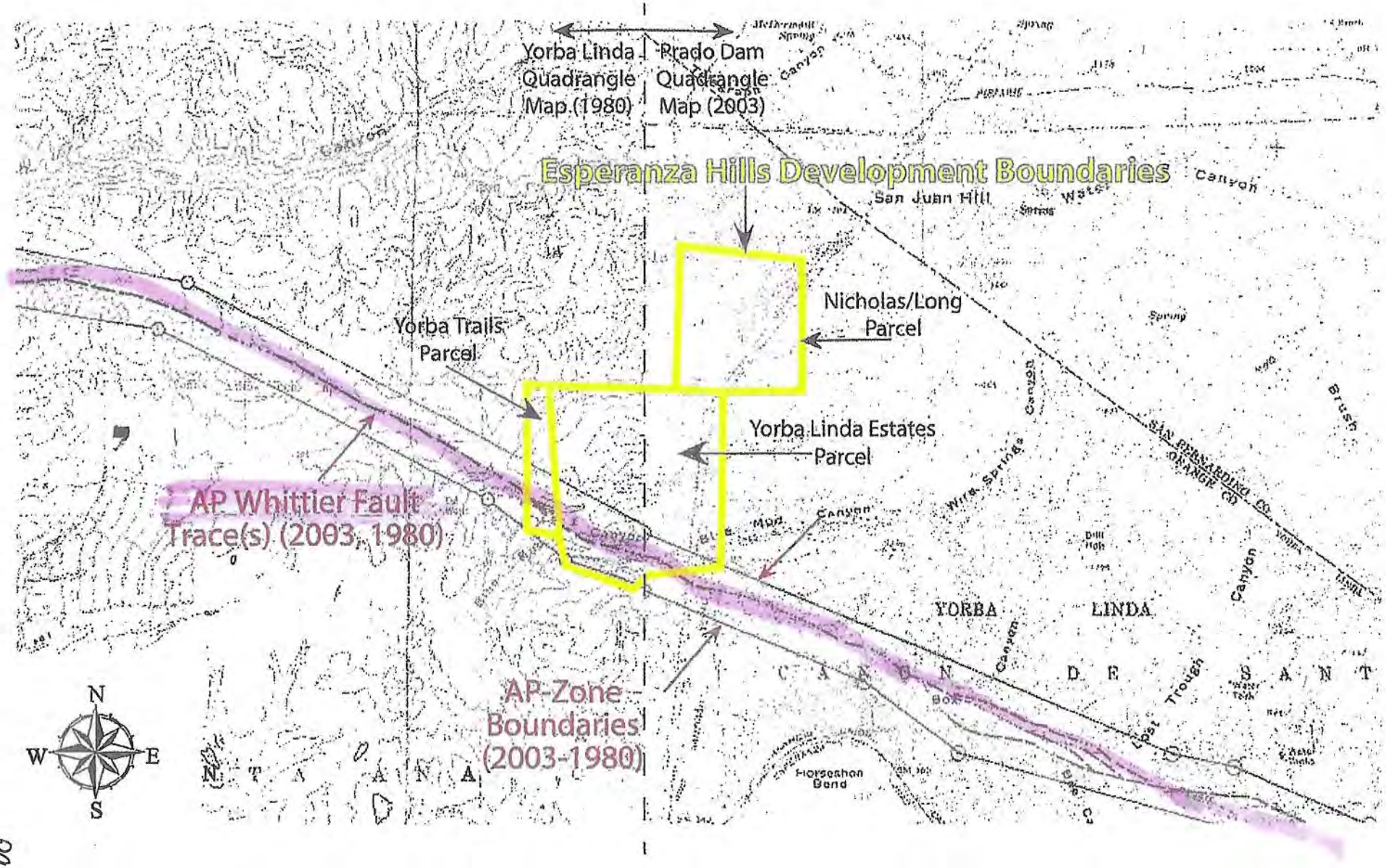
There was speculation that the Chino Hills earthquake may have been a foreshock to a larger earthquake.[26] The Southern California Seismic Network's *Aftershock Probability Report*, produced minutes after the event, stated that "Most likely, the recent mainshock will be the largest in the sequence. However, there is a small chance, approximately 5–10%, of an earthquake equal to or larger than this mainshock in the next 7 days."[27]

Geologists at the United States Geological Survey and Uniform California Earthquake Rupture Forecast suggest that an earthquake with a magnitude of 6.7 or larger will almost definitely occur somewhere in the state within the next 30 years.[28] California Governor Arnold Schwarzenegger said: "This earthquake reminds us to be prepared. [...] We were very fortunate that there were no serious injuries or property damage."[19] Additionally, registration for the Great Southern California ShakeOut, a regional earthquake drill scheduled to occur on Nov. 13, 2008, increased significantly in the aftermath of the earthquake.[22]

See also

References

1. "Magnitude 5.5 - Greater Los Angeles Area, California". USGS. Archived from the original on 1 August 2008. Retrieved 2008-07-29.
2. Robbins, Gary (2007-07-31). "Little known Yorba Linda fault caused Tuesday's quake". *The Orange County Register*. Orange County Register Communications. Retrieved 2008-08-01.
3. "What's Making Judge Judy Quake?". *Sky News*. 2008-07-30. Retrieved 2008-07-30.
4. "Tougher codes kept quake damage down". CNN. 2008-07-30. Archived from the original on August 5, 2008. Retrieved 2008-07-30.
5. "Magnitude 5.5 - Greater Los Angeles Area, California". USGS. 29 July 2008. Archived from the original on 9 August 2010. Retrieved September 1, 2010.
6. Steinhauer, Jennifer (2008-07-29). "Earthquake Rattles Southern California". *New York Times* (New York Times Company). Archived from the original on 4 August 2008. Retrieved 2008-07-29.
7. Rubin, Joel; Pierson, David; Landsberg, Mitchell (2008-07-29). "Minor damage from 5.4 quake shows California has learned its lessons". *Los Angeles Times*. Archived from the original on 30 July 2008. Retrieved 2008-07-29.
8. Jablon, Robert (2008-07-29). "Strong quake rattles buildings, nerves in S. Calif.". Associated Press via Yahoo! News. Archived from the original on 7 August 2008. Retrieved 2008-07-29.[dead link]
9. Robbins, Gary (2008-05-24). "Third microquake shakes Anaheim Hills". *The Orange County*



1 1/2 0 1/2 1

Graphic Scale : 1" = 1/2 mile

From: Alquist-Priolo (AP) Earthquake Fault Zone Maps
Yorba Linda Quadrangle (1980)
Prado Dam Quadrangle (2003)

page 104

Regional Topographic Location Map			Figure 1
AMERICAN GEOTECHNICAL, INC.	F.N.: 33366.01	DATE: OCT 2012	

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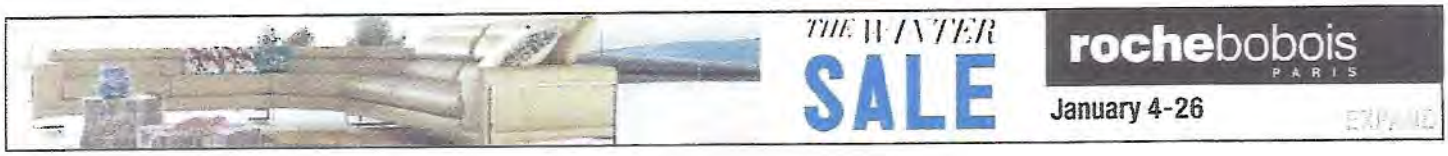

L.A. NOW

SOUTHERN CALIFORNIA -- THIS JUST IN

5% chance bigger earthquake could hit after Yorba Linda temblor

August 29, 2012 | 5:22 pm

There is a 5% chance that Wednesday's 4.1 earthquake in Yorba Linda could lead to something bigger in the next three days, U.S. Geological Survey seismologist Lucy Jones said.

There is "increased risk for the next few hours or days," Jones said. Most likely, the follow-up quakes would be smaller. A number of smaller aftershocks have already occurred.

Complicating matters, however, is that Wednesday's quake occurred near the Whittier fault, which is among the top 20 most dangerous faults in California, and has a potential of creating a magnitude 7 quake.

"On a normal basis, it's one of the potential sources of a bad earthquake," Jones said.

The Whittier fault runs for about 25 miles through Yorba Linda, Hacienda Heights and Whittier. It is considered to be among the more dangerous because the Whittier fault moves relatively fast, with a slip rate of 2 millimeters a year -- faster than the Newport-Inglewood, Hollywood or Santa Monica faults. (The San Andreas fault, by contrast, is considered to be California's No.1 dangerous fault.)

The 4.1 earthquake that jolted Yorba Linda on Wednesday afternoon appears to be an aftershock of the cluster of quakes that hit the region earlier this month, seismologists said.

The jolted area included southeastern Los Angeles County, Orange County and the Inland Empire. The quake occurred in about the same location of an earthquake doublet, two 4.5 quakes that occurred on Aug. 7 at 11:23 p.m. and Aug. 8 at 9:33 a.m. The area was also hit by a 4.0 quake on June 14.

Wednesday's quake, which hit at 1:31 p.m., was located near the center point of the magnitude-5.5 Chino Hills earthquake that reverberated through the Los Angeles Basin in the summer of 2008.

ALSO:

101-year-old driver injuries 8 children outside grade school

Tennis umpire carefully planned out killing of husband, D.A. says

Captured Glendale bear taken to animal rescue shelter in Alpine

-- Rong-Gong Lin II

EDITOR'S PICKS:

105

Letter: Pecora

From: Wayne Pecora [mailto:mrpeck2001@yahoo.com]
Sent: Tuesday, January 14, 2014 6:58 PM
To: Tippets, Ron
Subject: Cielo Vista project Draft Environmental Impact Report (DEIR)

Please accept this communication outlining my wife's, and my total opposition to the building of these two housing developments.

We've lived in Yorba Linda for over 12 years and reside in the area directly impacted by this proposed expansion and development. We lived here during the recent Freeway Fire and can personally attest to the fact that it was very hard to evacuate our neighborhood. Traffic was impossible on the feeder roads onto Yorba Linda Boulevard, and that road was a virtual parking lot. What would happen with hundreds (thousands) of additional cars?

In addition, our ongoing and current water pressure continues to fluctuate on a daily basis and appears to be much less than when we moved here. What is the potential negative impact on our water supply with the hundred of additional homes and thousands of additional residents? Could we fight the next fire?

Also, what's the potential negative impact on the environment, the lifestyle of current residents and their safety?

There continues to be significant, positive property development in Yorba Linda. But the location of these homes would make the complete survival of their residents in the next fire very doubtful. I believe their development would also greatly expand and increase the risk to my family, my neighbors and our properties in the next natural disaster --> wildfire, earthquake, ??

Please join the vast majority of residents in this area and oppose the development of these houses in this part of Orange County.

Regards,

Wayne & Lois Pecora

6000 Rockhampton CT

Yorba Linda, CA 92887

Letter: Ramocinski

From: docramo@aol.com [mailto:docramo@aol.com]
Sent: Monday, January 20, 2014 2:22 PM
To: Tippets, Ron
Subject: Cielo Sage EIR

OC Planning,

attn. Ron Tippets

1.I feel the soils and Geo Technical area failed to address the eminent position of the development to the active Whittier Fault.

This fault has produced recent earthquakes with millions in damages. Are you sure building as close as you recommend will be safe?

Moving tens of thousands cubic yards of dirt.....and less than significant impact...REALLY!!!

2.On the supply of utilities, especially water, I feel extremely strong that before any certificate of occupancy is issued, the ENTIRE water system should be tested and certified to it's ability to meet the current acceptable Cal Fire standard of Appendix B.

This testing should take place with YLWD ,OCFA, COUNTY REPRESENTATION, and OUTSIDE INDEPENDENT AGENCY!!!

No occupancy until this critical test is verified.....PERIOD.

Given the past history of the Hidden Hills failed water system during the Freeway Complex Fire and lack of ever meeting the minimum standard prior to the fire, and multiple developers , this should be obvious for public safety.

Even after the Freeway Complex Fire, permits were issued to build and occupy, the system still failed to meet water availability studies.

3. Lastly the DEIR fails to address potential liability if the project causes unforeseen losses due to faulty analysis in the DEIR

Will the county bear the consequences?

Will the City of Yorba Linda if the area is annexed?

Ultimately it will be the residents of the project and the citizens of this community.

We don't need this exposure.

Thank You

David Ramocinski

22865 Hidden Hills Rd.

Yorba Linda, Ca

Letter: Rehmeyer

From: Sharon & Ted Rehmeyer
4795 Via De La Roca
Yorba Linda, CA 92887-1816
Home: (714) 777-6818; Cell: (714) 323-4101
Email: ssrehmeyer@gmail.com

Date: January 20, 2014

SUBJECT: CIELO VISTA DRAFT EIR—SECTION 4.12 PUBLIC SERVICES

OVERVIEW:

- The Public Services section—Section 4.12-- of the Cielo Vista DEIR falls far short of providing a thorough, objective analysis of the proposed Project's likely impacts on public services and public safety. Anyone who lived in Yorba Linda during the 2008 "Freeway Complex Fire" knows all too well that **public safety in hillside areas** is not just a theoretical concern. It's a very tangible issue that **has real impacts on real people in our community.** In light of Yorba Linda's heightened sensitivity to this issue, it is especially disappointing that **the DEIR fails to meaningfully evaluate and fully disclose the potential threats associated with this high-risk development located in Very High Wildfire Hazard Severity Zone (VHFHSZ).**
- Overall, the Cielo Vista DEIR lacks a genuine quantitative analysis of public services and instead relies on generalities, unsubstantiated assumptions and vague mitigation measures. Whereas public safety impacts can be readily quantified in terms that the general public and the County's decision makers can clearly understand, the DEIR fails to do this. Specifically, the DEIR avoids quantitatively answering the critical question, **"How will the response feasibility of public safety agencies –notably, Orange County Fire Authority and Orange County Sheriff Department—be impacted by this Project for evacuating residents living in close proximity to the Project during wildfire events and earthquakes?"**

  The well documented data on the 2008 Freeway Complex Wildfire that swept through the entire Project area—as well as that of the other proposed Project, Esperanza Hills--shows that the Wildfire destroyed 76 homes within a half a mile of the Project site. Gigantic walls of flames, seen in a multitude of photographs and videos from that 2008 wildfire are forever embedded in ours and our neighbors' memories. Memories are still vivid of the intense heat, the wind-blown debris, smoke , ash, and soot, as flaming embers rained down on adjacent Yorba Linda neighborhoods at 60 mph, the rate the fast moving Santa Anas traveled that Saturday, Nov. 15, 2008.

QUESTIONS:

- **How will public service agencies-- OCFA and OCSD-- be impacted when the next Wildfire or Earthquake occurs?** As pointed out by OCFA at the 5th Anniversary of the Freeway Fire, "It's not a question of 'IF' it will occur, but 'WHEN'!"

- How can Orange County's Planning Commission and Board of Supervisors make a responsible decision on this project without getting an answer to this basic question, and understanding the degree to which the project would put existing residents in jeopardy?

- How will the response time and effectiveness of OCFA and OCSD be impacted by the addition of more residents in the Project area as earthquakes and Wildfires driven by 60 mph Santa Anas whip through the Project yet again? This information needs to be collected and scrutinized.

In addition to failing to provide a quantitative assessment of *future* response times, the **DEIR** even **fails to provide good baseline data indicating existing response times for these agencies**. Without the analysis of this data--which should be readily available from public records---it makes it impossible to understand potential impacts on the existing homes, plus the addition of the Project's proposed 112 houses.

The **four most significant concerns** regarding the Public Services section of the DEIR are summarized as follows:

1. *Wildfire service impacts are understated.* Although the DEIR correctly acknowledges that Cielo Vista is a high-risk project by virtue of its location within a Very High Wildfire Severity Zone – VHFHSZ), its unsupportable conclusions regarding potential impacts to fire safety and fire protection services seem to ignore the project's VHFHSZ status. In particular, the following deficiencies in the DEIR's analysis of fire protection services are noted:

a. **The DEIR (page 4.12-3) indicates that the OCFA guidelines for development within VHFHSZ's are currently being revised and are identified as "Expired" on the OCFA website. Yet, the DEIR fails to explain when these guidelines will be updated, pending their adoption, and what they are likely to say about how the development can safely proceed in the meantime, pending their adoption..**

b. The DEIR (page 4.12-5) indicates that **OCFA's goal for response time is to have the first engine on the scene within seven minutes and 20 seconds from the**

receipt of a call. The **DEIR then states that the response travel time to Cielo Vista is estimated at three minutes.** This is an incorrect and misleading comparison. **Travel time and response time are two very different things.** While an engine might be able respond within three minutes under ordinary circumstances, but when it most matters **– during an extraordinary event such as the Freeway Complex Fire of 2008– response times may far exceed the goal of seven minutes and 20 seconds (although it's impossible for a reader of the DEIR to know, since the DEIR neglects to discuss response times during a major fire event)**.

Also on page 4.12-5, the DEIR indicates that the fire stations that would serve the proposed project respond to approximately four service calls per day "on average," presumably implying that these stations have plenty of capacity to respond to additional calls from the proposed project. Again, however, it's not **the "average" circumstance that is the most significant concern. The real issue that needs to be evaluated (and which the DEIR fails to evaluate) is how this project would alter OCFA's response times during a major wildfire.** Frequently, in a wildfire situation, there are multiple wildfires, and with OCFA and OCPD participating in mutual aid agreements, especially with surrounding area Fire Departments, how does that impact our local public service personnel who might otherwise be available to serve the Yorba Linda Project area? With mutual aid agreements among cities and counties, local **firefighters** can easily be called elsewhere during a major wildfire, especially since Santa Ana wind conditions drive wildfires as fast as the wind itself can blow. In effect, during a major wildfire the proposed project would be "competing" with existing residents for fire protection resources, with the potential for significantly worsened response times, as demonstrated in the Nov. 15, 2008 Freeway Complex Wildfire. What happens to the residents of this 112 house Project if they either can't or won't "shelter in place"? Who will be there to aid them? **The DEIR's failure to evaluate response times during a major wildfire event is a fatal flaw in the overall document.** Furthermore, with regard to access to the hillside during a wildfire, there would need to be serious changes to Via Del Agua and Stonehaven, far beyond simply adding a traffic signal at Via Del Agua and Yorba Linda Blvd. With major egress/ingress to the Project at the intersection of Stonehaven and Via Del Agua, evacuation from the Project, and Esperanza Hills, plus emergency egress from Hidden Hills in an emergency situation, will be life threatening. During the 2008 wildfire, traffic evacuated existing homes down Stonehaven and Via Del Agua to Yorba Linda Blvd., and they evacuated with

three cars abreast on the winding, narrow two-lane roads. There were no Fire responders until Sunday night, November 16, 2008, 36 hours later, well after the fire was over. They were checking gas leaks on properties adjacent to our neighbor's home which had burned to the ground and his gas line too. What are the issues with methane gas leaks if it's being collected and transported out of the area? How does this impact public health and safety? But even if a fire truck had tried to access Via Del Agua or Stonehaven during the height of the flaming inferno, it couldn't have done so because of the traffic pouring downhill 3 abreast. To "shelter in place" in supposedly "fire safe" houses is not an acceptable alternative for this Project, given the project's location within this Very High Risk Fire Hazard Zone subject to the Whittier Earthquake Fault line. Who is going to "make" someone stay and shelter in place? What happens if they stay, and then become afraid and then try to evacuate? What's going to happen? Who will be there to help?

c. On page 4.12-10, the DEIR states that "the incremental increase in population from the Project would not be substantial enough to significantly impact fire and emergency services <u>on a daily or annual basis.</u>" Again, it's not the average impact of the course of year that really matters, but the impacts during a major event lasting perhaps just a few hours. How do concurrent multiple wildfires in the County or in Southern California impact the response effectiveness, as well as evacuation scenarios? The need to alter response times during an extraordinary event is the real "incremental" impact of this project, and the DEIR fails to adequately address this fundamental issue. Example: It took nearly 36 hours after the Nov. 15, 2008 Freeway Complex Wildfire before any OCFA trucks or personnel came to check for damaged gas lines or other major fire-related issues in four house cul de sac adjacent to the Project—this in spite of the fact that on of the two fire stations cited in the DEIR is located just a short distance from the County hillside Project. What are the problems of fighting wildfires with multiple regional wildfires, and what is the effect of this issue on the effectiveness of OCFA and OCPD personnel?

d. The DEIR (pages 4.12-11 and 4.12-12) discusses the OCFA's Freeway Complex Wildfire After Action Report (released in 2009), but does not fully explain how the recommendations from this report have (or have not) been implemented. From the DEIR's rather disjointed discussion of this report, it's unclear how its recommendations may help to minimize damage incurred during the next major

wildfire event. As OCFA officials pointed out at the Yorba Linda City Event commemorating the 5th Anniversary of the 2008 Freeway Complex Wildfire, "It's not a question of 'if' but 'when' the next wildfire roars through" this County Hillside. There is historical documentation of the hill being a wildfire prone area. See www.hillsforeveryone.org for the historical fire study records for this Project area (published in 2012): "A 100 YEAR HISTORY OF WILDFIRES NEAR CHINO HILLS STATE PARK" (ATTACHMENT A) states on p. 1: "Though fires are a natural part of the ecosystem, there is nothing natural about the size and frequency of the fires destroying our wildlands year after year." This fire study focuses on the period from 1914-2011, and the published data (pp.24-33) shows that only 2 fires were caused by lightning; all the rest in the 100 year history were caused by man.

e. On page 4.12-11, the DEIR makes the claim that "existing single-family residences to the west and south of the Project site would gain increased protection from the spread of wildfire [presumably due to the proposed project acting as a barrier between existing development and wildland areas]. As such, the Project would reduce the threat of wildland fires to people and structures in the project vicinity and thus lessen the potential demand for fire services needed in the event of a wildland fire." **This argument is not substantiated by evidence, and it ignores spreading mechanisms, such as embers igniting vegetation.** It needs further analysis before being presented as a key conclusion of the DEIR. We note that during the Freeway Complex Wildfire, damage to structures was not limited to homes on the edge of the urban/wildland interface. Some homes in "interior" locations (several blocks from wildland areas) were lost. In fact, 76 houses burned within a ½ mile of the proposed Cielo Vista Project site. Furthermore, with five active oil wells, one abandoned oil well, and one inactive well, the potential for methane gas explosions runs high in this Project. Also an active earthquake fault—the Whittier Fault line-- runs through the Project, and the impact of this and the issues of Fracking off Dorinda Rd. and San Antonio Rd., close to the Project, need further study. Further studies are needed on adding additional houses to a known and VERY HIGH RISK WILDFIRE ZONE! Who will provide homeowners' insurance for the folks who might unwittingly buy into this Project?

f. Page 4.12-11 also refers to OCFA's **mutual aid agreements** as a means of increasing response capacity to a major wildfire event. However, virtually all fire

protection agencies in California have mutual aid agreements. While they can be an important part of a local agency's overall capacity to respond to fires, they do not specifically address the unique impacts associated with a high risk project such as Cielo Vista. What will be the effect locally when our local personnel are going elsewhere to fight multiple wildfires under regional and Southern California mutual aid agreements?

g. The DEIR (on page 4.12-13) presents a total of only two mitigation measures related to fire protection services, and these are very generic. (4.12-1 and 4.12-2 are mitigation measures that could be offered for almost any project anywhere in Orange County. They do not reflect the unique risks associated with this project's VHFHSZ status. (4.12-1) states that "Prior to issuance of a grading permit, the Project Applicant shall enter into a Secured Fire Protection Agreement with the OCFA. This Agreement shall specify the developer's pro-rata fair share funding of capital improvements and equipment, which shall be limited to that required to serve the project site." How does this mitigate any potential risks to this Project to existing homeowners or to future home buyers? Mitigation (4.12-2) states: "All new traffic signals on public access ways and electric operating gates installed for the Project shall include the installation of optical preemption devices to the satisfaction of the OCFA and the County of Orange Manager, Subdivision and Grading Services."
These are both very vague mitigations for a Project located in a very HIGH RISK WILDFIRE ZONE with a known earthquake fault line down the middle, and the potential for methane gas explosions.

h. Elsewhere (page 4.12-9), though not specifically listed as a mitigation measure, the DEIR describes several Project Design Features (PDF's) that are presumably intended to mitigate the project's VHFHSZ status. While these PDF's are laudable and may reduce damage during a major wildfire, they do not address the underlying risk of a major wildfire event in this sensitive location or the resulting risk that wildfire emergency response times will be impacted due to the Project's additional demands on OCFA resources. "Sheltering in Place" housing might work, but ONLY if the residents don't exit into the burning inferno, deciding at the last minute that the fire is too scary and decide to leave. What happens if something goes wrong and they have overgrown vegetation, or they have wooden patio furniture or large umbrellas or tents in their backyard patio? With Santa Ana winds driving embers and flaming debris, there is no way any house in

this Project could truly be "fire safe." There is no mitigation because of the dangerous location of the Project in a VERY HIGH RISK WILDFIRE ZONE.

2. ***Police protection impacts are not adequately analyzed.*** The DEIR's analysis of police protection impacts is vague and fails to quantitatively measure the degree to which the proposed project would affect OCSD's response times. The DEIR (page 4.12-7) indicates that the OCSD has the following goals for response times: Priority One Calls in 5 minutes, Priority Two Calls in 12 minutes and Priority Three Calls in 20 minutes. The DEIR then makes the following vague statement regarding existing response times: "While response times fluctuate, the Department is generally meeting its response time goals for the City. The Police Services Chief reports to the City Manager regularly on the success of meeting these response time goals." If the Police Services Chief is regularly reporting to the City manager, actual data on response times must exist. Why are these data not provided in the DEIR? Without an accurate understanding of baseline conditions, how can the DEIR preparers make the conclusions (page 4.12-13) that existing response times are "adequate" and that "response times would not be substantially changed such that response time objectives are compromised in any manner"? It's also odd that the correspondence from OCSD (Appendix J of the DEIR) regarding this project was dated July 2012, or approximately 6 months before OCSD became the law enforcement agency for Yorba Linda. As such, the information provided obviously does not reflect current conditions and is of questionable value as the basis for the DEIR's conclusions. How could OCSD report on response times for a city which it did not serve at that time? Updated information is needed.

3. ***School overcrowding is acknowledged but not addressed.*** The DEIR (page 4.12-7) acknowledges that the K-5 portion of Travis Ranch School is overcrowded (with current enrollment exceeding capacity by 16%). With the addition of K-5 students generated by the proposed project, the DEIR forecasts (page 4.12-14) that the overcrowded condition would be exacerbated, with the result that enrollment would exceed capacity by 21%. The DEIR further acknowledges there are "no plans for new facilities or expansion of existing facilities." Although the DEIR indicates that Travis Ranch School is slated for modernization, it also clearly acknowledges that such modernization would be dependent on "State funding availability" and that "modernization of the schools does not necessarily mean that capacity will be increased." The proposed mitigation measure (payment of SB 50 mitigation fees) is of little consolation, since there is no guarantee that these fees would actually be guaranteed by State funding or spent to provide the needed expansion of Travis Ranch School. Furthermore, these are one time developer

fees. This mitigation is not guaranteed at all, but very "iffy" and totally dependent upon the alignment of the stars and the State Representatives and Governor funding expansions at the local school sites impacted by this Project. School enrollment fluctuates, and the DEIR proposes an improper deferral of mitigation for schools for major negative school impacts.

4. ***Cumulative impacts analysis is inadequate***. As with the rest of the Public Services section, the cumulative impacts discussion is lacking in substance and quantitative analysis. Notably, the project-specific discussions on fire and police services seemed to be based largely on correspondence with OCFA and OCSD (Appendix J of the DEIR). However, this correspondence was focused on the proposed project itself and did not address the substantial list of cumulative projects. How did the DEIR preparers make conclusions regarding cumulative impacts if the affected agencies did not specifically provide input regarding the cumulative projects? Furthermore, this Project should be considered by OC Planning and the City of Yorba Linda as one single Planning Package, along with Esperanza Hills, and the potential development of another 48 unit housing development called Bridal Hills that depends on access through Esperanza Hills. There may be other developments that feed off of these projects as well in the hillside area. Any and all developments proposed for the Project location is in HIGH RISK WILDFIRE ZONE and face the risks of potential oil well fires, which are far more dangerous and cause major harm to the environment and air quality. Many local homeowners, adjacent to the Project, cannot get adequate insurance on their existing homes because of the danger of policy cancellation because they live in a HIGH RISK WILDFIRE ZONE. If the potential buyers cannot get insurance for their houses, who will pay for the insurance gaps? Will people of Yorba Linda and/or Orange County end up paying for gaps caused by insurance companies failing to provide any or adequate coverage to potential home buyers in the Project or cancellation of insurance because of the risks involved with living in a HIGH RISK WILDFIRE ZONE. Shouldn't the potential dollar impact on the County and City because of lack of insurance issues be considered an impact on public services?

In the absence of a more comprehensive and even-handed analysis of these issues, it would be unconscionable and irresponsible for the County's Planning Commission and the Orange County Board of Supervisors to approve this project.

A 100 Year History of Wildfires

Near Chino Hills State Park

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ABSTRACT

After witnessing the devastation of the Freeway Complex Fire, the regional conservation non-profit Hills For Everyone undertook a study of fires in the region. Though fires are a natural part of the ecosystem, there is nothing natural about the size and frequency of the fires destroying our wildlands year after year. Data, mainly from fire agencies, the California Department of Parks and Recreation, and newspapers, have provided details on fire perimeters, points of origin, and fire causes. This paper is the culmination of research that documents a near 100-year fire history (1914-2011) in and around Chino Hills State Park. This paper articulates the problem months, weather conditions, and "hot spots" of fire ignition. Recommendations are included for residents, jurisdictions, and fire, transportation, and natural resource agencies to implement that would reduce the number of fires to a more natural fire regime. We will continue to work with fire and natural resource agencies to bring the necessary resources to this area.

INTRODUCTION

Fires are a natural part of the ecosystem. Many factors influence the natural fire regime: weather conditions, vegetation (fuel) types, vegetation moisture, and plant distribution, etc. The natural fire regime, however, has been drastically altered by humans who have caused many more fires than would have occurred naturally. "New" factors influencing this increased fire regime include the introduction and proliferation of flammable non-native vegetation (e.g., palm trees, pampas grass, *Arundo donax*, exotic annual grasslands, etc.), increased Wildland-Urban Interface (WUI), and roadways to name a few.

An article on global warming on the website of the State of California's Attorney General cites higher temperatures and decreased moisture in the vegetation will result in increased fires.[1] In fact, statistics show that the western United States now has a longer fire season (starting earlier and ending later) that is more intense than in previous decades.[2] A nearby example of a California landscape modified by wildfires is Chino Hills State Park in Southern California, where the dominant coastal sage scrub and chaparral vegetation is converting to highly flammable non-native annual grasses.[3]

Claire Schlotterbeck, Hayashi (1999)

Type conversion as seen after one fire.

Claire Schlotterbeck, Hayashi (2012)

In 2003 Southern California experienced 13 major wildland fires that swept through the region at an alarming rate.[4] The Cedar Fire (San Diego) was called the state's most devastating as it burned down entire communities, including historic buildings in Cuyamaca, and killed 15 people.[5] In 2007 the Santiago Fire (Orange County) burned 28,517 acres in the foothills of the Santa Ana Mountains, which damaged or destroyed 22 homes.[6] Just a year later, in 2008, two fires ignited at opposite ends of the hills and merged to create the Freeway Complex Fire which burned down 187 homes, damaged another 131 homes and other structures, burned 95% of Chino Hills State Park, and scorched a four-county region.[7]

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1 Department of Justice. "Global Warming Impacts in California." Retrieved 28 Dec 2011 from the California Attorney General's website: *http://www.ag.ca.gov/globalwarming/impact.php*.

2 Ibid.

3 Ing, Alissa. Environmental Scientist, Department of Parks and Recreation. Personal communication approximately June 2010.

4 CNN. "California Wildfires Burn Through 600,000 Acres." Retrieved 28 Dec 2011 from the CNN website: *http://articles.cnn.com/2003-10-28/us/california.wildfire_1_blazes-cuyamaca-and-julian-firefighters?_s=PM:US*.

5 Ibid.

6 Orange County Fire Authority. After Action Report: Santiago Fire. Retrieved 3 Aug 2012, from the OCFA website: *http://www.ocfa.org/_uploads/pdf/aar_3-27-08.pdf*.

7 Fire Department Network News. "Orange County Fire Authority Declares Full Containment Today of Triangle Complex Fire." Retrieved 3 Aug 2012 from the Fire Department Network News website: *http://www.fdnntv.com/news.asp_Q_articleID_E_3868_A_title_E_Orange_County_Fire_Authority_Declares_Full_Containment_Today_of_Triangle_Complex_Fire*.

After completing a lengthy review of the fires throughout the Chino Hills area, it is now known that the State Park and neighboring hillsides have experienced more than 100 fires in just as many years, though most of the fires have occurred since 1977. As a result of this information, conservation advocates are working with fire, transportation, and natural resource agencies to protect the landscape from continued wildfire assaults. Together through protective mitigation measures that can reduce the fire frequency toward a more natural fire regime, this approach will protect life and property, and ensure our human and natural communities are safer.

Chino Hills State Park — The Setting

The State Park sits at the juncture of four of Southern California's most urbanized counties: Los Angeles, Orange, Riverside, and San Bernardino. The Park has been assembled through more than 30 different acquisitions to grow to more than 14,100 acres. The Park's first acquisition was in 1981 and even 30 years later the Park continues to expand. Chino Hills State Park was secured to protect its many rare natural resources. Its gently rolling hills are covered in grasslands and dotted with oak and walnut trees. In the steep canyons of the interior, sycamore-lined streams and walnut woodlands abound.

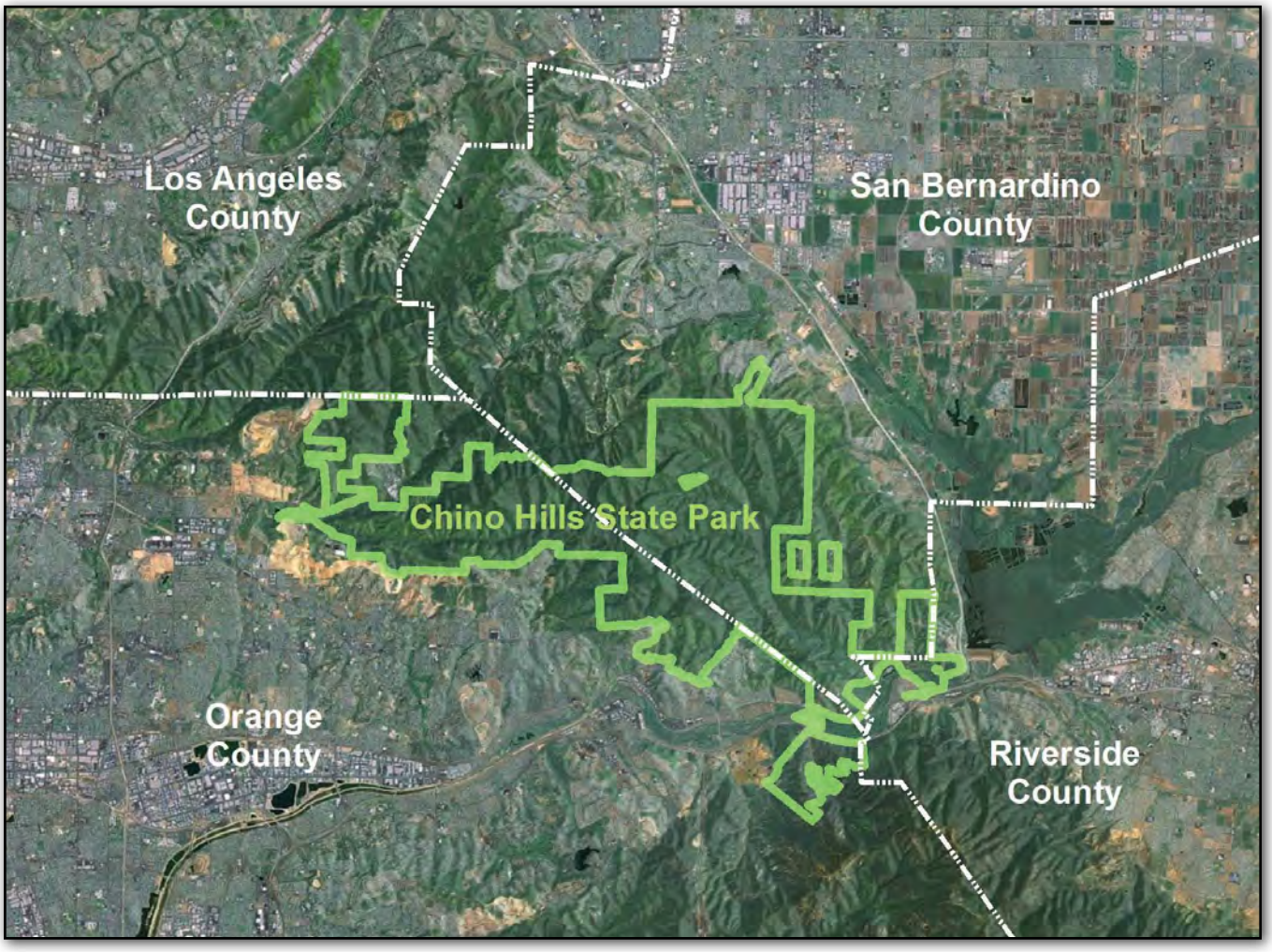

Figure 1. *Chino Hills State Park is located at the juncture of four Southern California counties.*

In 1771 the area was used for extensive grazing operations and by the early 1870s individuals began purchasing the land and using it for sheep and cattle ranching.[8] This grazing damaged the native plants and allowed opportunistic non-natives to spread. Now that the land is protected as a State Park, the grazing has been stopped and habitat restoration is underway.

The Park protects five main plant communities: southern oak woodland (11%), native and non-native grasslands (70%), coastal sage scrub (13%), mixed chaparral (5%), and cottonwood riparian woodland and riparian zones (1%).[9] In fact, the Park "supports 14 different vegetation series defined in the California Native Plant Society's classification,"[10] and 10 are considered unique or significant in Southern California because of their importance as habitat and because they are rapidly disappearing due to development.[11] The State Park contains some of the best remaining stands of walnut woodlands in Southern California. Similarly, the northern most stand of the rare tecate cypress tree is found in Coal Canyon in the State Park and neighboring Ecological Reserve.

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[8] Department of Parks and Recreation. Chino Hills State Park General Plan. February 1999.

[9] Department of Parks and Recreation. Chino Hills State Park General Plan. August 1986. p. 21.

[10] Department of Parks and Recreation. Chino Hills State Park General Plan. (1999). p. 21.

[11] Ibid.

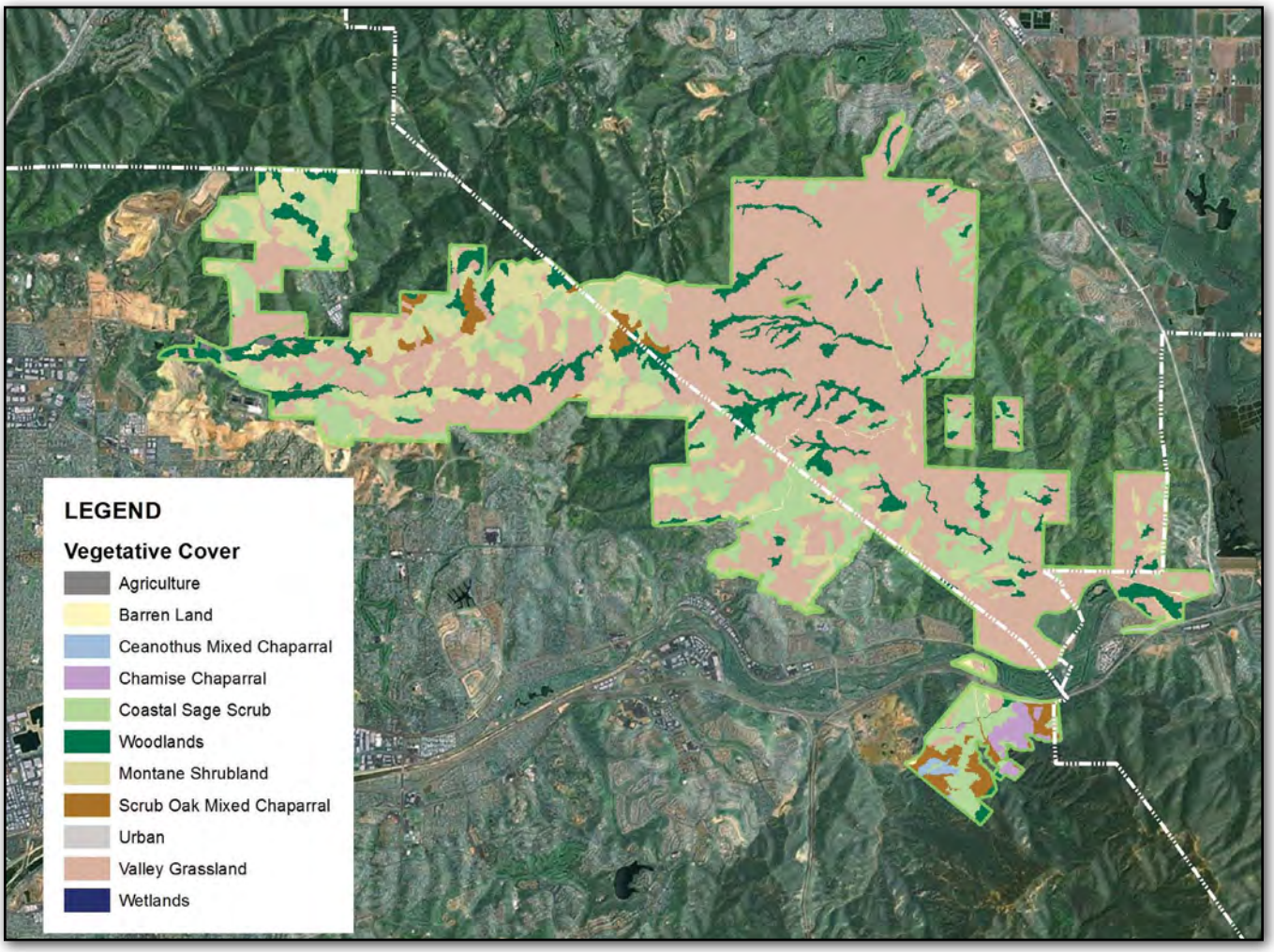

Figure 2. *Chino Hills State Park's vegetative cover provided by USDA Forest Service (EVEG Data) from 2002-2003.*

A wide variety of wildlife depend on the vegetative cover. Deer, bobcats, foxes, coyotes, raccoons, and the occasional mountain lion live in the hills. Falcons, hawks, owls, songbirds, and even golden eagles are protected in the Park. Several endangered birds are making a comeback as well.

Bicyclists, hikers, equestrians, photographers, campers, and other park enthusiasts frequent this natural area.

Ron Krueper, Coal Canyon Underpass (2003)

Hills For Everyone (HFE), a regional non-profit conservation organization, founded Chino Hills State Park in the early 1980s and has been working over the last 30 years to connect and protect this anchor parcel with protected lands in the Puente-Chino Hills Wildlife Corridor. Due to the work of HFE and State Parks, along with many other non-profits, agencies, and jurisdictions, a permanent connection at Coal Canyon was secured in 2001. Coal Canyon links the Trabuco District of the Cleveland National Forest in the Santa Ana Mountains with Chino Hills State Park and the greater Puente-Chino Hills ecosystem. This linkage provides a critical connection that allows wildlife to move freely between the Santa Ana Mountains and the Puente-Chino Hills. It also provides a source to repopulate natural areas should a catastrophic event, like a fire or disease outbreak, occur.

THE STUDY

After three decades of witnessing fires race through the hills and, in the aftermath of the 2008 Freeway Complex Fire which devastated the State Park, HFE launched a study to try to understand why so many fires burned in or adjacent to the State Park and to see if any actions could be taken to reduce the number of fires, resulting in the protection of both houses and natural resources. The study has resulted in the digital history of more than 100 fires that have burned between 1914 and 2011.

The Study Area includes lands generally bounded on the west by the 57 Freeway, Grand Avenue to the north, the 71 Freeway to the east, and the 91 Freeway to the south. The region studied includes all of Chino Hills State Park, but due to the proximity of other protected natural lands, portions of the northern section of the Cleveland National Forest's Trabuco District, the northern portion of the Irvine Ranch Lands (OC Parks), and the Prado Wetlands were also reviewed. Numerous private ownerships in Orange, Riverside, San Bernardino, and Los Angeles Counties that abut these protected lands were also included due to proximity.

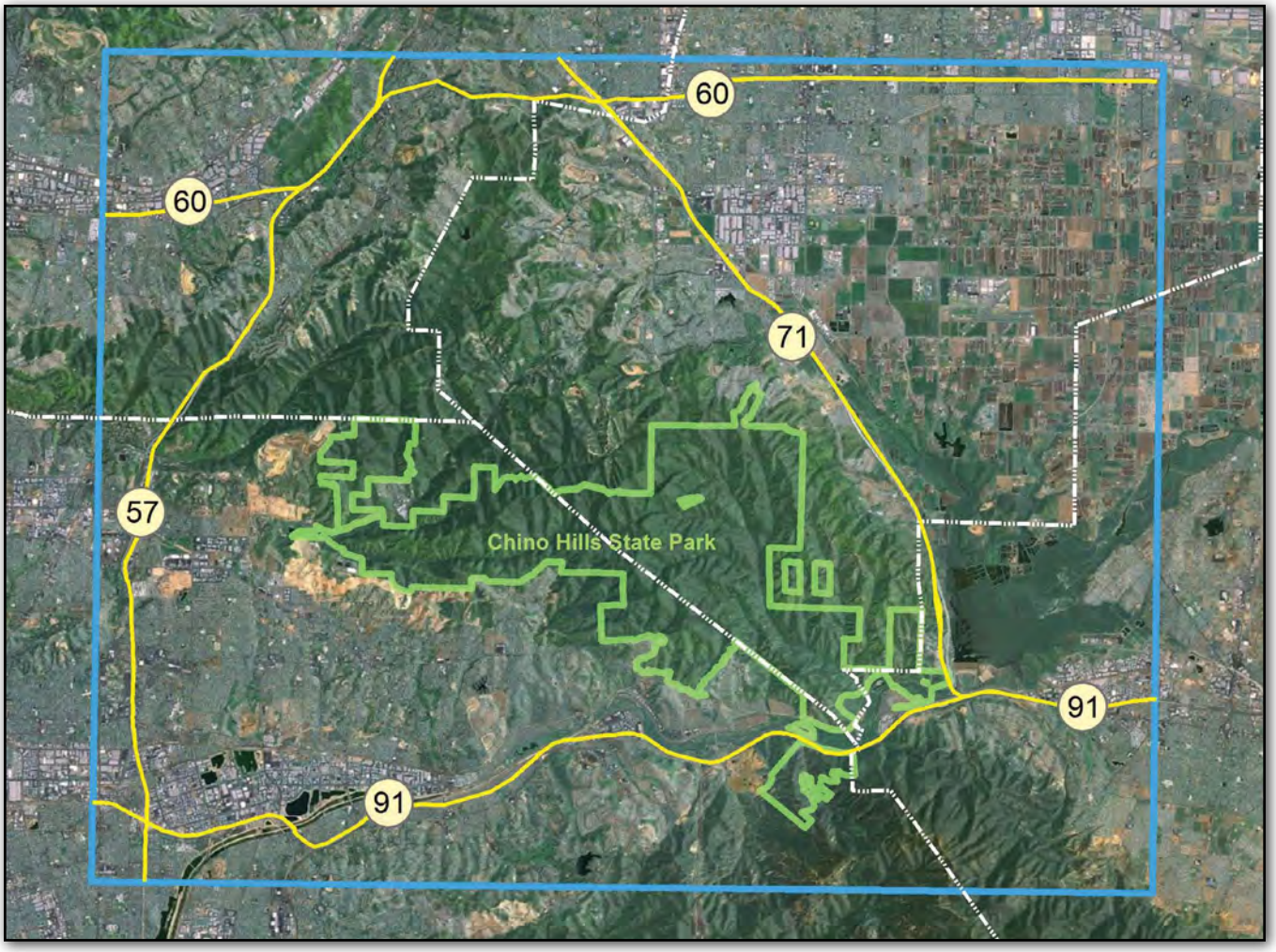

Figure 3. *The Study Area, shown in blue, includes Chino Hills State Park and surrounding hillsides.*

HFE had three main objectives in carrying out this study:

1. Using the data available document the fire perimeters, points of origin, causes, and weather conditions for each fire that burned in, adjacent to, or near Chino Hills State Park;
2. Analyze the results of the research and determine any fire-prone areas that needed particular attention; and
3. Provide general recommendations for residents and agencies to reduce the number of fires and impacts associated with wildland fires, and concurrently protect homes, people, and parkland from unnaturally frequent fires.

There are important terms used throughout this study and their meaning is useful to understand:

Cause: The confirmed or unconfirmed source of the wildland fire's ignition.

Fire Perimeter: The farthest geographical extent, also known as the outer boundary, of a fire. Note: Not all areas within the perimeter necessarily burned.

Fire Frequency: The number of times a specific geographic region has burned. This is similar to how population density is displayed, the darker the color the more frequent the area has burned.

Natural Fire Regime: The general classification of the role fire would play in the natural environment in the absence of modern human intervention.

Point of Origin: The approximate or exact location where the wildland fire ignited within the Study Area.

Study Area: Chino Hills State Park and environs.

Wildland-Urban Interface (WUI): The boundary between developed regions and the natural wildland areas.

Nancy Clifton Hawkes, Freeway Complex Fire (11/08)

Information Sources and GIS Analysis

HFE secured the shapefiles (digital data sets) of fire perimeters and points of origin from the California Department of Forestry and Fire Protection (CalFire), the Orange County Fire Authority (OCFA), and Chino Valley Independent Fire District (CVFD). Where appropriate, newspaper articles/maps, State Park Wildland Fire Reports, and personal accounts were used to digitally create a fire perimeter and/or point of origin. HFE used the ArcMap 10.1, a geographic information system (GIS) program, to assimilate the fire data. To enable wide distribution, the files were exported from ArcMap for use in Google Earth.

Through this research, HFE was able to piece together a digital dataset that outlines where known fires burned and where, and in some cases why, the fires started. Unfortunately, not all fires that burned in the Study Area were formally documented or no details about the perimeter or point of origin were complete enough to include in the study. Consequently, there are actually many additional fires that were not included in the study due to lack of adequate data. Historic record keeping for wildland fires wasn't as complete as it is now.

Fire Regime

HFE analyzed the fire regime (both natural and human-caused) of all documented fires that burned in, adjacent to, or had the potential to burn into Chino Hills State Park from 1914 – 2011. It seems in that 97 year history only two fires occurred naturally due to lightning strikes. This means the natural fire regime was one fire every 50 years. The balance of the fires (101) was caused by humans, either intentionally or unintentionally.

Fire Perimeters

HFE accumulated 71 separate fire perimeters in this study with 37 of those fires having known points of origin. The smallest fire is less than one acre, while the largest is over 41,000 acres.

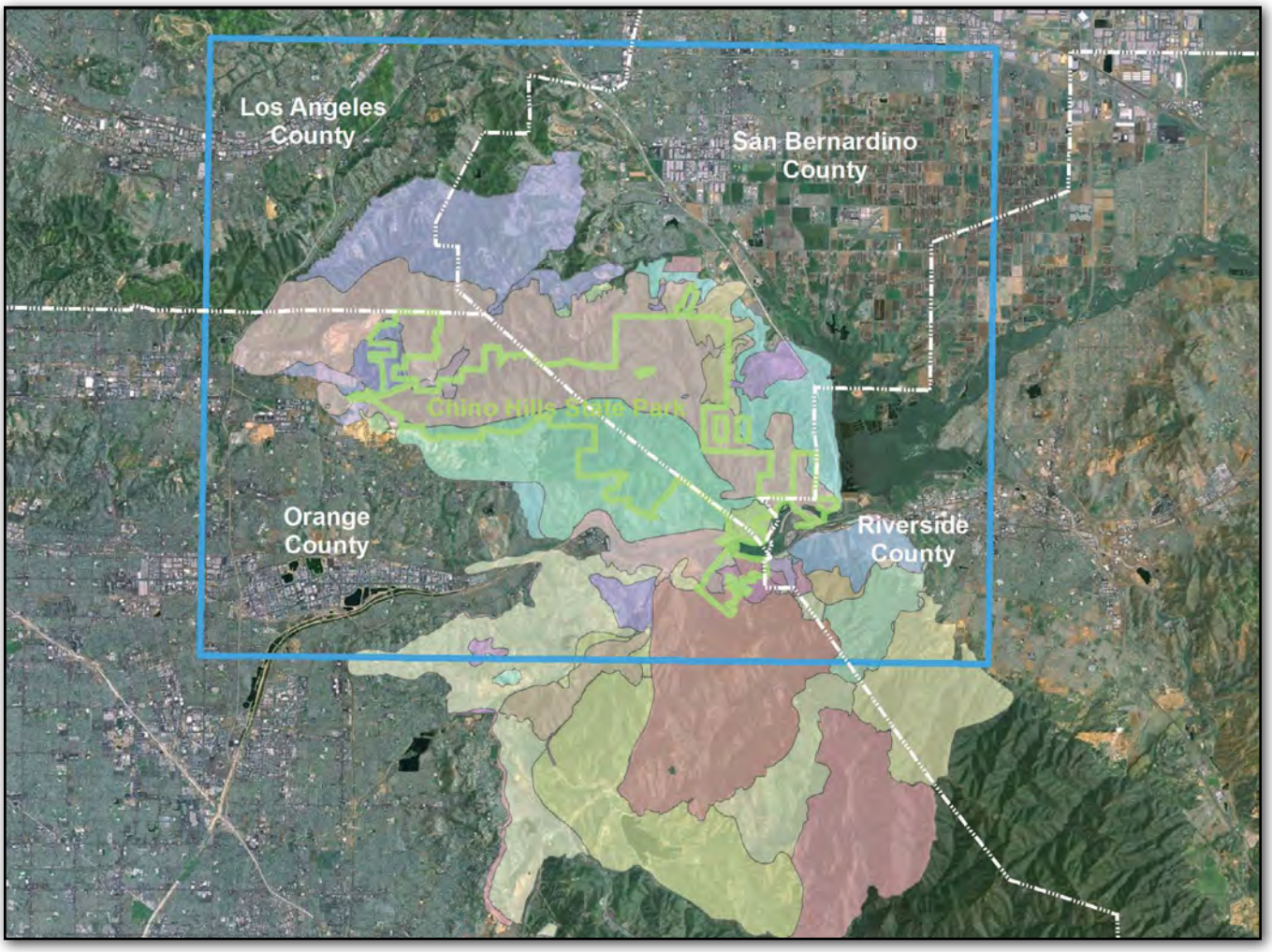

Figure 4. *The Study Area included 71 fire perimeters between 1914 - 2011.*

The three largest fires from the study include:

- Green River Fire - 41,285 acres
  November 1948
- Paseo Grande Fire - 39,872 acres
  October 1967
- Freeway Complex Fire - 30,306 acres
  November 2008

The first acquisition of parkland occurred in 1981 and since that date there has been increased pressure from residential development and road creation or expansions that have increased access to the undeveloped hills and the Park. It appears that the added housing developments at the WUI surrounding the Park have increased threefold the number of fires burning the Park. There were 26 fires between 1914-1980 and 76 fires between 1981-2011.

Claire Schlotterbeck, Freeway Complex Fire (11/08)

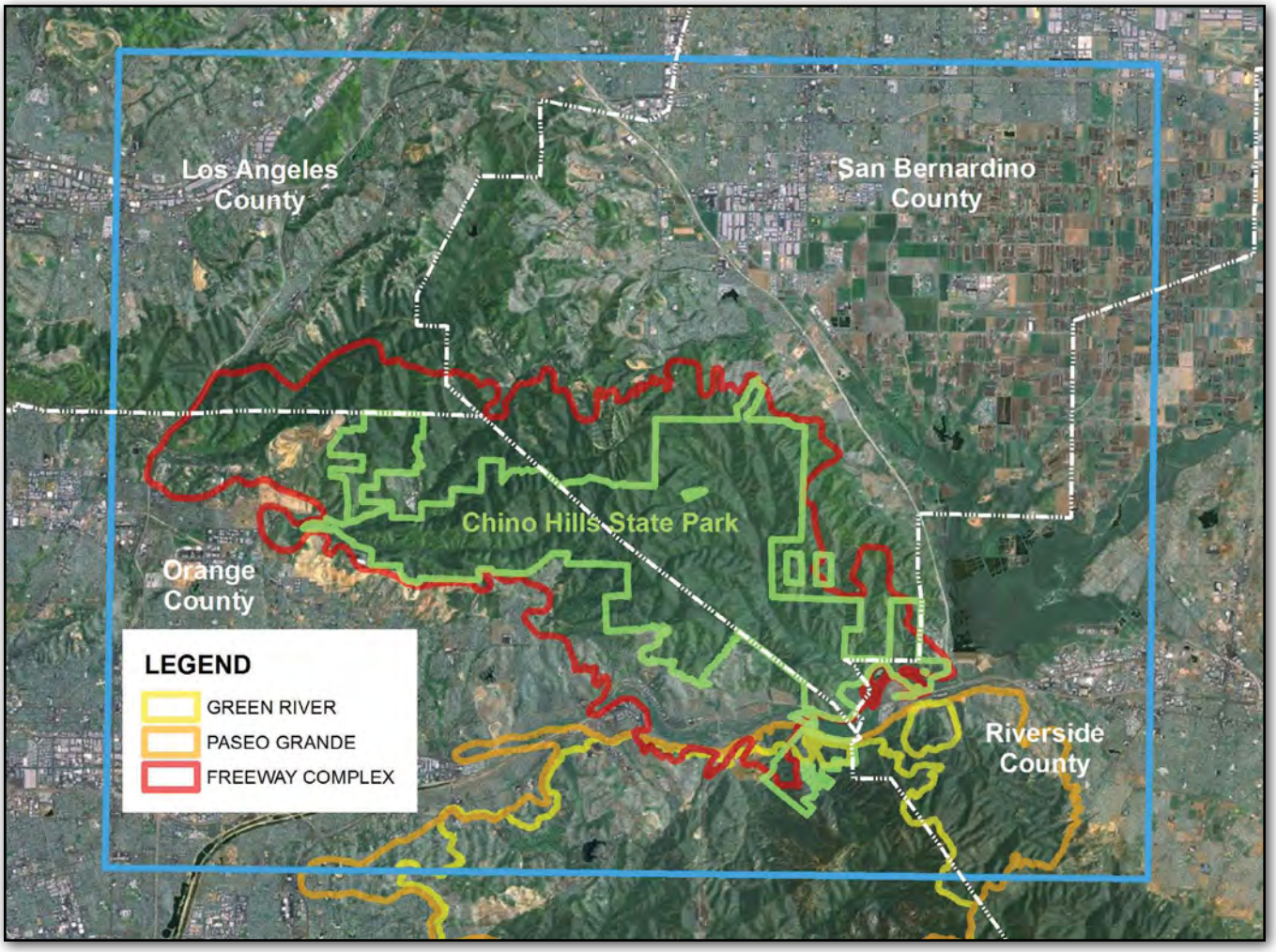

Figure 5. *The Study Area's three largest fires included the Green River, Paseo Grande, and Freeway Complex Fires.*

Fire Points of Origin

HFE documented 70 separate fire points of origin in this study, with 37 of the fires having known perimeters. The smallest fires are less than one acre in size, while the largest with a known point of origin is over 38,000 acres.

Claire Schlotterbeck, Green Fire (2/02)

Claire Schlotterbeck, Carbon Canyon Fire (9/90)

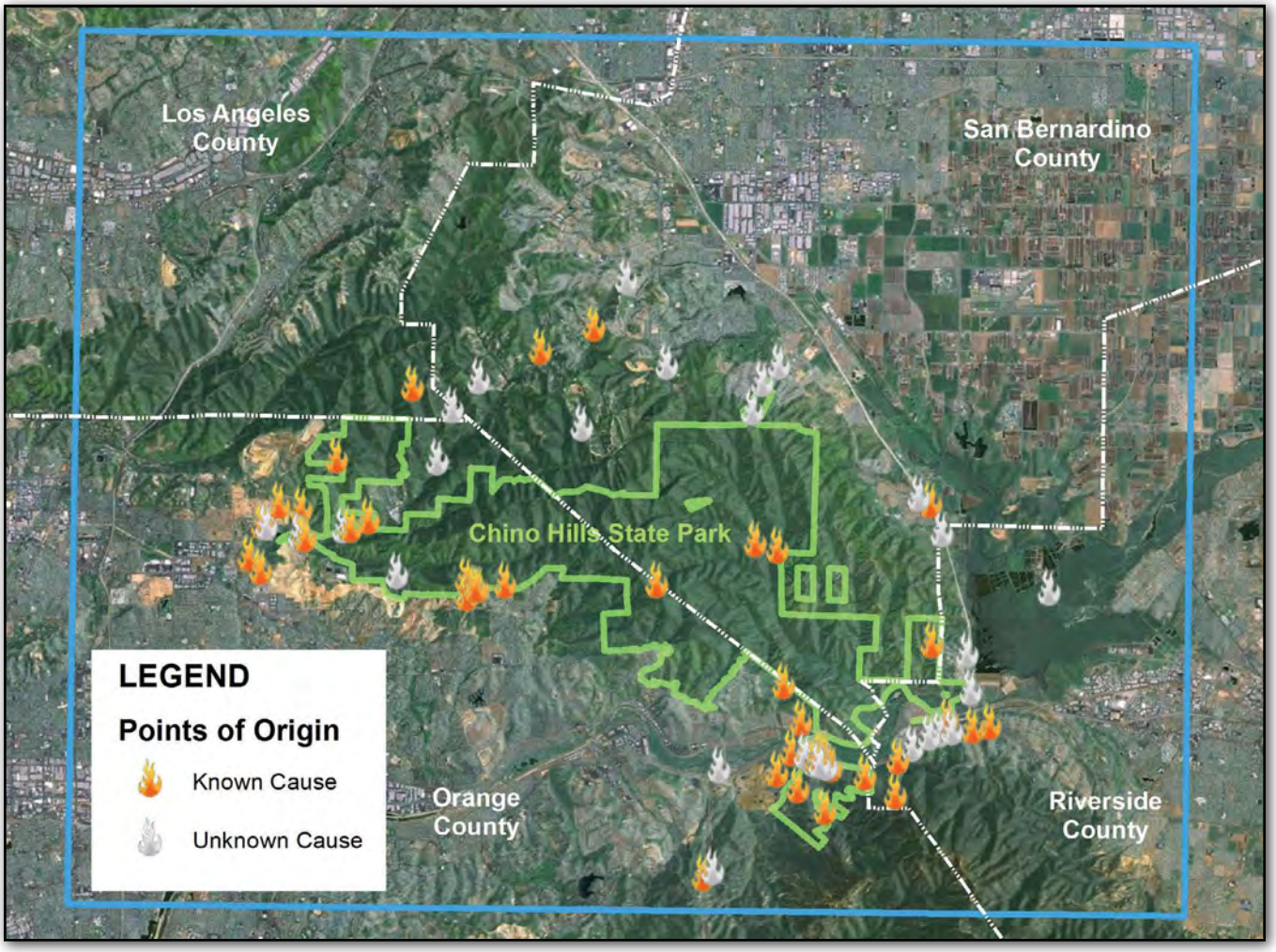

Figure 6. *The Study Area included 70 points of origin between 1914 - 2011, with some known causes and some unknown.*

The points of origin data indicate fires started due to a variety of causes. They are broken down as follows:

Table 1. *Fire causes, quantities, and total acreage burned.*

Cause	Number of Fires	Total Acreage Burned
Unknown	29	83,405*
Arson	9	9,349*
Power lines	7	53,048
Automobile	7	30,357*
Fireworks	5	10,316
Plane Crashes	5	829*
Machinery	4	393
Fire Agency**	2	14,150
Lightning	2	734
Total:	**70**	**202,599***

* indicates some acreages are unknown and therefore the number is actually higher than shown.
** indicates a re-ignited prescribed burn.

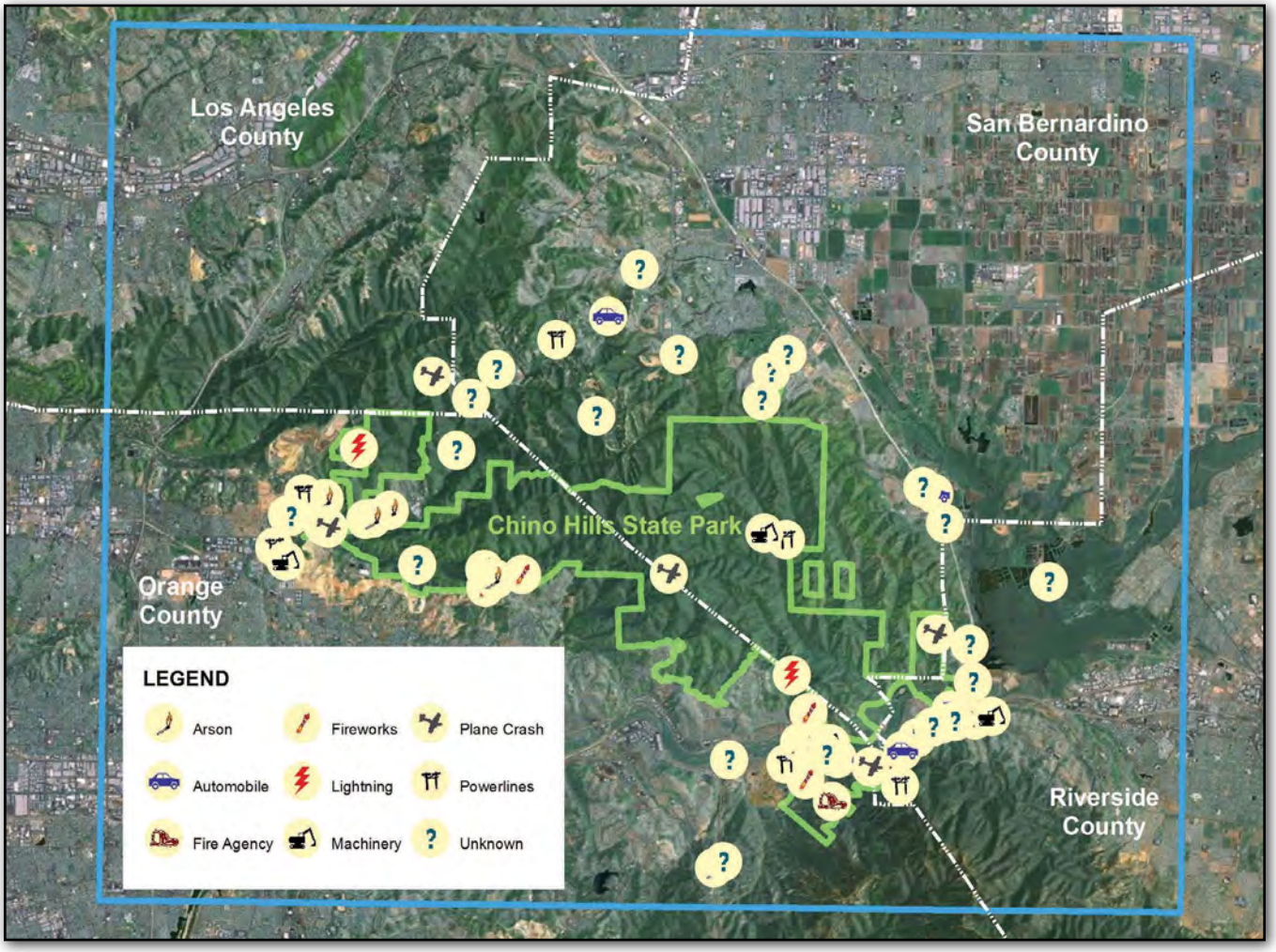

Figure 7. *The fire causes have been broken down into different categories with arson, power lines, and automobiles as the three main causes.*

Obtaining historic fire records was an issue during this study as 29 of the fires researched did not have a known or confirmed cause. The top three most identifiable causes of wildland fires in the Study Area are: arson, power lines, and automobiles.

Fire Frequency

By overlapping all the fire perimeters, HFE was able to determine the fire frequency in the Study Area. The lightest color on the map indicates that area only burned once. Whereas the darkest color on the map, a maroon color, indicates the area burned six or more times.

When one looks at the fire frequency and the points of origin there are obvious locations that have burned repeatedly. The data show the 91 Freeway Corridor (Santa Ana Canyon) between Anaheim and Corona, Carbon Canyon in Brea, and the Rim Crest entrance to Chino Hills State Park in Yorba Linda have burned the most. Later in this report, HFE will provide general recommendations for potential proactive steps to reduce the fire frequency at these known "hotspots."

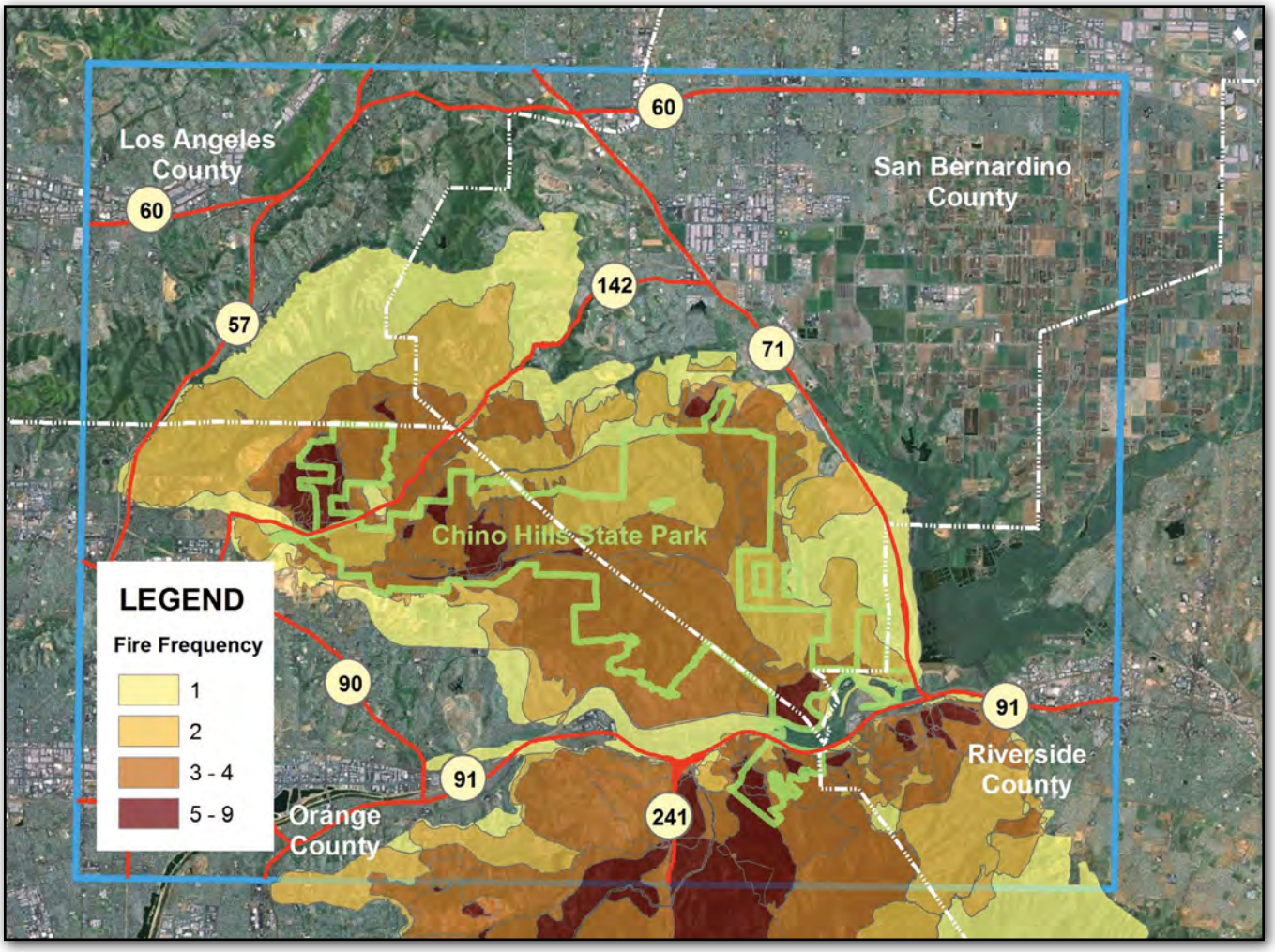

Figure 8. *The fire frequency shows three "hotspots:" the 91 Freeway Corridor, Carbon Canyon, and Rim Crest.*

Fires and Weather Patterns

The prevailing wind for this region is a westerly onshore flow and the majority of the fires occur during those normal conditions. The Santa Ana Winds (which come from the east/northeast) are the exception and as these winds tend to be hot and dry, fires that start under these extreme conditions have a tendency to get out of hand. The relative humidity and temperature play a significant role in reducing the fuel moisture in the vegetation, especially the fine dead fuel (such as annual grasses and mustard). It was noted in the After Action Report for the Freeway Complex Fire that due to the winds (gusts above 60 mph) and heat, "over 10,000 acres were consumed in the first 12 hours—roughly 14 acres per minute. That's nearly the length of 14 football fields every 60 seconds."[12] Consequently, Santa Ana Wind events are known for helping spread the fires and therefore require expanded and rapid fire protection presence.

Briefly, the feohn winds, known locally as Santa Ana Winds, are caused when high pressure systems sit inland and a low pressure system sits off the coast. In our area, the foehn/Santa Ana Winds are generated when the high pressure system is positioned over the high desert (Mojave and Great Basin). The winds blow from the southern side of the high pressure system toward the low pressure system over the Pacific Ocean. Typically they are hot and dry with a very low relative humidity (10-20%).[13] This is due to the compression of the wind after going up and over the mountains. Relative humidity indicates the ratio between the moisture in the air and the amount of moisture needed to saturate the air—it is a function of both moisture and temperature. Moisture in vegetation can be rapidly depleted in Santa Ana Wind conditions. Generally the finer the vegetation (grass) the quicker it dries out compared to a mature oak tree with a thick bark and a thick trunk.

Also researched were the weather patterns from the fires included in the study. Weather Underground and The Weather Channel websites were used to collect the data, using Chino Hills as the location. HFE was unable to obtain weather data before 1977.

Table 2. *Weather features during fire events.*

Weather Features on Fire Days		
Average Temperature was: (Data was available for 58 fires)	90°F	
Average Relative Humidity was: (Data was available for 34 fires)	51%	
Average Wind Speed was: (Data was available for 78 fires)	6 mph	
Average Wind Gusts were: (Data was available for 26 fires)	28 mph	
Wind Direction was: (The direction the wind originates from) (Data was available for 78 fires)	North (N, NE, NW)	11 fires
	East (E, ENE, ESE)	6 fires
	South (S, SE, SW)	16 fires
	West (W, WNW, WSW)	45 fires

[12] Orange County Fire Authority. After Action Report: Freeway Complex Fire. November 15, 2008. Retrieved 3 Aug 2012 from the OCFA website: *http://www.ocfa.org/_uploads/pdf/aar1_freeway.pdf*.

[13] National Oceanic and Atmospheric Administration. "Santa Ana Conditions – Southern California." Retrieved 20 June 2012 from the National Oceanic and Atmospheric Administration website: *http://www.noaawatch.gov/2008/santa_ana.php*.

Melanie Schlotterbeck, 91 Freeway Fire (6/10)

Duane Thompson, Carbon Canyon Fire (7/11)

Fires and Seasonal Patterns

It is not surprising that in the hotter, drier months between May and November there are more fires than in the moister winter months between December and April. There is a clear correlation between fire frequency and the summer months as seen in the table below. The majority of fires occur in July. However, October and November have the largest average acres burned. This is likely due to the fact that this is the end of the dry season and these months are prone to Santa Ana Wind conditions.

Table 3. *Fires by month, acreage burned, and average acreage burned.*

Month	Known Fires	Total Acreage Burned	Average Acreage Burned
Unknown	10	18,526*	2,058** (9 fires)
January	2	175*	175** (1 fire)
February	2	12,740	6,370
March	3	1,628*	814** (2 fires)
April	3	926	309
May	7	188	27
June	10	8,958	896
July	22	18,386*	919** (20 fires)
August	10	2,685*	298** (9 fires)
September	11	5,529*	614** (9 fires)
October	11	85,407*	8,541** (10 fires)
November	10	97,526	9,753
December	2	4*	4** (1 fire)
Total:	**103**	**252,678***	**2,717** (93 fires)**

* indicates some acreages are unknown and therefore the number is actually higher than shown.
** indicates acreages were averaged only where known fire acreages existed; if a fire acreage was unknown the fire was left out of the average.

CASE STUDY - THE 2008 FREEWAY COMPLEX FIRE

The power of zoning carries with it the responsibility for consequences.

Claire Schlotterbeck, Freeway Complex Fire (11/08)

The City of Yorba Linda has developed rapidly over the last 40 years. The data shows that Yorba Linda's population of 29,847 in 1980[14] had grown to 64,234 by 2011.[15] Despite the fact that many of the homes are relatively new and include fuel modification zones and other "ignition resistant" construction for the WUI, there was a tremendous loss of property in the 2008 Freeway Complex Fire. This case study outlines some of the fire statistics, anecdotes from Yorba Linda residents, and summarizes key points from the OCFA After Action Report.

The Freeway Complex Fire

On November 15, 2008 two fires started on opposite ends of the hills about two hours apart. The first fire ignited near the 91 Freeway on the eastern side of the hills in Corona by an automobile exhaust catching dry brush on fire, while the second fire began nearly 11 miles away to the northwest, in Brea, due to an unmaintained power line that also ignited dry brush.[16]

The weather conditions were ideal for a fire: 91°F, 4% relative humidity, sustained wind gusts at 35 mph (OCFA reports 43 mph with gusts at 60+ mph) coming from the northeast (a Santa Ana Wind event).[17] Due to the extreme weather conditions OCFA had ramped up its crews in the days preceding the fire.[18]

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[14] City Data. "Yorba Linda, California." Retrieved 31 Jul 2012 from the City Data website: *http://www.city-data.com/city/Yorba-Linda-California.html*.

[15] United States Census Bureau. "State and County Quick Facts." Retrieved 31 Jul 2012 from the U.S. Census Bureau website: *http://quickfacts.census.gov/qfd/states/06/0686832.html*.

[16] Orange County Fire Authority. Freeway Complex Fire - After Action Report.

[17] Weather Underground. "Fullerton Weather Station." Retrieved 1 Aug 2012 from the Weather Underground website: *http://www.wunderground.com/history/airport/KFUL/2008/11/15/DailyHistory.html?req_city=NA&req_state=NA&req_statename=NA*.

[18] Orange County Fire Authority. Freeway Complex Fire - After Action Report.

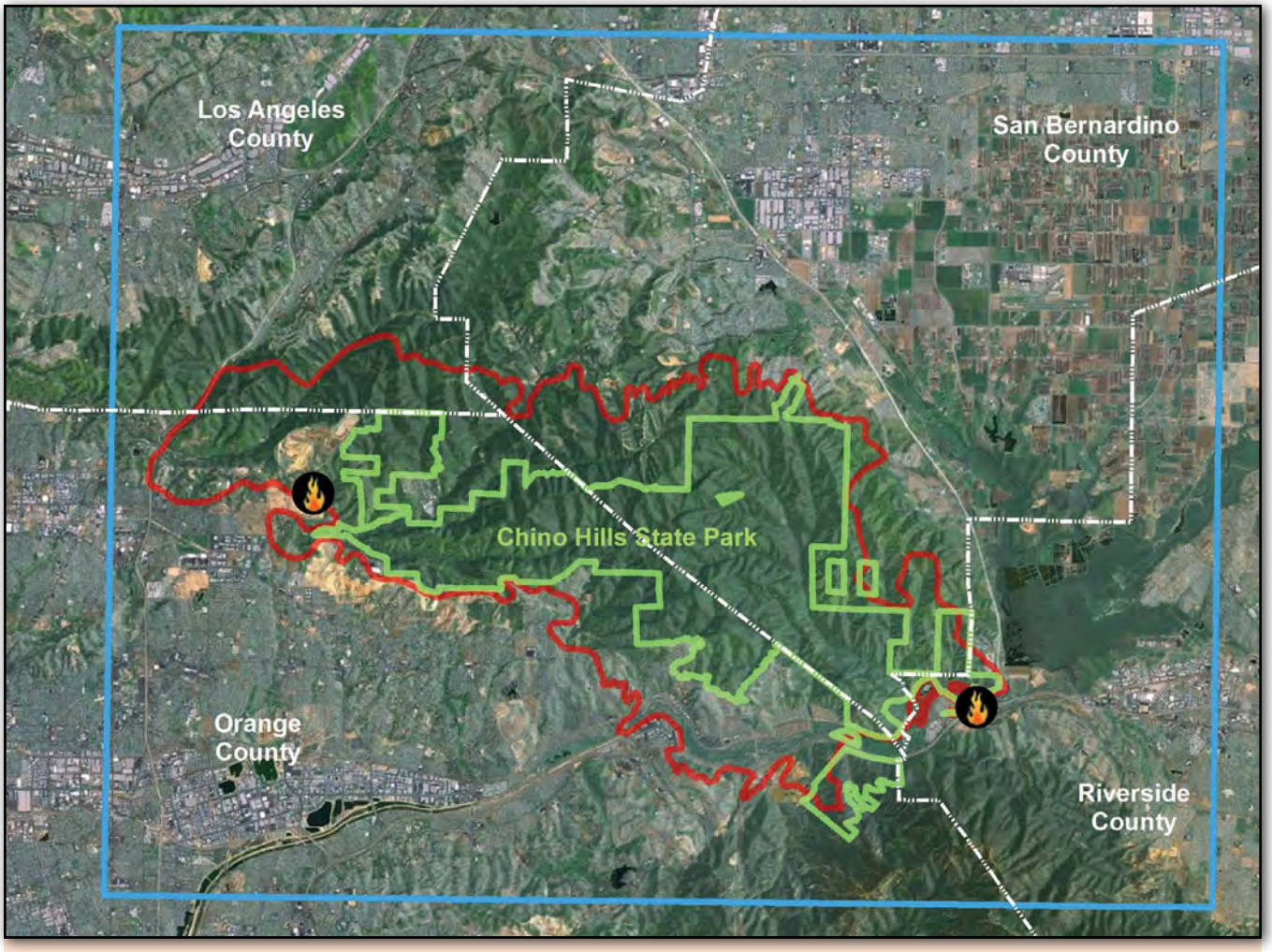

Figure 9. *The red outline indicates the fire perimeter for the Freeway Complex Fire of 2008 with its two points of origin.*

The Initial Timeline

The Corona Fire was reported at 9:01 AM. The first Orange County strike team arrived at 9:23 AM, and the first air assaults began at 10:10 AM. By 10:20 AM, OCFA reported the fire would reach the City of Yorba Linda within 30 minutes. The first 911 call to report the Brea fire arrived at 10:43 AM.[19] A personal account from a 911 caller revealed the dispatcher dismissed the notion that a new fire had started in Brea, stating the smoke the caller was seeing was from the Corona blaze. The caller relayed that flames could be seen from Carbon Canyon Road (in Brea), which is no where near the Corona blaze.

Nicholas Staddon, Freeway Complex Fire (11/08)

[19] Ibid.

Firefighting crews arrived on scene for the Olinda Landfill Fire by 10:55 AM.[20] The presence of this second fire, which immediately threatened homes, shifted the firefighting strategy. By 10:58 AM Yorba Linda's first home had already been destroyed.[21]

Yorba Linda on Fire

With many residents at home on a Saturday morning, they were witness to the quick moving Corona Fire. Residents began self evacuating and quickly clogged traffic on the major thoroughfares. Evacuees streamed down from the higher elevations making it harder for those closest to the thoroughfares to enter the traffic flow. The flood of cars brought the main east-west traffic corridors of Imperial Highway and Yorba Linda Boulevard to a standstill. In addition, due to the Corona fire, traffic was stopped on the other east-west corridor, the 91 Freeway. Fire trucks struggled to get to the fire as residents struggled to leave from the oncoming flames.[22]

> *"The fire moved through residential neighborhoods from Brush Canyon to the San Antonio neighborhood—a 5.5 mile span in less than five hours."*
> *— OCFA After Action Report, p. 36*

Bob Kanne, Freeway Complex Fire (11/08)

Anecdotal accounts from Yorba Linda residents describe the chaos of trying to evacuate during the firestorm. One resident stated, "people can't get out on San Antonio... [it was] a huge, huge traffic jam."[23] When exiting their neighborhoods they also hit gridlock on the major arterial of Yorba Linda Boulevard. One resident who lost his home had no time to even drive his cars out of the driveway. With no car to drive, he ended up directing traffic at Via Del Agua and Yorba Linda Boulevard. Evacuees from his neighborhood couldn't leave because there was no traffic signal to stop the flow of traffic.

A Predictable Disaster

This disaster was predictable since large fires on Santa Ana Wind days on east-west trending terrain have occurred over and over again. Land use decisions in the City of Yorba Linda may have contributed to placing residents, their homes, and businesses at risk. In late 2002 the City of Yorba Linda approved the Shapell project which allowed a threefold increase over the General Plan density.[24] It is uncertain whether mitigations for traffic impacts on major thoroughfares, in times of emergency, were adequate.

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[20] Ibid.

[21] Ibid.

[22] Ibid.

[23] The Weather Channel (Producer). Weathering Disaster: "Yorba Linda Fires" (Episode). (24 Sep 2011). Yorba Linda, CA: The Weather Channel.

[24] Los Angeles Times. "Yorba Linda Seeks to Rescind Development Vote." 5 Dec 2002. Retrieved 2 Aug 2012 from the Los Angeles Times website: http://articles.latimes.com/2002/dec/05/local/me-yorba5.

Melanie Schlotterbeck, Yorba Linda Flight (2008)

The Freeway Complex Fire burned down 187 homes, damaged another 131 homes and other structures[25] and burned 95% of Chino Hills State Park. According to the OCFA After Action Report: The Freeway Complex Fire burned "30,305 acres of watershed ... across six cities and four counties. [Fire] [s]uppression costs exceeded $16.1 million, and property loss has been estimated at nearly $150 million."[26]

Lessons Learned

If there are lessons to be learned, it seems there are opportunities for jurisdictions to revisit how their communities grow and where the most appropriate place for housing developments should be located. Cities and homeowners' associations must maintain defensible space at the WUI, buffering the homes from the edge of the WUI. When cities increase the density of a housing development but do not adequately increase the road capacity on arterials, evacuations during a fire storm are difficult, dangerous, and potentially disastrous.

Bob Kanne, Freeway Complex (11/08)

Even with more stringent building codes and relatively new houses, hundreds of homes were lost or damaged. According to Kris Concepcion of OCFA, "embers were getting into the attics of homes."[27] It seems there is still work to be done to harden homes from both flame fronts and ember storms. Most importantly, fleeing residents need to be able to evacuate safely.

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[25] Fire Department Network News. "Orange County Fire Authority Declares Full Containment Today of Triangle Complex Fire."

[26] Orange County Fire Authority. Freeway Complex Fire - After Action Report. p. 28.

[27] The Weather Channel. Weathering Disaster: "Yorba Linda Fires" (Episode).

Freeway Complex Fire Photos (11/08)

Dr. Jeff Hansen (Yorba Linda)

Bob Kanne (Yorba Linda)

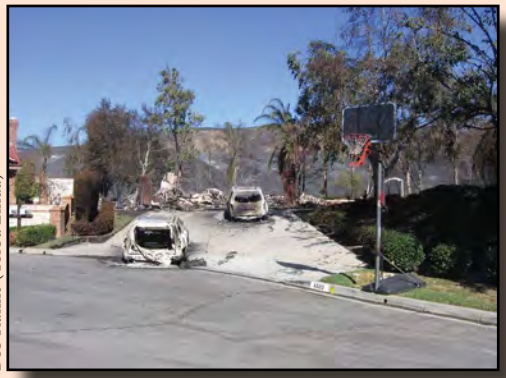
Bob Kanne (Yorba Linda)

© Lee Paulson (Diamond Bar) *used with permission*

Nicholas Staddon (Brea)

Nicholas Staddon (Brea)

Jeff Garvin (Chino Hills)



Bob Kanne (Yorba Linda)

RECOMMENDATIONS

The data demonstrate that there are three "hotspots" in the Study Area that show a propensity to burn: Santa Ana Canyon, Carbon Canyon, and Rim Crest. With that in mind HFE developed several suggestions for possible adoption by transportation and fire agencies, State Parks, cities, and homeowners. We recognize that these recommendations require appropriate staffing and reliable funding. HFE is willing to help develop the political will and partner on implementing these recommendations.

Melanie Schlotterbeck, Yorba Linda (8/12)

General Recommendations

- Enforcement of fire rules and regulations is essential if fires in this region are to be reduced. Develop an effective and funded mechanism for fining violators to improve safety.
- OCFA and citizens of Yorba Linda should organize and work together to increase fire safety as the neighboring Carbon Canyon Fire Safe Council has done.
- Communities around the hills should create volunteer Fire Watch programs that patrol streets on high wind days, like the Santiago Canyon area residents have implemented.
- Individual residents should take personal responsibility to improve the fire safety of their own homes.
- Jurisdictions should require the highest standard and state-of-the-art construction for fire prevention (e.g., installing passive closure attic vents, which close without human intervention).
- When planning for future development at the WUI, developers and lead agencies should involve fire agencies at the earliest planning stages.

Santa Ana Canyon Recommendations

- Harden the edges of the 91 Freeway that abut natural lands using K-rails or similar structures.
- Incorporate and enforce an appropriately frequent maintenance program for the power lines owned or operated by Edison and any other utility providers.
- The steep terrain and the wind tunnel effect of this east-west trending canyon heighten the threat of fire in this location. It seems prudent to add a new fire station at either Green River or Gypsum Canyon to improve response time to Santa Ana Canyon fires especially given that the 91 Freeway is often congested which reduces response time.
- Continue to increase fire patrols or fire agency presence on high wind/high heat/low humidity days on the 91 Freeway and neighboring streets/communities.
- Include Caltrans-type flashing signage on high fire hazard days alerting commuters to be cautious and report suspicious behavior.
- Improve safety by enforcing violations caused by agencies, contractors, and businesses that work along the Santa Ana Canyon. For example, agencies should requiring spotters and water trucks when working in or next to natural lands.

Carbon Canyon Recommendations

- Caltrans should continue to improve consistency on fuel clearance in a more timely fashion along Carbon Canyon Road (Highway 142). Spraying of the plants in the Caltrans right-of-way should occur early in the growing season, when the plants are small making handcrew removal easier and more economical.
- Consider reducing the participation for fire agency mutual aid for cities with a WUI and a history of fires. For example, the fire agencies serving Brea, Yorba Linda, and Chino Hills should be "at the bottom of the list" for sending mutual aid to other areas on high fire hazard days since they may have their own fire to respond to. Requests for mutual aid should first be made to more urbanized communities with no WUIs.
- Continue to increase fire agency presence and patrols during high wind/high heat/low humidity days.

Rim Crest Recommendations

- Include a door-to-door homeowner education program before fire season begins each year.
- Incorporate proactive steps by OCFA and the City of Yorba Linda for retrofitting homes with hardening techniques e.g., boxed eaves, automatic attic vent closures, roofs cleared of leaf debris, no ladder fuels near the house, etc.
- Remove non-native highly flammable vegetation (such as palm trees and pampas grass).
- Give fire risk the highest consideration in approving housing projects on the WUI.
- Continue fire agency presence and patrols during high wind/high heat/low humidity days.
- Require new developments to use native, fire resistance landscape to reduce ignition at the WUI and incorporate defensible space within the development.

CONCLUSION

This study shows that Chino Hills State Park and environs have endured significantly more fires, 101 to be exact, than would have naturally occurred by lightning strikes (2). Instead of a fire burning every 50 years in the natural fire regime, humans have increased the ratio essentially to a fire a year. HFE recognizes that a sample size of two fires is not enough to draw firm conclusions. However, our local examples of natural fires indicate fewer acres burn (367 acres) on average than fires ignited by humans or human error (2,494 acres). Natural fires tend to ignite on ridge tops with a lightning strike. The fire then generally spreads downhill and does so more slowly allowing firefighters more time to attack the blaze. Human-caused fires tend to start at a canyon bottom, where roads usually are, and race uphill.

As communities arose and developments were built, opportunities for fires to ignite at the WUI increased. It is clear from this research that humans have changed the natural fire regime—both intentionally and unintentionally. Some of the causes, like machinery hitting a rock igniting dry brush could be prevented. Risk could be reduced with the incorporation of fire spotters, restrictions on work during certain weather conditions, and the presence of water trucks. Other fires ignited by power lines seem to indicate the region would benefit from an improved maintenance schedule before the fire season begins.

Claire Schlotterbeck, Soquel Fire (10/78)

It is clear there are many more fires occurring here than would have occurred naturally and there are many consequences to having a fire a year burn in the region. First, there is an increased risk of loss of life, property, and natural resources, which all translate to a huge economic loss, not to mention personal losses, for a region each time it burns. Second, increased fires mean a shift in the type and location of vegetation that normally could have recovered in a natural fire regime. When burned too frequently the native vegetation does not have enough time, and in some cases stored energy, to regenerate or become mature enough to produce seeds. This stress on the native vegetation allows non-native plants to dominate the landscape. Finally, given the $150+ million investment made by private and public agencies in protecting and restoring the hills, it challenges the sensibilities to think of the State Park merely as fuel load. In the short-term, reducing the fuel load exacerbates the long-term problem of type conversion to highly flammable non-native fuels, which generally dry earlier, ignite easier, and spread fire faster than native plants. It was reported during the Freeway Complex Fire (2008) that the non-native 30 foot tall water-loving *Arundo donax* spread the flames up Carbon Canyon Creek toward the community of Sleepy Hollow. Riparian corridors are natural buffers to flames, but not when they are choked by non-native, highly flammable plants.

The responsibility for protection of the community from wildland fires lies first with the developer during the planning phase of the development. Governmental jurisdictions also share in this responsibility because decision makers have the power to approve or deny inappropriate developments at the WUI. Finally, private homeowners have the responsibility to learn the vulnerabilities of their home and take proactive steps to remedy them where possible. Additionally, the city and homeowners' associations must ensure proper maintenance of the defensible space within the community.

To reduce the unnatural frequency of fires to a more natural pace: education, outreach, planning, and a shift in approach is needed. HFE is committed to working with planners, natural resource, transportation, and fire agencies to reduce the fire frequency to a more natural fire regime in the Study Area.

Suggestions for Further Study

Due to capacity and time limitations, HFE was only able to report on the wildland fires (perimeters and points of origin), however HFE believes there are additional areas of study that would benefit fire prevention, resource protection, and planning efforts at the WUI. These include:

- An analysis of the effect of repeated wildfires on wildlife habitat and its effect on wildlife
- A historical analysis documenting the loss of valuable vegetation types and type conversion
- The effects wildfires have on wildlife movement, foraging, reproduction, and survival
- Whether enforcement measures for fire prevention are adequate
- The expansion of the WUI and its impacts on the Park

ACKNOWLEDGEMENTS

About the Authors

Claire and Melanie Schlotterbeck are conservation advocates specializing in the Puente-Chino Hills Wildlife Corridor. This mother-daughter team both work as long time consultants to HFE. Melanie is a technical consultant and works on GIS mapping, land acquisition, research projects, and outreach efforts. More recently, her efforts have resulted in acquisition and restoration projects that benefit the State Park. She earned her bachelor's degree in Environmental Geography and her Master of Science in Environmental Science from Cal State Fullerton. Claire Schlotterbeck is the Executive Director of HFE and has been involved in preservation of the Puente-Chino Hills for over three decades. She played a key role in the formation of the 14,100-acre Chino Hills State Park. Claire earned her bachelor's degree in Political Science from UCLA and a Master of Science from Purdue University.

HFE also gratefully recognizes the contributions of:

- CalFire, Orange County Fire Authority, and Chino Valley Independent Fire District for providing digital data for analysis and inclusion in this study.
- Chino Hills State Park staff, Ron Krueper, Kelly Elliott, Ken Kietzer and Alissa Ing, for providing important reports, expertise, critiques, and personal accounts that led to a more complete study.
- Scott Carpenter of the National Weather Service for assisting HFE accumulate weather statistics on the wildland fires.
- GreenInfo Network for providing the initial mapping for this project.
- Dan Nove for his expertise in converting the GIS data to Google Earth and refinement of the maps for this project.
- Carbon Canyon Fire Safe Council, for its support of this project and efforts to educate canyon residents through its outreach and annual Wildfire Awareness Fair.
- The City of Brea, California Fire Safe Council, and the Santa Ana Watershed Association for their funding and work in restoring Carbon Creek through the *Arundo* removal project post Freeway Complex Fire.
- Drs. Rod and Carol McKenzie for their able editorial assistance.

APPENDIX A

Fire Perimeter Data

Fire Name	Fire Date	Acreage Burned	Cause	Point of Origin
Fuel Break (Historical)	—	132	—	—
Irvine Ranch	1914	14,830	Unknown	Unknown
Fresno Canyon*	1928	1,007	Unknown	Unknown
Gypsum*	1929	1,085	Unknown	Unknown
Carbon Canyon*	1930	733	Unknown	Unknown
Santa Ana Canyon	Nov. 8, 1943	9,375	Unknown	Unknown
Gaines	Sep. 22, 1944	270	Unknown	Unknown
Shell	July 2, 1947	118	Unknown	Unknown
Green River	Nov. 4, 1948	41,285	Unknown	Unknown
Nohl	June 21, 1951	176	Unknown	Unknown
Santiago	Oct. 15 ,1958	110	Unknown	Unknown
La Vida	Nov. 29, 1959	611	Unknown	Unknown
91 Freeway*	1962	139	Unknown	Unknown
Paseo Grande	Oct. 29, 1967	39,872	Unknown	Known
Firestone	Oct. 30, 1967	236	Unknown	Known
Tonner Canyon	June 13, 1971	9	Unknown	Unknown
Serranos	Sep. 9, 1973	304	Unknown	Known
Mine	July 28, 1977	4,956	Unknown	Unknown
Soquel	Oct. 23, 1978	5,428	Unknown	Known
Soquel Canyon*	Oct. 25, 1978	251	Unknown	Unknown
Los Sarranos [Serranos]	June 19, 1979	172	Unknown	Known
Paseo	Sep. 15, 1979	3,644	Smoldering Sleeper Fire	Known
Corona	1980	116	Unknown	Unknown
Green River	July 13, 1980	379	Unknown	Known
Owl	Oct. 28, 1980	18,332	Unknown	Known
Carbon Canyon	Nov. 16, 1980	14,613	Unknown	Known
Euclid	Oct. 30, 1981	714	Unknown	Known
Fresno Canyon*	Oct. 1982	211	Unknown	Unknown
Gypsum	Oct. 9, 1982	19,986	Power lines	Known

* indicates the fire name was assigned by Hills For Everyone.

Fire Perimeter Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Point of Origin
Santa Ana Canyon*	Fall 1983	443	Unknown	Unknown
Fresno*	July 12, 1983	642	Unknown	Unknown
91 Freeway*	July 13, 1983	1,618	Unknown	Unknown
Bane Canyon*	Sep. 14, 1983	581	Unknown	Unknown
Wardlow Wash*	July 8, 1984	114	Unknown	Unknown
Coal Canyon	July 9, 1984	450	Fireworks (Bottle Rocket)	Known
Coal Canyon	July 2, 1985	540	Plane Crash into Power lines	Known
Shell	Aug. 11, 1985	1,635	Unknown	Known
Green River	Oct. 6, 1985	Less than 1	Unattended Children	Known
Fresno Canyon*	Aug. 2, 1986	95	Unknown	Unknown
Bane Canyon*	June 24, 1988	820	Unknown	Unknown
South Ridge	May 24, 1989	5	Mower hit rock, ignited brush	Known
Aliso Canyon	June 29, 1989	44	Unknown	Unknown
Carbon Canyon	June 27, 1990	6,664	Arson	Known
Yorba	July 12, 1990	7,884	Model Rocket	Known
91 Freeway	July 5, 1991	50	Machinery	Known
San Juan Hill	June 10, 1992	249	Plane Crash	Known
Stagecoach	Oct. 26, 1993	581	Unknown	Unknown
91 Freeway*	1994	41	Unknown	Unknown
Carbon Canyon [Wagon]	June 25, 1994	757	Unknown	Known
91 Freeway*	Aug. 5, 1994	28	Unknown	Known
Highway 91	Aug. 26, 1995	177	Unknown	Unknown
Carbon Canyon	Aug. 31, 1998	733	Lightning	Known
Green	Feb. 9, 2002	2,234	Downed Power lines	Known
Evening	Apr. 21, 2002	893	Fireworks	Known
Blue Gum	Nov. 20, 2002	497	Arson	Known
Coal Canyon	July 12, 2003	2	Arson	Known
Green River	July 24, 2004	16	Car Crash	Known
Carbon Canyon	Sep. 25, 2004	18	Car Fire	Known

* indicates the fire name was assigned by Hills For Everyone.

Fire Perimeter Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Point of Origin
Yorba Linda	July 5, 2005	1,079	Fireworks	Known
Carbon Canyon	Aug. 4, 2005	1	Arson	Unknown
Sierra Peak	Feb. 6, 2006	10,506	Backfire	Known
Brush Canyon	July 11, 2006	1	Unknown	Unknown
Blue Gum	Aug. 2, 2006	3	Illegal Campfire	Unknown
241 Incident	Aug. 22, 2006	Less than 1	Unknown	Unknown
Windy Ridge [241 Incident]	Mar. 11, 2007	1,618	Burning Car (Arson)	Known
Rose	Apr. 12, 2007	8	Machinery	Known
Freeway Complex	Nov. 15, 2008	30,306	Auto Exhaust & Power lines	Known
241 Incident	Sep. 25, 2009	Less than 1	Unknown	Unknown
91 Freeway Incident	June 16, 2010	47	Unknown	Known
Carbon Canyon	July 11, 2011	518	Arson	Known
Rose Drive*	Nov. 2, 2011	5	Power lines	Known

* indicates the fire name was assigned by Hills For Everyone.

APPENDIX B

Fire Causes and Points of Origin Data

Fire Name	Fire Date	Acreage Burned	Cause	Perimeter
Sonome Canyon	Unknown	Unknown	Plane Crash	Unknown
Paseo Grande	Oct. 29, 1967	39,872	Unknown	Known
Firestone	Oct. 30, 1967	236	Unknown	Known
Serranos	Sep. 9, 1973	304	Unknown	Known
Soquel	Oct. 23, 1978	5,428	Unknown	Known
Los Sarranos [Serranos]	June 19, 1979	172	Unknown	Known
Paseo	Sep. 15, 1979	3,644	Smoldering Sleeper Fire	Known
Green River	July 13, 1980	379	Unknown	Known
Owl	Oct. 28, 1980	18,332	Unknown	Known
Carbon Canyon	Nov. 16, 1980	14,613	Unknown	Known
Euclid	Oct. 31, 1981	714	Unknown	Unknown
Gypsum Canyon	Oct. 9, 1982	19,986	Electric Lines	Known
Coal Canyon	July 9, 1984	450	Fireworks (Bottle Rocket)	Known
Coal Canyon	July 2, 1985	540	Plane Crash into Power lines	Known
Shell	Aug. 11, 1985	1,635	Unknown	Known
Green River	Oct. 6, 1985	Unknown	Unattended Children	Known
Coal Canyon	Apr. 21, 1987	25	Vehicle Fire	Unknown
Gypsum Canyon	May 12, 1987	20	Incendiary Device	Unknown
Coal Canyon	July 7, 1987	5	Unknown	Unknown
Coal Canyon	July 28, 1987	10	Unknown	Unknown
Rim Crest	Mar. 13, 1988	10	Kids with Matches	Unknown
Coal Canyon	May 13, 1988	3	Unknown	Unknown
La Vida	Dec. 4, 1988	Unknown	Unknown	Unknown
South Ridge	May 24, 1989	5	Mower hit rock, ignites brush	Known
Carbon Canyon	July 5, 1989	Unknown	Unknown	Unknown
Featherly Regional Park	July 14, 1989	Unknown	Unknown	Unknown

Fire Causes and Points of Origin Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Perimeter
Chino Hills State Park	Oct. 10, 1989	400	Unknown	Unknown
Carbon Canyon	June 27, 1990	6,664	Arson	Known
Yorba	July 12, 1990	7,884	Model Rocket	Known
Carbon Canyon	July 22, 1990	1	Unknown	Unknown
Carbon Canyon	July 27, 1990	2	Downed Power line	Unknown
91 Freeway	July 5, 1991	245	Machinery	Known
Coal Canyon	May 10, 1992	3	Unknown	Unknown
San Juan Hill	June 10, 1992	249	Plane Crash	Known
Chino Hills State Park	Sep. 8, 1992	500	Power lines	Unknown
Carbon Canyon	Nov. 15, 1993	40	Plane Crash	Unknown
Carbon Canyon [Wagon]	June 25, 1994	757	Unknown	Known
91 Freeway	Aug. 5, 1994	28	Unknown	Known
71 Freeway	Dec. 19, 1994	4	Unknown	Unknown
Carbon Canyon	June 24, 1998	20	Road Flare (Arson)	Unknown
Carbon Canyon	Aug. 31, 1998	733	Lightning	Known
Chino Hills State Park	Jan. 19, 1999	Unknown	Plane Crash	Unknown
Woodview	Sep. 12, 2000	200	Unknown	Unknown
Chino Hills Parkway	Sep. 18, 2000	2	Unknown	Unknown
Green	Feb. 9, 2002	2,234	Downed Power lines	Known
Evening	Apr. 21, 2002	893	Fireworks	Known
71 Freeway	Aug. 3, 2002	10	Car Exhaust Pipe	Unknown
Blue Gum	Nov. 20, 2002	497	Arson	Known
Coal Canyon	July 12, 2003	2	Arson	Known
71 Freeway	Aug. 19, 2003	3	Unknown	Unknown
Coal Canyon	May 30, 2004	2	Unknown	Unknown
Green River	July 24, 2004	16	Car Crash	Known
Carbon Canyon	Sep. 25, 2004	18	Car Fire	Known

Fire Causes and Points of Origin Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Perimeter
Yorba Linda	July 5, 2005	1,079	Illegal Fireworks	Known
Sierra Peak	Feb. 6, 2006	10,506	Back Fire	Known
Brush Canyon	July 23, 2006	1	Lightning	Unknown
Feldspar	Sep. 26, 2006	Unknown	Car Crash	Unknown
Red Star	Jan. 7, 2007	175	Unknown	Unknown
Windy Ridge [241 Incident]	Mar. 11, 2007	1,618	Burning Car (Arson)	Known
Rose	Apr. 12, 2007	3	Machinery	Known
Coal Canyon	May 7, 2007	140	Caltrans Machinery	Unknown
Western Hills	May 16, 2008	15	Downed Power lines	Unknown
Freeway Complex	Nov. 15, 2008	30,306	Auto Exhaust Power lines	Known
Windy Ridge	Nov. 25, 2009	80	Unknown	Unknown
Coal Canyon	Mar. 16, 2010	Unknown	Car Accident	Unknown
91 Freeway Incident	June 16, 2010	47	Unknown	Known
Quarter Horse	Sep. 4, 2010	10	Fireworks	Unknown
Carbon Canyon	July 11, 2011	518	Arson	Known
Rose Drive	Nov. 2, 2011	5	Power lines	Known

APPENDIX C

All Fires Combined (Perimeters and Points of Origin) Data

Fire Name	Fire Date	Acreage Burned	Cause	Data Type
Fuel Break (Historical)	—	132	—	Perimeter
Sonome Canyon	Unknown	Unknown	Plane Crash	Point of Origin
Irvine Ranch	1914	14,830	Unknown	Perimeter
Fresno Canyon*	1928	1,007	Unknown	Perimeter
Gypsum*	1929	1,085	Unknown	Perimeter
Carbon Canyon*	1930	733	Unknown	Perimeter
Santa Ana Canyon	Nov. 8, 1943	9,375	Unknown	Perimeter
Gaines	Sep. 22, 1944	270	Unknown	Perimeter
Shell	July 2, 1947	118	Unknown	Perimeter
Green River	Nov. 4, 1948	41,285	Unknown	Both
Nohl	June 21, 1951	176	Unknown	Perimeter
Santiago	Oct. 15, 1958	110	Unknown	Perimeter
La Vida	Nov. 29, 1959	611	Unknown	Perimeter
91 Freeway*	1962	139	Unknown	Perimeter
Paseo Grande	Oct. 29, 1967	39,872	Unknown	Both
Firestone	Oct. 30, 1967	236	Unknown	Both
Tonner Canyon	June 13, 1971	9	Unknown	Perimeter
Serranos	Sep. 9, 1973	304	Unknown	Both
Mine	July 28, 1977	4,956	Unknown	Perimeter
Soquel	Oct. 23, 1978	5,428	Unknown	Both
Soquel Canyon*	Oct. 25, 1978	251	Unknown	Perimeter
Los Serranos [Serranos]	June 19, 1979	172	Unknown	Both
Paseo	Sept. 15, 1979	3,644	Smoldering Sleeper Fire	Both

* indicates the fire name was assigned by Hills For Everyone.

All Fires Combined (Perimeters and Points of Origin) Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Data Type
Corona	1980	116	Unknown	Perimeter
Green River	July 13, 1980	379	Unknown	Both
Owl	Oct. 28, 1980	18,332	Unknown	Both
Carbon Canyon	Nov. 16, 1980	14,613	Unknown	Both
Euclid	Oct. 30, 1981	714	Unknown	Both
Fresno Canyon*	Oct. 1982	211	Unknown	Perimeter
Gypsum	Oct. 9, 1982	19,986	Power lines	Both
Santa Ana Canyon*	Fall 1983	443	Unknown	Perimeter
Fresno*	July 12, 1983	642	Unknown	Perimeter
91 Freeway*	July 13, 1983	1,618	Unknown	Perimeter
Bane Canyon*	Sep. 14, 1983	581	Unknown	Perimeter
Wardlow Wash*	July 8, 1984	114	Unknown	Perimeter
Coal Canyon	July 9, 1984	450	Fireworks (Bottle Rocket)	Both
Coal Canyon	July 2, 1985	540	Plane Crash into Power lines	Both
Shell	Aug. 11, 1985	1,635	Unknown	Both
Green River	Oct. 6, 1985	Less than 1	Unattended Children	Both
Fresno Canyon*	Aug. 2, 1986	95	Unknown	Perimeter
Coal Canyon	Apr. 21, 1987	25	Vehicle Fire	Point of Origin
Gypsum Canyon	May 12, 1987	20	Incendiary Device	Point of Origin
Coal Canyon	July 7, 1987	5	Unknown	Point of Origin
Coal Canyon	July 28, 1987	10	Unknown	Point of Origin
Rim Crest	Mar. 13, 1988	10	Kids with Matches	Point of Origin
Coal Canyon	May 13, 1988	3	Unknown	Point of Origin
Bane Canyon*	June 24, 1988	820	Unknown	Perimeter
La Vida	Dec. 4, 1988	Unknown	Unknown	Point of Origin
South Ridge	May 24, 1989	5	Mower hit rock, ignited brush	Both
Aliso Canyon	June 29, 1989	44	Unknown	Perimeter
Carbon Canyon	July 5, 1989	Unknown	Unknown	Point of Origin
Featherly Regional Park	July 14, 1989	Unknown	Unknown	Point of Origin

* indicates the fire name was assigned by Hills For Everyone.

All Fires Combined (Perimeters and Points of Origin) Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Data Type
Chino Hills State Park	Oct. 10, 1989	400	Unknown	Point of Origin
Carbon Canyon	June 27, 1990	6,664	Arson	Both
Yorba	July 12, 1990	7,884	Model Rocket	Both
Carbon Canyon	July 22, 1990	1	Unknown	Point of Origin
Carbon Canyon	July 27, 1990	2	Downed Power lines	Point of Origin
91 Freeway	July 5, 1991	50	Machinery	Both
Coal Canyon	May 10, 1992	3	Unknown	Point of Origin
San Juan Hill	June 10, 1992	249	Plane Crash	Both
Chino Hills State Park	Sep. 8, 1992	500	Power lines	Point of Origin
Stagecoach	Oct. 26, 1993	581	Unknown	Perimeter
Carbon Canyon	Nov. 15, 1993	40	Plane Crash	Point of Origin
91 Freeway*	1994	41	Unknown	Perimeter
Carbon Canyon [Wagon]	June 25, 1994	757	Unknown	Both
91 Freeway*	Aug. 5, 1994	28	Unknown	Both
71 Freeway	Dec. 19, 1994	4	Unknown	Point of Origin
Highway 91	Aug. 26, 1995	177	Unknown	Perimeter
Carbon Canyon	June 24, 1998	20	Road Flare (Arson)	Point of Origin
Carbon Canyon	Aug. 31, 1998	733	Lightning	Both
Chino Hills State Park	Jan. 19, 1999	Unknown	Plane Crash	Point of Origin
Woodview	Sep. 12, 2000	200	Unknown	Point of Origin
Chino Hills Parkway	Sep. 18, 2000	2	Unknown	Point of Origin
Green	Feb. 9, 2002	2,234	Downed Power lines	Both
Evening	Apr. 21, 2002	893	Fireworks	Both
71 Freeway	Aug. 3, 2002	10	Car Exhaust Pipe	Point of Origin
Blue Gum	Nov. 20, 2002	497	Arson	Both
Coal Canyon	July 12, 2003	2	Arson	Both
71 Freeway	Aug. 19, 2003	3	Unknown	Point of Origin

* indicates the fire name was assigned by Hills For Everyone.

All Fires Combined (Perimeters and Points of Origin) Data Continued...

Fire Name	Fire Date	Acreage Burned	Cause	Data Type
Coal Canyon	May 30, 2004	2	Unknown	Point of Origin
Green River	July 24, 2004	16	Car Crash	Both
Carbon Canyon	Sep. 25, 2004	18	Car Fire	Both
Yorba Linda	July 5, 2005	1,079	Fireworks	Both
Carbon Canyon	Aug. 4, 2005	1	Arson	Perimeter
Sierra Peak	Feb. 6, 2006	10,506	Backfire	Both
Brush Canyon	July 11, 2006	1	Unknown	Perimeter
Brush Canyon	July 23, 2006	1	Lightning	Point of Origin
Blue Gum	Aug. 2, 2006	3	Illegal Campfire	Perimeter
241 Incident	Aug. 22, 2006	Less than 1	Unknown	Perimeter
Feldspar	Sep. 26, 2006	Unknown	Car Crash	Point of Origin
Red Star	Jan. 7, 2007	175	Unknown	Point of Origin
Windy Ridge [241 Incident]	Mar. 11, 2007	1,618	Burning Car (Arson)	Both
Rose	Apr. 12, 2007	8	Machinery	Both
Coal Canyon	May 7, 2007	140	Caltrans Machinery	Point of Origin
Western Hills	May 16, 2008	15	Downed Power lines	Point of Origin
Freeway Complex	Nov. 15, 2008	30,306	Auto Exhaust & Power lines	Both
241 Incident	Sep. 25, 2009	Less than 1	Unknown	Perimeter
Windy Ridge	Nov. 25, 2009	80	Unknown	Point of Origin
Coal Canyon	Mar. 16, 2010	Unknown	Car Accident	Point of Origin
91 Freeway Incident	June 16, 2010	47	Unknown	Both
Quarter Horse	Sep. 4, 2010	10	Fireworks	Point of Origin
Carbon Canyon	July 11, 2011	518	Arson	Both
Rose Drive*	Nov. 2, 2011	5	Power lines	Both

* indicates the fire name was assigned by Hills For Everyone.

HILLS FOR EVERYONE

P.O. Box 9835 • Brea, CA 92822 • *www.HillsForEveryone.org*

Letter: Rikel

From: Chris R [mailto:cdrikel7@gmail.com]
Sent: Wednesday, January 22, 2014 5:13 PM
To: Tippets, Ron
Subject: Cielo Vista Project

Mr Tippets,

I am a Yorba Linda resident and writing you with great concerns about the Cielo Vista project that is being proposed in the hills near Yorba Linda. I have lived in Yorba Linda for over 20 years and was in the city during the 2008 Freeway Complex Fire, witnessing the destruction it brought to Yorba Linda and all the surrounding territories. Specifically the North East area of Yorba Linda and the neighboring hills. This is the general area that is being proposed for this development.

I am urging the County of Orange to deny the project from progressing any further until the County can assure all Yorba Linda Resident's safety will not be adversely impacted by the project.

Chris Rikel

Letter: Ruge

From: Debra Ruge [mailto:druge@ph.lacounty.gov]
Sent: Monday, January 06, 2014 10:27 AM
To: Tippets, Ron
Subject: Cielo Vista Enviornmental Impact

Hello Mr. Tippets,

I am contacting you to express my concern about the proposed Cielo Vista housing development. I live on Dunrobin Way in Yorba Linda which can only be reached via Stonehaven or Via Del Agua roads. I was at this address during the 2008 Freeway Fire and experienced firsthand the challenge of evacuating at the same time that fire vehicles were attempting to go to the homes. I concur with the recent environmental –impact report that states that the intersection at Via Del Agua and Yorba Linda Blvd. would be adversely affected by increased traffic from the proposed houses. I am concerned that not only will this intersection be affected, but the intersection of Stonehaven and Yorba Linda Blvd. as well. In addition, traffic on Yorba Linda Blvd. would be at a standstill with the additional residents based on the experience during the Freeway Fire as residents must use Yorba Linda Blvd. to evacuate the area. I ask that you take these safety concerns very seriously.

Thank you for your consideration,

Debra Ruge

Director, Medical Therapy Program

California Children's Services, Children's Medical Services

Los Angeles County Department of Public Health

9320 Telstar Avenue, Suite 226

El Monte, CA 91731

druge@ph.lacounty.gov

Letter: Schlotterbeck

Melanie Schlotterbeck
19042 Alamo Ln
Yorba Linda, CA 92886
714-779-7561

January 22, 2014

Via E-Mail

Orange County Planning
Attn: Ron Tippets
300 N. Flower Street
Santa Ana, CA 92702-4048

Re: Cielo Vista Project Draft Environmental Impact Report

Dear Mr. Tippets:

As a resident of Yorba Linda I would like to submit the following comments and attachments on the Cielo Vista Draft Environmental Impact Report (DEIR). The project's DEIR must recirculated to provide more complete investigation as it relates to geology.

Understanding the existing geologic conditions for the Cielo Vista site is critically important to knowing the safety of the site as it relates to this proposed development. There is a unique confluence of geologic circumstances: liquefaction, seismic risk (earthquakes), landslides, and expansive soils on this site. These conditions need further review and investigation. The project proponent must conduct extensive trenching and boring on the site to understand the existing conditions. This investigation has not been done. Therefore, the DEIR must be recirculated.

Additionally, this analysis in and of itself requires its own environmental impact review under the California Environmental Quality Act due to the impacts.

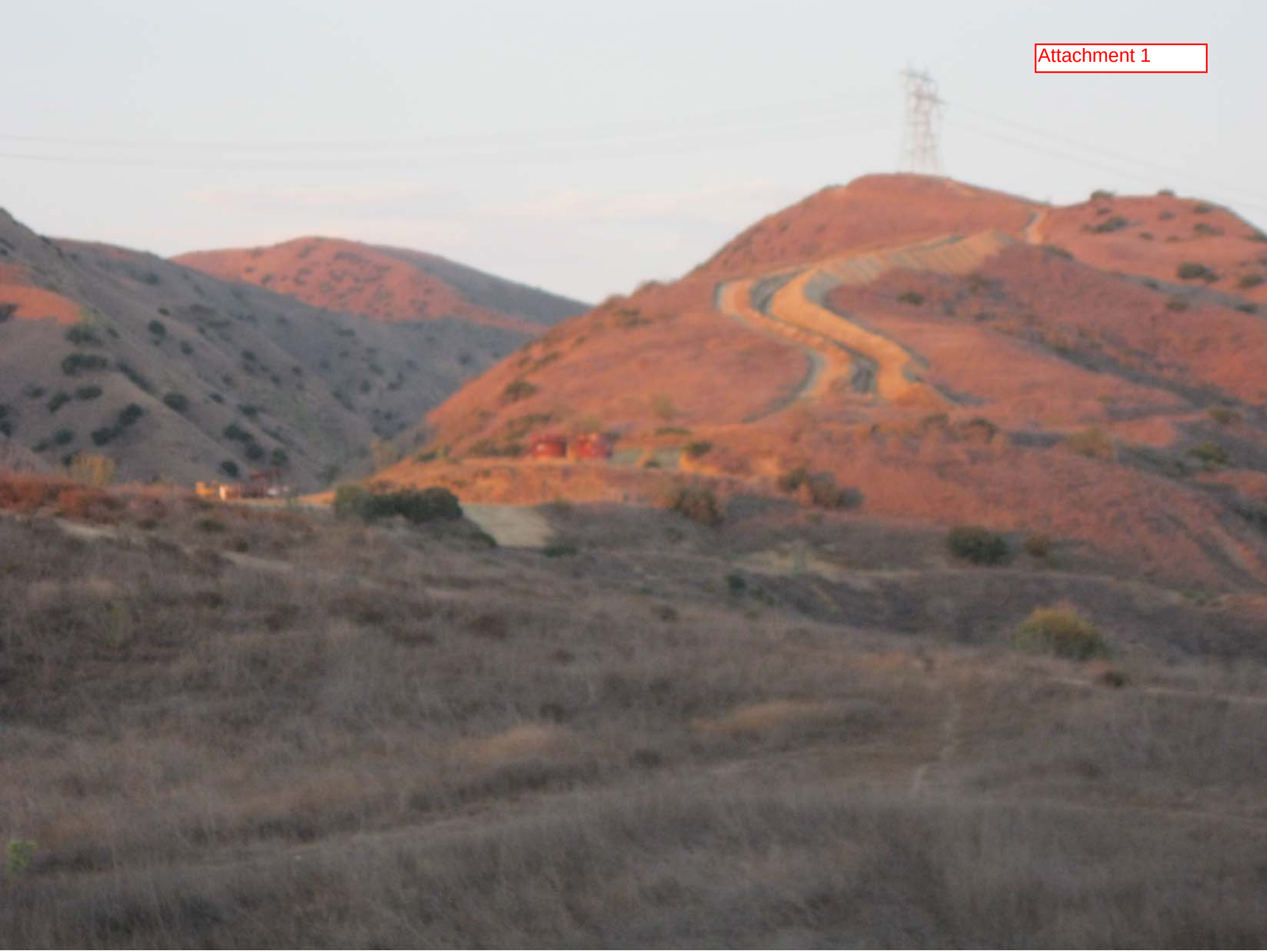
I submit into the record photos from the neighboring Esperanza Hills property, where similar investigations were already completed for that property's DEIR. (**See Attachments 1, 2, and 3**)

Sincerely,

Melanie Schlotterbeck

CC: Todd Spitzer

Attachments: 1, 2 and 3 – Photos of Esperanza Hills


Attachment 1

Attachment 2

Letter: Schock

From: Mark Schock [mailto:mschock74@earthlink.net]
Sent: Tuesday, January 21, 2014 4:52 PM
To: Tippets, Ron; Canning, Kevin
Cc: Lindsey, Tom; Gene Hernandez; anderhd@roadrunner.com; Mark Schwing; maalders@yorba-linda.org; Steve Harris; David Brantley; cyoung@yorba-linda.org
Subject: Public Comments - Esperanza Hills DEIR

Mr. Ron Tippets (Cielo Vista)

Orange County Planning Services

300 N. Flower St.

P.O. Box 4048

Santa Ana, CA 92702-4048

Mr. Kevin Canning (Esperanza Hills)

Orange County Planning Services

300 N. Flower St.

P.O. Box 4048

Santa Ana, CA 92702-4048

January 21, 2014

Public Response to **Esperanza Hills DEIR** and **Request for Time Extension and** a Request that this Public Comment also be attached to the **Cielo Vista DEIR**

Mr. Tippets & Mr. Canning

Immediately after the Freeway Complex Fire, I made a Public Records Request for copies of any security camera footage **captured during the fire** from the Metropolitan Water District's Santiago Tower. **The MWD Santiago Tower security camera directly overlooks the canyon where the Cielo Vista and Esperanza Hills developments are proposed to be built**. During the fire, the security camera was remotely operated by personnel from the MWD Deimer Plant, and was panned from the top (at Hidden Hills) of the Canyon, to the bottom, where the new developments are proposed to be built. This video footage shows in real time, the devastating speed and intensity of the fire where it raced down the canyon where the proposed **Esperanza Hills and Cielo Vista Projects**, will be built if approved. The viewing of the MWD Santiago Tower Freeway Complex Fire Videos, will most assuredly give anyone

responsible for reviewing or approving Esperanza Hills or Cielo Vista Project plans, a much greater insight into whether or not the proposed development plans are adequate as currently presented. The video appears to show that the **ENTIRE CANYON burned in approximately 37 MINUTES**. The video is fully date and time stamped.

Please see the attached e-mail that I had sent to the County for the NOP Public Comment Process for Esperanza Hills describing the MWD Video and my comments that it should be reviewed by all parties involved in the preparation and review of the Esperanza Hills DEIR process, as well as the DEIR process for Cielo Vista. Also see the attached e-mail from Kevin Canning acknowledging receipt of my public comments.

I attended the **Esperanza Hills Open House Meeting on January 16, 2014**. I asked to see the hard copy of the DEIR so that I could ensure that my public comments were included in the formal package. Much to my surprise, my letter was nowhere to be found in the document. I asked the developer's staff person to confirm that my letter had somehow not been included in the document. She confirmed that my letter had not been included in the document, and said that it must have been a printing error. I checked the County's website to see if my letter had been included in the electronic version of the document. My letter had also not been included in the electronic version posted on the County's website.

At the end of the meeting, I approached **Mr. Michael Huff, of Dudek** who was the **Fire Protection & Urban Forestry Practice Manager** hired by the developer to ask if he had reviewed my public comments or the MWD Video as part of his preparation of the **Fire preparedness and Fire Evacuation** portion of the DEIR. **Mr. Huff indicated that he had not seen my public comments nor the MWD Video and was unaware of their existence**. Mr. Huff said that **he would very much like to get a copy of the video so that he could compare it with his computer fire simulations upon which he had based his DEIR report**. After all, why depend solely on computer fire simulations when an actual dated and time stamped video of the Freeway Complex Fire in the canyon where the Esperanza Hills development is proposed to be built exists. Mr. Huff could not explain why the developer had not provided him with my public comments.

Please see the above e-mail from Kathy Crum of the Developer's staff. In her e-mail, she stated that my public comments were "somehow" not included in Appendix B of the DEIR. **She went on to say that my comments were considered in the preparation of the DEIR**. This seems very hard to believe. **I find it very unfortunate and of great concern** that Mr. Huff of Dudek had no knowledge of my public comments or the video, that the developer evidently did not provide Mr. Huff with that information, and finally, that my public comments were not published in the DEIR document in a timely manner for review by the public, OCFA and the Sheriff's Department prior to the preparation of those agencies' formal responses to the DEIR.

Because Mr. Huff of Dudek indicated that he would very much like to obtain a copy of the MWD Video so that he could compare it with his computer fire simulations upon which he had based his Fire Preparedness and Fire Evacuation portion of the Esperanza Hills DEIR, I request the following:

- That the Esperanza Hills Developer be required to formally document that the current Esperanza Hills DEIR as presented to the public did not consider the MWD Santiago Tower Security Video Footage during its preparation of the Fire Preparedness and Fire Evacuation portions of the document.

- That the developer formally document that my original NOP Public Comment e-mail had been omitted from the DEIR **until yesterday** which precluded all reviewing agencies and members of the public from having access to its contents and knowledge of the existence of the MWD Video Footage. This information, along my original NOP Public Comment e-mail should be immediately sent to all entities and individuals who had previously been sent HARD and ELECTRONIC copies of the DEIR.

- That the Esperanza Hills DEIR process be extended for an ADDITIONAL 30 DAYS to allow Mr. Huff of Dudek and the developer to obtain and review the MWD Video to see if it would have any impact on the final preparation of the Fire Preparedness and Fire Evacuation portion of the DEIR.

- That the Esperanza Hills DEIR process be extended for an ADDITIONAL 45 DAYS after that to allow a reasonable period of time for responding agencies and members of the public to review and comment on the new revised information.

- That the **MWD Video be added to the electronic copies and County website postings of the Esperanza Hills DEIR and the Cielo Vista DEIR** to facilitate public access to the video footage as well as additional public comment on the issue.

Before any County of Orange employees or appointed or elected officials, begin their review, or approval, of any and all documents related to the proposed Esperanza Hills and Cielo Vista projects, I strongly recommend that all parties be required to view the Metropolitan Water District Santiago Tower Security Camera Video taken during the November 15, 2008 Freeway Complex Fire.

Based on my telephone conversation with Mr. Tippets this afternoon, I will provide each of your respective offices with both **full and edited copies of the MWD Video Footage** and hard copies of this correspondence tomorrow. The edited copy of the MWD Video Footage is approximately 142MB in file size and approximately 33 minutes in length. The edited version starts as the fire appears at the top of the canyon at Hidden Hills, and essentially has been edited to eliminate those portions of the video where the security camera's view was obscured by smoke.

Please attach this Public Comment Letter to <u>BOTH</u> the <u>Esperanza Hills and Cielo Vista DEIR's</u> as the importance of the MWD Video directly applies to both proposed developments.

Mark Schock

4955 Fairwood Circle

Yorba Linda, CA 92887

February 1, 2013

Mr. Kevin Canning

Contract Planner

OC Planning

300 N. Flower Street, 1st Floor

Santa Ana, CA 92702-4048

Subject: Public Comments Regarding Esperanza Hills Project

Mr. Canning

As a resident of Yorba Linda who experienced the Freeway Complex Fire, who currently lives UPWIND and to the EAST of the proposed Esperanza Hills Project, I would like to take this opportunity to make several public comments.

1. Before any County of Orange employees or appointed or elected officials, begin their review, or approval, of any and all documents related to the proposed Esperanza Hills Project, I strongly recommend that all parties be required to view the Metropolitan Water District Santiago Tower Security Camera Videos taken during the November 15, 2008 Freeway Complex Fire. These videos show in real time, the devastating speed and intensity of the fire where it raced down the canyon where the proposed Esperanza Hills Project, and the proposed emergency evacuation route, will be built if approved by the County. Any proposed fire related emergency evacuation route that would cause/direct evacuees to travel towards the flames during a Historic Fire Corridor event does not seem sound, and should be thoroughly reviewed. It is my understanding that the Metropolitan Water District has destroyed/purged the videos from its document archives in accordance with their ongoing document management policies and process. However, I do have copies of the videos that were obtained through a Public Records Request from the Metropolitan Water District and the Yorba Linda Water District. These video files are extremely large, and cannot be e-mailed due to their large size. Please contact me directly and advise the best method/format for me to provide copies of the video to the County of Orange to be used as part of the public comment and overall Esperanza Hills Project review process. The viewing of the MWD Santiago Tower Freeway Complex Fire Videos, will most assuredly give anyone responsible for reviewing or approving Esperanza Hills Project plans, a much greater insight into whether or not the proposed development plans are adequate as currently presented.

2. All fire emergency related issues, opinions, reviews, and approvals for the Esperanza Hills Project need to be PEER REVIEWED. Whichever fire agency that is charged with the responsibility for the PEER

REVIEW of the Esperanza Hills Project, should also be required to review the MWD Videos mentioned in Item #1 above as part of the peer review process.

3. Based on information provided at last night's meeting on the Esperanza Hills Project, it sounds like residents from the Cielo Vista Project might be expected to also utilize the proposed fire evacuation route as currently provided in the Esperanza Project. If this is so, both projects need to be <u>considered as one</u> when determining the adequacy and appropriateness of any proposed fire related evacuation route.

Thank you very much for your review and consideration of these public comments related to the Esperanza Hills Project.

Mark Schock

4955 Fairwood Circle

Yorba Linda, CA 92887

From: Kevin Canning <entitleplus@gmail.com>
Sent: Friday, February 01, 2013 5:06 PM
To: Mark Schock
Subject: Re: Esperanza Hills Project - Public Comments

Mark,
Your comments are noted and received. Thank you.

Kevin Canning
(949) 235-3846
Sent from my iPhone

On Feb 1, 2013, at 4:54 PM, Mark Schock <mschock74@earthlink.net> wrote:

> February 1, 2013
>
> Mr. Kevin Canning
> Contract Planner
> OC Planning
> 300 N. Flower Street, 1st Floor
> Santa Ana, CA 92702-4048
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> Mark Schock
> 4955 Fairwood Circle
> Yorba Linda, CA 92887
>

From: Kathy Crum <kcrum@caaplanning.com>
Sent: Friday, January 17, 2014 12:50 PM
To: mschock74@earthlink.net
Cc: Canning, Kevin
Subject: Esperanza Hills Comments
Attachments: Mark Schock Email.pdf

Mr. Schock,

Thank you for attending the meeting last night on the Esperanza Hills project. I apologize that your comment email dated February 1, 2013, was somehow not included in Appendix B of the DEIR. It was obviously a printing error because we did receive your email and your comments were considered in the preparation of the EIR. Attached is a copy of your email to assure you that we have included it as part of the IS/NOP comment letters.

I have copied Kevin Canning so he is aware of our conversation. Please send any additional comments to Kevin prior to the DEIR public review February 3 deadline.

Kathleen M. Crum
CAA Planning, Inc.
(949) 581-2888
(949) 588-3599 (fax)

From: Kevin Canning <entitleplus@gmail.com>
Sent: Friday, February 01, 2013 5:06 PM
To: Mark Schock
Subject: Re: Esperanza Hills Project - Public Comments

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Kevin Canning
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> Mark Schock
> 4955 Fairwood Circle
> Yorba Linda, CA 92887
>

Letter: Schumann1

To: Ron Tippets, Planner, Current & Environmental Planning Section, OC Planning Services
From: Edward Schumann
Re: Cielo Vista Project, Draft EIR #615
Date: Jan. 16, 2014

The purpose of this letter is to comment on the Cielo Vista Project, Draft EIR #615. As a concerned Yorba Linda resident I am opposed to the Project and believe the Draft EIR does not adequately address important issues and reaches incorrect and erroneous conclusions. My specific comments follow:

Aesthetics

One of CEQA's stated purposes is "to provide the people of this state with . . . enjoyment of aesthetic, natural, scenic, and historic environmental qualities" (§ 21001, subd. (b)), and aesthetic issues are among those that are "properly studied in an EIR" (*Mira Mar Mobile Community v. City of Oceanside* (2004) 119 Cal.App.4th 477, 492; *National Parks & Conservation Assn. v. County of Riverside* (1991) 71 Cal.App.4th 1341, 1360). As relevant here, the Guidelines give content to the concept of aesthetics by including the following questions in the checklist of a project's potential environmental effects: "Would the project have a substantial adverse effect on a scenic vista?" and "Would the project substantially degrade the existing visual character or quality of the site and its surroundings?" (Guidelines, Appendix G, questions I(a) and I(c).)

The Project and it's neighboring Esperanza Hills Project effectively destroy the last open scenic space between Yorba Linda and Chino Hills State Park. (The DEIR gives short shrift to the cumulative impact of the adjoining projects.) In its less than 50 acres, the Project will grade some 660,000 cubic yards of hillside. Figures 4.1-2 - 4.1-7 to the DEIR show existing views but the proposed views fail to take into account the cumulative visual impact with the Esperanza Hills Project.

Likewise, the DEIR erroneously concludes the Project will affect the view of only a few existing homes and will not substantially degrade the existing visual character of the area. As shown in the attached photographs, the area currently consists of rolling hills and scenic vistas. The area is visible from most of the homes in the Casino Ridge area, as well as from the homes to the south and west of the Project area. There is no mitigation for the destruction of the visual character of the area. The DEIR must address and analyze the degradation of the scenic landscape and aesthetic quality of the area.

Yorba Linda's Land Use Element (LUE) requires hillside area density to account for slope severity and stability, topographic conditions and natural resources protection, and to preserve open space areas and natural drainage areas. Per the County's LUE, development in hillside areas is bound by the same constraints both to preserve the natural terrain and contours, as feasible, which is also addressed in the County's Resource Element.

The Yorba Linda Municipal Code (18.30.040 - Standards and guidelines) provides these Site Design Principles:

1.Most of the hillside sites are highly visible from distant locations. Therefore, views of the site from the neighborhood and other off-site locations should be given careful consideration.

2.Massive grading and single retaining walls in excess of six (6) feet in height should be avoided in order to preserve a more natural slope appearance.

3.The buildings located near hillside rims have higher visibility. The buildings should be partially screened with landscaping to minimize the "wall" effect.

4.Significant trees and other vegetation, which contribute to the aesthetics of the site and surrounding area, should be preserved.

5.Natural hillsides and ridgelines should be preserved to the extent feasible. The usual impacts of grading should be softened through designs which incorporate slope undulation, blending and other features to reflect the natural terrain.

Additionally, any residential tract or individual residential unit development within hillside areas, **shall conform** to the following standards:

1.Ridgelines shall be preserved in their natural state to the degree possible.

2.Streets, both public and private, shall be developed below the crest of a natural ridgeline.

3.Building pads shall not be located so as to be on the crest of a natural ridgeline.

4.Any construction shall be done in a manner so as a dwelling, roofline or any component part of the construction shall be superimposed against another land mass and shall not be visible against a horizon or the sky when viewed from the canyon floor.

5.Tract and parcel maps for the purposes of residential construction shall include a variety of house styles, heights, roof elements and other design features.

6.Natural earth tones and materials shall be used; use of bright colors, including stark white, shall be discouraged.

7.Terraces, terrace drains, down-drains and other similar structures, shall incorporate the use of natural rock or other man-made design feature that has the appearance of a natural material.

8.Any manufactured slope shall be contoured in a manner to appear to have a natural grade.

Finally, the Code provides that, for any proposed residential development that is determined to be viewed from any point within Chino Hills State Park, the grading and landscaping plans shall include, for each lot so determined to be viewed, specific measures, including height limits, setbacks, landscaping, berms and/or other measures which will assure that any structure built on the lot will not be viewed from Chino Hills State Park.

The Draft EIR fails to recognize or address these multiple requirements. The Project proposes to destroy natural hillsides and ridges via massive grading. The building pads for Planning Area 1 flatten a natural ridgeline and replace it with densely packed homes.

Planning Area 2 abuts homes just east of San Antonio Road. Each of those homes are on lots of over an acre. In contrast, the 17 residences in Planning Area 2 all fall within only 6.4 acres. The DEIR gives no consideration to this failure to maintain the rural quality of the surrounding area.

OrangeCounty.net City Guide describes Yorba Linda as follows:
"In 2005 CNN ranked Yorba Linda 21st among the best places in the U.S. to live in their 'Great American Towns' quest. With a population over 68,000, Yorba Linda is best known as a residential community of single-family homes situation on sizable lots.
Yorba Linda' commitment to equestrian activities has helped set it apart from other communities with it's [sic] three state-of-the-art equestrian arenas. It also boasts 100 miles of equestrian, biking and walking trails."

The OC Register likewise describes Yorba Linda as "primarily a residential community of single-family homes built on large lots." "Yorba Linda is well known for its equestrian community. Many of the large

lots have their own stables and riders can often be seen along the streets moving between the city's 100 miles of trails."

The Project aesthetically fails to conform to these existing conditions and the DEIR fails to address the divergence with the character of the local community.

Air Quality

The DEIR does not adequately address the generation of dust and other particulates as soil is disturbed (including soil contaminated with hazardous substances from oilfield operations and methane deposits) during construction. Such particulates could cause or exacerbate asthma and reactive airway syndrome for downwind residents.

One significant health risk not addressed in the DEIR is soil disturbance during site preparation resulting in the airborne dispersal of coccidioidomycosis (aka “Valley Fever”) spores. These spores frequently contaminate soils in arid areas of California. The resulting disease, which produces flu-like symptoms lasting one to several weeks in most cases, is endemic to inland valleys in California. Since the symptoms are usually transient and resemble many other common illnesses, many cases are not recognized or diagnosed. Disseminated disease, which develops in about 1/1000 recognized cases, can spread to many organ systems, manifesting in a variety of ways including lung disease and meningitis. Dissemination is more likely among Blacks, Asians and individuals who are immuno-suppressed. Although coccidioidomycosis is endemic to Los Angeles County and the incidence has increased sharply in the past five years, it is unknown whether the spores are found in soils in the Project area. This should be analyzed and determined in the DEIR with appropriate mitigation measures required.

The California Dept. of Public Health (CDPH) received reports of 18,776 statewide cases of coccidioidomycosis with estimated symptom onset dates from 2001 through 2008. Annual rates of coccidioidomycosis increased by 91.3 percent from 2001 (4.25 per 100,000) to 2006 (8.13 per 100,000) and decreased by 25.3 percent from 2006 to 2008 (6.07 per 100,000). During the surveillance period, 265 (1.4 percent) cases were reported to have died with coccidioidomycosis. (Epidemiologic Summaries of Selected General Communicable Diseases in California, 2001-2008.)

The DEIR also does not address dispersal into the atmosphere of toxic or carcinogenic components of petroleum from currently operating wells and facilities.

The DEIR further fails to consider release of methane creating potential for explosions. Drilling and other oilfield related operations in the past may facilitate increased migration and leakage of methane through ground fissures and faults and through old shafts and wellheads where it can then build up to explosive concentrations in buildings. Methane gas is a colorless, odorless, tasteless gas that is less dense than air. It is formed as the by-product of organic decomposition and is of concern because of its flammability and explosive potential, particularly in the manmade enclosed spaces. In California, the sensitivity to methane gas increased dramatically with an explosion and fire in the Fairfax district in 1985. This occurred when methane gas built up in the basement of a department store and exploded. The methane was traced to oil contamination in an abandoned portion of an old oil field–the Salt Lake Field.

The danger can be greatly reduced or prevented by venting the methane and installing alarms. Such mitigation is not discussed in the DEIR. The Orange County Fire Authority Fire Prevention Division Informational Bulletin 05-03 (Combustible Soil Gas Hazard Mitigation for Existing Homes Undergoing Expansion in Yorba Linda) noted that the City of Yorba Linda has adopted an amendment to the local fire code that enables the city to enforce measures requiring methane soil gas hazards to be investigated and mitigated. The DEIR fails to address the conditions and necessary mitigation measures. (See, http://www.ocfa.org/_uploads/pdf/ib-05-03.pdf)

A Union of Concerned Scientists 2006 study analyzed air pollution caused by construction equipment and quantified its effect on California's public health and economy. The report noted that construction equipment is operating in cities and towns throughout California, releasing harmful NOx and PM emissions into the air and raising the risk of exposure to these pollutants for residents who live and work near construction sites. The likelihood of people living or working close to construction sites is highest in densely populated urban areas, but the suburbs are not free of risk from construction equipment pollution. Many projects in these areas, including new commercial and residential developments, require extensive use of construction equipment for land clearing and grading operations.

The analysis found that the economic and health damage caused by construction equipment pollution in California is staggering. More than 1,000 premature deaths per year can be attributed to these emissions, along with more than 1,000 hospitalizations for cardiovascular and respiratory illness, and more than 30,000 asthma attacks and other respiratory symptoms. Hundreds of thousands of lost work days and school absences equate to more than $60 million in annual economic losses. In addition,

Californians collectively experience millions of days each year when air pollution restricts their activities. Overall, construction equipment pollution costs the state more than nine billion dollars every year. Construction equipment pollution is therefore a health concern for all Californians.

The DEIR does not address the public health issues from air pollution arising from construction equipment and operations. The DEIR must also include a cumulative impact analysis of such issues.

Geology & Soils

As the Yorba Linda City's Safety Element points out, slope stability is a serious geologic problem in the northern and eastern portions of the City. This area is underlain by siltstone and interbedded sandstone of the Puente Formation and are often the most prone to landsliding and other forms of slope failure. Slope stability needs to be fully addressed in the DEIR.

the identification, excavation and disposal of contaminated soils is not meaningfully addressed in the DEIR. The Project site has long been used for oil production and the DEIR acknowledges the abandonment of oil service material (including an unidentified 55 gallon drum of unknown contents and origin) but fails to evaluate the existing conditions and likely environmental impacts associated with the Project as required by CEQA. The DEIR fails to analyze and identify appropriate mitigation measures. The level of contamination is not properly evaluated and the various methods of soil reclamation and disposal of contaminated soil are not addressed.

Yorba Linda Municipal Code 15.36.700 requires leak testing of abandoned wells processed through the Orange County Fire Authority with the leak test report prepared by a state licensed geotechnical or civil engineer or state-registered environmental assessor, class II. The Code provides that a well shall be considered leaking if the leak test report indicates the meter read is greater than the lower explosive limit which is set at 500 parts per million. An approved leak test report is only valid for 12 months from City acceptance. The DEIR provides no leak test data and fails to report any historic or current conditions or to analyze future performance..

Greenhouse Gases

Even if methane (see above) is "safely" vented to the atmosphere, it is also a potent greenhouse gas. Direct health effects linked to such greenhouse effects are negligible in isolation, but cumulatively contribute to the global burden of greenhouse gases with far reaching effects on the physical environment and human health. This element is not addressed in the DEIR.

Hazards & Hazardous Materials

Yorba Linda is subject to wildfires due to the steep terrain, highly flammable vegetation of adjacent Chino Hills and the high winds (Santa Ana winds) that correspond with seasonal dry periods. Major fires have threatened the City in the past. High wildfire hazard areas include the northern and eastern portions of the City.

Since 1980, the Yorba Linda area has experienced 25 separate wildland fires, burning a total of 82,734 acres; single events range from one to nearly 20,000 acres. Until the recent Freeway Complex Fire, the most notable and devastating of these were the 1982 Gypsum Incident (19,986 acres), the 1980 Owl Incident (18,332 acres), the 1980 Carbon Canyon Incident (14,613 acres) and the 2006 Sierra Peak Incident (10,506 acres). The commonality of each of these larger fires is the Santa Ana Wind and the effect it has on vegetation and fire behavior. The Santa Ana Canyon funnels the wind, increasing its speed and magnifying the effects on the available fuel bed. The frequency of fire in this area has allowed non-native vegetation of volatile grasses and weeds to become the dominate fuel type.

On November 15, 2008, Yorba Linda experienced the Freeway Complex Fire. The Orange County Fire Authority's preliminary report (December 2, 2008) on the fire indicated that the fire consumed 30,305 acres; destroyed 187 residential structures (including multi-family residential buildings) and damaged 127 residential structures. Four commercial properties were destroyed or damaged, along with 43 outbuildings. My home was one of those destroyed.

As you will note from my experiences, we live in a rural community. Most resident have animals, many have horses, chickens, goats and other livestock. This results in much more confusion and logistic difficulties in evacuating for a fire. Local vets evacuated during the 2008 fire and left no emergency facilities available. That contributed to the death of our dog the night our house burned down.

This is my story:

It was a hot day for November 2008, not unlike the first weeks of 2014. The Santa Anas were blowing hard, hot and dry. A heavy chain rattled against my barn as I fed the horses that Saturday morning. My wife, Tam, left about 8:30 for a class in Lemon Heights.

As I started the weekend chores, I saw the smoke to the east and went to the back fence to have a look. We live on a hillside property - about 2 1/2 acres, all told. The house and landscaped yard sat on a pad at the top. Our 2 stall barn was on a small pad just lower than that. A steep hill then falls away to the 'lower 40' - a flat piece of land that runs to the edge of or property. We have a small riding arena and hay shed down there. A small creek runs just beyond our property line, paralleling it. Beyond that is the Cielo Vista property and other open land and the Chino Hills State Park.

The next door neighbor, Nick, was standing by his back fence too and we chatted a while as we watched the smoke. I remember one of us commenting that one of these days the land back there needed to burn. It was so dense you couldn't even bushwhack through it. We discussed that we were safe from any fire. Between the cleared arena area was our hillside. Our hillsides was bare with grought resistant ground cover near the top; Nick had his planted in freeway daisy or some type of drought resistant plant. Also the fire was both east and south. Since the wind was a hard easterly, the fire would run down along the 91, not north toward us.

Still, you don't take chances. Our other adjacent neighbor, Joyce, was loading her horses to ship them farther away from the danger area. I hooked our trailer to my pickup and took the 2 horses down to the arena and turned 'em out.

By 10 or so, the smoke became thicker; I went back to the house and called Tam to come home but the students don't take phones into her classes. She'd be gone til noon. I called some friends who live in Hidden Hills. John was at work but Lisa and the kids along with her neighbor and her kids were out and could not get home due to the evacuation and chaotic traffic. I told them to come over "where it's safe" until they could get back home. The agreed and headed over.

Meanwhile, I went back down and helped Joyce with her animals. In addition to several horses, she had some goats and pot-bellied pigs, dogs, a cat..... The horses had been moved out and the rest of the menagerie was being loaded up when the pigs got free. While restricted to her own arena, the big fellows gave several of us a good run before they all got loaded... a pretty funny scene all in all.
By that time, it was clear that the fire was coming our way. I started the water sprinklers we use to keep the dust down in the arena and turned on the automatic sprinklers around the house. I went back up to the house. Tam had arrived and was talking to Lisa and clan and watching the fire coverage on TV. I told them they'd better not stay and needed to get moving. I told Tam to load the dogs and call

our friends Ken and Jana and see if we can dump the animals there until it's safe, then get loaded and get over there. I'd follow with the horses.

We scattered and I went down and got the horses in our trailer. As I helped Joyce with the last of hers, we saw the flames cresting the closest hill. Time to go. By the time I got up to San Antonio, the traffic was jammed and the fire was right behind me, blasting through the little canyon like a furnace. Traffic was virtually stopped going down San Antonio and houses were burning on either side of the street. I turned and headed up San Antonio, threading the trailer through the downhill traffic trying to use both lanes. It was probably 1 pm but was like night up along the hills... the smoke dense as flames licked along the ridgeline to the northeast. I was able to circle around to Fairmont and parked in the Methodist Church parking lot to wait for Tam. Where the hell was she?!

She had grabbed things out of the safe, a change of clothes for each of us, and the 3 dogs and went down San Antonio. She saw kids running down the street carrying their pets.... traffic snarled trying to get down to YL Blvd.... and houses on fire to the left as the flames jumped across the street. (And to this day, I have not heard the end of the fact that I left the Element almost on empty and Tam was certain she was going to run out of gas and be pushed to the side and left....She got down to the Chevron station and cursed me until she made it to our rendezvous. Now we wonder, is it safer to keep cars fueled up knowing they pose a heightened fire danger or keep limited fuel with the attendant danger of not having enough to get out.)

In the parking lot, we traded cars and put the dogs in the truck with Tam. I headed back home. I managed to get up San Antonio through the still heavy downhill traffic. When I pulled into our cul-de-sac, I saw Joyce & Todd's house on fire. A fire dept. pickup truck was parked in the middle of the cul-de-sac and a single fireman stood alongside. He asked if that house was mine and I said, no, and pointed out mine. He said he was sorry but mine was 'gone too'. "But it looks fine." I said. He explained that the fire was in the attic and there were no resources available to do anything. It seems everyone had been sent to Hidden Hills, again assuming the fire would not turn north. There was no one coming to help us. This poses the question for future fires - what are the chances of fire personnel being called to another area - Cielo Vista, Esperanza Hills, Hidden Hills - and again leaving us without sufficient protection?

H e offered to go in with me ("We have maybe 5 minutes.") and grab a few things. Let me digress a moment here. Both of Tam's parents died that summer within about 2 months of each other. We had

recently cleared out their Las Vegas home to sell it and had brought back what we wanted to keep. Our dining room had been cleared out and was full of crates, boxes and furniture. For our part, we had about 20 years of collected goods in the house including a pretty nice art collection (a Goya series, a very nice Gorman litho, an original Steadman drawing, a few original works by minor artists and a couple of really nice bronzes). Tam teaches Japanese tea ceremony, so she had a LOT of Japanese ceramics, utensils, scrolls and the like, in and around a bedroom I had converted into a tea room. I had a collection of Japanese tea bowls from the famous kilns from across Japan. I also was working as an independent contractor and had a home office upstairs. The garage contained a wine cellar with about 200 bottles of aging cabs. We also love books and could probably have started a used bookstore with our inventory... or a nice house fire. Tam also had an office upstairs. She is also an accomplished pianist. She had a Steinway concert grand piano and a Yamaha baby grand.

So when you are offered 5 minutes to 'grab a few things', your mind kinda goes blank. The fireman suggested my computer. Good idea. We sprinted upstairs but when we got there my office was full of smoke and he wouldn't let me go in. He asked where it was and crawled in after I gave directions. He came out with the (desktop) unit. (Later I realized he had pulled all the cables including the one to my external hard drive. So much for data.) By this time, not only was the wind still howling, rattling the windows , but all of the smoke alarms were screaming their high pitched whistle, and the upstairs was filling with smoke. "We can't stay", the fireman warned. That eliminated saving anything from the offices or bedrooms.

We went down and I grabbed some family photos and our wedding album (I did want to see Tam again, after all..) My tea bowl collection was in a display case and I tossed some into an empty box. And that was about it. A second fireman came in and they told me to get out. As we left, we passed our 48# flat screen TV sitting on a table. "Want this?" one asked. He grabbed it and the next thing I knew he was trying to shove it into my Mini Cooper (in the garage). "Just put it in the yard." I suggested. Through force of habit, I guess, I grabbed my tennis bag and pulled the Mini out to the street. I took a third car from the garage and then shuttled them a few blocks away. I came back and, at that point, all I could do was watch and take some pictures as my house burned.

At some point a fire truck arrived. They stayed a while, mostly trying to keep the fires contained and then left saying they had to try to save some homes. They left a hose attached to the fire hydrant (ironically) directly across the street from our house. By this time it was late afternoon, a male from each of the five houses on our cul-de-sac (except for Todd next door who was out of town) was there

and we took turns on the hose, keeping the fires contained, wetting down the adjacent houses and, occasionally, putting out the random tree fire. There was not sufficient fire department personnel to protect the surrounding homes.
The end - until the next one.

The Cielo Vista Project proposes to add over 100 homes. The adjoining Esperanza Hills Project would add another 340 homes. The projects cannot be considered in isolation due to their cumulative impact on all environmental matters including and especially public safety. The After Action Report on the Freeway Complex Fire by the OC Fire Authority noted that traffic became gridlocked as residents tried to flee while emergency vehicles attempted to gain access. As noted above, San Antonio Drive was almost impassable as homes burned on each side of the street. Access by Via del Agua was similarly clogged. The major artery of Yorba Linda Blvd. was inadequate to divert the evacuating vehicles.

The DEIR uses the unrealistic and unsupported figure of 1.5 vehicles per home. Ours is an affluent community with multiple vehicles per home. Even at 1.5 vehicles per home, the Project would add over 150 vehicles to the already overburdened exit routes and when considered with the adjoining project, some 700 additional vehicles would make the exit routes virtually impassable during an emergency. Even at the volume of traffic which existed in 2008, one stalled car on San Antonio could easily have resulted in many lost lives. Without major changes to the traffic infrastructure surrounding the Project, the lack of consideration of public safety is irresponsible.

Edward Schumann
4310 Willow Tree Ln
Yorba Linda

Letter: Schumann2

From: Ed & Tam Schumann [mailto:tam.ed.schumann@gmail.com]
Sent: Tuesday, January 21, 2014 6:54 PM
To: Tippets, Ron
Cc: Spitzer, Todd [HOA]
Subject: Cielo Vista Project DRAFT EIR No. 615

TO: Mr. Ron Tippets

Orange County Planning

300 North Flower Street

Santa Ana, CA 92702-4048

Cc: The Honorable Todd Spitzer, OC Supervisor, Third District

FROM: Edward L. Schumann

DATE: JANUARY 21, 2014

SUBJECT: Cielo Vista Project DRAFT EIR No. 615

This article from Voice of OC, provides a nice response to the DEIR which fails to take into account the issues raised in Ms. Sefton's article.

Community Editorial: Heed the 'Sustainable Communities Strategy'

By GLORIA SEFTON | Posted: Tuesday, January 21, 2014 8:15 am

At first blush, the Madrona housing proposal in Brea might look like any other. It's a 162-unit development of single-family homes that will sit on 367 acres.

But it represents a tipping point.

And it's only one of many similar proposals that are pushing development boundaries all over Orange County.

As the Brea City Council opens hearings on Madrona on Tuesday, council members and the public should see the project for what it actually is: more sprawl development.

It's on virgin hillside land abutting Chino Hills State Park on the fringes of Brea. It runs counter to the Sustainable Communities Strategy that Orange County — and Brea itself — adopted in April 2012.

What is the Sustainable Communities Strategy?

It flows from California's landmark greenhouse gas reduction law, which requires cuts in greenhouse gas emissions to 1990 levels by the year 2020. The Southern California Association of Governments, in response to the law, set greenhouse gas transportation reduction targets for the region at 9% by 2020 and 16% by 2035, and in a multiyear effort involving stakeholders across the region, established the Sustainable Communities Strategy.

The Strategy lays out many ways to reduce vehicle miles driven to achieve the mandated greenhouse gas reductions and at the same time build livable, vibrant and sustainable communities for Orange County — even in the face of expected population growth of 4 million over the next 25 years.

(Click here to read the Sustainable Communities Strategy.)

These "smart land-use strategies" encourage maximizing use of existing facilities and avoiding or limiting impacts to open space that contain important natural resources and habitat. The strategies also support "infill" housing and redevelopment, mixed-use development and walkability of communities, improving the jobs to housing ratio and promoting land-use patterns that offer alternatives to single-occupant auto use. These strategies also have the benefit of reducing pollution and improving health.

The Sustainable Communities Strategy doesn't propose a wholesale change to Southern California's developed areas; existing stable residential neighborhoods are expected to remain the way they are today. Rather, the strategy promotes new ways of developing new neighborhoods and revitalizing old ones to give Orange County residents a variety of lifestyle choices.

But Madrona doesn't fit the bill for any of these modern planning strategies. It's dangerous too. The tract would be situated on hills prone to landslides and smack in the middle of a historic wildland fire corridor. Surely Madrona violates the fundamental principle of protecting natural habitat and resources that are critical for environmental and public health. It will destroy more than 1,300 oak and walnut trees and bulldoze virgin land.

Likewise, Cielo Vista and Esperanza Hills, also in the binge of proposals under consideration, fail to make the grade. Those tracts are on virtually undeveloped county land that Yorba Linda is anticipated to annex. Cielo Vista proposes 112 homes on 84 hillside acres that support natural habitat. Esperanza Hills proposes 340 homes on 469 hillside acres bordering a state park.

Adding more to the list, Mission Viejo recently approved Skyridge, a development next to natural habitat on previously unincorporated county parcels that will be annexed to Mission Viejo, expanding its boundaries. And SaddleCrest, though currently in litigation, is an isolated tract in unincorporated rural Trabuco Canyon on undeveloped land far from services and transportation hubs and without current infrastructure. If SaddleCrest's approval stands, we can expect more developments like it in the canyon areas.

All of these development proposals fly in the face of sustainable development strategies. And they are being made against a backdrop of burning Southern California hillsides and an official state declaration of drought emergency. It would be reckless to ignore the fact that these developments will require vast amounts of water where virtually no water is being used today.

Climate change is occurring, and it's having severe negative impacts that cannot be denied. If we're serious about greenhouse gas reduction and, importantly, sustainability and protection of resources and quality of life for the next generations, projects like Madrona, Cielo Vista and Esperanza Hills should not go forward.

Instead of blithely approving these outmoded development plans, it's time for elected officials — the ones with authority to say yes or no to these projects — to scrutinize them according to the sustainable development tenets that the region signed on to. Will these officials have the courage and foresight to reject these proposals, or is the Sustainable Communities Strategy just a meaningless document?

Local jurisdictions can use creative tools, like transferring development rights to appropriate locations elsewhere, to keep the valuable and sensitive open space undisturbed while providing economic fairness to landowners and developers. Many California cities and counties are already doing this.

We have virtually no chance of meeting our target greenhouse gas reductions or creating a desirable, livable Orange County for the long term if land-use decisions are going to be made with little or no regard for the adopted strategies of building sustainable communities and reducing vehicle miles driven. Rather, our precious open space will be consumed forever and we'll be living in isolated island communities, far from work or services, traveling long distances on traffic-choked highways and dealing more and more with the negative impacts of climate change.

That would be a colossal failure on our part.

Gloria Sefton is a Voice of OC Community Editorial Board member and a co-founder of the Saddleback Canyons Conservancy.

Letter: Sedita

From: Robert Sedita [mailto:rnsedita@sbcglobal.net]
Sent: Monday, January 13, 2014 3:22 PM
To: Tippets, Ron
Subject: Cielo Vista Project

Mr. Ron Tippets

Orange County Public Works

Mr. Tippets:

I am writing you today to express my concern over the proposed Cielo Vista Project in Yorba Linda. I have lived in the track of homes entered thru Via Del Agua for approximately 25 years and have seen the continued growth of Yorba Linda and the effect such growth has had on the existing infrastructure, safety and quality of life within Yorba Linda.

I have two primary concerns relative to this project. Firstly, the traffic situation that currently exists at the uncontrolled intersection of Via Del Agua and Yorba Linda Blvd. has continually deteriorated with the addition of more homes in the area. This is especially true during school hours, when parents dropping off their children at Travis Ranch School use Via Del Agua as a turn-around get onto Yorba Linda Blvd., and approach the school from the north rather than deal with the congestion at the school when approaching from the south. This routinely backs traffic up and it is not uncommon to have over a dozen vehicles waiting to make left turns out of Via Del Agua. This level of traffic waiting at the stop sign and the high volume of traffic already moving on Yorba Linda Blvd. during this time of day, results in substantial delays for residents attempting to exit the track. Additionally, pedestrian traffic is also impacted. Many residents walk in this area as do many parents and grandparents with small children and/or infants in strollers. The amount of traffic already using Via Del Agua is significant and crossing at the corners is somewhat hazardous for these pedestrians. I have witnessed several incidents wherein drivers were traveling in excess of the residential limit and have cut-off pedestrians attempting to cross Via Del Agua. The addition of these homes would exasperate these already significant problems.

Secondly, I was at home during the Freeway Complex Fire and witness how rapidly a wind driven fire can spread. We lost three homes in our track. The problem was not so much the hillsides, but rather the landscaping and the homes that fed the fire into our track. We did not see a fire truck for 3 days in our track. The construction of these homes bordering the Chino State Park property is a recipe for disaster.

I respectfully request that the County reconsider allowing the construction of these homes. Such construction would have an adverse effect on the traffic flow, public safety and quality of life that attracted many of us to Orange County in the past.

Respectfully,

R. Sedita

Letter: Shidler

From: Mark Shidler [mailto:msrshidler@msn.com]
Sent: Friday, January 17, 2014 3:11 PM
To: Tippets, Ron
Subject: Objection to Cielo Vista Project and Esperanza Hills Project

Good Afternoon,

I am a long time Yorba Linda resident, living here since 1994. I moved here because my family and I craved the low density and rural feel, Yorba Linda offered. My family was quite content with the " Land of Gracious Living" until we were stuck in the major traffic jam, causes by the Freeway Complex Fire evacuations. We genuinely feared for our lives as the fire came towards us. As a result of the fire we lost our back yard and almost our house. Thanks to the fire fighters infra- red technology, the embers that started burning in the frame of our house were discovered and cut out. I have no doubt our house would have been lost.

The streets here in our track couldn't handle the amount of cars already trying to escape the blaze. Adding more homes and cars is only going to make it worse and next time, it could cost lives.

The developer and the OC planning staff, need to be honest and not just ram this thru.

The Fire Authority has concerns , as does the OC Sheriffs Dept. about public safety. These projects must not endanger anyone and as it stands there aren't adequate routes to escape quickly. There needs to be enough water to fight future fires. The only reason my house was saved was because the water pumping station was damaged from the fire and the fire dept. came back.

Everyone of my neighbors is against this project as am I. These projects need to be rejected and put down permanently. They do not benefit our community.

I urge you to not let these projects proceed.

I want this on the record.

Sincerely,

Sheryl A Shidler

Letter: Sinner

From: Barbara Sinner [mailto:barbsinner@gmail.com]
Sent: Sunday, January 05, 2014 9:50 PM
To: Tippets, Ron
Subject: Cielo Vista and Esperanza Hills

Dear Ron,

I am strongly opposed to these two proposed developments being accessed by utilizing San Antonio or Via Del Aqua. I lost my home in the Freeway Complex Fire. I live on San Antonio with a fire station and a police station at the bottom of my street. My home never received a drop of water from a Fireman, and when police were notified of looters on my property, they did not respond. I remember the horrifying gridlock that day I escaped. I remember driving through the thickest cloud of black smoke, hoping there wouldn't be a car in front of that cloud, and that I wouldn't die in my car on San Antonio.

Yorba Linda lost 135 homes that day. The new developers claim that their additional homes will create a fire break. I think we already had hundreds of homes that did not create a fire break. No so called "fire break" can withstand 50 mph gusts carrying burning embers. The developers claim that their new houses will be burn proof. Anyone remember the Titanic????

The developers claim that people won't evacuate and stay in their homes because they have been told their new houses are burn proof. Let's see, I don't see Grandma whose babysitting her grand kids calmly watching a DVD and cranking up the A/C. I don't see a dad calling his 16 yr old daughter at home and instructing her on how to use the garden hose to put out the fire on the bushes. I don't see horse owners bringing their horses indoors until the fire passes. It is second nature to run, not to stay. People will not stay at home comfortable with the belief that their home is fire proof, they will run. And they will all run at the same time in the same direction, because they have no other way out, A proposed 500 home cul de sac in a well documented fire area is ludicrous!!

Please know that I and others will continue to fight these proposed projects.

Barbara Sinner

Letter: Spellman

Lizette and David Spellman
4460 San Antonio Rd
Yorba Linda, CA 92886
(714) 970-1420
Lizette18@sbcglobal.net

January 19, 2014

Mr. Ron Tippets
ORANGE COUNTY PLANNING
300 North Flower Street
Santa Ana, California 92702

SUBJECT: Response to Cielo Vista Project DRAFT EIR No. 615, Geology – Section 4.5

The Draft EIR acknowledges four major geological risks present on the project site:

a. The presence of the Whittier fault and trace lines, although the locations used for site planning were "inferred". (Appendix E, LGC Geotechnical Feasibility Study, 3/1/13, Page 2);
b. Several "large-scale' landslides are indentified at the northwestern portion of the subject site". (Appendix E, LGC Geotechnical Feasibility Study, 3/1/13, Page 2);
c. expansive soils are present;
d. liquefaction is possible;

The DEIR statement that with proper geotechnical investigation, all of these risks can be minimized is not supported by substantial evidence.

All four of the above listed conditions are likely to have significant impacts on the site plan. For example, a significant number of planned homes fall within the 1000' wide Whittier fault zone in areas that could be undevelopable.

Additionally, depending upon the amount of remedial grading required to mitigate landslide formations, significant offsite grading may be required to the east on the Esperanza Hills property. (Appendix E, PSE Geotechnical Evaluation, 6/8/06, Section 4.5.)

Appendix E, LGC Geotechnical Feasibility Study, 3/1/13, Introduction makes reference to "subsurface geotechnical evaluation of the site is currently in-progress"….this information was not found.

Mitigation Measure 4.5-1 proposes to require a final site specific geotechnical investigation prior to issuance of grading permits. The final site specific geotechnical investigation should be completed prior to approval of the EIR. Identification of impacts must be analyzed in the Draft EIR and all reasonable avoidance and mitigation options must also be analyzed in the document.

Any other approach constitutes improper deferral under the California Environmental Quality Act.

Letter: Stansberry

From: Valerie Stansberry [mailto:Truthrule7@aol.com]
Sent: Wednesday, January 22, 2014 8:48 AM
To: Tippets, Ron
Subject: Corliss Vista & Esperanza Hills

Dear Ron, my husband and I have been residents in Yorba Linda for thirty years. The appealing semi small town atmosphere has been Yorba Linda's appeal and trademark. Unlike South Orange County, you don't have to wait through a traffic signal three times to cross. Also, witnessing and being part of the last fire, all residents will conclude that the evacuation did not work in our best interest. It will only get worse. Let's leave our beautiful city which attracts people just because of the quaintness and less congestion. Please stop the building!! Sincerely, Ron & Valerie Stansberry

Letter: Steverding

From: Olivia Steverding [mailto:steverdingassoc@sbcglobal.net]
Sent: Friday, January 10, 2014 1:03 PM
To: Tippets, Ron
Subject: Cielo Vista Responses

My name is John Steverding and my wife is Olivia we live at 4760 Stirlingbirdge Circle Yorba Linda, CA for 25 years. Our cull de sac empty's on to Stonehaven a few houses from Via Del Agua.

On the day of the fires in November of 2008 we were viewing the fire on a hill top close to our street. As the fire approached we prepared to evacuate, the wind was extreme and the fire was moving very fast, within 10 minutes it traveled over a mile and was upon us. The fire was over 30 feet tall and the air was as dark as midnight.

As we approached Stonehaven the street was packed with cars and fire surrounded us. We never expected to see our home again, cars were being abandoned and some were running down the street, there was no other way out and it took forever to get onto Yorba Linda Blvd. Now picture that and add 500 new auto's to the scenario, and when the second development is completed add another 1,000 vehicles.

I cannot even believe that a new development that empties on to Via Del Agua is going to be considered. On top of that, the project could go on 5 to 7 years of earth moving and contaminating the air, with God knows what.

If this project goes through as designed I'll think about moving from the "Land of Gracious Living" it won't be gracious anymore.

I am sure that you are aware of the earthquake faults within these developments.

Letter: Stull

From: tlstull [mailto:tlstull@pacbell.net]
Sent: Wednesday, January 22, 2014 2:30 PM
To: Tippets, Ron
Subject: Cielo Vista Project

Dear Mr. Tippets,

I writing regarding the Cielo Vista project. I strongly oppose this project due to the negative impacts that it will impose on the air quality, the increased traffic, and the harm it will do the environment.

The harm and negative impacts it will have on the current resident's quality of life is significant.

Further, it will cause irreversible harm to the environment and sensitive populations that reside in the vicinity.

Please do not allow this project to proceed.

Sincerely,

Theresa Stull

Yorba Linda Resident

Letter: Thaete

From: David & Tricia Thaete [mailto:badandee@ca.rr.com]
Sent: Tuesday, January 14, 2014 9:58 PM
To: Tippets, Ron
Subject: Ceilo Vista and Esperanza Hills
Importance: High

Mr. Tippets: this email serves as my notice of opposition to the Ceilo Vista and Esperanza Hills projects. As a resident of Yorba Linda in the neighborhood below and adjacent to these projects, and having personally experienced the ravishing fires 5 years ago, including the inept actions of our emergency response agencies, I am convinced that these projects would only serve to increase the level of danger that my family and our fellow neighbors would be exposed to in the event of another catastrophic event, like the fires fire years ago, or an earthquake. Primarily, with the number of residential units planned, and the ingress/egress planned to accommodate these units, there has been a complete lack of good planning practices and good judgment applied to support these projects.

Please put me on record as opposing these projects.

Sincerely,

David Thaete

21570 Dunrobin Way

Yorba Linda, CA 92887

Letter: Thayer

From: Dale Thayer [mailto:dalethayer@me.com]
Sent: Wednesday, January 22, 2014 6:01 PM
To: Tippets, Ron
Subject: Cielo Vista Project

Mr. Tippets
Mr. Tod Spitzer

My name is Dale Thayer and I live at 4660 San Antonio Rd. I attended the meeting on the 16th of January but was not able to make a comment due to the late hour that the meeting ran to. I will keep my comments brief and to the point.

I lost my home and nearly my wife and son during the fire of 2008. If you look up my address you will see that we are the first house as you go up San Antonio.
Even being that close to Yorba Linda Blvd. my wife was not able to exit down San Antonio due to heavy smoke and fire. She had to turn around amidst several other vehicles doing the same thing to travel up San Antonio to Fairmont and out. With additional traffic created by the new development coming the same way it's not incorrect to state that there will be life lost in the case of a similar event.

My second statement is this: One of the proposed exit routes is to build a road practically in my back yard in the gas easement area from the development to San Antonio. All I want from each of you is your estimate of how much this will lower my property value. I did ask the developer after the meeting on the 16th and he admitted that he could not answer me. In other words," substantially" and I think you will agree. That being the case how is it right to allow one man or developer the right to build in such a way that another mans property is devalued?

I informed the developer that evening that if this plan were to go forward I will be seeking legal action against all involved in this action and those approving this action which would include all public agencies. His comment to me before he walked away was "let's get together and work something out". I trust that the decision makers in this action will consider the damage this will do not only to me but several of my neighbors not to mention the endangerment of future residents to this community.

Please be men of integrity in your decision making.

Sincerely,

Dale Thayer
4660 San Antonio Rd.
Yorba Linda, CA

Letter: Unland

From: James Unland [mailto:jmunland49@att.net]
Sent: Monday, January 06, 2014 8:19 AM
To: Tippets, Ron
Subject: Cielo Vista Development

As a property owner immediately adjacent to the proposed Cielo Vista development in Yorba Linda, I write to express my strong opposition to the development. Putting a large development in a fire prone area is not only a danger to the new residents, it is a danger and risk to the existing residents. Developers cannot mediate this risk, no matter what their PowerPoint slides will say.

I lived through the Freeway Complex fire. I remember trying to evacuate the area only to find gridlock on Stonehaven, and more importantly, Yorba Linda Blvd-we were trapped. There is no way a builder can promise to mediate the risk of surface street gridlock. Promising development exits into two streets running into YL Blvd, to evacuate the 500 homes, does not do anything but increase the gridlock.

Fire will come again. We must intelligently plan for that eventuality. Putting a new development squat in the middle of the fire area is just not intelligent.

Open space is at a premium in Orange County. The higher purpose of the land should be for open space, not developer's pockets.

Very Respectfully,

Jim Unland

4765 Stirlingbridge Circle

Yorba Linda, CA 92887

jmunland49@att.net

Letter: Wallace

From: Scott Wallace [mailto:scottwallace@votaw.com]
Sent: Thursday, November 21, 2013 3:41 PM
To: Tippets, Ron
Subject: Cielo Vista Project

I am writing in opposition to the Cielo Vista Project. I live on Allonby Circle which is the street right off of Stonehaven. We are at the bottom of Stonehaven and hear the traffic coming down the hill to Yorba Linda Blvd all day and night. It can be substantial at specific times of the day. During the fire evacuation, I am told there was tremendous traffic trying to get off of the hill. Adding the Cielo project will add significantly to the challenge of ecavuation.

Yorba Linda Blvd is a main road which has increased in traffic tremendously over the past 10 years we have lived here. More traffic in this area will negatively affect our "Gracious Living" in Yorba Linda.

I have lived in Orange County since 1963, so I witnessed amazing growth. For me, in this case it is not so much the growth - it's the access to it and the added specific traffic over very few roads. I can only imagine the number of construction trucks up and down Stonehaven, let alone the continuous added traffic that will come when other direct routes to Yorba Linda Blvd will back up and the choice is made to use Stonehaven.

Please consider stopping this project

Scott Wallace

Letter: Wilkerson

From: Brian Wilkerson [mailto:wilkersn@pacbell.net]
Sent: Tuesday, January 07, 2014 8:37 PM
To: Tippets, Ron
Subject:

Dear Supervisor Spitzer,

I've lived in Yorba Linda for over 25 years, and I recently retired from the Orange County Sheriff's Department. I believe all my neighbors and I oppose the proposed housing development that would go in our neighborhood (Cielo Vista and Esperanza Hills). The reasons are simple, increased traffic in our neighborhood and additional fire hazard. I ask that if you haven't, please look at the area that is proposed for this new development and the proposed ingress and egress for all the additional traffic. It will cause a bottle neck effect, affecting the quality of life for all of us that live here. Also, the fire in 2008 showed us first hand how vulnerable we are to fire storms, and how fire resources were stretched to the breaking point. My street went hours before we saw a fire truck, when it did arrive the fire had already passed taking many houses with it. Additionally, water pressure was not effective to fight the fire.

I realize that you and the other Supervisors must make decisions based on all the information available to you, including input from the developers and the residents. I hope you will give the residents that must live with this decision, proper consideration.

thank you,

Brian Wilkerson

4605 Alder Ave

Yorba Linda Ca, 92886

Letter: Unknown

Cielo Vista Project – Proposed Single-Family Residential Development
Community Open House
Comment Form

The County of Orange welcomes your comments on the environmental review process. Your comments will assist us in better understanding your concerns regarding the proposed Project.

You may submit your comments to County staff at the Community Open House on December 16, 2013, or if you prefer, you can mail, FAX, hand deliver, or e-mail your comments to OC Planning, attention Ron Tippets, Project Planner, **by January 7, 2014**.

Mail: P.O. Box 4048
Santa Ana, CA 92702-4048

Hand Delivery: 300 North Flower Street, 3rd Floor
Santa Ana, CA 92702-4048

Fax: (714) 796-0307

E-mail: Ron.Tippets@ocpw.ocgov.com

Telephone: (714) 667-8856

1. What specific comments do you have on the issues analyzed in the Draft EIR?

Aesthetics

Air Quality

Biological Resources

Cultural Resources

Greenhouse Gas/Climate Change

Geology and Soils

Hazards/Hazardous Materials

Hydrology/Water Quality

Land Use/Planning

Noise

Population and Housing

City ax Yorba Linda going down hill from here! If this goes through

Public Services Didn't have enough Fire & Police when the fires came through; Adding more homes is a disaster waiting to happen!

Recreation

Traffic/Transportation Via Del Agua Signal will not Help! Fires & more Traffic, 2 ways in is not enough

Utilities

Alternatives Put a road in The Back hills, Put more Schools & Fire Dept.!

2. What specific comments do you have regarding the proposed Cielo Vista project?

_____
_____
_____
_____
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If you are mailing your comments, please fold the paper in half and place first class postage in the upper right corner before dropping in the mail box. **Please submit your comments** as soon as possible, but **no later than** the close of the Draft EIR public comment period on **January 7, 2014, 5:00 p.m.**

OC Public Works
OC Planning Services
300 North Flower Street
P. O. Box 4048
Santa Ana, CA 92702-4048

ATTN: Mr. Ron Tippets, Project Planner

CIELO VISTA OPEN HOUSE

Monday, December 16, 2013

Reported by: Arcy M. Dropulic, CSR No. 13394

COMMUNITY MEMBER: We all have the same questions. We all have the same complaints. We all have the same concerns. And I think when you sequester us to the different tables, it colludes the ability to have it documented and recorded. So I think if you just take a quick vote, just say let's not go to these stations and let's ask the questions where everyone can hear, and let's answer.

I asked a very simple question of who actually owns that land. I could not get an answer. They would not tell me who owns that land. Well, we think the Travis Company. I said, well, who are you guys? Well, we're Sage. I said, do you guys own the land? Well, that's a really hard question. I can't really answer that.

So I think we all -- we all have the same questions and we have all been misled, very, very blatantly misled. We've been told by our city council that they will fight for us a year and a half ago. And then all of a sudden, here we are.

And, you know, when they tell us, we stand behind you, period. Well, we all learned what that means, and I think we all deserve to be dealt with honestly. And I think everyone who is in this room could answer these questions from why didn't you go guys go through

Yorba Linda to how did we get to this place.

COMMUNITY MEMBER: And is Mr. Spitzer here tonight? And how will he hear from us if he doesn't have enough interest to come to any of these meetings?

COMMUNITY MEMBER: I think what the lady is saying is, let's have it as an open forum. Let's not go to the tables. That's a divided and conquer. That's an old Roman, you know, tactic.

Number 2, I think what we've got here is we got one of the developers, the small portion that's speaking tonight. This whole issue I think tonight is really more to talk about the EIR, the SEQUA. And this developer is really the small potatoes compared to Esperanza Hills. Gosh only knows if friends in Texaco can be developed.

So you're not coming to us collectively, as you've just used that word. You're coming to us singular to where then we got to go to the Esperanza Hills. And collectively is what is going to impact because we're the ones -- you don't live in Yorba Linda. You don't know what the hell it was getting the hell out when that fire took place. We're not talking what ifs. We're talking what if it happens again.

COMMUNITY MEMBER: When it happens again.

COMMUNITY MEMBER: It will happen.

COMMUNITY MEMBER: It will happen. It will

happen again.

COMMUNITY MEMBER: So let's get to the meat and potatoes. Let's get right to the traffic issue. Let's get right to the EIR. Let's get to the SEQUA and how it's going to impact us. That's what I think Mr. Spitzer would want to hear and what everybody here is all about.

COMMUNITY MEMBER: Was it one way in and one way out?

COMMUNITY MEMBER: Is Yorba Linda a master plan community, yes or no?

COMMUNITY MEMBER: Like, say, Irvine? Does it compare? How can you compare the fire in Irvine there to the fire here?

COMMUNITY MEMBER: If Yorba Linda planned its borders and they're sitting there looking at agricultural land which has been in that format for decades, all a sudden now after everything's been built around its borders, we're supposed to allow a developer to take an agricultural piece of land, which is one of the lowest in the value, leapfrog it to the highest in value, which is residential, and because we didn't realize this could happen and we have streets already in place that are not arterial streets, we're to take the consequences? You tell me as a planner that I'm full of it on that issue.

COMMUNITY MEMBER: Show me one in the county of

Orange that you've done just like this, please.

COMMUNITY MEMBER: Who are the decision-makers?

COMMUNITY MEMBER: Any planners here tonight? Are there any county planners here tonight?

COMMUNITY MEMBER: So the city has no say whatsoever in this development?

COMMUNITY MEMBER: And if the city had expressed their desire not to go forward with it, would we still be sitting here today?

COMMUNITY MEMBER: If the city -- if the mayor and the city council and whoever -- those powers that be had expressed a desire not to have this project go forward, would we still be sitting here today?

COMMUNITY MEMBER: And are you allowed to tell us what the city has expressed as in yes, go forward, or no, go forward?

COMMUNITY MEMBER: You're not going to tell us? Is that what you're saying?

COMMUNITY MEMBER: Okay. We can go around in circles. We have a limited amount of time. Let me ask you. Who owns the property?

And two, does it need to be rezoned in order for those houses to be built?

Who owns the property right now? That shouldn't be a hard question. Someone in this room knows who owns

that property right now. I would like to know owns that property.

COMMUNITY MEMBER: I don't think anyone, sir, with all due respect, is going to walk through that room when a simple answer -- question could not get answered on who owns that property and does it need to be rezoned. I don't think that's a very -- who filed the application? And can someone who does not own the property file the application?

COMMUNITY MEMBER: Can I go in and file an option to develop a piece of property, that property that I do not own? Can I do that, yes or no?

COMMUNITY MEMBER: And who would that legal owner of that property be, sir? I don't think that's a really hard question. And you wonder why we feel so misled. You're the head of the Planning Commission or Department of Orange and you're here to represent and to have a meeting about this property, and no one in your department knows who owns that piece of property?

COMMUNITY MEMBER: They know. They don't want to say.

COMMUNITY MEMBER: And my question, why would you not want to say? There is a reason why you don't want to tell us, and I'd like that to be expressed.

Well, we'll all sit here and we'll all be very

quiet while you get that information, sir.

COMMUNITY MEMBER: Planning question. Why aren't both of these projects, Esperanza Hills and this one, being looked at in total instead of piecemeal? You can't adequately address the impact to the neighborhoods without looking at these together instead of piecemeal. You just can't do it.

COMMUNITY MEMBER: Well, the point really comes down to when you look at the e-mail address for the county, the e-mail goes to you for Cielo Vista; right? But it goes to a different individual at Esperanza Hills; correct?

COMMUNITY MEMBER: Why isn't it collectively one person with one EIR?

COMMUNITY MEMBER: Okay. Does that mean that we can sit there and allow one and squash the other? Is that what you're saying as a potential, just a potential?

COMMUNITY MEMBER: Why were they split up? At one time did not the county say, you two developers are supposed to come in with one voice, yes or no? Yes or no? It's simple "yes" or "no" question.

COMMUNITY MEMBER: Why did the county at one time -- and until you correct me, I'm going to assume that at one time county said one voice. Why did you then segregate if at one point they said one voice?

1 COMMUNITY MEMBER: You're not giving an image of
2 trust.
3 I'm not picking on you, but I'm talking about --
4 reverse the tables. You're not you. You're the people
5 that live in Yorba Linda that went through hell getting
6 out of dodge.
7 And now we have this coming into us in two
8 different avenues. And we know for a fact it was in the
9 press that at one time, in fact, I think even Mr. Spitzer
10 said, it's got to be one voice and it came from him. And
11 then all of a sudden here we got the divide and conquer.
12 Do you feel if the tables were reversed that
13 gives a warm trust feeling?
14 COMMUNITY MEMBER: Well, what's the best way for
15 us to fight it? I mean, you work for us, basically. We
16 he pay your checks. You're not the developer. Give us
17 some insight on how to stop this. What are your views on
18 that? I mean, you've been here since June, did you say?
19 I've been here for 14 years.
20 COMMUNITY MEMBER: Are the decision-makers
21 elected officials?
22 COMMUNITY MEMBER: Do you know why I know that
23 your process is a failure already? 'Cause we had a thing
24 called an NOP that's already come through town. There are
25 tons of our comments. They're in the appendix of the EIR;

1 okay? It's like none of those exist. We all said
2 ingress, egress, traffic, fire, danger, the roads can't
3 support any more vehicles; okay?
4 Now we're talking about adding another 200, at a
5 minimum, vehicles with this project and tons more with the
6 Esperanza Hills project. The streets that can support
7 zero more vehicles in the event of an evacuation; okay?
8 The whole proposal failed there.
9 So we can talk about the EIR and what color the
10 houses are going to be, but you're not doing anything to
11 widen the infrastructure leading to two of those
12 developers. You're going to be working off the same
13 streets that we have, the same limited two-lane streets.
14 And those streets, my wife was on one of them and
15 she almost burned to death in her vehicle because the
16 traffic, it was gridlock; okay? When it hits
17 Yorba Linda Boulevard, there ain't nowhere to go. And she
18 sat in her vehicle next to a burning house and was really
19 tossing the idea that, I'm going to have to abandon my car
20 and get the hell out because the car's going to go.
21 So when we talk about adding another 200 cars, at
22 a minimum, from this development to streets that can't
23 support the cars that we already have getting out of
24 dodge, it fails. So everything else beyond that is a moot
25 point, in my book. I don't need to go to a station about

1 what color the houses are going to be or, you know, if
2 they're going to have three bedrooms or four bedrooms or
3 this or that or park space or open spaces. All that is
4 nice, but we're talking about one way in and one way out
5 of a development that people aren't going to be getting
6 out of; okay?
7 Because I'm not -- I'm not going to be yielding
8 for some joker coming out of that development to endanger
9 my friends and my family and my neighbors who are also
10 trying to get out. So as far as I'm concerned, the people
11 that buy in there do so at their own risk. And I ain't
12 going to be stopping my car and letting them out while my
13 friends, 20 cars behind me, burn up in their vehicle.
14 I don't think you understand, sir, the magnitude
15 of this fire that we had here in 2008 and the
16 neighborhoods that it affected; okay? There wasn't time
17 to decide what to take out of your house. It was just get
18 in the car and go.
19 So to me, this development fails on that one main
20 point. We're talking life and death here. We're not
21 talking about, you know, somebody just losing property in
22 the fire, whatever. We're talking life and death issues
23 here. That's why everybody in this room is so passionate
24 and heated like I am right now about this.
25 So, you know, for the county and the developer to

1 come trotting into town and put this out to us and have
2 experts in the room who can answer our questions, we don't
3 need experts. Firsthand experience trumps the experts
4 every time, and we were all there and we all lived this.
5 And we all know a sixth grader can figure out that the
6 math ain't going to work. That 200 -- that adding
7 200 vehicles to the cue of vehicles already trying to get
8 out is going to cause fatalities; okay?
9 I -- I was a police officer. I'm retired from --
10 from that work now, but, you know, I had to look at
11 evacuations and things like that before and this just
12 ain't going to work. And you can have -- you can have
13 experts work it six ways from Sunday, but it's obvious to
14 everyone in this room who was there that it isn't going to
15 work.
16 And I wrote a response to both the NOPs for both
17 projects, and I read the EIR and it's like it never
18 happened. These comments that people made about the fire
19 issue, it's like, oh, it can be mitigated. We'll just put
20 a signal in at Via del Lago and Yorba Linda and that will
21 take care of the problem. That ain't going to take care
22 of the problem. It isn't going to take care of the
23 problem with thousands of people already on that
24 evacuation route trying to get out.
25 So to me, it comes down to that one point. And

1 then you add in -- we don't know yet where that other
2 development is going to exit. They're having all types of
3 problems about right of way, getting out of Aspen, getting
4 out on San Antonio. And the last thing I saw in their
5 proposal, in their EIR was, oh, we'll just drop everybody
6 down to Stonehaven along with these other 120 homes.
7 So now we're looking at 460 homes dumping out
8 onto Stonehaven where there isn't room for one more
9 vehicle in the event of an evacuation. So that's what it
10 boils down to. And going to the tables here and
11 circulating and seeing all these other issues, it's a moot
12 point to me because the whole thing fails on that one
13 issue.
14 COMMUNITY MEMBER: I used the process and so did
15 dozens of other people. And then you look at the EIR and
16 it says traffic is a mitigatible [sic] issue and it's not.
17 Unless you're widening streets, it ain't mitigatible,
18 period.
19 COMMUNITY MEMBER: Let me ask you a question
20 regarding your process.
21 How many e-mails do you need to see before you
22 realize, we might have a problem, Houston? You tell me.
23 Would a hundred hit you? Would 200 hit you? I mean, we
24 can all get our neighbors to do so. You tell us when you
25 finally sit there and see the light bulb go on.

COMMUNITY MEMBER: The one thing we haven't heard once in the last year and a half as I attended this forum is, we exhausted all other options to build arterial roads to bring these people in and out of those developments without stranding them in the existing roads.

COMMUNITY MEMBER: No one says, okay. We can understand people want to develop their property. Anybody in this room can understand that. I think the bitch is, the concern is we can't absorb any existing roads we have today without risking ourselves as well as these new folks, who may be in this room, the ones who are going to buy those homes might be listening to this.

I don't think anyone's ever done an exhaustive study. We've never seen it in any of the documents that said, here's a potential set of roads we can build to accommodate 500 more homes and perhaps more developments after that. Right now it's just, let's just hook onto the existing little roads that exist and couldn't handle it before. And the sheriff can get a one-way road out. That's no answer.

COMMUNITY MEMBER: I think that's everybody's concern here. People aren't complaining about your developing. It's what you're going to do to the thoroughfares and the safety of the people here already and those who will be added to it. No one has ever

1 addressed that adequately.
2 COMMUNITY MEMBER: And, sir, when we were all
3 watching some of us, our own homes burn, our neighbors'
4 houses burn -- in fact, the house that the entrance to the
5 street is burned to the ground. And as you can see, they
6 left their vehicle. I mean, it looks like they left, as
7 we all did, with just the shirt on our backs and a dog and
8 cat in the car and praying that we would come home to
9 something. And coming back up that street and seeing our
10 houses burned to the ground and going down the hill hoping
11 to get out only to be met, as we went down Stonehaven,
12 only to be met with absolute gridlock. And it was
13 literally like hell. The smoke, the flames, the absolute
14 panic and chaos.
15 And, Mr. Spitzer, if you have -- I hope if you
16 take the time to listen, if you would look at the aerial
17 footage of what happened and all the people trying to get
18 out. And with all due respect to the sheriff, and I'm
19 sure he's doing a great job and has a new plan in place,
20 I'm sure some other plan was in place at that time, but
21 people couldn't get out. People -- it was absolute chaos.
22 And the only reason our house is standing is
23 because we had some neighbors stay and fight it, as
24 firemen would go up and down the street and just let
25 houses burn because they were so overwhelmed --- -

COMMUNITY MEMBER: You know, talk about something simple. The reverse 911 call came four hours after the homes were burnt.

COMMUNITY MEMBER: Complete failure.

COMMUNITY MEMBER: After the homes were burnt.

COMMUNITY MEMBER: After the homes were burnt, the first 911 call came to our home.

COMMUNITY MEMBER: We never saw them in our neighborhood.

COMMUNITY MEMBER: If we can't execute something that simple, who's to believe that your strategy to dump 4,000 more cars in our community and get them out safely is going to make any sense?

COMMUNITY MEMBER: We also had a water pressure issue, and the whole situation is -- first of all, I understand your process, but we're not going away; okay? This development was imposed upon us, forced upon us by a square peg in a round hole after the fact.

This isn't in the Yorba Linda sphere of influence the way you're making it sound because you're just going to sit there and take the process. We'll address, we'll send you an e-mail, and it sounds like a rubber stamp situation; okay.

The whole thing is, this is a bad idea. Pure and simple. If it's a great idea and the developers are

1 really straightforward, have them build a road outgoing
2 east. Problem solved.
3 COMMUNITY MEMBER: Esperanza. Esperanza Road.
4 COMMUNITY MEMBER: I think we're missing
5 criteria. What is their criteria? Go? No go? What is
6 it that the county wants to see? I mean, is it just the
7 influx of money from the taxes? I can see where that
8 would be a good thing.
9 COMMUNITY MEMBER: I get your process. But the
10 criteria, when you're planning like, let's say,
11 San Antonio Road, just -- just for instance, how many --
12 how many cars is that road designed for today? I called
13 the City of Yorba Linda. I talked to Planning. They
14 don't know.
15 I said, how does Yorba Linda Boulevard differ
16 from San Antonio Road volume-wise? Why isn't it called,
17 you know, boulevard? Why is it called road? I couldn't
18 get an answer from the City of Yorba Linda. Maybe you can
19 enlighten us.
20 COMMUNITY MEMBER: Let me ask you a question.
21 Does your process -- you love that word; okay?
22 Does your process take into the complex fire
23 issue? Where is it in the EIR, written in that? I didn't
24 see it.
25 COMMUNITY MEMBER: But, sir, you know, you have

1 all these numbers and all these statistics. We are
2 talking about the same roads that we all, in real life,
3 experienced. Because you say these numbers does not make
4 it true. Just because you say it or said that traffic
5 won't be a problem does not make it true. We know that it
6 is a problem. We lived through it. We tried to go down
7 those streets. We all tried to go onto Yorba Linda
8 Boulevard.
9 So you may have a formula, but that does not make
10 it right. Just because, you know, a bunch of people get
11 in a room and calculate a formula does not make it any
12 more accessible than it was before. And that was even
13 before all the other homes up off Casino Ridge and
14 everything else were inhabited. It's even much worse now
15 than it was on November 15, 2008.
16 So now, all of a sudden now it's supposed to be
17 okay. I think it's a very common sense question and
18 nobody responds how -- we hear all these other things.
19 But if it didn't work in real life on November 15th in
20 2008, it's not going to work again.
21 And -- and there's other causes for evacuations.
22 What if there was a terrible earthquake? I mean, it's
23 not just --
24 COMMUNITY MEMBER: A railroad accident?
25 COMMUNITY MEMBER: There's so many things. And

1 if it didn't work then, why would it work now?
2 COMMUNITY MEMBER: Forget the report. It
3 couldn't support it then. Why could it support it now?
4 If you look at the topography, there's only one
5 street that it's going out to. I mean, this is not rocket
6 science, sir.
7 There is a hole in the document. All that's
8 related to fire. If there's a fire coming down, barreling
9 down on us again, which even the fire authority says it's
10 not a matter of if, it's a matter of when, when that
11 happens again, how are these homes going to make it better
12 for us? How is that?
13 COMMUNITY MEMBER: Well, they'll be burning
14 first.
15 COMMUNITY MEMBER: That is a good point.
16 COMMUNITY MEMBER: 'Cause they drove a line up
17 San Antonio and said, a hundred homes. We're not fighting
18 them. Let 'em go. I live right there.
19 COMMUNITY MEMBER: And I think we all owe it to
20 the potential homeowners to let them know that. But, you
21 know, all this will go around in circles. And they're
22 saying, well, the fire mitigation, blah, blah, blah, blah,
23 blah. That just doesn't make sense. Forget the report.
24 Just how could that possibly make sense when
25 you've got 3500 square feet homes that probably have at

least two to three cars, maybe a couple teenagers who have cars. So we're talking about maybe just on one little track, maybe 4 or 500 more cars trying to get down a street that couldn't handle it before. How does that make sense to you?

COMMUNITY MEMBER: You can't simple ignore what happened on November 15, 2008, sir. You can't ignore that.

COMMUNITY MEMBER: I'll comment that nobody has addressed yet still on the traffic. Here you got a young community. Two cars possibly in every house. It matures. Now you got three kids. You got five cars and a pickup and an SUV to boot. We have that in our neighborhood right now. And needless to say, we got six motorcycles also parked in the garage. See you later.

(Recess taken)

COMMUNITY MEMBER: Is that trust information, who owns that trust available?

COMMUNITY MEMBER: Why is this project being processed through the county and not through the City of Yorba Linda?

COMMUNITY MEMBER: Mr. Sandzimier, I'm sorry to interrupt you for one second. This is all news we've all heard before. Every one of us knows this story. What I'd like to do right now is take a survey of how many

concerned citizens in a very busy Christmas time frame are here to object to this property and this development. Please raise your hands, ladies and gentlemen.

(Hands raised)

COMMUNITY MEMBER: These are concerned citizens right here. We've heard all this before.

COMMUNITY MEMBER: We've heard it for years.

COMMUNITY MEMBER: And I'm sorry -- and I'm sorry to interrupt. I know it's just your job to be here, but we're all here in a time we should be spending with our families right now. And frankly, there's a lot of holes in this -- in this proposition -- in -- in this development.

Ingress, egress, above all else, more than anything else. San Antonio, Via del Agua, two-lane roads to get in and out. It's horrific. It spells disaster. Not only for the people that are buying the homes in this project, but for the people who actually live in these homes.

So one more time. Round of applause. Raise your hands, please.

(Hands raised)

COMMUNITY MEMBER: Thank you. A lot of concerned citizens here. We know that the gentlemen from Esperanza Hills are here from their project. We want them

1 to see we have even more people that would have been here
2 had this not been at Christmastime. We're united in our
3 front, and we won't stop.
4 COMMUNITY MEMBER: And to that end, what is going
5 to be said about the number one issue here, which is
6 public safety? I live on San Antonio and barely got out
7 during the fires with my life. As the fire crossed San
8 Antonio, cars backed up because they couldn't get onto
9 Yorba Linda.
10 What is being done to address that issue? Which
11 above all else, I think, separates this from normal
12 additional housing is public safety. Who's is going to --
13 what is being done to address that? I don't want to see
14 people die.
15 COMMUNITY MEMBER: Many of us are very concerned
16 because this is just a small project, apparently. There's
17 another project coming down with far many, many more
18 homes, and I don't see how you can possibly address the
19 small project without involving a discussion of the larger
20 project; otherwise (applause) having a meeting here with
21 just this one small project, why does the county not come
22 here with the entire project so that we can see what's in
23 the future what the county is proposing for rather than
24 doing it piecemeal?
25 That's what I feel is happening right now, that

it's a piecemeal approach where basically once we think we need to settle, it's just a few homes is okay. Then it becomes even more difficult when the county comes back and says, well, we want to do a few more homes and a few more homes. That's the concern, I think, many of us have.

COMMUNITY MEMBER: You have to do a study impact on the whole project, not just this line over here.

COMMUNITY MEMBER: Rick, why don't you give us Spitzer's e-mail address right now to everybody? Is it online?

COMMUNITY MEMBER: I know this is being videotaped, and you've addressed it earlier that Mr. Spitzer and all the other board of supervisors are going to view it since they didn't have enough interest in being here tonight, but how -- will this videotape be public so we can see it, post it on YouTube, get it out on social media so it can be shown to -- or is it just going to be just for your eyes only, which seems to have been a lot of things in the last two years?

I'm asking about the videotape. I would like everyone to raise their hand who would like that video --

COMMUNITY MEMBER: I'd like that video.

COMMUNITY MEMBER: -- so we can post it. Because you know what? That's what we were -- that's what we were led to believe, that this was to be viewed just like the

city council meetings are taped and viewed. We all expressed our opinions, and we did not want to all go to your little tables because we wanted our voices heard.

You're taping it. Let -- let us show our neighbors who are busy working this holiday season, and it's five days -- a week from Christmas, not everybody can be here, but this video should be public and we should be available to circulate it.

COMMUNITY MEMBER: Amen, sister.

COMMUNITY MEMBER: Can I have your word that that will be available?

COMMUNITY MEMBER: Could you point out Spitzer's staff here to hear our input? Where is Spitzer's staff? If they're not here, why aren't they here? We're here to give them input, not filtered through the developer, not filtered through the Planning staff. We'd like to talk to --

COMMUNITY MEMBER: Sir, I think we got the wrong information. I got a postcard buried in Christmas cards that said that this was a developer meeting. I didn't know it was going to be an OC Planning meeting.

It didn't indicate that. It said, "Cielo Vista." I understand that, but it should have been presented as a Planning meeting.

And unfortunately, this is at the worst time

1 possible, the very worst time possible for many of us.
2 I'm leaving in the morning really early to go on a flight
3 to Washington. And to get here tonight is just really
4 tough. You've got people already on Christmas vacation
5 and winter break, or whatever you want to call it, all
6 people that are tied up with whatever. This is a really
7 bad plan to dump it on us shortly around Thanksgiving and
8 say, hey, it's all due back on the draft EIR by
9 December 23rd. That's not okay.
10 And then gee, wow. An extension to January 7th.
11 And then we get hit with EH and so in February you've got
12 a due date. This whole thing should have been done by the
13 county together. There's no excuse for having Cielo Vista
14 and EH separated with separate plans. I agree with the
15 previous people.
16 (Applause)
17 COMMUNITY MEMBER: City of Yorba Linda is in the
18 county of Orange County; right?
19 So you have an obligation to represent our issues
20 and concerns as a county employee; correct?
21 Do you think that that's the perception that we
22 have at this point from the Planning Department that seems
23 to be helping drive this thing to fruition, or are the
24 issues and concerns that we ask and need from you, as our
25 employee, are actually being carried forward? I don't

1 perceive that. My perception is you work for the
2 developer and you're helping the developer.
3 (Applause)
4 COMMUNITY MEMBER: Okay. So I'll give you my two
5 cents on what's deficient here. And I'll preface this.
6 I've lived here for 20 years. I'm not anti-development.
7 I'm not a tree hugger. I'm not a hill hugger, but I am a
8 safety person and a quality-of-life person. And it's
9 amazing to me that this project's safety has been
10 whitewashed -- whitewashed by the county.
11 There is no way that anybody that lived through
12 those last fires that was here when there was no firemen
13 at my door, when there was no one that came to check on
14 me, when there was no one directing traffic on
15 Yorba Linda Boulevard, which was clogged, when none of
16 that happened, and now we're talking about a whitewash
17 when someone says they're going to put in an emergency
18 road, an unmaintained emergency road with a chained gate
19 on it that in the middle a 70-mile-an-hour windstorm and a
20 firestorm in the middle of the night maybe and my
21 grandmother is trying to make her way down that road, that
22 I'm supposed to believe that automatically some magic
23 person is going to show up and unlock that gate and let
24 them out.
25 So the only safe thing you can have is an open

road that is a well-used and well-maintained road, and -- and there are none of those roads on this map. You can't evacuate 500 more homes when you couldn't get out the existing homes. We're going to put 500 more homes on the same infrastructure? That's a complete whitewash for OCFA or anyone else to say, oh, this is safe. This is okay.

And I know that some day you'll be retired and these developers will be gone and the guys in the city council will be gone and Todd Spitzer will be in Washington and someone is going to die on that hill, and they're all going to say, well, gee, sorry to hear about that and act like they can whitewash that. But they won't be able to 'cause they'll have signed their names to it.

So I think it's incumbent on you guys to come to this developer and say, go ahead and make your development. Let's see your plans, but I want to see the new ingress and egress points in this road. And yeah, it's going to cost you some money, but you know what? We're all over 21 and you made the decision to buy this property. You want to develop it, you build the roads to support it.

COMMUNITY MEMBER: I want you to comment on what this gentleman here said. I have yet to hear you say anything about stopping this development if you were truly

1 on the side of the taxpayer who pays your salary. I
2 haven't heard you say anything about, tell the developers
3 to basically leave. We don't want it. But I haven't
4 heard that from you yet. Why is that?
5 COMMUNITY MEMBER: These are my comments and I'm
6 making them to the developer because I was not aware you
7 were going to be the one in charge of it. So bear with
8 me. My comment are as follows. These are to the
9 developers and these are my comments because I thought
10 they were the one that was presenting the meeting here.
11 First, your proposal that is presented in the
12 draft EIR lacks consideration to our neighborhood context.
13 Our dwelling units per acre are highly understated in your
14 documents. It is your net dwelling units per acre that
15 will be a visible life upon our neighborhood. We will see
16 -- what we will see is what we will get. We will not
17 visually see 1.33 gross dwelling units per acre, but we'll
18 see 2.4 and upwards dwelling units per acre as a result of
19 the clustering of the homes you propose to build.
20 Our neighborhood is not a cluster concept. Leave
21 that concept to Vista del Verde, please. We are not that.
22 Second, the property you are attempting to
23 develop has environmental constraints upon it. The
24 county's own general plan states, quote, for potential
25 slope and seismic hazard, constrained development. And

while both conditions settle and preclude development, they may increase the cost of construction.

Your true mitigation measure is to request a zone modification to 1-B in order to pack an acreage that is conducive to building thereby attempting to increase or maintain profit and avoid any increase cost of construction associated with the land subject to the environmental constraints you face.

We should not be burdened by your investment in largely unsuitable land. Are you going to be the entity to build the homes, or are you merely gaining entitlement, selling the land off to some unknown entity and leaving town?

What design rights for density will an eventual builder be bound by? Will we be faced with the up-to-18 dwelling units per acre that you assert in your EIR that could be built with the 1-G designation when it's all said and done? Those are my comments.

(Applause)

COMMUNITY MEMBER: Can we have a conversation directly with the developer, or just you? We're talking to you. The developer is here. Can we have the development team in the front? 'Cause they're at the back.

COMMUNITY MEMBER: Give them the mic.

1 COMMUNITY MEMBER: We'd like to hear from them.
2 (Applause)
3 COMMUNITY MEMBER: Frankly, they're the ones who
4 are affecting our lives, not you.
5 COMMUNITY MEMBER: Why is it if this is a
6 development meeting yet the facade is you're representing
7 them as a county employee up here trying to control the
8 meeting, maintain the order, collection of the
9 information, yet we're under the perception we're supposed
10 to be talking with the developer here. So it's kind of
11 like a buffer. Like you're running --
12 COMMUNITY MEMBER: Like you're their sock puppet
13 or something like that.
14 COMMUNITY MEMBER: I would urge those of us here,
15 we are not the majority of our homeowners, that those of
16 here not fill these in and turn them in tonight. Take
17 your time. The draft EIR is available, unfortunately, at
18 very few places, but the Yorba Linda Public Library --
19 you're going to have to help me out, those of you are can
20 recall -- but the Planning Office, City Hall, and they are
21 available online.
22 COMMUNITY MEMBER: You can download them.
23 COMMUNITY MEMBER: And it's far bigger than these
24 little couple of lines per copy and it doesn't really
25 address what your concerns and ours are. Traffic is huge.

1 Egress, ingress, huge. Earthquake issues, huge. The
2 whole thing, to say as the kids do, this sucks. Thanks
3 very much.
4 COMMUNITY MEMBER: One is that the signal at
5 Via del Agua and Yorba Linda Boulevard will not cure this
6 problem. It will not fix it.
7 COMMUNITY MEMBER: And conversely, the traffic
8 gentleman here that I spoke to, when I asked him about
9 traffic flow studies, he said he didn't take any
10 consideration in his traffic flow study the evacuation
11 plan and everybody leaving at one time at all. He just
12 said it. I was standing here. So that's a huge concern
13 on video for all of the residents.
14 COMMUNITY MEMBER: Emergency, earthquake, fire,
15 you name it. I mean, natural disasters, flood. Prado Dam
16 collapsing. You name it. You've got to get out.
17 COMMUNITY MEMBER: So my issue has been a concern
18 about you representing the developer in this thing. Could
19 we ask the county, since it appears that at least
20 perception-wise is that the developer clearly have an
21 advocate, or at least my perception is that there's an
22 advocacy within the county, can we get a county advocate
23 to carry our flag and be an employee that works for us?
24 We're county -- county citizens. We'd like to have
25 somebody carrying our flag.

How can we get somebody within the Planning Department to be that person? I know you have to sit on both sides of it, but I'm saying, you know what? It really appears that we have a lot of protective behavior over what is -- what's going on with this to support the developer.

Can we have an advocate within the -- within the Planning Commission or the Planning Department that carries our flag and carries our concerns?

Can you take that back and say, this -- this area, the citizens of Orange County who happen to be impacted by this area up here in Yorba Linda would like to have an advocate that is dedicated from the Planning Commission or the Planning Department?

COMMUNITY MEMBER: I read the traffic portion of that DIR and it was extremely long and extremely dull because there was so much repetition in it and redundancy and the numbers that they took in the study, whenever that was done, just seemed very, very general. And they took broad guidelines and applied it to our neighborhood, which, from I read, wasn't appropriate at all. It wasn't specific to our neighborhoods and our streets and our situations. And with the potential fire emergency that sort of thing, just in my mind, is the wrong conclusion.

They're just saying, well, you can take X number

1 of cars for this kind of road. Yeah. They can line them
2 all up, but they're not going to be able to move them
3 anywhere. So that's pretty specific.
4 COMMUNITY MEMBER: Correct me if I'm wrong, but
5 my perception so far of this process having gone through
6 the NOP, now we're dealing with the EIR, is that we have
7 our comments that we make and the developer has paid boat
8 loads of money for so-called experts and others to come in
9 and give their expert opinions on the matter.
10 And like I said earlier, firsthand experience, in
11 my book, trumps experts opinions every time. We lived it.
12 We were there. My fear is in the final analysis of this
13 thing is that the county and the developer are both going
14 to trot out these experts who say, oh, our conclusion is
15 that these streets will handle this added traffic based on
16 this, you know, exercise in numbers that we've done and,
17 you know, like I said, theories and so forth.
18 But really, a sixth grader can look at this and
19 just -- just know that the numbers aren't there. It just
20 isn't going to support it. And like -- like the gentleman
21 said earlier about a whitewash, I think a whitewash is
22 going to turn into a railroad, and we're going to be
23 railroaded right on to the bitter end the way the
24 developer is going with this.
25 COMMUNITY MEMBER: Yes. Would you ask the

developer if they plan to build a school? There's 37 kids in the classes here. Traffic backs up to Yorba Ranch Road in the morning. When I get to the parking lot, it takes me 15 minutes just to get around the parking lot. Adding more kids to that --

Traffic coming down from Via del Agua, it's difficult to get out. Even if you put a light in, a lot of times it's backed up to Yorba Ranch Road. And then even at the pickup line, you're blocking streets. Via del Esquela is blocked in the pickup lines because there's so many people there. Adding more cars to that, that's a safety issue right there.

COMMUNITY MEMBER: Just one quick question. Does the county -- I know like the guy was saying they're trying piecemeal one development here, one development. Won't the county take a look at the whole development as a whole? I mean, I talked to the traffic gentleman back here, and he said that right now at peak hours there was maybe 40 cars -- I can't remember -- during the peak time, and that's fine.

But when you build 500 homes behind it, you're going to have over a thousand cars during that peak hour. But if they look at this small tract here, it's only a small portion. You know, maybe there's a hundred homes and now they're only going to have maybe 200 or 300 more

cars. It just escalates. That's why I think the county should look at it as a whole rather than just one tract and one tract and one tract.

COMMUNITY MEMBER: Where will that be reflected, your analysis of both developments?

COMMUNITY MEMBER: I've got a question about traffic. I was just talking to the guy that developed the traffic land. He said they have not analyzed the history of accidents at Agua and Yorba Linda Boulevard. They had somebody clicking as cars went by with a clicker, not using those counter machines, just using a clicker. He said he didn't analyze the accidents, both the frequency and severity of the accidents.

In Agua are about 54 homes, going up Stonehaven about another 50. You're talking about doubling the traffic through the Agua-Yorba Linda Boulevard intersection. Why was a traffic study not done including a history of accidents along those roads? I don't understand.

COMMUNITY MEMBER: And along with the traffic, you're talking about intersections at Stonehaven and Yorba Linda and San Antonio and Yorba Linda, but what about the big intersection, Yorba Linda Boulevard and Imperial and Weir Canyon and La Palma, Weir Canyon and Santa Ana Canyon?

1 Have you ever tried to get through those areas
2 between 5:00 and 6:00 at night? And you're talking about
3 throwing 500-plus more homes that will impact it also, go
4 through the major arteries? 4,000 more cars?
5 COMMUNITY MEMBER: It can't handle it. It would
6 be like Temecula.
7 COMMUNITY MEMBER: So are they looking at that in
8 the traffic studies, the major arteries, or just the
9 little capillaries?
10 COMMUNITY MEMBER: We heard all about the
11 developers and all the analysts that they have hired to do
12 whatever they've done. What have you, the county, done to
13 help us know that you've represented us to do the studies
14 too that would let us know all the facts about it?
15 Whether that's true or not, have you hired anybody? I
16 mean, we're paying taxes, high taxes in this county. You
17 haven't said one thing about what your department or
18 anybody in the county has done to analyze whether this is
19 even feasible or even possible.
20 COMMUNITY MEMBER: So you're saying, if I
21 understand you correctly, you're standing behind these
22 documents? You're agreeing with what's been prepared to
23 this point? You're saying you're ready to go with forward
24 with it if everybody supports it?
25 COMMUNITY MEMBER: I'm back to the traffic again.

1 I guess I'm really kind of stuck on the whole thing
2 because seems like this property is landlocked by all
3 intents -- for all intents and purposes.
4 And to me, I want to know whose responsibility is
5 it to build the roads in and out? Because you're using
6 the City of Yorba Linda, the existing roads that have been
7 there for like decades; right?
8 So how they expect that -- that -- that they're
9 going to get people in and out of these properties by
10 using existing roads? Is it the City of Yorba Linda's job
11 to widen the road? 'Cause I know they're not going to pay
12 for it.
13 Is the county going to pay for it? Is the
14 developer going to pay for it? Who's going to pay to
15 widen the roads? 'Cause I can safely tell you right now
16 just from a usability standpoint, analysis aside, you
17 know, this lady said it best back here, she said, you know
18 what? Experts said the Titanic wouldn't sink either. And
19 we all know the end of that story.
20 So experts and people who live here on a daily
21 basis who understand the ins and the outs of these roads,
22 I think we're the experts; okay?
23 (Applause)
24 COMMUNITY MEMBER: So I can safely tell you right
25 now somebody will have to do something about the roads.

1 And if it's the county, fine. If it's the developer,
2 fine. But if it's the City of Yorba Linda and our city
3 council and they approve widening the road, fine. But I
4 can tell you right now given the current infrastructure,
5 it won't work. So that's my comment.
6 COMMUNITY MEMBER: Good evening. I'm
7 Ken Peterson. I live above the Casino Ridge area. It's
8 Mt. San Antonio HOA. I just want to let everybody know
9 that it's already been approved for 11 additional lots in
10 Mt. San Antonio. So our subdivision is increasing by
11 11 lots, whenever it's going to be.
12 So whatever the impact report is putting together
13 as far as the cumulative impact, that should be considered
14 as well because it's a project. It's been there for
15 years. It's been sort of simmering, if you will. But it
16 will go forward. And one additional note, traffic is
17 going to be coming down that road.
18 COMMUNITY MEMBER: How many homes are there
19 already?
20 COMMUNITY MEMBER: There's 63 right now.
21 COMMUNITY MEMBER: And originally they were
22 supposed to build how many homes?
23 COMMUNITY MEMBER: I'm not sure.
24 COMMUNITY MEMBER: Yeah.
25 COMMUNITY MEMBER: But in any event, there's

1 definitely 11 more coming down through that area. In
2 looking at the project from what I can see, it certainly
3 doesn't look like Yorba Linda. I'm not seeing equestrian
4 trails. I'm not seeing parks. It just seems like what
5 you have is a cluster community, as mentioned earlier,
6 coming into the area having a very negative impact in all
7 ways as opposed to really bringing something to the
8 community that would be rather helpful.
9 (Applause)
10 COMMUNITY MEMBER: My question, we sort danced
11 around it, but the city of Yorba Linda is impacted. The
12 City of Yorba Linda provides services, ultimately, the
13 streets.
14 So what rights does the City of Yorba Linda have
15 vis-à-vis this development's approval if the County of
16 Orange decides to move forward? Because I understand that
17 it's currently unincorporated, but eventually it's going
18 to get annexed into the city and eventually it's going to
19 be the city's burden.
20 So are there not permits for discretionary
21 approvals that the City of Yorba Linda would have to grant
22 before this can move forward?
23 COMMUNITY MEMBER: Or will you do it by imminent
24 domain?
25 COMMUNITY MEMBER: That's why the developer went

to the county.

COMMUNITY MEMBER: Understood. That's why I'm asking the question.

COMMUNITY MEMBER: If the City of Yorba Linda chooses not to accept the connectivity from this annex, from this area that you're allowing to develop as the county representatives, what happens? What happens if we say, you know what? We don't want this thing. You want to build that property, build it, but don't connect it to our city. Don't -- or would that go by imminent domain?

COMMUNITY MEMBER: Well, my -- my last comment would be in my limited understanding, the county is opposed to island developments and these, Cielo Vista and Esperanza Hills, and potentially the other developments that Ken Peterson mentioned and there's some others, those are totally dependent upon annexation. And if you are not considering these as one unit, I think we have problems. I think that you have to consider the entire hillside project as one thing or it just simply won't work.

CERTIFICATION

OF

CERTIFIED SHORTHAND REPORTER

I, the undersigned, a Certified Shorthand Reporter of the State of California do hereby certify:

That the foregoing proceedings were taken before me at the time and place herein set forth; that any witnesses in the foregoing proceedings, prior to testifying, were placed under oath; that a verbatim record of the proceedings was made by me using machine shorthand which was thereafter transcribed under my direction; further, that the foregoing is an accurate transcription thereof.

I further certify that I am neither financially interested in the action nor a relative or employee of any attorney of any of the parties.

IN WITNESS WHEREOF, I have this date subscribed my name:

Dated: December 29, 2013

Certificate Number: 13394

Supplemental LGC Geotechnical Letter Reports

July 31, 2014 Project No. 10106-01

Mr. Larry Netherton
North County BRS Project, LLC
3 Corporate Plaza, Suite 102
Newport Beach, California 92660

Subject: ***Location of Whittier Fault, Cielo Vista, Tentative Tract Map No. 17341, County of Orange, California***

Introduction

LGC Geotechnical, Inc. (LGC Geotechnical) has prepared this letter to discuss the location of the Whittier Fault relative to the proposed Cielo Vista development, tentative tract map no. 17341, County of Orange, California. LGC Geotechnical had previously conducted geotechnical trench work on the Cielo Vista development site and prepared a report titled, "Geotechnical Feasibility Study Proposed Development of Tentative Tract Map No. 17341, County of Orange, California", dated March 1, 2013. This letter report provides additional information with respect to the location of the Whittier Fault.

Method of Fault Evaluation

An evaluation of the area of proposed development within the Fault Rupture Hazard Zone (CDMG, 1980) was initiated by LGC Geotechnical in 2012. Our evaluation included the following:

- Review of available geologic maps and geotechnical documents for the subject site, as well as adjacent and nearby sites along the Fault Rupture Hazard Zone for the Whittier Fault. Our research supplied data with regard to where the active trace of the Whittier Fault had been identified in the vicinity of the site. A previously published report (ERA, 1985) established the location of the Whittier Fault on the western property line of the Cielo Vista project site.

- Excavation of four fault trenches (Fault Trench FT-1 through FT-4 as depicted on our Whittier Fault Location Map, Sheet 1). Each of the fault trenches was excavated to a depth of approximately 10 feet below the existing ground surface and ranged in lengths from approximately 105 feet to 320 feet. The trenches were excavated within the area of the proposed Cielo Vista development within the southern portion of the Fault Rupture Hazard Zone – the boundaries of which are depicted on Figure 4.5-1 of the Draft EIR. The trenches were oriented approximately perpendicular to the primary fault trace.

- Fault trenching was not conducted within the northern portion of the Fault Rupture Hazard Zone on the Cielo Vista site due to the presence of deep saturated alluvium, a drainage channel, and landslide areas. However, our review of fault trenching performed east (AGI, 2012) and west (ERA, 1985) of

the northern Fault Rupture Hazard Zone on the site has indicated the absence of active faulting projecting towards this area.

- Observation of fault trenches excavated as part of American Geotechnical's Fault Hazard Assessment Report prepared in connection with the Esperanza Hills development adjacent to the east side of the subject site and review of the referenced report and fault trench logs (AGI, 2012).

Conclusion

The primary trace of the Whittier Fault is well-defined as a narrow fault zone less than approximately 15-feet-wide along the east-west drainage in the central portion of the Cielo Vista site as depicted on our Whittier Fault Location Map (Sheet 1). The findings of our study are in general concurrence with the findings of the previous fault studies in the vicinity of the subject site, including the recent fault study performed east of the site prepared in connection with the Esperanza Hills development (AGI, 2012). The fault trace location was established by projection of the fault trace across the site using the fault trace locations established at the eastern and western property boundaries of Cielo Vista.

Should you have any questions regarding this letter-report, please do not hesitate to contact our office. We appreciate this opportunity to be of service.

Sincerely,

LGC Geotechnical, Inc.

Tim Lawson
Geotechnical Engineer

TJL/kmb

Attachments: References
Sheet 1 – Whittier Fault Location Map

Distribution: County of Orange

References

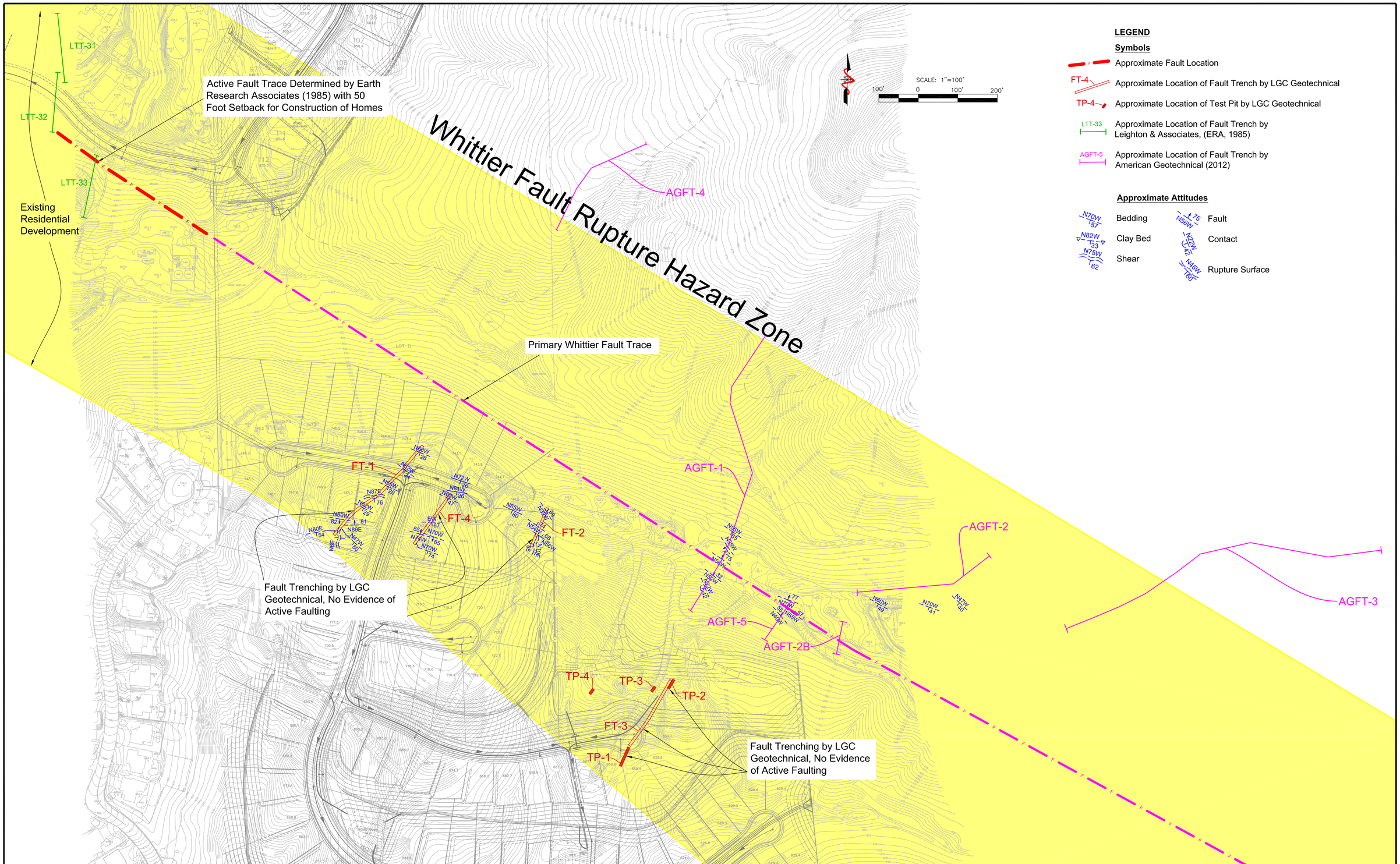
American Geotechnical, Inc., 2012, Fault Hazard Assessment Report "Whittier Fault Zone: Addressing a Portion of the Proposed Esperanza Hills Residential Development Project in the Southeastern Puente Hills Unincorporated Orange County, Southern California, Project No. 33366-01, dated November 2012.

California Department of Conservation, Division of Mines and Geology (CDMG), 1980, State of California Special Studies Zones, Yorba Linda Quadrangle, Official Map Effective: January 1, 1980.

_____, 2007, Fault-Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps, Special Publication 42, Interim Revision 2007.

Earth Research Associates, Inc., 1985, Preliminary Soils Engineering and Engineering Geologic Investigation, Tentative Tract No. 9813, City of Yorba Linda, California, Job No. 233-84, dated March 27, 1985.

LGC Geotechnical, Inc., 2013, Geotechnical Feasibility Study, Proposed Development of Tentative Tract Map No. 17341, County of Orange, California, Project No. 10106-01, dated March 1, 2013.



LGC Geotechnical, Inc.

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TEL (949) 369-6141 FAX (949) 369-6142

Whittier Fault Location Map

PROJECT NAME	Cielo Vista
PROJECT NO.	10106-01
ENG. / GEOL.	TJL/KBC
SCALE	Not to Scale
DATE	July 2014

SHEET 1 of 1

August 1, 2014 Project No. 10106-01

Mr. Larry Netherton
North County BRS Project, LLC
3 Corporate Plaza, Suite 102
Newport Beach, California 92660

Subject: ***Discussion of Potential Implications of Subsurface Geological Features in the Southern Portion of Cielo Vista, Tentative Tract Map No. 17341, County of Orange, California***

Introduction

LGC Geotechnical, Inc. ("LGC") has prepared this letter to discuss its findings relating to the potential effect of various subsurface geological features on the proposed southern portion of the Cielo Vista development, Tentative Tract Map No. 17341, County of Orange, California. In a separate letter, LGC Geotechnical (LGC, 2014) concluded that the location of the Whittier Fault was well defined as a narrow fault zone along the east-west drainage in the central portion of the Cielo Vista site.

Method of Investigation

In the Fall of 2012, LGC Geotechnical excavated, detail-logged, backfilled and compacted four fault trenches (FT-1 through FT-4) within the southern portion of the Fault Rupture Hazard Zone depicted on Figure 4.5-1 of the Draft EIR and the Whittier Fault Setback Map, Sheet 1 attached to this letter. Each of the fault trenches was excavated to a depth of approximately ten feet below the existing ground surface. The trenches ranged in lengths from approximately 105 feet to 320 feet. The locations and lateral extents of Fault Trenches FT-1 through FT-4 are presented on the Whittier Fault Setback Map, Sheet 1. The trenches were excavated within the footprint of the proposed Cielo Vista development in the Southern Fault Rupture Hazard Zone Area. The trenches were oriented approximately perpendicular to the Whittier Fault's primary trace. The trench walls of the trenches were scraped clean and detail logging of the lithology, geologic structure and stratigraphy exposed within the trench walls was performed.

LGC Geotechnical also observed the trenching on the adjacent Esperanza Hills property, and reviewed the fault studies for the properties immediately adjacent to the east (Esperanza Hills) and west of the Cielo Vista site.

Conclusion

Our review of fault trenching performed east and west of the southern Fault Rupture Hazard Zone on the site has indicated the absence of active faulting projecting towards and within the southern portion of the Fault Rupture Hazard Zone. Although we have identified subsurface geological features in Fault Trenches FT-1

and FT-4, these faults are well south of and subparallel to the primary trace of the Whittier Fault and are not considered to be the active trace, nor active branches of the Whittier Fault. Rather, the features in Fault Trenches FT-1 and FT-4 are likely older faults related to "ridge shatter" as the ridgeline in the central portion of the site was uplifted and the geology folded.

To build residential structures within the Southern Fault Rupture Hazard Zone Area, it needs to be demonstrated that the area of proposed development is not underlain by an active fault (CDMG, 2007). A fault that has ruptured the ground surface within the Holocene Age (approximately the last 11,000 years) is considered active. The data examined and exposed by LGC Geotechnical's excavations does not definitively conclude that the area of proposed development is underlain by inactive or ancient faults, as datable materials were not identified which could constrain the age of the faults encountered. Therefore, it cannot be ruled out that an active fault may extend between the unfaulted materials exposed in Fault Trenches FT-2 and FT-3, which could also project south of the unfaulted southern portion of American Geotechnical's Fault Trench T-1 and connect to the primary trace of the Whittier Fault (Sheet 1). As a result, LGC Geotechnical recommends the following measures:

Recommendations

Cielo Vista Planning Area 1:

Additional off-site fault trenching is recommended to determine the presence or absence of active faulting projecting towards the proposed development area within the Fault Rupture Hazard Zone shown on Sheet 1. If the proposed additional fault trenching finds unfaulted bedrock and/or faulted bedrock capped by old alluvial material, then it would show that the faulting encountered within Fault Trenches FT-1 and FT-4 is not active.

In the event the faults in FT-1 and FT-4 are not active, then a 75-foot fault setback zone would be recommended along the south side of the active Whittier Fault. This setback zone would be expected to have little effect on the development of the southern portion of the site (Planning Area 1). A 10-foot overexcavation and recompaction below pad grade for the proposed structures in the ridge area of the site closest to the Whittier Fault would be recommended in order to reduce the potential effect of the differential expansion of the steeply dipping bedding in this area. Post-tensioned (PT) foundations would also be recommended. The 10-foot overexcavation and use of PT foundations would also mitigate any potential impacts associated with minor movement along the old faults due to a major event on the Whittier Fault.

Should the faults be found to be active, it is recommended that the lots within the southern portion of the Fault Rupture Hazard Zone Area shown on Sheet 1 not receive residential building permits until studies are performed and the County determines which lots are suitable for residential construction (e.g., because additional study concludes that certain areas of proposed development are not underlain by an active fault.)

All lots located outside of the southern portion of the Fault Rupture Hazard Zone Area can be developed without mitigation for faulting, as no faulting was encountered within Fault Trench FT-3 and the active trace of the Whittier Fault has been well constrained by the fault evaluation discussed in the separate letter based upon our additional analysis of the fault trenches and evaluation by American Geotechnical and Earth Research Associates north, east and west of the Southern Fault Rupture Hazard Zone Area.

Cielo Vista Planning Area 2:

Immediately west of the site, previous fault studies have recommended a 100-foot-wide setback zone: 50 feet on either side of the primary trace of the fault and residential structures were accordingly set back from the active trace of the fault. North of the Whittier Fault, we recommend a setback zone in accordance with that recommended by American Geotechnical (AGI, 2012), ranging from 50 feet on the west side of the site to approximately 120 feet on the east side. The proposed development area north of the Whittier Fault (Planning Area 2) would be sufficiently located away from the fault so that the fault setback zone would not impact this portion of the proposed development.

Should you have any questions regarding this letter-report, please do not hesitate to contact our office. We appreciate this opportunity to be of service.

Sincerely,

LGC Geotechnical, Inc.

Tim Lawson
Geotechnical Engineer

TJL/kmb

Attachments: References
Sheet 1 – Whittier Fault Setback Map

Distribution: County of Orange

References

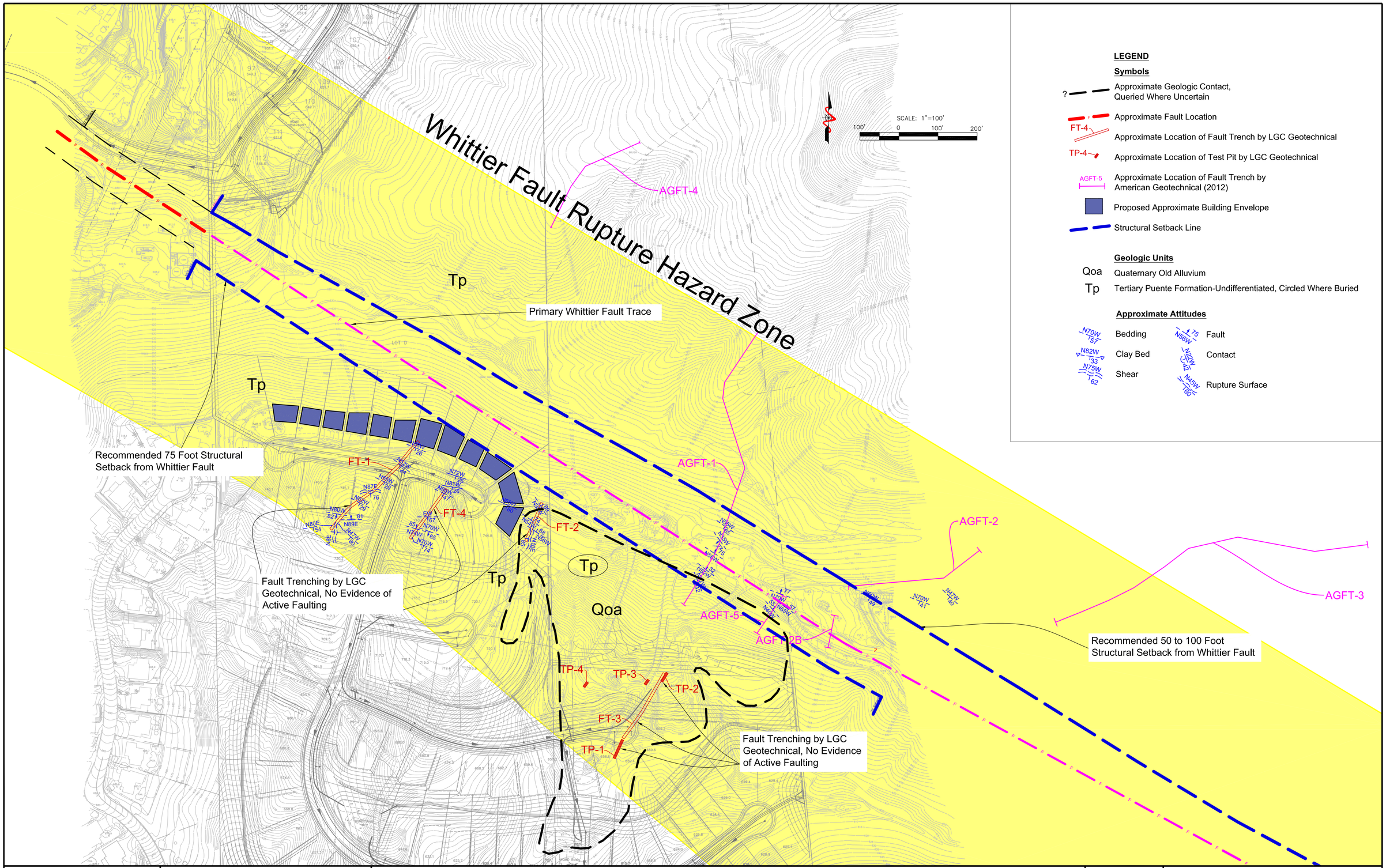
American Geotechnical, Inc., 2012, Fault Hazard Assessment Report "Whittier Fault Zone: Addressing a Portion of the Proposed Esperanza Hills Residential Development Project in the Southeastern Puente Hills Unincorporated Orange County, Southern California, Project No. 33366-01, dated November 2012.

California Department of Conservation, Division of Mines and Geology (CDMG), 1980, State of California Special Studies Zones, Yorba Linda Quadrangle, Official Map Effective: January 1, 1980.

_____, 2007, Fault-Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps, Special Publication 42, Interim Revision 2007.

Earth Research Associates, Inc., 1985, Preliminary Soils Engineering and Engineering Geologic Investigation, Tentative Tract No. 9813, City of Yorba Linda, California, Job No. 233-84, dated March 27, 1985.

LGC Geotechnical, Inc., 2014, Location of Whittier Fault, Cielo Vista, Tentative Tract Map No. 17341, County of Orange, California, Project No. 10106-01, dated July 31, 2014.



LGC Geotechnical, Inc.

LGC Geotechnical, Inc.
131 Calle Iglesia, Ste. 200
San Clemente, CA 92672
TEL (949) 369-6141 FAX (949) 369-6142

Whittier Fault Setback Map

PROJECT NAME	Cielo Vista
PROJECT NO.	10106-01
ENG. / GEOL.	TJL/KBC
SCALE	Not to Scale
DATE	August 2014

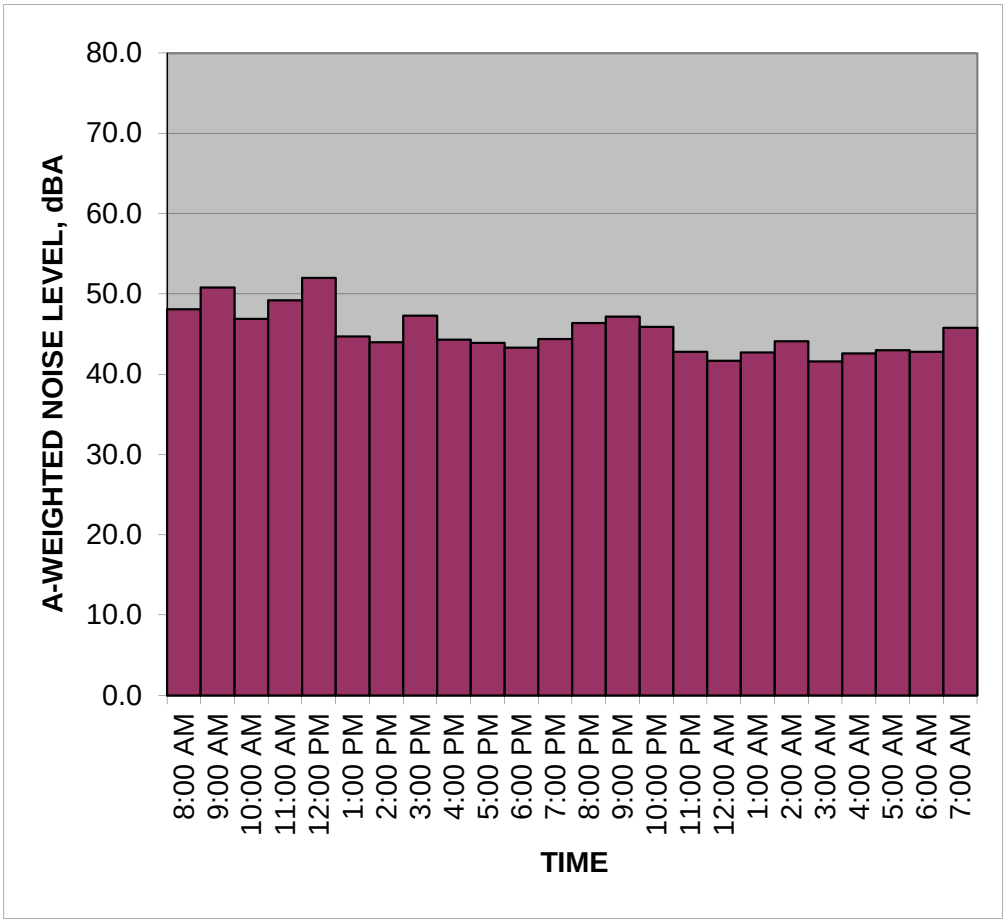
SHEET 1 of 1

Measured Ambient Noise Levels

Project: Cielo Vista Project
Location: R1 - Southwestern Property Line
Sources: Ambient

Date: June 25-26, 2014

TIME	HNL, dB(A)
8:00 AM	48.1
9:00 AM	50.8
10:00 AM	46.9
11:00 AM	49.2
12:00 PM	52.0
1:00 PM	44.7
2:00 PM	44.0
3:00 PM	47.3
4:00 PM	44.3
5:00 PM	43.9
6:00 PM	43.3
7:00 PM	44.4
8:00 PM	46.4
9:00 PM	47.2
10:00 PM	45.9
11:00 PM	42.8
12:00 AM	41.7
1:00 AM	42.7
2:00 AM	44.1
3:00 AM	41.6
4:00 AM	42.6
5:00 AM	43.0
6:00 AM	42.8
7:00 AM	45.8
CNEL, dB(A):	**50.9**



NOTES:

fieldcnel.xls

Fire Behavior Analysis Report
Cielo Vista

Prepared for:

Orange County Fire Authority

Planning and Development Services

Prepared By:

firesafe ::PLANNING SOLUTIONS

Revised: August 21, 2013

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Purpose of Report

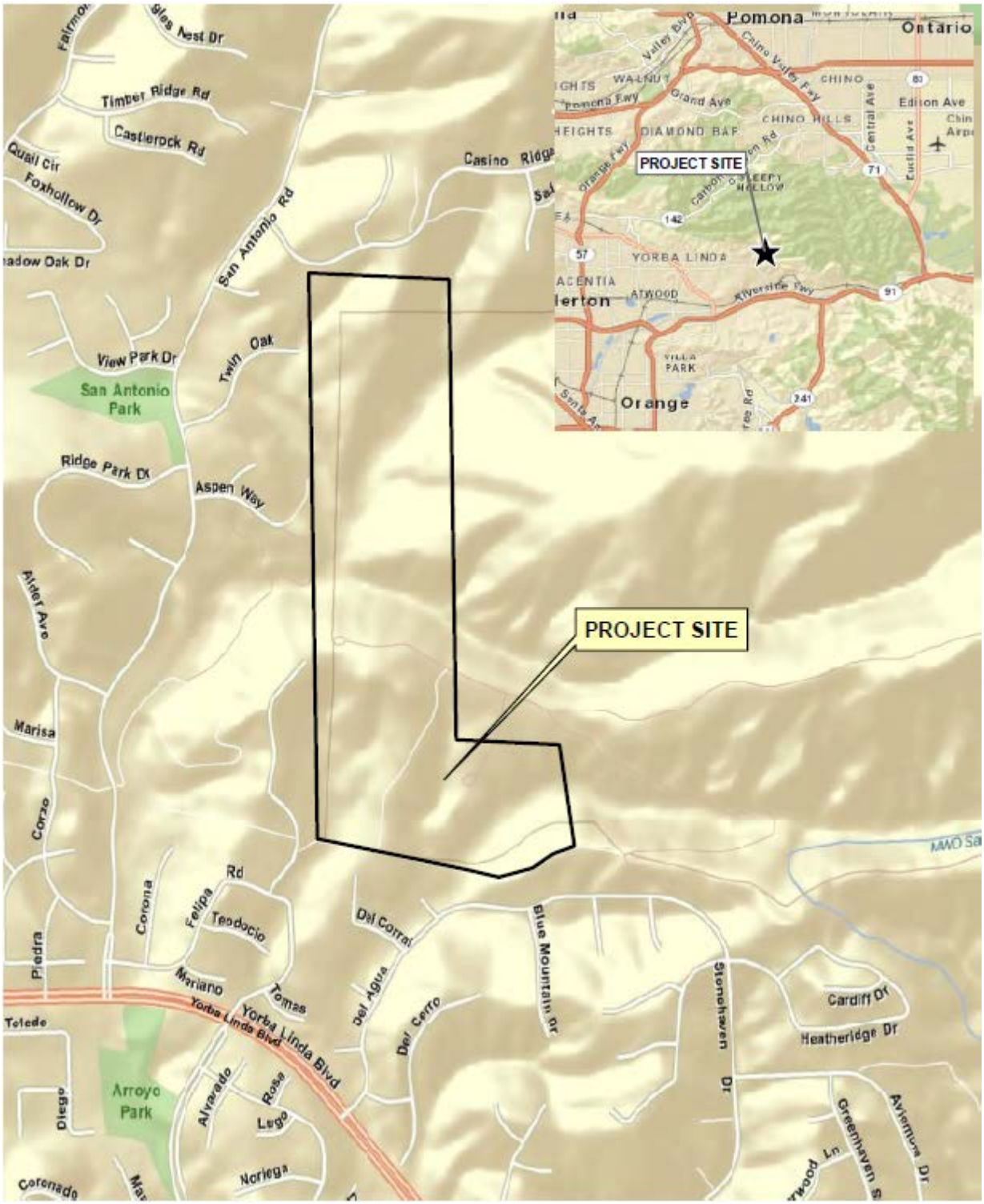
Firesafe Planning Solutions performed an assessment of the risks related wildland fire and to establish the appropriate criteria for a defensible space installation and maintenance program that will reduce the intensity of a wildfire approaching the Cielo Vista residential community. This report will provide the results of the assessment and provide objective support of the defensible space installation and maintenance program for this community that is equal to or greater than the risk which would be encountered in a worst case scenario. The study takes into consideration existing/future vegetative interface fuels, topography, and weather conditions during a fire. The report provides results of computer calculations that measured the fire intensity from a worst case scenario wildfire in both the extreme (Santa Ana- NE wind) and the predominate (Onshore – Southwest wind) conditions. The results of fire behavior calculations have been incorporated into the fire protection design built into the Cielo Vista development.

Geographic Description

The Cielo Vista site is located in a Fire Hazard Severity Zone in Orange County within the City of Yorba Linda's sphere of influence but within the unincorporated area of Orange County. The Cielo Vista Project proposes to develop a maximum of 112 single-family dwellings on approximately 84 acres located in unincorporated Orange County. The proposed dwellings and associated infrastructure would occupy approximately 47.6 acres of the project site, while approximately 36.3 acres of the site would be preserved as permanent open space. The permanent open space would consist of the site's natural habitat as well as the Project's fuel modification zones, but exclusive of private slopes, water quality basins and roadways.

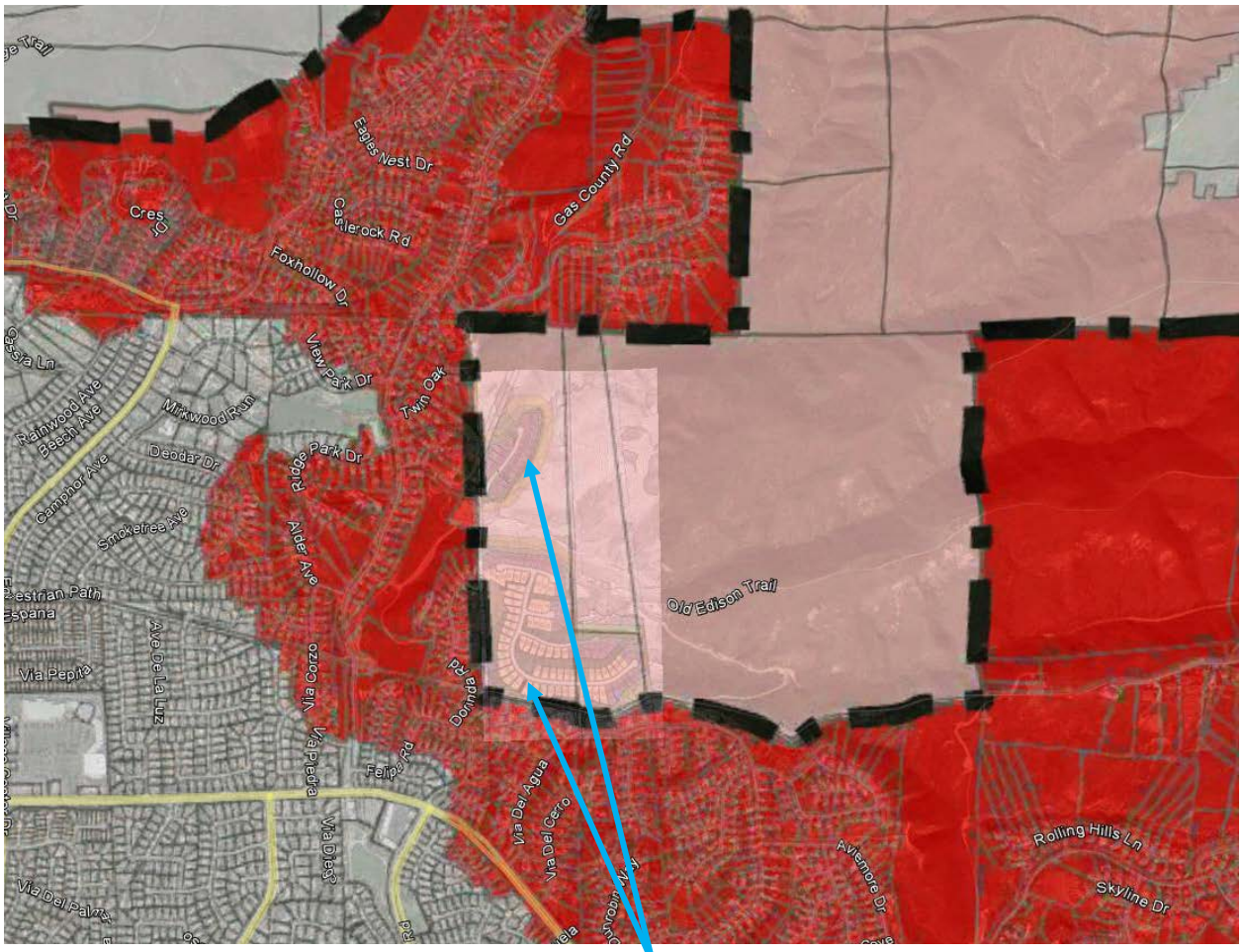
The proposed project is bordered by existing development to the west, north and south. The west and south sides of Cielo Vista has interface areas which are typical of existing development in the area. The east and north sides of the proposed community are bounded by open space areas which will create wildland interfaces at these locations. Further to the north is the existing Casino Ridge development.

On the next page, the *Regional Location and Project Vicinity Map* from the draft EIR has been provide for reference. To the left is the project super imposed on an aerial photo of the project area.

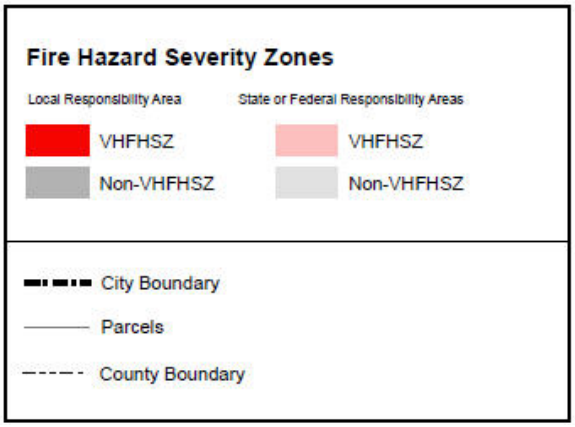


Regional Location and Project Vicinity Map from the draft EIR

CAL FIRE Local Responsibility Area Very High Fire Hazard Severity Zone Map

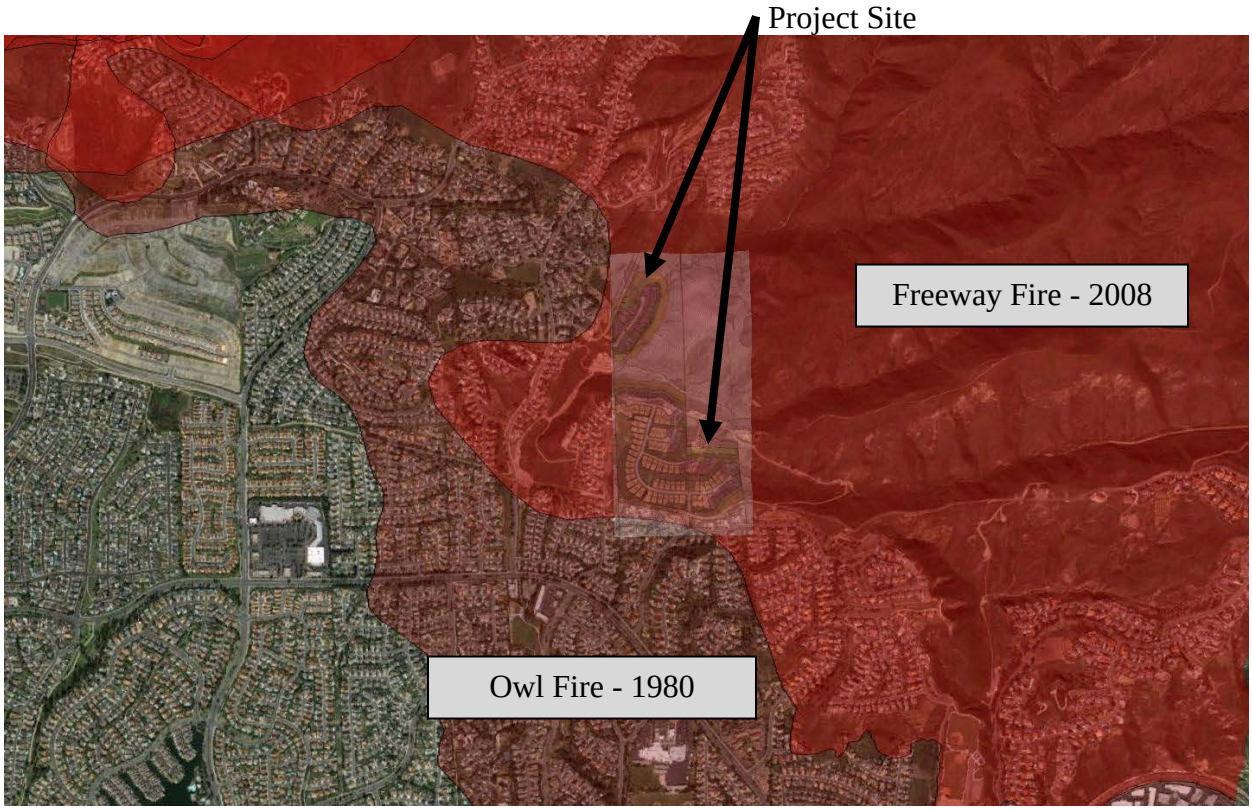


Project Location



As shown above, the project site is in the State Responsibility Area (SRA) as identified by CAL FIRE per state law and is completely within Very High Fire Hazard Severity Zone of that map.

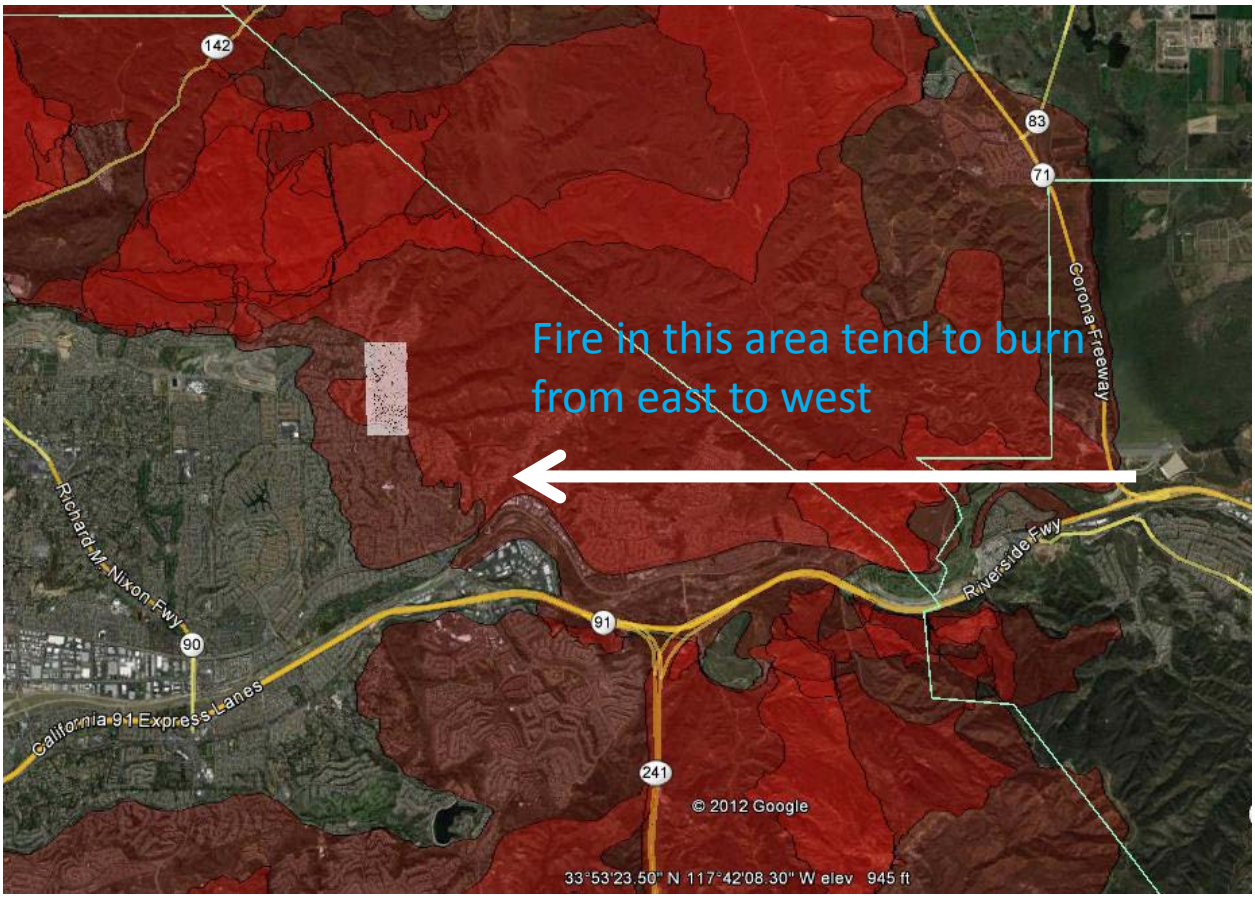
Fire History



Only two fires have occurred on the project site that are within the CalFire database. The first began on October 28, 1980; the Owl fire consumed over 18,330 acres in Orange and Riverside counties while the Freeway Complex started on November 15, 2008 and burned 30,305 acres. The Owl fire destroyed three structures, which were scheduled for demolition before the fire. The Freeway Complex destroyed 187 homes, damaged another 127 homes. Two commercial structures were destroyed and two others damaged. It should be noted that structured that survived the 1980 fire, were destroyed during the 2008 fire. According to the After Action Report from the Orange County Fire Authority, all structures damaged or destroyed were impacted by ember intrusion rather than by radiant heat or direct flame contact from the wildland. Some structures did burn through fire communicating from one burning structure to the next.

Historical fire corridors exist to the north and south of the project site. The large majority of the fires with in the area in the CalFire database have burned from the east to the west under high wind conditions and normally in the fall. The graphic on the next page shows some of these fires and the ultimate fire perimeters when they were finally contained.

Fire Travel within the Historic Fire Corridors



Fire Behavior

Firesafe Planning Solutions used a computer software program titled, "BehavePlus Fire Modeling System 5.0.4" to predict the level of wildfire intensity for a fire approaching Cileo Vista . BehavePlus, is a fire behavior prediction and fuel modeling system and is one of the most accurate methods for predicting wildland fire behavior. The BehavePlus fire behavior computer modeling system is utilized by wildland fire experts nationwide. Vegetative fuels are recognized as fuel models within the BehavePlus program. The fuel models in the computer program, are also referenced from the book titled, "Aids to Determining Fuel Models for Estimating Fire Behavior". The fuel models were designed to aid in determining fuel types and are used in calculating and estimating fire behavior. We used BehavePlus to measure the intensity of a fire moving towards this development.

The fire model describes the fire behavior only within the flaming front of the fire. The primary moving force in the fire is dead fuel less than ¼" in diameter. These are the finest fuels that carry the fire. Fuels larger than ¼" contribute to fire intensity, but not necessarily to fire spread as much as the fine fuels. The BehavePlus fire model describes a wildfire spreading through surface fuels, which are the burnable materials within 6' of the ground and contiguous to the ground.

This type of modeling will demonstrate that the proposed protection is the best fire defense system for Cielo Vista. The Modeling will show that the structures are significantly further away than the most extreme flame lengths and intensity that would be produced. Instead of estimating with the exact fuel models for calculating fire behavior, we have used worst case scenario factors and fuel models to ensure a further safety cushion in the computer fire behavior calculations and results analysis.

<u>BehavePlus Related References:</u>

1. <u>Aids to Determining Fuel Models for Estimating Fire Behavior,</u> Hal E. Anderson. General Technical Report INT-122 April 1982.United States Department of Agriculture - Forest Service, Intermountain Station, Ogden, Utah 84401.

2. <u>BehavePlus: Fire Behavior Prediction and Fuel Modeling System - BURN Subsystem.</u> General Technical Report INT-194. Patricia L. Andrews, United States Department of Agriculture - Forest Service, Intermountain Station, Ogden, Utah 84401

<u>Wildland Interface Fuel Types</u>

For the purposes of modeling in the plan, Fuel Models gs2, sh5, model 4 and SCAL18 were used:

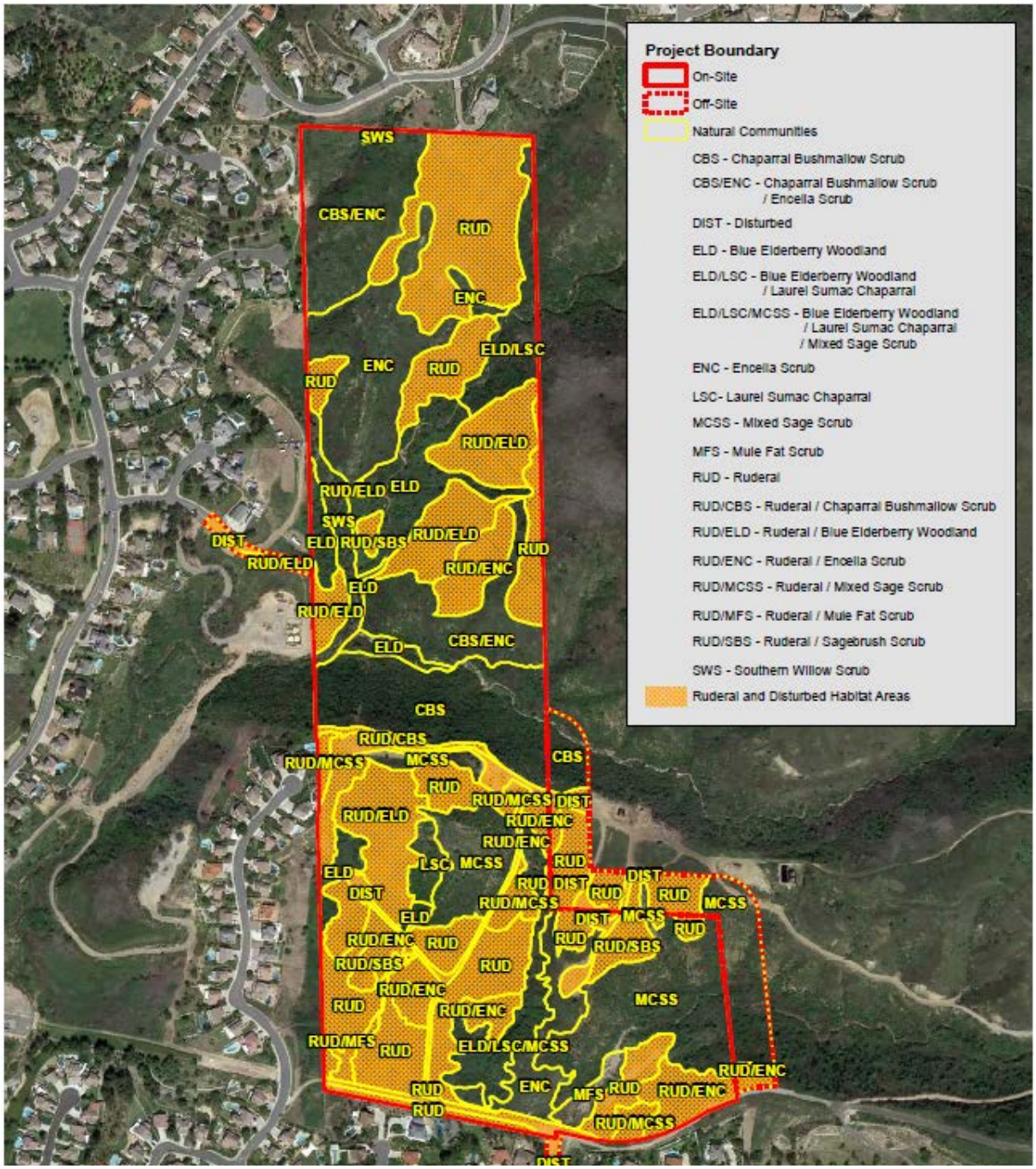
Fuel **Model GS2** is shrubs that are 1 to 3 feet high and a moderate grass load. Spread rate high; flame length moderate.

Fuel **Model SH5** is a heavy shrub load, depth 4-6 feet – representative of area of brush growth on and offsite (all aspects) where slope is not significant enough for Fuel Model 4 growth.

Fuel **Model 4** is a heavy southern mixed chaparral – representative of the north aspect natural hillside where brush is growing offsite of the project in a typical southern California wildland interface.

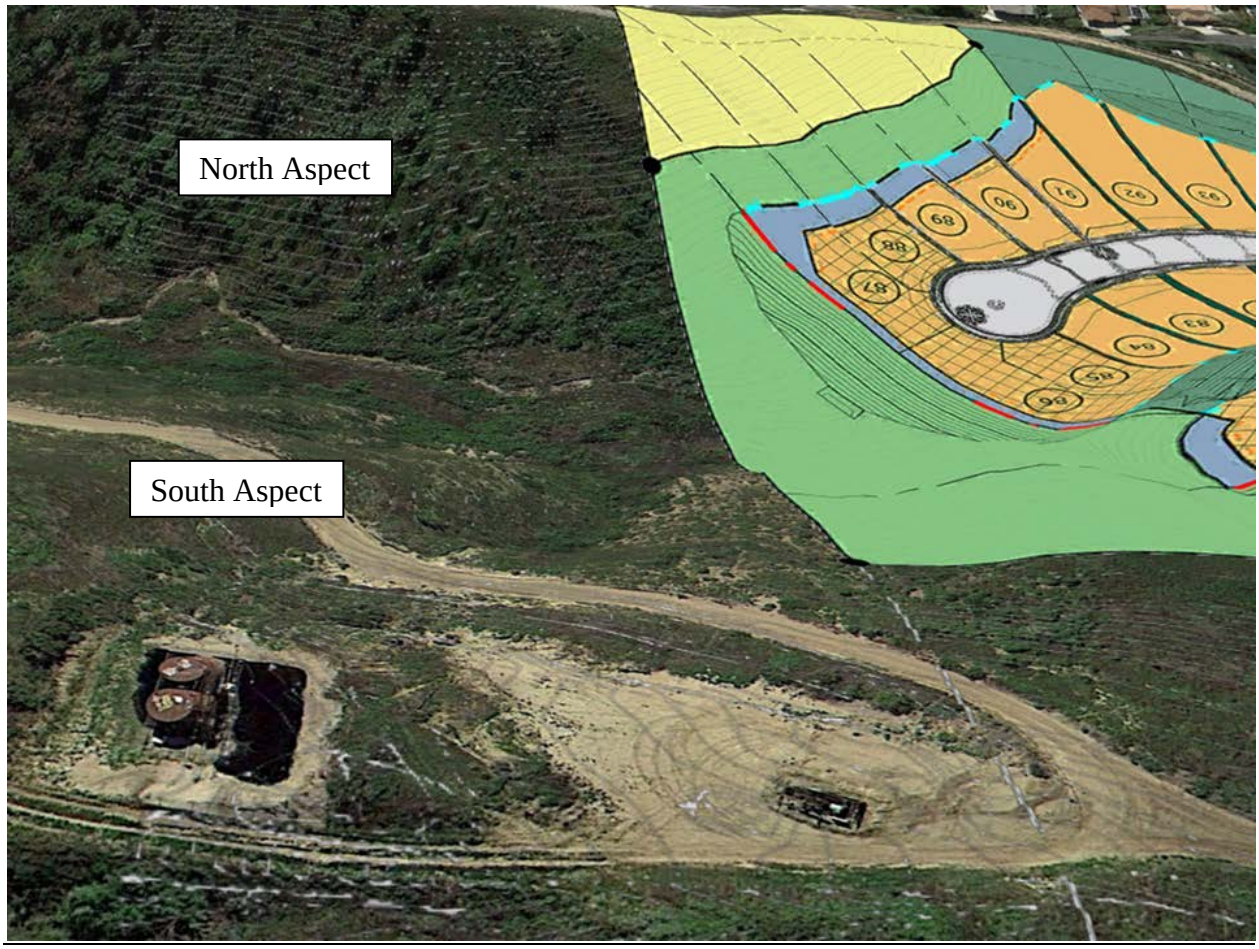
Fuel **Model SCAL18** is a southern California specific model for coastal sage scrub and northern mixed chaparral with and average fuel depth of 3 feet.

The map below shows the site overlaid on an aerial photo. Plant communities are shown in the legend. A larger copy is provided in the Appendix A



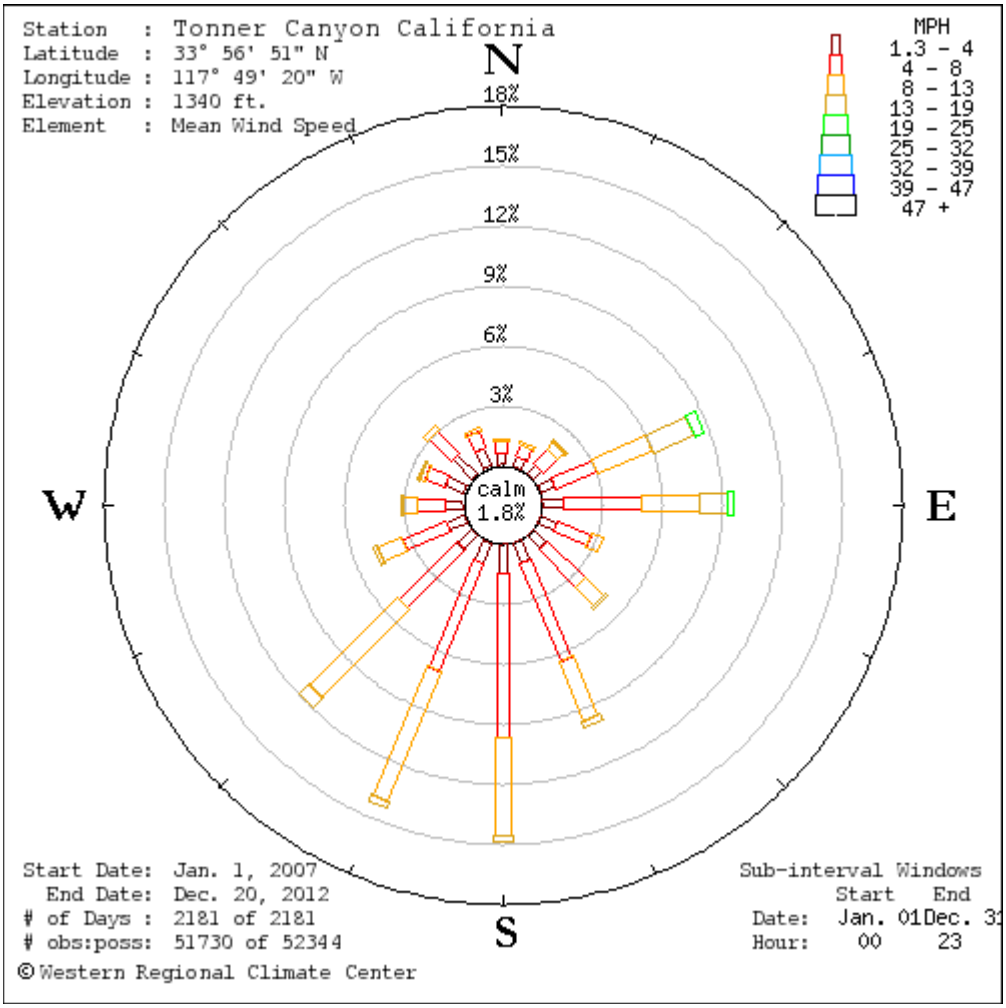
Fuels Summary

The predominate fuels in the project site are grasses, grass/scrub mixtures and chaparral. The only locations which have areas of moderate to heavy fuels are on the northern aspects of the steeper canyon. Some of these areas will be adjacent to the project site but none are below or immediately aligned to the with the wind/topograhy so as to create a condition where slope, wind and fuel are in full alignment. All of the fuels within the development area will be removed and replaced with plants from the approved palette. A series of photos are used to show the predominate vegetation on the site in Appendix B of this report. The graphic below illustrates the difference in fuel loading on the north and south aspects adjacent to the project site.



Wind Patterns and Weather Inputs

After a review of the local RAWS (Remote Access Weather Station) data, the most extreme wind patterns and speeds relating to wildfires were enter into the modeling programs (BEHAVE and Wind Ninja). All other lesser wind patterns and wind speeds normally produce less fire intensity based on a fire in wildland fuels. Several RAWS are available in the area of the project but the one closest only has two years of data so one a few miles away has been used. Since some data gaps exist, data from two sites have been used. First is Tonner Canyon, for which a wind rose has been completed and is shown the following page. This graphic clearly shows that the predominate wind is south to southwest and the strongest winds are from the east and east-northeast. The other graphic is from the RAWS in Brea which has five years of data. The summary is shown and graphed on the following page.



History for KCABREA1

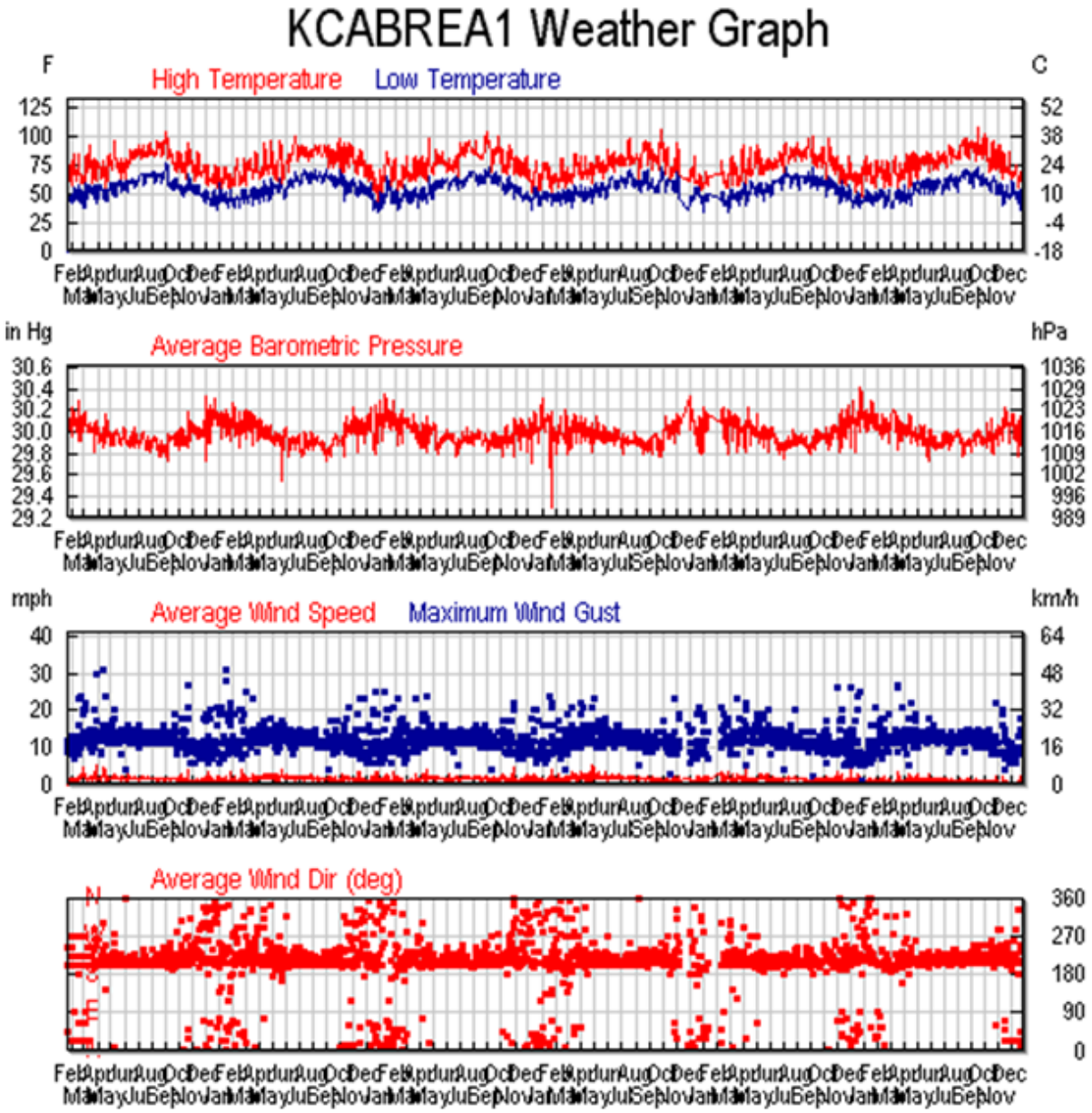
Northern Brea, Brea, CA — Current Conditions

Daily Summary for January 20, 2007 - December 21, 2012

January 20 2007 - TO - December 21 2012 Go

Daily | Weekly | Monthly | Yearly | **Custom**

	High:	Low:	Average:
Temperature:	**106.6** °F	**0.0** °F	**64.2** °F
Dew Point:	**72.8** °F	**-99.9** °F	**49.5** °F
Humidity:	100.0%	1.0%	64.9%
Wind Speed:	**14.0**mph from the North	-	**1.4**mph
Wind Gust:	**31.0**mph from the North	-	-
Wind:	-	-	SSW
Pressure:	**30.47**in	**29.09**in	-
Precipitation:	**61.60**in		



The graph above clearly shows the predominate wind direction is from the south to southwest. Storm come in from the northwest and the occasionally Santa Ana Wind event brings a east or northeast wind. The strongest wind gust measured 31 mph at this site.

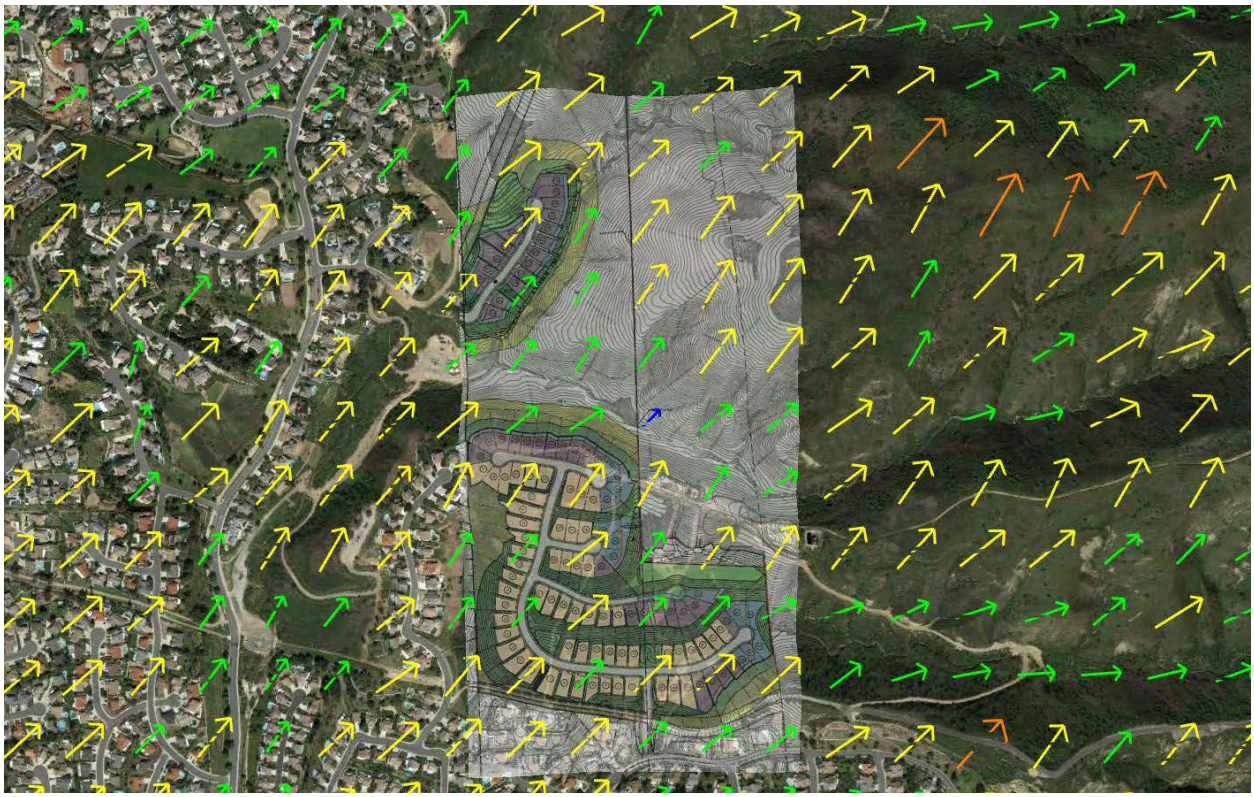
The two most extreme wind patterns/wildland fuel alignments are:

- A 50 mph northeast to easterly Santa Ana wind.
- A rare 25 mph dry south to southwest on-shore, for the normal prevailing wind.

Temperature and relative humidity max/min are also taken from the RAWS data.

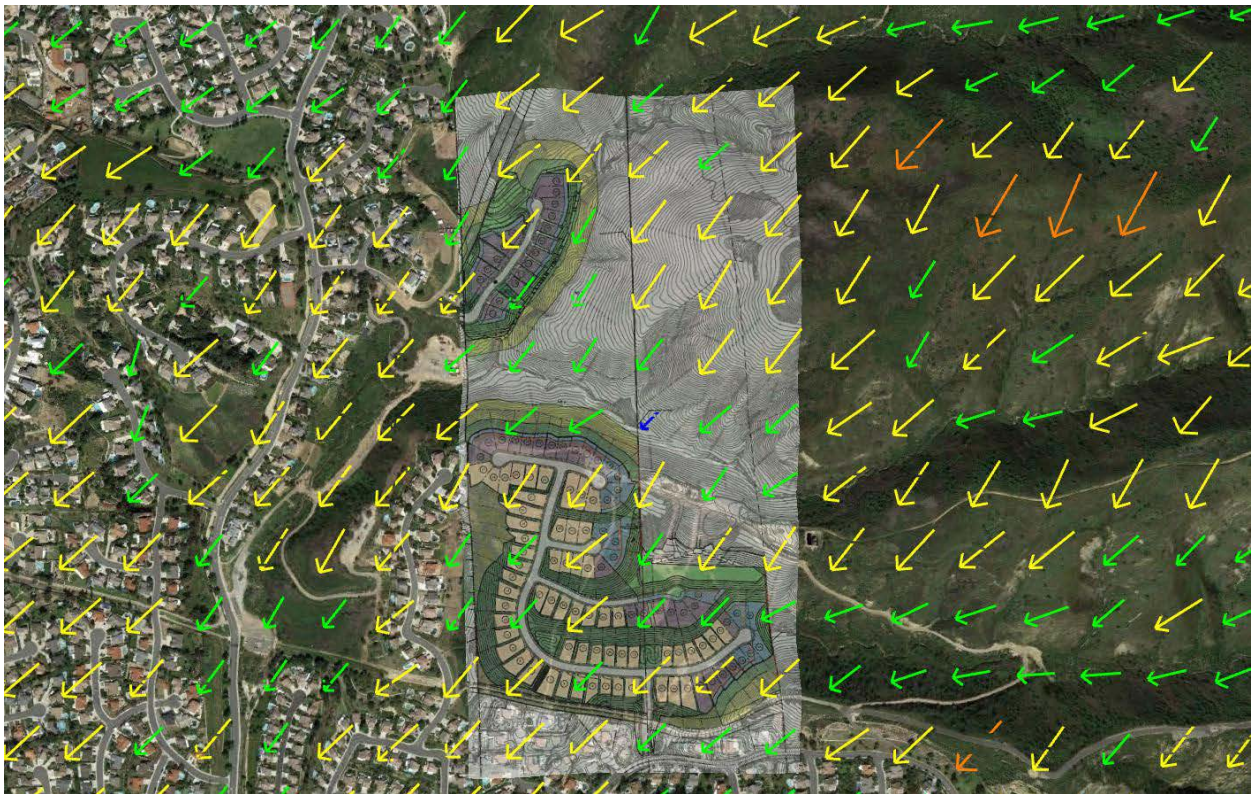
Using the Wind Ninja software, the wind and the relationship to the topography has been determined to NOT be a factor with this development. Limited wind channeling is achieved on any wind pattern at the project site. The changes in topography at the project site are simply too minor to overcome the wind in any scenario. The predominate wind (from the southwest) intersection the project boundaries from developed areas where no significant wildland fuel bed exist as shown below.

Southwest Wind

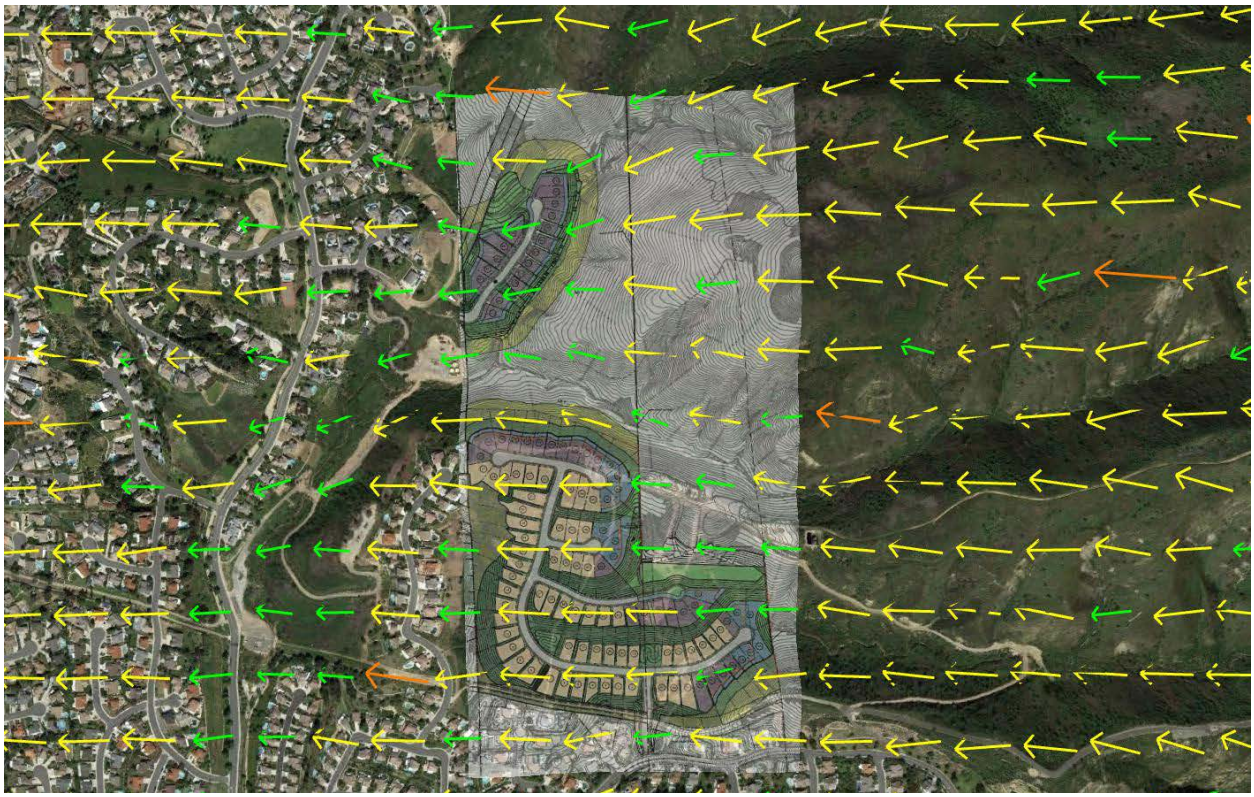


The graphics on the next page show a northeast wind (top) and an east wind (bottom). More wind channeling occurs with the NE wind than the E wind as the E wind runs parallel with the canyons thereby creating very little resistance to change the direction. Some ridgeline acceleration (orange arrows) occurs away from the development site and above the project site elevation. Some minor wind sheltering (green and blue arrows) occurs in the deeper drainages between the two development sites. Yellow arrows are average wind speed and the modeling showed no extreme acceleration (red arrows) near the project site.

Northeast Wind



East Wind



Note: no wind acceleration or wind channeling on the site.

Wind from the east will travel down the two canyons east of the project site as shown above. Any fire within these canyons will be influenced by the wind and by the topography of the canyon. Once again the difference in fuel load on the north and south aspects is clearly visible and it should also be noted that the slope of the northern aspects is also significantly greater.

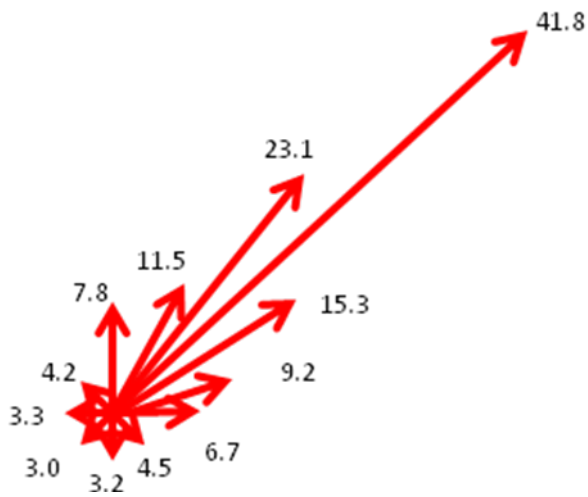
BehavePlus Fire Behavior Inputs and Results:

Inputs for the Behave Plus Fire Behavior Model were as follows:

Moisture scenarios used are extreme. One-hour fuels at 3%, ten-hour at 4% and hundred-hour at 5%. Herbaceous live fuels are modeled at fully cured (30%) and woody fuels at 50%. Model runs have been completed for various aspects on the two wind scenarios and for an east wind with slope influences. All scenarios assumed a 100% (1:1 slope), except the north aspect influence which used 200% as the worst case. Aspects are shown on the model scenario and the spread direction is shown in 15 degree increments to show the slope effect and when and/or if it over powers the wind.

Behave runs have been completed for both the NE Santa Ana wind and the onshore SW wind. The moisture scenario are unchanged to simulate the rear dry onshore that can occur when the Santa Ana winds break down and on shore flow is resumed but the air immediately offshore is the dry air that has been pushed out to see by the NE wind event. This condition is rare and only last for a short period of time as the air further out to sea, will have increased moisture level when then return to the land by the onshore breeze. An east wind has been modeled to show the effects of fuel and slope in the canyons to the east of the project site and to get a better idea of how the fire will behave in these interface areas.

The Behave outputs are attached in the appendixes but have been summarized here for discussion purposes. The fire that has been modeled here is a fast running wind driven fire that burns in an elliptical pattern shown below by the red arrows. To the right are the calculated flame lengths for each of the directions of spread for the worst case scenarios modeled. We find that a maximum flame length for SCAL18 of 41.8 feet is possible at the head of the fire, when the fire is running across the slope with a continuous fuel bed that is consistent enough to produce a self-sustaining, self propagating fire. It is important to note that flames only 15 degrees out of the perfect alignment of all the factors are about one-half the size if the flaming point of the fire. Another 15 degrees drops the flame lengths to less than 1/3 of the flaming point. Fire to the flanks and backing fire are small enough to extinguished using hand tools.



Flame Length (ft)			
Spread Dir	Fuel Model		
deg	SCAL18	gs2	sh5
0	3.2	2.1	4.2
15	3.1	2	4
30	3	1.9	3.9
45	3	1.9	3.8
60	3	1.8	3.8
75	3.1	1.9	3.9
90	3.3	1.9	4
105	3.5	2	4.2
120	3.8	2.1	4.5
135	4.2	2.3	4.9
150	4.9	2.6	5.6
165	6	2.9	6.5
180	7.8	3.5	8.1
195	11.5	4.5	10.8
210	23.1	6.5	16.8
225	41.8	11.6	37.3
240	15.3	23.1	34.2
255	9.2	10.3	16.1
270	6.7	6	10.5
285	5.4	4.3	7.9
300	4.5	3.4	6.4
315	4	2.9	5.5
330	3.6	2.5	4.9
345	3.4	2.3	4.5
360	3.2	2.1	4.2

A summary matrix of the modeling result is found on the next four pages

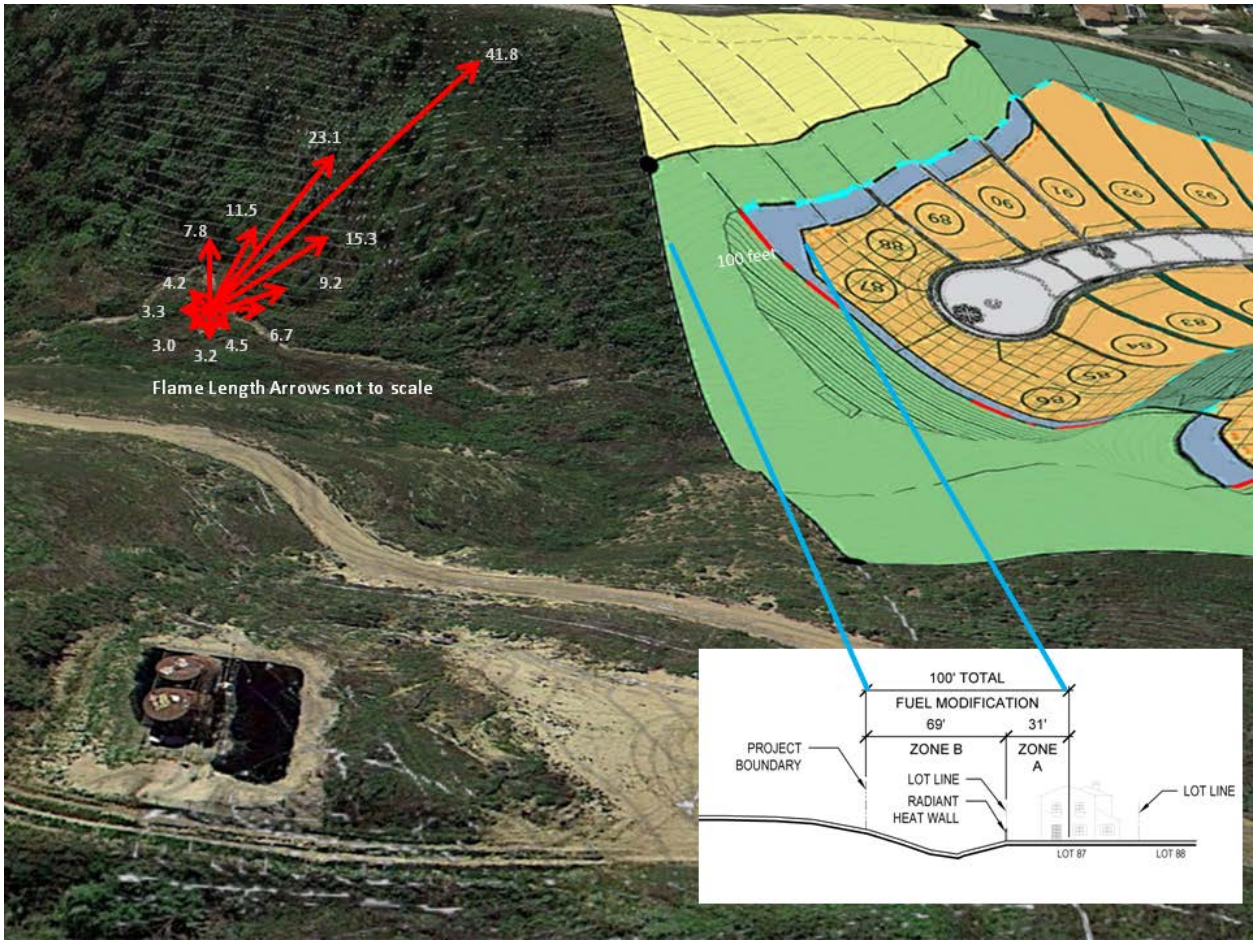
	SouthWest 30 mph			East 50mph			East 50 mph - N Aspect				East 50 mph - S Aspect	
Surface Rate of Spread (ch/h)												
Spread Dir	Fuel			Fuel			Fuel				Fuel	
deg	SCAL18	gs2	sh5	SCAL18	gs2	sh5	SCAL18	gs2	sh5	4	SCAL18	gs2
0	8.7	14.9	24.5	1.9	4.1	6	0.9	2.7	3.6	7.8	3.2	4.9
15	18.2	30.6	50.6	1.5	3.2	4.8	0.9	2.4	3.2	7	2.4	3.8
30	58	90.7	153.9	1.3	2.7	4	0.8	2.2	3	6.4	1.9	3.1
45	229.2	275.4	505.9	1.1	2.4	3.5	0.8	2.1	2.9	6.1	1.6	2.6
60	58	90.7	153.9	1	2.2	3.2	0.8	2	2.9	6.1	1.4	2.4
75	18.2	30.6	50.6	1	2.1	3.1	0.9	2.1	3	6.2	1.3	2.2
90	8.7	14.9	24.5	1	2	3	1	2.2	3.3	6.6	1.2	2.1
105	5.2	8.9	14.6	1	2.1	3.1	1.1	2.4	3.6	7.3	1.2	2.1
120	3.5	6.1	10	1	2.2	3.2	1.4	2.7	4.2	8.4	1.2	2.2
135	2.6	4.5	7.4	1.1	2.4	3.5	1.7	3.3	5.2	10.1	1.2	2.3
150	2.1	3.6	5.9	1.3	2.7	4	2.4	4.1	6.8	12.9	1.4	2.6
165	1.8	3	5	1.5	3.2	4.8	3.7	5.6	9.5	17.6	1.5	3
180	1.5	2.7	4.4	1.9	4.1	6	6.5	8.4	15	26.7	1.8	3.6
195	1.4	2.4	4	2.6	5.5	8	15.3	14.3	28.3	46.9	2.3	4.7
210	1.3	2.3	3.8	3.8	8.1	11.9	70	31.2	74.3	107.2	3.1	6.5
225	1.3	2.3	3.7	6.4	13.6	20.1	252.8	111.6	419.8	431.3	4.5	10.1
240	1.3	2.3	3.8	13.8	28.9	42.6	28.5	497.7	347.2	1296.4	7.5	18.5
255	1.4	2.4	4	48.1	97.3	145.2	9.5	85.5	67	208.7	15.5	45.2
270	1.5	2.7	4.4	322.9	504.5	814.2	4.7	26.8	26.5	70.9	49.5	202.7
285	1.8	3	5	48.1	97.3	145.2	2.9	12.9	14.4	35.6	258	268.7
300	2.1	3.6	5.9	13.8	28.9	42.6	2	7.8	9.2	21.9	60.2	53.9
315	2.6	4.5	7.4	6.4	13.6	20.1	1.5	5.3	6.6	15.2	17.4	20.6
330	3.5	6.1	10	3.8	8.1	11.9	1.2	4	5.1	11.5	8.1	11
345	5.2	8.9	14.6	2.6	5.5	8	1	3.2	4.2	9.2	4.7	6.9
360	8.7	14.9	24.5	1.9	4.1	6	0.9	2.7	3.6	7.8	3.2	4.9

	SouthWest 30 mph			East 50mph			East 50 mph - N Aspect				East 50 mph - S Aspect	
Fireline Intensity (Btu/ft/s)												
Spread Dir	Fuel Model			Fuel Model			Fuel Model				Fuel	
deg	SCAL18	gs2	sh5	SCAL18	gs2	sh5	SCAL18	gs2	sh5	4	SCAL18	gs2
0	652	156	866	143	43	212	70	28	127	469	239	52
15	1363	321	1791	114	34	168	65	25	114	416	177	40
30	4348	953	5446	96	29	141	62	23	107	384	140	32
45	17182	2893	17901	84	25	124	61	22	103	368	118	28
60	4348	953	5446	77	23	114	63	21	104	364	103	25
75	1363	321	1791	73	22	108	67	22	107	373	94	23
90	652	156	866	72	21	106	74	23	115	397	89	22
105	388	94	518	73	22	108	85	25	129	437	88	22
120	264	64	353	77	23	114	102	29	150	502	89	23
135	196	48	263	84	25	124	131	35	183	604	93	24
150	156	38	209	96	29	141	180	44	239	770	102	27
165	131	32	176	114	34	168	274	59	337	1055	115	31
180	115	28	155	143	43	212	487	88	531	1596	137	38
195	106	26	142	193	58	285	1146	150	1000	2805	172	49
210	100	24	135	285	85	420	5247	327	2627	6412	230	69
225	99	24	132	483	143	710	18950	1172	14854	25794	336	106
240	100	24	135	1031	304	1507	2134	5229	12283	77530	561	194
255	106	26	142	3604	1022	5139	709	898	2370	12481	1163	475
270	115	28	155	24210	5300	28809	356	281	938	4240	3713	2129
285	131	32	176	3604	1022	5139	218	136	508	2130	19342	2823
300	156	38	209	1031	304	1507	152	82	326	1307	4513	566
315	196	48	263	483	143	710	115	56	233	907	1303	217
330	264	64	353	285	85	420	93	42	180	685	605	115
345	388	94	518	193	58	285	79	33	148	553	355	73
360	652	156	866	143	43	212	70	28	127	469	239	52

	SouthWest 30 mph			East 50mph			East 50 mph - N Aspect				East 50 mph - S Aspect	
Flame Length (ft)												
Spread Dir	Fuel Model			Fuel Model			Fuel Model				Fuel	
deg	SCAL18	gs2	sh5	SCAL18	gs2	sh5	SCAL18	gs2	sh5	4	SCAL18	gs2
0	8.9	4.6	10.1	4.4	2.5	5.3	3.2	2.1	4.2	7.6	5.6	2.8
15	12.4	6.4	14.1	4	2.3	4.8	3.1	2	4	7.2	4.9	2.4
30	21.2	10.6	23.5	3.7	2.1	4.4	3	1.9	3.9	7	4.4	2.2
45	39.9	17.6	40.7	3.5	2	4.1	3	1.9	3.8	6.8	4	2.1
60	21.2	10.6	23.5	3.3	1.9	4	3	1.8	3.8	6.8	3.8	2
75	12.4	6.4	14.1	3.2	1.9	3.9	3.1	1.9	3.9	6.9	3.6	1.9
90	8.9	4.6	10.1	3.2	1.8	3.8	3.3	1.9	4	7.1	3.6	1.9
105	7	3.6	8	3.2	1.9	3.9	3.5	2	4.2	7.4	3.5	1.9
120	5.8	3	6.7	3.3	1.9	4	3.8	2.1	4.5	7.9	3.5	1.9
135	5.1	2.7	5.8	3.5	2	4.1	4.2	2.3	4.9	8.6	3.6	2
150	4.6	2.4	5.3	3.7	2.1	4.4	4.9	2.6	5.6	9.6	3.8	2.1
165	4.2	2.2	4.9	4	2.3	4.8	6	2.9	6.5	11.1	4	2.2
180	4	2.1	4.6	4.4	2.5	5.3	7.8	3.5	8.1	13.4	4.3	2.4
195	3.8	2	4.4	5.1	2.9	6.1	11.5	4.5	10.8	17.3	4.8	2.7
210	3.7	2	4.3	6.1	3.5	7.2	23.1	6.5	16.8	25.4	5.5	3.2
225	3.7	1.9	4.3	7.7	4.4	9.2	41.8	11.6	37.3	48.1	6.5	3.9
240	3.7	2	4.3	10.9	6.2	13	15.3	23.1	34.2	79.9	8.3	5.1
255	3.8	2	4.4	19.5	10.9	22.9	9.2	10.3	16.1	34.5	11.6	7.7
270	4	2.1	4.6	46.8	23.2	50.7	6.7	6	10.5	21	19.7	15.3
285	4.2	2.2	4.9	19.5	10.9	22.9	5.4	4.3	7.9	15.3	42.2	17.4
300	4.6	2.4	5.3	10.9	6.2	13	4.5	3.4	6.4	12.2	21.6	8.3
315	5.1	2.7	5.8	7.7	4.4	9.2	4	2.9	5.5	10.3	12.2	5.3
330	5.8	3	6.7	6.1	3.5	7.2	3.6	2.5	4.9	9.1	8.6	4
345	7	3.6	8	5.1	2.9	6.1	3.4	2.3	4.5	8.2	6.7	3.2
360	8.9	4.6	10.1	4.4	2.5	5.3	3.2	2.1	4.2	7.6	5.6	2.8

	SouthWest 30 mph			East 50mph			East 50 mph - N Aspect				East 50 mph - S Aspect	
Direction of Maximum Spread												
Spread	Fuel Model			Fuel Model			Fuel Model				Fuel	
Dir												
deg	SCAL18	gs2	sh5	SCAL18	gs2	sh5	SCAL18	gs2	sh5	4	SCAL18	gs2
0	45	45	45	270	270	270	221	239	232	237	286	279
15	45	45	45	270	270	270	221	239	232	237	286	279
30	45	45	45	270	270	270	221	239	232	237	286	279
45	45	45	45	270	270	270	221	239	232	237	286	279
60	45	45	45	270	270	270	221	239	232	237	286	279
75	45	45	45	270	270	270	221	239	232	237	286	279
90	45	45	45	270	270	270	221	239	232	237	286	279
105	45	45	45	270	270	270	221	239	232	237	286	279
120	45	45	45	270	270	270	221	239	232	237	286	279
135	45	45	45	270	270	270	221	239	232	237	286	279
150	45	45	45	270	270	270	221	239	232	237	286	279
165	45	45	45	270	270	270	221	239	232	237	286	279
180	45	45	45	270	270	270	221	239	232	237	286	279
195	45	45	45	270	270	270	221	239	232	237	286	279
210	45	45	45	270	270	270	221	239	232	237	286	279
225	45	45	45	270	270	270	221	239	232	237	286	279
240	45	45	45	270	270	270	221	239	232	237	286	279
255	45	45	45	270	270	270	221	239	232	237	286	279
270	45	45	45	270	270	270	221	239	232	237	286	279
285	45	45	45	270	270	270	221	239	232	237	286	279
300	45	45	45	270	270	270	221	239	232	237	286	279
315	45	45	45	270	270	270	221	239	232	237	286	279
330	45	45	45	270	270	270	221	239	232	237	286	279
345	45	45	45	270	270	270	221	239	232	237	286	279
360	45	45	45	270	270	270	221	239	232	237	286	279

The fire behavior relative to the topography and structures within the project is an important factor in the development of the fire protection system for this development. Shown below, the north aspect due east of the southerly portion of the project site has significant fuels but is not in a location that will create an expose to the project site. The red arrows (not to scale) show that an east wind carrying fire down this canyon would be influenced by the slope and fuel to have the largest flame length be upslope away from the project site structures. Flames coming at the project site would be significantly less. The vegetation in the bottom of the canyon and on the south aspect, simply do not have enough fuel to produce the large flame lengths of the north aspect. The largest flame length impacting the fuel modification zone would be less than 25 feet and well within the 2:1 ratio needed for protecting the structures. In fact, the ration would be more in line with the 4:1 ratio required for a "safety zone" where personnel and equipment would be safe without the use of radiant heat shelters.



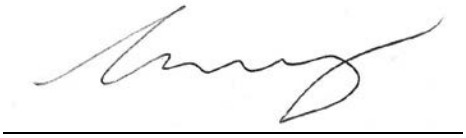
Fire Behavoir Summary

While the modeling indicates that flame lengths of just under 50 feet are possible under perfect conditions, this is unlikely due to predominate winds that drive wildland fires and arrangment of the slopes and fuel relative to the structures. The fuels are not aligned with the slope and wind and fuels are not continueous enough to drive fire behavior to the level of the equilibrium spread rates used in the modeling in most of the areas adjacent to the fuel modification zones. Flanking fire of six to eight feet maximum is expected at the property line of the lots within the development or at the base of the fuel modification zones or radiant heat walls. In all areas, the 2:1 safety ratio is achieved and in most areas the ratio is 4:1 or more.

Most of the fuels that would have been an issue with the development will be removed and replaced with approved vegetation as a part of the grading and project development.

Associated with the fuel modification plan, the Project would incorporate a landscape plan that utilizes a plant palette consisting of fire resistant plants, native and appropriate non-native drought tolerant species in accordance with Orange County Fire Authority (OCFA) guidelines. The Project's fuel modification plan would provide fire protection for the Project, as well for the existing residences to the south and west of the project site. A detailed description of the fire protection plan to be implemented for the Project and illustrations of the Project's fuel modification zones is included in Section 4.7, *Hazards and Hazardous Materials*, in this Draft EIR.

The technical results provided as part of the Fire Behavior Analysis within this report were obtained using Behave Plus version 5.0.5. and Wind Ninja software.



Tim Chavez
Wildland Interface Specialist

Fuel Modification Zones/Fire Protection Features

The Project would implement a fire protection plan that would comply with or exceed the Orange County Fire Authority's (OCFA) standards for Very High Fire Hazard Severity Zone/Special Fire Protection Areas. Fire protection measures as part of the project would include, but are not limited to, fire-resistant structures adjoining natural open space areas and fuel modification/management to help suppress wildland fires. Several areas of the project site would require fuel modification. Fuel modification would occur within four zones with each zone designed specifically to help suppress a fire in different ways. The zones would include requirements for minimum structure setbacks, permanent irrigation systems, fire resistant plants from an approved plant list by the County, landscape and planting maintenance (i.e., thinning and removal of dead plants). On the following page is a description of the fuel modification zones.

ZONE A - NON-COMBUSTILBE CONSTRUCTION:

10'-0" to 95'-0" setback zone for non-combustible construction only. Zone A shall be maintained by the Homeowners Association.

ZONE B - WET ZONE (100% REMOVAL UNDESIRABLE SHRUBS):

First 5'-0" to 186'-0" from Zone A. Zone B shall be cleared of all undesirable plant species, irrigated, and planted with species from Attachment 8. Exceptions to save desirable species may be submitted for approval by the OCFA on a site specific basis.

ZONE C - THINNING ZONE (50% THINNING NATIVE SHRUBS):

21'-0" - 100'-0" out from Zone B. Zone C shall be non-irrigated and required horizontal and vertical spacing of plant groups in accordance with Attachement 6 and removal of all dead and dying vegetation and undesirable species from Attachment 7. Minimum thinning percentage of plant removal is 50%. Zone C area shall be maintained the Homeowners Association.

SPECIAL MAINTENANCE AREA - WET ZONE AND DRY ZONE:

The Special Maintenance Areas have maintenance requirements to reduce the chances of ignition from wildfires. They need maintenance just as fuel modification zones do and shall be maintained on a year round basis, with removal of all dead and dying plant material, replacement of dead or diseased species with plant material with the same growth characteristics from the approved landscape plans. Irrigation shall be verified on a regular basis to ensure it is in a working a condition and the plants shall be irrigated as necessary to keep them healthy with their appropriate moisture content. A copy of the approved Landscape Plans shall be provided to the HOA by the developer and remain on record indefinitely with the HOA. Copies of plans shall be provided to the contracted maintenance company. It is the responsibility of the HOA to forward a copy of the approved Landscape Plans to any new property management company. The HOA shall inspect the special maintenance areas twice a year to ensure the special maintenance areas retain the original design of the areas.

The following are further Special Maintenance Area (SMA) requirements:

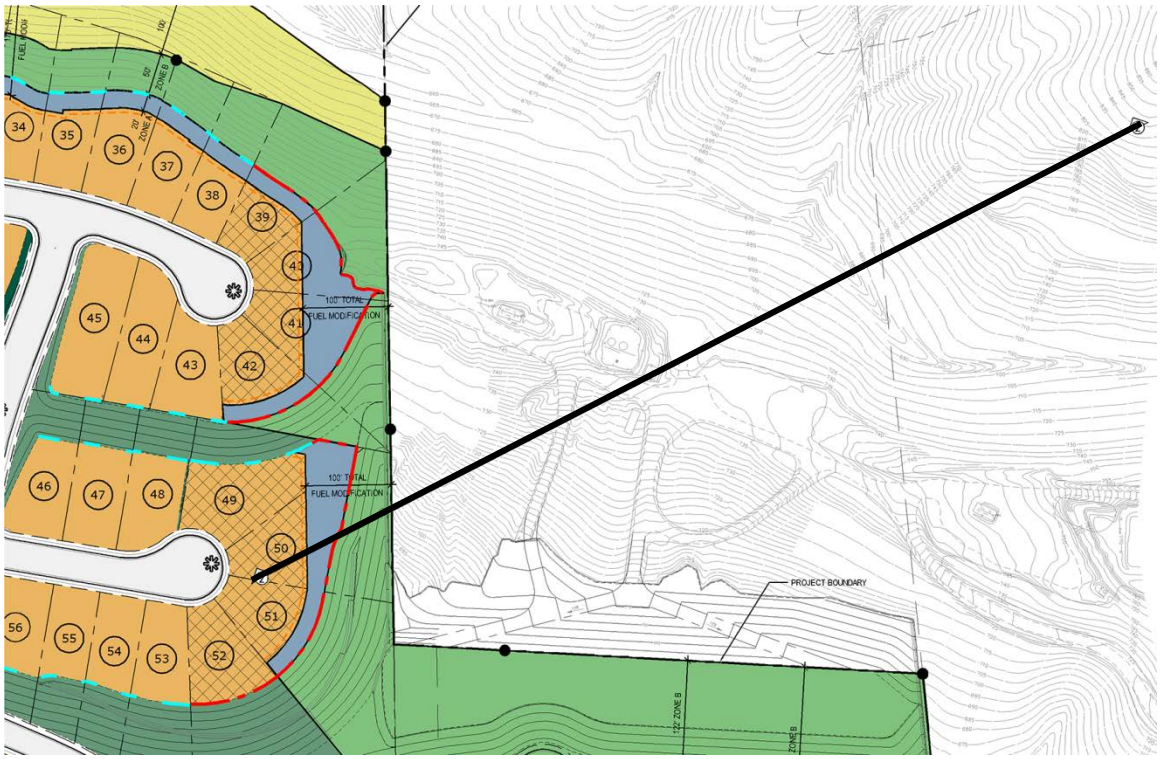
- Other than trees, a large percentage of the special maintenance area shall consist of a ground cover that naturally grows no taller than 2 feet in height.

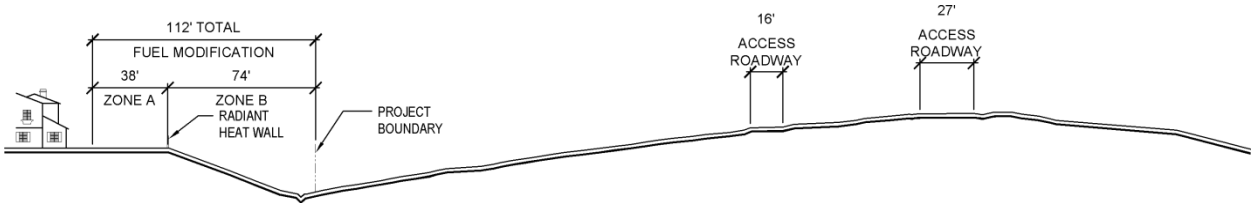
- The areas are completely irrigated and have plants that need irrigation to retain healthy fuel moisture.
- Any dead and dying specimens and branches shall be removed.
- Leaf litter on top of vegetative cover shall be removed.
- Landscape design Plans shall be retained by the HOA indefinitely and the slopes shall always remain as they were designed.
- As plants migrate or new plants seed-in, those shall be removed to retain the original design.
- Future changes to slope designs shall be approved by OCFA.
- The maintenance requirements of the special maintenance areas shall be factored into the funding with the fuel modification zones.
- Special Maintenance Areas shall be designed and also maintained as to not provide direct flame or an excessive amount of radiant heat on structures.
- Special Maintenance Areas will have a limited use of native grasses as approved by OCFA.

PRIVATE HOMEOWNER SIDE YARD SLOPES:

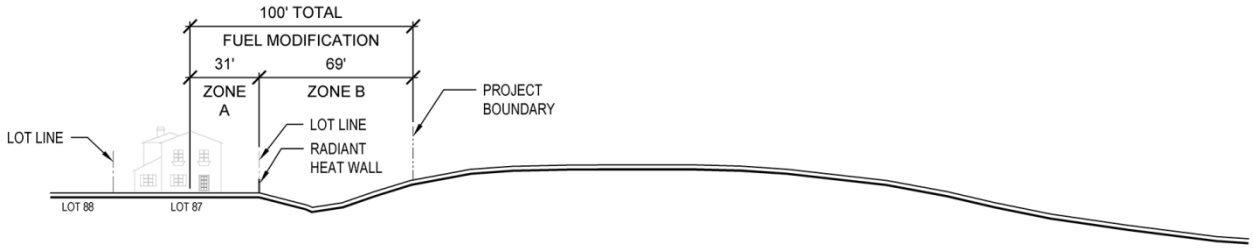
Planting Plans for the private homeowner side yard slopes shall be reviewed by the HOA and shall be devoid of eucalyptus, juniper, cedar, cypress, washingtonia robusta (mexican fan palm), acacia (except for acacia desert carpet) and pine trees, California sagebrush, chamise, buckwheat and black and white sage (Salvia spp.). Additionally California Fescue (Festuca californica) shall not be planted or included within any seed mix as recorded within the CC&R's.

Two areas within the project site will not be capable of providing a typical 170 foot fuel modification zone. These areas would be protected in an equal but alternative method by increasing the irrigated zone(s) to 100 feet and providing a six foot high radiant heat wall at the bottom of the fuel modification zone (indicated by dotted red line).



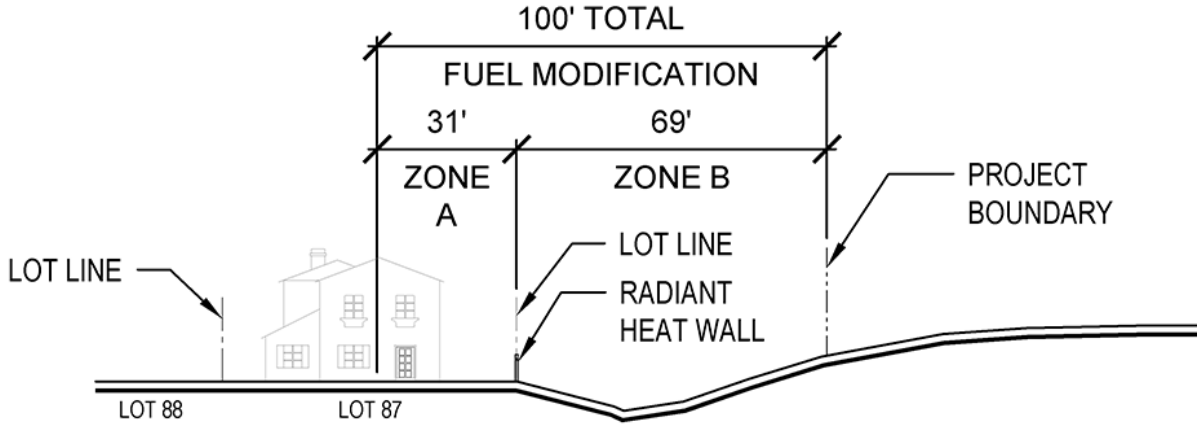


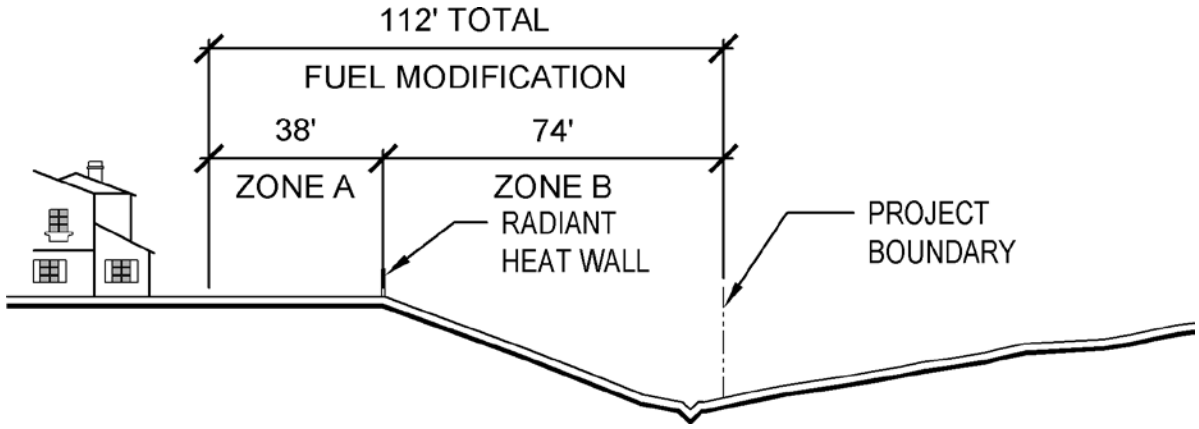
122' ZONE B
222' ZONE B
10' ZONE A
20' ZONE A
139' TOTAL FUEL MODIFICATION
PROJECT BOUNDARY
100'
68
69
70
81
82
83
84
85
86
87
88
89
90
91
92
93


100' TOTAL
FUEL MODIFICATION
31'
69'
ZONE A
ZONE B
PROJECT BOUNDARY
LOT LINE
LOT LINE
RADIANT HEAT WALL
LOT 88
LOT 87

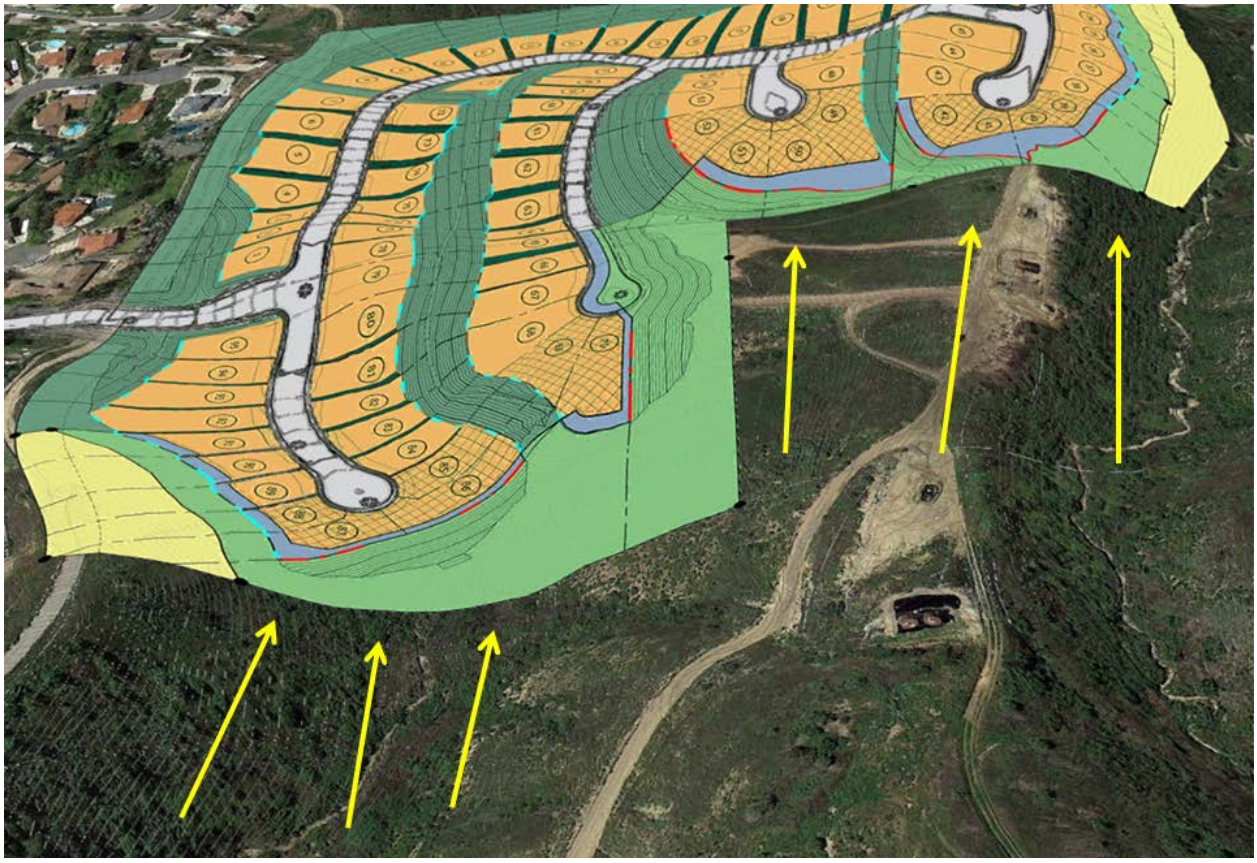
Radiant Heat Walls

As indicated in the defensible space design, a block wall/radiant heat wall will be constructed when a fuel modification zone is not possible without offsite improvements. In all cases, the wall has been placed where the fuels below the structure is not of a continuous nature, not in alignment with the slope and Santa Ana winds or the predominate wind (S). In most cases, the radiant heat wall is at the base of the irrigated zone and down slope from the native vegetation

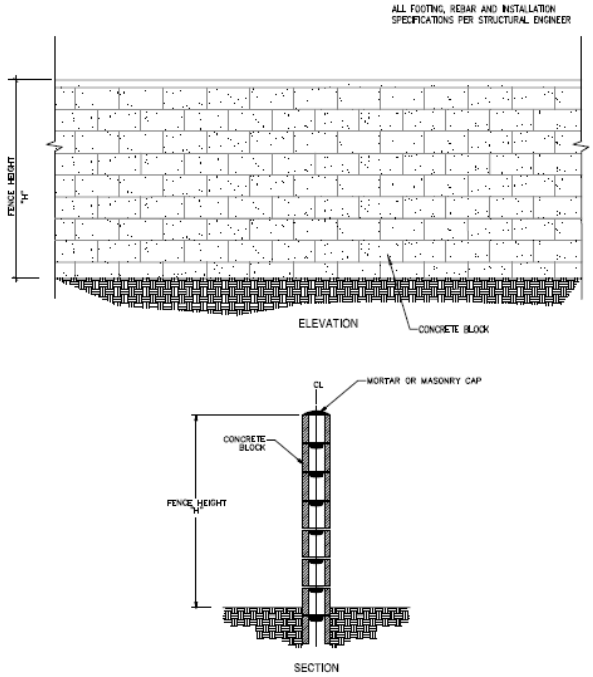




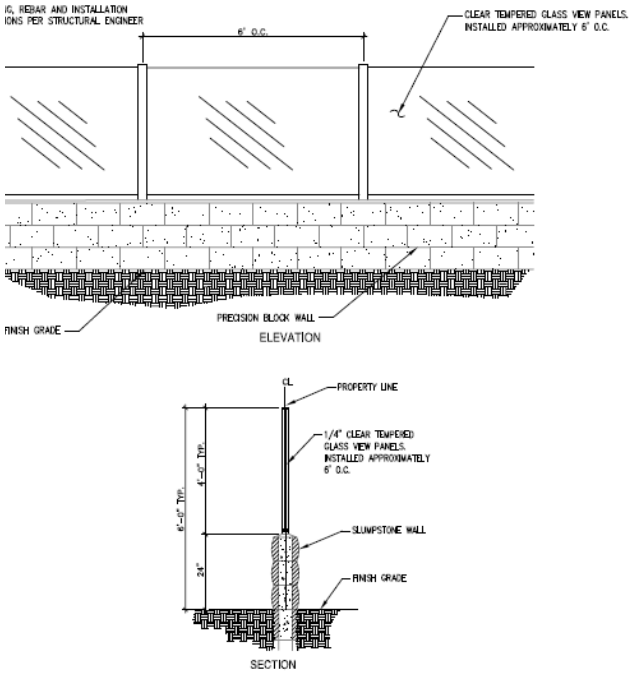
The radiant heat walls are perpendicular to the wind but parallel with the slope. This is shown on the graphic on the following page where the radiant heat wall locations are in red and the east wind shown in yellow. The radiant heat walls are at the property line and will be constructed on what is essentally the native slope that is shown in the graphic.



These walls will be either block or tempered glass over block similar to those shown below.



6' MASONRY FENCE
(PER INFORMATIONAL BULLETIN 223)
(NO SCALE)



6' COMBINATION VIEW FENCE
(NO SCALE)

These types of walls are extremely effective when used at the top of the slope in light to moderate fuels. The extreme fire behavior that can be produced by high winds also bends the fire over making it travel more parallel to the ground. The harder the wind, the more the flame angle will be and the more effective the radiant heat wall will become.

Report Summary

The Cielo Vista project will have a number of features and factors which make the community safer than any other development currently in the area. These include:

- New homes will provide a buffer against the flame front for home to the west (historic fire comes from the east)
- All homes lost in Freeway Complex in this area were lost to ember intrusion not the flaming fire front but the new project will have a minimum 2:1 ratio of flame length to fuel modification zone. Most areas will be 4:1 ratio.
- All homes will be fully protected by automatic fire sprinklers and are unlikely to produce ember plumes as they will not likely burn to a point of having a downwind ember cast
- Evacuation routes have at least two directions of travel from the project entrance(s) and many options within a relative short distance
- Water system, wide roads, wildland access points, Full 170 foot fuel modification (or equivalent) make this project as defendable as possible and will not need a large number of resources during a fire.

The Cielo Vista project is has been designed and protected by the most recently adopted codes and practices. Firesafe has used the BEHAVE model to measure the intensity of a fire moving towards this development to design a protection system that will ensure that the project will be safe from wildland fires even without fire department suppression activities . Flame lengths and fire intensity are ultimately reduced by the installation and maintenance of the fuel modification plan through the use of the irrigated Zone A and B, the removal of fuels in the Zone C and the radiant heat walls surrounding the homes on the perimeter where 170 foot zone cannot be achieved.

Based on the scientific fire bahavior analysis, exterior portions of future structures or attic spaces will not ignite from the exterior fire exposure from a wildland vegetation fire. This is primarily because the greatest fire energy is too far away from the structures due to the low plant densities within the fuel modification zones and the construction feature requirements.

The codes enforced by the Orange County Fire Authority for Fuel Modification were developed to handle the exact type of fuels that are interfacing with this future development.

We recommend approval of this Fire Behavior Report as an accurate and acceptable assessment of the hazard and risk factors for the Cielo Vista development as they relate to wildland fire protection.

Respectfully;

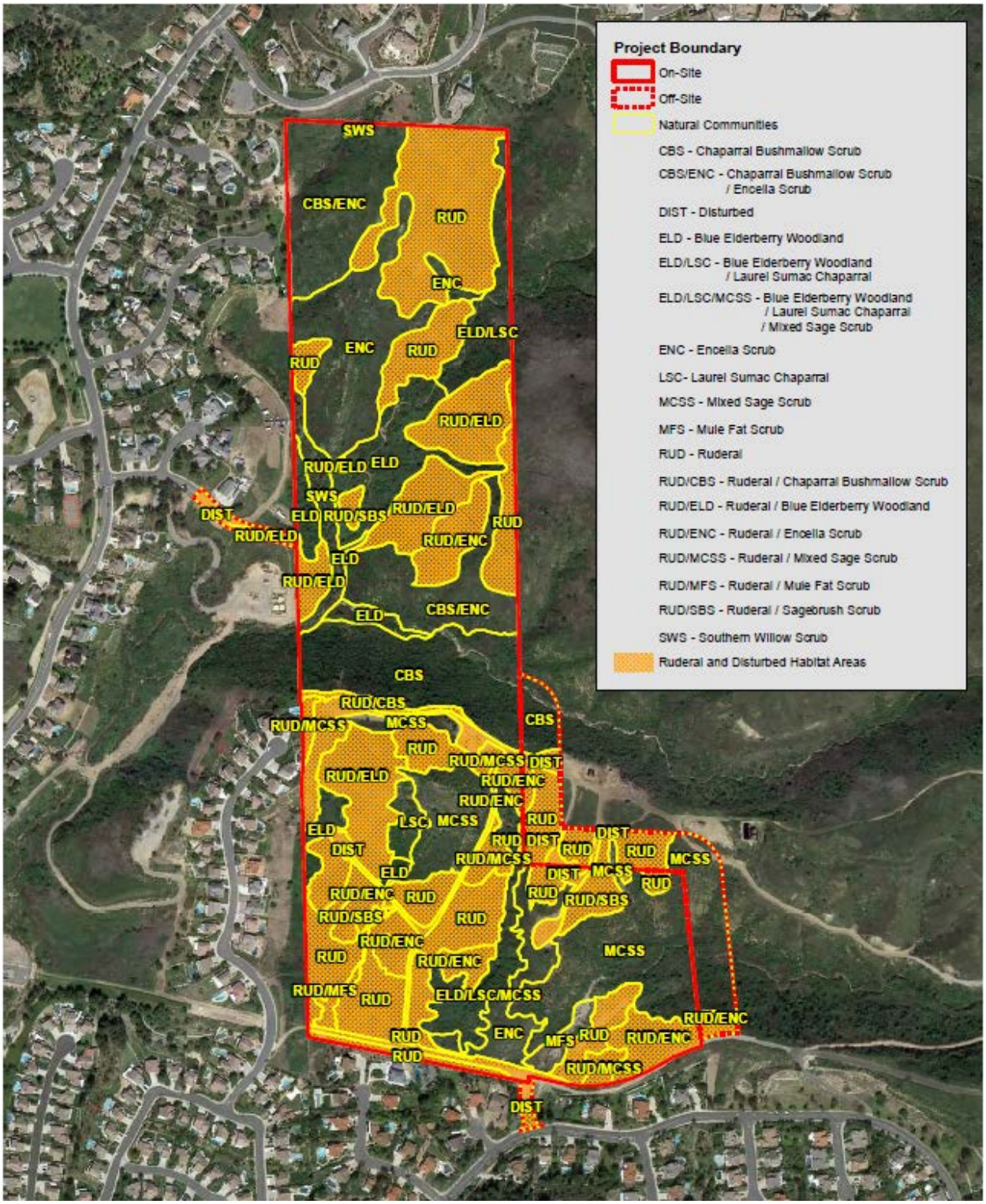
Tim Chavez
Wildland Interface Specialist

Concurrence;

David Oatis
Principal, Firesafe Planning Solutions

Appendix A

Plant Communities



Appendix B

Site Photos

P C R

0 350 700 Feet

Aerial Photograph

Cielo Vista Project

Source: ESRI Street Map, 2009; PCR Services Corporation, 2012.

FIGURE 2-2

Photograph 1: Northerly view of project site from Via Del Agua at primary entrance to Planning Area 1.

Photograph 3: Northwesterly view from southern-central portion of project site (Planning Area 4) towards adjacent residential uses along Dorinda Road.

Photograph 2: Easterly view of project site from Dorinda Road. Dorinda Road is adjacent to Planning Area 1, just west of the project site.

Photograph 4: Southerly view from central portion of project site (Planning Area 1).

Photograph 5: Easterly view of existing on-site oil well located within central portion of Planning Area 1.

Photograph 7: Northwesterly view towards Aspen Way. Aspen Way would provide access to Planning Area 2.

Photograph 6: Westerly view of existing on-site oil well located within northern portion of Planning Area 1.

Photograph 8: Easterly view of project site from terminus of Aspen Way at entrance point to Planning Area 2.

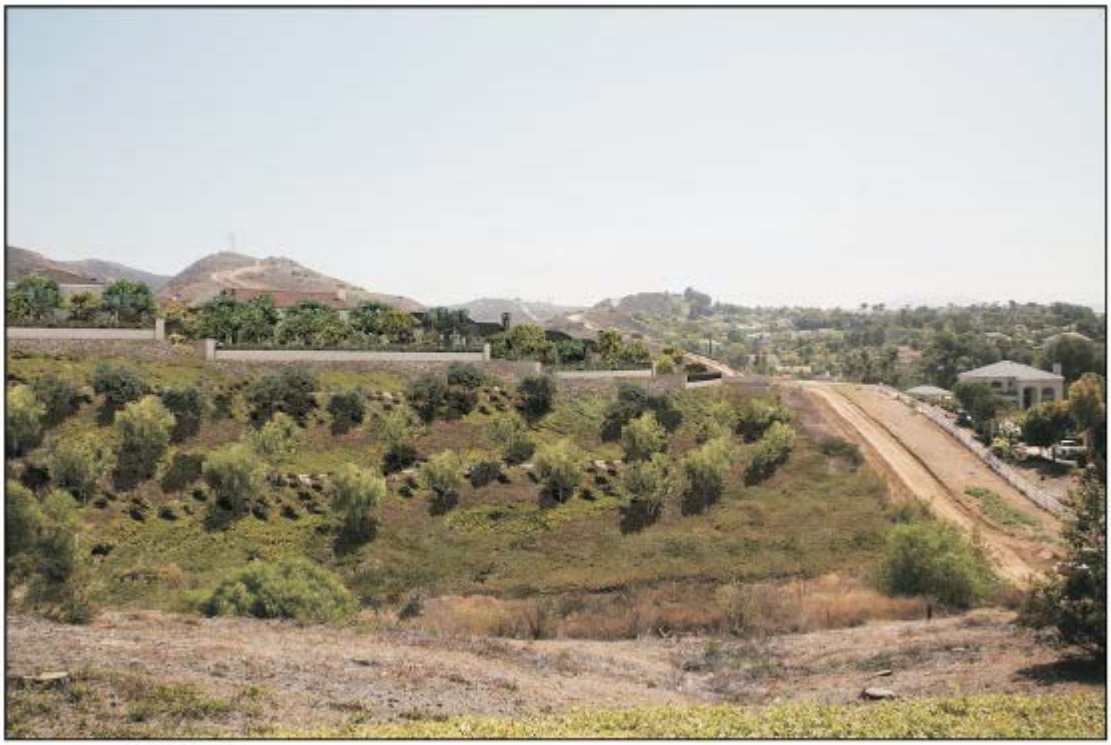
Photograph 9: Easterly view towards project site from end of cul-de-sac of Dorinda road (Planning Area 1).

Photograph 10: Northerly view towards project site (Plannning Area 1) from Via Del Agua/Via De Lakosa intersection.

Photograph 11: Southerly view of project site from Casino Ridge Road.

Visual Simulations of Project Interface

Existing View



Proposed View

Dorinda Road looking southeast

Existing View

Proposed View

Dorinda Road looking northeast

Existing View

Proposed View

Aspen Way looking to the northeast towards Casino Ridge.

Appendix C
Behave Reports

Inputs: SURFACE

Description		Cielo Vista Section 1 East Wind 50 mph

Fuel/Vegetation, Surface/Understory

Fuel Model		SCAL18, gs2, sh5, 4

Fuel Moisture

1-h Moisture	%	3
10-h Moisture	%	4
100-h Moisture	%	5
Live Herbaceous Moisture	%	30
Live Woody Moisture	%	50

Weather

Midflame Wind Speed	mi/h	25
Wind Direction (from north)	deg	90

Terrain

Slope Steepness	%	200
Aspect	deg	0

Fire

Spread Direction (from north)	deg	0, 15, 30, 45, 60, 75, 90, 105, 1

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].

Calculations are for the specified spread directions [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind and spread directions are degrees clockwise from north [SURFACE].

Wind direction is the direction from which the wind is blowing [SURFACE].

Output Variables

Surface Rate of Spread (ch/h) [SURFACE]

Fireline Intensity (Btu/ft/s) [SURFACE]

Flame Length (ft) [SURFACE]

Direction of Maximum Spread (from north) (deg) [SURFACE]

Flame Residence Time (min) [SURFACE]

(continued on next page)

Input Worksheet (continued)

Notes

Cielo Vista Section 1 East Wind 50 mph

Surface Rate of Spread (ch/h)

Spread Dir deg	Fuel Model SCAL18	gs2	sh5	4
0	0.9	2.7	3.6	7.8
15	0.9	2.4	3.2	7.0
30	0.8	2.2	3.0	6.4
45	0.8	2.1	2.9	6.1
60	0.8	2.0	2.9	6.1
75	0.9	2.1	3.0	6.2
90	1.0	2.2	3.3	6.6
105	1.1	2.4	3.6	7.3
120	1.4	2.7	4.2	8.4
135	1.7	3.3	5.2	10.1
150	2.4	4.1	6.8	12.9
165	3.7	5.6	9.5	17.6
180	6.5	8.4	15.0	26.7
195	15.3	14.3	28.3	46.9
210	70.0	31.2	74.3	107.2
225	252.8	111.6	419.8	431.3
240	28.5	497.7	347.2	1296.4
255	9.5	85.5	67.0	208.7
270	4.7	26.8	26.5	70.9
285	2.9	12.9	14.4	35.6
300	2.0	7.8	9.2	21.9
315	1.5	5.3	6.6	15.2
330	1.2	4.0	5.1	11.5
345	1.0	3.2	4.2	9.2
360	0.9	2.7	3.6	7.8

Cielo Vista Section 1 East Wind 50 mph

Fireline Intensity (Btu/ft/s)

Spread Dir deg	Fuel Model SCAL18	gs2	sh5	4
0	70	28	127	469
15	65	25	114	416
30	62	23	107	384
45	61	22	103	368
60	63	21	104	364
75	67	22	107	373
90	74	23	115	397
105	85	25	129	437
120	102	29	150	502
135	131	35	183	604
150	180	44	239	770
165	274	59	337	1055
180	487	88	531	1596
195	1146	150	1000	2805
210	5247	327	2627	6412
225	18950	1172	14854	25794
240	2134	5229	12283	77530
255	709	898	2370	12481
270	356	281	938	4240
285	218	136	508	2130
300	152	82	326	1307
315	115	56	233	907
330	93	42	180	685
345	79	33	148	553
360	70	28	127	469

Cielo Vista Section 1 East Wind 50 mph

Flame Length (ft)

Spread Dir deg	Fuel Model SCAL18	gs2	sh5	4
0	3.2	2.1	4.2	7.6
15	3.1	2.0	4.0	7.2
30	3.0	1.9	3.9	7.0
45	3.0	1.9	3.8	6.8
60	3.0	1.8	3.8	6.8
75	3.1	1.9	3.9	6.9
90	3.3	1.9	4.0	7.1
105	3.5	2.0	4.2	7.4
120	3.8	2.1	4.5	7.9
135	4.2	2.3	4.9	8.6
150	4.9	2.6	5.6	9.6
165	6.0	2.9	6.5	11.1
180	7.8	3.5	8.1	13.4
195	11.5	4.5	10.8	17.3
210	23.1	6.5	16.8	25.4
225	41.8	11.6	37.3	48.1
240	15.3	23.1	34.2	79.9
255	9.2	10.3	16.1	34.5
270	6.7	6.0	10.5	21.0
285	5.4	4.3	7.9	15.3
300	4.5	3.4	6.4	12.2
315	4.0	2.9	5.5	10.3
330	3.6	2.5	4.9	9.1
345	3.4	2.3	4.5	8.2
360	3.2	2.1	4.2	7.6

Cielo Vista Section 1 East Wind 50 mph

Direction of Maximum Spread (from north) (deg)

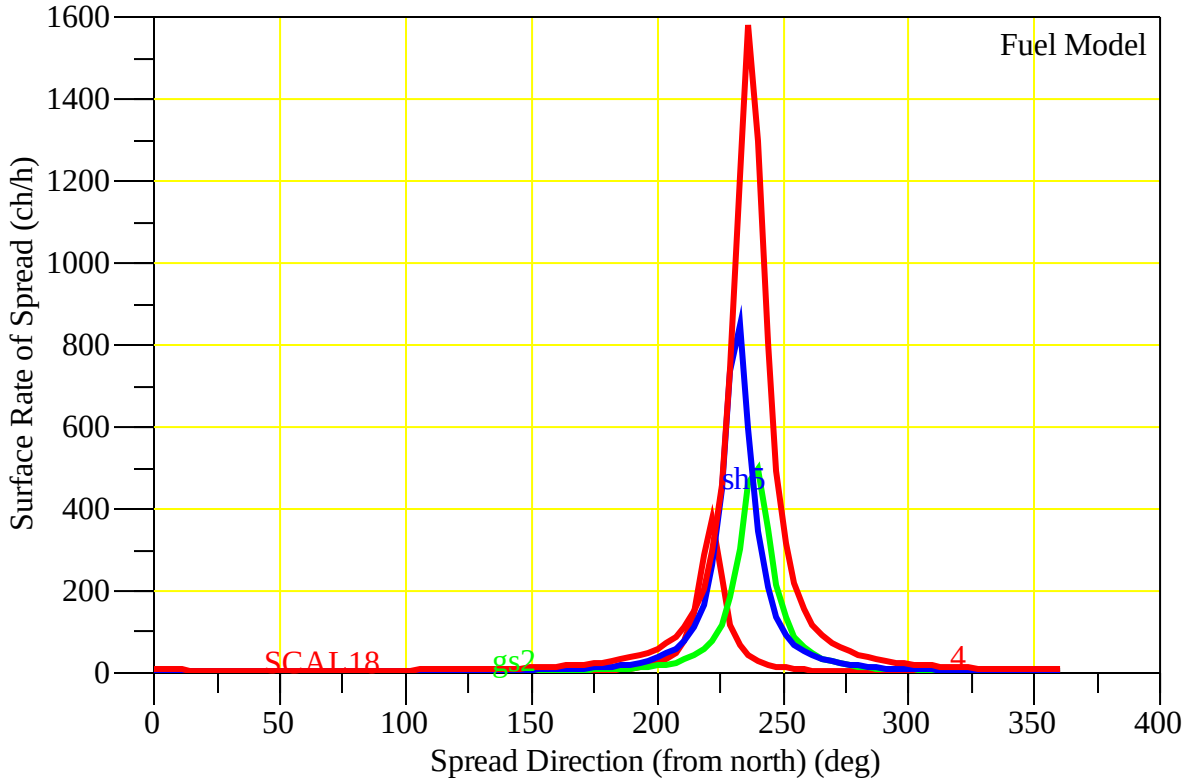
Spread Dir deg	Fuel Model SCAL18	gs2	sh5	4
0	221	239	232	237
15	221	239	232	237
30	221	239	232	237
45	221	239	232	237
60	221	239	232	237
75	221	239	232	237
90	221	239	232	237
105	221	239	232	237
120	221	239	232	237
135	221	239	232	237
150	221	239	232	237
165	221	239	232	237
180	221	239	232	237
195	221	239	232	237
210	221	239	232	237
225	221	239	232	237
240	221	239	232	237
255	221	239	232	237
270	221	239	232	237
285	221	239	232	237
300	221	239	232	237
315	221	239	232	237
330	221	239	232	237
345	221	239	232	237
360	221	239	232	237

Cielo Vista Section 1 East Wind 50 mph

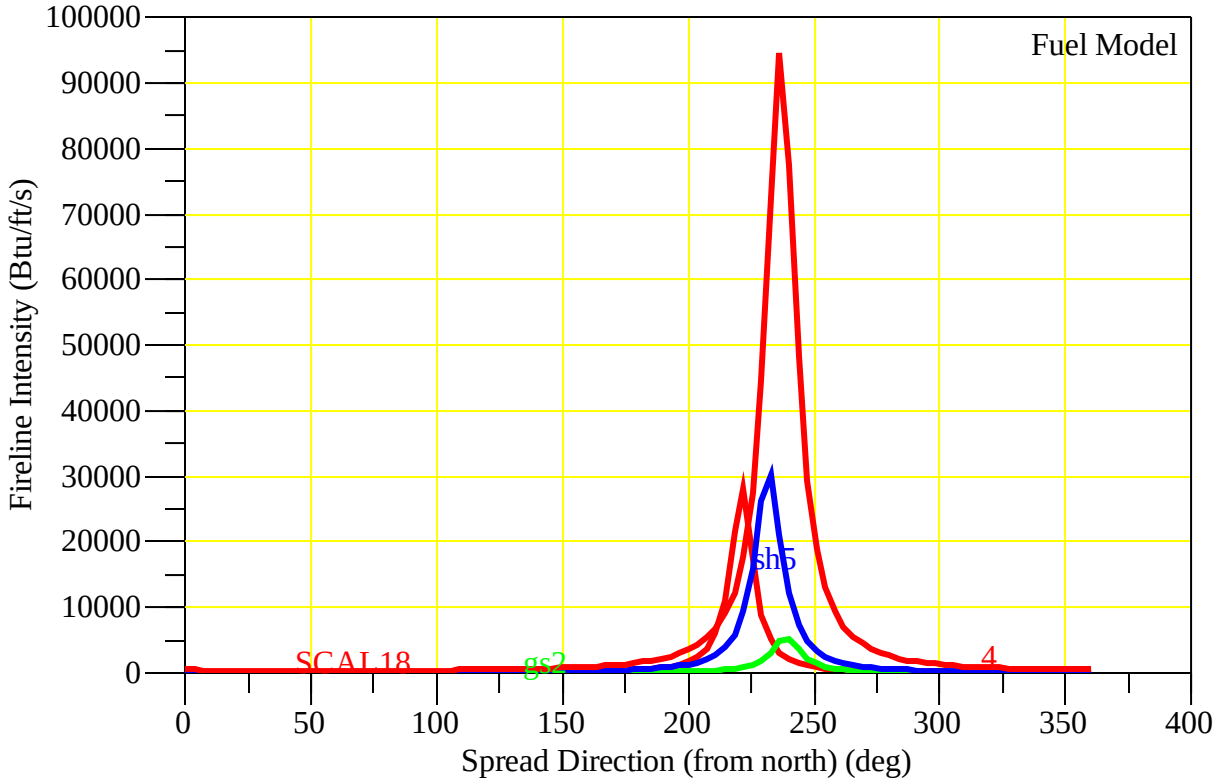
Flame Residence Time (min)

Spread Dir deg	Fuel Model SCAL18	gs2	sh5	4
0	0.49	0.21	0.31	0.22
15	0.49	0.21	0.31	0.22
30	0.49	0.21	0.31	0.22
45	0.49	0.21	0.31	0.22
60	0.49	0.21	0.31	0.22
75	0.49	0.21	0.31	0.22
90	0.49	0.21	0.31	0.22
105	0.49	0.21	0.31	0.22
120	0.49	0.21	0.31	0.22
135	0.49	0.21	0.31	0.22
150	0.49	0.21	0.31	0.22
165	0.49	0.21	0.31	0.22
180	0.49	0.21	0.31	0.22
195	0.49	0.21	0.31	0.22
210	0.49	0.21	0.31	0.22
225	0.49	0.21	0.31	0.22
240	0.49	0.21	0.31	0.22
255	0.49	0.21	0.31	0.22
270	0.49	0.21	0.31	0.22
285	0.49	0.21	0.31	0.22
300	0.49	0.21	0.31	0.22
315	0.49	0.21	0.31	0.22
330	0.49	0.21	0.31	0.22
345	0.49	0.21	0.31	0.22
360	0.49	0.21	0.31	0.22

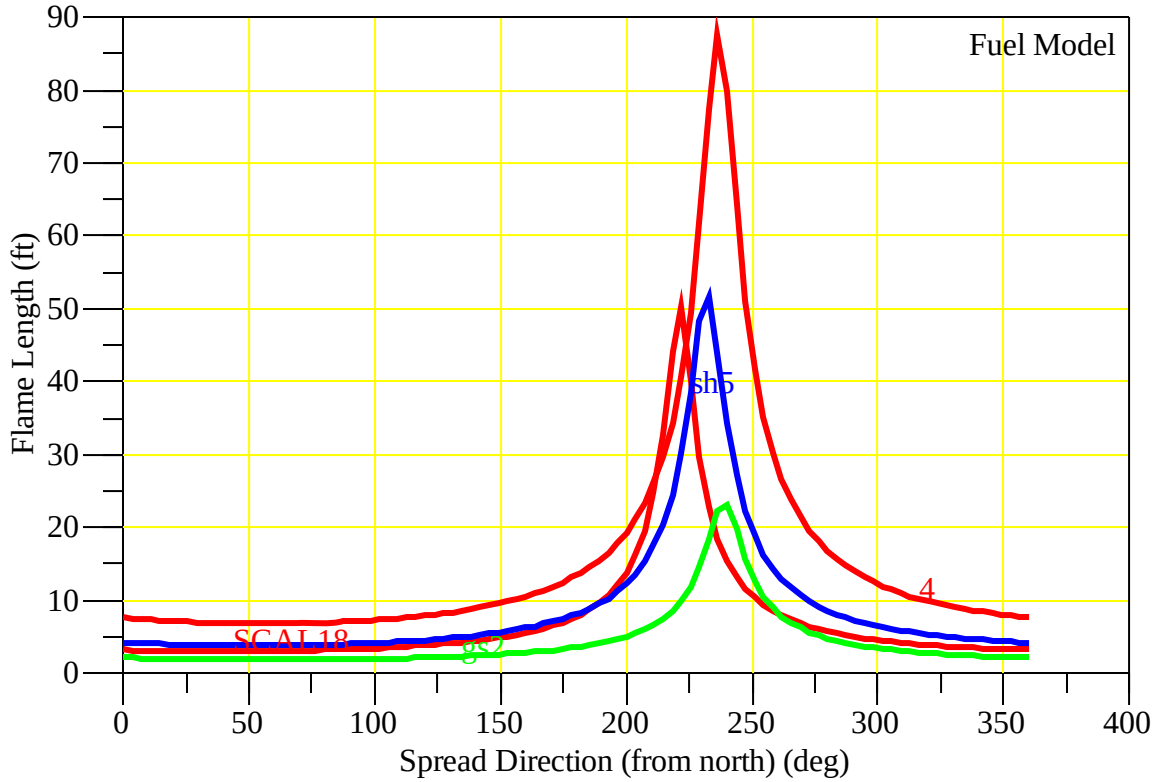
Cielo Vista Section 1 East Wind 50 mph



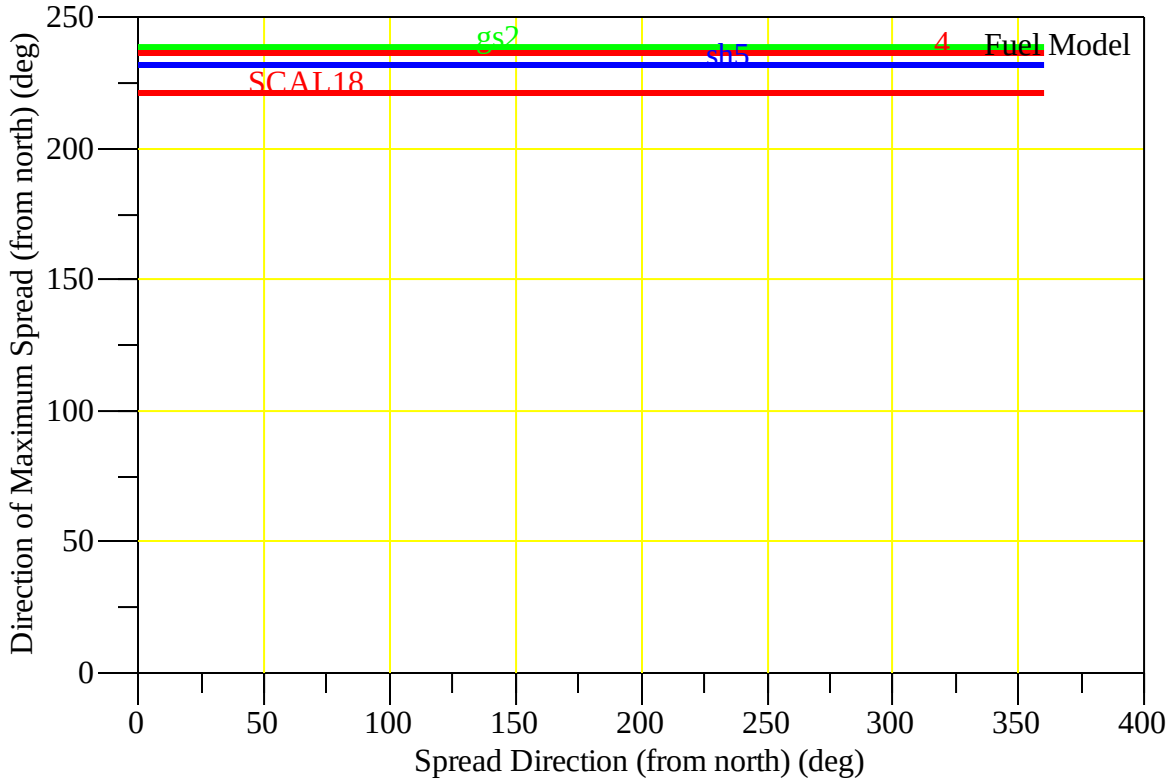
Cielo Vista Section 1 East Wind 50 mph



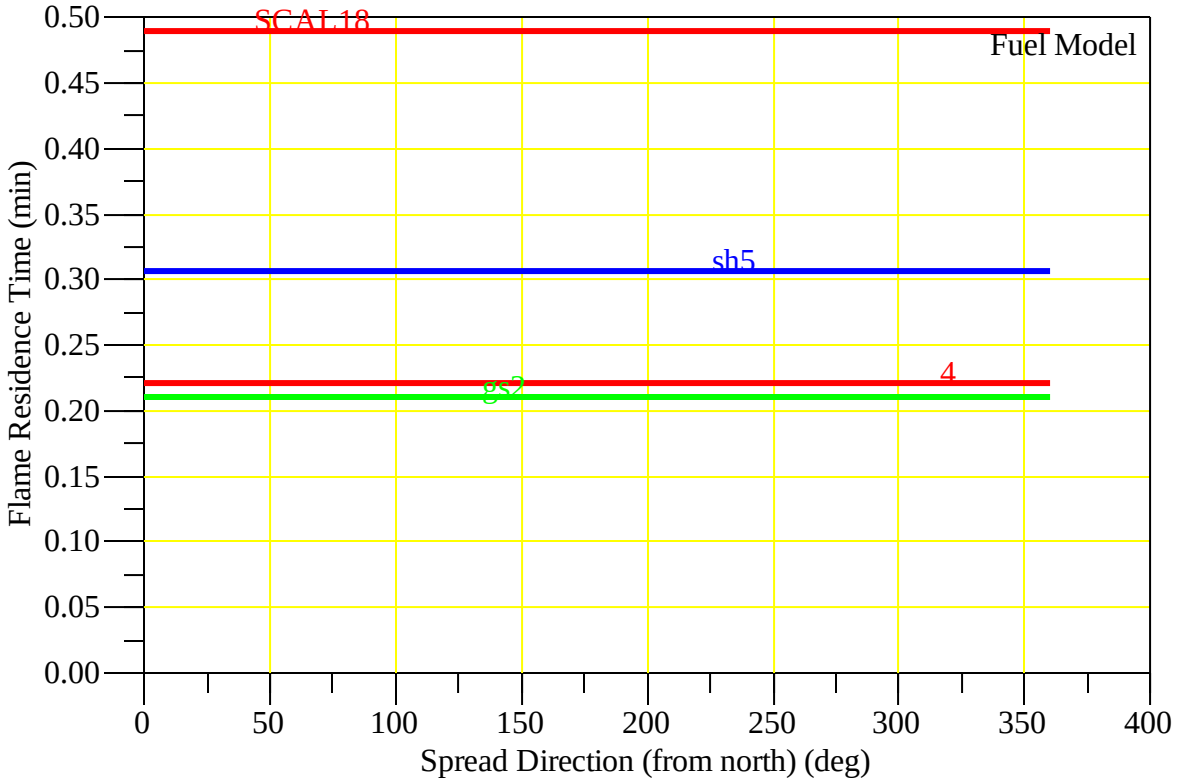
Cielo Vista Section 1 East Wind 50 mph



Cielo Vista Section 1 East Wind 50 mph



Cielo Vista Section 1 East Wind 50 mph



Discrete Variable Codes Used
Cielo Vista Section 1 East Wind 50 mph

Fuel Model

SCAL18	Sage / Buckwheat
gs2	Moderate load, dry climate grass-shrub (D) (122)
sh5	High load, dry climate shrub (S) (145)
4	Chaparral (S)

Inputs: SURFACE

Description		Cielo Vista Section 1 East 50 mph S Aspect

Fuel/Vegetation, Surface/Understory

Fuel Model		SCAL18, gs2

Fuel Moisture

1-h Moisture	%	3
10-h Moisture	%	4
100-h Moisture	%	5
Live Herbaceous Moisture	%	30
Live Woody Moisture	%	50

Weather

Midflame Wind Speed	mi/h	25
Wind Direction (from north)	deg	90

Terrain

Slope Steepness	%	100
Aspect	deg	180

Fire

Spread Direction (from north)	deg	0, 15, 30, 45, 60, 75, 90, 105, 1

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].

Calculations are for the specified spread directions [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind and spread directions are degrees clockwise from north [SURFACE].

Wind direction is the direction from which the wind is blowing [SURFACE].

Output Variables

Surface Rate of Spread (ch/h) [SURFACE]

Fireline Intensity (Btu/ft/s) [SURFACE]

Flame Length (ft) [SURFACE]

Direction of Maximum Spread (from north) (deg) [SURFACE]

Flame Residence Time (min) [SURFACE]

(continued on next page)

Input Worksheet (continued)

Notes

Cielo Vista Section 1 East 50 mph S Aspect

Surface Rate of Spread (ch/h)

Spread Dir deg	Fuel Model SCAL18	gs2
0	3.2	4.9
15	2.4	3.8
30	1.9	3.1
45	1.6	2.6
60	1.4	2.4
75	1.3	2.2
90	1.2	2.1
105	1.2	2.1
120	1.2	2.2
135	1.2	2.3
150	1.4	2.6
165	1.5	3.0
180	1.8	3.6
195	2.3	4.7
210	3.1	6.5
225	4.5	10.1
240	7.5	18.5
255	15.5	45.2
270	49.5	202.7
285	258.0	268.7
300	60.2	53.9
315	17.4	20.6
330	8.1	11.0
345	4.7	6.9
360	3.2	4.9

Cielo Vista Section 1 East 50 mph S Aspect

Fireline Intensity (Btu/ft/s)

Spread Dir deg	Fuel Model SCAL18	gs2
0	239	52
15	177	40
30	140	32
45	118	28
60	103	25
75	94	23
90	89	22
105	88	22
120	89	23
135	93	24
150	102	27
165	115	31
180	137	38
195	172	49
210	230	69
225	336	106
240	561	194
255	1163	475
270	3713	2129
285	19342	2823
300	4513	566
315	1303	217
330	605	115
345	355	73
360	239	52

Cielo Vista Section 1 East 50 mph S Aspect

Flame Length (ft)

Spread Dir deg	Fuel Model SCAL18	gs2
0	5.6	2.8
15	4.9	2.4
30	4.4	2.2
45	4.0	2.1
60	3.8	2.0
75	3.6	1.9
90	3.6	1.9
105	3.5	1.9
120	3.5	1.9
135	3.6	2.0
150	3.8	2.1
165	4.0	2.2
180	4.3	2.4
195	4.8	2.7
210	5.5	3.2
225	6.5	3.9
240	8.3	5.1
255	11.6	7.7
270	19.7	15.3
285	42.2	17.4
300	21.6	8.3
315	12.2	5.3
330	8.6	4.0
345	6.7	3.2
360	5.6	2.8

Cielo Vista Section 1 East 50 mph S Aspect

Direction of Maximum Spread (from north) (deg)

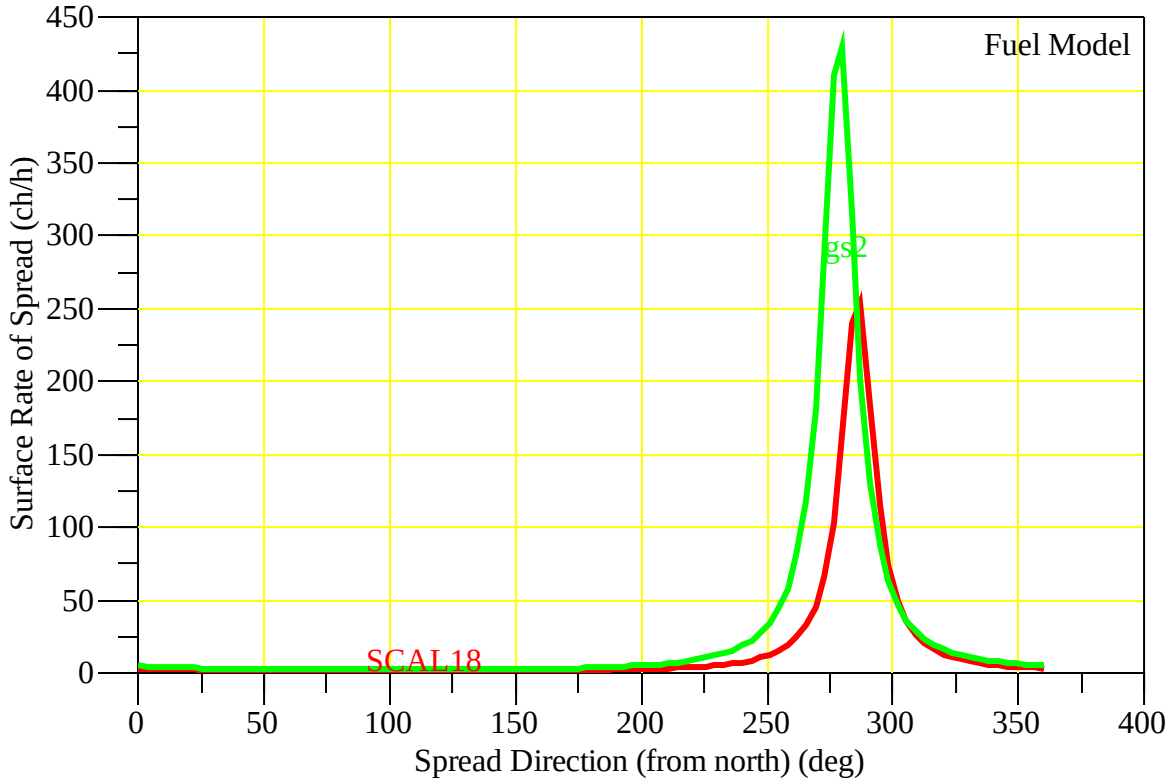
Spread Dir deg	Fuel Model SCAL18	gs2
0	286	279
15	286	279
30	286	279
45	286	279
60	286	279
75	286	279
90	286	279
105	286	279
120	286	279
135	286	279
150	286	279
165	286	279
180	286	279
195	286	279
210	286	279
225	286	279
240	286	279
255	286	279
270	286	279
285	286	279
300	286	279
315	286	279
330	286	279
345	286	279
360	286	279

Cielo Vista Section 1 East 50 mph S Aspect

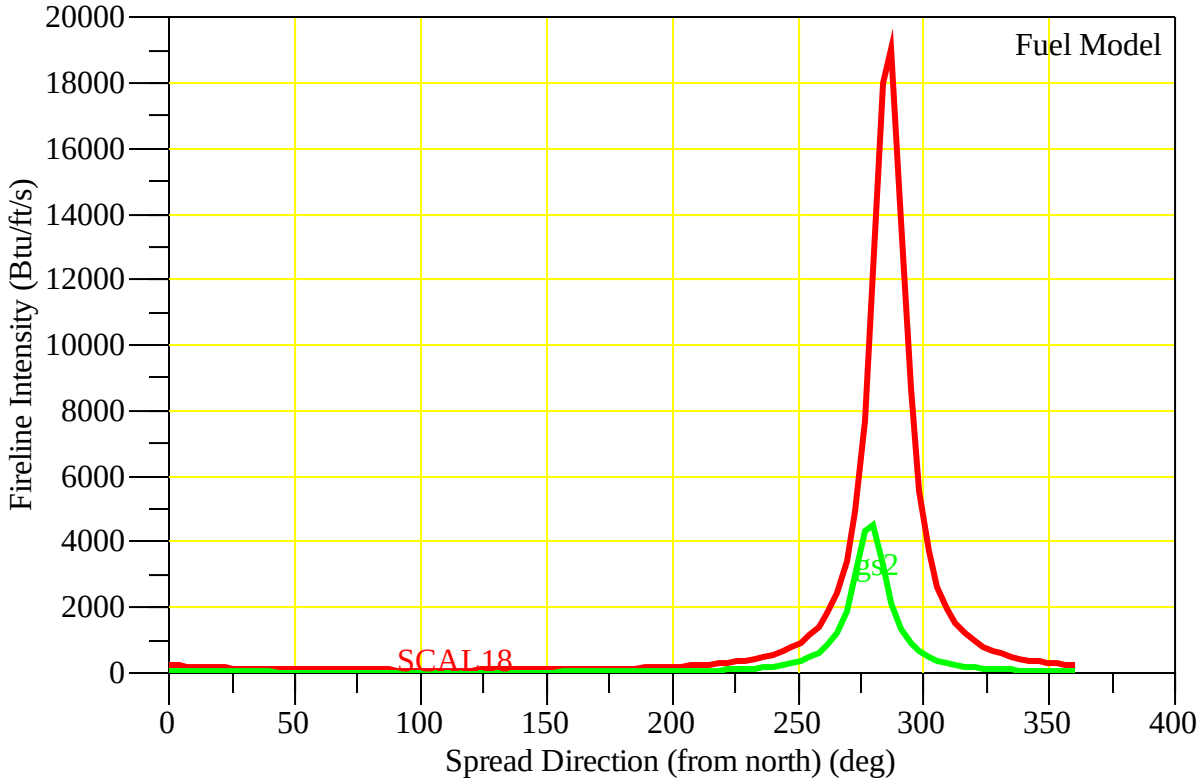
Flame Residence Time (min)

Spread Dir deg	Fuel Model SCAL18	gs2
0	0.49	0.21
15	0.49	0.21
30	0.49	0.21
45	0.49	0.21
60	0.49	0.21
75	0.49	0.21
90	0.49	0.21
105	0.49	0.21
120	0.49	0.21
135	0.49	0.21
150	0.49	0.21
165	0.49	0.21
180	0.49	0.21
195	0.49	0.21
210	0.49	0.21
225	0.49	0.21
240	0.49	0.21
255	0.49	0.21
270	0.49	0.21
285	0.49	0.21
300	0.49	0.21
315	0.49	0.21
330	0.49	0.21
345	0.49	0.21
360	0.49	0.21

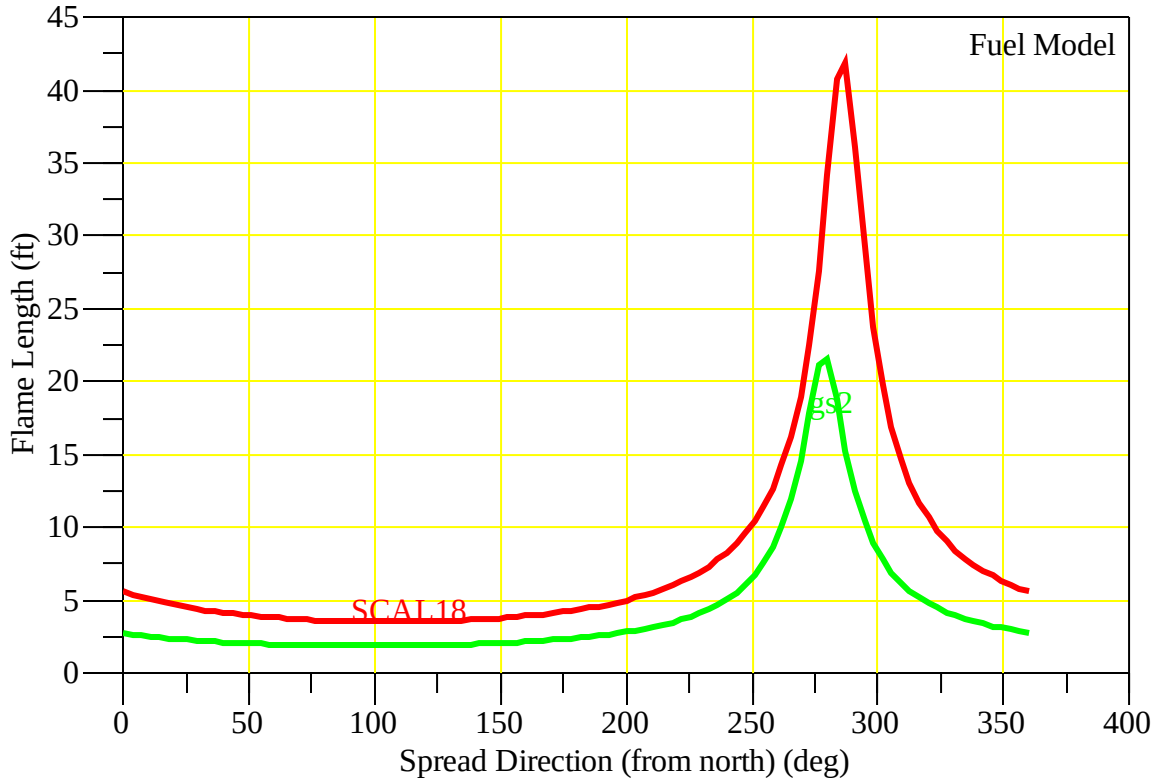
Cielo Vista Section 1 East 50 mph S Aspect



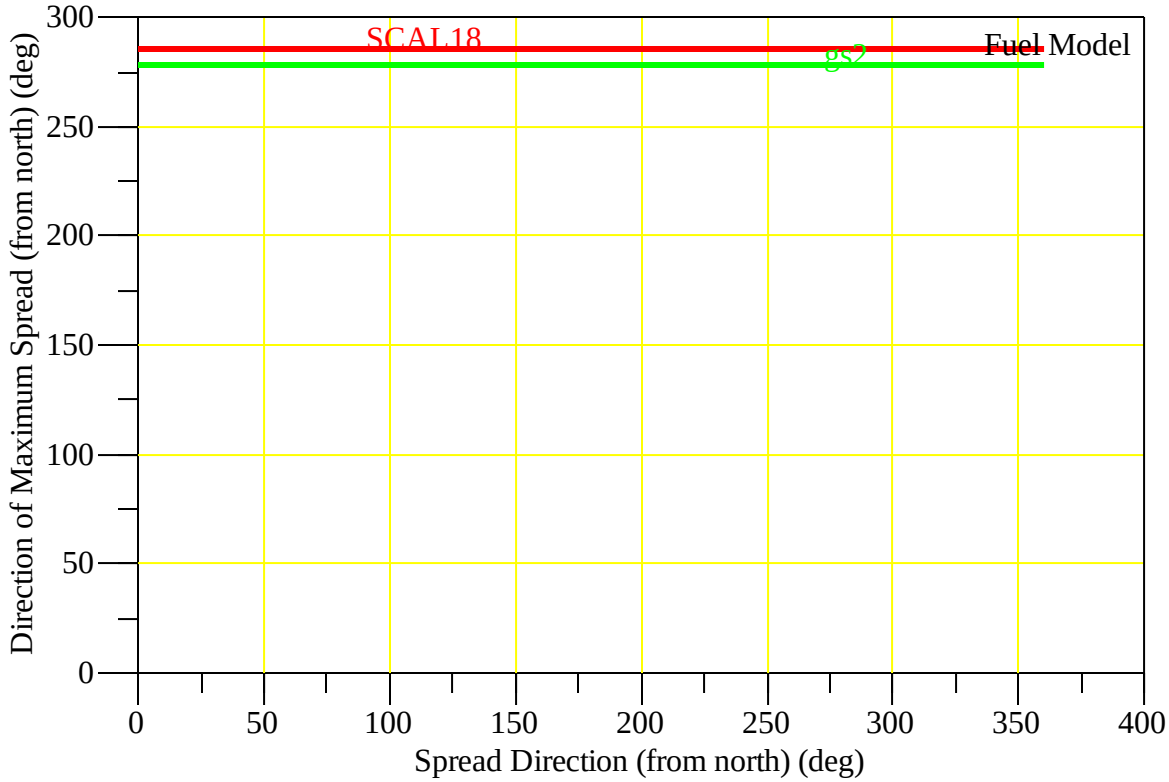
Cielo Vista Section 1 East 50 mph S Aspect



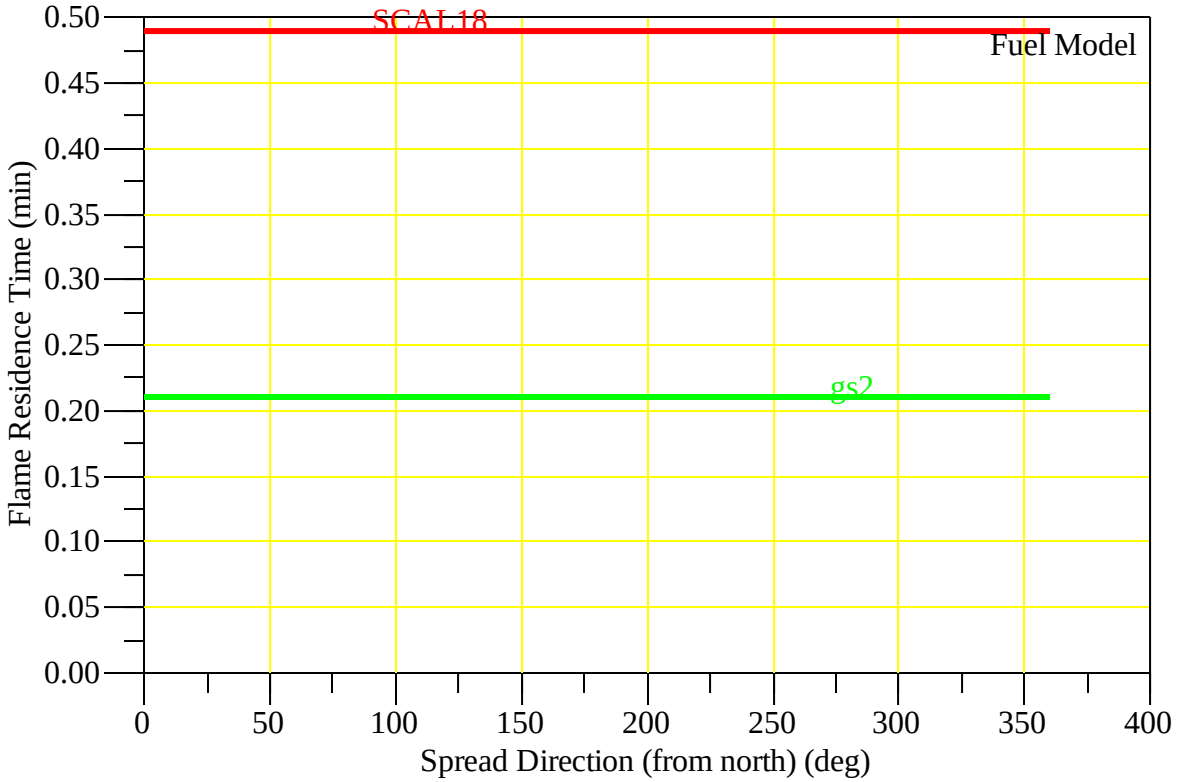
Cielo Vista Section 1 East 50 mph S Aspect



Cielo Vista Section 1 East 50 mph S Aspect



Cielo Vista Section 1 East 50 mph S Aspect



Discrete Variable Codes Used
Cielo Vista Section 1 East 50 mph S Aspect

Fuel Model

SCAL18	Sage / Buckwheat
gs2	Moderate load, dry climate grass-shrub (D) (122)

Inputs: SURFACE

Description		Cielo Vista East 50mph worst case

Fuel/Vegetation, Surface/Understory

Fuel Model		SCAL18, gs2,sh5

Fuel Moisture

1-h Moisture	%	3
10-h Moisture	%	4
100-h Moisture	%	5
Live Herbaceous Moisture	%	30
Live Woody Moisture	%	50

Weather

Midflame Wind Speed	mi/h	25
Wind Direction (from north)	deg	90

Terrain

Slope Steepness	%	100
Aspect	deg	90

Fire

Spread Direction (from north)	deg	0, 15, 30, 45, 60, 75, 90, 105, 1

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].

Calculations are for the specified spread directions [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind and spread directions are degrees clockwise from north [SURFACE].

Wind direction is the direction from which the wind is blowing [SURFACE].

Output Variables

Surface Rate of Spread (ch/h) [SURFACE]

Fireline Intensity (Btu/ft/s) [SURFACE]

Flame Length (ft) [SURFACE]

Direction of Maximum Spread (from north) (deg) [SURFACE]

Flame Residence Time (min) [SURFACE]

(continued on next page)

Input Worksheet (continued)

Notes

Cielo Vista East 50mph worst case

Surface Rate of Spread (ch/h)

Spread Dir deg	Fuel Model SCAL18	gs2	sh5
0	1.9	4.1	6.0
15	1.5	3.2	4.8
30	1.3	2.7	4.0
45	1.1	2.4	3.5
60	1.0	2.2	3.2
75	1.0	2.1	3.1
90	1.0	2.0	3.0
105	1.0	2.1	3.1
120	1.0	2.2	3.2
135	1.1	2.4	3.5
150	1.3	2.7	4.0
165	1.5	3.2	4.8
180	1.9	4.1	6.0
195	2.6	5.5	8.0
210	3.8	8.1	11.9
225	6.4	13.6	20.1
240	13.8	28.9	42.6
255	48.1	97.3	145.2
270	322.9	504.5	814.2
285	48.1	97.3	145.2
300	13.8	28.9	42.6
315	6.4	13.6	20.1
330	3.8	8.1	11.9
345	2.6	5.5	8.0
360	1.9	4.1	6.0

Cielo Vista East 50mph worst case

Fireline Intensity (Btu/ft/s)

Spread Dir deg	Fuel Model SCAL18	gs2	sh5
0	143	43	212
15	114	34	168
30	96	29	141
45	84	25	124
60	77	23	114
75	73	22	108
90	72	21	106
105	73	22	108
120	77	23	114
135	84	25	124
150	96	29	141
165	114	34	168
180	143	43	212
195	193	58	285
210	285	85	420
225	483	143	710
240	1031	304	1507
255	3604	1022	5139
270	24210	5300	28809
285	3604	1022	5139
300	1031	304	1507
315	483	143	710
330	285	85	420
345	193	58	285
360	143	43	212

Cielo Vista East 50mph worst case

Flame Length (ft)

Spread Dir deg	Fuel Model SCAL18	gs2	sh5
0	4.4	2.5	5.3
15	4.0	2.3	4.8
30	3.7	2.1	4.4
45	3.5	2.0	4.1
60	3.3	1.9	4.0
75	3.2	1.9	3.9
90	3.2	1.8	3.8
105	3.2	1.9	3.9
120	3.3	1.9	4.0
135	3.5	2.0	4.1
150	3.7	2.1	4.4
165	4.0	2.3	4.8
180	4.4	2.5	5.3
195	5.1	2.9	6.1
210	6.1	3.5	7.2
225	7.7	4.4	9.2
240	10.9	6.2	13.0
255	19.5	10.9	22.9
270	46.8	23.2	50.7
285	19.5	10.9	22.9
300	10.9	6.2	13.0
315	7.7	4.4	9.2
330	6.1	3.5	7.2
345	5.1	2.9	6.1
360	4.4	2.5	5.3

Cielo Vista East 50mph worst case

Direction of Maximum Spread (from north) (deg)

Spread Dir deg	Fuel Model SCAL18	gs2	sh5
0	270	270	270
15	270	270	270
30	270	270	270
45	270	270	270
60	270	270	270
75	270	270	270
90	270	270	270
105	270	270	270
120	270	270	270
135	270	270	270
150	270	270	270
165	270	270	270
180	270	270	270
195	270	270	270
210	270	270	270
225	270	270	270
240	270	270	270
255	270	270	270
270	270	270	270
285	270	270	270
300	270	270	270
315	270	270	270
330	270	270	270
345	270	270	270
360	270	270	270

Cielo Vista East 50mph worst case

Flame Residence Time (min)

Spread Dir deg	Fuel Model SCAL18	gs2	sh5
0	0.49	0.21	0.31
15	0.49	0.21	0.31
30	0.49	0.21	0.31
45	0.49	0.21	0.31
60	0.49	0.21	0.31
75	0.49	0.21	0.31
90	0.49	0.21	0.31
105	0.49	0.21	0.31
120	0.49	0.21	0.31
135	0.49	0.21	0.31
150	0.49	0.21	0.31
165	0.49	0.21	0.31
180	0.49	0.21	0.31
195	0.49	0.21	0.31
210	0.49	0.21	0.31
225	0.49	0.21	0.31
240	0.49	0.21	0.31
255	0.49	0.21	0.31
270	0.49	0.21	0.31
285	0.49	0.21	0.31
300	0.49	0.21	0.31
315	0.49	0.21	0.31
330	0.49	0.21	0.31
345	0.49	0.21	0.31
360	0.49	0.21	0.31

Discrete Variable Codes Used
Cielo Vista East 50mph worst case

Fuel Model

SCAL18	Sage / Buckwheat
gs2	Moderate load, dry climate grass-shrub (D) (122)
sh5	High load, dry climate shrub (S) (145)

Inputs: SURFACE

Description		Cielo Vista SouthWest 30mph Onshore

Fuel/Vegetation, Surface/Understory

Fuel Model		SCAL18, gs2,sh5

Fuel Moisture

1-h Moisture	%	3
10-h Moisture	%	4
100-h Moisture	%	5
Live Herbaceous Moisture	%	30
Live Woody Moisture	%	50

Weather

Midflame Wind Speed	mi/h	15
Wind Direction (from north)	deg	225

Terrain

Slope Steepness	%	100
Aspect	deg	225

Fire

Spread Direction (from north)	deg	0, 15, 30, 45, 60, 75, 90, 105, 1

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].

Calculations are for the specified spread directions [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind and spread directions are degrees clockwise from north [SURFACE].

Wind direction is the direction from which the wind is blowing [SURFACE].

Output Variables

Surface Rate of Spread (ch/h) [SURFACE]

Fireline Intensity (Btu/ft/s) [SURFACE]

Flame Length (ft) [SURFACE]

Direction of Maximum Spread (from north) (deg) [SURFACE]

Flame Residence Time (min) [SURFACE]

(continued on next page)

Input Worksheet (continued)

Notes

Cielo Vista SouthWest 30mph Onshore

Surface Rate of Spread (ch/h)

Spread Dir deg	Fuel Model SCAL18	gs2	sh5
0	8.7	14.9	24.5
15	18.2	30.6	50.6
30	58.0	90.7	153.9
45	229.2	275.4	505.9
60	58.0	90.7	153.9
75	18.2	30.6	50.6
90	8.7	14.9	24.5
105	5.2	8.9	14.6
120	3.5	6.1	10.0
135	2.6	4.5	7.4
150	2.1	3.6	5.9
165	1.8	3.0	5.0
180	1.5	2.7	4.4
195	1.4	2.4	4.0
210	1.3	2.3	3.8
225	1.3	2.3	3.7
240	1.3	2.3	3.8
255	1.4	2.4	4.0
270	1.5	2.7	4.4
285	1.8	3.0	5.0
300	2.1	3.6	5.9
315	2.6	4.5	7.4
330	3.5	6.1	10.0
345	5.2	8.9	14.6
360	8.7	14.9	24.5

Cielo Vista SouthWest 30mph Onshore

Fireline Intensity (Btu/ft/s)

Spread Dir deg	Fuel Model SCAL18	gs2	sh5
0	652	156	866
15	1363	321	1791
30	4348	953	5446
45	17182	2893	17901
60	4348	953	5446
75	1363	321	1791
90	652	156	866
105	388	94	518
120	264	64	353
135	196	48	263
150	156	38	209
165	131	32	176
180	115	28	155
195	106	26	142
210	100	24	135
225	99	24	132
240	100	24	135
255	106	26	142
270	115	28	155
285	131	32	176
300	156	38	209
315	196	48	263
330	264	64	353
345	388	94	518
360	652	156	866

Cielo Vista SouthWest 30mph Onshore

Flame Length (ft)

Spread Dir deg	Fuel Model SCAL18	gs2	sh5
0	8.9	4.6	10.1
15	12.4	6.4	14.1
30	21.2	10.6	23.5
45	39.9	17.6	40.7
60	21.2	10.6	23.5
75	12.4	6.4	14.1
90	8.9	4.6	10.1
105	7.0	3.6	8.0
120	5.8	3.0	6.7
135	5.1	2.7	5.8
150	4.6	2.4	5.3
165	4.2	2.2	4.9
180	4.0	2.1	4.6
195	3.8	2.0	4.4
210	3.7	2.0	4.3
225	3.7	1.9	4.3
240	3.7	2.0	4.3
255	3.8	2.0	4.4
270	4.0	2.1	4.6
285	4.2	2.2	4.9
300	4.6	2.4	5.3
315	5.1	2.7	5.8
330	5.8	3.0	6.7
345	7.0	3.6	8.0
360	8.9	4.6	10.1

Cielo Vista SouthWest 30mph Onshore

Direction of Maximum Spread (from north) (deg)

Spread Dir deg	Fuel Model SCAL18	gs2	sh5
0	45	45	45
15	45	45	45
30	45	45	45
45	45	45	45
60	45	45	45
75	45	45	45
90	45	45	45
105	45	45	45
120	45	45	45
135	45	45	45
150	45	45	45
165	45	45	45
180	45	45	45
195	45	45	45
210	45	45	45
225	45	45	45
240	45	45	45
255	45	45	45
270	45	45	45
285	45	45	45
300	45	45	45
315	45	45	45
330	45	45	45
345	45	45	45
360	45	45	45

Cielo Vista SouthWest 30mph Onshore

Flame Residence Time (min)

Spread Dir deg	Fuel Model SCAL18	gs2	sh5
0	0.49	0.21	0.31
15	0.49	0.21	0.31
30	0.49	0.21	0.31
45	0.49	0.21	0.31
60	0.49	0.21	0.31
75	0.49	0.21	0.31
90	0.49	0.21	0.31
105	0.49	0.21	0.31
120	0.49	0.21	0.31
135	0.49	0.21	0.31
150	0.49	0.21	0.31
165	0.49	0.21	0.31
180	0.49	0.21	0.31
195	0.49	0.21	0.31
210	0.49	0.21	0.31
225	0.49	0.21	0.31
240	0.49	0.21	0.31
255	0.49	0.21	0.31
270	0.49	0.21	0.31
285	0.49	0.21	0.31
300	0.49	0.21	0.31
315	0.49	0.21	0.31
330	0.49	0.21	0.31
345	0.49	0.21	0.31
360	0.49	0.21	0.31

Discrete Variable Codes Used
Cielo Vista SouthWest 30mph Onshore

Fuel Model

SCAL18	Sage / Buckwheat
gs2	Moderate load, dry climate grass-shrub (D) (122)
sh5	High load, dry climate shrub (S) (145)

Cielo Vista Behave Output Summary

Surface Rate of Spread (ch/h)

Spread Dir deg	SouthWest 30 mph Fuel SCAL18	gs2	sh5	East 50mph Fuel SCAL18	gs2	sh5	East 50 mph - N Aspect Fuel SCAL18	gs2	sh5	4	East 50 mph - S Aspect Fuel SCAL18	gs2
0	8.7	14.9	24.5	1.9	4.1	6	0.9	2.7	3.6	7.8	3.2	4.9
15	18.2	30.6	50.6	1.5	3.2	4.8	0.9	2.4	3.2	7	2.4	3.8
30	58	90.7	153.9	1.3	2.7	4	0.8	2.2	3	6.4	1.9	3.1
45	229.2	275.4	505.9	1.1	2.4	3.5	0.8	2.1	2.9	6.1	1.6	2.6
60	58	90.7	153.9	1	2.2	3.2	0.8	2	2.9	6.1	1.4	2.4
75	18.2	30.6	50.6	1	2.1	3.1	0.9	2.1	3	6.2	1.3	2.2
90	8.7	14.9	24.5	1	2	3	1	2.2	3.3	6.6	1.2	2.1
105	5.2	8.9	14.6	1	2.1	3.1	1.1	2.4	3.6	7.3	1.2	2.1
120	3.5	6.1	10	1	2.2	3.2	1.4	2.7	4.2	8.4	1.2	2.2
135	2.6	4.5	7.4	1.1	2.4	3.5	1.7	3.3	5.2	10.1	1.2	2.3
150	2.1	3.6	5.9	1.3	2.7	4	2.4	4.1	6.8	12.9	1.4	2.6
165	1.8	3	5	1.5	3.2	4.8	3.7	5.6	9.5	17.6	1.5	3
180	1.5	2.7	4.4	1.9	4.1	6	6.5	8.4	15	26.7	1.8	3.6
195	1.4	2.4	4	2.6	5.5	8	15.3	14.3	28.3	46.9	2.3	4.7
210	1.3	2.3	3.8	3.8	8.1	11.9	70	31.2	74.3	107.2	3.1	6.5
225	1.3	2.3	3.7	6.4	13.6	20.1	252.8	111.6	419.8	431.3	4.5	10.1
240	1.3	2.3	3.8	13.8	28.9	42.6	28.5	497.7	347.2	1296.4	7.5	18.5
255	1.4	2.4	4	48.1	97.3	145.2	9.5	85.5	67	208.7	15.5	45.2
270	1.5	2.7	4.4	322.9	504.5	814.2	4.7	26.8	26.5	70.9	49.5	202.7
285	1.8	3	5	48.1	97.3	145.2	2.9	12.9	14.4	35.6	258	268.7
300	2.1	3.6	5.9	13.8	28.9	42.6	2	7.8	9.2	21.9	60.2	53.9
315	2.6	4.5	7.4	6.4	13.6	20.1	1.5	5.3	6.6	15.2	17.4	20.6
330	3.5	6.1	10	3.8	8.1	11.9	1.2	4	5.1	11.5	8.1	11
345	5.2	8.9	14.6	2.6	5.5	8	1	3.2	4.2	9.2	4.7	6.9
360	8.7	14.9	24.5	1.9	4.1	6	0.9	2.7	3.6	7.8	3.2	4.9

Cielo Vista Behave Output Summary

Fireline Intensity (Btu/ft/s)

Spread Dir deg	SouthWest 30 mph Fuel Model SCAL18	gs2	sh5	East 50mph Fuel Model SCAL18	gs2	sh5	East 50 mph - N Aspect Fuel Model SCAL18	gs2	sh5	4	East 50 mph - S Aspect Fuel SCAL18	gs2
0	652	156	866	143	43	212	70	28	127	469	239	52
15	1363	321	1791	114	34	168	65	25	114	416	177	40
30	4348	953	5446	96	29	141	62	23	107	384	140	32
45	17182	2893	17901	84	25	124	61	22	103	368	118	28
60	4348	953	5446	77	23	114	63	21	104	364	103	25
75	1363	321	1791	73	22	108	67	22	107	373	94	23
90	652	156	866	72	21	106	74	23	115	397	89	22
105	388	94	518	73	22	108	85	25	129	437	88	22
120	264	64	353	77	23	114	102	29	150	502	89	23
135	196	48	263	84	25	124	131	35	183	604	93	24
150	156	38	209	96	29	141	180	44	239	770	102	27
165	131	32	176	114	34	168	274	59	337	1055	115	31
180	115	28	155	143	43	212	487	88	531	1596	137	38
195	106	26	142	193	58	285	1146	150	1000	2805	172	49
210	100	24	135	285	85	420	5247	327	2627	6412	230	69
225	99	24	132	483	143	710	18950	1172	14854	25794	336	106
240	100	24	135	1031	304	1507	2134	5229	12283	77530	561	194
255	106	26	142	3604	1022	5139	709	898	2370	12481	1163	475
270	115	28	155	24210	5300	28809	356	281	938	4240	3713	2129
285	131	32	176	3604	1022	5139	218	136	508	2130	19342	2823
300	156	38	209	1031	304	1507	152	82	326	1307	4513	566
315	196	48	263	483	143	710	115	56	233	907	1303	217
330	264	64	353	285	85	420	93	42	180	685	605	115
345	388	94	518	193	58	285	79	33	148	553	355	73
360	652	156	866	143	43	212	70	28	127	469	239	52

Cielo Vista Behave Output Summary

Flame Length (ft)

Spread Dir deg	SouthWest 30 mph Fuel Model SCAL18	gs2	sh5	East 50mph Fuel Model SCAL18	gs2	sh5	East 50 mph - N Aspect Fuel Model SCAL18	gs2	sh5	4	East 50 mph - S Aspect Fuel SCAL18	gs2
0	8.9	4.6	10.1	4.4	2.5	5.3	3.2	2.1	4.2	7.6	5.6	2.8
15	12.4	6.4	14.1	4	2.3	4.8	3.1	2	4	7.2	4.9	2.4
30	21.2	10.6	23.5	3.7	2.1	4.4	3	1.9	3.9	7	4.4	2.2
45	39.9	17.6	40.7	3.5	2	4.1	3	1.9	3.8	6.8	4	2.1
60	21.2	10.6	23.5	3.3	1.9	4	3	1.8	3.8	6.8	3.8	2
75	12.4	6.4	14.1	3.2	1.9	3.9	3.1	1.9	3.9	6.9	3.6	1.9
90	8.9	4.6	10.1	3.2	1.8	3.8	3.3	1.9	4	7.1	3.6	1.9
105	7	3.6	8	3.2	1.9	3.9	3.5	2	4.2	7.4	3.5	1.9
120	5.8	3	6.7	3.3	1.9	4	3.8	2.1	4.5	7.9	3.5	1.9
135	5.1	2.7	5.8	3.5	2	4.1	4.2	2.3	4.9	8.6	3.6	2
150	4.6	2.4	5.3	3.7	2.1	4.4	4.9	2.6	5.6	9.6	3.8	2.1
165	4.2	2.2	4.9	4	2.3	4.8	6	2.9	6.5	11.1	4	2.2
180	4	2.1	4.6	4.4	2.5	5.3	7.8	3.5	8.1	13.4	4.3	2.4
195	3.8	2	4.4	5.1	2.9	6.1	11.5	4.5	10.8	17.3	4.8	2.7
210	3.7	2	4.3	6.1	3.5	7.2	23.1	6.5	16.8	25.4	5.5	3.2
225	3.7	1.9	4.3	7.7	4.4	9.2	41.8	11.6	37.3	48.1	6.5	3.9
240	3.7	2	4.3	10.9	6.2	13	15.3	23.1	34.2	79.9	8.3	5.1
255	3.8	2	4.4	19.5	10.9	22.9	9.2	10.3	16.1	34.5	11.6	7.7
270	4	2.1	4.6	46.8	23.2	50.7	6.7	6	10.5	21	19.7	15.3
285	4.2	2.2	4.9	19.5	10.9	22.9	5.4	4.3	7.9	15.3	42.2	17.4
300	4.6	2.4	5.3	10.9	6.2	13	4.5	3.4	6.4	12.2	21.6	8.3
315	5.1	2.7	5.8	7.7	4.4	9.2	4	2.9	5.5	10.3	12.2	5.3
330	5.8	3	6.7	6.1	3.5	7.2	3.6	2.5	4.9	9.1	8.6	4
345	7	3.6	8	5.1	2.9	6.1	3.4	2.3	4.5	8.2	6.7	3.2
360	8.9	4.6	10.1	4.4	2.5	5.3	3.2	2.1	4.2	7.6	5.6	2.8

Cielo Vista Behave Output Summary

Flame Length (ft)

Spread Dir deg	Fuel Model SCAL18	gs2	sh5
0	3.2	2.1	4.2
15	3.1	2	4
30	3	1.9	3.9
45	3	1.9	3.8
60	3	1.8	3.8
75	3.1	1.9	3.9
90	3.3	1.9	4
105	3.5	2	4.2
120	3.8	2.1	4.5
135	4.2	2.3	4.9
150	4.9	2.6	5.6
165	6	2.9	6.5
180	7.8	3.5	8.1
195	11.5	4.5	10.8
210	23.1	6.5	16.8
225	41.8	11.6	37.3
240	15.3	23.1	34.2
255	9.2	10.3	16.1
270	6.7	6	10.5
285	5.4	4.3	7.9
300	4.5	3.4	6.4
315	4	2.9	5.5
330	3.6	2.5	4.9
345	3.4	2.3	4.5
360	3.2	2.1	4.2

Cielo Vista Behave Output Summary

Direction of Maximum Spread

Spread Dir deg	SouthWest 30 mph Fuel Model SCAL18	gs2	sh5	East 50mph Fuel Model SCAL18	gs2	sh5	East 50 mph - N Aspect Fuel Model SCAL18	gs2	sh5	4	East 50 mph - S Aspect Fuel Model SCAL18	gs2
0	45	45	45	270	270	270	221	239	232	237	286	279
15	45	45	45	270	270	270	221	239	232	237	286	279
30	45	45	45	270	270	270	221	239	232	237	286	279
45	45	45	45	270	270	270	221	239	232	237	286	279
60	45	45	45	270	270	270	221	239	232	237	286	279
75	45	45	45	270	270	270	221	239	232	237	286	279
90	45	45	45	270	270	270	221	239	232	237	286	279
105	45	45	45	270	270	270	221	239	232	237	286	279
120	45	45	45	270	270	270	221	239	232	237	286	279
135	45	45	45	270	270	270	221	239	232	237	286	279
150	45	45	45	270	270	270	221	239	232	237	286	279
165	45	45	45	270	270	270	221	239	232	237	286	279
180	45	45	45	270	270	270	221	239	232	237	286	279
195	45	45	45	270	270	270	221	239	232	237	286	279
210	45	45	45	270	270	270	221	239	232	237	286	279
225	45	45	45	270	270	270	221	239	232	237	286	279
240	45	45	45	270	270	270	221	239	232	237	286	279
255	45	45	45	270	270	270	221	239	232	237	286	279
270	45	45	45	270	270	270	221	239	232	237	286	279
285	45	45	45	270	270	270	221	239	232	237	286	279
300	45	45	45	270	270	270	221	239	232	237	286	279
315	45	45	45	270	270	270	221	239	232	237	286	279
330	45	45	45	270	270	270	221	239	232	237	286	279
345	45	45	45	270	270	270	221	239	232	237	286	279
360	45	45	45	270	270	270	221	239	232	237	286	279

Cielo Vista Behave Output Summary

Flame Residence Time (min)

Spread Dir deg	SouthWest 30 mph Fuel Model SCAL18	gs2	sh5	East 50mph Fuel Model SCAL18	gs2	sh5	East 50 mph - N Aspect Fuel Model SCAL18	gs2	sh5	4	East 50 mph - S Aspect Fuel Model SCAL18	gs2
0	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
15	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
30	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
45	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
60	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
75	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
90	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
105	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
120	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
135	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
150	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
165	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
180	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
195	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
210	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
225	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
240	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
255	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
270	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
285	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
300	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
315	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
330	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
345	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21
360	0.49	0.21	0.31	0.49	0.21	0.31	0.49	0.21	0.31	0.22	0.49	0.21

SECTION R327
MATERIALS AND CONSTRUCTION METHODS FOR EXTERIOR WILDFIRE EXPOSURE

SECTION R327.1
SCOPE, PURPOSE AND APPLICATION

R327.1.1 Scope. *This chapter applies to building materials, systems and or assemblies used in the exterior design and construction of new buildings located within a Wildland-Urban Interface Fire Area as defined in Section R327.2.*

R327.1.2 Purpose. *The purpose of this Chapter is to establish minimum standards for the protection of life and prop-*

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erty by increasing the ability of a building located in any Fire Hazard Severity Zone within State Responsibility Areas or any Wildland-Urban Interface Fire Area to resist the intrusion of flame or burning embers projected by a vegetation fire and contributes to a systematic reduction in conflagration losses.

R327.1.3. Application. *New buildings located in any Fire Hazard Severity Zone or any Wildland-Urban Interface Fire Area designated by the enforcing agency constructed after the application date shall comply with the provisions of this chapter.*

Exceptions:

1. *Buildings of an accessory character classified as a Group U occupancy and not exceeding 120 square feet in floor area, when located at least 30 feet from an applicable building.*
2. *Buildings of an accessory character classified as Group U occupancy of any size located least 50 feet from an applicable building.*
3. *Buildings classified as a Group U Agricultural Building, as defined in Section 202 of this code (see also Appendix C – Group U Agricultural Buildings), when located at least 50 feet from an applicable building.*
4. *Additions to and remodels of buildings originally constructed prior to the applicable application date.*

R327.1.3.1 Application date and where required. *New buildings for which an application for a building permit is submitted on or after July 1, 2008 located in any Fire Hazard Severity Zone or Wildland Interface Fire Area shall comply with all sections of this chapter, including all of the following areas:*

1. *All unincorporated lands designated by the State Board of Forestry and Fire Protection as State Responsibility Area (SRA) including:*
   - *1.1. Moderate Fire Hazard Severity Zones*
   - *1.2. High Fire Hazard Severity Zones*
   - *1.3. Very-High Fire Hazard Severity Zones*
2. *Land designated as Very-High Fire Hazard Severity Zone by cities and other local agencies.*
3. *Land designated as Wildland Interface Fire Area by cities and other local agencies.*

Exceptions:

1. *New buildings located in any Fire Hazard Severity Zone within State Responsibility Areas, for which an application for a building permit is submitted on or after January 1, 2008, shall comply with all sections of this chapter.*
2. *New buildings located in any Fire Hazard Severity Zone within State Responsibility Areas or any Wildland Interface Fire Area designated by cities and other local agencies for which an application for a building permit is submitted on or after December 1, 2005 but prior to July 1, 2008 shall only comply with the following sections of this chapter:*
   - *2.1. Section R327.5 – Roofing*
   - *2.2. Section R327.6 – Vents*

R327.1.4 Inspection and certification. *Building permit applications and final completion approvals for buildings within the scope and application of this chapter shall comply with the following:*

1. *Building permit issuance. The local building official shall, prior to construction, provide the owner or applicant a certification that the building as proposed to be built complies with all applicable state and local building standards, including those for materials and construction methods for wildfire exposure as described in this chapter. Issuance of a building permit by the local building official for the proposed building shall be considered as complying with this section.*
2. *Building permit final. The local building official shall, upon completion of construction, provide the owner or applicant with a copy of the final inspection report that demonstrates the building was constructed in compliance with all applicable state and local building standards, including those for materials and construction methods for wildfire exposure as described in this Chapter. Issuance of a certificate of occupancy by the local building official for the proposed building shall be considered as complying with this section.*

R327.1.5 Vegetation management compliance. *Prior to building permit final approval, the property shall be in compliance with the vegetation management requirements prescribed in California Fire Code section 4906, including California Public Resources Code 4291 or California Government Code Section 51182. Acceptable methods of compliance inspection and documentation shall be determined by the enforcing agency and may include any of the following:*

1. *Local, state or federal fire authority or designee authorized to enforce vegetation management requirements*
2. *Enforcing agency*
3. *Third-party inspection and certification authorized to enforce vegetation management requirements*
4. *Property owner certification authorized by the enforcing agency*

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SECTION R327.2
DEFINITIONS

For the purposes of this chapter, certain terms are defined below:

***CDF DIRECTOR** means the Director of the California Department of Forestry and Fire Protection.*

***EXTERIOR COVERING.** The exposed siding or cladding material applied to the exterior side of an exterior wall, roof eave soffit, floor projection or exposed underfloor framing.*

***FIRE PROTECTION PLAN** is a document prepared for a specific project or development proposed for a Wildland-Urban Interface Fire Area. It describes ways to minimize and mitigate potential for loss from wildfire exposure. The Fire Protection Plan shall be in accordance with this chapter and the California Fire Code, Chapter 49. When required by the enforcing agency for the purposes of granting modifications, a fire protection plan shall be submitted. Only locally adopted ordinances that have been filed with the California Building Standards Commission or the Department of Housing and Community Development in accordance with Section 1.1.8 shall apply.*

***FIRE HAZARD SEVERITY ZONES** are geographical areas designated pursuant to California Public Resources Codes Sections 4201 through 4204 and classified as Very-High, High or Moderate in State Responsibility Areas or as Local Agency Very-High Fire Hazard Severity Zones designated pursuant to California Government Code Sections 51175 through 51189. See California Fire Code Article 86.*

The California Code of Regulations, Title 14, Section 1280 entitles the maps of these geographical areas as "Maps of the Fire Hazard Severity Zones in the State Responsibility Area of California."

***HEAVY TIMBER.** A type of construction classification specified in Section 602 of the California Building Code. For use in this chapter, heavy timber shall be sawn lumber or glue laminated wood with the smallest minimum nominal dimension of 4 inches (102 mm). Heavy timber walls or floors shall be sawn or glue-laminated planks splined, tongue-and-grove, or set close together and well spiked.*

***IGNITION-RESISTANT MATERIAL** A type of building material that resists ignition or sustained flaming combustion sufficiently so as to reduce losses from wildland-urban interface conflagrations under worst-case weather and fuel conditions with wildfire exposure of burning embers and small flames, as prescribed in Section R327.3 and SFM Standard 12-7A-5, Ignition-Resistant Material.*

***LOCAL AGENCY VERY-HIGH FIRE HAZARD SEVERITY ZONE** means an area designated by a local agency upon the recommendation of the CDF Director pursuant to Government Code Sections 51177(c), 51178 and 5118 that is not a state responsibility area and where a local agency, city, county, city and county, or district is responsible for fire protection.*

***LOG WALL CONSTRUCTION.** A type of construction in which exterior walls are constructed of solid wood members and where the smallest horizontal dimension of each solid wood member is at least 6 inches (152 mm).*

***RAFTER TAIL.** The portion of roof rafter framing in a sloping roof assembly that projects beyond and overhangs an exterior wall.*

***ROOF EAVE.** The lower portion of a sloping roof assembly that projects beyond and overhangs an exterior wall at the lower end of the rafter tails. Roof eaves may be either "open" or "enclosed." Open roof eaves have exposed rafter tails and an unenclosed space on the underside of the roof deck. Enclosed roof eaves have a boxed-in roof eave soffit with a horizontal underside or sloping rafter tails with an exterior covering applied to the underside of the rafter tails.*

***ROOF EAVE SOFFIT.** An enclosed boxed-in soffit under a roof eave with exterior covering material applied to the soffit framing creating a horizontal surface on the exposed underside.*

***STATE RESPONSIBILITY AREA** means lands that are classified by the Board of Forestry pursuant to Public Resources Code Section 4125 where the financial responsibility of preventing and suppressing forest fires is primarily the responsibility of the state.*

***WILDFIRE** is any uncontrolled fire spreading through vegetative fuels that threatens to destroy life, property or resources as defined in Public Resources Code Sections 4103 and 4104.*

***WILDFIRE EXPOSURE** is one or a combination of radiant heat, convective heat, direct flame contact and burning embers being projected by vegetation fire to a structure and its immediate environment.*

***WILDLAND-URBAN INTERFACE FIRE AREA** is a geographical area identified by the state as a "Fire Hazard Severity Zone" in accordance with the Public Resources Code Sections 4201 through 4204 and Government Code Sections 51175 through 51189, or other areas designated by the enforcing agency to be at a significant risk from wildfires.*

SECTION R327.3
STANDARDS OF QUALITY

***R327.3.1 General.** Building material, systems, assemblies and methods of construction used in this chapter shall be in accordance with Section R327.3.*

***R327.3.2 Qualification by testing.** Material and material assemblies tested in accordance with the requirements of Section R327.3 shall be accepted for use when the results and conditions of those tests are met. Product evaluation testing of material and material assemblies shall be approved or listed by the State Fire Marshal, or identified in a current report issued by an approved agency.*

***R327.3.3 Approved agency.** Product evaluation testing shall be performed by an approved agency as defined in Section 1702 of the California Building Code. The scope of accreditation for the approved agency shall include building product compliance with code.*

***R327.3.4 Labeling.** Material and material assemblies tested in accordance with the requirements of section R327.3 shall bear an identification label showing the fire test results. That identification label shall be issued by a*

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testing and/or inspecting agency approved by the State Fire Marshal.

1. *Identification mark of the approved testing and/or inspecting agency*
2. *Contact and identification information of the manufacturer*
3. *Model number or identification of the product or material*
4. *Pre-test weathering specified in this chapter*
5. *Compliance standard as described under Section R327.3.7*

R327.3.5 Weathering and surface treatment protection.

R327.3.5.1 General. *Material and material assemblies tested in accordance with the requirements of Section R327.3 shall maintain their fire test performance under conditions of use when installed in accordance with the manufacturers instructions.*

R327.3.5.2 Weathering. *Fire-retardant-treated wood and fire-retardant-treated wood shingles and shakes shall meet the fire test performance requirements of this chapter after being subjected to the weathering conditions contained in the following standards, as applicable to the materials and the conditions of use.*

R327.3.5.2.1 Fire-retardant-treated wood. *Fire-retardant-treated wood shall be tested in accordance with ASTM D 2898, "Standard Practice for Accelerated Weathering of Fire-Retardant Treated Wood for Fire Testing (Method A)" and the requirements of Section 2303.2 of the California Building Code.*

R327.3.5.2.2 Fire-retardant-treated wood shingles and shakes. *Fire-retardant-treated wood shingles and shakes shall be approved and listed by the State Fire Marshal in accordance with Section 208(c), Title 19 California Code of Regulations.*

R327.3.5.3 Surface treatment protection. *The use of paints, coatings, stains or other surface treatments are not an approved method of protection as required in this section.*

R327.3.6 Alternates for materials, design, tests and methods of construction. *The enforcing agency is permitted to modify the provisions of this chapter for site-specific conditions in accordance with Section 1.11.2.4. When required by the enforcing agency for the purposes of granting modifications, a fire protection plan shall be submitted in accordance with the California Fire Code, Chapter 49.*

R327.3.7 Standards of quality. *The State Fire Marshal standards for exterior wildfire exposure protection listed below and as referenced in this chapter are located in the California Referenced Standards Code, Part 12 and Chapter 44 of this code.*

SFM Standard 12-7A-1, *Exterior Wall Siding and Sheathing. A fire resistance test standard consisting of a 150 kW intensity direct flame exposure for a 10 minutes duration.*

SFM Standard 12-7A-2, *Exterior Windows. A fire resistance test standard consisting of a 150 kW intensity direct flame exposure for a 8 minutes duration.*

SFM Standard 12-7A-3, *Horizontal Projection Underside. A fire resistance test standard consisting of a 300 kW intensity direct flame exposure for a 10 minute duration.*

SFM Standard 12-7A-4, *Decking. A two-part test consisting of a heat release rate (Part A) deck assembly combustion test with an under deck exposure of 80 kW intensity direct flame for a 3 minute duration, and a (Part B) sustained deck assembly combustion test consisting of a deck upper surface burning ember exposure with a 12 mph wind for 40 minutes using a 2.2lb (1kg) burning "Class A" size 12 inch x 12 inch x 2.25inch (300 mm x 300 mm x 57mm) roof test brand.*

SFM Standard 12-7A-4A, *Decking Alternate Method A. A heat release rate deck assembly combustion test with an under deck exposure of 80 kW intensity direct flame for a 3 minute duration,*

SFM Standard 12-7A-5, *Ignition-resistant Material. A generic building material surface burning flame spread test standard consisting of an extended 30 minute ASTM E 84 or UL 723 test method as is used for Fire-Retardant-Treated wood.*

SECTION R327.4
IGNITION RESISTANT CONSTRUCTION

R327.4.1 General. *The materials prescribed herein for ignition resistance shall conform to the requirements of this chapter.*

R327.4.2 Ignition-resistant material. *Ignition-resistant material shall be determined in accordance with the test procedures set forth in SFM Standard 12-7A-5 "Ignition-Resistant Material" or in accordance with this section.*

R327.4.3 Alternative methods for determining ignition-resistant material. *Any one of the following shall be accepted as meeting the definition of ignition-resistant material:*

1. *Noncombustible material. Material that complies with the definition for noncombustible materials in Section R202.*
2. *Fire-retardant-treated wood. Fire-retardant-treated wood identified for exterior use that complies with the requirements of Section 2303.2 of the California Building Code.*
3. *Fire-retardant-treated wood shingles and shakes. Fire-retardant-treated wood shingles and shakes, as defined in Section 1505.6 of the California Building Code and listed by State Fire Marshal for use as "Class B" roof covering, shall be accepted as an igni-*

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tion-resistant wall covering material when installed over solid sheathing.

SECTION R327.5
ROOFING

R327.5.1 General. *Roofs shall comply with the requirements of Sections R327 and R902. Roofs shall have a roofing assembly installed in accordance with its listing and the manufacturer's installation instructions.*

R327.5.2 Roof coverings. *Where the roof profile allows a space between the roof covering and roof decking, the spaces shall be constructed to prevent the intrusion of flames and embers, be firestopped with approved materials or have one layer of minimum 72 pound (32.4 kg) mineral-surfaced nonperforated cap sheet complying with ASTM D 3909 installed over the combustible decking.*

R327.5.3 Roof valleys. *Where valley flashing is installed, the flashing shall be not less than 0.019-inch (0.48 mm) No. 26 gage galvanized sheet corrosion-resistant metal installed over not less than one layer of minimum 72-pound (32.4 kg) mineral-surfaced nonperforated cap sheet complying with ASTM D 3909, at least 36-inch-wide (914 mm) running the full length of the valley.*

R327.5.4 Roof gutters. *Roof gutters shall be provided with the means to prevent the accumulation of leaves and debris in the gutter.*

SECTION R327.6
VENTS

R327.6.1 General. *Where provided, ventilation openings for enclosed attics, enclosed eave soffit spaces, enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters, and underfloor ventilation shall be in accordance with Section 1203 of the California Building Code and Sections R327.6.1 through R327.6.3 of this section to resist building ignition from the intrusion of burning embers and flame through the ventilation openings.*

R327.6.2 Requirements. *Ventilation openings for enclosed attics, enclosed eave soffit spaces, enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters, and underfloor ventilation openings shall be fully covered with metal wire mesh, vents, other materials or other devices that meet the following requirements:*

1. *The dimensions of the openings therein shall be a minimum of $^{1}/_{16}$th inch (1.6 mm) and shall not exceed $^{1}/_{8}$th inch (3.2mm).*
2. *The materials used shall be noncombustible.*

   Exception: Vents located under the roof covering, along the ridge of roofs, with the exposed surface of the vent covered by noncombustible wire mesh, may be of combustible materials.
3. *The materials used shall be corrosion resistant.*

R327.6.3 Ventilation openings on the underside of eaves and cornices: *Vents shall not be installed on the underside of eaves and cornices.*

Exceptions:

1. *The enforcing agency may accept or approve special eave and cornice vents that resist the intrusion of flame and burning embers.*
2. *Vents complying with the requirements of Section R327.6.2 may be installed on the underside of eaves and cornices in accordance with either one of the following conditions:*

   2.1. *The attic space being ventilated is fully protected by an automatic sprinkler system installed in accordance with Section 903.3.1.1 of the California Building Code or,*

   2.2. *The exterior wall covering and exposed underside of the eave are of noncombustible material, or ignition-resistant-materials as determined in accordance with SFM Standard 12-7A-5 Ignition-Resistant Material and the vent is located more than 12 feet from the ground or walking surface of a deck, porch, patio, or similar surface.*

SFM-SECTION R327.7
EXTERIOR COVERING

R327.7.1 Scope. *The provisions of this section shall govern the materials and construction methods used to resist building ignition and/or safeguard against the intrusion of flames resulting from small ember and short-term direct flame contact exposure.*

R327.7.2 General. *The following exterior covering materials and/or assemblies shall comply with this section:*

1. *Exterior wall covering material*
2. *Exterior wall assembly*
3. *Exterior exposed underside of roof eave overhangs*
4. *Exterior exposed underside of roof eave soffits*
5. *Exposed underside of exterior porch ceilings*
6. *Exterior exposed underside of floor projections*
7. *Exterior underfloor areas*

Exceptions:

1. *Exterior wall architectural trim, embellishments, fascias, and gutters*
2. *Roof or wall top cornice projections and similar assemblies*
3. *Roof assembly projections over gable end walls*

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4. *Solid wood rafter tails and solid wood blocking installed between rafters having minimum dimension 2 inch (50.8 mm) nominal*
5. *Deck walking surfaces shall comply with Section R327.9 only*

R327.7.3. Exterior walls. *The exterior wall covering or wall assembly shall comply with one of the following requirements:*

1. *Noncombustible material*
2. *Ignition-resistant material*
3. *Heavy-timber exterior wall assembly*
4. *Log wall construction assembly*
5. *Wall assemblies that meet the performance criteria in accordance with the test procedures for a 10-minute direct flame contact exposure test set forth in SFM Standard 12-7A-1*

Exceptions: *Any of the following shall be deemed to meet the assembly performance criteria and intent of this section:*

1. *One layer of $^5/_8$-inch Type X gypsum sheathing applied behind the exterior covering or cladding on the exterior side of the framing.*
2. *The exterior portion of a 1-hour fire resistive exterior wall assembly designed for exterior fire exposure including assemblies using the gypsum panel and sheathing products listed in the Gypsum Association Fire Resistance Design Manual.*

R327.7.3.1 Extent of exterior wall covering. *Exterior wall coverings shall extend from the top of the foundation to the roof, and terminate at 2 inch (50.8 mm) nominal solid wood blocking between rafters at all roof overhangs, or in the case of enclosed eaves, terminate at the enclosure.*

R327.7.4 Open roof eaves. *The exposed roof deck on the underside of unenclosed roof eaves shall consist of one of the following:*

1. *Noncombustible material*
2. *Ignition-resistant material*
3. *One layer of $^5/_8$-inch Type X gypsum sheathing applied behind an exterior covering on the underside exterior of the roof deck*
4. *The exterior portion of a 1-hour fire resistive exterior wall assembly applied to the underside of the roof deck designed for exterior fire exposure including assemblies using the gypsum panel and sheathing products listed in the Gypsum Association Fire Resistance Design Manual*

Exceptions: *The following materials do not require protection:*

1. *Solid wood rafter tails on the exposed underside of open roof eaves having a minimum nominal dimension of 2 inch (50.8 mm)*
2. *Solid wood blocking installed between rafter tails on the exposed underside of open roof eaves having a minimum nominal dimension of 2 inch (50.8 mm)*
3. *Gable end overhangs and roof assembly projections beyond an exterior wall other than at the lower end of the rafter tails*
4. *Fascia and other architectural trim boards*

R327.7.5 Enclosed roof eaves and roof eave soffits. *The exposed underside of enclosed roof eaves having either a boxed-in roof eave soffit with a horizontal underside, or sloping rafter tails with an exterior covering applied to the underside of the rafter tails, shall be protected by one of the following:*

1. *Noncombustible material*
2. *Ignition-resistant material*
3. *One layer of $^5/_8$-inch Type X gypsum sheathing applied behind an exterior covering on the underside of the rafter tails or soffit*
4. *The exterior portion of a 1-hour fire resistive exterior wall assembly applied to the underside of the rafter tails or soffit including assemblies using the gypsum panel and sheathing products listed in the Gypsum Association Fire Resistance Design Manual*
5. *Boxed-in roof eave soffit assemblies with a horizontal underside that meet the performance criteria in accordance with the test procedures set forth in SFM Standard 12-7A-3*

Exceptions: *The following materials do not require protection:*

1. *Gable end overhangs and roof assembly projections beyond an exterior wall other than at the lower end of the rafter tails*
2. *Fascia and other architectural trim boards*

R327.7.6 Exterior porch ceilings. *The exposed underside of exterior porch ceilings shall be protected by one of the following:*

1. *Noncombustible material*
2. *Ignition-resistant material*
3. *One layer of $^5/_8$-inch Type X gypsum sheathing applied behind the exterior covering on the underside of the ceiling*
4. *The exterior portion of a 1-hour fire resistive exterior wall assembly applied to the underside of the ceiling assembly including assemblies using the gypsum panel and sheathing products listed in the Gypsum Association Fire Resistance Design Manual*
5. *Porch ceiling assemblies with a horizontal underside that meet the performance criteria in accordance with the test procedures set forth in SFM Standard 12-7A-3*

Exception: *Architectural trim boards.*

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R327.7.7 Floor projections. *The exposed underside of a cantilevered floor projection where a floor assembly extends over an exterior wall shall be protected by one of the following:*

1. *Noncombustible material*
2. *Ignition-resistant material*
3. *One layer of $^5/_8$-inch Type X gypsum sheathing applied behind an exterior covering on the underside of the floor projection*
4. *The exterior portion of a 1-hour fire resistive exterior wall assembly applied to the underside of the floor projection including assemblies using the gypsum panel and sheathing products listed in the Gypsum Association Fire Resistance Design Manual*
5. *The underside of a floor projection assembly that meet the performance criteria in accordance with the test procedures set forth in SFM Standard 12-7A-3*

Exception: *Architectural trim boards.*

R327.7.8. Underfloor protection. *The underfloor area of elevated or overhanging buildings shall be enclosed to grade in accordance with the requirements of this chapter or the underside of the exposed underfloor shall consist of one of the following:*

1. *Noncombustible material*
2. *Ignition-resistant material*
3. *One layer of $^5/_8$-inch Type X gypsum sheathing applied behind an exterior covering on the underside of the floor projection*
4. *The exterior portion of a 1-hour fire resistive exterior wall assembly applied to the underside of the floor including assemblies using the gypsum panel and sheathing products listed in the Gypsum Association Fire Resistance Design Manual*
5. *The underside of a floor assembly that meets the performance criteria in accordance with the test procedures set forth in SFM Standard 12-7A-3*

Exception: *Heavy-timber structural columns and beams do not require protection.*

R327.7.9 Underside of appendages. *When required by the enforcing agency the underside of overhanging appendages shall be enclosed to grade in accordance with the requirements of this chapter or the underside of the exposed underfloor shall consist of one of the following:*

1. *Noncombustible material*
2. *Ignition-resistant material*
3. *One layer of $^5/_8$-inch Type X gypsum sheathing applied behind an exterior covering on the underside of the floor projection*
4. *The exterior portion of a 1-hour fire resistive exterior wall assembly applied to the underside of the floor including assemblies using the gypsum panel and sheathing products listed in the Gypsum Association Fire Resistance Design Manual*
5. *The underside of a floor assembly that meets the performance criteria in accordance with the test procedures set forth in SFM Standard 12-7A-3*

Exception: *Heavy-timber structural columns and beams do not require protection.*

SECTION R327.8
EXTERIOR WINDOWS AND DOORS

R327.8.1 General.

R327.8.2 Exterior glazing. *The following exterior glazing materials and/or assemblies shall comply with this section:*

1. *Exterior windows*
2. *Exterior glazed doors*
3. *Glazed openings within exterior doors*
4. *Glazed openings within exterior garage doors*
5. *Exterior structural glass veneer*

R327.8.2.1 Exterior windows and exterior glazed door assembly requirements. *Exterior windows and exterior glazed door assemblies shall comply with one of the following requirements:*

1. *Be constructed of multipane glazing with a minimum of one tempered pane meeting the requirements of Section 2406 Safety Glazing, or*
2. *Be constructed of glass block units, or*
3. *Have a fire-resistance rating of not less than 20 minutes when tested according to NFPA 257, or*
5. *Be tested to meet the performance requirements of SFM Standard 12-7A-2.*

R327.8.2.2 Structural glass veneer. *The wall assembly behind structural glass veneer shall comply with Section R327.7.3.*

R327.8.3 Exterior doors. *Exterior doors shall comply with one of the following:*

1. *The exterior surface or cladding shall be of noncombustible or ignition-resistant material, or*
2. *Shall be constructed of solid core wood that comply with the following requirements:*
   - *2.1. Stiles and rails shall not be less than $1^3/_8$ inches thick*
   - *2.2. Raised panels shall not be less than $1^1/_4$ inches thick, except for the exterior perimeter of the raised panel that may taper to a tongue not less than $^3/_8$ inch thick.*
3. *Shall have a fire-resistance rating of not less than 20 minutes when tested according to NFPA 252.*
4. *Shall be tested to meet the performance requirements of SFM Standard 12-7A-1.*

R327.8.3.1 Exterior door glazing. *Glazing in exterior doors shall comply with Section R327.8.2.1.*

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SECTION R327.9
DECKING

R327.9.1 General. *The walking surface material of decks, porches, balconies and stairs shall comply with the requirements of this section.*

R327.9.2 Where required. *The walking surface material of decks, porches, balconies and stairs shall comply with the requirements of this section when any portion of such surface is within 10 feet (3048 mm) of the building.*

R327.9.3 Decking surfaces. *The walking surface material of decks, porches, balconies and stairs shall be constructed with one of the following materials:*

1. *Ignition-resistant material that complies with the performance requirements of both SFM Standard 12-7A-4 and SFM Standard 12-7A-5*
2. *Exterior fire retardant treated wood*
3. *Noncombustible material*
4. *Any material that complies with the performance requirements of SFM Standard 12-7A-4A when attached exterior wall covering is also either noncombustible or ignition-resistant material*

Exception: *Wall material may be of any material that otherwise complies with this chapter when the decking surface material complies with the performance requirements ASTM E 84 with a Class B flame spread rating.*

SECTION R327.10
ACCESSORY STRUCTURES

R327.10.1 General. *Accessory and miscellaneous structures, other than buildings covered by Section R327.1.3, which pose a significant exterior exposure hazard to applicable buildings during wildfires shall be constructed to conform to the ignition resistance requirements of this section.*

R327.10.2 Applicability. *The provisions of this section shall apply to trellises, arbors, patio covers, carports, gazebos and similar structures of an accessory or miscellaneous character.*

Exceptions:

1. *Decks shall comply with the requirements of Section R327.9.*
2. *Awnings and canopies shall comply with the requirements of Section 3105 of the California Building Code.*

R327.10.3 Where required. *Accessory structures shall comply with the requirements of this section.*

R327.10.3.1 *Attached accessory structures shall comply with the requirements of this section.*

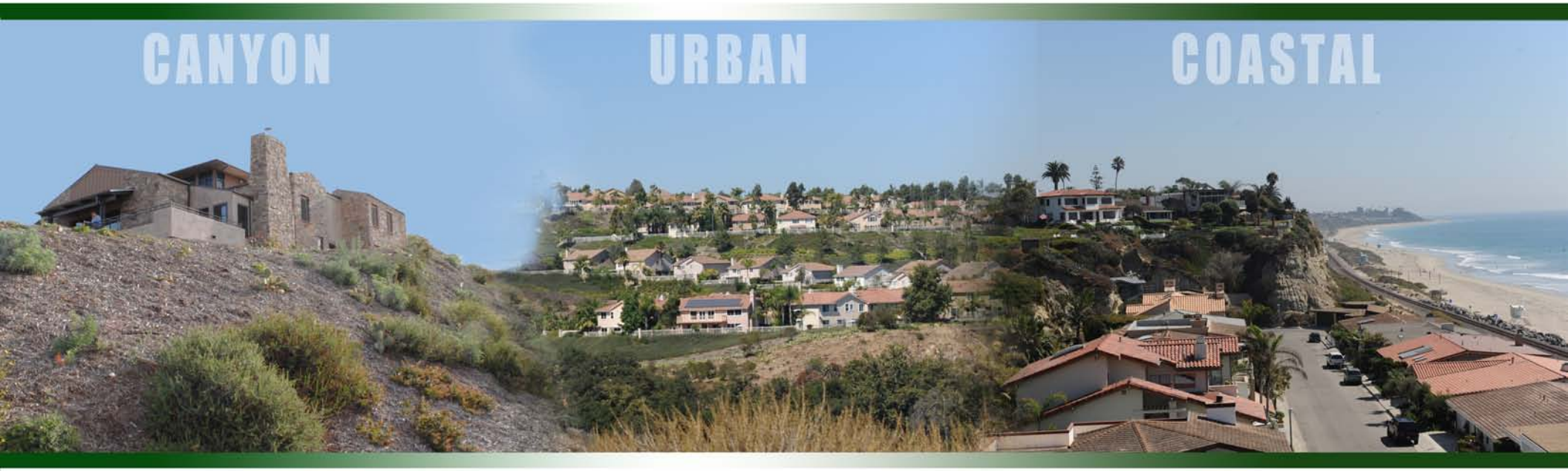
R327.10.3.2 *When required by the enforcing agency, detached accessory structures within 50 feet of an applicable building shall comply with the requirements of this section.*

R327.10.4. Requirements. *When required by the enforcing agency accessory structures shall be constructed of noncombustible or ignition-resistant materials.*

Appendix E

ORANGE COUNTY FIRE AUTHORITY

Vegetation Management Maintenance Guidelines For Property Owners



Accept Responsibility to Protect:
Yourself, Your Family, Your Property,
and Your Community.

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READY, SET, GO!

Vegetation Management Maintenance Guidelines For Property Owners

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Accept Responsibility to Protect: Yourself, Your Family, Your Property, and Your Community.

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READY, SET, GO!

Vegetation Management - It's Up to You To Get Ready!

Introduction	The Orange County Fire Authority understands that many of our high wildfire risk areas are also our most beautiful and in many cases the reason people choose to live where they do. Each year, thousands of acres of wildland and hundreds of homes are destroyed by wildfires. It is up to you, the property owner, to take responsibility for preparing your home. By applying knowledge of Vegetation Management and home hardening, you will be closer to ensuring your home's survivability and your family's safety. When your work is done you will have also done your part in making your community a safer place in which to live.
Guideline Purpose	Orange County Fire Authority takes every precaution to help protect you and your property from wildfire. In the event of a major wildfire, however, firefighting resources will be stretched. Please prepare now to protect yourself, your family, and your property from a devastating wildfire by taking time to learn about Vegetation Management.
What do I have, Defensible Space or Fuel Modification?	Vegetation Management practices are implemented and enforced in two ways. These two practices are titled Defensible Space and Fuel Modification. California state-wide law requires that land owners in areas at risk from wildfires implement and maintain a Defensible Space landscape area between buildings and potential approaching wildfires. Since 1979, local agencies served by Orange County Fire Authority (OCFA) have adopted provisions in local fire codes requiring new buildings to be protected by Fuel Modification Zone. During the design and construction process, land owners and builders are required to design, implement, and maintain a landscape Fuel Modification Zone. Generally, buildings built prior to 1979 have Defensible Space and buildings built after 1979 have a Fuel Modification Zone.
What is Vegetation Management?	Vegetation Management is the controlling of plant materials for the prevention of fire spread. Vegetation Management is simply removing dead and dying fuels, thinning heavy brush, and trimming trees that could contribute to a fire's spread towards your home.
Did you know?	During a wildfire, thousands of embers can rain down on your roof and pelt the side of your home like hail during a storm. If these embers become lodged in something easily ignited on or near your house, the home will be in jeopardy of burning. Embers coming into contact with vegetation or combustible construction material are the major reason homes are destroyed during wildfires.

The objective of VEGETATION MANAGEMENT is to reduce the wildfire threat to a home by changing the characteristics of the vegetation adjacent to the home.

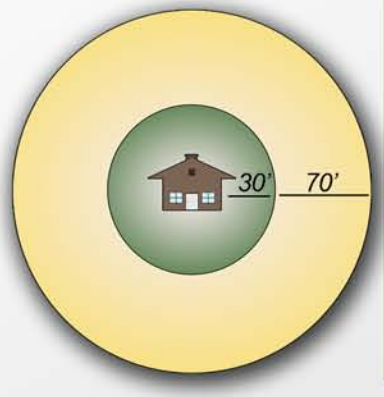
Vegetation Management practices include:

1. Increasing the moisture content of vegetation.
2. Decreasing the amount of vegetation within 100' of your house.
3. Shortening plant height. Keep plants within 10' of a building below 2'.
4. Altering the arrangement of plants.
5. Installing plants that use less water.

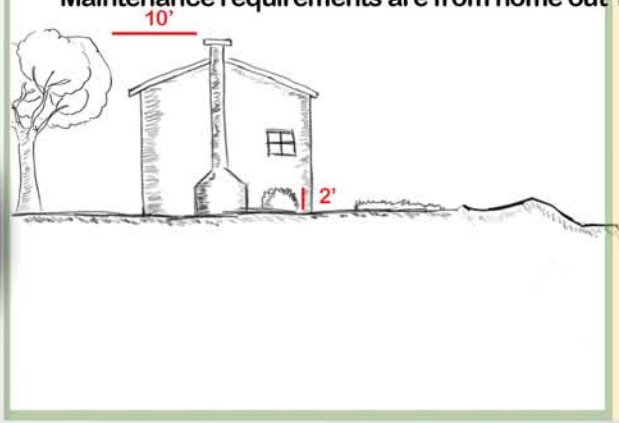
FOUR R's of Vegetation Management

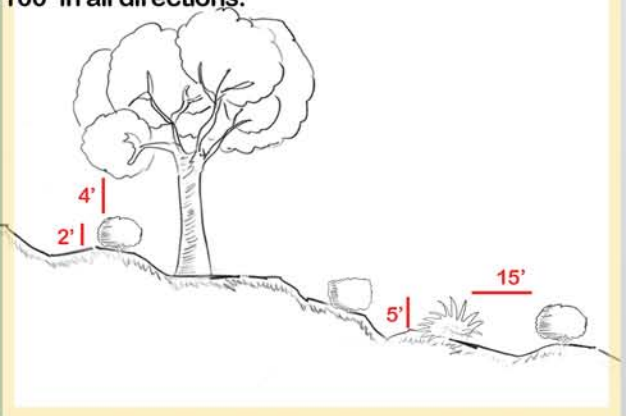
REMOVAL:	- Remove all dead vegetation within 100' of your home. - Remove plants found on the undesirable plant list.
REDUCTION:	- Reduce the amount of vegetation by pruning and thinning within 100' of your home. - Trees and shrubs need to be pruned to provide separation (See Vertical Separation Requirements). - Shrubs over 2' can be in groups of 3 plants with a minimum spacing between groups of 15' or 3 times the tallest in the group. - Plants within 10' of your home should be 2' or lower to reduce the flame length. - Additional spacing may be recommended on steeper slopes.
REPLACEMENT:	- Remove highly combustible plants within 100' of your home. - Keep in mind that if you use the recommended plants, you must still reduce the amount of plant material by thinning per the spacing guidelines for both vertical separation and horizontal separation. - When installing new plants make sure to plant them with spacing and mature plant size in mind.
RESISTANT:	- Utilize fire resistive plants whenever possible. - Keep in mind that if you use recommended plants, you must still reduce the amount of plant material by thinning per the spacing guidelines for both vertical separation and horizontal separation.

STRUCTURE AT TOP OF SLOPE



Maintenance requirements are from home out 100' in all directions.





Remove all tree branches or vegetation within 10' of chimney outlet.

Trees within 100' of your home or neighbor's home should be kept free of dead branches and debris.

Provide vertical separation between shrubs and trees.

Provide horizontal separation for plants over 2' in height. Plants that are 2' or lower need no space between each other.

Maintain palm trees clear of dead fronds.

Remove all dead or dying plant material including dead material within vines.

It is recommended that you keep all shrubs within 10' of your home 2' or lower and keep plants away from windows.

Move wood piles at least 30' away from your home or to property line.

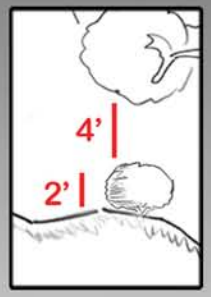
Keep annual grasses and weeds cut to 4".

Wood fences, patio covers, and gazebos need to be free of dead vines.

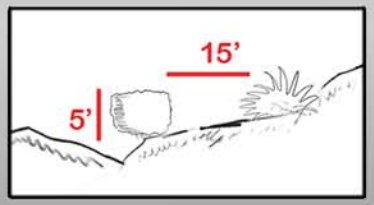
If you own within this area, you must maintain the plants / trees according to the separation requirements within the document.

This area may be maintained by the homeowner association or adjacent landowner.

VERTICAL SEPARATION

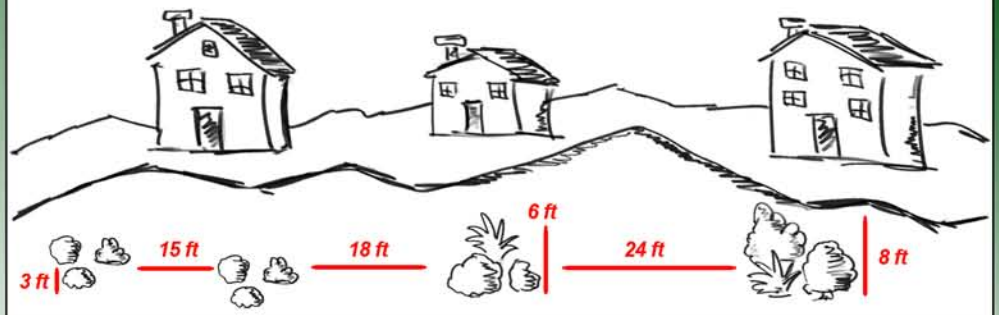


HORIZONTAL SEPARATION

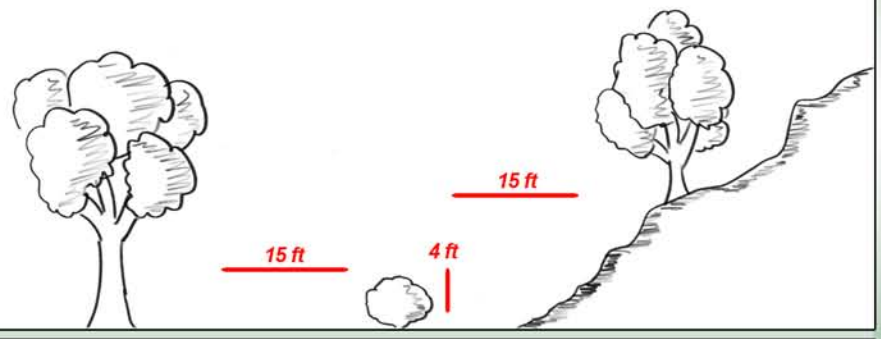


HORIZONTAL SEPARATION

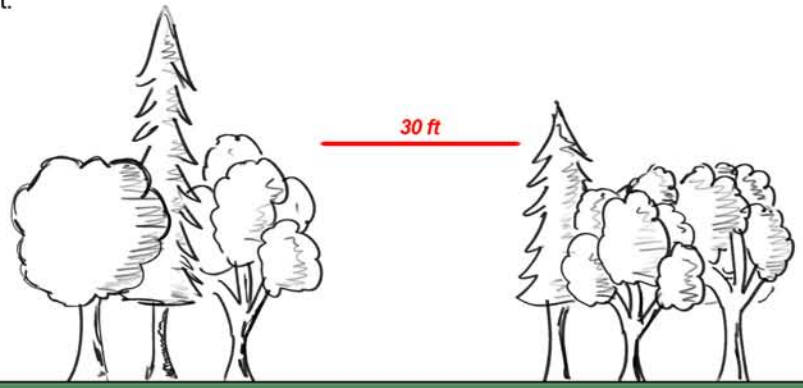
All shrubs greater than 2 feet in height shall be in a maximum grouping of 3 plants and separated by a distance of 3 times the height of the tallest shrub in the group, or 15 feet, whichever is greater.



Shrubs greater than 2 feet in height shall be no closer than 15 feet from the edge of the tree canopy(s) measured horizontally.

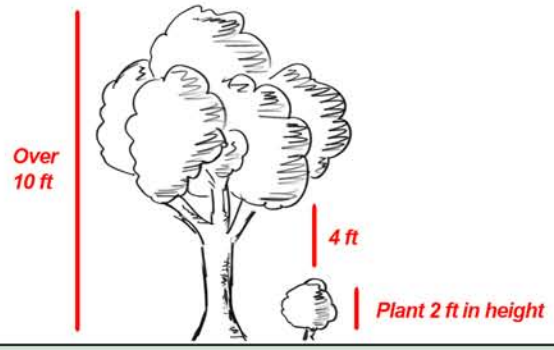


All trees shall be in a maximum grouping of 3 and shall be separated by a distance of 30 feet.

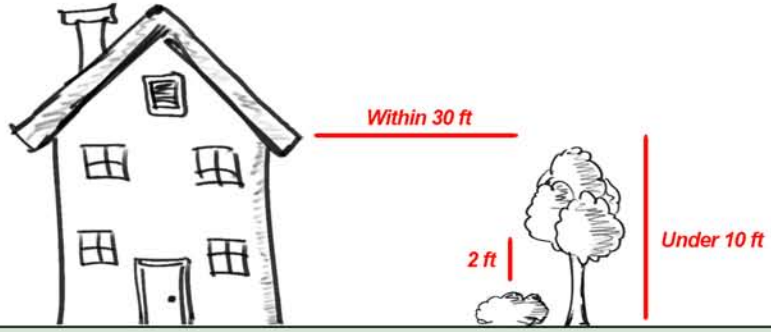


VERTICAL SEPARATION

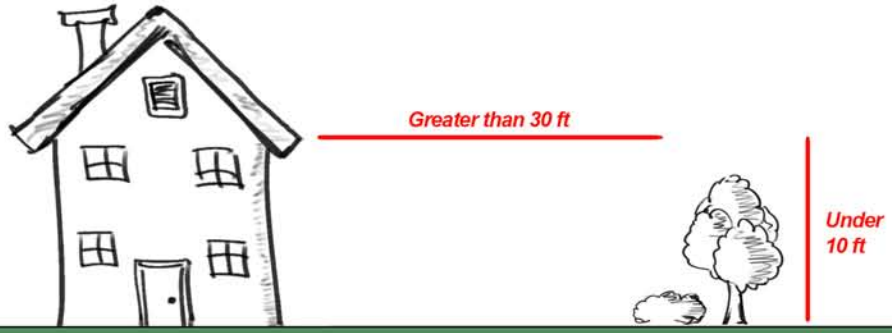
Trees and shrubs more than 10 feet in height require vertical separation of 4 feet between the plant material and the lowest branch of the tree or shrub.



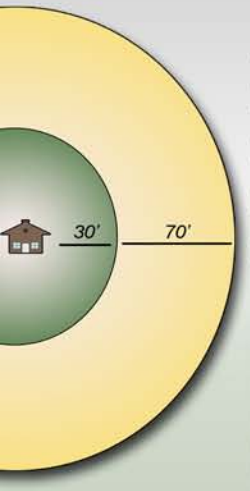
Trees and shrubs less than 10 feet in height, and are located within 30 feet of the home, require vertical separation of 2 feet between the plant material below and the lowest branch of the tree or shrub.



No vertical separation is required between the plant material below when trees or shrubs are located more than 30 feet from the home and they are less than 10 feet in height.



DEFENSIBLE SPACE
Planting Guide



Aeonium
Alkali Heath
Australian Fuscia
Baby Blue Eyes
Beach Bur-Sage
Beach Evening Primrose
Beach Sagewort
Bearberry
Beard Tongue
Bird of Paradise
Bird's Eyes
Bird's Foot Trefoil
Blanketflower
Blue Dicks
Blue Eyed Grass
Brickellbush
Bush Ice Plant
Califiornia Coreopsis
California Brome
California Bulrush
California Croton
California Evening Primrose
California Everlasting
California Plantain
California Poppy
Carpet Bugle
Caucasian Artesmisia
Century Plant
Chalk Dudleya
Chinese Houses
Coast Cholla
Coreopsis
Creeping Coprosma
Creeping Sage
Desert Lupine
Desert Marigold
Dewflower
Dwarf Goldfields
Dwarf Periwinkle
Edging Candytuft
Elephant's Food
English Ivy
Evergreen Plantain
Foothill Needlegrass
Germander
Giant Bird of Paradise
Giant Wild Rye
Globe Candytuft
Globe Gilia
Goldmoss Sedum
Grass Tree
Green Carpet Natal Plum
Green Stonecrop
Gum Plant
Hard Stem Bulrush
Hoary California Fuschia
Hyron Rose Clover
Ivy Geranium
Jade Tree
Kangaroo Paw
Lance-leaved Dudleya
Lavender Cotton
Lemon Thyme
Lilac Vine
Little Sur Manzanita
Loosely Flowered Annual Lupine/Coulter's Lupine
Medicinal Aloe
Mexican Evening Primrose
Mexican Poppy
Mojave Woolly Star
Mondo Grass
Monkeyflower
Northern Woolly Lotus
O'Connor's Legume
Oracle Cactus
Oxeye Daisy
Pacific Mist Manzanita
Prickly Pear
Prostrate Coprosma
Purple Needlegrass
Purple Nightshade
Puya
Red Apple Aptenia
Red Hot Poker
Red Yucca
Redondo Creeper
Rosea Ice Plant
Rush Rose
Salt Heliotrope
San Miguel Savory
Sea Fig Ice Plant
Sea Lavender
Shaw's Century Plant
Show Evening Primrose
Showy Fairwell to Spring
Showy Gilia
Sky Lupine
Snow-in-Summer
South African Daisy (Gazania)
Spider Lupine
Spiny Rush
Spring Cinquefoil
Sunrose
Trailing Ice Plant
Training African Daisy
Training Gazania
Training Ice Plant
Verbena
Western Vervain
White Trailing Ice Plant
Wild Snapdragon
Wild Strawberry/ Sand Strawberry
Winter Creeper Euonymus
Wishbone Bush
Woolly Plantain
Yankee Point
Yucca
Zorro Annual Fescue
Hall's Japanese Honeysuckle

TREES

African Sumac
American Sweet Gum
Big Leaf Maple
California Black Walnut
California Laurel
California Sycamore
Carob
Chinese Pistache
Citrus
Coast Live Oak
Coral Tree
Cork Oak
Crape Myrtle
Engelmann Oak
Fernleaf Ironwood
Firewheel Tree
Italian Alder
Loquat
Macadamia Nut
Maidenhair Tree
Mayten Tree
Mexican Elderberry
Mexican Palo Verde
New Zealand Christmas Tree
Primrose Tree
Strawberry Tree
Tulip Tree
Victorian Box
Western Cottonwood
White Alder

SHRUBS

Pink Rockrose
Aaron's Beard
Australian Tea Tree
Autums Sage
Big Pod Ceanothus
Bladderpod
Blue Hibiscus
Blue Stemmed Bush Penstemon
Boobyalla
Bougainvillea
Brewer Saltbush
Bush Morning Glory
Bush Poppy
Bush Snapdragon
Bushrue (Bush Rue)
California Coffee Berry
California Encelia
California Flannelbush
California Scrub Oak
Carmel Creeper Ceanothus
Carolina Cherry Laurel
Chaparral Bloom
Chapparal Mallow
Chapparal Nolina
Coastal Goldenbush
Coastal Scrub Oak
Common Yarrow
Creeping Snowberry
Deerweed
Douglas Nightshade
Eastwood Manzanita
Emory Baccharis
Evergreen Currant
Firethorn
Four-Wing Saltbush
French Lavender
Fuschia Flowering Goosebberry
Golden Abundance Oregon Grape
Golden Currant
Green Bark Ceanothus
Green Lavender Cotton
Greensphere Manzanita
Heart Leaved Penstemon
Holly Leafed Cherry
Hollyleaf Redberry
Hopseed Bush
Indian Hawthorne
Italian Buckthorn
Lemonade Berry
Louis Edmunds Ceanothus
Matilija Poppy
Mexican Grasstree
Monterey Carpet Manzanita
Mulefat
Nevin Mahonia
Oleander
Orchid Rockrose
Pineapple Guava
Pink Melaleuca
Plumbago Cape
Point Reyes Ceanothus
Pomegranate
Redberry
Refugio Manzanita
Sageleaf Rockrose
Shiny Xylosma
Silktassel
Silverberry
Squaw Carpet Ceanothus
Star Jasmine
Star-Lower
Sugarbush
Summer Holly
Sweet Hakea
Sweet Olive
Texas privet
Texas Ranger
Thick Leaf Yerba Santa
Toyon
Trailing Lantana
Tree Aloe
Wart-Stem Ceanothus
Western False Indigobush
Western Redbud
White Cloud Matilija Poppy
White Flowering Currant
White Rockrose
Wild Honeysuckle
Woolly Blue Curls
Woolly Yarrow
Yellow Bells
Yellow Bush Penstemon
Yellow Sage

Undesirable Plant Species *(Target Species)*

The plants listed below are more susceptible to burning, due to rough or peeling bark, production of large amounts of litter, vegetation that contains oils, resin, wax, or pitch, large amounts of dead material in the plant, or plantings with a high dead to live fuel ratio. Many of these species, if existing on the property and adequately maintained (pruning, thinning, irrigation, litter removal, and weeding), may remain as long as the potential for spreading a fire has been reduced or eliminated. Some of these plants may be considered undesirable because of their ability to naturalize and become a pest. These types of plants should be avoided, especially in sensitive riparian or coastal areas where they could become established and compete with native vegetation.

Arborvitae

Artichoke Thistle

Bamboo

Black Mustard

Black Sage

Buckwheat

Burning Nettle

California Sagebrush

Caster Bean Plant

Chamise

Cypress

Eucalyptus

Fountain Grass

Horseweed

Indian Tobacco

Juniper

Undesirable Plant Species *(Target Species) CONTINUED*

Mayweed

Milk Thistle

Noary Cress / Peppergrass

Meixcan Palm

Pampa Grass

Pine Tree

Prickley Lettuce

Red Shanks

Russian Thistle / Tumbleweed

Telegraph Plant

Tree Tobacco

Wild Turnip

Yellow Mustard

Safety Tips For Getting Ready

READY, SET, GO!
www.ReadySetGoOC.org

Things To Think About When Thinning Vegetation

When working with hand tools it is best to have personal protection, which includes proper long-sleeved clothing, gloves, hardhat, boots, eye protection, and noise protection equipment. The sharpest tools are best, since dull tools cause more accidents due to worker fatigue and frustration. Saws, loppers, and other cutting tools should be handled carefully and never put into anything except the wood they are to cut. When people work together they can get in each other's way, so it is best to work separated by at least two lengths of the vegetation reach. Thus, if you are cutting out 6 foot tall shrubs, you should be working at least 12 feet apart.

Often, having one person cutting and one or more people pulling the cut brush to a pile works most productively and safely. Piles should have vegetation laid parallel for later ease of handling. Working with power tools means having another person present and having greater communication so that all understand what the course of work is going to be. If someone tries to engage you in conversation while you are working with a chainsaw or other power tools, stop the equipment if you need to respond. Distractions can cause injury. Working safely means having fire extinguishers and first aid help close by the work site.

Cutting of large trees (larger than 8 inch stump diameter) needs skill and know-how. These trees can weigh over half a ton and can crush cars and things of value. Someone skilled with a chainsaw and full safety gear needs to do the actual work and often needs other ground assistance. This cutting should not be done without planning and forethought. Certified arborists are available for this kind of work and getting bids from licensed and insured contractors generally ensures the best value. Be sure to specify what you want the finished site to look like before work begins.

Stop the Start of a Wildfire!

- Use tools with non-metallic blades to eliminate sparks.

- Have a garden hose available and turned on while operating all power tools.

- Dispose of cuttings and debris promptly to reduce the amount of fuel on property.

- Do not park cars in tall grass. The hot catalytic converter can ignite dry plant materials.

- Do not cut during a red flag warning or dry windy day.

- Spark arresters are required on gasoline, diesel, and propane-powered engines.

FREQUENTLY ASKED QUESTIONS

What is Defensible Space?	Defensible Space refers to the area between a house and an oncoming wildfire where the vegetation has been modified to reduce the wildfire threat and which provides an opportunity for firefighters to effectively defend your house. Oftentimes, Defensible Space is simply your backyard.
What is Fuel Modification?	Fuel Modification is a strip of land where combustible native or ornamental vegetation has been modified and partially or totally replaced with drought tolerant, fire resistant plants.
What is the relationship between vegetation and wildfire threat?	Many people do not view the plants growing on their property as a threat. But in terms of wildfire, what is growing adjacent to your home can have considerable influence upon its survivability. All vegetation, including naturally occurring native plants and ornamental plants in the residential landscape, is potential fuel for a wildfire. If the vegetation is properly spaced and maintained, a wildfire can be slowed down, the flame lengths are reduced, and the amount of heat reduced, all of which contribute to your house surviving a wildfire.
Why is Defensible Space necessary? Won't the fire department protect my house?	Some individuals incorrectly assume that a fire truck will be parked in their driveway and firefighters will be actively defending their home when a wildfire approaches. During a major wildfire, it is unlikely that there will be fire fighting resources available to defend your home. Even with adequate resources, some wildfires may be so intense that there may be little that firefighters can do to prevent your house from burning. The key is to reduce fire intensity as a wildfire nears your house. This can be accomplished by reducing the amount of flammable vegetation surrounding your home.
Does Defensible Space require a lot of bare ground around the house?	NO. While bare ground would certainly provide effective Defensible Space, it's unnecessary and unattractive. Bare ground may also cause soil to erode. Many homes have yards with both effective Defensible Space and attractive landscapes with little or no bare ground.
Does creating Defensible Space require special skills or equipment?	NO. For the most part, creating Defensible Space requires routine gardening and landscape maintenance practices such as pruning, mowing, weeding, plant removal, appropriate plant selection, and irrigation. The necessary equipment consists of common tools like a chain saw, pruning saw, pruning shears, shovel, and rake. Pay close attention to sparks this equipment may generate. Try not to do this maintenance during hot and windy weather.
How big is an effective Defensible Space?	Defensible Space size is usually expressed as the distance from your house in which vegetation is managed to reduce the wildfire threat. The necessary distance for effective Defensible Space is not the same for everyone, but varies by slope and type of vegetation growing near your house, at a miminum distance of 100' from the structure. Visit *ReadySetGoOC.org* to schedule an OCFA representative to come out and go over any special conditions associated with your house.

FREQUENTLY ASKED QUESTIONS

Does having Defensible Space guarantee my home will survive a wildfire?	NO. Under extreme conditions, almost any house can burn. Having Defensible Space along with a good Hardened Home will significantly improve the odds of your home surviving a wildfire.
Why doesn't everyone living in a high wildfire hazard area create Defensible Space?	The specific reasons for not creating Defenisble Space are varied. Some individuals believe that "it wont happen to my family." Others think the cost of maintanence outweighs the benefits. Some have failed to implement Defensible Space practices because of lack of knowledge. For those individuals wanting to learn more about Defenisble Space and how to harden their homes, please go to *ReadySetGoOC.org*
Does having an effective Defensible Space make a difference?	YES. Homes with effective Defensible Space are much more likely to survive a wildfire. Furthermore, Hardened Homes (go to ReadySetGoOC.org) with effective Defensible Space have an even greater chance to survive a wildfire than homes where no wildfire preparations have been taken.
What should I do to make my property Defensible?	Remove all tree branches or vegetation within 10' of chimney outlet. Trees within 100' of your home or neighbor's home should be kept free of dead branches and debris. Provide vertical clearance between shrubs and trees. Clearance may need to increase on steeper slopes. Provide horizontal separation for plants over 2' in height. Keep palm trees clear of dead fronds. Palms trees are not recommended within 100' of your home. Remove all dead or dying plant material including dead material within vines. Move wood piles at least 30' away from your home or to property line. Keep annual grasses and weeds cut to 4". Wood fences, patio covers, and gazebos need to be free of dead vines. It is *recommended* that you keep all shrubs within 10' of your home 2' or lower and keep plants away from windows.
Why Vegetation Management?	In the event of a catastrophic wildfire, the fire department may not have the resources to protect your home. Wildfires fueled by dry vegetation and driven by hot, dry winds are extremely dangerous and impossible to control. Many residents have built their homes and landscaped in fire-prone areas without fully understanding the impact a fire could have on them. Wildland-urban fire emergency strategy and tactics differ from both the standard wildland and the standard urban fire suppression practices. Wildland fire suppression largely attempts to keep a fire from spreading beyond its current location. Urban fire suppression initially addresses life safety (principally building occupants) and then fire containment within a portion of the structure and/or prevents adjacent structure involvement. Neither wildland nor urban suppression practices typically provide for home ignition potential reduction given an encroaching wildfire.

FREQUENTLY ASKED QUESTIONS

What can you do?

The success of this program and more importantly, its ability to reduce the high probability of fatalities and multiple structure loss, depends upon each property owner's aggressive participation in maintaining vegetation around their property. It's not a question of "if" but "when" the next major wildfire will occur in Orange County. That's why the most important person in protecting your life and property is not the firefighter, but you. Through advance planning and preparation, we can all be ready for wildfire. We hope you find the tips included in this publication helpful in creating heightened situational awareness and a fire safe environment for you and your family. For more information visit our website at *ReadySetGoOC.org* or *ocfa.org*.

CONCEPTUAL DRAINAGE STUDY

CIELO VISTA
TRACT 17341

Yorba Linda, California
County of Orange

PLANNING APPLICATION NO. PA100004

Prepared for

North County BRS Project LLC
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Date Prepared: August 2015
Date Revised: October 2015
Job Number: 1296-001-03

full circle thinking®

CONCEPTUAL DRAINAGE STUDY

FOR
CIELO VISTA TRACT 17341
Yorba Linda CA, County of Orange

APN: 351-031-05 AND 351-031-17
Planning Application No. PA100004

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1.0 INTRODUCTION

1.1 PROJECT INTRODUCTION AND BACKGROUND

The proposed Cielo Vista Project, Tract No. 17341 site encompasses approximately 84 acres located in unincorporated Orange County, within the city sphere of Yorba Linda. The project sits within the foothills of Yorba Linda and is bounded by Dorinda Road and Aspen Way to the west; Via Del Agua and Stonehaven Drive to the south, east-west trending hills with v-shaped canyons to the east and existing residential units to the north. Adjacent land uses include residential properties to the west and south of the site. A Vicinity Map is included in Section 1.4.

Under existing conditions, the project site is vacant, with the exception of several operational and abandoned oil wells and various dirt access roads and trails that traverse the site. The project site has been subject to a mineral lease for oil production as part of the Esperanza Oil Field. Oil production facilities within the project site include both operational and abandoned wells, one idle well and tank batteries, unimproved oil field service roads, and unimproved drill pad sites scattered throughout the site.

The Project proposes to develop a maximum of 112 single-family dwellings and associated infrastructure within two Planning Areas. Planning Area 1 (south site), located in the southerly portion of the site, would include 95 residences within 41.3 gross acres with access provided through Via Del Agua along the south of the site. Planning Area 2 (north site), located in the northwesterly part of the site, would include 17 residences within 6.4 gross acres with access provided from Aspen Way to the west.

1.2 PURPOSE OF THIS REPORT

The purpose of this "conceptual" analysis is to identify and analyze the pre and post-project drainage conditions in order to provide adequate drainage facilities for the proposed Cielo Vista residential development located in unincorporated County of Orange, California.

This Conceptual Drainage Study will analyze and compare the 10-year, 25-year and 100-year storm events for the existing and proposed conditions. Outcomes of the analysis will facilitate the conceptual layout of a drainage system in support of the project Environmental Impact Report (EIR) to adequately convey storm runoff through the site without adversely impacting surrounding areas, neighboring properties, and/or existing storm drain facilities.

This report also includes a discussion of the MS4 stormwater requirements for the County of Orange and will integrate a water quality concept that will be further described in a separate Conceptual WQMP.

1.3 REFERENCES

The following references were used to evaluate hydrologic conditions and water quality requirements:

- Orange County Hydrology Manual (October 1986)
- Orange County Hydrology Manual Addendum No. 1 (1996)
- Orange County Local Drainage Manual (January 1996)
- Orange County MS4 Permit. Order No. R8-2009-0030, NPDES Permit No. CAS618030 as Amended by Order No. R8-2010-0062.

1.4 PROJECT SITE LOCATION MAP

The Project Site is identified in the location map shown below.

2.0 EXISTING TOPOGRAPHIC & HYDROLOGIC CONDITIONS

2.1 EXISTING TOPOGRAPHY

The approximate 84-acre project site is characterized by steeply sloping hillsides vegetated by scrub and chaparral. Runoff from the site is directed to drainages that slope southwesterly with slopes varying from two percent (2%) to areas as steep as 1.5:1. Side sloped canyons, to which the drainages are located, have slopes up to 2:1 with some locally steeper and flatter elements. Elevations range from 560 feet above mean sea level (MSL) in the southern portions of the project site, to approximately 885 feet above MSL at the highest point in the northern portions of the project site. With the exception of the few on-site oil production facilities, the site is nearly a 100 percent pervious area.

2.2 EXISTING DRAINAGE PATTERN

For purposes of this hydrology discussion, the project site is generally described as consisting of two distinct areas: Planning Area 1 (approximately 41.3 acres, located in the southerly portion of the site, also known as the South Site) and Planning Area 2 (approximately 42.7 acres, located in the northwesterly part of the site, also known as the North Site).

The project site is downstream of four significant offsite natural tributary areas that drain via overland flow through natural flow paths, which are ultimately intercepted by the drainage systems described in Section 2.3. The four tributary areas from the east, identified as Creeks 'A', 'B', 'C', and 'D', pass through the project site and are illustrated in the existing hydrology maps located in Appendix A. Additionally, a major tributary runoff from the northwest emanates from the existing residential Tract 9813 and is conveyed towards the Cielo Vista project via an 84" R.C.P. which then joins Creek 'D'. The natural onsite terrain conveys the flows through the site towards downstream offsite drainage facilities.

Natural runoff from the onsite and offsite tributary areas are directed towards three receiving storm drain systems located downstream of the project at the following locations;

1. An 8' wide by 7' high RCB, located at Stonehaven Drive to the south (referred to as the "Southern Boundary").

2. A 36-inch RCP, located just east of Dorinda Road, north of Felipa Road (referred to as "Dorinda Road").

3. Esperanza Channel, located between San Antonio Road and Via Corona to the west of the project site (referred to as the "Western Boundary").

These three facilities will intercept storm flows discharged from the project site. The North Site drains to the Western Boundary, while the South Site drains to both the Southern Boundary and Dorinda Road.

Runoff from the North Site, inclusive of four large offsite tributaries (Creeks 'B', 'C', 'D' and Tract 9813), converge onsite prior to leaving the property at the western project boundary. These combined flows (identified as Creek 'F') continue to drain via overland flow where they are intercepted by Esperanza Channel located adjacent to San Antonio Road.

A large offsite natural tributary area located to the west of the project site (Creek 'E'), drains to the receiving southern portion of the project site, discharging to the receiving box culvert (8-feet by 7-feet) storm drain located within Stonehaven Drive. Approximately 17.8 acres, comprised of 13 acres of onsite from the South Site and 4.8 acres of offsite storm flows drain to a 36-inch RCP at Dorinda Road (Creek 'E').

2.3 EXISTING OFFSITE STORM DRAIN FACILITIES

As noted previously, the project site experiences offsite surface drainages from the north, northwest, and easterly areas. In order to accurately document the offsite existing drainage conditions, field investigations were performed along with reviewing aerials, various historical photos and as-built plans. There is one upstream offsite drainage facilities from Tract 9813 as described previously that discharges storm flows towards the project.

Upstream Storm Drain – Currently one existing storm drain facility discharges storm flows towards to the site. Detailed information for this facility is summarized below;

Table 2.3-1

Description	Type	Size	Ownership	Flowrate (cfs)	
				25 year	100 year
Tract 9813 (1)	Circular Pipe	84"	City of Yorba Linda	1160 (2)	1580 (2)

Notes:

1. Previous drainage studies in support of the Project EIR include Tract 9813 within Creek 'D' tributaries and analyses.
2. Flow rates are based upon the Preliminary Drainage Report for the Esperanza Hills Project, dated June 20, 2013.

Downstream Storm Drain Point of Connection – Each of the three existing storm drain facilities downstream of the project as described in Section 2.2 are publically owned and maintained. The drainage inlets off Stonehaven Drive and Dorinda Road are owned and maintained by the city of Yorba Linda, whereas the drainage inlet at Esperanza Channel off San Antonio Road is owned and maintained by OCFCD. Each system outlets to the Santa Ana River, approximately two miles south of the project site. These storm drain facilities currently have adequate capacity to accommodate existing storm flows. The proposed project will propose a drainage design that will not exceed the current conveyance capacity of the existing downstream facilities. Detailed storm drain information for each facility is provided as follows;

Table 2.3-2				Flowrate (cfs)	
Description	Type	Size	Ownership	25 year	100 year
Esperanza Channel	Open Channel	13'x11'	OCFCD	2593.6	3470.2
Storm Drain at Dorinda Rd.	Circular Pipe	36" RCP	City of Yorba Linda	39.4	52.3
RCB at Stonehaven Dr.	RCB	8'x7'	City of Yorba Linda	890.4	1195.5

See "Base Map of Drainage Facilities in Orange County" – Sheet No. 9 for facility ownership identification (located in Appendix E). Existing plans for each offsite drainage facility are located in Appendix E.

2.4 EXISTING ONSITE STORM DRAIN FACILITIES

There are no known onsite drainage facilities that discharge storm flows onto the project or convey storm flows through the project. All storm flows are currently conveyed through the site via natural v-shaped surface drainages.

3.0 HYDROLOGY

3.1 STORM FREQUENCY

Per Orange County's requirements, the design storm for this project various based upon the design facilities, a 10-year, 25-year, and 100-year storm event is analyzed and modeled as applicable. The 100-year storm event will be analyzed to model the off-site tributary flows and hydraulic conveyance through the project. The 25-year storm will be analyzed for the proposed condition street capacities and hydraulic conveyance of the onsite storm drain facilities. Ultimately habitable building floor elevations must be designed to be at least 1 foot above the 100-year flood water surface.

3.2 METHODOLOGY

The area of the study site is under the jurisdiction of the County of Orange, Department of Public Works.

The County of Orange accepts methodologies and practices as described in the Orange County Hydrology Manual and the Orange County Local Drainage Manual – January 1996. The Orange County Hydrology Manual uses a return period of 10-year, 25-year, and 100-year storm event to describe drainage characteristics and design capacity.

The computer program used for this report to perform hydrologic calculations is the CivilCadd/Civil Design Engineering Software, Version 7.0 program packaged 2005 by Bondiman and Associates, Inc. This software has been identified as acceptable software within the County of Orange.

Civil Design's Rational Hydrology Program and Unit Hydrograph Analysis was used to determine all runoff tributary to Planning Area 1. Included in this area of study are the areas

tributary to project outfall for the existing 8'x7' RCB at Stonehaven Dr. (Creek 'A') and existing 36" RCP at Dorinda Road (Creek 'E').

For Planning Area 2 upstream tributary runoff was sourced from the approved "Preliminary Drainage Reports for Esperanza Hills Property, Option 2" prepared by KWC Engineers, dated May 2013. Specifically Creek 'B', 'C' and 'D' are all tributary to the northern portion of the subject property and areas adjacent to Planning Area 2. This study area encompasses all runoff tributary to the existing project outfall of Esperanza Channel (Creek 'F'), located at San Antonio Road. For key portions along the perimeter of the site, the runoff was based on prorated Q's from KWC's analysis, unless otherwise identified. Existing drainage subareas B-1, F-1 and F-2 were calculated using Civil Design's Rational Hydrology Program with user defined time of concentration of upstream portions from KWC's study.

3.3 EXISTING CONDITION HYDROLOGY

As described in Section 2.2, five major drainage tributaries flow towards the project are identified as Creeks 'A', 'B', 'C', 'D' and Tract 9813 tributary. Table 3.3-1 below summarizes the existing 25-year and 100-year storm event flow rates as applicable and tributary area for each creek at various points of interest (indicated as node points on the existing hydrology maps in Appendix A). The nodal points of interest are at the east property boundary, west property boundary and the downstream point of connection to existing facilities. Downstream Creek 'F' is also summarized at its point of connection with the beginning of the Esperanza Channel.

Per this study, the entire tributary area for Creek 'A' was analyzed and modeled to the two points of interest described in Section 3.2. For Creeks 'B', 'C', 'D', and Tract 9813 tributary, hydrologic data from the County approved Esperanza "Preliminary Drainage Report" was utilized to obtain various storm frequency volumetric flow rates as applicable to the Cielo Vista project. Each drainage course was then analyzed from this point to its downstream existing facility point of connection.

See Figures A.1, A.2 and A.3 for Existing Condition Hydrology Maps for Watershed A (Creek 'A'), Watershed E (Creek 'E') and Planning Area 2 respectively. See Figure 9 from the approved "Preliminary Drainage Reports for Esperanza Hills Property, Option 2" (Appendix D) for upstream tributary flows to Planning Area 2.

Table 3.3-1

Creek Watershed	Node	Description	Existing Runoff (CFS)		Area Acres
			100-Yr	25-Yr	
B-1	201	B Creek at east PL	427.1	319.2	16.7
B-2	202	Subarea B-2 at east PL	4.5	3.3	1.8
B-3	203	Subarea B-3 at east PL	18.2	13.6	7.3
C	304	C Creek at east PL	1409.6	1054.9	647.2
C-1	301	Subarea C-1 at east PL	8.0	6.0	3.2
C-2	302	Subarea C-2 at east PL	3.2	2.4	1.3
C-3	303	Subarea C-3 at east PL	12	8.9	4.8

Table 3.3-1

Creek Watershed	Node	Description	Existing Runoff (CFS)		Area Acres
			100-Yr	25-Yr	
D-1	401	Subarea D-1 at west PL	14.7	10.0	5.4
D-2	402	Subarea D-2 at west PL	2.0	1.5	0.8
D-3	403	Subarea D-3 at west PL	9.0	6.7	3.8
C	305	C Creek at C and D Confluence	1409.6	1054.9	647.2
D	404	D Creek at C and D Confluence	1580.8	1160.7	435.6
B	204	B Creek at B and C Confluence	456.5	338.5	217.7
F	501	F Creek Downstream from Confluence	3401.8	2543.0	1366.0
F-1	603	F Creek at west PL	3406.1	2546.2	1368.6
F-2	606	F Creek at San Antonio Rd. Inlet	3470.2	2593.6	1401.6

See "Planning Area 2 – Existing Hydrology Map" (Figure B.3) in Appendix A for node and watershed locations.

3.4 DEBRIS BASIN

It has been understood that the county of Orange defers to the Army Core of Engineers LA District Debris methods and requirements. In order to accommodate this criteria and to protect the proposed storm drain system from debris laden flows, the development project proposes three debris basin as shown in Figures B.2 and B.3.

One debris Basin is proposed for a drainage tributary of approximately 636 acres, which enters the project site at the easterly property line within Planning Area 1 identified as Creek 'A'. The total debris potential volume for this tributary is approximately 4500 CY, based upon the calculations provided in Appendix C. An area within the project boundary between most easterly cul-de-sac and the property line is designated for a debris basin and shown on the proposed condition Hydrology Map Figure B-2. Further details for calculations and basin design will be provided at the TTM level. If additional area is needed to capture the required debris volume, the proposed lots in this area may be utilized for the construction of a debris basin.

The remaining areas of the project where offsite storm flows must be intercepted in order to convey peak storm flows safely through the project will not require debris basins based upon the Army Core of Engineers LA District Debris methods and requirements (due to the relative small natural tributary areas). Therefore storm drain facilities for these drainages will be designed to pass a bulked flow rate based upon the County's current requirements.

3.5 PROPOSED CONDITION HYDROLOGY

The proposed condition will consist of a maximum 112 single-family dwelling units along with neighborhood open space and related planning infrastructure required to accommodate the Cielo Vista hillside community. Planning Area 1 is comprised of 95 single-family homes and Planning Area 2 is comprised of 17 single-family homes. Each Planning Area proposes quarter acre residential lots as its land use. A hydrology study was prepared for the onsite

proposed conditions and analyzed a 25-year storm event in order to conceptually design storm drain alignments and estimate storm drain facility sizes. Furthermore a second hydrology study was prepared for the proposed condition, which analyzes a 100-year and 10-year storm event in order to provide conveyance for offsite storm flows through the proposed project and their impacts to the downstream point of connections. These studies were conducted for both Planning Area 1 and Planning Area 2.

Planning Area 1- Generally, the onsite drainage patterns for the proposed condition will be consistent with the existing condition. The site will be graded to slope in a southerly direction and the majority of the on-site flows (approximately 31.9 acres within the limits of construction) will be directed towards Stonehaven Drive, joining an existing City of Yorba Linda maintained 8'x7' reinforced concrete box (RCB) E06501. Creek 'A' also enters this existing facility as it will cross the southeasterly tip of the proposed south site development. This portion of the site will be filled to create development area (see Planning Area 1 - Proposed Hydrology Map - Figure A.2). The portion of Creek 'A' that resides upstream of the development will remain natural.

One adjacent localized creek, Creek 'E' also traverses the southwesterly portion of the site and will be filled to create the development area. This results in roughly 2.2 acres of the proposed developed portions of Planning Area 1, which will drain to the westerly property line as previous described, to be conveyed southerly and directed offsite towards the existing City of Yorba Linda maintained 36-inch storm drain line at Dorinda Road as described in Section 2.3.

Total watershed area tributary to Creek 'A' totals 674 acres with 41.3 acres (≈ 6.1%) comprising the development area and 632.7 acres (≈ 93.9%) comprising upstream natural canyon areas.

Planning Area 2- The north and south sites will be separated by a natural creek approximately 50 feet below proposed pad elevations. Generally, the onsite drainage patterns for the proposed condition will be consistent with the existing condition as well. Creeks 'C' and 'D', as described in the existing condition, will cross the North Site and will be filled to create the development area. Just south of the North Site development area, Creeks 'C' and 'D' confluence with a third creek, Creek 'B' thus becoming Creek 'F', which then drains downstream approximately one-half mile in a southwesterly direction before entering the County of Orange's Esperanza Channel drainage facility at San Antonia Road (see Planning Area 2 – Existing Hydrology Map - Figure A.3). Creek 'B', Creek 'F' and those portions of Creeks 'C' and 'D' that reside upstream of the development will remain natural.

Total watershed area tributary to Creeks 'B', 'C', 'D' and 'F' totals 1,401.6 acres with 7.2 acres (≈ 0.5%) comprising development area and 1,371.3 acres (≈ 99.5%) comprising upstream natural canyon areas. Post development conditions results in an increase of runoff flows toward 'F' Creek. This increase will be detained onsite to maintain predevelopment conditions.

A comparison table between the pre and post project conditions is provided below for the 10, 25 and 100-year storm events at the downstream point of connections. Per As-Built plans, the

existing capacity of the 8'x7' RCB is 1,200 cfs and the existing capacity of the 36" RCP at Dorinda Road is 46.87 cfs (As-Built storm drain plans are located in Appendix E).

Hydrology Calculations for Table 3.5-1 below are provided in Appendix C.

Table 3-5.1

Unmitigated Hydrology Calculations Summary Table									
	South Outlet – 8'x7' RCB (PA 1)			Southwest Outlet – 36" RCP (PA 1)			West Outlet at PL – 'F' Creek (PA 2)		
	Q100 (cfs)	Q25 (cfs)	Q10 (cfs)	Q100 (cfs)	Q25 (cfs)	Q10 (cfs)	Q100 (cfs)	Q25 (cfs)	Q10 (cfs)
Existing	1195.5	890.4	658.0	52.3	39.4	31.7	3406.1	2546.2	2046.6
Proposed	1217.5	909.9	672.8	14.1*	10.6*	8.6*	3413.5	2551.8	2056.3
Change	+22.0	+19.5	+14.8	-38.2	-28.8	-23.1	+7.4	+5.6	+9.7

**Calculated using the existing conditions flow rate (CFS/Acre) applied to the remaining area tributary to the 36" RCP outlet.*

4.0 PROPOSED STORM DRAIN FACILITIES

The proposed onsite storm drain facilities will consist of a combined bulked and clear flow, low flow water quality, and peak flow conveyance system for Planning Area 1 and a combined low flow water quality and peak flow conveyance system for Planning Area 2. Planning Area 2 will integrate some level of detention.

Planning Area 1- A debris basins is proposed at the easterly property boundary within Planning Area 1, which will de-bulk approximately 636 acres of offsite undeveloped tributary storm flows. Clear flows will then leave the basin and be conveyed through the site via a proposed 8x7 RCB with a transition inlet to allow open flow into the system and prevent upstream ponding. The proposed development will be designed to allow for onsite flows to be directed towards proposed local streets and then intercepted by proposed catch basins. Once the storm flows are within the proposed storm drain system, flows will be conveyed to water quality facilities as required and then ultimately to the proposed 8x7 RCB, prior to leaving the project boundary, and joining the existing downstream facility in Stonehaven drive as described in Section 2.3.

The existing facility in Stonehaven has a hydraulic design capacity of 1,200 cfs, per the as-built plans locate in Appendix E. The proposed grading design of the site causes an increase in tributary area to the existing downstream RCB as flows are being diverted from the existing Creek 'E' adjacent to the west. In order to not exceed design capacity of the existing 8'x7' RCB and to maintain drainage patterns similar to predeveloped conditions, a portion of on-site runoff will be bifurcated from the proposed storm drain to the west towards Creek 'E' and ultimately discharging to the existing 36" RCP at Dorinda Road (See Figures B.1 and B.2 in Appendix B). This will ensure the existing capacity of the existing downstream facilities are not exceeded (See Table 4.0-1).

A system of bioretention basins will be installed to provide water quality treatment in order to comply with the North Orange County Technical Guidance Document (further described in the Cielo Vista project specific Conceptual WQMP).

Planning Area 2 - North site drainage improvements will include the interception of Creeks 'C' and 'D' runoff at the project's upstream interface and conveyance of said runoff along the easterly edge of the developed area, and outlet south of the project site via a proposed 96" RCP. On-site local catch basins and drains will intercept storm flows and convey improved area runoff through the site to a proposed water quality facility. A multiple use basin for mitigating water quality, and potential hydromodification is proposed in line of the onsite flow within the southerly portion of this planning area and upstream of the outlet location. The proposed basin will have a total storage of approximately 0.42 acre-ft of which the lower portions will be utilized for bio-filtration and hydromodification mitigation with the higher portions provided for detention.

A 96" RCP is proposed near the westerly boundary just east of an existing 100' wide Southern California Gas Co. easement. This system will intercept approximately 1410 cfs from Tract 9813 as described in Section 3.3 and convey these storm flows through Planning Area 2 back to its original flow path within Creek 'C', just before its confluence with Creek 'B'. Only "clean" storm flows from the onsite development will join this system (See Figure B.3 in Appendix B).

The low flow water quality system and bio-filtration portion of the proposed basin will provide water quality treatment in order to comply with the North Orange County Technical Guidance Document (further described in the Cielo Vista project specific Conceptual WQMP).

Tributary runoff for Planning Area 1 (Creeks 'A' and 'E') actually decreases in post development conditions. The existing condition is steep hillsides which does not allow for much infiltration. Therefore with the graded portions of Planning Area 1 reducing portions of steeper hillsides, at the conceptual level of analysis, it seems feasible that there may be a slight reduction of tributary runoff flows.

The post developed conditions for Planning Area 1 results in a reduction of overall site runoff and therefore by utilizing a bifurcation design to balance storm discharges, detention is not required. Conceptually, a 30" storm drain mainline within Street 'B' can convey approximately 36 cfs (5% slope) emanating from Area A1 per Figure 1-1 of the WQMP, which results in 3.8 cfs/acre. The bifurcation structure adjacent to Lot A will be designed to split off approximately 22 cfs from this line during a 100 year storm event and convey these flows to the existing 36" RCP via an 24" RCP as described in the report. The design of this structure as attached will ensure that the 85th percentile storm and hydromodification mitigation flows will also be split off at this location. These flows are 0.55 cfs and 12.74 cfs, respectfully.

Table 4.0-1 below compares predevelopment and post development (mitigated) hydrologic conditions at adjacent downstream conveyance points from both Planning Areas 1 and 2. Note that Overall, the post developed conditions for the Project (including both Planning Areas 1 and 2) will not exceed the predeveloped conditions at the downstream drainage facilities.

Hydrology Calculations for Table 4.0-1 below are provided in Appendix C.

Table 4.0-1

Mitigated Hydrology Calculations Summary Table									
	South Outlet – 8'x7' RCB (PA 1)			Southwest Outlet – 36" RCP (PA 1)			West Outlet at PL – 'F' Creek (PA 2)		
	Q100 (cfs)	Q25 (cfs)	Q10 (cfs)	Q100 (cfs)	Q25 (cfs)	Q10 (cfs)	Q100 (cfs)	Q25 (cfs)	Q10 (cfs)
Predevelopment	1195.5	890.4	658.0	52.3	39.4	31.7	3406.1	2546.2	2046.6
Postdevelopment (Mitigated)	1195.5	890.4	658.0	36.1	30.1	23.4	3406.1	2546.2	2046.6
Change	0	0	0	-16.2	-9.3	-8.3	0	0	0
Detention Basin (Mitigated)	N/A	N/A	N/A	N/A	N/A	N/A	7.4	5.6	9.7

The proposed drainage facilities described in this report will provide for adequate flood control protection per the current County of Orange Hydrology Manual and the County of Orange Local Drainage Manual requirements. The proposed project will reduce the storm flow rate at each discharge location for the various studied storm events to meet Orange County Public Works and other agency standard guidelines to ensure discharge velocities at this location are non-erosive, less than 5 fps. A detailed design for an energy dissipating structure will be prepared at the TTM stage.

Based upon the hydrologic analyses performed for the pre and post project conditions, the upstream and downstream properties will not experience any significant drainage impacts.

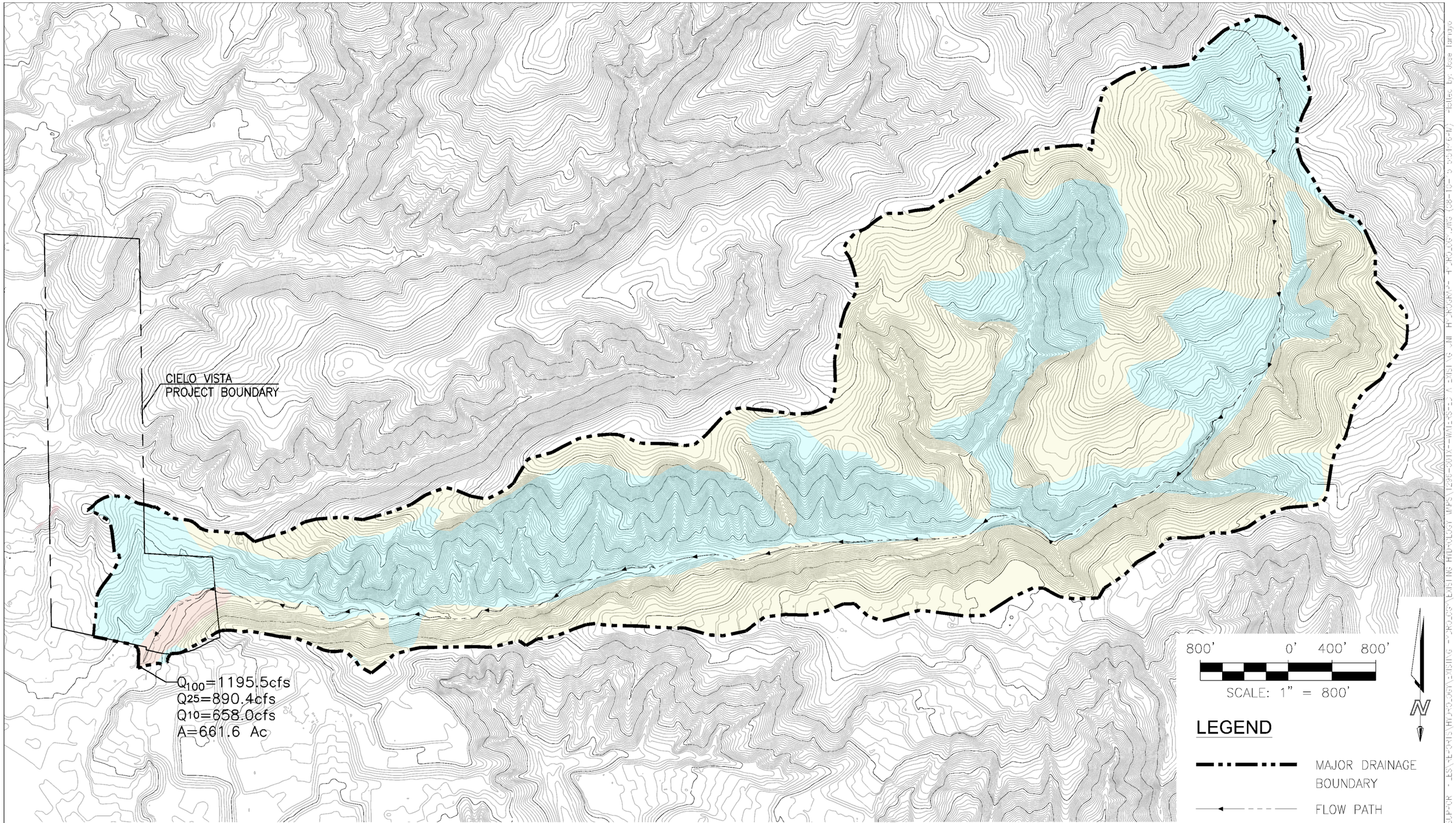
5.0 CONCLUSION

Given that the Project would be designed to maintain existing drainage patterns and post development runoff volume would not significantly exceed the pre-development condition, the post-project site would not result in significant hydrology impacts downstream such that flooding or erosion would occur on- or off-site. Furthermore, based upon the mitigation measures described in the above sections of this report, the Project would not create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage.[1]

[1] *County of Orange/Santa Ana Region Priority Project Water Quality Management Plan: Cielo Vista Tentative Tract 17341, prepared by Charles Hartman & Associates in August 2012.*

APPENDICES

APPENDIX A:
Existing Hydrology Maps

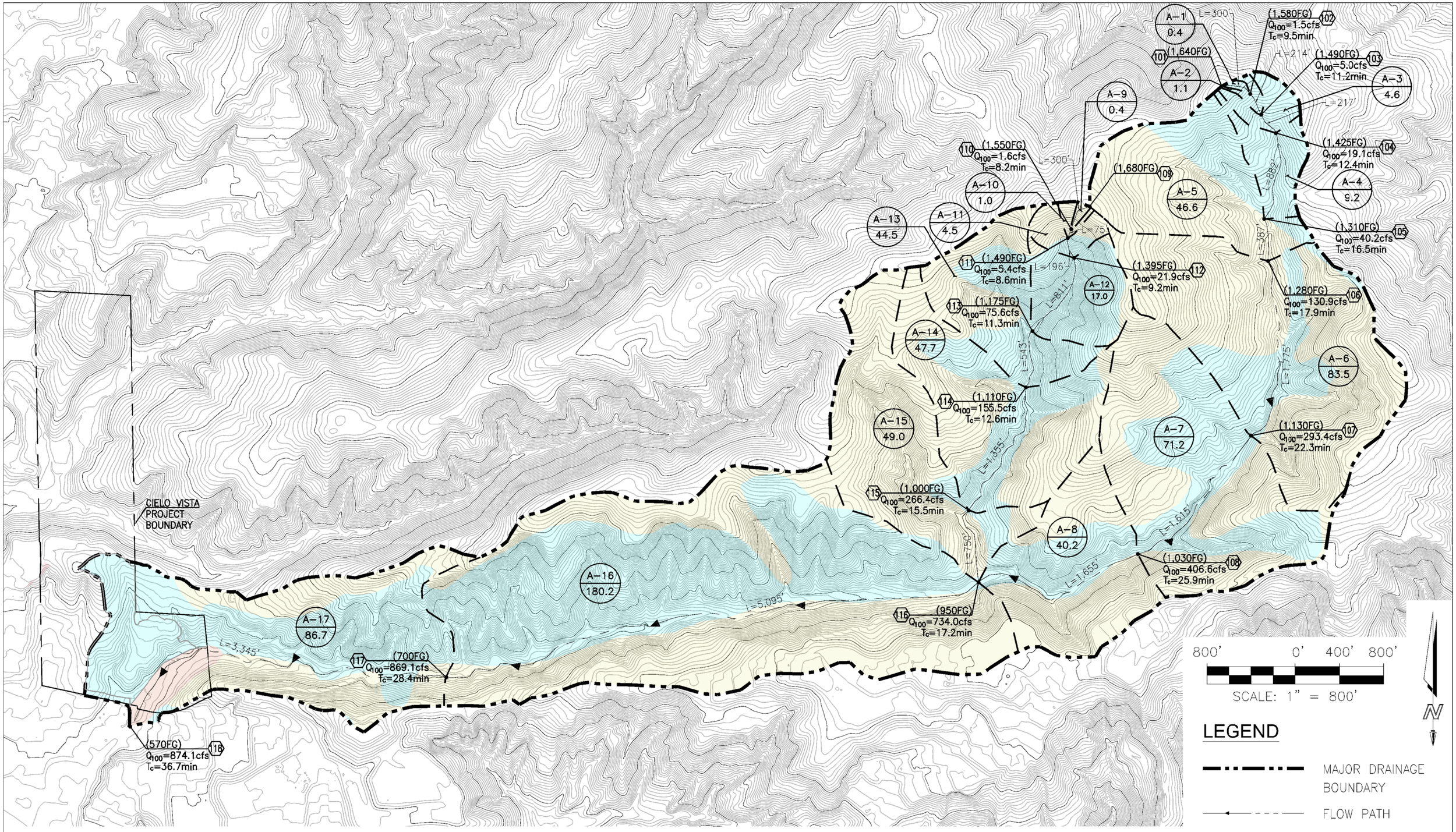


FUSCOE ENGINEERING
full circle thinking

CIELO VISTA

WATERSHED 'A' EXISTING UNIT HYDROGRAPH HYDROLOGY MAP

FIGURE A.1



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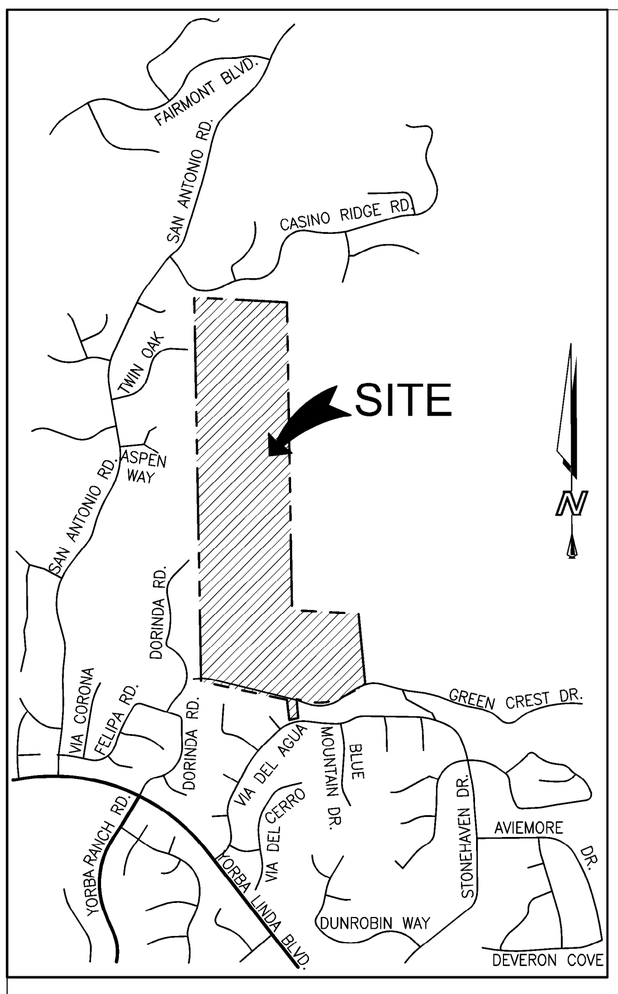
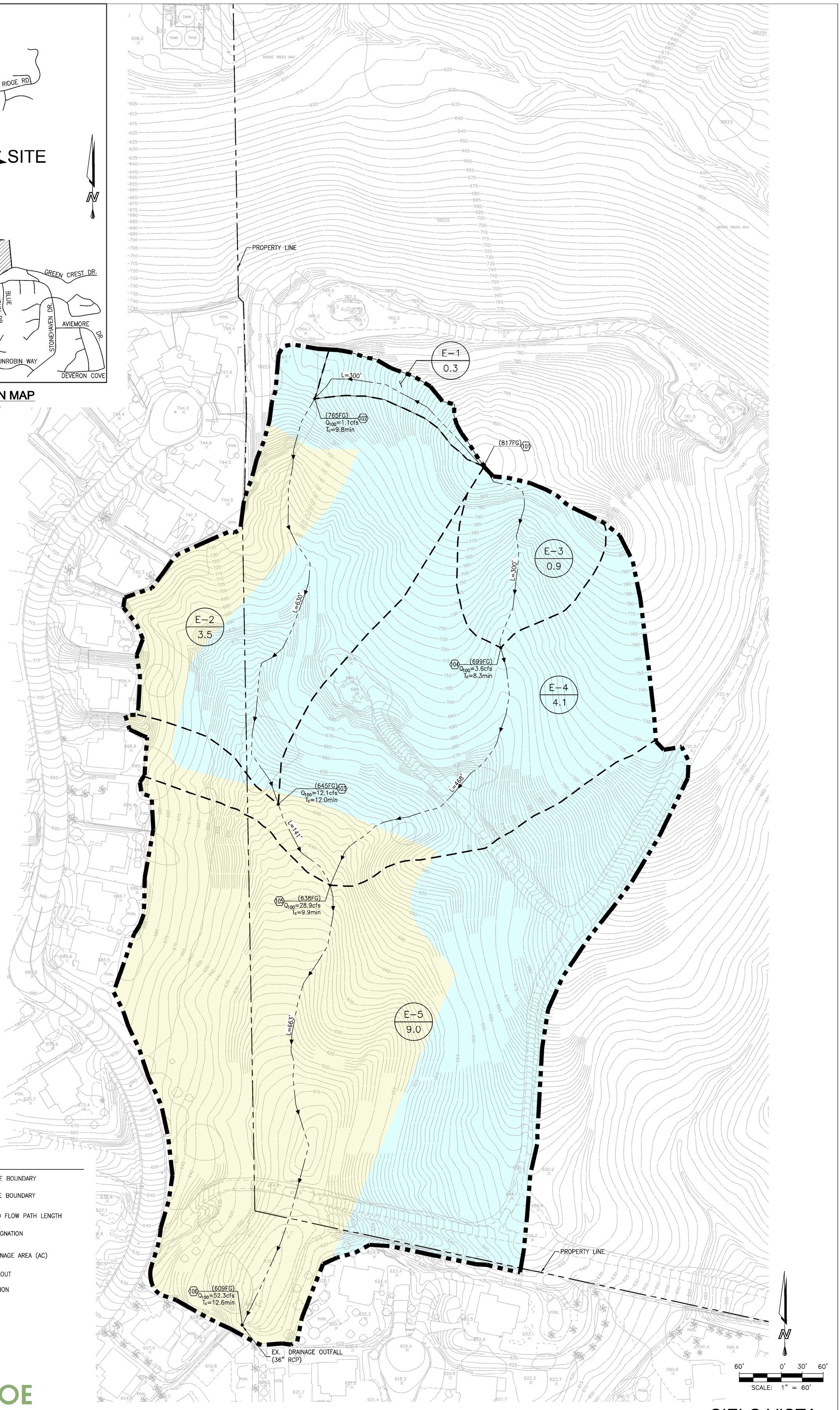
CIELO VISTA

WATERSHED 'A' RATIONAL METHOD HYDROLOGY MAP

FIGURE A.1a



LOCATION MAP
N.T.S.



LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- L=75' — FLOW PATH AND FLOW PATH LENGTH
- E-1 / 0.3 — SUB-AREA DESIGNATION / SUB-AREA DRAINAGE AREA (AC)
- (153FC) 110 — ELEVATION CALLOUT / NODE DESIGNATION
- SOIL TYPE C
- SOIL TYPE D

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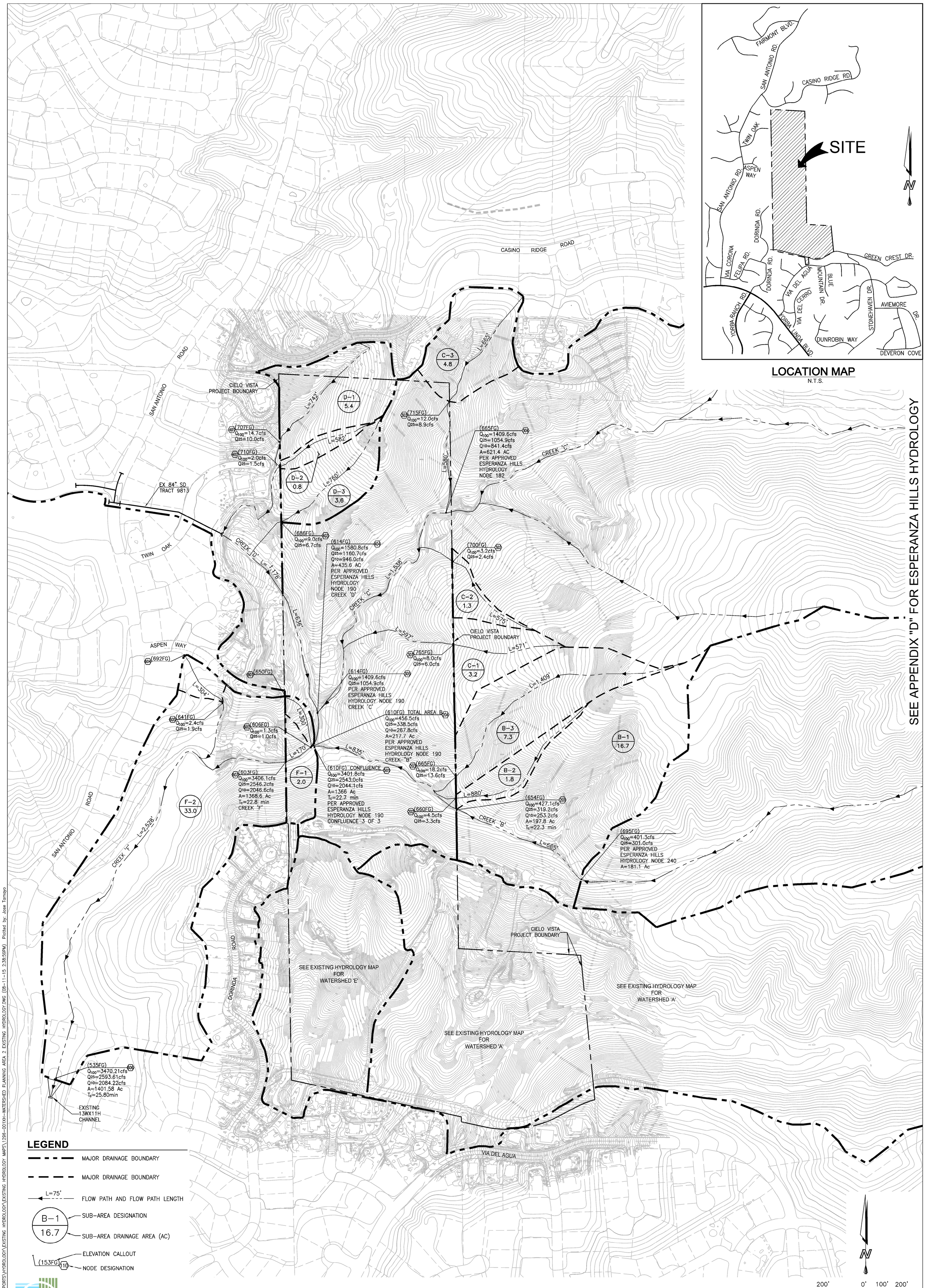
WATERSHED 'E' - EXISTING HYDROLOGY MAP

FIGURE A.2

F:\PROJECTS\1296\001_SUPPORT FILES\REPORTS\HYDROLOGY\EXISTING HYDROLOGY\EXISTING HYDROLOGY MAPS\1296-001XH-WATERSHED E EXISTING RATIONAL METHOD HYDROLOGY.DWG (08-10-15 6:05:04PM) Plotted by: Jose Tamayo



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full circle thinking

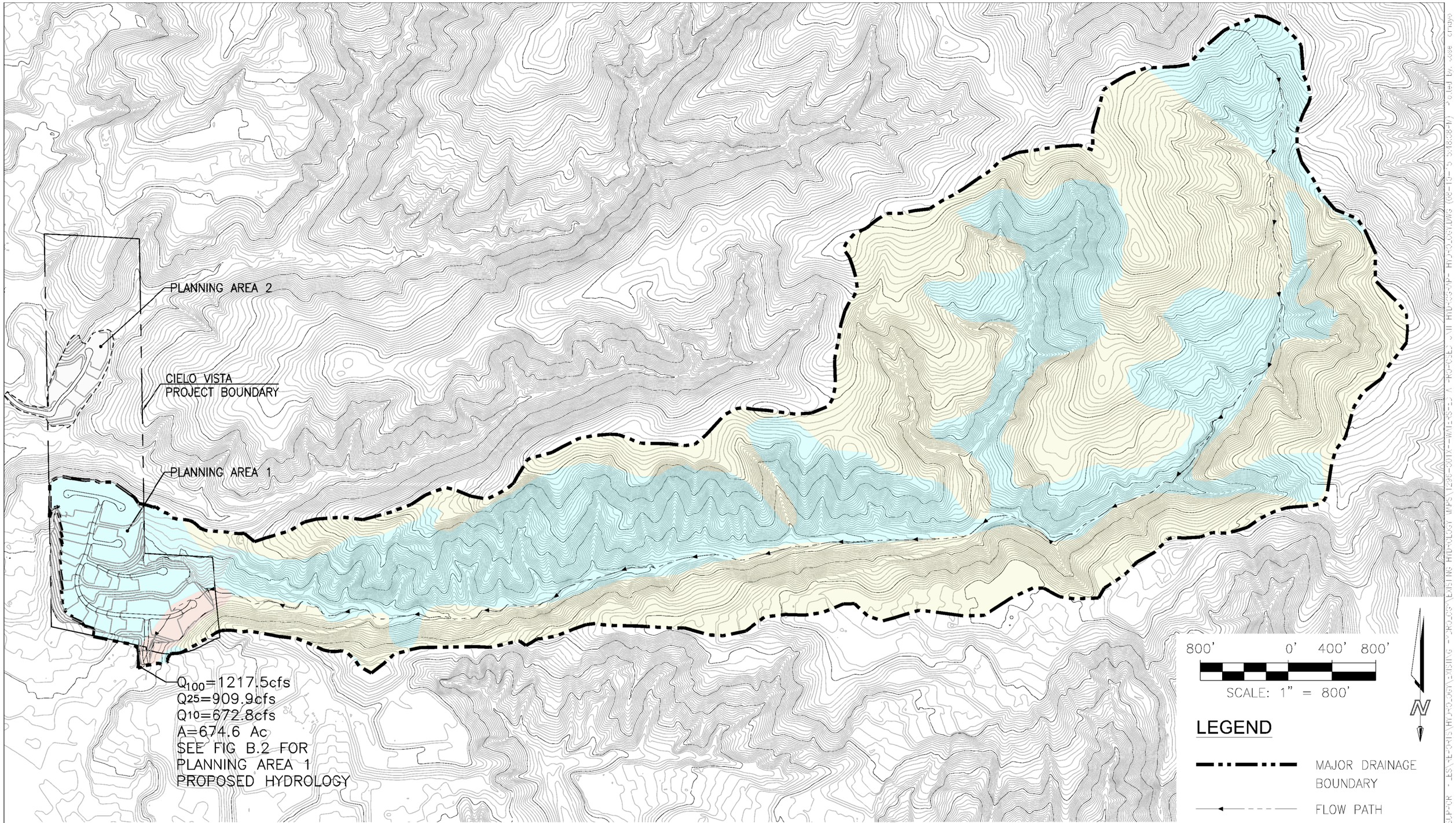
CIELO VISTA

PLANNING AREA 2 - EXISTING HYDROLOGY MAP

FIGURE A.3

F:\PROJECTS\1296\001_SUPPORT FILES\REPORTS\HYDROLOGY\EXISTING HYDROLOGY\EXISTING HYDROLOGY MAPS\1296-001XH-WATERSHED PLANNING AREA 2 EXISTING HYDROLOGY.DWG (08-11-15 2:38:59PM) Plotted by: Jose Tamayo

APPENDIX B:
Proposed Hydrology Maps



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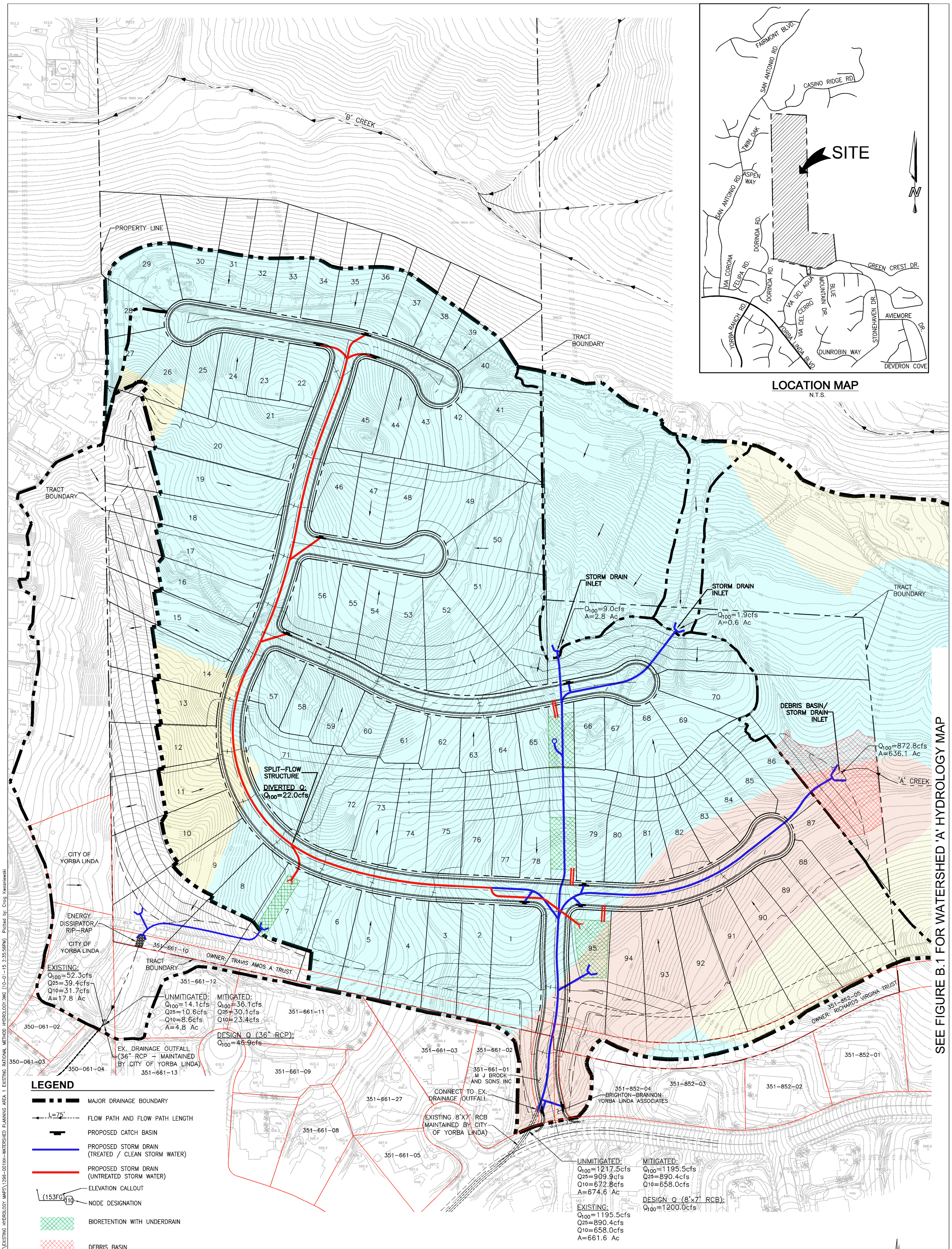
CIELO VISTA

WATERSHED 'A' PROPOSED UNIT HYDROGRAPH HYDROLOGY MAP

FIGURE B.1



LOCATION MAP

N.T.S.

LEGEND

- MAJOR DRAINAGE BOUNDARY
- L=75' FLOW PATH AND FLOW PATH LENGTH
- PROPOSED CATCH BASIN
- PROPOSED STORM DRAIN (TREATED / CLEAN STORM WATER)
- PROPOSED STORM DRAIN (UNTREATED STORM WATER)
- (153FG) ELEVATION CALLOUT
- (110) NODE DESIGNATION
- BIORETENTION WITH UNDERDRAIN
- DEBRIS BASIN
- SOIL TYPE B
- SOIL TYPE C
- SOIL TYPE D

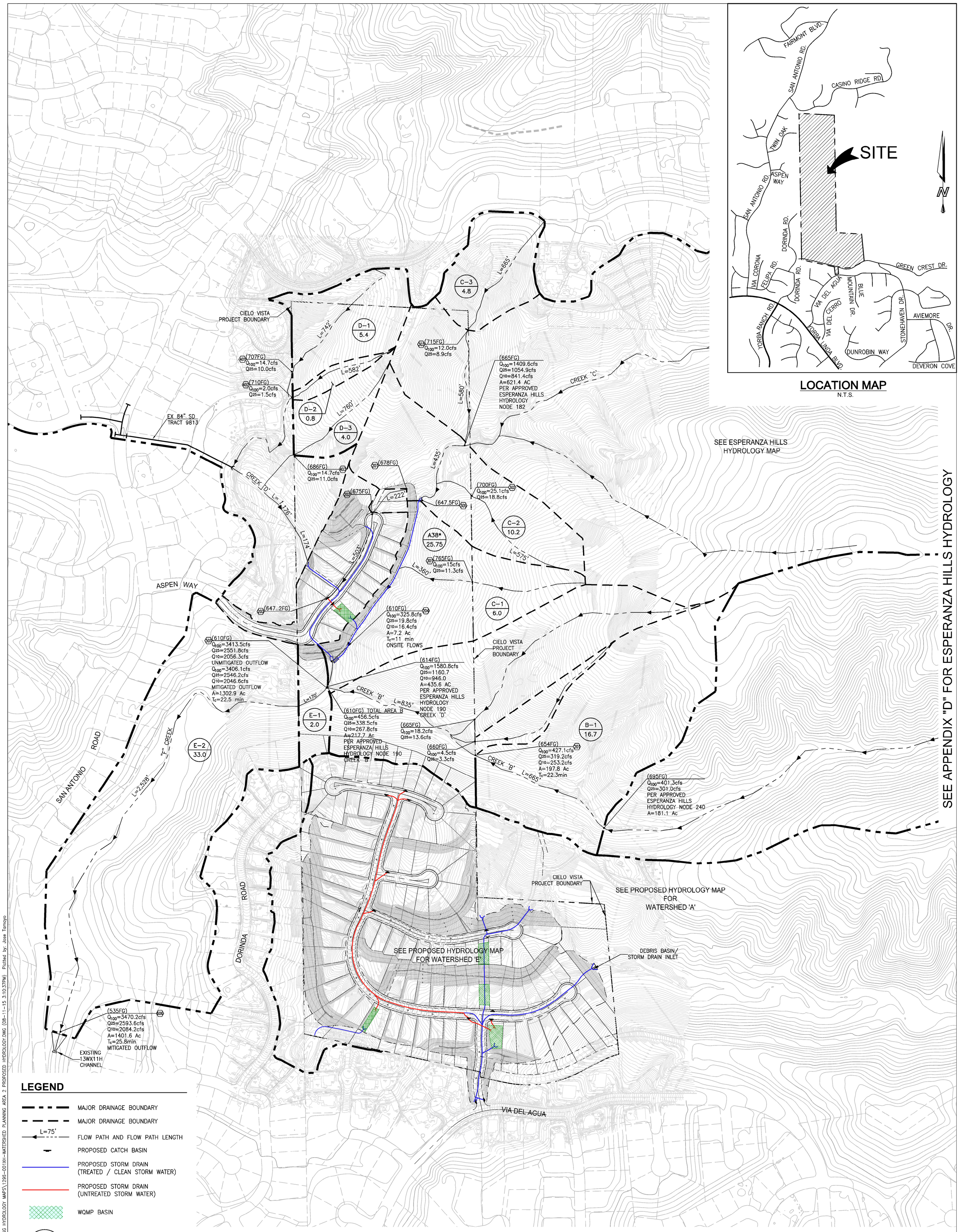
FUSCOE ENGINEERING
full circle thinking

CIELO VISTA

PLANNING AREA 1 - PROPOSED HYDROLOGY MAP

FIGURE B.2

F:\PROJECTS\1296\001_SUPPORT FILES\REPORTS\HYDROLOGY\EXISTING HYDROLOGY\EXISTING HYDROLOGY MAPS\1296-001XH-WATERSHED PLANNING AREA 1 EXISTING RATIONAL METHOD HYDROLOGY.DWG (10-01-15 2:35:56PM) Plotted by: Craig Kwasniewski



CIELO VISTA

PLANNING AREA 2 - PROPOSED HYDROLOGY MAP

FIGURE B.3

F:\PROJECTS\296\001_SUPPORT FILES\REPORTS\HYDROLOGY\EXISTING HYDROLOGY MAPS\296-001XH-WATERSHED PLANNING AREA 2 PROPOSED HYDROLOGY.DWG (08-11-15 3:10:37PM) Plotted by: Jose Tamayo

APPENDIX C:
Hydrology Calculations

Creek "A"
Existing Rational Method Calculations
10, 25 & 100-Year Storms

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                    Orange County Rational Hydrology Program

                (Hydrology Manual Date(s) October 1986 & November 1996)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2004 Version 8.0
        Rational Hydrology Study, Date: 08/03/15  File Name: CIELOVISTAEXWSHDARAT.roc
----------------------------------------------------------------------------
WATERSHED A
EXISTING CONDITIONS - CREEK A
100-YEAR STORM
BY FUSCOE ENGINEERING
----------------------------------------------------------------------------


Program License Serial Number 6049

----------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

----------------------------------------------------------------------------

Rational hydrology study storm event year is   100.0

Decimal fraction of study above 2000 ft., 600M  =     0.0000
English Units Used for input data


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =  1640.000(Ft.)
Bottom (of initial area) elevation =  1580.000(Ft.)
Difference in elevation =    60.000(Ft.)
Slope =    0.20000  s(%)=      20.00
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.538 min.
Rainfall intensity =      4.274(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.858
Subarea runoff =      1.466(CFS)
Total initial stream area =        0.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1580.000(Ft.)
Downstream point elevation =  1490.000(Ft.)
Channel length thru subarea  =   214.000(Ft.)
Channel base width     =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      3.259(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =      3.259(CFS)
Depth of flow =   0.031(Ft.), Average velocity =   2.106(Ft/s)
Channel flow top width =   50.185(Ft.)
Flow Velocity =    2.11(Ft/s)
Travel time  =    1.69 min.
Time of concentration =   11.23 min.
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Critical depth =      0.051(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Rainfall intensity =      3.891(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.854
Subarea runoff =      3.517(CFS) for    1.100(Ac.)
Total runoff =      4.983(CFS)       Total area =        1.50(Ac.)
Area averaged Fm value =    0.200(In/Hr)
Depth of flow =   0.040(Ft.), Average velocity =   2.494(Ft/s)
Critical depth =      0.067(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1490.000(Ft.)
Downstream point elevation =  1425.000(Ft.)
Channel length thru subarea  =   217.000(Ft.)
Channel base width     =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     12.092(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     12.092(CFS)
Depth of flow =   0.075(Ft.), Average velocity =   3.206(Ft/s)
Channel flow top width =   50.451(Ft.)
Flow Velocity =    3.21(Ft/s)
Travel time  =    1.13 min.
Time of concentration =   12.36 min.
Critical depth =      0.121(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Rainfall intensity =      3.684(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.851
Subarea runoff =     14.142(CFS) for    4.600(Ac.)
Total runoff =     19.126(CFS)       Total area =        6.10(Ac.)
Area averaged Fm value =    0.200(In/Hr)
Depth of flow =   0.099(Ft.), Average velocity =   3.847(Ft/s)
Critical depth =      0.164(Ft.)


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Process from Point/Station      104.000 to Point/Station      105.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1425.000(Ft.)
Downstream point elevation =  1310.000(Ft.)
Channel length thru subarea  =   882.000(Ft.)
Channel base width     =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     29.729(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     29.729(CFS)
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Depth of flow =   0.165(Ft.), Average velocity =   3.564(Ft/s)
Channel flow top width =   50.991(Ft.)
Flow Velocity =    3.56(Ft/s)
Travel time  =    4.12 min.
Time of concentration =   16.48 min.
Critical depth =      0.223(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Rainfall intensity =      3.123(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.842
Subarea runoff =     21.130(CFS) for    9.200(Ac.)
Total runoff =     40.255(CFS)        Total area =       15.30(Ac.)
Area averaged Fm value =    0.200(In/Hr)
Depth of flow =   0.198(Ft.), Average velocity =   4.017(Ft/s)
Critical depth =      0.270(Ft.)


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Process from Point/Station      105.000 to Point/Station      106.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1310.000(Ft.)
Downstream point elevation =  1280.000(Ft.)
Channel length thru subarea  =   387.000(Ft.)
Channel base width     =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     85.607(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     85.607(CFS)
Depth of flow =   0.363(Ft.), Average velocity =   4.610(Ft/s)
Channel flow top width =   52.181(Ft.)
Flow Velocity =    4.61(Ft/s)
Travel time  =    1.40 min.
Time of concentration =   17.88 min.
Critical depth =      0.445(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.400
SCS curve number for soil(AMC 2)  = 81.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.230(In/Hr)
Max Catchment Loss (Fm) =     0.230(In/Hr)
Rainfall intensity =      2.981(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.833
Subarea runoff =     90.636(CFS) for   37.400(Ac.)
Total runoff =    130.892(CFS)        Total area =       52.70(Ac.)
Area averaged Fm value =    0.221(In/Hr)
Depth of flow =   0.468(Ft.), Average velocity =   5.436(Ft/s)
Critical depth =      0.594(Ft.)


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Process from Point/Station      106.000 to Point/Station      107.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1280.000(Ft.)
Downstream point elevation =  1130.000(Ft.)
Channel length thru subarea  =  1775.000(Ft.)
Channel base width     =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
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Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    212.181(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    212.181(CFS)
Depth of flow =   0.609(Ft.), Average velocity =   6.723(Ft/s)
Channel flow top width =   53.654(Ft.)
Flow Velocity =    6.72(Ft/s)
Travel time  =    4.40 min.
Time of concentration =   22.28 min.
Critical depth =      0.813(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.850
Decimal fraction soil group D = 0.150
SCS curve number for soil(AMC 2)  = 79.75
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.242(In/Hr)
Max Catchment Loss (Fm) =     0.242(In/Hr)
Rainfall intensity =      2.628(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.820
Subarea runoff =    162.520(CFS) for   83.500(Ac.)
Total runoff =    293.411(CFS)       Total area =      136.20(Ac.)
Area averaged Fm value =    0.234(In/Hr)
Depth of flow =   0.739(Ft.), Average velocity =   7.607(Ft/s)
Critical depth =      1.000(Ft.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1130.000(Ft.)
Downstream point elevation =  1030.000(Ft.)
Channel length thru subarea  =  1615.000(Ft.)
Channel base width    =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    350.048(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    350.048(CFS)
Depth of flow =   0.900(Ft.), Average velocity =   7.382(Ft/s)
Channel flow top width =   55.399(Ft.)
Flow Velocity =    7.38(Ft/s)
Travel time  =    3.65 min.
Time of concentration =   25.93 min.
Critical depth =      1.125(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.500
SCS curve number for soil(AMC 2)  = 81.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.225(In/Hr)
Max Catchment Loss (Fm) =     0.225(In/Hr)
Rainfall intensity =      2.409(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.814
Subarea runoff =    113.181(CFS) for   71.200(Ac.)
Total runoff =    406.593(CFS)       Total area =      207.40(Ac.)
Area averaged Fm value =    0.231(In/Hr)
Depth of flow =   0.983(Ft.), Average velocity =   7.808(Ft/s)
Critical depth =      1.234(Ft.)


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Process from Point/Station      108.000 to Point/Station      116.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
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Upstream point elevation =  1030.000(Ft.)
Downstream point elevation =   950.000(Ft.)
Channel length thru subarea  =  1655.000(Ft.)
Channel base width     =   60.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    424.878(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    424.878(CFS)
Depth of flow =   0.977(Ft.), Average velocity =   6.912(Ft/s)
Channel flow top width =   65.861(Ft.)
Flow Velocity =    6.91(Ft/s)
Travel time  =    3.99 min.
Time of concentration =   29.92 min.
Critical depth =      1.141(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.650
Decimal fraction soil group D = 0.350
SCS curve number for soil(AMC 2)  = 80.75
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.232(In/Hr)
Max Catchment Loss (Fm) =     0.232(In/Hr)
Rainfall intensity =      2.220(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.806
Subarea runoff =     36.477(CFS) for   40.200(Ac.)
Total runoff =    443.069(CFS)       Total area =      247.60(Ac.)
Area averaged Fm value =    0.231(In/Hr)
Depth of flow =   1.001(Ft.), Average velocity =   7.022(Ft/s)
Critical depth =      1.172(Ft.)


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Process from Point/Station      108.000 to Point/Station      116.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =    247.600(Ac.)
Runoff from this stream =    443.069(CFS)
Time of concentration =   29.92 min.
Rainfall intensity =     2.220(In/Hr)
Area averaged loss rate (Fm) =    0.2313(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Program is now starting with Main Stream No. 2


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Process from Point/Station      109.000 to Point/Station      110.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 79.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.250(In/Hr)
Max Catchment Loss (Fm) =     0.250(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =  1680.000(Ft.)
Bottom (of initial area) elevation =  1550.000(Ft.)
Difference in elevation =   130.000(Ft.)
Slope =    0.43333  s(%)=      43.33
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.171 min.
Rainfall intensity =      4.669(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.852
Subarea runoff =      1.591(CFS)
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Total initial stream area =        0.400(Ac.)

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Process from Point/Station      110.000 to Point/Station      111.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1550.000(Ft.)
Downstream point elevation =  1490.000(Ft.)
Channel length thru subarea  =    75.000(Ft.)
Channel base width     =   30.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      3.549(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =      3.549(CFS)
Depth of flow =   0.036(Ft.), Average velocity =   3.237(Ft/s)
Channel flow top width =   30.219(Ft.)
Flow Velocity =    3.24(Ft/s)
Travel time  =    0.39 min.
Time of concentration =    8.56 min.
Critical depth =      0.075(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.700
SCS curve number for soil(AMC 2)  = 82.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.215(In/Hr)
Max Catchment Loss (Fm) =     0.215(In/Hr)
Rainfall intensity =      4.548(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.855
Subarea runoff =      3.855(CFS) for    1.000(Ac.)
Total runoff =      5.446(CFS)       Total area =        1.40(Ac.)
Area averaged Fm value =    0.225(In/Hr)
Depth of flow =   0.047(Ft.), Average velocity =   3.838(Ft/s)
Critical depth =      0.101(Ft.)


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Process from Point/Station      111.000 to Point/Station      112.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1490.000(Ft.)
Downstream point elevation =  1395.000(Ft.)
Channel length thru subarea  =   196.000(Ft.)
Channel base width     =   30.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     13.692(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     13.692(CFS)
Depth of flow =   0.095(Ft.), Average velocity =   4.756(Ft/s)
Channel flow top width =   30.570(Ft.)
Flow Velocity =    4.76(Ft/s)
Travel time  =    0.69 min.
Time of concentration =    9.24 min.
Critical depth =      0.186(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.700
Decimal fraction soil group D = 0.300
SCS curve number for soil(AMC 2)  = 80.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.235(In/Hr)
Max Catchment Loss (Fm) =     0.235(In/Hr)
Rainfall intensity =      4.351(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
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rational method)(Q=KCIA) is C = 0.852
Subarea runoff =     16.421(CFS) for    4.500(Ac.)
Total runoff =     21.867(CFS)       Total area =        5.90(Ac.)
Area averaged Fm value =    0.233(In/Hr)
Depth of flow =   0.126(Ft.), Average velocity =   5.721(Ft/s)
Critical depth =      0.254(Ft.)


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Process from Point/Station      112.000 to Point/Station      113.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1395.000(Ft.)
Downstream point elevation =  1175.000(Ft.)
Channel length thru subarea  =   811.000(Ft.)
Channel base width     =   30.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     48.764(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     48.764(CFS)
Depth of flow =   0.242(Ft.), Average velocity =   6.562(Ft/s)
Channel flow top width =   31.451(Ft.)
Flow Velocity =    6.56(Ft/s)
Travel time  =    2.06 min.
Time of concentration =   11.30 min.
Critical depth =      0.430(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.950
SCS curve number for soil(AMC 2)  = 83.75
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.203(In/Hr)
Max Catchment Loss (Fm) =     0.203(In/Hr)
Rainfall intensity =      3.877(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.851
Subarea runoff =     53.706(CFS) for   17.000(Ac.)
Total runoff =     75.573(CFS)       Total area =       22.90(Ac.)
Area averaged Fm value =    0.210(In/Hr)
Depth of flow =   0.314(Ft.), Average velocity =   7.774(Ft/s)
Critical depth =      0.570(Ft.)


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Process from Point/Station      113.000 to Point/Station      114.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1175.000(Ft.)
Downstream point elevation =  1110.000(Ft.)
Channel length thru subarea  =   543.000(Ft.)
Channel base width     =   30.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    115.590(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    115.590(CFS)
Depth of flow =   0.516(Ft.), Average velocity =   7.097(Ft/s)
Channel flow top width =   33.097(Ft.)
Flow Velocity =    7.10(Ft/s)
Travel time  =    1.28 min.
Time of concentration =   12.58 min.
Critical depth =      0.750(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.500
```

```
SCS curve number for soil(AMC 2)  = 81.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.225(In/Hr)
Max Catchment Loss (Fm) =     0.225(In/Hr)
Rainfall intensity =      3.647(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.846
Subarea runoff =     79.942(CFS) for   27.500(Ac.)
Total runoff =    155.515(CFS)       Total area =       50.40(Ac.)
Area averaged Fm value =    0.218(In/Hr)
Depth of flow =   0.616(Ft.), Average velocity =   7.932(Ft/s)
Critical depth =      0.914(Ft.)


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Process from Point/Station      114.000 to Point/Station      115.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1110.000(Ft.)
Downstream point elevation =  1000.000(Ft.)
Channel length thru subarea  =  1355.000(Ft.)
Channel base width     =   30.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    210.985(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    210.985(CFS)
Depth of flow =   0.827(Ft.), Average velocity =   7.853(Ft/s)
Channel flow top width =   34.963(Ft.)
Flow Velocity =    7.85(Ft/s)
Travel time  =    2.88 min.
Time of concentration =   15.45 min.
Critical depth =      1.109(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.400
SCS curve number for soil(AMC 2)  = 81.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.230(In/Hr)
Max Catchment Loss (Fm) =     0.230(In/Hr)
Rainfall intensity =      3.241(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.838
Subarea runoff =    110.854(CFS) for   47.700(Ac.)
Total runoff =    266.369(CFS)       Total area =       98.10(Ac.)
Area averaged Fm value =    0.224(In/Hr)
Depth of flow =   0.949(Ft.), Average velocity =   8.546(Ft/s)
Critical depth =      1.281(Ft.)


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Process from Point/Station      115.000 to Point/Station      116.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1000.000(Ft.)
Downstream point elevation =   950.000(Ft.)
Channel length thru subarea  =   750.000(Ft.)
Channel base width     =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    319.926(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    319.926(CFS)
Depth of flow =   0.834(Ft.), Average velocity =   7.302(Ft/s)
Channel flow top width =   55.007(Ft.)
Flow Velocity =    7.30(Ft/s)
Travel time  =    1.71 min.
Time of concentration =   17.17 min.
Critical depth =      1.063(Ft.)
 Adding area flow to channel
```

```
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.900
Decimal fraction soil group D = 0.100
SCS curve number for soil(AMC 2)  = 79.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.245(In/Hr)
Max Catchment Loss (Fm) =     0.245(In/Hr)
Rainfall intensity =      3.052(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.832
Subarea runoff =    107.058(CFS) for   49.000(Ac.)
Total runoff =    373.426(CFS)       Total area =      147.10(Ac.)
Area averaged Fm value =    0.231(In/Hr)
Depth of flow =   0.915(Ft.), Average velocity =   7.740(Ft/s)
Critical depth =      1.172(Ft.)


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Process from Point/Station      115.000 to Point/Station      116.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =    147.100(Ac.)
Runoff from this stream =    373.426(CFS)
Time of concentration =   17.17 min.
Rainfall intensity =     3.052(In/Hr)
Area averaged loss rate (Fm) =    0.2310(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1    247.60   443.069     29.92    0.231      2.220
2    147.10   373.426     17.17    0.231      3.052
Qmax(1) =
          1.000 *    1.000 *   443.069) +
          0.705 *    1.000 *   373.426) + =     706.343
Qmax(2) =
          1.418 *    0.574 *   443.069) +
          1.000 *    1.000 *   373.426) + =     734.010

Total of 2 main streams to confluence:
Flow rates before confluence point:
     444.069     374.426
Maximum flow rates at confluence using above data:
      706.343      734.010
Area of streams before confluence:
      247.600      147.100
Effective area values after confluence:
      394.700      289.158


Results of confluence:
Total flow rate =    734.010(CFS)
Time of concentration =    17.167 min.
Effective stream area after confluence  =    289.158(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.231(In/Hr)
Study area total =     394.70(Ac.)


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Process from Point/Station      116.000 to Point/Station      117.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   950.000(Ft.)
Downstream point elevation =   700.000(Ft.)
Channel length thru subarea  =  5095.000(Ft.)
Channel base width     =   90.000(Ft.)
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Slope or 'Z' of left channel bank =   5.000
Slope or 'Z' of right channel bank =   5.000
Estimated mean flow rate at midpoint of channel =    801.567(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    801.567(CFS)
Depth of flow =   1.111(Ft.), Average velocity =   7.547(Ft/s)
Channel flow top width =  101.114(Ft.)
Flow Velocity =    7.55(Ft/s)
Travel time  =   11.25 min.
Time of concentration =   28.42 min.
Critical depth =      1.313(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.500
SCS curve number for soil(AMC 2)  = 81.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.225(In/Hr)
Max Catchment Loss (Fm) =     0.225(In/Hr)
Rainfall intensity =      2.286(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.810
Subarea runoff =    135.045(CFS) for  180.200(Ac.)
Total runoff =    869.054(CFS)       Total area =      469.36(Ac.)
Area averaged Fm value =    0.229(In/Hr)
Depth of flow =   1.166(Ft.), Average velocity =   7.778(Ft/s)
Critical depth =      1.391(Ft.)


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Process from Point/Station      117.000 to Point/Station      118.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   700.000(Ft.)
Downstream point elevation =   570.000(Ft.)
Channel length thru subarea  =  3345.000(Ft.)
Channel base width     =  110.000(Ft.)
Slope or 'Z' of left channel bank =   5.000
Slope or 'Z' of right channel bank =   5.000
Estimated mean flow rate at midpoint of channel =    871.720(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    871.720(CFS)
Depth of flow =   1.114(Ft.), Average velocity =   6.771(Ft/s)
Channel flow top width =  121.139(Ft.)
Flow Velocity =    6.77(Ft/s)
Travel time  =    8.23 min.
Time of concentration =   36.65 min.
Critical depth =      1.219(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.100
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.500
SCS curve number for soil(AMC 2)  = 80.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.230(In/Hr)
Max Catchment Loss (Fm) =     0.230(In/Hr)
Rainfall intensity =      1.976(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.796
Subarea runoff =      5.233(CFS) for   86.700(Ac.)
Total runoff =    874.287(CFS)       Total area =      556.06(Ac.)
Area averaged Fm value =    0.229(In/Hr)
Depth of flow =   1.116(Ft.), Average velocity =   6.779(Ft/s)
Critical depth =      1.234(Ft.)
End of computations, total study area =          661.60 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.
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Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number (AMC 2) =  81.0
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                    Orange County Rational Hydrology Program

                (Hydrology Manual Date(s) October 1986 & November 1996)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2004 Version 8.0
        Rational Hydrology Study, Date: 08/03/15  File Name: CieloVistaExWshdARat25.roc
----------------------------------------------------------------------
WATERSHED A
EXISTING CONDITIONS - CREEK A
25-YEAR STORM
BY FUSCOE ENGINEERING
----------------------------------------------------------------------


Program License Serial Number 6049

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 *********   Hydrology Study Control Information **********

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Rational hydrology study storm event year is    25.0

Decimal fraction of study above 2000 ft., 600M  =     0.0000
English Units Used for input data


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Process from Point/Station      101.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =  1640.000(Ft.)
Bottom (of initial area) elevation =  1580.000(Ft.)
Difference in elevation =    60.000(Ft.)
Slope =    0.20000  s(%)=      20.00
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.538 min.
Rainfall intensity =      3.347(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.846
Subarea runoff =      1.133(CFS)
Total initial stream area =        0.400(Ac.)


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Process from Point/Station      102.000 to Point/Station      103.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1580.000(Ft.)
Downstream point elevation =  1490.000(Ft.)
Channel length thru subarea  =   214.000(Ft.)
Channel base width     =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      2.501(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =      2.501(CFS)
Depth of flow =   0.026(Ft.), Average velocity =   1.894(Ft/s)
Channel flow top width =   50.158(Ft.)
Flow Velocity =    1.89(Ft/s)
Travel time  =    1.88 min.
Time of concentration =   11.42 min.
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Critical depth =      0.042(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Rainfall intensity =      3.022(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.840
Subarea runoff =      2.677(CFS) for    1.100(Ac.)
Total runoff =      3.810(CFS)       Total area =        1.50(Ac.)
Area averaged Fm value =    0.200(In/Hr)
Depth of flow =   0.034(Ft.), Average velocity =   2.241(Ft/s)
Critical depth =      0.057(Ft.)


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Process from Point/Station      103.000 to Point/Station      104.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1490.000(Ft.)
Downstream point elevation =  1425.000(Ft.)
Channel length thru subarea  =   217.000(Ft.)
Channel base width     =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      9.208(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =      9.208(CFS)
Depth of flow =   0.064(Ft.), Average velocity =   2.877(Ft/s)
Channel flow top width =   50.383(Ft.)
Flow Velocity =    2.88(Ft/s)
Travel time  =    1.26 min.
Time of concentration =   12.68 min.
Critical depth =      0.102(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Rainfall intensity =      2.849(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.837
Subarea runoff =     10.732(CFS) for    4.600(Ac.)
Total runoff =     14.542(CFS)       Total area =        6.10(Ac.)
Area averaged Fm value =    0.200(In/Hr)
Depth of flow =   0.084(Ft.), Average velocity =   3.450(Ft/s)
Critical depth =      0.137(Ft.)


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Process from Point/Station      104.000 to Point/Station      105.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1425.000(Ft.)
Downstream point elevation =  1310.000(Ft.)
Channel length thru subarea  =   882.000(Ft.)
Channel base width     =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     22.380(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     22.380(CFS)
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Depth of flow =   0.139(Ft.), Average velocity =   3.185(Ft/s)
Channel flow top width =   50.836(Ft.)
Flow Velocity =    3.19(Ft/s)
Travel time  =    4.61 min.
Time of concentration =   17.29 min.
Critical depth =      0.184(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Rainfall intensity =      2.390(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.825
Subarea runoff =     15.612(CFS) for    9.200(Ac.)
Total runoff =     30.154(CFS)        Total area =       15.30(Ac.)
Area averaged Fm value =    0.200(In/Hr)
Depth of flow =   0.167(Ft.), Average velocity =   3.584(Ft/s)
Critical depth =      0.223(Ft.)


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Process from Point/Station      105.000 to Point/Station      106.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1310.000(Ft.)
Downstream point elevation =  1280.000(Ft.)
Channel length thru subarea  =   387.000(Ft.)
Channel base width    =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     63.814(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     63.814(CFS)
Depth of flow =   0.305(Ft.), Average velocity =   4.111(Ft/s)
Channel flow top width =   51.829(Ft.)
Flow Velocity =    4.11(Ft/s)
Travel time  =    1.57 min.
Time of concentration =   18.86 min.
Critical depth =      0.367(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.400
SCS curve number for soil(AMC 2)  = 81.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.230(In/Hr)
Max Catchment Loss (Fm) =     0.230(In/Hr)
Rainfall intensity =      2.275(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.812
Subarea runoff =     67.263(CFS) for   37.400(Ac.)
Total runoff =     97.418(CFS)        Total area =       52.70(Ac.)
Area averaged Fm value =    0.221(In/Hr)
Depth of flow =   0.393(Ft.), Average velocity =   4.848(Ft/s)
Critical depth =      0.484(Ft.)


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Process from Point/Station      106.000 to Point/Station      107.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1280.000(Ft.)
Downstream point elevation =  1130.000(Ft.)
Channel length thru subarea  =  1775.000(Ft.)
Channel base width    =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
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Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    156.626(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    156.626(CFS)
Depth of flow =   0.508(Ft.), Average velocity =   5.983(Ft/s)
Channel flow top width =   53.049(Ft.)
Flow Velocity =    5.98(Ft/s)
Travel time  =    4.94 min.
Time of concentration =   23.81 min.
Critical depth =      0.664(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.850
Decimal fraction soil group D = 0.150
SCS curve number for soil(AMC 2)  = 79.75
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.242(In/Hr)
Max Catchment Loss (Fm) =     0.242(In/Hr)
Rainfall intensity =      1.994(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.794
Subarea runoff =    118.324(CFS) for   83.500(Ac.)
Total runoff =    215.741(CFS)       Total area =      136.20(Ac.)
Area averaged Fm value =    0.234(In/Hr)
Depth of flow =   0.615(Ft.), Average velocity =   6.766(Ft/s)
Critical depth =      0.820(Ft.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1130.000(Ft.)
Downstream point elevation =  1030.000(Ft.)
Channel length thru subarea  =  1615.000(Ft.)
Channel base width    =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    256.454(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    256.454(CFS)
Depth of flow =   0.748(Ft.), Average velocity =   6.564(Ft/s)
Channel flow top width =   54.487(Ft.)
Flow Velocity =    6.56(Ft/s)
Travel time  =    4.10 min.
Time of concentration =   27.91 min.
Critical depth =      0.922(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.500
SCS curve number for soil(AMC 2)  = 81.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.225(In/Hr)
Max Catchment Loss (Fm) =     0.225(In/Hr)
Rainfall intensity =      1.823(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.786
Subarea runoff =     81.352(CFS) for   71.200(Ac.)
Total runoff =    297.094(CFS)       Total area =      207.40(Ac.)
Area averaged Fm value =    0.231(In/Hr)
Depth of flow =   0.816(Ft.), Average velocity =   6.940(Ft/s)
Critical depth =      1.016(Ft.)


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Process from Point/Station      108.000 to Point/Station      116.000
**** IMPROVED CHANNEL TRAVEL TIME ****
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Upstream point elevation =  1030.000(Ft.)
Downstream point elevation =   950.000(Ft.)
Channel length thru subarea  =  1655.000(Ft.)
Channel base width     =   60.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    309.417(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    309.417(CFS)
Depth of flow =   0.809(Ft.), Average velocity =   6.128(Ft/s)
Channel flow top width =   64.853(Ft.)
Flow Velocity =    6.13(Ft/s)
Travel time  =    4.50 min.
Time of concentration =   32.41 min.
Critical depth =      0.922(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.650
Decimal fraction soil group D = 0.350
SCS curve number for soil(AMC 2)  = 80.75
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.232(In/Hr)
Max Catchment Loss (Fm) =     0.232(In/Hr)
Rainfall intensity =      1.675(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.776
Subarea runoff =     24.572(CFS) for   40.200(Ac.)
Total runoff =    321.666(CFS)       Total area =      247.60(Ac.)
Area averaged Fm value =    0.231(In/Hr)
Depth of flow =   0.828(Ft.), Average velocity =   6.219(Ft/s)
Critical depth =      0.953(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      116.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =    247.600(Ac.)
Runoff from this stream =    321.666(CFS)
Time of concentration =   32.41 min.
Rainfall intensity =     1.675(In/Hr)
Area averaged loss rate (Fm) =    0.2313(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      110.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 79.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.250(In/Hr)
Max Catchment Loss (Fm) =     0.250(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =  1680.000(Ft.)
Bottom (of initial area) elevation =  1550.000(Ft.)
Difference in elevation =   130.000(Ft.)
Slope =    0.43333  s(%)=      43.33
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.171 min.
Rainfall intensity =      3.653(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.838
Subarea runoff =      1.225(CFS)
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Total initial stream area =        0.400(Ac.)

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Process from Point/Station      110.000 to Point/Station      111.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1550.000(Ft.)
Downstream point elevation =  1490.000(Ft.)
Channel length thru subarea  =    75.000(Ft.)
Channel base width     =   30.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      2.756(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =      2.756(CFS)
Depth of flow =   0.031(Ft.), Average velocity =   2.927(Ft/s)
Channel flow top width =   30.188(Ft.)
Flow Velocity =    2.93(Ft/s)
Travel time  =    0.43 min.
Time of concentration =    8.60 min.
Critical depth =      0.063(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.700
SCS curve number for soil(AMC 2)  = 82.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.215(In/Hr)
Max Catchment Loss (Fm) =     0.215(In/Hr)
Rainfall intensity =      3.549(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.843
Subarea runoff =      2.963(CFS) for    1.000(Ac.)
Total runoff =      4.188(CFS)       Total area =        1.40(Ac.)
Area averaged Fm value =    0.225(In/Hr)
Depth of flow =   0.040(Ft.), Average velocity =   3.457(Ft/s)
Critical depth =      0.084(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      112.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1490.000(Ft.)
Downstream point elevation =  1395.000(Ft.)
Channel length thru subarea  =   196.000(Ft.)
Channel base width     =   30.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     10.487(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     10.487(CFS)
Depth of flow =   0.081(Ft.), Average velocity =   4.279(Ft/s)
Channel flow top width =   30.486(Ft.)
Flow Velocity =    4.28(Ft/s)
Travel time  =    0.76 min.
Time of concentration =    9.36 min.
Critical depth =      0.154(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.700
Decimal fraction soil group D = 0.300
SCS curve number for soil(AMC 2)  = 80.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.235(In/Hr)
Max Catchment Loss (Fm) =     0.235(In/Hr)
Rainfall intensity =      3.382(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
```

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rational method)(Q=KCIA) is C = 0.838
Subarea runoff =     12.536(CFS) for    4.500(Ac.)
Total runoff =     16.725(CFS)       Total area =        5.90(Ac.)
Area averaged Fm value =    0.233(In/Hr)
Depth of flow =   0.107(Ft.), Average velocity =   5.147(Ft/s)
Critical depth =      0.211(Ft.)


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Process from Point/Station      112.000 to Point/Station      113.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1395.000(Ft.)
Downstream point elevation =  1175.000(Ft.)
Channel length thru subarea  =   811.000(Ft.)
Channel base width     =   30.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     37.023(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     37.023(CFS)
Depth of flow =   0.205(Ft.), Average velocity =   5.895(Ft/s)
Channel flow top width =   31.231(Ft.)
Flow Velocity =    5.90(Ft/s)
Travel time  =    2.29 min.
Time of concentration =   11.65 min.
Critical depth =      0.359(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.950
SCS curve number for soil(AMC 2)  = 83.75
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.203(In/Hr)
Max Catchment Loss (Fm) =     0.203(In/Hr)
Rainfall intensity =      2.988(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.837
Subarea runoff =     40.522(CFS) for   17.000(Ac.)
Total runoff =     57.247(CFS)       Total area =       22.90(Ac.)
Area averaged Fm value =    0.210(In/Hr)
Depth of flow =   0.266(Ft.), Average velocity =   6.983(Ft/s)
Critical depth =      0.477(Ft.)


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Process from Point/Station      113.000 to Point/Station      114.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1175.000(Ft.)
Downstream point elevation =  1110.000(Ft.)
Channel length thru subarea  =   543.000(Ft.)
Channel base width     =   30.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     87.210(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     87.210(CFS)
Depth of flow =   0.437(Ft.), Average velocity =   6.380(Ft/s)
Channel flow top width =   32.620(Ft.)
Flow Velocity =    6.38(Ft/s)
Travel time  =    1.42 min.
Time of concentration =   13.07 min.
Critical depth =      0.625(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.500
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SCS curve number for soil(AMC 2)  = 81.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.225(In/Hr)
Max Catchment Loss (Fm) =     0.225(In/Hr)
Rainfall intensity =      2.800(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.830
Subarea runoff =     59.851(CFS) for   27.500(Ac.)
Total runoff =    117.097(CFS)       Total area =       50.40(Ac.)
Area averaged Fm value =    0.218(In/Hr)
Depth of flow =   0.520(Ft.), Average velocity =   7.132(Ft/s)
Critical depth =      0.758(Ft.)


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Process from Point/Station      114.000 to Point/Station      115.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1110.000(Ft.)
Downstream point elevation =  1000.000(Ft.)
Channel length thru subarea  =  1355.000(Ft.)
Channel base width     =   30.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    157.892(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    157.892(CFS)
Depth of flow =   0.697(Ft.), Average velocity =   7.060(Ft/s)
Channel flow top width =   34.181(Ft.)
Flow Velocity =    7.06(Ft/s)
Travel time  =    3.20 min.
Time of concentration =   16.27 min.
Critical depth =      0.922(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.400
SCS curve number for soil(AMC 2)  = 81.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.230(In/Hr)
Max Catchment Loss (Fm) =     0.230(In/Hr)
Rainfall intensity =      2.474(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.819
Subarea runoff =     81.519(CFS) for   47.700(Ac.)
Total runoff =    198.616(CFS)       Total area =       98.10(Ac.)
Area averaged Fm value =    0.224(In/Hr)
Depth of flow =   0.798(Ft.), Average velocity =   7.682(Ft/s)
Critical depth =      1.063(Ft.)


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Process from Point/Station      115.000 to Point/Station      116.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1000.000(Ft.)
Downstream point elevation =   950.000(Ft.)
Channel length thru subarea  =   750.000(Ft.)
Channel base width     =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    237.805(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    237.805(CFS)
Depth of flow =   0.699(Ft.), Average velocity =   6.526(Ft/s)
Channel flow top width =   54.197(Ft.)
Flow Velocity =    6.53(Ft/s)
Travel time  =    1.92 min.
Time of concentration =   18.19 min.
Critical depth =      0.875(Ft.)
 Adding area flow to channel
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UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.900
Decimal fraction soil group D = 0.100
SCS curve number for soil(AMC 2)  = 79.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.245(In/Hr)
Max Catchment Loss (Fm) =     0.245(In/Hr)
Rainfall intensity =      2.323(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.810
Subarea runoff =     78.289(CFS) for   49.000(Ac.)
Total runoff =    276.905(CFS)       Total area =      147.10(Ac.)
Area averaged Fm value =    0.231(In/Hr)
Depth of flow =   0.766(Ft.), Average velocity =   6.914(Ft/s)
Critical depth =      0.969(Ft.)


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Process from Point/Station      115.000 to Point/Station      116.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =    147.100(Ac.)
Runoff from this stream =    276.905(CFS)
Time of concentration =   18.19 min.
Rainfall intensity =     2.323(In/Hr)
Area averaged loss rate (Fm) =    0.2310(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1    247.60   321.666     32.41    0.231      1.675
2    147.10   276.905     18.19    0.231      2.323
Qmax(1) =
          1.000 *    1.000 *   321.666) +
          0.690 *    1.000 *   276.905) + =     512.813
Qmax(2) =
          1.449 *    0.561 *   321.666) +
          1.000 *    1.000 *   276.905) + =     538.427

Total of 2 main streams to confluence:
Flow rates before confluence point:
     322.666     277.905
Maximum flow rates at confluence using above data:
      512.813      538.427
Area of streams before confluence:
      247.600      147.100
Effective area values after confluence:
      394.700      286.051


Results of confluence:
Total flow rate =    538.427(CFS)
Time of concentration =    18.187 min.
Effective stream area after confluence  =    286.051(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.231(In/Hr)
Study area total =     394.70(Ac.)


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Process from Point/Station      116.000 to Point/Station      117.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   950.000(Ft.)
Downstream point elevation =   700.000(Ft.)
Channel length thru subarea  =  5095.000(Ft.)
Channel base width     =   90.000(Ft.)
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Slope or 'Z' of left channel bank =   5.000
Slope or 'Z' of right channel bank =   5.000
Estimated mean flow rate at midpoint of channel =    582.425(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    582.425(CFS)
Depth of flow =   0.920(Ft.), Average velocity =   6.694(Ft/s)
Channel flow top width =   99.197(Ft.)
Flow Velocity =    6.69(Ft/s)
Travel time  =   12.69 min.
Time of concentration =   30.87 min.
Critical depth =      1.070(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.500
SCS curve number for soil(AMC 2)  = 81.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.225(In/Hr)
Max Catchment Loss (Fm) =     0.225(In/Hr)
Rainfall intensity =      1.721(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.780
Subarea runoff =     87.938(CFS) for  180.200(Ac.)
Total runoff =    626.365(CFS)       Total area =      466.25(Ac.)
Area averaged Fm value =    0.229(In/Hr)
Depth of flow =   0.960(Ft.), Average velocity =   6.880(Ft/s)
Critical depth =      1.125(Ft.)


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Process from Point/Station      117.000 to Point/Station      118.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   700.000(Ft.)
Downstream point elevation =   570.000(Ft.)
Channel length thru subarea  =  3345.000(Ft.)
Channel base width     =  110.000(Ft.)
Slope or 'Z' of left channel bank =   5.000
Slope or 'Z' of right channel bank =   5.000
Estimated mean flow rate at midpoint of channel =    626.394(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    626.394(CFS)
Depth of flow =   0.915(Ft.), Average velocity =   5.973(Ft/s)
Channel flow top width =  119.153(Ft.)
Flow Velocity =    5.97(Ft/s)
Travel time  =    9.33 min.
Time of concentration =   40.21 min.
Critical depth =      0.984(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.100
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.500
SCS curve number for soil(AMC 2)  = 80.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.230(In/Hr)
Max Catchment Loss (Fm) =     0.230(In/Hr)
The area added to the existing stream with this TC
does not add flow per Para 6b, Page D-15 of the OCHM,
therefore the upstream flow rate of Q =    626.365(CFS) is being used
Rainfall intensity =      1.482(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.761
Subarea runoff =      0.000(CFS) for   86.700(Ac.)
Total runoff =    626.365(CFS)       Total area =      552.95(Ac.)
Area averaged Fm value =    0.229(In/Hr)
Depth of flow =   0.915(Ft.), Average velocity =   5.973(Ft/s)
Critical depth =      0.984(Ft.)
End of computations, total study area =          661.60 (Ac.)
The following figures may
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be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number (AMC 2) =  81.0
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                    Orange County Rational Hydrology Program

                (Hydrology Manual Date(s) October 1986 & November 1996)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2004 Version 8.0
        Rational Hydrology Study, Date: 08/03/15  File Name: CieloVistaExWshdARat10.roc
----------------------------------------------------------------------
WATERSHED A
EXISTING CONDITIONS - CREEK A
10-YEAR STORM
BY FUSCOE ENGINEERING
----------------------------------------------------------------------


Program License Serial Number 6049

----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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Rational hydrology study storm event year is    10.0

Decimal fraction of study above 2000 ft., 600M  =     0.0000
English Units Used for input data


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =  1640.000(Ft.)
Bottom (of initial area) elevation =  1580.000(Ft.)
Difference in elevation =    60.000(Ft.)
Slope =    0.20000  s(%)=      20.00
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.538 min.
Rainfall intensity =      2.804(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.836
Subarea runoff =      0.937(CFS)
Total initial stream area =        0.400(Ac.)


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Process from Point/Station      102.000 to Point/Station      103.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1580.000(Ft.)
Downstream point elevation =  1490.000(Ft.)
Channel length thru subarea  =   214.000(Ft.)
Channel base width     =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      2.054(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =      2.054(CFS)
Depth of flow =   0.023(Ft.), Average velocity =   1.751(Ft/s)
Channel flow top width =   50.141(Ft.)
Flow Velocity =    1.75(Ft/s)
Travel time  =    2.04 min.
Time of concentration =   11.57 min.
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Critical depth =      0.038(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Rainfall intensity =      2.510(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.828
Subarea runoff =      2.181(CFS) for    1.100(Ac.)
Total runoff =      3.118(CFS)       Total area =        1.50(Ac.)
Area averaged Fm value =    0.200(In/Hr)
Depth of flow =   0.030(Ft.), Average velocity =   2.069(Ft/s)
Critical depth =      0.049(Ft.)


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Process from Point/Station      103.000 to Point/Station      104.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1490.000(Ft.)
Downstream point elevation =  1425.000(Ft.)
Channel length thru subarea  =   217.000(Ft.)
Channel base width     =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      7.501(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =      7.501(CFS)
Depth of flow =   0.056(Ft.), Average velocity =   2.651(Ft/s)
Channel flow top width =   50.338(Ft.)
Flow Velocity =    2.65(Ft/s)
Travel time  =    1.36 min.
Time of concentration =   12.94 min.
Critical depth =      0.089(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Rainfall intensity =      2.354(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.824
Subarea runoff =      8.710(CFS) for    4.600(Ac.)
Total runoff =     11.827(CFS)       Total area =        6.10(Ac.)
Area averaged Fm value =    0.200(In/Hr)
Depth of flow =   0.074(Ft.), Average velocity =   3.178(Ft/s)
Critical depth =      0.120(Ft.)


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Process from Point/Station      104.000 to Point/Station      105.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1425.000(Ft.)
Downstream point elevation =  1310.000(Ft.)
Channel length thru subarea  =   882.000(Ft.)
Channel base width     =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     17.994(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     17.994(CFS)
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Depth of flow =   0.122(Ft.), Average velocity =   2.922(Ft/s)
Channel flow top width =   50.734(Ft.)
Flow Velocity =    2.92(Ft/s)
Travel time  =    5.03 min.
Time of concentration =   17.97 min.
Critical depth =      0.158(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Rainfall intensity =      1.950(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.808
Subarea runoff =     12.276(CFS) for    9.200(Ac.)
Total runoff =     24.103(CFS)        Total area =       15.30(Ac.)
Area averaged Fm value =    0.200(In/Hr)
Depth of flow =   0.146(Ft.), Average velocity =   3.280(Ft/s)
Critical depth =      0.191(Ft.)


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Process from Point/Station      105.000 to Point/Station      106.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1310.000(Ft.)
Downstream point elevation =  1280.000(Ft.)
Channel length thru subarea  =   387.000(Ft.)
Channel base width    =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     50.751(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     50.751(CFS)
Depth of flow =   0.266(Ft.), Average velocity =   3.758(Ft/s)
Channel flow top width =   51.595(Ft.)
Flow Velocity =    3.76(Ft/s)
Travel time  =    1.72 min.
Time of concentration =   19.69 min.
Critical depth =      0.316(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.400
SCS curve number for soil(AMC 2)  = 81.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.230(In/Hr)
Max Catchment Loss (Fm) =     0.230(In/Hr)
Rainfall intensity =      1.851(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.792
Subarea runoff =     53.198(CFS) for   37.400(Ac.)
Total runoff =     77.302(CFS)        Total area =       52.70(Ac.)
Area averaged Fm value =    0.221(In/Hr)
Depth of flow =   0.342(Ft.), Average velocity =   4.430(Ft/s)
Critical depth =      0.414(Ft.)


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Process from Point/Station      106.000 to Point/Station      107.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1280.000(Ft.)
Downstream point elevation =  1130.000(Ft.)
Channel length thru subarea  =  1775.000(Ft.)
Channel base width    =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
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Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    123.008(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    123.008(CFS)
Depth of flow =   0.440(Ft.), Average velocity =   5.449(Ft/s)
Channel flow top width =   52.639(Ft.)
Flow Velocity =    5.45(Ft/s)
Travel time  =    5.43 min.
Time of concentration =   25.12 min.
Critical depth =      0.566(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.850
Decimal fraction soil group D = 0.150
SCS curve number for soil(AMC 2)  = 79.75
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.242(In/Hr)
Max Catchment Loss (Fm) =     0.242(In/Hr)
Rainfall intensity =      1.610(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.769
Subarea runoff =     91.330(CFS) for   83.500(Ac.)
Total runoff =    168.632(CFS)       Total area =      136.20(Ac.)
Area averaged Fm value =    0.234(In/Hr)
Depth of flow =   0.531(Ft.), Average velocity =   6.155(Ft/s)
Critical depth =      0.695(Ft.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1130.000(Ft.)
Downstream point elevation =  1030.000(Ft.)
Channel length thru subarea  =  1615.000(Ft.)
Channel base width    =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    199.463(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    199.463(CFS)
Depth of flow =   0.644(Ft.), Average velocity =   5.965(Ft/s)
Channel flow top width =   53.864(Ft.)
Flow Velocity =    5.96(Ft/s)
Travel time  =    4.51 min.
Time of concentration =   29.63 min.
Critical depth =      0.781(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.500
SCS curve number for soil(AMC 2)  = 81.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.225(In/Hr)
Max Catchment Loss (Fm) =     0.225(In/Hr)
Rainfall intensity =      1.465(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.758
Subarea runoff =     61.601(CFS) for   71.200(Ac.)
Total runoff =    230.233(CFS)       Total area =      207.40(Ac.)
Area averaged Fm value =    0.231(In/Hr)
Depth of flow =   0.701(Ft.), Average velocity =   6.300(Ft/s)
Critical depth =      0.859(Ft.)


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Process from Point/Station      108.000 to Point/Station      116.000
**** IMPROVED CHANNEL TRAVEL TIME ****
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Upstream point elevation =  1030.000(Ft.)
Downstream point elevation =   950.000(Ft.)
Channel length thru subarea  =  1655.000(Ft.)
Channel base width     =   60.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    238.675(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    238.675(CFS)
Depth of flow =   0.693(Ft.), Average velocity =   5.549(Ft/s)
Channel flow top width =   64.157(Ft.)
Flow Velocity =    5.55(Ft/s)
Travel time  =    4.97 min.
Time of concentration =   34.60 min.
Critical depth =      0.781(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.650
Decimal fraction soil group D = 0.350
SCS curve number for soil(AMC 2)  = 80.75
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.232(In/Hr)
Max Catchment Loss (Fm) =     0.232(In/Hr)
Rainfall intensity =      1.340(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.745
Subarea runoff =     16.820(CFS) for   40.200(Ac.)
Total runoff =    247.053(CFS)       Total area =      247.60(Ac.)
Area averaged Fm value =    0.231(In/Hr)
Depth of flow =   0.707(Ft.), Average velocity =   5.623(Ft/s)
Critical depth =      0.797(Ft.)


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Process from Point/Station      108.000 to Point/Station      116.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =    247.600(Ac.)
Runoff from this stream =    247.053(CFS)
Time of concentration =   34.60 min.
Rainfall intensity =     1.340(In/Hr)
Area averaged loss rate (Fm) =    0.2313(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Program is now starting with Main Stream No. 2


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Process from Point/Station      109.000 to Point/Station      110.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 79.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.250(In/Hr)
Max Catchment Loss (Fm) =     0.250(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =  1680.000(Ft.)
Bottom (of initial area) elevation =  1550.000(Ft.)
Difference in elevation =   130.000(Ft.)
Slope =    0.43333  s(%)=      43.33
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.171 min.
Rainfall intensity =      3.064(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.827
Subarea runoff =      1.013(CFS)
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Total initial stream area =        0.400(Ac.)

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Process from Point/Station      110.000 to Point/Station      111.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1550.000(Ft.)
Downstream point elevation =  1490.000(Ft.)
Channel length thru subarea  =    75.000(Ft.)
Channel base width     =   30.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      2.279(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =      2.279(CFS)
Depth of flow =   0.028(Ft.), Average velocity =   2.713(Ft/s)
Channel flow top width =   30.168(Ft.)
Flow Velocity =    2.71(Ft/s)
Travel time  =    0.46 min.
Time of concentration =    8.63 min.
Critical depth =      0.057(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.700
SCS curve number for soil(AMC 2)  = 82.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.215(In/Hr)
Max Catchment Loss (Fm) =     0.215(In/Hr)
Rainfall intensity =      2.969(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.832
Subarea runoff =      2.444(CFS) for    1.000(Ac.)
Total runoff =      3.457(CFS)       Total area =        1.40(Ac.)
Area averaged Fm value =    0.225(In/Hr)
Depth of flow =   0.036(Ft.), Average velocity =   3.203(Ft/s)
Critical depth =      0.074(Ft.)


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Process from Point/Station      111.000 to Point/Station      112.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1490.000(Ft.)
Downstream point elevation =  1395.000(Ft.)
Channel length thru subarea  =   196.000(Ft.)
Channel base width     =   30.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      8.619(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =      8.619(CFS)
Depth of flow =   0.072(Ft.), Average velocity =   3.959(Ft/s)
Channel flow top width =   30.432(Ft.)
Flow Velocity =    3.96(Ft/s)
Travel time  =    0.83 min.
Time of concentration =    9.46 min.
Critical depth =      0.137(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.700
Decimal fraction soil group D = 0.300
SCS curve number for soil(AMC 2)  = 80.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.235(In/Hr)
Max Catchment Loss (Fm) =     0.235(In/Hr)
Rainfall intensity =      2.818(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
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rational method)(Q=KCIA) is C = 0.826
Subarea runoff =     10.269(CFS) for    4.500(Ac.)
Total runoff =     13.726(CFS)       Total area =        5.90(Ac.)
Area averaged Fm value =    0.233(In/Hr)
Depth of flow =   0.095(Ft.), Average velocity =   4.760(Ft/s)
Critical depth =      0.186(Ft.)


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Process from Point/Station      112.000 to Point/Station      113.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1395.000(Ft.)
Downstream point elevation =  1175.000(Ft.)
Channel length thru subarea  =   811.000(Ft.)
Channel base width     =   30.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     30.131(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     30.131(CFS)
Depth of flow =   0.181(Ft.), Average velocity =   5.439(Ft/s)
Channel flow top width =   31.088(Ft.)
Flow Velocity =    5.44(Ft/s)
Travel time  =    2.49 min.
Time of concentration =   11.94 min.
Critical depth =      0.313(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.950
SCS curve number for soil(AMC 2)  = 83.75
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.203(In/Hr)
Max Catchment Loss (Fm) =     0.203(In/Hr)
Rainfall intensity =      2.465(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.823
Subarea runoff =     32.744(CFS) for   17.000(Ac.)
Total runoff =     46.470(CFS)       Total area =       22.90(Ac.)
Area averaged Fm value =    0.210(In/Hr)
Depth of flow =   0.235(Ft.), Average velocity =   6.441(Ft/s)
Critical depth =      0.414(Ft.)


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Process from Point/Station      113.000 to Point/Station      114.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1175.000(Ft.)
Downstream point elevation =  1110.000(Ft.)
Channel length thru subarea  =   543.000(Ft.)
Channel base width     =   30.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =     70.474(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     70.474(CFS)
Depth of flow =   0.385(Ft.), Average velocity =   5.882(Ft/s)
Channel flow top width =   32.307(Ft.)
Flow Velocity =    5.88(Ft/s)
Travel time  =    1.54 min.
Time of concentration =   13.48 min.
Critical depth =      0.547(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.500
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SCS curve number for soil(AMC 2)  = 81.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.225(In/Hr)
Max Catchment Loss (Fm) =     0.225(In/Hr)
Rainfall intensity =      2.300(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.815
Subarea runoff =     47.939(CFS) for   27.500(Ac.)
Total runoff =     94.409(CFS)       Total area =       50.40(Ac.)
Area averaged Fm value =    0.218(In/Hr)
Depth of flow =   0.458(Ft.), Average velocity =   6.575(Ft/s)
Critical depth =      0.656(Ft.)


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Process from Point/Station      114.000 to Point/Station      115.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1110.000(Ft.)
Downstream point elevation =  1000.000(Ft.)
Channel length thru subarea  =  1355.000(Ft.)
Channel base width    =   30.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    126.365(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    126.365(CFS)
Depth of flow =   0.611(Ft.), Average velocity =   6.500(Ft/s)
Channel flow top width =   33.665(Ft.)
Flow Velocity =    6.50(Ft/s)
Travel time  =    3.47 min.
Time of concentration =   16.96 min.
Critical depth =      0.797(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.400
SCS curve number for soil(AMC 2)  = 81.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.230(In/Hr)
Max Catchment Loss (Fm) =     0.230(In/Hr)
Rainfall intensity =      2.016(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.800
Subarea runoff =     63.849(CFS) for   47.700(Ac.)
Total runoff =    158.258(CFS)       Total area =       98.10(Ac.)
Area averaged Fm value =    0.224(In/Hr)
Depth of flow =   0.698(Ft.), Average velocity =   7.066(Ft/s)
Critical depth =      0.922(Ft.)


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Process from Point/Station      115.000 to Point/Station      116.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1000.000(Ft.)
Downstream point elevation =   950.000(Ft.)
Channel length thru subarea  =   750.000(Ft.)
Channel base width    =   50.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =    188.750(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    188.750(CFS)
Depth of flow =   0.610(Ft.), Average velocity =   5.975(Ft/s)
Channel flow top width =   53.657(Ft.)
Flow Velocity =    5.97(Ft/s)
Travel time  =    2.09 min.
Time of concentration =   19.05 min.
Critical depth =      0.750(Ft.)
 Adding area flow to channel
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UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.900
Decimal fraction soil group D = 0.100
SCS curve number for soil(AMC 2)  = 79.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.245(In/Hr)
Max Catchment Loss (Fm) =     0.245(In/Hr)
Rainfall intensity =      1.886(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.790
Subarea runoff =     60.904(CFS) for   49.000(Ac.)
Total runoff =    219.162(CFS)       Total area =      147.10(Ac.)
Area averaged Fm value =    0.231(In/Hr)
Depth of flow =   0.666(Ft.), Average velocity =   6.326(Ft/s)
Critical depth =      0.828(Ft.)


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Process from Point/Station      115.000 to Point/Station      116.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =    147.100(Ac.)
Runoff from this stream =    219.162(CFS)
Time of concentration =   19.05 min.
Rainfall intensity =     1.886(In/Hr)
Area averaged loss rate (Fm) =    0.2310(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1    247.60   247.053     34.60    0.231      1.340
2    147.10   219.162     19.05    0.231      1.886
Qmax(1) =
          1.000 *    1.000 *   247.053) +
          0.670 *    1.000 *   219.162) + =     393.873
Qmax(2) =
          1.493 *    0.551 *   247.053) +
          1.000 *    1.000 *   219.162) + =     422.205

Total of 2 main streams to confluence:
Flow rates before confluence point:
     248.053     220.162
Maximum flow rates at confluence using above data:
      393.873      422.205
Area of streams before confluence:
      247.600      147.100
Effective area values after confluence:
      394.700      283.409


Results of confluence:
Total flow rate =    422.205(CFS)
Time of concentration =    19.047 min.
Effective stream area after confluence  =    283.409(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.231(In/Hr)
Study area total =     394.70(Ac.)


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Process from Point/Station      116.000 to Point/Station      117.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   950.000(Ft.)
Downstream point elevation =   700.000(Ft.)
Channel length thru subarea  =  5095.000(Ft.)
Channel base width     =   90.000(Ft.)
```

```
Slope or 'Z' of left channel bank =   5.000
Slope or 'Z' of right channel bank =   5.000
Estimated mean flow rate at midpoint of channel =    450.507(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    450.507(CFS)
Depth of flow =   0.790(Ft.), Average velocity =   6.073(Ft/s)
Channel flow top width =   97.896(Ft.)
Flow Velocity =    6.07(Ft/s)
Travel time  =   13.98 min.
Time of concentration =   33.03 min.
Critical depth =      0.906(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.500
SCS curve number for soil(AMC 2)  = 81.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.225(In/Hr)
Max Catchment Loss (Fm) =     0.225(In/Hr)
Rainfall intensity =      1.376(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.750
Subarea runoff =     56.511(CFS) for  180.200(Ac.)
Total runoff =    478.715(CFS)        Total area =      463.61(Ac.)
Area averaged Fm value =    0.229(In/Hr)
Depth of flow =   0.819(Ft.), Average velocity =   6.215(Ft/s)
Critical depth =      0.938(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      117.000 to Point/Station      118.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   700.000(Ft.)
Downstream point elevation =   570.000(Ft.)
Channel length thru subarea  =  3345.000(Ft.)
Channel base width     =  110.000(Ft.)
Slope or 'Z' of left channel bank =   5.000
Slope or 'Z' of right channel bank =   5.000
Estimated mean flow rate at midpoint of channel =    478.759(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =    478.759(CFS)
Depth of flow =   0.780(Ft.), Average velocity =   5.389(Ft/s)
Channel flow top width =  117.800(Ft.)
Flow Velocity =    5.39(Ft/s)
Travel time  =   10.35 min.
Time of concentration =   43.37 min.
Critical depth =      0.828(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.100
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.500
SCS curve number for soil(AMC 2)  = 80.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.230(In/Hr)
Max Catchment Loss (Fm) =     0.230(In/Hr)
The area added to the existing stream with this TC
does not add flow per Para 6b, Page D-15 of the OCHM,
therefore the upstream flow rate of Q =    478.715(CFS) is being used
Rainfall intensity =      1.177(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.725
Subarea runoff =      0.000(CFS) for   86.700(Ac.)
Total runoff =    478.715(CFS)        Total area =      550.31(Ac.)
Area averaged Fm value =    0.229(In/Hr)
Depth of flow =   0.780(Ft.), Average velocity =   5.389(Ft/s)
Critical depth =      0.828(Ft.)
End of computations, total study area =          661.60 (Ac.)
The following figures may
```

```
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number (AMC 2) =  81.0
```

Creek "A"
Existing Unit Hydrograph Calculations
10, 25 & 100-Year Storms

U n i t H y d r o g r a p h A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989-2004, Version 7.0

Study date 08/03/15 File Name CieloVistaExWshdAUH.out

++

Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6049

WATERSHED A
EXISTING CONDITIONS - CREEK A
100-YEAR STORM
BY FUSCOE ENGINEERING

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
82.0	0.2	0.00	B	0.300	1.000	0.300
72.0	0.2	0.00	B	0.300	1.000	0.300
79.0	365.1	0.55	C	0.250	1.000	0.250
84.0	264.3	0.40	D	0.200	1.000	0.200
82.0	2.5	0.00	B	0.300	1.000	0.300
72.0	2.5	0.00	B	0.300	1.000	0.300
79.0	3.7	0.01	C	0.250	1.000	0.250
84.0	23.1	0.03	D	0.200	1.000	0.200

Area-averaged adjusted loss rate Fm (In/Hr) = 0.229

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
0.20	0.000	82.0	95.2	0.50	0.900
0.20	0.000	72.0	88.6	1.29	0.770
365.10	0.552	79.0	93.4	0.71	0.864
264.30	0.399	84.0	96.4	0.37	0.925
2.50	0.004	82.0	95.2	0.50	0.900
2.50	0.004	72.0	88.6	1.29	0.770
3.70	0.006	79.0	93.4	0.71	0.864
23.10	0.035	84.0	96.4	0.37	0.925

Area-averaged catchment yield fraction, Y = 0.890
Area-averaged low loss fraction, Yb = 0.110
++
User entry of time of concentration = 0.617 (hours)
Watershed area = 661.60(Ac.)
Catchment Lag time = 0.493 hours

```
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 16.8937
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.229(In/Hr)
Average low loss rate fraction (Yb) = 0.110 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall =  0.520(In)
Computed peak 30-minute rainfall =  1.090(In)
Specified peak 1-hour rainfall =  1.450(In)
Computed peak 3-hour rainfall =  2.430(In)
Specified peak 6-hour rainfall =  3.360(In)
Specified peak 24-hour rainfall =  5.630(In)


Rainfall depth area reduction factors:
Using a total area of     661.60(Ac.) (Ref: fig. E-4)

5-minute factor = 0.969     Adjusted rainfall =  0.504(In)
30-minute factor = 0.969    Adjusted rainfall =  1.056(In)
1-hour factor = 0.969       Adjusted rainfall =  1.405(In)
3-hour factor = 0.996       Adjusted rainfall =  2.420(In)
6-hour factor = 0.998       Adjusted rainfall =  3.353(In)
24-hour factor = 0.999 Adjusted rainfall =  5.625(In)
----------------------------------------------------------------------

                      U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
----------------------------------------------------------------------
               (K =      8001.23 (CFS))

  1                1.077                  86.146
  2                3.933                 228.564
  3                8.078                 331.619
  4               13.921                 467.504
  5               22.799                 710.399
  6               39.604                1344.595
  7               56.304                1336.209
  8               64.238                 634.773
  9               69.997                 460.799
 10               74.376                 350.360
 11               78.182                 304.557
 12               81.338                 252.537
 13               84.009                 213.663
 14               86.347                 187.113
 15               88.387                 163.191
 16               90.138                 140.103
 17               91.689                 124.130
 18               93.043                 108.341
 19               94.202                  92.724
 20               95.205                  80.229
 21               96.018                  65.063
 22               96.729                  56.854
 23               97.339                  48.846
 24               97.802                  37.039
 25               98.067                  21.183
 26               98.269                  16.220
 27               98.470                  16.042
 28               98.646                  14.066
 29               98.815                  13.517
 30               98.978                  13.078
 31               99.092                   9.073
 32               99.193                   8.110
 33               99.298                   8.376
 34               99.428                  10.395
 35               99.563                  10.814
 36               99.690                  10.181
 37               99.766                   6.127
 38               99.834                   5.407
 39               99.897                   5.035
 40               99.935                   3.009
 41               99.968                   2.703
```

42	100.000	2.529

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5039	0.5039
2	0.6709	0.1670
3	0.7932	0.1223
4	0.8933	0.1001
5	0.9796	0.0863
6	1.0562	0.0766
7	1.1254	0.0692
8	1.1890	0.0636
9	1.2481	0.0591
10	1.3034	0.0553
11	1.3556	0.0522
12	1.4050	0.0494
13	1.4618	0.0568
14	1.5165	0.0546
15	1.5691	0.0527
16	1.6201	0.0509
17	1.6695	0.0494
18	1.7174	0.0479
19	1.7640	0.0466
20	1.8093	0.0454
21	1.8536	0.0442
22	1.8968	0.0432
23	1.9390	0.0422
24	1.9802	0.0413
25	2.0207	0.0404
26	2.0603	0.0396
27	2.0991	0.0389
28	2.1373	0.0381
29	2.1747	0.0375
30	2.2115	0.0368
31	2.2477	0.0362
32	2.2834	0.0356
33	2.3184	0.0351
34	2.3529	0.0345
35	2.3869	0.0340
36	2.4205	0.0335
37	2.4518	0.0314
38	2.4828	0.0309
39	2.5133	0.0305
40	2.5434	0.0301
41	2.5731	0.0297
42	2.6024	0.0293
43	2.6314	0.0290
44	2.6600	0.0286
45	2.6882	0.0283
46	2.7161	0.0279
47	2.7437	0.0276
48	2.7710	0.0273
49	2.7980	0.0270
50	2.8247	0.0267
51	2.8512	0.0264
52	2.8773	0.0262
53	2.9032	0.0259
54	2.9288	0.0256
55	2.9542	0.0254
56	2.9793	0.0251
57	3.0042	0.0249
58	3.0289	0.0247
59	3.0534	0.0244
60	3.0776	0.0242
61	3.1016	0.0240
62	3.1254	0.0238
63	3.1490	0.0236
64	3.1724	0.0234
65	3.1956	0.0232
66	3.2186	0.0230
67	3.2415	0.0228
68	3.2641	0.0227
69	3.2866	0.0225

70	3.3089	0.0223
71	3.3311	0.0221
72	3.3531	0.0220
73	3.3704	0.0173
74	3.3875	0.0172
75	3.4045	0.0170
76	3.4214	0.0169
77	3.4381	0.0167
78	3.4547	0.0166
79	3.4712	0.0165
80	3.4875	0.0163
81	3.5037	0.0162
82	3.5198	0.0161
83	3.5358	0.0160
84	3.5516	0.0158
85	3.5673	0.0157
86	3.5830	0.0156
87	3.5984	0.0155
88	3.6138	0.0154
89	3.6291	0.0153
90	3.6443	0.0152
91	3.6593	0.0151
92	3.6743	0.0150
93	3.6891	0.0149
94	3.7039	0.0148
95	3.7186	0.0147
96	3.7331	0.0146
97	3.7476	0.0145
98	3.7620	0.0144
99	3.7762	0.0143
100	3.7904	0.0142
101	3.8045	0.0141
102	3.8186	0.0140
103	3.8325	0.0139
104	3.8463	0.0138
105	3.8601	0.0138
106	3.8738	0.0137
107	3.8874	0.0136
108	3.9009	0.0135
109	3.9143	0.0134
110	3.9277	0.0134
111	3.9410	0.0133
112	3.9542	0.0132
113	3.9673	0.0131
114	3.9804	0.0131
115	3.9934	0.0130
116	4.0063	0.0129
117	4.0192	0.0129
118	4.0320	0.0128
119	4.0447	0.0127
120	4.0573	0.0127
121	4.0699	0.0126
122	4.0825	0.0125
123	4.0949	0.0125
124	4.1073	0.0124
125	4.1196	0.0123
126	4.1319	0.0123
127	4.1441	0.0122
128	4.1563	0.0121
129	4.1684	0.0121
130	4.1804	0.0120
131	4.1924	0.0120
132	4.2043	0.0119
133	4.2161	0.0119
134	4.2279	0.0118
135	4.2397	0.0117
136	4.2514	0.0117
137	4.2630	0.0116
138	4.2746	0.0116
139	4.2861	0.0115
140	4.2976	0.0115
141	4.3091	0.0114
142	4.3204	0.0114

143	4.3318	0.0113
144	4.3430	0.0113
145	4.3543	0.0112
146	4.3655	0.0112
147	4.3766	0.0111
148	4.3877	0.0111
149	4.3987	0.0110
150	4.4097	0.0110
151	4.4207	0.0109
152	4.4316	0.0109
153	4.4424	0.0109
154	4.4533	0.0108
155	4.4640	0.0108
156	4.4748	0.0107
157	4.4854	0.0107
158	4.4961	0.0106
159	4.5067	0.0106
160	4.5172	0.0106
161	4.5278	0.0105
162	4.5382	0.0105
163	4.5487	0.0104
164	4.5591	0.0104
165	4.5694	0.0104
166	4.5797	0.0103
167	4.5900	0.0103
168	4.6003	0.0102
169	4.6105	0.0102
170	4.6206	0.0102
171	4.6307	0.0101
172	4.6408	0.0101
173	4.6509	0.0101
174	4.6609	0.0100
175	4.6709	0.0100
176	4.6808	0.0099
177	4.6907	0.0099
178	4.7006	0.0099
179	4.7104	0.0098
180	4.7202	0.0098
181	4.7300	0.0098
182	4.7398	0.0097
183	4.7495	0.0097
184	4.7591	0.0097
185	4.7688	0.0096
186	4.7784	0.0096
187	4.7879	0.0096
188	4.7975	0.0095
189	4.8070	0.0095
190	4.8165	0.0095
191	4.8259	0.0094
192	4.8353	0.0094
193	4.8447	0.0094
194	4.8541	0.0094
195	4.8634	0.0093
196	4.8727	0.0093
197	4.8819	0.0093
198	4.8912	0.0092
199	4.9004	0.0092
200	4.9096	0.0092
201	4.9187	0.0091
202	4.9278	0.0091
203	4.9369	0.0091
204	4.9460	0.0091
205	4.9550	0.0090
206	4.9640	0.0090
207	4.9730	0.0090
208	4.9820	0.0090
209	4.9909	0.0089
210	4.9998	0.0089
211	5.0087	0.0089
212	5.0175	0.0088
213	5.0263	0.0088
214	5.0351	0.0088
215	5.0439	0.0088

216	5.0526	0.0087
217	5.0614	0.0087
218	5.0700	0.0087
219	5.0787	0.0087
220	5.0874	0.0086
221	5.0960	0.0086
222	5.1046	0.0086
223	5.1131	0.0086
224	5.1217	0.0085
225	5.1302	0.0085
226	5.1387	0.0085
227	5.1472	0.0085
228	5.1556	0.0085
229	5.1641	0.0084
230	5.1725	0.0084
231	5.1808	0.0084
232	5.1892	0.0084
233	5.1975	0.0083
234	5.2059	0.0083
235	5.2141	0.0083
236	5.2224	0.0083
237	5.2307	0.0082
238	5.2389	0.0082
239	5.2471	0.0082
240	5.2553	0.0082
241	5.2634	0.0082
242	5.2716	0.0081
243	5.2797	0.0081
244	5.2878	0.0081
245	5.2959	0.0081
246	5.3039	0.0081
247	5.3120	0.0080
248	5.3200	0.0080
249	5.3280	0.0080
250	5.3360	0.0080
251	5.3439	0.0080
252	5.3519	0.0079
253	5.3598	0.0079
254	5.3677	0.0079
255	5.3755	0.0079
256	5.3834	0.0079
257	5.3912	0.0078
258	5.3991	0.0078
259	5.4069	0.0078
260	5.4147	0.0078
261	5.4224	0.0078
262	5.4302	0.0077
263	5.4379	0.0077
264	5.4456	0.0077
265	5.4533	0.0077
266	5.4610	0.0077
267	5.4686	0.0077
268	5.4762	0.0076
269	5.4839	0.0076
270	5.4915	0.0076
271	5.4990	0.0076
272	5.5066	0.0076
273	5.5142	0.0075
274	5.5217	0.0075
275	5.5292	0.0075
276	5.5367	0.0075
277	5.5442	0.0075
278	5.5516	0.0075
279	5.5591	0.0074
280	5.5665	0.0074
281	5.5739	0.0074
282	5.5813	0.0074
283	5.5887	0.0074
284	5.5961	0.0074
285	5.6034	0.0073
286	5.6107	0.0073
287	5.6180	0.0073
288	5.6253	0.0073

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0073	0.0008	0.0065
2	0.0073	0.0008	0.0065
3	0.0073	0.0008	0.0065
4	0.0074	0.0008	0.0066
5	0.0074	0.0008	0.0066
6	0.0074	0.0008	0.0066
7	0.0074	0.0008	0.0066
8	0.0075	0.0008	0.0066
9	0.0075	0.0008	0.0067
10	0.0075	0.0008	0.0067
11	0.0075	0.0008	0.0067
12	0.0076	0.0008	0.0067
13	0.0076	0.0008	0.0068
14	0.0076	0.0008	0.0068
15	0.0077	0.0008	0.0068
16	0.0077	0.0008	0.0068
17	0.0077	0.0008	0.0069
18	0.0077	0.0009	0.0069
19	0.0078	0.0009	0.0069
20	0.0078	0.0009	0.0069
21	0.0078	0.0009	0.0070
22	0.0078	0.0009	0.0070
23	0.0079	0.0009	0.0070
24	0.0079	0.0009	0.0070
25	0.0079	0.0009	0.0071
26	0.0080	0.0009	0.0071
27	0.0080	0.0009	0.0071
28	0.0080	0.0009	0.0071
29	0.0081	0.0009	0.0072
30	0.0081	0.0009	0.0072
31	0.0081	0.0009	0.0072
32	0.0081	0.0009	0.0072
33	0.0082	0.0009	0.0073
34	0.0082	0.0009	0.0073
35	0.0082	0.0009	0.0073
36	0.0083	0.0009	0.0074
37	0.0083	0.0009	0.0074
38	0.0083	0.0009	0.0074
39	0.0084	0.0009	0.0075
40	0.0084	0.0009	0.0075
41	0.0085	0.0009	0.0075
42	0.0085	0.0009	0.0075
43	0.0085	0.0009	0.0076
44	0.0085	0.0009	0.0076
45	0.0086	0.0009	0.0076
46	0.0086	0.0009	0.0077
47	0.0087	0.0010	0.0077
48	0.0087	0.0010	0.0077
49	0.0087	0.0010	0.0078
50	0.0088	0.0010	0.0078
51	0.0088	0.0010	0.0078
52	0.0088	0.0010	0.0079
53	0.0089	0.0010	0.0079
54	0.0089	0.0010	0.0079
55	0.0090	0.0010	0.0080
56	0.0090	0.0010	0.0080
57	0.0091	0.0010	0.0081
58	0.0091	0.0010	0.0081
59	0.0091	0.0010	0.0081
60	0.0092	0.0010	0.0082
61	0.0092	0.0010	0.0082
62	0.0093	0.0010	0.0082
63	0.0093	0.0010	0.0083
64	0.0094	0.0010	0.0083
65	0.0094	0.0010	0.0084
66	0.0094	0.0010	0.0084
67	0.0095	0.0010	0.0085
68	0.0095	0.0011	0.0085

69	0.0096	0.0011	0.0085
70	0.0096	0.0011	0.0086
71	0.0097	0.0011	0.0086
72	0.0097	0.0011	0.0087
73	0.0098	0.0011	0.0087
74	0.0098	0.0011	0.0088
75	0.0099	0.0011	0.0088
76	0.0099	0.0011	0.0088
77	0.0100	0.0011	0.0089
78	0.0101	0.0011	0.0089
79	0.0101	0.0011	0.0090
80	0.0102	0.0011	0.0090
81	0.0102	0.0011	0.0091
82	0.0103	0.0011	0.0091
83	0.0104	0.0011	0.0092
84	0.0104	0.0011	0.0093
85	0.0105	0.0012	0.0093
86	0.0105	0.0012	0.0094
87	0.0106	0.0012	0.0094
88	0.0106	0.0012	0.0095
89	0.0107	0.0012	0.0095
90	0.0108	0.0012	0.0096
91	0.0109	0.0012	0.0097
92	0.0109	0.0012	0.0097
93	0.0110	0.0012	0.0098
94	0.0110	0.0012	0.0098
95	0.0111	0.0012	0.0099
96	0.0112	0.0012	0.0100
97	0.0113	0.0012	0.0100
98	0.0113	0.0012	0.0101
99	0.0114	0.0013	0.0102
100	0.0115	0.0013	0.0102
101	0.0116	0.0013	0.0103
102	0.0116	0.0013	0.0104
103	0.0117	0.0013	0.0105
104	0.0118	0.0013	0.0105
105	0.0119	0.0013	0.0106
106	0.0120	0.0013	0.0107
107	0.0121	0.0013	0.0108
108	0.0121	0.0013	0.0108
109	0.0123	0.0014	0.0109
110	0.0123	0.0014	0.0110
111	0.0125	0.0014	0.0111
112	0.0125	0.0014	0.0111
113	0.0127	0.0014	0.0113
114	0.0127	0.0014	0.0113
115	0.0129	0.0014	0.0114
116	0.0129	0.0014	0.0115
117	0.0131	0.0014	0.0116
118	0.0131	0.0014	0.0117
119	0.0133	0.0015	0.0118
120	0.0134	0.0015	0.0119
121	0.0135	0.0015	0.0120
122	0.0136	0.0015	0.0121
123	0.0138	0.0015	0.0122
124	0.0138	0.0015	0.0123
125	0.0140	0.0015	0.0125
126	0.0141	0.0016	0.0126
127	0.0143	0.0016	0.0127
128	0.0144	0.0016	0.0128
129	0.0146	0.0016	0.0130
130	0.0147	0.0016	0.0130
131	0.0149	0.0016	0.0132
132	0.0150	0.0016	0.0133
133	0.0152	0.0017	0.0135
134	0.0153	0.0017	0.0136
135	0.0155	0.0017	0.0138
136	0.0156	0.0017	0.0139
137	0.0158	0.0017	0.0141
138	0.0160	0.0018	0.0142
139	0.0162	0.0018	0.0144
140	0.0163	0.0018	0.0145
141	0.0166	0.0018	0.0148

142	0.0167	0.0018	0.0149
143	0.0170	0.0019	0.0151
144	0.0172	0.0019	0.0153
145	0.0220	0.0024	0.0196
146	0.0221	0.0024	0.0197
147	0.0225	0.0025	0.0200
148	0.0227	0.0025	0.0202
149	0.0230	0.0025	0.0205
150	0.0232	0.0026	0.0207
151	0.0236	0.0026	0.0210
152	0.0238	0.0026	0.0212
153	0.0242	0.0027	0.0216
154	0.0244	0.0027	0.0218
155	0.0249	0.0027	0.0222
156	0.0251	0.0028	0.0224
157	0.0256	0.0028	0.0228
158	0.0259	0.0028	0.0230
159	0.0264	0.0029	0.0235
160	0.0267	0.0029	0.0238
161	0.0273	0.0030	0.0243
162	0.0276	0.0030	0.0246
163	0.0283	0.0031	0.0251
164	0.0286	0.0031	0.0254
165	0.0293	0.0032	0.0261
166	0.0297	0.0033	0.0264
167	0.0305	0.0034	0.0272
168	0.0309	0.0034	0.0275
169	0.0335	0.0037	0.0298
170	0.0340	0.0037	0.0303
171	0.0351	0.0039	0.0312
172	0.0356	0.0039	0.0317
173	0.0368	0.0041	0.0328
174	0.0375	0.0041	0.0333
175	0.0389	0.0043	0.0346
176	0.0396	0.0044	0.0353
177	0.0413	0.0045	0.0367
178	0.0422	0.0046	0.0376
179	0.0442	0.0049	0.0394
180	0.0454	0.0050	0.0404
181	0.0479	0.0053	0.0426
182	0.0494	0.0054	0.0439
183	0.0527	0.0058	0.0469
184	0.0546	0.0060	0.0486
185	0.0494	0.0054	0.0440
186	0.0522	0.0057	0.0464
187	0.0591	0.0065	0.0526
188	0.0636	0.0070	0.0566
189	0.0766	0.0084	0.0682
190	0.0863	0.0095	0.0768
191	0.1223	0.0135	0.1089
192	0.1670	0.0184	0.1486
193	0.5039	0.0191	0.4848
194	0.1001	0.0110	0.0891
195	0.0692	0.0076	0.0616
196	0.0553	0.0061	0.0492
197	0.0568	0.0063	0.0505
198	0.0509	0.0056	0.0453
199	0.0466	0.0051	0.0415
200	0.0432	0.0048	0.0384
201	0.0404	0.0045	0.0360
202	0.0381	0.0042	0.0339
203	0.0362	0.0040	0.0322
204	0.0345	0.0038	0.0307
205	0.0314	0.0035	0.0279
206	0.0301	0.0033	0.0268
207	0.0290	0.0032	0.0258
208	0.0279	0.0031	0.0249
209	0.0270	0.0030	0.0240
210	0.0262	0.0029	0.0233
211	0.0254	0.0028	0.0226
212	0.0247	0.0027	0.0220
213	0.0240	0.0026	0.0214
214	0.0234	0.0026	0.0208

215	0.0228	0.0025	0.0203
216	0.0223	0.0025	0.0199
217	0.0173	0.0019	0.0154
218	0.0169	0.0019	0.0150
219	0.0165	0.0018	0.0147
220	0.0161	0.0018	0.0143
221	0.0157	0.0017	0.0140
222	0.0154	0.0017	0.0137
223	0.0151	0.0017	0.0134
224	0.0148	0.0016	0.0131
225	0.0145	0.0016	0.0129
226	0.0142	0.0016	0.0126
227	0.0139	0.0015	0.0124
228	0.0137	0.0015	0.0122
229	0.0134	0.0015	0.0120
230	0.0132	0.0015	0.0118
231	0.0130	0.0014	0.0116
232	0.0128	0.0014	0.0114
233	0.0126	0.0014	0.0112
234	0.0124	0.0014	0.0110
235	0.0122	0.0013	0.0109
236	0.0120	0.0013	0.0107
237	0.0119	0.0013	0.0106
238	0.0117	0.0013	0.0104
239	0.0115	0.0013	0.0103
240	0.0114	0.0013	0.0101
241	0.0112	0.0012	0.0100
242	0.0111	0.0012	0.0099
243	0.0109	0.0012	0.0097
244	0.0108	0.0012	0.0096
245	0.0107	0.0012	0.0095
246	0.0106	0.0012	0.0094
247	0.0104	0.0011	0.0093
248	0.0103	0.0011	0.0092
249	0.0102	0.0011	0.0091
250	0.0101	0.0011	0.0090
251	0.0100	0.0011	0.0089
252	0.0099	0.0011	0.0088
253	0.0098	0.0011	0.0087
254	0.0097	0.0011	0.0086
255	0.0096	0.0011	0.0085
256	0.0095	0.0010	0.0084
257	0.0094	0.0010	0.0084
258	0.0093	0.0010	0.0083
259	0.0092	0.0010	0.0082
260	0.0091	0.0010	0.0081
261	0.0090	0.0010	0.0080
262	0.0090	0.0010	0.0080
263	0.0089	0.0010	0.0079
264	0.0088	0.0010	0.0078
265	0.0087	0.0010	0.0078
266	0.0086	0.0010	0.0077
267	0.0086	0.0009	0.0076
268	0.0085	0.0009	0.0076
269	0.0084	0.0009	0.0075
270	0.0084	0.0009	0.0074
271	0.0083	0.0009	0.0074
272	0.0082	0.0009	0.0073
273	0.0082	0.0009	0.0073
274	0.0081	0.0009	0.0072
275	0.0080	0.0009	0.0072
276	0.0080	0.0009	0.0071
277	0.0079	0.0009	0.0070
278	0.0079	0.0009	0.0070
279	0.0078	0.0009	0.0069
280	0.0077	0.0009	0.0069
281	0.0077	0.0008	0.0068
282	0.0076	0.0008	0.0068
283	0.0076	0.0008	0.0067
284	0.0075	0.0008	0.0067
285	0.0075	0.0008	0.0067
286	0.0074	0.0008	0.0066
287	0.0074	0.0008	0.0066

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288              0.0073           0.0008              0.0065
-----------------------------------------------------------------------
-----------------------------------------------------------------------
Total soil rain loss =      0.58(In)
Total effective rainfall =      5.04(In)
Peak flow rate in flood hydrograph =   1195.47(CFS)
-----------------------------------------------------------------------
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - H O U R    S T O R M
                R u n o f f      H y d r o g r a p h
-----------------------------------------------------------------------
            Hydrograph in   5   Minute intervals ((CFS))

-----------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0      300.0     600.0     900.0    1200.0
-----------------------------------------------------------------------
  0+ 5       0.0039      0.56  Q         |         |         |         |
  0+10       0.0179      2.05  Q         |         |         |         |
  0+15       0.0469      4.20  Q         |         |         |         |
  0+20       0.0969      7.25  Q         |         |         |         |
  0+25       0.1787     11.89  Q         |         |         |         |
  0+30       0.3210     20.66  Q         |         |         |         |
  0+35       0.5235     29.40  Q         |         |         |         |
  0+40       0.7550     33.62  VQ        |         |         |         |
  0+45       1.0079     36.72  VQ        |         |         |         |
  0+50       1.2772     39.11  VQ        |         |         |         |
  0+55       1.5611     41.22  VQ        |         |         |         |
  1+ 0       1.8573     43.00  VQ        |         |         |         |
  1+ 5       2.1640     44.53  VQ        |         |         |         |
  1+10       2.4801     45.90  VQ        |         |         |         |
  1+15       2.8045     47.11  VQ        |         |         |         |
  1+20       3.1364     48.18  VQ        |         |         |         |
  1+25       3.4749     49.16  VQ        |         |         |         |
  1+30       3.8195     50.03  VQ        |         |         |         |
  1+35       4.1693     50.80  VQ        |         |         |         |
  1+40       4.5240     51.50  VQ        |         |         |         |
  1+45       4.8829     52.10  VQ        |         |         |         |
  1+50       5.2455     52.66  VQ        |         |         |         |
  1+55       5.6116     53.16  VQ        |         |         |         |
  2+ 0       5.9807     53.59  VQ        |         |         |         |
  2+ 5       6.3520     53.92  VQ        |         |         |         |
  2+10       6.7254     54.22  VQ        |         |         |         |
  2+15       7.1009     54.52  |Q        |         |         |         |
  2+20       7.4784     54.81  |Q        |         |         |         |
  2+25       7.8578     55.10  |Q        |         |         |         |
  2+30       8.2392     55.38  |Q        |         |         |         |
  2+35       8.6225     55.65  |Q        |         |         |         |
  2+40       9.0075     55.91  |Q        |         |         |         |
  2+45       9.3944     56.17  |Q        |         |         |         |
  2+50       9.7831     56.45  |Q        |         |         |         |
  2+55      10.1739     56.73  |Q        |         |         |         |
  3+ 0      10.5665     57.02  |Q        |         |         |         |
  3+ 5      10.9610     57.27  |Q        |         |         |         |
  3+10      11.3572     57.53  |Q        |         |         |         |
  3+15      11.7552     57.79  |Q        |         |         |         |
  3+20      12.1548     58.03  |Q        |         |         |         |
  3+25      12.5562     58.28  |Q        |         |         |         |
  3+30      12.9592     58.52  |Q        |         |         |         |
  3+35      13.3639     58.76  |Q        |         |         |         |
  3+40      13.7702     58.99  |Q        |         |         |         |
  3+45      14.1781     59.23  |QV       |         |         |         |
  3+50      14.5876     59.47  |QV       |         |         |         |
  3+55      14.9989     59.71  |QV       |         |         |         |
  4+ 0      15.4118     59.96  |QV       |         |         |         |
  4+ 5      15.8264     60.20  | Q       |         |         |         |
  4+10      16.2428     60.45  | Q       |         |         |         |
  4+15      16.6609     60.71  | Q       |         |         |         |
  4+20      17.0808     60.96  | Q       |         |         |         |
  4+25      17.5024     61.22  | Q       |         |         |         |
  4+30      17.9259     61.48  | Q       |         |         |         |
  4+35      18.3511     61.75  | Q       |         |         |         |
  4+40      18.7782     62.02  | Q       |         |         |         |
  4+45      19.2072     62.29  | Q       |         |         |         |
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 4+50      19.6381     62.56  | Q       |         |         |         |
 4+55      20.0709     62.84  | Q       |         |         |         |
 5+ 0      20.5056     63.12  | Q       |         |         |         |
 5+ 5      20.9422     63.40  | QV      |         |         |         |
 5+10      21.3809     63.69  | QV      |         |         |         |
 5+15      21.8215     63.98  | QV      |         |         |         |
 5+20      22.2642     64.27  | QV      |         |         |         |
 5+25      22.7089     64.57  | QV      |         |         |         |
 5+30      23.1556     64.87  | QV      |         |         |         |
 5+35      23.6045     65.18  | QV      |         |         |         |
 5+40      24.0555     65.48  | QV      |         |         |         |
 5+45      24.5086     65.80  | QV      |         |         |         |
 5+50      24.9640     66.11  | QV      |         |         |         |
 5+55      25.4215     66.43  | QV      |         |         |         |
 6+ 0      25.8812     66.76  | QV      |         |         |         |
 6+ 5      26.3432     67.08  | QV      |         |         |         |
 6+10      26.8075     67.42  | QV      |         |         |         |
 6+15      27.2742     67.75  | QV      |         |         |         |
 6+20      27.7431     68.09  | QV      |         |         |         |
 6+25      28.2145     68.44  | Q V     |         |         |         |
 6+30      28.6882     68.79  | Q V     |         |         |         |
 6+35      29.1644     69.14  | Q V     |         |         |         |
 6+40      29.6431     69.50  | Q V     |         |         |         |
 6+45      30.1243     69.87  | Q V     |         |         |         |
 6+50      30.6080     70.24  | Q V     |         |         |         |
 6+55      31.0943     70.61  | Q V     |         |         |         |
 7+ 0      31.5832     70.99  | Q V     |         |         |         |
 7+ 5      32.0748     71.38  | Q V     |         |         |         |
 7+10      32.5691     71.77  | Q V     |         |         |         |
 7+15      33.0661     72.16  | Q V     |         |         |         |
 7+20      33.5659     72.57  | Q V     |         |         |         |
 7+25      34.0684     72.98  | Q V     |         |         |         |
 7+30      34.5739     73.39  | Q V     |         |         |         |
 7+35      35.0822     73.81  | Q  V    |         |         |         |
 7+40      35.5935     74.23  | Q  V    |         |         |         |
 7+45      36.1077     74.67  | Q  V    |         |         |         |
 7+50      36.6250     75.11  | Q  V    |         |         |         |
 7+55      37.1453     75.55  | Q  V    |         |         |         |
 8+ 0      37.6688     76.01  | Q  V    |         |         |         |
 8+ 5      38.1954     76.47  | Q  V    |         |         |         |
 8+10      38.7253     76.93  | Q  V    |         |         |         |
 8+15      39.2584     77.41  | Q  V    |         |         |         |
 8+20      39.7949     77.89  | Q  V    |         |         |         |
 8+25      40.3347     78.39  | Q  V    |         |         |         |
 8+30      40.8780     78.88  | Q  V    |         |         |         |
 8+35      41.4248     79.39  | Q  V    |         |         |         |
 8+40      41.9751     79.91  | Q   V   |         |         |         |
 8+45      42.5290     80.43  | Q   V   |         |         |         |
 8+50      43.0866     80.97  | Q   V   |         |         |         |
 8+55      43.6480     81.51  | Q   V   |         |         |         |
 9+ 0      44.2132     82.06  | Q   V   |         |         |         |
 9+ 5      44.7822     82.63  | Q   V   |         |         |         |
 9+10      45.3552     83.20  | Q   V   |         |         |         |
 9+15      45.9322     83.78  | Q   V   |         |         |         |
 9+20      46.5133     84.37  | Q   V   |         |         |         |
 9+25      47.0986     84.98  | Q   V   |         |         |         |
 9+30      47.6881     85.60  | Q   V   |         |         |         |
 9+35      48.2819     86.23  | Q   V   |         |         |         |
 9+40      48.8801     86.86  | Q    V  |         |         |         |
 9+45      49.4829     87.52  | Q    V  |         |         |         |
 9+50      50.0902     88.18  | Q    V  |         |         |         |
 9+55      50.7022     88.86  | Q    V  |         |         |         |
10+ 0      51.3190     89.56  | Q    V  |         |         |         |
10+ 5      51.9407     90.27  |  Q   V  |         |         |         |
10+10      52.5673     90.99  |  Q   V  |         |         |         |
10+15      53.1990     91.72  |  Q   V  |         |         |         |
10+20      53.8359     92.48  |  Q   V  |         |         |         |
10+25      54.4781     93.25  |  Q   V  |         |         |         |
10+30      55.1257     94.03  |  Q   V  |         |         |         |
10+35      55.7789     94.84  |  Q    V |         |         |         |
10+40      56.4377     95.66  |  Q    V |         |         |         |
10+45      57.1023     96.50  |  Q    V |         |         |         |
10+50      57.7728     97.36  |  Q    V |         |         |         |
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10+55      58.4494     98.24  |  Q    V |         |         |         |
11+ 0      59.1322     99.14  |  Q    V |         |         |         |
11+ 5      59.8214    100.07  |  Q    V |         |         |         |
11+10      60.5171    101.01  |  Q    V |         |         |         |
11+15      61.2195    101.99  |  Q    V |         |         |         |
11+20      61.9287    102.98  |  Q    V |         |         |         |
11+25      62.6450    104.00  |  Q     V|         |         |         |
11+30      63.3684    105.05  |  Q     V|         |         |         |
11+35      64.0993    106.13  |  Q     V|         |         |         |
11+40      64.8378    107.23  |  Q     V|         |         |         |
11+45      65.5841    108.37  |  Q     V|         |         |         |
11+50      66.3385    109.53  |  Q     V|         |         |         |
11+55      67.1011    110.73  |  Q     V|         |         |         |
12+ 0      67.8722    111.97  |  Q     V|         |         |         |
12+ 5      68.6545    113.59  |  Q     V|         |         |         |
12+10      69.4522    115.82  |  Q     V|         |         |         |
12+15      70.2683    118.51  |  Q      V         |         |         |
12+20      71.1071    121.79  |   Q     V         |         |         |
12+25      71.9756    126.10  |   Q     V         |         |         |
12+30      72.8917    133.02  |   Q     V         |         |         |
12+35      73.8556    139.97  |   Q     V         |         |         |
12+40      74.8485    144.16  |   Q     V         |         |         |
12+45      75.8659    147.73  |   Q     V         |         |         |
12+50      76.9053    150.91  |    Q    |V        |         |         |
12+55      77.9657    153.98  |    Q    |V        |         |         |
13+ 0      79.0463    156.90  |    Q    |V        |         |         |
13+ 5      80.1465    159.75  |    Q    |V        |         |         |
13+10      81.2660    162.55  |    Q    |V        |         |         |
13+15      82.4048    165.36  |    Q    |V        |         |         |
13+20      83.5628    168.14  |    Q    | V       |         |         |
13+25      84.7402    170.96  |    Q    | V       |         |         |
13+30      85.9372    173.80  |    Q    | V       |         |         |
13+35      87.1541    176.70  |    Q    | V       |         |         |
13+40      88.3913    179.64  |    Q    | V       |         |         |
13+45      89.6492    182.65  |     Q   | V       |         |         |
13+50      90.9285    185.74  |     Q   |  V      |         |         |
13+55      92.2298    188.95  |     Q   |  V      |         |         |
14+ 0      93.5538    192.25  |     Q   |  V      |         |         |
14+ 5      94.9022    195.78  |     Q   |  V      |         |         |
14+10      96.2774    199.67  |     Q   |  V      |         |         |
14+15      97.6818    203.92  |     Q   |   V     |         |         |
14+20      99.1180    208.55  |     Q   |   V     |         |         |
14+25     100.5904    213.78  |      Q  |   V     |         |         |
14+30     102.1069    220.20  |      Q  |   V     |         |         |
14+35     103.6694    226.88  |      Q  |   V     |         |         |
14+40     105.2728    232.80  |      Q  |    V    |         |         |
14+45     106.9176    238.83  |      Q  |    V    |         |         |
14+50     108.6054    245.07  |       Q |    V    |         |         |
14+55     110.3389    251.70  |       Q |    V    |         |         |
15+ 0     112.1207    258.72  |       Q |     V   |         |         |
15+ 5     113.9544    266.25  |       Q |     V   |         |         |
15+10     115.8440    274.38  |        Q|     V   |         |         |
15+15     117.7948    283.25  |        Q|     V   |         |         |
15+20     119.8125    292.97  |        Q|      V  |         |         |
15+25     121.8993    303.01  |         Q      V  |         |         |
15+30     124.0556    313.09  |         Q      V  |         |         |
15+35     126.2862    323.89  |         Q       V |         |         |
15+40     128.5972    335.55  |         |Q      V |         |         |
15+45     130.9934    347.94  |         |Q      V |         |         |
15+50     133.4638    358.70  |         |Q       V|         |         |
15+55     136.0532    375.98  |         | Q      V|         |         |
16+ 0     138.8822    410.76  |         |  Q     V|         |         |
16+ 5     142.2455    488.35  |         |     Q   V         |         |
16+10     146.3283    592.83  |         |        Q|V        |         |
16+15     151.0622    687.35  |         |         |VQ       |         |
16+20     156.5857    802.01  |         |         | V   Q   |         |
16+25     163.1699    956.03  |         |         |  V      |Q        |
16+30     171.4032   1195.47  |         |         |   V     |        Q|
16+35     179.2282   1136.20  |         |         |    V    |      Q  |
16+40     184.8131    810.92  |         |         |     VQ  |         |
16+45     189.5549    688.51  |         |         | Q    V  |         |
16+50     193.7622    610.91  |         |        Q     V  |         |
16+55     197.6573    565.57  |         |       Q |       V |         |
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17+ 0     201.2244    517.93 |          |       Q  |        V |          |
17+ 5     204.5166    478.03 |          |     Q    |         V|          |
17+10     207.5807    444.91 |          |    Q     |         V|          |
17+15     210.4380    414.88 |          |   Q      |          V          |
17+20     213.1025    386.89 |          |  Q       |          V          |
17+25     215.6005    362.70 |          |  Q       |          |V         |
17+30     217.9349    338.96 |          |Q         |          |V         |
17+35     220.1139    316.39 |         Q          |          |V         |
17+40     222.1593    297.00 |        Q|          |          |V         |
17+45     224.0745    278.08 |        Q|          |          | V        |
17+50     225.8844    262.79 |       Q |          |          | V        |
17+55     227.5939    248.22 |       Q |          |          | V        |
18+ 0     229.1988    233.04 |      Q  |          |          | V        |
18+ 5     230.6964    217.44 |      Q  |          |          |  V       |
18+10     232.1199    206.70 |     Q   |          |          |  V       |
18+15     233.4859    198.34 |     Q   |          |          |  V       |
18+20     234.7911    189.52 |     Q   |          |          |  V       |
18+25     236.0354    180.68 |     Q   |          |          |  V       |
18+30     237.2040    169.68 |    Q    |          |          |   V      |
18+35     238.2920    157.97 |    Q    |          |          |   V      |
18+40     239.3304    150.78 |    Q    |          |          |   V      |
18+45     240.3305    145.21 |   Q     |          |          |   V      |
18+50     241.3011    140.93 |   Q     |          |          |   V      |
18+55     242.2395    136.25 |   Q     |          |          |   V      |
19+ 0     243.1441    131.36 |   Q     |          |          |    V     |
19+ 5     244.0092    125.61 |   Q     |          |          |    V     |
19+10     244.8455    121.43 |   Q     |          |          |    V     |
19+15     245.6557    117.64 |  Q      |          |          |    V     |
19+20     246.4378    113.57 |  Q      |          |          |    V     |
19+25     247.1975    110.30 |  Q      |          |          |    V     |
19+30     247.9361    107.25 |  Q      |          |          |    V     |
19+35     248.6499    103.64 |  Q      |          |          |    V     |
19+40     249.3468    101.19 |  Q      |          |          |    V     |
19+45     250.0284     98.97 |  Q      |          |          |    V     |
19+50     250.6959     96.92 |  Q      |          |          |     V    |
19+55     251.3500     94.98 |  Q      |          |          |     V    |
20+ 0     251.9917     93.18 |  Q      |          |          |     V    |
20+ 5     252.6220     91.53 |  Q      |          |          |     V    |
20+10     253.2417     89.97 | Q       |          |          |     V    |
20+15     253.8511     88.48 | Q       |          |          |     V    |
20+20     254.4507     87.07 | Q       |          |          |     V    |
20+25     255.0410     85.71 | Q       |          |          |     V    |
20+30     255.6224     84.41 | Q       |          |          |     V    |
20+35     256.1952     83.18 | Q       |          |          |     V    |
20+40     256.7599     82.00 | Q       |          |          |     V    |
20+45     257.3168     80.85 | Q       |          |          |      V   |
20+50     257.8660     79.74 | Q       |          |          |      V   |
20+55     258.4078     78.67 | Q       |          |          |      V   |
21+ 0     258.9424     77.63 | Q       |          |          |      V   |
21+ 5     259.4703     76.65 | Q       |          |          |      V   |
21+10     259.9916     75.69 | Q       |          |          |      V   |
21+15     260.5065     74.77 | Q       |          |          |      V   |
21+20     261.0154     73.89 | Q       |          |          |      V   |
21+25     261.5183     73.03 | Q       |          |          |      V   |
21+30     262.0156     72.20 | Q       |          |          |      V   |
21+35     262.5073     71.40 | Q       |          |          |      V   |
21+40     262.9937     70.63 | Q       |          |          |      V   |
21+45     263.4750     69.88 | Q       |          |          |      V   |
21+50     263.9512     69.14 | Q       |          |          |      V   |
21+55     264.4225     68.43 | Q       |          |          |       V  |
22+ 0     264.8890     67.74 | Q       |          |          |       V  |
22+ 5     265.3509     67.07 | Q       |          |          |       V  |
22+10     265.8082     66.41 | Q       |          |          |       V  |
22+15     266.2612     65.77 | Q       |          |          |       V  |
22+20     266.7099     65.15 | Q       |          |          |       V  |
22+25     267.1543     64.54 | Q       |          |          |       V  |
22+30     267.5947     63.94 | Q       |          |          |       V  |
22+35     268.0311     63.36 | Q       |          |          |       V  |
22+40     268.4636     62.80 | Q       |          |          |       V  |
22+45     268.8922     62.24 | Q       |          |          |       V  |
22+50     269.3172     61.70 | Q       |          |          |       V  |
22+55     269.7385     61.17 | Q       |          |          |       V  |
23+ 0     270.1562     60.66 | Q       |          |          |       V  |
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   23+ 5     270.5705     60.15  | Q       |         |         |       V |
   23+10     270.9813     59.66  |Q        |         |         |        V|
   23+15     271.3889     59.17  |Q        |         |         |        V|
   23+20     271.7931     58.70  |Q        |         |         |        V|
   23+25     272.1942     58.23  |Q        |         |         |        V|
   23+30     272.5921     57.78  |Q        |         |         |        V|
   23+35     272.9870     57.33  |Q        |         |         |        V|
   23+40     273.3789     56.90  |Q        |         |         |        V|
   23+45     273.7678     56.47  |Q        |         |         |        V|
   23+50     274.1538     56.05  |Q        |         |         |        V|
   23+55     274.5370     55.64  |Q        |         |         |        V|
   24+ 0     274.9174     55.24  |Q        |         |         |        V|
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U n i t H y d r o g r a p h A n a l y s i s

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Study date 08/03/15 File Name CieloVistaExWshdAUH25.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6049

WATERSHED A
EXISTING CONDITIONS - CREEK A
25-YEAR STORM
BY FUSCOE ENGINEERING

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
82.0	0.2	0.00	B	0.300	1.000	0.300
72.0	0.2	0.00	B	0.300	1.000	0.300
79.0	365.1	0.55	C	0.250	1.000	0.250
84.0	264.3	0.40	D	0.200	1.000	0.200
82.0	2.5	0.00	B	0.300	1.000	0.300
72.0	2.5	0.00	B	0.300	1.000	0.300
79.0	3.7	0.01	C	0.250	1.000	0.250
84.0	23.1	0.03	D	0.200	1.000	0.200

Area-averaged adjusted loss rate Fm (In/Hr) = 0.229

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.20	0.000	82.0	82.0	2.20	0.585
0.20	0.000	72.0	72.0	3.89	0.404
365.10	0.552	79.0	79.0	2.66	0.527
264.30	0.399	84.0	84.0	1.90	0.625
2.50	0.004	82.0	82.0	2.20	0.585
2.50	0.004	72.0	72.0	3.89	0.404
3.70	0.006	79.0	79.0	2.66	0.527
23.10	0.035	84.0	84.0	1.90	0.625

Area-averaged catchment yield fraction, Y = 0.570
Area-averaged low loss fraction, Yb = 0.430
++
User entry of time of concentration = 0.670 (hours)
Watershed area = 661.60(Ac.)
Catchment Lag time = 0.536 hours

Unit interval = 5.000 minutes
Unit interval percentage of lag time = 15.5426
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.229(In/Hr)
Average low loss rate fraction (Yb) = 0.430 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall = 0.400(In)
Computed peak 30-minute rainfall = 0.870(In)
Specified peak 1-hour rainfall = 1.150(In)
Computed peak 3-hour rainfall = 1.940(In)
Specified peak 6-hour rainfall = 2.710(In)
Specified peak 24-hour rainfall = 4.490(In)

Rainfall depth area reduction factors:
Using a total area of 661.60(Ac.) (Ref: fig. E-4)

5-minute factor = 0.969 Adjusted rainfall = 0.388(In)
30-minute factor = 0.969 Adjusted rainfall = 0.843(In)
1-hour factor = 0.969 Adjusted rainfall = 1.114(In)
3-hour factor = 0.996 Adjusted rainfall = 1.932(In)
6-hour factor = 0.998 Adjusted rainfall = 2.704(In)
24-hour factor = 0.999 Adjusted rainfall = 4.486(In)

U n i t H y d r o g r a p h

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 8001.23 (CFS))		
1	0.985	78.809
2	3.515	202.465
3	7.138	289.887
4	11.980	387.379
5	19.155	574.077
6	30.299	891.700
7	49.711	1553.140
8	59.911	816.187
9	66.264	508.290
10	71.169	392.439
11	75.015	307.716
12	78.461	275.753
13	81.343	230.563
14	83.815	197.811
15	86.002	174.986
16	87.909	152.618
17	89.618	136.732
18	91.100	118.557
19	92.403	104.270
20	93.586	94.638
21	94.591	80.416
22	95.440	67.936
23	96.172	58.541
24	96.810	51.082
25	97.361	44.060
26	97.789	34.246
27	98.043	20.308
28	98.229	14.923
29	98.416	14.920
30	98.585	13.565
31	98.741	12.436
32	98.896	12.436
33	99.030	10.721
34	99.124	7.533
35	99.217	7.462
36	99.316	7.930
37	99.438	9.763
38	99.563	9.949
39	99.682	9.558
40	99.756	5.880
41	99.818	4.974

42	99.880	4.934
43	99.921	3.324
44	99.952	2.487
45	99.983	2.487
46	100.000	1.337

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3876	0.3876
2	0.5235	0.1359
3	0.6242	0.1006
4	0.7071	0.0829
5	0.7789	0.0718
6	0.8430	0.0641
7	0.8970	0.0540
8	0.9465	0.0495
9	0.9925	0.0460
10	1.0355	0.0430
11	1.0760	0.0405
12	1.1143	0.0384
13	1.1599	0.0456
14	1.2038	0.0439
15	1.2462	0.0423
16	1.2871	0.0410
17	1.3268	0.0397
18	1.3654	0.0386
19	1.4029	0.0375
20	1.4394	0.0365
21	1.4750	0.0356
22	1.5098	0.0348
23	1.5438	0.0340
24	1.5771	0.0333
25	1.6097	0.0326
26	1.6416	0.0319
27	1.6730	0.0313
28	1.7037	0.0308
29	1.7340	0.0302
30	1.7637	0.0297
31	1.7929	0.0292
32	1.8216	0.0288
33	1.8499	0.0283
34	1.8778	0.0279
35	1.9053	0.0275
36	1.9324	0.0271
37	1.9582	0.0258
38	1.9837	0.0255
39	2.0089	0.0251
40	2.0337	0.0248
41	2.0582	0.0245
42	2.0824	0.0242
43	2.1063	0.0239
44	2.1299	0.0236
45	2.1532	0.0233
46	2.1763	0.0231
47	2.1991	0.0228
48	2.2217	0.0226
49	2.2440	0.0223
50	2.2661	0.0221
51	2.2879	0.0219
52	2.3096	0.0216
53	2.3310	0.0214
54	2.3523	0.0212
55	2.3733	0.0210
56	2.3941	0.0208
57	2.4147	0.0206
58	2.4352	0.0205
59	2.4555	0.0203
60	2.4756	0.0201
61	2.4955	0.0199
62	2.5152	0.0198
63	2.5348	0.0196
64	2.5543	0.0194
65	2.5735	0.0193

66	2.5927	0.0191
67	2.6116	0.0190
68	2.6305	0.0188
69	2.6492	0.0187
70	2.6677	0.0185
71	2.6861	0.0184
72	2.7044	0.0183
73	2.7181	0.0137
74	2.7316	0.0135
75	2.7450	0.0134
76	2.7583	0.0133
77	2.7715	0.0132
78	2.7846	0.0131
79	2.7976	0.0130
80	2.8105	0.0129
81	2.8232	0.0128
82	2.8359	0.0127
83	2.8485	0.0126
84	2.8610	0.0125
85	2.8734	0.0124
86	2.8857	0.0123
87	2.8979	0.0122
88	2.9100	0.0121
89	2.9220	0.0120
90	2.9340	0.0119
91	2.9458	0.0119
92	2.9576	0.0118
93	2.9693	0.0117
94	2.9809	0.0116
95	2.9924	0.0115
96	3.0039	0.0115
97	3.0153	0.0114
98	3.0266	0.0113
99	3.0378	0.0112
100	3.0490	0.0112
101	3.0601	0.0111
102	3.0711	0.0110
103	3.0821	0.0110
104	3.0930	0.0109
105	3.1038	0.0108
106	3.1146	0.0108
107	3.1253	0.0107
108	3.1359	0.0106
109	3.1465	0.0106
110	3.1570	0.0105
111	3.1674	0.0104
112	3.1778	0.0104
113	3.1882	0.0103
114	3.1984	0.0103
115	3.2086	0.0102
116	3.2188	0.0102
117	3.2289	0.0101
118	3.2389	0.0100
119	3.2489	0.0100
120	3.2589	0.0099
121	3.2688	0.0099
122	3.2786	0.0098
123	3.2884	0.0098
124	3.2981	0.0097
125	3.3078	0.0097
126	3.3175	0.0096
127	3.3270	0.0096
128	3.3366	0.0095
129	3.3461	0.0095
130	3.3555	0.0094
131	3.3649	0.0094
132	3.3743	0.0094
133	3.3836	0.0093
134	3.3929	0.0093
135	3.4021	0.0092
136	3.4113	0.0092
137	3.4204	0.0091
138	3.4295	0.0091

139	3.4385	0.0091
140	3.4476	0.0090
141	3.4565	0.0090
142	3.4655	0.0089
143	3.4744	0.0089
144	3.4832	0.0089
145	3.4920	0.0088
146	3.5008	0.0088
147	3.5095	0.0087
148	3.5182	0.0087
149	3.5269	0.0087
150	3.5355	0.0086
151	3.5441	0.0086
152	3.5526	0.0086
153	3.5612	0.0085
154	3.5696	0.0085
155	3.5781	0.0084
156	3.5865	0.0084
157	3.5949	0.0084
158	3.6032	0.0083
159	3.6115	0.0083
160	3.6198	0.0083
161	3.6280	0.0082
162	3.6363	0.0082
163	3.6444	0.0082
164	3.6526	0.0081
165	3.6607	0.0081
166	3.6688	0.0081
167	3.6768	0.0081
168	3.6849	0.0080
169	3.6929	0.0080
170	3.7008	0.0080
171	3.7088	0.0079
172	3.7167	0.0079
173	3.7245	0.0079
174	3.7324	0.0078
175	3.7402	0.0078
176	3.7480	0.0078
177	3.7557	0.0078
178	3.7635	0.0077
179	3.7712	0.0077
180	3.7789	0.0077
181	3.7865	0.0077
182	3.7941	0.0076
183	3.8017	0.0076
184	3.8093	0.0076
185	3.8169	0.0075
186	3.8244	0.0075
187	3.8319	0.0075
188	3.8393	0.0075
189	3.8468	0.0074
190	3.8542	0.0074
191	3.8616	0.0074
192	3.8690	0.0074
193	3.8763	0.0073
194	3.8836	0.0073
195	3.8909	0.0073
196	3.8982	0.0073
197	3.9055	0.0072
198	3.9127	0.0072
199	3.9199	0.0072
200	3.9271	0.0072
201	3.9342	0.0072
202	3.9414	0.0071
203	3.9485	0.0071
204	3.9556	0.0071
205	3.9626	0.0071
206	3.9697	0.0070
207	3.9767	0.0070
208	3.9837	0.0070
209	3.9907	0.0070
210	3.9976	0.0070
211	4.0046	0.0069

212	4.0115	0.0069
213	4.0184	0.0069
214	4.0253	0.0069
215	4.0321	0.0069
216	4.0390	0.0068
217	4.0458	0.0068
218	4.0526	0.0068
219	4.0594	0.0068
220	4.0661	0.0068
221	4.0729	0.0067
222	4.0796	0.0067
223	4.0863	0.0067
224	4.0930	0.0067
225	4.0996	0.0067
226	4.1063	0.0066
227	4.1129	0.0066
228	4.1195	0.0066
229	4.1261	0.0066
230	4.1327	0.0066
231	4.1392	0.0066
232	4.1457	0.0065
233	4.1523	0.0065
234	4.1588	0.0065
235	4.1652	0.0065
236	4.1717	0.0065
237	4.1781	0.0064
238	4.1846	0.0064
239	4.1910	0.0064
240	4.1974	0.0064
241	4.2037	0.0064
242	4.2101	0.0064
243	4.2165	0.0063
244	4.2228	0.0063
245	4.2291	0.0063
246	4.2354	0.0063
247	4.2417	0.0063
248	4.2479	0.0063
249	4.2542	0.0062
250	4.2604	0.0062
251	4.2666	0.0062
252	4.2728	0.0062
253	4.2790	0.0062
254	4.2852	0.0062
255	4.2913	0.0062
256	4.2975	0.0061
257	4.3036	0.0061
258	4.3097	0.0061
259	4.3158	0.0061
260	4.3218	0.0061
261	4.3279	0.0061
262	4.3340	0.0060
263	4.3400	0.0060
264	4.3460	0.0060
265	4.3520	0.0060
266	4.3580	0.0060
267	4.3640	0.0060
268	4.3699	0.0060
269	4.3759	0.0059
270	4.3818	0.0059
271	4.3877	0.0059
272	4.3936	0.0059
273	4.3995	0.0059
274	4.4054	0.0059
275	4.4113	0.0059
276	4.4171	0.0058
277	4.4230	0.0058
278	4.4288	0.0058
279	4.4346	0.0058
280	4.4404	0.0058
281	4.4462	0.0058
282	4.4519	0.0058
283	4.4577	0.0058
284	4.4634	0.0057

285	4.4692	0.0057
286	4.4749	0.0057
287	4.4806	0.0057
288	4.4863	0.0057

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0057	0.0025	0.0032
2	0.0057	0.0025	0.0033
3	0.0057	0.0025	0.0033
4	0.0057	0.0025	0.0033
5	0.0058	0.0025	0.0033
6	0.0058	0.0025	0.0033
7	0.0058	0.0025	0.0033
8	0.0058	0.0025	0.0033
9	0.0058	0.0025	0.0033
10	0.0059	0.0025	0.0033
11	0.0059	0.0025	0.0034
12	0.0059	0.0025	0.0034
13	0.0059	0.0026	0.0034
14	0.0059	0.0026	0.0034
15	0.0060	0.0026	0.0034
16	0.0060	0.0026	0.0034
17	0.0060	0.0026	0.0034
18	0.0060	0.0026	0.0034
19	0.0061	0.0026	0.0035
20	0.0061	0.0026	0.0035
21	0.0061	0.0026	0.0035
22	0.0061	0.0026	0.0035
23	0.0062	0.0026	0.0035
24	0.0062	0.0027	0.0035
25	0.0062	0.0027	0.0035
26	0.0062	0.0027	0.0035
27	0.0062	0.0027	0.0036
28	0.0063	0.0027	0.0036
29	0.0063	0.0027	0.0036
30	0.0063	0.0027	0.0036
31	0.0063	0.0027	0.0036
32	0.0064	0.0027	0.0036
33	0.0064	0.0028	0.0036
34	0.0064	0.0028	0.0037
35	0.0064	0.0028	0.0037
36	0.0065	0.0028	0.0037
37	0.0065	0.0028	0.0037
38	0.0065	0.0028	0.0037
39	0.0066	0.0028	0.0037
40	0.0066	0.0028	0.0037
41	0.0066	0.0028	0.0038
42	0.0066	0.0029	0.0038
43	0.0067	0.0029	0.0038
44	0.0067	0.0029	0.0038
45	0.0067	0.0029	0.0038
46	0.0067	0.0029	0.0038
47	0.0068	0.0029	0.0039
48	0.0068	0.0029	0.0039
49	0.0068	0.0029	0.0039
50	0.0069	0.0030	0.0039
51	0.0069	0.0030	0.0039
52	0.0069	0.0030	0.0039
53	0.0070	0.0030	0.0040
54	0.0070	0.0030	0.0040
55	0.0070	0.0030	0.0040
56	0.0070	0.0030	0.0040
57	0.0071	0.0031	0.0040
58	0.0071	0.0031	0.0041
59	0.0072	0.0031	0.0041
60	0.0072	0.0031	0.0041
61	0.0072	0.0031	0.0041
62	0.0072	0.0031	0.0041
63	0.0073	0.0031	0.0042
64	0.0073	0.0032	0.0042

65	0.0074	0.0032	0.0042
66	0.0074	0.0032	0.0042
67	0.0074	0.0032	0.0042
68	0.0075	0.0032	0.0043
69	0.0075	0.0032	0.0043
70	0.0075	0.0032	0.0043
71	0.0076	0.0033	0.0043
72	0.0076	0.0033	0.0043
73	0.0077	0.0033	0.0044
74	0.0077	0.0033	0.0044
75	0.0078	0.0033	0.0044
76	0.0078	0.0034	0.0044
77	0.0078	0.0034	0.0045
78	0.0079	0.0034	0.0045
79	0.0079	0.0034	0.0045
80	0.0080	0.0034	0.0045
81	0.0080	0.0035	0.0046
82	0.0081	0.0035	0.0046
83	0.0081	0.0035	0.0046
84	0.0081	0.0035	0.0046
85	0.0082	0.0035	0.0047
86	0.0082	0.0035	0.0047
87	0.0083	0.0036	0.0047
88	0.0083	0.0036	0.0048
89	0.0084	0.0036	0.0048
90	0.0084	0.0036	0.0048
91	0.0085	0.0037	0.0049
92	0.0086	0.0037	0.0049
93	0.0086	0.0037	0.0049
94	0.0087	0.0037	0.0049
95	0.0087	0.0038	0.0050
96	0.0088	0.0038	0.0050
97	0.0089	0.0038	0.0050
98	0.0089	0.0038	0.0051
99	0.0090	0.0039	0.0051
100	0.0090	0.0039	0.0051
101	0.0091	0.0039	0.0052
102	0.0091	0.0039	0.0052
103	0.0092	0.0040	0.0053
104	0.0093	0.0040	0.0053
105	0.0094	0.0040	0.0053
106	0.0094	0.0040	0.0054
107	0.0095	0.0041	0.0054
108	0.0095	0.0041	0.0054
109	0.0096	0.0041	0.0055
110	0.0097	0.0042	0.0055
111	0.0098	0.0042	0.0056
112	0.0098	0.0042	0.0056
113	0.0099	0.0043	0.0057
114	0.0100	0.0043	0.0057
115	0.0101	0.0043	0.0058
116	0.0102	0.0044	0.0058
117	0.0103	0.0044	0.0059
118	0.0103	0.0044	0.0059
119	0.0104	0.0045	0.0060
120	0.0105	0.0045	0.0060
121	0.0106	0.0046	0.0061
122	0.0107	0.0046	0.0061
123	0.0108	0.0047	0.0062
124	0.0109	0.0047	0.0062
125	0.0110	0.0047	0.0063
126	0.0111	0.0048	0.0063
127	0.0112	0.0048	0.0064
128	0.0113	0.0049	0.0064
129	0.0115	0.0049	0.0065
130	0.0115	0.0050	0.0066
131	0.0117	0.0050	0.0067
132	0.0118	0.0051	0.0067
133	0.0119	0.0051	0.0068
134	0.0120	0.0052	0.0069
135	0.0122	0.0053	0.0070
136	0.0123	0.0053	0.0070
137	0.0125	0.0054	0.0071

138	0.0126	0.0054	0.0072
139	0.0128	0.0055	0.0073
140	0.0129	0.0055	0.0073
141	0.0131	0.0056	0.0075
142	0.0132	0.0057	0.0075
143	0.0134	0.0058	0.0076
144	0.0135	0.0058	0.0077
145	0.0183	0.0079	0.0104
146	0.0184	0.0079	0.0105
147	0.0187	0.0080	0.0106
148	0.0188	0.0081	0.0107
149	0.0191	0.0082	0.0109
150	0.0193	0.0083	0.0110
151	0.0196	0.0084	0.0112
152	0.0198	0.0085	0.0113
153	0.0201	0.0086	0.0114
154	0.0203	0.0087	0.0115
155	0.0206	0.0089	0.0118
156	0.0208	0.0090	0.0119
157	0.0212	0.0091	0.0121
158	0.0214	0.0092	0.0122
159	0.0219	0.0094	0.0125
160	0.0221	0.0095	0.0126
161	0.0226	0.0097	0.0129
162	0.0228	0.0098	0.0130
163	0.0233	0.0100	0.0133
164	0.0236	0.0102	0.0135
165	0.0242	0.0104	0.0138
166	0.0245	0.0105	0.0140
167	0.0251	0.0108	0.0143
168	0.0255	0.0110	0.0145
169	0.0271	0.0117	0.0154
170	0.0275	0.0118	0.0157
171	0.0283	0.0122	0.0161
172	0.0288	0.0124	0.0164
173	0.0297	0.0128	0.0169
174	0.0302	0.0130	0.0172
175	0.0313	0.0135	0.0179
176	0.0319	0.0137	0.0182
177	0.0333	0.0143	0.0190
178	0.0340	0.0146	0.0194
179	0.0356	0.0153	0.0203
180	0.0365	0.0157	0.0208
181	0.0386	0.0166	0.0220
182	0.0397	0.0171	0.0226
183	0.0423	0.0182	0.0241
184	0.0439	0.0189	0.0250
185	0.0384	0.0165	0.0218
186	0.0405	0.0174	0.0231
187	0.0460	0.0191	0.0269
188	0.0495	0.0191	0.0305
189	0.0641	0.0191	0.0450
190	0.0718	0.0191	0.0528
191	0.1006	0.0191	0.0816
192	0.1359	0.0191	0.1169
193	0.3876	0.0191	0.3685
194	0.0829	0.0191	0.0639
195	0.0540	0.0191	0.0349
196	0.0430	0.0185	0.0245
197	0.0456	0.0191	0.0265
198	0.0410	0.0176	0.0233
199	0.0375	0.0161	0.0214
200	0.0348	0.0150	0.0198
201	0.0326	0.0140	0.0186
202	0.0308	0.0132	0.0175
203	0.0292	0.0126	0.0166
204	0.0279	0.0120	0.0159
205	0.0258	0.0111	0.0147
206	0.0248	0.0107	0.0141
207	0.0239	0.0103	0.0136
208	0.0231	0.0099	0.0131
209	0.0223	0.0096	0.0127
210	0.0216	0.0093	0.0123

211	0.0210	0.0090	0.0120
212	0.0205	0.0088	0.0117
213	0.0199	0.0086	0.0113
214	0.0194	0.0084	0.0111
215	0.0190	0.0082	0.0108
216	0.0185	0.0080	0.0106
217	0.0137	0.0059	0.0078
218	0.0133	0.0057	0.0076
219	0.0130	0.0056	0.0074
220	0.0127	0.0055	0.0072
221	0.0124	0.0053	0.0071
222	0.0121	0.0052	0.0069
223	0.0119	0.0051	0.0068
224	0.0116	0.0050	0.0066
225	0.0114	0.0049	0.0065
226	0.0112	0.0048	0.0064
227	0.0110	0.0047	0.0062
228	0.0108	0.0046	0.0061
229	0.0106	0.0045	0.0060
230	0.0104	0.0045	0.0059
231	0.0102	0.0044	0.0058
232	0.0100	0.0043	0.0057
233	0.0099	0.0043	0.0056
234	0.0097	0.0042	0.0055
235	0.0096	0.0041	0.0055
236	0.0094	0.0041	0.0054
237	0.0093	0.0040	0.0053
238	0.0092	0.0040	0.0052
239	0.0091	0.0039	0.0052
240	0.0089	0.0038	0.0051
241	0.0088	0.0038	0.0050
242	0.0087	0.0037	0.0050
243	0.0086	0.0037	0.0049
244	0.0085	0.0036	0.0048
245	0.0084	0.0036	0.0048
246	0.0083	0.0036	0.0047
247	0.0082	0.0035	0.0047
248	0.0081	0.0035	0.0046
249	0.0080	0.0034	0.0046
250	0.0079	0.0034	0.0045
251	0.0078	0.0034	0.0045
252	0.0077	0.0033	0.0044
253	0.0077	0.0033	0.0044
254	0.0076	0.0033	0.0043
255	0.0075	0.0032	0.0043
256	0.0074	0.0032	0.0042
257	0.0073	0.0032	0.0042
258	0.0073	0.0031	0.0041
259	0.0072	0.0031	0.0041
260	0.0071	0.0031	0.0041
261	0.0071	0.0030	0.0040
262	0.0070	0.0030	0.0040
263	0.0069	0.0030	0.0040
264	0.0069	0.0030	0.0039
265	0.0068	0.0029	0.0039
266	0.0068	0.0029	0.0038
267	0.0067	0.0029	0.0038
268	0.0066	0.0029	0.0038
269	0.0066	0.0028	0.0038
270	0.0065	0.0028	0.0037
271	0.0065	0.0028	0.0037
272	0.0064	0.0028	0.0037
273	0.0064	0.0027	0.0036
274	0.0063	0.0027	0.0036
275	0.0063	0.0027	0.0036
276	0.0062	0.0027	0.0035
277	0.0062	0.0027	0.0035
278	0.0061	0.0026	0.0035
279	0.0061	0.0026	0.0035
280	0.0060	0.0026	0.0034
281	0.0060	0.0026	0.0034
282	0.0060	0.0026	0.0034
283	0.0059	0.0025	0.0034

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     284              0.0059           0.0025              0.0033
     285              0.0058           0.0025              0.0033
     286              0.0058           0.0025              0.0033
     287              0.0058           0.0025              0.0033
     288              0.0057           0.0025              0.0033
     ---------------------------------------------------------------------
     ---------------------------------------------------------------------
     Total soil rain loss =      1.67(In)
     Total effective rainfall =      2.81(In)
     Peak flow rate in flood hydrograph =    890.39(CFS)
     ----------------------------------------------------------------------
     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                         24 - H O U R    S T O R M
                   R u n o f f      H y d r o g r a p h
     ---------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

     ---------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0      225.0     450.0     675.0     900.0
-------------------------------------------------------------------------
  0+ 5       0.0018      0.26  Q          |         |         |         |
  0+10       0.0080      0.91  Q          |         |         |         |
  0+15       0.0208      1.86  Q          |         |         |         |
  0+20       0.0423      3.12  Q          |         |         |         |
  0+25       0.0767      4.99  Q          |         |         |         |
  0+30       0.1311      7.90  Q          |         |         |         |
  0+35       0.2203     12.96  Q          |         |         |         |
  0+40       0.3281     15.65  Q          |         |         |         |
  0+45       0.4475     17.35  Q          |         |         |         |
  0+50       0.5762     18.68  Q          |         |         |         |
  0+55       0.7121     19.74  Q          |         |         |         |
  1+ 0       0.8547     20.70  Q          |         |         |         |
  1+ 5       1.0029     21.52  Q          |         |         |         |
  1+10       1.1560     22.23  Q          |         |         |         |
  1+15       1.3135     22.88  VQ         |         |         |         |
  1+20       1.4750     23.45  VQ         |         |         |         |
  1+25       1.6402     23.98  VQ         |         |         |         |
  1+30       1.8085     24.44  VQ         |         |         |         |
  1+35       1.9798     24.87  VQ         |         |         |         |
  1+40       2.1537     25.26  VQ         |         |         |         |
  1+45       2.3301     25.61  VQ         |         |         |         |
  1+50       2.5086     25.92  VQ         |         |         |         |
  1+55       2.6891     26.21  VQ         |         |         |         |
  2+ 0       2.8714     26.46  VQ         |         |         |         |
  2+ 5       3.0553     26.70  VQ         |         |         |         |
  2+10       3.2406     26.91  VQ         |         |         |         |
  2+15       3.4271     27.08  VQ         |         |         |         |
  2+20       3.6146     27.22  VQ         |         |         |         |
  2+25       3.8031     27.37  VQ         |         |         |         |
  2+30       3.9926     27.52  |Q         |         |         |         |
  2+35       4.1832     27.66  |Q         |         |         |         |
  2+40       4.3746     27.80  |Q         |         |         |         |
  2+45       4.5671     27.95  |Q         |         |         |         |
  2+50       4.7605     28.07  |Q         |         |         |         |
  2+55       4.9547     28.21  |Q         |         |         |         |
  3+ 0       5.1499     28.34  |Q         |         |         |         |
  3+ 5       5.3461     28.48  |Q         |         |         |         |
  3+10       5.5432     28.63  |Q         |         |         |         |
  3+15       5.7414     28.77  |Q         |         |         |         |
  3+20       5.9404     28.90  |Q         |         |         |         |
  3+25       6.1404     29.03  |Q         |         |         |         |
  3+30       6.3412     29.16  |Q         |         |         |         |
  3+35       6.5430     29.29  |Q         |         |         |         |
  3+40       6.7456     29.42  |Q         |         |         |         |
  3+45       6.9490     29.55  |Q         |         |         |         |
  3+50       7.1534     29.67  |Q         |         |         |         |
  3+55       7.3586     29.79  |Q         |         |         |         |
  4+ 0       7.5646     29.92  |Q         |         |         |         |
  4+ 5       7.7715     30.04  |QV        |         |         |         |
  4+10       7.9793     30.17  |QV        |         |         |         |
  4+15       8.1879     30.30  |QV        |         |         |         |
  4+20       8.3975     30.42  |QV        |         |         |         |
  4+25       8.6079     30.56  |QV        |         |         |         |
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 4+30       8.8192     30.68  |QV        |          |          |          |
 4+35       9.0315     30.82  |QV        |          |          |          |
 4+40       9.2447     30.95  |QV        |          |          |          |
 4+45       9.4588     31.09  |QV        |          |          |          |
 4+50       9.6738     31.23  |QV        |          |          |          |
 4+55       9.8899     31.37  |QV        |          |          |          |
 5+ 0      10.1069     31.51  |QV        |          |          |          |
 5+ 5      10.3249     31.65  |QV        |          |          |          |
 5+10      10.5438     31.79  |QV        |          |          |          |
 5+15      10.7638     31.94  |QV        |          |          |          |
 5+20      10.9848     32.09  |QV        |          |          |          |
 5+25      11.2069     32.24  |QV        |          |          |          |
 5+30      11.4299     32.39  |QV        |          |          |          |
 5+35      11.6541     32.55  |Q V       |          |          |          |
 5+40      11.8793     32.70  |Q V       |          |          |          |
 5+45      12.1056     32.86  |Q V       |          |          |          |
 5+50      12.3329     33.01  |Q V       |          |          |          |
 5+55      12.5614     33.18  |Q V       |          |          |          |
 6+ 0      12.7910     33.34  |Q V       |          |          |          |
 6+ 5      13.0218     33.51  |Q V       |          |          |          |
 6+10      13.2537     33.67  |Q V       |          |          |          |
 6+15      13.4868     33.84  |Q V       |          |          |          |
 6+20      13.7210     34.01  |Q V       |          |          |          |
 6+25      13.9565     34.19  |Q V       |          |          |          |
 6+30      14.1931     34.36  |Q V       |          |          |          |
 6+35      14.4310     34.54  |Q V       |          |          |          |
 6+40      14.6701     34.72  |Q V       |          |          |          |
 6+45      14.9106     34.91  |Q V       |          |          |          |
 6+50      15.1522     35.09  |Q V       |          |          |          |
 6+55      15.3952     35.28  |Q V       |          |          |          |
 7+ 0      15.6395     35.47  |Q  V      |          |          |          |
 7+ 5      15.8852     35.67  |Q  V      |          |          |          |
 7+10      16.1321     35.86  |Q  V      |          |          |          |
 7+15      16.3805     36.06  |Q  V      |          |          |          |
 7+20      16.6303     36.26  |Q  V      |          |          |          |
 7+25      16.8815     36.47  |Q  V      |          |          |          |
 7+30      17.1340     36.68  |Q  V      |          |          |          |
 7+35      17.3881     36.89  |Q  V      |          |          |          |
 7+40      17.6437     37.10  |Q  V      |          |          |          |
 7+45      17.9007     37.33  |Q  V      |          |          |          |
 7+50      18.1593     37.54  |Q  V      |          |          |          |
 7+55      18.4194     37.77  |Q  V      |          |          |          |
 8+ 0      18.6811     37.99  |Q  V      |          |          |          |
 8+ 5      18.9444     38.23  |Q  V      |          |          |          |
 8+10      19.2093     38.46  |Q  V      |          |          |          |
 8+15      19.4758     38.71  |Q   V     |          |          |          |
 8+20      19.7441     38.94  |Q   V     |          |          |          |
 8+25      20.0140     39.20  |Q   V     |          |          |          |
 8+30      20.2857     39.44  |Q   V     |          |          |          |
 8+35      20.5591     39.70  |Q   V     |          |          |          |
 8+40      20.8343     39.96  |Q   V     |          |          |          |
 8+45      21.1113     40.23  |Q   V     |          |          |          |
 8+50      21.3902     40.49  |Q   V     |          |          |          |
 8+55      21.6710     40.77  |Q   V     |          |          |          |
 9+ 0      21.9536     41.04  |Q   V     |          |          |          |
 9+ 5      22.2383     41.33  |Q   V     |          |          |          |
 9+10      22.5249     41.61  |Q   V     |          |          |          |
 9+15      22.8135     41.91  |Q   V     |          |          |          |
 9+20      23.1042     42.21  |Q   V     |          |          |          |
 9+25      23.3970     42.52  |Q    V    |          |          |          |
 9+30      23.6920     42.82  |Q    V    |          |          |          |
 9+35      23.9891     43.14  |Q    V    |          |          |          |
 9+40      24.2884     43.46  |Q    V    |          |          |          |
 9+45      24.5900     43.80  |Q    V    |          |          |          |
 9+50      24.8939     44.12  |Q    V    |          |          |          |
 9+55      25.2002     44.47  |Q    V    |          |          |          |
10+ 0      25.5088     44.81  |Q    V    |          |          |          |
10+ 5      25.8199     45.18  | Q   V    |          |          |          |
10+10      26.1335     45.53  | Q   V    |          |          |          |
10+15      26.4497     45.91  | Q   V    |          |          |          |
10+20      26.7685     46.28  | Q   V    |          |          |          |
10+25      27.0900     46.68  | Q   V    |          |          |          |
10+30      27.4141     47.07  | Q    V   |          |          |          |
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10+35      27.7411     47.48  | Q    V  |         |         |         |
10+40      28.0709     47.88  | Q    V  |         |         |         |
10+45      28.4036     48.31  | Q    V  |         |         |         |
10+50      28.7393     48.74  | Q    V  |         |         |         |
10+55      29.0781     49.19  | Q    V  |         |         |         |
11+ 0      29.4199     49.64  | Q    V  |         |         |         |
11+ 5      29.7650     50.11  | Q    V  |         |         |         |
11+10      30.1133     50.58  | Q    V  |         |         |         |
11+15      30.4651     51.07  | Q    V  |         |         |         |
11+20      30.8202     51.56  | Q    V  |         |         |         |
11+25      31.1789     52.09  | Q     V |         |         |         |
11+30      31.5412     52.60  | Q     V |         |         |         |
11+35      31.9073     53.15  | Q     V |         |         |         |
11+40      32.2771     53.70  | Q     V |         |         |         |
11+45      32.6509     54.28  | Q     V |         |         |         |
11+50      33.0287     54.86  | Q     V |         |         |         |
11+55      33.4108     55.47  | Q     V |         |         |         |
12+ 0      33.7970     56.08  | Q     V |         |         |         |
12+ 5      34.1891     56.93  | Q     V |         |         |         |
12+10      34.5892     58.10  | Q     V |         |         |         |
12+15      34.9993     59.54  | Q      V|         |         |         |
12+20      35.4209     61.22  | Q      V|         |         |         |
12+25      35.8578     63.44  | Q      V|         |         |         |
12+30      36.3156     66.47  | Q      V|         |         |         |
12+35      36.8063     71.26  |  Q     V|         |         |         |
12+40      37.3171     74.16  |  Q     V|         |         |         |
12+45      37.8429     76.35  |  Q     V|         |         |         |
12+50      38.3817     78.23  |  Q     V|         |         |         |
12+55      38.9325     79.97  |  Q      V         |         |         |
13+ 0      39.4946     81.62  |  Q      V         |         |         |
13+ 5      40.0678     83.23  |  Q      V         |         |         |
13+10      40.6516     84.76  |  Q      V         |         |         |
13+15      41.2460     86.31  |  Q      V         |         |         |
13+20      41.8507     87.80  |  Q      V         |         |         |
13+25      42.4660     89.34  |  Q      V         |         |         |
13+30      43.0916     90.84  |   Q     |V        |         |         |
13+35      43.7279     92.40  |   Q     |V        |         |         |
13+40      44.3748     93.93  |   Q     |V        |         |         |
13+45      45.0329     95.55  |   Q     |V        |         |         |
13+50      45.7018     97.13  |   Q     |V        |         |         |
13+55      46.3824     98.82  |   Q     |V        |         |         |
14+ 0      47.0745    100.50  |   Q     | V       |         |         |
14+ 5      47.7794    102.35  |   Q     | V       |         |         |
14+10      48.4973    104.24  |   Q     | V       |         |         |
14+15      49.2295    106.31  |   Q     | V       |         |         |
14+20      49.9763    108.44  |   Q     | V       |         |         |
14+25      50.7398    110.85  |   Q     |  V      |         |         |
14+30      51.5212    113.45  |    Q    |  V      |         |         |
14+35      52.3242    116.61  |    Q    |  V      |         |         |
14+40      53.1468    119.44  |    Q    |  V      |         |         |
14+45      53.9898    122.40  |    Q    |  V      |         |         |
14+50      54.8531    125.35  |    Q    |   V     |         |         |
14+55      55.7389    128.61  |    Q    |   V     |         |         |
15+ 0      56.6475    131.94  |    Q    |   V     |         |         |
15+ 5      57.5820    135.68  |     Q   |   V     |         |         |
15+10      58.5431    139.55  |     Q   |    V    |         |         |
15+15      59.5345    143.95  |     Q   |    V    |         |         |
15+20      60.5577    148.57  |     Q   |    V    |         |         |
15+25      61.6148    153.49  |     Q   |    V    |         |         |
15+30      62.7038    158.13  |      Q  |     V   |         |         |
15+35      63.8291    163.39  |      Q  |     V   |         |         |
15+40      64.9931    169.01  |      Q  |     V   |         |         |
15+45      66.2069    176.25  |      Q  |      V  |         |         |
15+50      67.4793    184.75  |       Q |      V  |         |         |
15+55      68.8270    195.68  |       Q |      V  |         |         |
16+ 0      70.3379    219.39  |        Q|       V |         |         |
16+ 5      72.2429    276.61  |         | Q     V |         |         |
16+10      74.6682    352.15  |         |    Q   V|         |         |
16+15      77.6070    426.72  |         |       Q V         |         |
16+20      81.0724    503.17  |         |         V Q       |         |
16+25      85.2907    612.50  |         |         | V    Q  |         |
16+30      90.3780    738.68  |         |         |  V       | Q       |
16+35      96.5101    890.39  |         |         |   V     |        Q|
```

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16+40     100.8341    627.84  |         |         |     VQ  |         |
16+45     104.1519    481.75  |         |         |Q    V   |         |
16+50     106.9708    409.30  |         |       Q |      V  |         |
16+55     109.4756    363.71  |         |     Q   |       V |         |
17+ 0     111.7779    334.29  |         |   Q     |       V |         |
17+ 5     113.8707    303.87  |         |  Q      |        V|         |
17+10     115.7928    279.09  |         | Q       |        V|         |
17+15     117.5751    258.79  |         |Q        |         V         |
17+20     119.2295    240.23  |         Q         |         V         |
17+25     120.7743    224.31  |        Q|         |         |V        |
17+30     122.2112    208.64  |        Q|         |         |V        |
17+35     123.5516    194.63  |       Q |         |         |V        |
17+40     124.8107    182.81  |       Q |         |         | V       |
17+45     125.9846    170.46  |      Q  |         |         | V       |
17+50     127.0813    159.23  |      Q  |         |         | V       |
17+55     128.1109    149.50  |     Q   |         |         |  V      |
18+ 0     129.0807    140.81  |     Q   |         |         |  V      |
18+ 5     129.9915    132.26  |    Q    |         |         |  V      |
18+10     130.8382    122.94  |    Q    |         |         |  V      |
18+15     131.6176    113.17  |    Q    |         |         |  V      |
18+20     132.3513    106.53  |   Q     |         |         |   V     |
18+25     133.0512    101.63  |   Q     |         |         |   V     |
18+30     133.7120     95.95  |   Q     |         |         |   V     |
18+35     134.3240     88.86  |  Q      |         |         |   V     |
18+40     134.9034     84.13  |  Q      |         |         |   V     |
18+45     135.4536     79.89  |  Q      |         |         |   V     |
18+50     135.9760     75.85  |  Q      |         |         |    V    |
18+55     136.4802     73.21  |  Q      |         |         |    V    |
19+ 0     136.9694     71.03  |  Q      |         |         |    V    |
19+ 5     137.4471     69.37  |  Q      |         |         |    V    |
19+10     137.9101     67.22  | Q       |         |         |    V    |
19+15     138.3567     64.84  | Q       |         |         |    V    |
19+20     138.7817     61.71  | Q       |         |         |    V    |
19+25     139.1917     59.53  | Q       |         |         |    V    |
19+30     139.5893     57.73  | Q       |         |         |     V   |
19+35     139.9724     55.63  | Q       |         |         |     V   |
19+40     140.3433     53.85  | Q       |         |         |     V   |
19+45     140.7040     52.38  | Q       |         |         |     V   |
19+50     141.0532     50.70  | Q       |         |         |     V   |
19+55     141.3914     49.11  | Q       |         |         |     V   |
20+ 0     141.7222     48.03  | Q       |         |         |     V   |
20+ 5     142.0463     47.05  | Q       |         |         |     V   |
20+10     142.3642     46.16  | Q       |         |         |     V   |
20+15     142.6764     45.33  | Q       |         |         |     V   |
20+20     142.9832     44.56  |Q        |         |         |     V   |
20+25     143.2850     43.82  |Q        |         |         |     V   |
20+30     143.5820     43.12  |Q        |         |         |      V  |
20+35     143.8743     42.45  |Q        |         |         |      V  |
20+40     144.1622     41.80  |Q        |         |         |      V  |
20+45     144.4459     41.19  |Q        |         |         |      V  |
20+50     144.7255     40.60  |Q        |         |         |      V  |
20+55     145.0012     40.04  |Q        |         |         |      V  |
21+ 0     145.2732     39.49  |Q        |         |         |      V  |
21+ 5     145.5415     38.96  |Q        |         |         |      V  |
21+10     145.8062     38.44  |Q        |         |         |      V  |
21+15     146.0676     37.95  |Q        |         |         |      V  |
21+20     146.3256     37.47  |Q        |         |         |      V  |
21+25     146.5806     37.02  |Q        |         |         |      V  |
21+30     146.8325     36.57  |Q        |         |         |      V  |
21+35     147.0814     36.15  |Q        |         |         |      V  |
21+40     147.3276     35.74  |Q        |         |         |       V |
21+45     147.5710     35.34  |Q        |         |         |       V |
21+50     147.8117     34.96  |Q        |         |         |       V |
21+55     148.0499     34.59  |Q        |         |         |       V |
22+ 0     148.2856     34.23  |Q        |         |         |       V |
22+ 5     148.5189     33.87  |Q        |         |         |       V |
22+10     148.7499     33.53  |Q        |         |         |       V |
22+15     148.9785     33.20  |Q        |         |         |       V |
22+20     149.2049     32.88  |Q        |         |         |       V |
22+25     149.4292     32.56  |Q        |         |         |       V |
22+30     149.6513     32.25  |Q        |         |         |       V |
22+35     149.8714     31.95  |Q        |         |         |       V |
22+40     150.0895     31.66  |Q        |         |         |       V |
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   22+45     150.3055     31.37  |Q        |         |         |       V |
   22+50     150.5197     31.09  |Q        |         |         |       V |
   22+55     150.7320     30.82  |Q        |         |         |       V |
   23+ 0     150.9424     30.55  |Q        |         |         |       V |
   23+ 5     151.1510     30.29  |Q        |         |         |        V|
   23+10     151.3579     30.04  |Q        |         |         |        V|
   23+15     151.5631     29.79  |Q        |         |         |        V|
   23+20     151.7665     29.54  |Q        |         |         |        V|
   23+25     151.9684     29.31  |Q        |         |         |        V|
   23+30     152.1686     29.07  |Q        |         |         |        V|
   23+35     152.3672     28.84  |Q        |         |         |        V|
   23+40     152.5643     28.62  |Q        |         |         |        V|
   23+45     152.7599     28.40  |Q        |         |         |        V|
   23+50     152.9539     28.18  |Q        |         |         |        V|
   23+55     153.1466     27.97  |Q        |         |         |        V|
   24+ 0     153.3377     27.76  |Q        |         |         |        V|
   24+ 5     153.5258     27.30  |Q        |         |         |        V|
   24+10     153.7079     26.45  |Q        |         |         |        V|
   24+15     153.8823     25.32  |Q        |         |         |        V|
   24+20     154.0468     23.89  |Q        |         |         |        V|
   24+25     154.1974     21.86  Q         |         |         |        V|
   24+30     154.3270     18.82  Q         |         |         |        V|
   24+35     154.4210     13.66  Q         |         |         |        V|
   24+40     154.4963     10.92  Q         |         |         |        V|
   24+45     154.5596      9.20  Q         |         |         |        V|
   24+50     154.6138      7.86  Q         |         |         |        V|
   24+55     154.6607      6.81  Q         |         |         |        V|
   25+ 0     154.7011      5.87  Q         |         |         |        V|
   25+ 5     154.7361      5.08  Q         |         |         |        V|
   25+10     154.7665      4.41  Q         |         |         |        V|
   25+15     154.7927      3.81  Q         |         |         |        V|
   25+20     154.8153      3.29  Q         |         |         |        V|
   25+25     154.8348      2.82  Q         |         |         |        V|
   25+30     154.8514      2.42  Q         |         |         |        V|
   25+35     154.8656      2.06  Q         |         |         |        V|
   25+40     154.8776      1.74  Q         |         |         |        V|
   25+45     154.8878      1.47  Q         |         |         |        V|
   25+50     154.8963      1.24  Q         |         |         |        V|
   25+55     154.9035      1.04  Q         |         |         |        V|
   26+ 0     154.9095      0.87  Q         |         |         |        V|
   26+ 5     154.9144      0.72  Q         |         |         |        V|
   26+10     154.9186      0.60  Q         |         |         |        V|
   26+15     154.9223      0.53  Q         |         |         |        V|
   26+20     154.9256      0.48  Q         |         |         |        V|
   26+25     154.9285      0.43  Q         |         |         |        V|
   26+30     154.9312      0.38  Q         |         |         |        V|
   26+35     154.9335      0.34  Q         |         |         |        V|
   26+40     154.9356      0.30  Q         |         |         |        V|
   26+45     154.9374      0.26  Q         |         |         |        V|
   26+50     154.9390      0.23  Q         |         |         |        V|
   26+55     154.9404      0.21  Q         |         |         |        V|
   27+ 0     154.9417      0.18  Q         |         |         |        V|
   27+ 5     154.9427      0.15  Q         |         |         |        V|
   27+10     154.9435      0.12  Q         |         |         |        V|
   27+15     154.9441      0.08  Q         |         |         |        V|
   27+20     154.9445      0.06  Q         |         |         |        V|
   27+25     154.9449      0.05  Q         |         |         |        V|
   27+30     154.9451      0.03  Q         |         |         |        V|
   27+35     154.9452      0.02  Q         |         |         |        V|
   27+40     154.9453      0.01  Q         |         |         |        V|
   27+45     154.9453      0.00  Q         |         |         |         V
-----------------------------------------------------------------------
```

U n i t H y d r o g r a p h A n a l y s i s

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Study date 08/03/15 File Name CieloVistaExWshdAUH10.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6049

WATERSHED A
EXISTING CONDITIONS - CREEK A
10-YEAR STORM
BY FUSCOE ENGINEERING

Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
82.0	0.2	0.00	B	0.300	1.000	0.300
72.0	0.2	0.00	B	0.300	1.000	0.300
79.0	365.1	0.55	C	0.250	1.000	0.250
84.0	264.3	0.40	D	0.200	1.000	0.200
82.0	2.5	0.00	B	0.300	1.000	0.300
72.0	2.5	0.00	B	0.300	1.000	0.300
79.0	3.7	0.01	C	0.250	1.000	0.250
84.0	23.1	0.03	D	0.200	1.000	0.200

Area-averaged adjusted loss rate Fm (In/Hr) = 0.229

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.20	0.000	82.0	82.0	2.20	0.525
0.20	0.000	72.0	72.0	3.89	0.337
365.10	0.552	79.0	79.0	2.66	0.464
264.30	0.399	84.0	84.0	1.90	0.568
2.50	0.004	82.0	82.0	2.20	0.525
2.50	0.004	72.0	72.0	3.89	0.337
3.70	0.006	79.0	79.0	2.66	0.464
23.10	0.035	84.0	84.0	1.90	0.568

Area-averaged catchment yield fraction, Y = 0.509
Area-averaged low loss fraction, Yb = 0.491
++
User entry of time of concentration = 0.723 (hours)
Watershed area = 661.60(Ac.)
Catchment Lag time = 0.578 hours

```
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 14.4115
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.229(In/Hr)
Average low loss rate fraction (Yb) = 0.491 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall =  0.340(In)
Computed peak 30-minute rainfall =  0.720(In)
Specified peak 1-hour rainfall =  0.950(In)
Computed peak 3-hour rainfall =  1.590(In)
Specified peak 6-hour rainfall =  2.200(In)
Specified peak 24-hour rainfall =  3.680(In)


Rainfall depth area reduction factors:
Using a total area of     661.60(Ac.) (Ref: fig. E-4)

5-minute factor = 0.969     Adjusted rainfall =  0.329(In)
30-minute factor = 0.969    Adjusted rainfall =  0.698(In)
1-hour factor = 0.969       Adjusted rainfall =  0.921(In)
3-hour factor = 0.996       Adjusted rainfall =  1.584(In)
6-hour factor = 0.998       Adjusted rainfall =  2.195(In)
24-hour factor = 0.999 Adjusted rainfall =  3.677(In)
----------------------------------------------------------------------

                      U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
----------------------------------------------------------------------
               (K =      8001.23 (CFS))

  1                0.913                  73.030
  2                3.173                 180.870
  3                6.383                 256.833
  4               10.595                 337.019
  5               16.518                 473.908
  6               24.901                 670.697
  7               40.633                1258.742
  8               55.356                1178.079
  9               62.562                 576.560
 10               67.895                 426.725
 11               72.147                 340.175
 12               75.613                 277.322
 13               78.739                 250.115
 14               81.394                 212.439
 15               83.691                 183.815
 16               85.741                 163.968
 17               87.535                 143.563
 18               89.191                 132.475
 19               90.595                 112.366
 20               91.881                 102.922
 21               93.031                  92.000
 22               94.030                  79.950
 23               94.929                  71.942
 24               95.656                  58.153
 25               96.319                  52.998
 26               96.900                  46.502
 27               97.393                  39.490
 28               97.790                  31.738
 29               98.029                  19.103
 30               98.202                  13.837
 31               98.375                  13.837
 32               98.539                  13.145
 33               98.684                  11.589
 34               98.828                  11.531
 35               98.969                  11.316
 36               99.070                   8.031
 37               99.156                   6.919
 38               99.243                   6.919
 39               99.339                   7.725
 40               99.454                   9.194
 41               99.569                   9.225
```

42	99.681	8.915
43	99.750	5.537
44	99.808	4.612
45	99.865	4.612
46	99.911	3.684
47	99.940	2.318
48	99.969	2.306
49	100.000	1.153

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3295	0.3295
2	0.4404	0.1110
3	0.5219	0.0815
4	0.5887	0.0668
5	0.6464	0.0577
6	0.6977	0.0513
7	0.7420	0.0444
8	0.7827	0.0407
9	0.8205	0.0378
10	0.8558	0.0353
11	0.8891	0.0333
12	0.9205	0.0315
13	0.9577	0.0371
14	0.9934	0.0357
15	1.0278	0.0344
16	1.0611	0.0333
17	1.0933	0.0323
18	1.1246	0.0313
19	1.1551	0.0304
20	1.1847	0.0296
21	1.2136	0.0289
22	1.2418	0.0282
23	1.2694	0.0276
24	1.2963	0.0270
25	1.3227	0.0264
26	1.3486	0.0259
27	1.3740	0.0254
28	1.3989	0.0249
29	1.4233	0.0245
30	1.4474	0.0240
31	1.4710	0.0236
32	1.4943	0.0232
33	1.5171	0.0229
34	1.5397	0.0225
35	1.5619	0.0222
36	1.5838	0.0219
37	1.6043	0.0206
38	1.6246	0.0203
39	1.6446	0.0200
40	1.6644	0.0197
41	1.6838	0.0195
42	1.7031	0.0192
43	1.7221	0.0190
44	1.7408	0.0188
45	1.7593	0.0185
46	1.7776	0.0183
47	1.7958	0.0181
48	1.8137	0.0179
49	1.8314	0.0177
50	1.8489	0.0175
51	1.8662	0.0173
52	1.8834	0.0172
53	1.9003	0.0170
54	1.9172	0.0168
55	1.9338	0.0166
56	1.9503	0.0165
57	1.9666	0.0163
58	1.9828	0.0162
59	1.9988	0.0160
60	2.0147	0.0159
61	2.0305	0.0158
62	2.0461	0.0156

63	2.0616	0.0155
64	2.0769	0.0154
65	2.0922	0.0152
66	2.1073	0.0151
67	2.1222	0.0150
68	2.1371	0.0149
69	2.1519	0.0148
70	2.1665	0.0146
71	2.1810	0.0145
72	2.1955	0.0144
73	2.2067	0.0113
74	2.2179	0.0112
75	2.2290	0.0111
76	2.2401	0.0110
77	2.2510	0.0109
78	2.2618	0.0108
79	2.2725	0.0107
80	2.2832	0.0107
81	2.2938	0.0106
82	2.3043	0.0105
83	2.3147	0.0104
84	2.3250	0.0103
85	2.3353	0.0103
86	2.3455	0.0102
87	2.3556	0.0101
88	2.3656	0.0100
89	2.3756	0.0100
90	2.3855	0.0099
91	2.3953	0.0098
92	2.4051	0.0098
93	2.4147	0.0097
94	2.4244	0.0096
95	2.4339	0.0096
96	2.4434	0.0095
97	2.4529	0.0094
98	2.4622	0.0094
99	2.4716	0.0093
100	2.4808	0.0093
101	2.4900	0.0092
102	2.4992	0.0091
103	2.5083	0.0091
104	2.5173	0.0090
105	2.5263	0.0090
106	2.5352	0.0089
107	2.5441	0.0089
108	2.5529	0.0088
109	2.5616	0.0088
110	2.5704	0.0087
111	2.5790	0.0087
112	2.5876	0.0086
113	2.5962	0.0086
114	2.6047	0.0085
115	2.6132	0.0085
116	2.6216	0.0084
117	2.6300	0.0084
118	2.6384	0.0083
119	2.6467	0.0083
120	2.6549	0.0083
121	2.6631	0.0082
122	2.6713	0.0082
123	2.6794	0.0081
124	2.6875	0.0081
125	2.6955	0.0080
126	2.7035	0.0080
127	2.7115	0.0080
128	2.7194	0.0079
129	2.7273	0.0079
130	2.7352	0.0078
131	2.7430	0.0078
132	2.7507	0.0078
133	2.7585	0.0077
134	2.7662	0.0077
135	2.7738	0.0077

136	2.7815	0.0076
137	2.7890	0.0076
138	2.7966	0.0076
139	2.8041	0.0075
140	2.8116	0.0075
141	2.8191	0.0075
142	2.8265	0.0074
143	2.8339	0.0074
144	2.8412	0.0074
145	2.8486	0.0073
146	2.8558	0.0073
147	2.8631	0.0073
148	2.8703	0.0072
149	2.8775	0.0072
150	2.8847	0.0072
151	2.8918	0.0071
152	2.8990	0.0071
153	2.9060	0.0071
154	2.9131	0.0071
155	2.9201	0.0070
156	2.9271	0.0070
157	2.9341	0.0070
158	2.9410	0.0069
159	2.9479	0.0069
160	2.9548	0.0069
161	2.9617	0.0069
162	2.9685	0.0068
163	2.9753	0.0068
164	2.9821	0.0068
165	2.9888	0.0068
166	2.9955	0.0067
167	3.0022	0.0067
168	3.0089	0.0067
169	3.0156	0.0067
170	3.0222	0.0066
171	3.0288	0.0066
172	3.0354	0.0066
173	3.0419	0.0066
174	3.0485	0.0065
175	3.0550	0.0065
176	3.0614	0.0065
177	3.0679	0.0065
178	3.0743	0.0064
179	3.0807	0.0064
180	3.0871	0.0064
181	3.0935	0.0064
182	3.0999	0.0063
183	3.1062	0.0063
184	3.1125	0.0063
185	3.1188	0.0063
186	3.1250	0.0063
187	3.1313	0.0062
188	3.1375	0.0062
189	3.1437	0.0062
190	3.1499	0.0062
191	3.1560	0.0062
192	3.1622	0.0061
193	3.1683	0.0061
194	3.1744	0.0061
195	3.1804	0.0061
196	3.1865	0.0061
197	3.1925	0.0060
198	3.1986	0.0060
199	3.2046	0.0060
200	3.2105	0.0060
201	3.2165	0.0060
202	3.2224	0.0059
203	3.2284	0.0059
204	3.2343	0.0059
205	3.2402	0.0059
206	3.2460	0.0059
207	3.2519	0.0059
208	3.2577	0.0058

209	3.2635	0.0058
210	3.2693	0.0058
211	3.2751	0.0058
212	3.2809	0.0058
213	3.2866	0.0057
214	3.2924	0.0057
215	3.2981	0.0057
216	3.3038	0.0057
217	3.3095	0.0057
218	3.3151	0.0057
219	3.3208	0.0056
220	3.3264	0.0056
221	3.3320	0.0056
222	3.3376	0.0056
223	3.3432	0.0056
224	3.3488	0.0056
225	3.3543	0.0056
226	3.3599	0.0055
227	3.3654	0.0055
228	3.3709	0.0055
229	3.3764	0.0055
230	3.3819	0.0055
231	3.3873	0.0055
232	3.3928	0.0054
233	3.3982	0.0054
234	3.4036	0.0054
235	3.4090	0.0054
236	3.4144	0.0054
237	3.4198	0.0054
238	3.4252	0.0054
239	3.4305	0.0053
240	3.4358	0.0053
241	3.4412	0.0053
242	3.4465	0.0053
243	3.4518	0.0053
244	3.4570	0.0053
245	3.4623	0.0053
246	3.4675	0.0053
247	3.4728	0.0052
248	3.4780	0.0052
249	3.4832	0.0052
250	3.4884	0.0052
251	3.4936	0.0052
252	3.4988	0.0052
253	3.5039	0.0052
254	3.5091	0.0051
255	3.5142	0.0051
256	3.5193	0.0051
257	3.5244	0.0051
258	3.5295	0.0051
259	3.5346	0.0051
260	3.5397	0.0051
261	3.5447	0.0051
262	3.5498	0.0050
263	3.5548	0.0050
264	3.5598	0.0050
265	3.5649	0.0050
266	3.5699	0.0050
267	3.5748	0.0050
268	3.5798	0.0050
269	3.5848	0.0050
270	3.5897	0.0050
271	3.5947	0.0049
272	3.5996	0.0049
273	3.6045	0.0049
274	3.6094	0.0049
275	3.6143	0.0049
276	3.6192	0.0049
277	3.6241	0.0049
278	3.6289	0.0049
279	3.6338	0.0049
280	3.6386	0.0048
281	3.6435	0.0048

282	3.6483	0.0048
283	3.6531	0.0048
284	3.6579	0.0048
285	3.6627	0.0048
286	3.6674	0.0048
287	3.6722	0.0048
288	3.6770	0.0048

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0048	0.0023	0.0024
2	0.0048	0.0023	0.0024
3	0.0048	0.0023	0.0024
4	0.0048	0.0024	0.0024
5	0.0048	0.0024	0.0025
6	0.0048	0.0024	0.0025
7	0.0049	0.0024	0.0025
8	0.0049	0.0024	0.0025
9	0.0049	0.0024	0.0025
10	0.0049	0.0024	0.0025
11	0.0049	0.0024	0.0025
12	0.0049	0.0024	0.0025
13	0.0050	0.0024	0.0025
14	0.0050	0.0024	0.0025
15	0.0050	0.0024	0.0025
16	0.0050	0.0025	0.0025
17	0.0050	0.0025	0.0026
18	0.0050	0.0025	0.0026
19	0.0051	0.0025	0.0026
20	0.0051	0.0025	0.0026
21	0.0051	0.0025	0.0026
22	0.0051	0.0025	0.0026
23	0.0051	0.0025	0.0026
24	0.0051	0.0025	0.0026
25	0.0052	0.0025	0.0026
26	0.0052	0.0025	0.0026
27	0.0052	0.0026	0.0027
28	0.0052	0.0026	0.0027
29	0.0053	0.0026	0.0027
30	0.0053	0.0026	0.0027
31	0.0053	0.0026	0.0027
32	0.0053	0.0026	0.0027
33	0.0053	0.0026	0.0027
34	0.0053	0.0026	0.0027
35	0.0054	0.0026	0.0027
36	0.0054	0.0026	0.0027
37	0.0054	0.0027	0.0028
38	0.0054	0.0027	0.0028
39	0.0055	0.0027	0.0028
40	0.0055	0.0027	0.0028
41	0.0055	0.0027	0.0028
42	0.0055	0.0027	0.0028
43	0.0056	0.0027	0.0028
44	0.0056	0.0027	0.0028
45	0.0056	0.0028	0.0029
46	0.0056	0.0028	0.0029
47	0.0056	0.0028	0.0029
48	0.0057	0.0028	0.0029
49	0.0057	0.0028	0.0029
50	0.0057	0.0028	0.0029
51	0.0057	0.0028	0.0029
52	0.0058	0.0028	0.0029
53	0.0058	0.0028	0.0030
54	0.0058	0.0029	0.0030
55	0.0059	0.0029	0.0030
56	0.0059	0.0029	0.0030
57	0.0059	0.0029	0.0030
58	0.0059	0.0029	0.0030
59	0.0060	0.0029	0.0030
60	0.0060	0.0029	0.0030
61	0.0060	0.0030	0.0031

62	0.0060	0.0030	0.0031
63	0.0061	0.0030	0.0031
64	0.0061	0.0030	0.0031
65	0.0061	0.0030	0.0031
66	0.0062	0.0030	0.0031
67	0.0062	0.0030	0.0032
68	0.0062	0.0031	0.0032
69	0.0063	0.0031	0.0032
70	0.0063	0.0031	0.0032
71	0.0063	0.0031	0.0032
72	0.0063	0.0031	0.0032
73	0.0064	0.0031	0.0033
74	0.0064	0.0031	0.0033
75	0.0065	0.0032	0.0033
76	0.0065	0.0032	0.0033
77	0.0065	0.0032	0.0033
78	0.0066	0.0032	0.0033
79	0.0066	0.0032	0.0034
80	0.0066	0.0033	0.0034
81	0.0067	0.0033	0.0034
82	0.0067	0.0033	0.0034
83	0.0068	0.0033	0.0034
84	0.0068	0.0033	0.0034
85	0.0068	0.0034	0.0035
86	0.0069	0.0034	0.0035
87	0.0069	0.0034	0.0035
88	0.0069	0.0034	0.0035
89	0.0070	0.0034	0.0036
90	0.0070	0.0034	0.0036
91	0.0071	0.0035	0.0036
92	0.0071	0.0035	0.0036
93	0.0072	0.0035	0.0036
94	0.0072	0.0035	0.0037
95	0.0073	0.0036	0.0037
96	0.0073	0.0036	0.0037
97	0.0074	0.0036	0.0037
98	0.0074	0.0036	0.0038
99	0.0075	0.0037	0.0038
100	0.0075	0.0037	0.0038
101	0.0076	0.0037	0.0038
102	0.0076	0.0037	0.0039
103	0.0077	0.0038	0.0039
104	0.0077	0.0038	0.0039
105	0.0078	0.0038	0.0040
106	0.0078	0.0038	0.0040
107	0.0079	0.0039	0.0040
108	0.0079	0.0039	0.0040
109	0.0080	0.0039	0.0041
110	0.0080	0.0039	0.0041
111	0.0081	0.0040	0.0041
112	0.0082	0.0040	0.0042
113	0.0083	0.0041	0.0042
114	0.0083	0.0041	0.0042
115	0.0084	0.0041	0.0043
116	0.0084	0.0041	0.0043
117	0.0085	0.0042	0.0043
118	0.0086	0.0042	0.0044
119	0.0087	0.0043	0.0044
120	0.0087	0.0043	0.0044
121	0.0088	0.0043	0.0045
122	0.0089	0.0044	0.0045
123	0.0090	0.0044	0.0046
124	0.0090	0.0044	0.0046
125	0.0091	0.0045	0.0047
126	0.0092	0.0045	0.0047
127	0.0093	0.0046	0.0047
128	0.0094	0.0046	0.0048
129	0.0095	0.0047	0.0048
130	0.0096	0.0047	0.0049
131	0.0097	0.0048	0.0049
132	0.0098	0.0048	0.0050
133	0.0099	0.0049	0.0050
134	0.0100	0.0049	0.0051

135	0.0101	0.0050	0.0051
136	0.0102	0.0050	0.0052
137	0.0103	0.0051	0.0053
138	0.0104	0.0051	0.0053
139	0.0106	0.0052	0.0054
140	0.0107	0.0052	0.0054
141	0.0108	0.0053	0.0055
142	0.0109	0.0054	0.0056
143	0.0111	0.0055	0.0057
144	0.0112	0.0055	0.0057
145	0.0144	0.0071	0.0073
146	0.0145	0.0071	0.0074
147	0.0148	0.0072	0.0075
148	0.0149	0.0073	0.0076
149	0.0151	0.0074	0.0077
150	0.0152	0.0075	0.0078
151	0.0155	0.0076	0.0079
152	0.0156	0.0077	0.0079
153	0.0159	0.0078	0.0081
154	0.0160	0.0079	0.0082
155	0.0163	0.0080	0.0083
156	0.0165	0.0081	0.0084
157	0.0168	0.0083	0.0086
158	0.0170	0.0083	0.0086
159	0.0173	0.0085	0.0088
160	0.0175	0.0086	0.0089
161	0.0179	0.0088	0.0091
162	0.0181	0.0089	0.0092
163	0.0185	0.0091	0.0094
164	0.0188	0.0092	0.0095
165	0.0192	0.0094	0.0098
166	0.0195	0.0096	0.0099
167	0.0200	0.0098	0.0102
168	0.0203	0.0100	0.0103
169	0.0219	0.0107	0.0111
170	0.0222	0.0109	0.0113
171	0.0229	0.0112	0.0116
172	0.0232	0.0114	0.0118
173	0.0240	0.0118	0.0122
174	0.0245	0.0120	0.0124
175	0.0254	0.0125	0.0129
176	0.0259	0.0127	0.0132
177	0.0270	0.0132	0.0137
178	0.0276	0.0135	0.0140
179	0.0289	0.0142	0.0147
180	0.0296	0.0146	0.0151
181	0.0313	0.0154	0.0159
182	0.0323	0.0158	0.0164
183	0.0344	0.0169	0.0175
184	0.0357	0.0175	0.0182
185	0.0315	0.0155	0.0160
186	0.0333	0.0163	0.0169
187	0.0378	0.0185	0.0192
188	0.0407	0.0191	0.0216
189	0.0513	0.0191	0.0322
190	0.0577	0.0191	0.0386
191	0.0815	0.0191	0.0624
192	0.1110	0.0191	0.0919
193	0.3295	0.0191	0.3104
194	0.0668	0.0191	0.0478
195	0.0444	0.0191	0.0253
196	0.0353	0.0173	0.0180
197	0.0371	0.0182	0.0189
198	0.0333	0.0163	0.0169
199	0.0304	0.0149	0.0155
200	0.0282	0.0138	0.0144
201	0.0264	0.0130	0.0134
202	0.0249	0.0122	0.0127
203	0.0236	0.0116	0.0120
204	0.0225	0.0111	0.0115
205	0.0206	0.0101	0.0105
206	0.0197	0.0097	0.0100
207	0.0190	0.0093	0.0097

208	0.0183	0.0090	0.0093
209	0.0177	0.0087	0.0090
210	0.0172	0.0084	0.0087
211	0.0166	0.0082	0.0085
212	0.0162	0.0079	0.0082
213	0.0158	0.0077	0.0080
214	0.0154	0.0075	0.0078
215	0.0150	0.0074	0.0076
216	0.0146	0.0072	0.0075
217	0.0113	0.0055	0.0057
218	0.0110	0.0054	0.0056
219	0.0107	0.0053	0.0055
220	0.0105	0.0052	0.0053
221	0.0103	0.0050	0.0052
222	0.0100	0.0049	0.0051
223	0.0098	0.0048	0.0050
224	0.0096	0.0047	0.0049
225	0.0094	0.0046	0.0048
226	0.0093	0.0045	0.0047
227	0.0091	0.0045	0.0046
228	0.0089	0.0044	0.0045
229	0.0088	0.0043	0.0045
230	0.0086	0.0042	0.0044
231	0.0085	0.0042	0.0043
232	0.0083	0.0041	0.0042
233	0.0082	0.0040	0.0042
234	0.0081	0.0040	0.0041
235	0.0080	0.0039	0.0041
236	0.0078	0.0039	0.0040
237	0.0077	0.0038	0.0039
238	0.0076	0.0037	0.0039
239	0.0075	0.0037	0.0038
240	0.0074	0.0036	0.0038
241	0.0073	0.0036	0.0037
242	0.0072	0.0036	0.0037
243	0.0071	0.0035	0.0036
244	0.0071	0.0035	0.0036
245	0.0070	0.0034	0.0035
246	0.0069	0.0034	0.0035
247	0.0068	0.0033	0.0035
248	0.0067	0.0033	0.0034
249	0.0067	0.0033	0.0034
250	0.0066	0.0032	0.0033
251	0.0065	0.0032	0.0033
252	0.0064	0.0032	0.0033
253	0.0064	0.0031	0.0032
254	0.0063	0.0031	0.0032
255	0.0062	0.0031	0.0032
256	0.0062	0.0030	0.0031
257	0.0061	0.0030	0.0031
258	0.0061	0.0030	0.0031
259	0.0060	0.0029	0.0031
260	0.0059	0.0029	0.0030
261	0.0059	0.0029	0.0030
262	0.0058	0.0029	0.0030
263	0.0058	0.0028	0.0029
264	0.0057	0.0028	0.0029
265	0.0057	0.0028	0.0029
266	0.0056	0.0028	0.0029
267	0.0056	0.0027	0.0028
268	0.0055	0.0027	0.0028
269	0.0055	0.0027	0.0028
270	0.0054	0.0027	0.0028
271	0.0054	0.0027	0.0028
272	0.0054	0.0026	0.0027
273	0.0053	0.0026	0.0027
274	0.0053	0.0026	0.0027
275	0.0052	0.0026	0.0027
276	0.0052	0.0026	0.0026
277	0.0052	0.0025	0.0026
278	0.0051	0.0025	0.0026
279	0.0051	0.0025	0.0026
280	0.0050	0.0025	0.0026

281	0.0050	0.0025	0.0026
282	0.0050	0.0024	0.0025
283	0.0049	0.0024	0.0025
284	0.0049	0.0024	0.0025
285	0.0049	0.0024	0.0025
286	0.0048	0.0024	0.0025
287	0.0048	0.0024	0.0024
288	0.0048	0.0023	0.0024

Total soil rain loss = 1.57(In)
Total effective rainfall = 2.10(In)
Peak flow rate in flood hydrograph = 657.98(CFS)

++

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

```
Time(h+m) Volume Ac.Ft   Q(CFS)  0      175.0     350.0     525.0     700.0
-------------------------------------------------------------------------
  0+ 5       0.0012      0.18  Q         |         |         |         |
  0+10       0.0055      0.61  Q         |         |         |         |
  0+15       0.0140      1.24  Q         |         |         |         |
  0+20       0.0281      2.06  Q         |         |         |         |
  0+25       0.0503      3.21  Q         |         |         |         |
  0+30       0.0836      4.84  Q         |         |         |         |
  0+35       0.1381      7.90  Q         |         |         |         |
  0+40       0.2123     10.78  Q         |         |         |         |
  0+45       0.2964     12.21  Q         |         |         |         |
  0+50       0.3879     13.28  Q         |         |         |         |
  0+55       0.4853     14.15  Q         |         |         |         |
  1+ 0       0.5877     14.87  Q         |         |         |         |
  1+ 5       0.6946     15.52  Q         |         |         |         |
  1+10       0.8054     16.09  Q         |         |         |         |
  1+15       0.9197     16.59  Q         |         |         |         |
  1+20       1.0370     17.04  Q         |         |         |         |
  1+25       1.1572     17.45  Q         |         |         |         |
  1+30       1.2800     17.83  VQ        |         |         |         |
  1+35       1.4051     18.16  VQ        |         |         |         |
  1+40       1.5323     18.47  VQ        |         |         |         |
  1+45       1.6615     18.76  VQ        |         |         |         |
  1+50       1.7925     19.02  VQ        |         |         |         |
  1+55       1.9251     19.26  VQ        |         |         |         |
  2+ 0       2.0592     19.47  VQ        |         |         |         |
  2+ 5       2.1947     19.67  VQ        |         |         |         |
  2+10       2.3314     19.85  VQ        |         |         |         |
  2+15       2.4693     20.02  VQ        |         |         |         |
  2+20       2.6082     20.17  VQ        |         |         |         |
  2+25       2.7479     20.29  VQ        |         |         |         |
  2+30       2.8883     20.39  VQ        |         |         |         |
  2+35       3.0295     20.50  |Q        |         |         |         |
  2+40       3.1715     20.61  |Q        |         |         |         |
  2+45       3.3142     20.72  |Q        |         |         |         |
  2+50       3.4576     20.82  |Q        |         |         |         |
  2+55       3.6017     20.93  |Q        |         |         |         |
  3+ 0       3.7465     21.03  |Q        |         |         |         |
  3+ 5       3.8920     21.12  |Q        |         |         |         |
  3+10       4.0381     21.22  |Q        |         |         |         |
  3+15       4.1850     21.32  |Q        |         |         |         |
  3+20       4.3325     21.43  |Q        |         |         |         |
  3+25       4.4808     21.53  |Q        |         |         |         |
  3+30       4.6298     21.64  |Q        |         |         |         |
  3+35       4.7796     21.74  |Q        |         |         |         |
  3+40       4.9299     21.84  |Q        |         |         |         |
  3+45       5.0810     21.93  |Q        |         |         |         |
  3+50       5.2327     22.03  |Q        |         |         |         |
  3+55       5.3851     22.13  |Q        |         |         |         |
  4+ 0       5.5382     22.22  |Q        |         |         |         |
  4+ 5       5.6918     22.32  |Q        |         |         |         |
  4+10       5.8462     22.41  |QV       |         |         |         |
```

```
 4+15       6.0011     22.50  |QV       |         |         |         |
 4+20       6.1568     22.60  |QV       |         |         |         |
 4+25       6.3130     22.69  |QV       |         |         |         |
 4+30       6.4700     22.79  |QV       |         |         |         |
 4+35       6.6276     22.89  |QV       |         |         |         |
 4+40       6.7859     22.98  |QV       |         |         |         |
 4+45       6.9449     23.08  |QV       |         |         |         |
 4+50       7.1045     23.18  |QV       |         |         |         |
 4+55       7.2649     23.29  |QV       |         |         |         |
 5+ 0       7.4260     23.39  |QV       |         |         |         |
 5+ 5       7.5878     23.49  |QV       |         |         |         |
 5+10       7.7503     23.60  |QV       |         |         |         |
 5+15       7.9136     23.71  |QV       |         |         |         |
 5+20       8.0776     23.81  |QV       |         |         |         |
 5+25       8.2424     23.92  |QV       |         |         |         |
 5+30       8.4079     24.03  |QV       |         |         |         |
 5+35       8.5742     24.15  |QV       |         |         |         |
 5+40       8.7413     24.26  |Q V      |         |         |         |
 5+45       8.9091     24.37  |Q V      |         |         |         |
 5+50       9.0778     24.49  |Q V      |         |         |         |
 5+55       9.2473     24.61  |Q V      |         |         |         |
 6+ 0       9.4176     24.73  |Q V      |         |         |         |
 6+ 5       9.5887     24.85  |Q V      |         |         |         |
 6+10       9.7607     24.97  |Q V      |         |         |         |
 6+15       9.9335     25.09  |Q V      |         |         |         |
 6+20      10.1072     25.22  |Q V      |         |         |         |
 6+25      10.2817     25.35  |Q V      |         |         |         |
 6+30      10.4572     25.47  |Q V      |         |         |         |
 6+35      10.6335     25.60  |Q V      |         |         |         |
 6+40      10.8107     25.74  |Q V      |         |         |         |
 6+45      10.9889     25.87  |Q V      |         |         |         |
 6+50      11.1680     26.01  |Q V      |         |         |         |
 6+55      11.3481     26.14  |Q V      |         |         |         |
 7+ 0      11.5291     26.28  |Q V      |         |         |         |
 7+ 5      11.7111     26.42  |Q  V     |         |         |         |
 7+10      11.8941     26.57  |Q  V     |         |         |         |
 7+15      12.0780     26.71  |Q  V     |         |         |         |
 7+20      12.2630     26.86  |Q  V     |         |         |         |
 7+25      12.4491     27.01  |Q  V     |         |         |         |
 7+30      12.6361     27.16  |Q  V     |         |         |         |
 7+35      12.8243     27.32  |Q  V     |         |         |         |
 7+40      13.0135     27.47  |Q  V     |         |         |         |
 7+45      13.2038     27.63  |Q  V     |         |         |         |
 7+50      13.3952     27.79  |Q  V     |         |         |         |
 7+55      13.5877     27.96  |Q  V     |         |         |         |
 8+ 0      13.7814     28.12  |Q  V     |         |         |         |
 8+ 5      13.9763     28.29  |Q  V     |         |         |         |
 8+10      14.1723     28.46  |Q  V     |         |         |         |
 8+15      14.3695     28.64  |Q  V     |         |         |         |
 8+20      14.5679     28.81  |Q   V    |         |         |         |
 8+25      14.7676     28.99  |Q   V    |         |         |         |
 8+30      14.9686     29.18  |Q   V    |         |         |         |
 8+35      15.1708     29.36  |Q   V    |         |         |         |
 8+40      15.3743     29.55  |Q   V    |         |         |         |
 8+45      15.5792     29.74  |Q   V    |         |         |         |
 8+50      15.7853     29.94  |Q   V    |         |         |         |
 8+55      15.9929     30.14  |Q   V    |         |         |         |
 9+ 0      16.2018     30.34  |Q   V    |         |         |         |
 9+ 5      16.4122     30.55  |Q   V    |         |         |         |
 9+10      16.6240     30.75  |Q   V    |         |         |         |
 9+15      16.8373     30.97  |Q   V    |         |         |         |
 9+20      17.0521     31.18  |Q   V    |         |         |         |
 9+25      17.2684     31.41  |Q   V    |         |         |         |
 9+30      17.4862     31.63  |Q    V   |         |         |         |
 9+35      17.7056     31.86  |Q    V   |         |         |         |
 9+40      17.9267     32.09  |Q    V   |         |         |         |
 9+45      18.1494     32.33  |Q    V   |         |         |         |
 9+50      18.3737     32.58  |Q    V   |         |         |         |
 9+55      18.5998     32.82  |Q    V   |         |         |         |
10+ 0      18.8276     33.08  |Q    V   |         |         |         |
10+ 5      19.0572     33.34  |Q    V   |         |         |         |
10+10      19.2885     33.60  |Q    V   |         |         |         |
10+15      19.5218     33.87  |Q    V   |         |         |         |
```

```
10+20      19.7569     34.14  |Q    V   |          |          |          |
10+25      19.9940     34.42  |Q    V   |          |          |          |
10+30      20.2330     34.71  |Q    V   |          |          |          |
10+35      20.4741     35.00  | Q    V  |          |          |          |
10+40      20.7172     35.30  | Q    V  |          |          |          |
10+45      20.9624     35.61  | Q    V  |          |          |          |
10+50      21.2098     35.92  | Q    V  |          |          |          |
10+55      21.4594     36.24  | Q    V  |          |          |          |
11+ 0      21.7112     36.57  | Q    V  |          |          |          |
11+ 5      21.9654     36.90  | Q    V  |          |          |          |
11+10      22.2219     37.25  | Q    V  |          |          |          |
11+15      22.4808     37.60  | Q    V  |          |          |          |
11+20      22.7423     37.96  | Q    V  |          |          |          |
11+25      23.0062     38.33  | Q    V  |          |          |          |
11+30      23.2728     38.71  | Q     V |          |          |          |
11+35      23.5421     39.10  | Q     V |          |          |          |
11+40      23.8142     39.50  | Q     V |          |          |          |
11+45      24.0891     39.91  | Q     V |          |          |          |
11+50      24.3668     40.33  | Q     V |          |          |          |
11+55      24.6476     40.77  | Q     V |          |          |          |
12+ 0      24.9315     41.22  | Q     V |          |          |          |
12+ 5      25.2193     41.79  | Q     V |          |          |          |
12+10      25.5123     42.54  | Q     V |          |          |          |
12+15      25.8113     43.43  | Q     V |          |          |          |
12+20      26.1175     44.45  | Q      V|          |          |          |
12+25      26.4322     45.70  | Q      V|          |          |          |
12+30      26.7579     47.28  | Q      V|          |          |          |
12+35      27.1007     49.78  | Q      V|          |          |          |
12+40      27.4601     52.18  | Q      V|          |          |          |
12+45      27.8298     53.69  |  Q     V|          |          |          |
12+50      28.2085     54.98  |  Q     V|          |          |          |
12+55      28.5953     56.16  |  Q     V|          |          |          |
13+ 0      28.9897     57.28  |  Q      V          |          |          |
13+ 5      29.3917     58.37  |  Q      V          |          |          |
13+10      29.8011     59.44  |  Q      V          |          |          |
13+15      30.2177     60.49  |  Q      V          |          |          |
13+20      30.6415     61.54  |  Q      V          |          |          |
13+25      31.0725     62.59  |  Q      V          |          |          |
13+30      31.5109     63.65  |  Q      V          |          |          |
13+35      31.9567     64.73  |  Q      |V         |          |          |
13+40      32.4100     65.82  |  Q      |V         |          |          |
13+45      32.8711     66.94  |  Q      |V         |          |          |
13+50      33.3400     68.09  |  Q      |V         |          |          |
13+55      33.8171     69.27  |  Q      |V         |          |          |
14+ 0      34.3025     70.48  |   Q     |V         |          |          |
14+ 5      34.7968     71.78  |   Q     | V        |          |          |
14+10      35.3008     73.18  |   Q     | V        |          |          |
14+15      35.8151     74.67  |   Q     | V        |          |          |
14+20      36.3403     76.27  |   Q     | V        |          |          |
14+25      36.8775     77.99  |   Q     | V        |          |          |
14+30      37.4277     79.89  |   Q     | V        |          |          |
14+35      37.9937     82.19  |   Q     |  V       |          |          |
14+40      38.5759     84.54  |   Q     |  V       |          |          |
14+45      39.1731     86.71  |   Q     |  V       |          |          |
14+50      39.7856     88.93  |    Q    |  V       |          |          |
14+55      40.4141     91.26  |    Q    |  V       |          |          |
15+ 0      41.0594     93.70  |    Q    |   V      |          |          |
15+ 5      41.7229     96.33  |    Q    |   V      |          |          |
15+10      42.4057     99.14  |    Q    |   V      |          |          |
15+15      43.1097    102.22  |    Q    |   V      |          |          |
15+20      43.8366    105.55  |     Q   |    V     |          |          |
15+25      44.5873    108.99  |     Q   |    V     |          |          |
15+30      45.3615    112.42  |     Q   |    V     |          |          |
15+35      46.1612    116.12  |     Q   |    V     |          |          |
15+40      46.9890    120.19  |     Q   |     V    |          |          |
15+45      47.8517    125.27  |      Q  |     V    |          |          |
15+50      48.7589    131.72  |      Q  |     V    |          |          |
15+55      49.7221    139.85  |      Q  |      V   |          |          |
16+ 0      50.7879    154.77  |       Q |      V   |          |          |
16+ 5      52.1329    195.29  |         |Q     V   |          |          |
16+10      53.8415    248.08  |         |   Q   V  |          |          |
16+15      55.9001    298.91  |         |      Q V|          |          |
16+20      58.3386    354.07  |         |         Q          |          |
```

```
16+25      61.2855    427.89  |         |         |V  Q     |         |
16+30      64.8387    515.92  |         |         | V      Q|         |
16+35      69.3702    657.98  |         |         |  V      |      Q  |
16+40      73.4991    599.52  |         |         |    V    |   Q     |
16+45      76.3122    408.45  |         |         |  Q  V   |         |
16+50      78.6186    334.89  |         |       Q|      V  |         |
16+55      80.6322    292.37  |         |     Q   |      V  |         |
17+ 0      82.4400    262.50  |         |    Q    |       V |         |
17+ 5      84.1077    242.15  |         |  Q      |        V|         |
17+10      85.6302    221.06  |         | Q       |        V|         |
17+15      87.0314    203.45  |         |Q        |         V         |
17+20      88.3342    189.17  |         Q         |         V         |
17+25      89.5446    175.75  |         Q         |         V         |
17+30      90.6810    165.01  |        Q|         |         |V        |
17+35      91.7319    152.59  |       Q |         |         |V        |
17+40      92.7184    143.23  |       Q |         |         | V       |
17+45      93.6435    134.33  |      Q  |         |         | V       |
17+50      94.5086    125.61  |      Q  |         |         | V       |
17+55      95.3223    118.15  |     Q   |         |         | V       |
18+ 0      96.0789    109.86  |     Q   |         |         |  V      |
18+ 5      96.7942    103.85  |    Q    |         |         |  V      |
18+10      97.4665     97.62  |    Q    |         |         |  V      |
18+15      98.0950     91.25  |    Q    |         |         |  V      |
18+20      98.6786     84.74  |   Q     |         |         |   V     |
18+25      99.2121     77.47  |   Q     |         |         |   V     |
18+30      99.7106     72.38  |   Q     |         |         |   V     |
18+35     100.1801     68.18  |  Q      |         |         |   V     |
18+40     100.6222     64.19  |  Q      |         |         |   V     |
18+45     101.0428     61.08  |  Q      |         |         |   V     |
18+50     101.4467     58.64  |  Q      |         |         |    V    |
18+55     101.8349     56.36  |  Q      |         |         |    V    |
19+ 0     102.2042     53.62  |  Q      |         |         |    V    |
19+ 5     102.5598     51.64  | Q       |         |         |    V    |
19+10     102.9056     50.21  | Q       |         |         |    V    |
19+15     103.2440     49.13  | Q       |         |         |    V    |
19+20     103.5760     48.21  | Q       |         |         |    V    |
19+25     103.8989     46.89  | Q       |         |         |    V    |
19+30     104.2115     45.39  | Q       |         |         |    V    |
19+35     104.5094     43.26  | Q       |         |         |     V   |
19+40     104.7975     41.83  | Q       |         |         |     V   |
19+45     105.0779     40.71  | Q       |         |         |     V   |
19+50     105.3494     39.42  | Q       |         |         |     V   |
19+55     105.6117     38.09  | Q       |         |         |     V   |
20+ 0     105.8674     37.12  | Q       |         |         |     V   |
20+ 5     106.1150     35.96  | Q       |         |         |     V   |
20+10     106.3553     34.89  |Q        |         |         |     V   |
20+15     106.5908     34.19  |Q        |         |         |     V   |
20+20     106.8219     33.56  |Q        |         |         |     V   |
20+25     107.0491     32.99  |Q        |         |         |     V   |
20+30     107.2725     32.44  |Q        |         |         |      V  |
20+35     107.4924     31.92  |Q        |         |         |      V  |
20+40     107.7089     31.43  |Q        |         |         |      V  |
20+45     107.9221     30.96  |Q        |         |         |      V  |
20+50     108.1322     30.51  |Q        |         |         |      V  |
20+55     108.3393     30.07  |Q        |         |         |      V  |
21+ 0     108.5435     29.66  |Q        |         |         |      V  |
21+ 5     108.7450     29.26  |Q        |         |         |      V  |
21+10     108.9439     28.88  |Q        |         |         |      V  |
21+15     109.1402     28.50  |Q        |         |         |      V  |
21+20     109.3340     28.14  |Q        |         |         |      V  |
21+25     109.5254     27.79  |Q        |         |         |      V  |
21+30     109.7145     27.45  |Q        |         |         |      V  |
21+35     109.9013     27.13  |Q        |         |         |      V  |
21+40     110.0860     26.82  |Q        |         |         |      V  |
21+45     110.2686     26.51  |Q        |         |         |       V |
21+50     110.4492     26.22  |Q        |         |         |       V |
21+55     110.6278     25.94  |Q        |         |         |       V |
22+ 0     110.8046     25.66  |Q        |         |         |       V |
22+ 5     110.9795     25.40  |Q        |         |         |       V |
22+10     111.1526     25.14  |Q        |         |         |       V |
22+15     111.3240     24.89  |Q        |         |         |       V |
22+20     111.4938     24.65  |Q        |         |         |       V |
22+25     111.6619     24.41  |Q        |         |         |       V |
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 22+30     111.8284     24.18  |Q         |         |         |       V |
 22+35     111.9933     23.95  |Q         |         |         |       V |
 22+40     112.1567     23.73  |Q         |         |         |       V |
 22+45     112.3187     23.52  |Q         |         |         |       V |
 22+50     112.4792     23.31  |Q         |         |         |       V |
 22+55     112.6383     23.10  |Q         |         |         |       V |
 23+ 0     112.7960     22.90  |Q         |         |         |       V |
 23+ 5     112.9524     22.70  |Q         |         |         |       V |
 23+10     113.1074     22.51  |Q         |         |         |        V|
 23+15     113.2612     22.33  |Q         |         |         |        V|
 23+20     113.4137     22.14  |Q         |         |         |        V|
 23+25     113.5649     21.96  |Q         |         |         |        V|
 23+30     113.7150     21.79  |Q         |         |         |        V|
 23+35     113.8639     21.62  |Q         |         |         |        V|
 23+40     114.0116     21.45  |Q         |         |         |        V|
 23+45     114.1581     21.28  |Q         |         |         |        V|
 23+50     114.3036     21.12  |Q         |         |         |        V|
 23+55     114.4480     20.96  |Q         |         |         |        V|
 24+ 0     114.5913     20.81  |Q         |         |         |        V|
 24+ 5     114.7323     20.48  |Q         |         |         |        V|
 24+10     114.8693     19.89  |Q         |         |         |        V|
 24+15     115.0010     19.13  |Q         |         |         |        V|
 24+20     115.1262     18.18  |Q         |         |         |        V|
 24+25     115.2427     16.91  Q          |         |         |        V|
 24+30     115.3471     15.17  Q          |         |         |        V|
 24+35     115.4299     12.02  Q          |         |         |        V|
 24+40     115.4926      9.09  Q          |         |         |        V|
 24+45     115.5452      7.64  Q          |         |         |        V|
 24+50     115.5903      6.55  Q          |         |         |        V|
 24+55     115.6294      5.68  Q          |         |         |        V|
 25+ 0     115.6637      4.97  Q          |         |         |        V|
 25+ 5     115.6935      4.33  Q          |         |         |        V|
 25+10     115.7196      3.79  Q          |         |         |        V|
 25+15     115.7425      3.32  Q          |         |         |        V|
 25+20     115.7625      2.90  Q          |         |         |        V|
 25+25     115.7799      2.53  Q          |         |         |        V|
 25+30     115.7951      2.20  Q          |         |         |        V|
 25+35     115.8082      1.91  Q          |         |         |        V|
 25+40     115.8196      1.65  Q          |         |         |        V|
 25+45     115.8293      1.41  Q          |         |         |        V|
 25+50     115.8376      1.21  Q          |         |         |        V|
 25+55     115.8447      1.03  Q          |         |         |        V|
 26+ 0     115.8508      0.88  Q          |         |         |        V|
 26+ 5     115.8559      0.75  Q          |         |         |        V|
 26+10     115.8602      0.63  Q          |         |         |        V|
 26+15     115.8639      0.53  Q          |         |         |        V|
 26+20     115.8670      0.45  Q          |         |         |        V|
 26+25     115.8697      0.40  Q          |         |         |        V|
 26+30     115.8722      0.36  Q          |         |         |        V|
 26+35     115.8745      0.33  Q          |         |         |        V|
 26+40     115.8765      0.29  Q          |         |         |        V|
 26+45     115.8783      0.26  Q          |         |         |        V|
 26+50     115.8799      0.23  Q          |         |         |        V|
 26+55     115.8813      0.20  Q          |         |         |        V|
 27+ 0     115.8826      0.18  Q          |         |         |        V|
 27+ 5     115.8837      0.17  Q          |         |         |        V|
 27+10     115.8847      0.15  Q          |         |         |        V|
 27+15     115.8856      0.13  Q          |         |         |        V|
 27+20     115.8863      0.10  Q          |         |         |        V|
 27+25     115.8869      0.08  Q          |         |         |        V|
 27+30     115.8873      0.06  Q          |         |         |        V|
 27+35     115.8876      0.05  Q          |         |         |        V|
 27+40     115.8878      0.03  Q          |         |         |        V|
 27+45     115.8880      0.02  Q          |         |         |        V|
 27+50     115.8881      0.01  Q          |         |         |        V|
 27+55     115.8882      0.01  Q          |         |         |        V|
 28+ 0     115.8882      0.00  Q          |         |         |         V
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Creek "E"
Existing Rational Method Calculations
10, 25 & 100-Year Storms

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                    Orange County Rational Hydrology Program

                (Hydrology Manual Date(s) October 1986 & November 1996)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2004 Version 8.0
        Rational Hydrology Study, Date: 08/03/15  File Name: CVEXWE.roc
----------------------------------------------------------------------
WATERSHED E
EXISTING CONDITIONS - CREEK E
100-YEAR STORM
BY FUSCOE ENGINEERING
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Program License Serial Number 6049

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 *********   Hydrology Study Control Information **********

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Rational hydrology study storm event year is   100.0

Decimal fraction of study above 2000 ft., 600M  =     0.0000
English Units Used for input data


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =   817.000(Ft.)
Bottom (of initial area) elevation =   765.000(Ft.)
Difference in elevation =    52.000(Ft.)
Slope =    0.17333  s(%)=      17.33
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.815 min.
Rainfall intensity =      4.204(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.857
Subarea runoff =      1.081(CFS)
Total initial stream area =        0.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   765.000(Ft.)
Downstream point elevation =   645.000(Ft.)
Channel length thru subarea  =   630.000(Ft.)
Channel base width     =   10.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =      6.606(CFS)
Manning's 'N'    = 0.035
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =      6.606(CFS)
Depth of flow =   0.135(Ft.), Average velocity =   4.770(Ft/s)
Channel flow top width =   10.539(Ft.)
Flow Velocity =    4.77(Ft/s)
Travel time  =    2.20 min.
Time of concentration =   12.02 min.
```

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Critical depth =      0.234(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.700
SCS curve number for soil(AMC 2)  = 82.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.215(In/Hr)
Max Catchment Loss (Fm) =     0.215(In/Hr)
Rainfall intensity =      3.744(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.849
Subarea runoff =     10.991(CFS) for    3.500(Ac.)
Total runoff =     12.072(CFS)        Total area =        3.80(Ac.)
Area averaged Fm value =    0.214(In/Hr)
Depth of flow =   0.193(Ft.), Average velocity =   6.012(Ft/s)
Critical depth =      0.348(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   645.000(Ft.)
Downstream point elevation =   638.000(Ft.)
Channel length thru subarea  =   141.000(Ft.)
Channel base width     =   10.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Manning's 'N'    = 0.035
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     12.072(CFS)
Depth of flow =   0.289(Ft.), Average velocity =   3.955(Ft/s)
Channel flow top width =   11.154(Ft.)
Flow Velocity =    3.96(Ft/s)
Travel time  =    0.59 min.
Time of concentration =   12.61 min.
Critical depth =      0.348(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.800(Ac.)
Runoff from this stream =     12.072(CFS)
Time of concentration =   12.61 min.
Rainfall intensity =     3.642(In/Hr)
Area averaged loss rate (Fm) =    0.2138(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      104.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =   817.000(Ft.)
Bottom (of initial area) elevation =   699.000(Ft.)
Difference in elevation =   118.000(Ft.)
Slope =    0.39333  s(%)=      39.33
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
```

```
Initial area time of concentration =    8.331 min.
Rainfall intensity =      4.618(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.861
Subarea runoff =      3.579(CFS)
Total initial stream area =        0.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   699.000(Ft.)
Downstream point elevation =   638.000(Ft.)
Channel length thru subarea  =   468.000(Ft.)
Channel base width     =   10.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =     10.801(CFS)
Manning's 'N'    = 0.035
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     10.801(CFS)
Depth of flow =   0.203(Ft.), Average velocity =   5.124(Ft/s)
Channel flow top width =   10.810(Ft.)
Flow Velocity =    5.12(Ft/s)
Travel time  =    1.52 min.
Time of concentration =    9.85 min.
Critical depth =      0.324(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.900
SCS curve number for soil(AMC 2)  = 83.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.205(In/Hr)
Max Catchment Loss (Fm) =     0.205(In/Hr)
Rainfall intensity =      4.195(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.856
Subarea runoff =     14.379(CFS) for    4.100(Ac.)
Total runoff =     17.957(CFS)        Total area =        5.00(Ac.)
Area averaged Fm value =    0.204(In/Hr)
Depth of flow =   0.274(Ft.), Average velocity =   6.207(Ft/s)
Critical depth =      0.453(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      5.000(Ac.)
Runoff from this stream =     17.957(CFS)
Time of concentration =    9.85 min.
Rainfall intensity =     4.195(In/Hr)
Area averaged loss rate (Fm) =    0.2041(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1      3.80    12.072     12.61    0.214      3.642
2      5.00    17.957      9.85    0.204      4.195
Qmax(1) =
          1.000 *    1.000 *    12.072) +
          0.861 *    1.000 *    17.957) + =      27.541
Qmax(2) =
          1.161 *    0.781 *    12.072) +
          1.000 *    1.000 *    17.957) + =      28.912

Total of 2 streams to confluence:
```

```
Flow rates before confluence point:
      12.072      17.957
Maximum flow rates at confluence using above data:
       27.541       28.912
Area of streams before confluence:
        3.800        5.000
Effective area values after confluence:
        8.800        7.969
Results of confluence:
Total flow rate =     28.912(CFS)
Time of concentration =     9.853 min.
Effective stream area after confluence =      7.969(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.208(In/Hr)
Study area total (this main stream) =       8.80(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   638.000(Ft.)
Downstream point elevation =   609.000(Ft.)
Channel length thru subarea  =   663.000(Ft.)
Channel base width    =   30.000(Ft.)
Slope or 'Z' of left channel bank =   5.000
Slope or 'Z' of right channel bank =   5.000
Estimated mean flow rate at midpoint of channel =     40.636(CFS)
Manning's 'N'    = 0.035
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     40.636(CFS)
Depth of flow =   0.320(Ft.), Average velocity =   4.016(Ft/s)
Channel flow top width =   33.202(Ft.)
Flow Velocity =    4.02(Ft/s)
Travel time  =    2.75 min.
Time of concentration =   12.60 min.
Critical depth =      0.375(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.400
SCS curve number for soil(AMC 2)  = 81.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.230(In/Hr)
Max Catchment Loss (Fm) =     0.230(In/Hr)
Rainfall intensity =      3.643(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.846
Subarea runoff =     23.361(CFS) for    9.000(Ac.)
Total runoff =     52.273(CFS)       Total area =       16.97(Ac.)
Area averaged Fm value =    0.220(In/Hr)
Depth of flow =   0.372(Ft.), Average velocity =   4.414(Ft/s)
Critical depth =      0.445(Ft.)
End of computations, total study area =           17.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number (AMC 2) =  82.1
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                    Orange County Rational Hydrology Program

                (Hydrology Manual Date(s) October 1986 & November 1996)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2004 Version 8.0
        Rational Hydrology Study, Date: 08/03/15  File Name: CVEXWE25.roc
----------------------------------------------------------------------
WATERSHED E
EXISTING CONDITIONS - CREEK E
25-YEAR STORM
BY FUSCOE ENGINEERING
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Program License Serial Number 6049

----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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Rational hydrology study storm event year is    25.0

Decimal fraction of study above 2000 ft., 600M  =     0.0000
English Units Used for input data


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =   817.000(Ft.)
Bottom (of initial area) elevation =   765.000(Ft.)
Difference in elevation =    52.000(Ft.)
Slope =    0.17333  s(%)=      17.33
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.815 min.
Rainfall intensity =      3.293(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.845
Subarea runoff =      0.835(CFS)
Total initial stream area =        0.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   765.000(Ft.)
Downstream point elevation =   645.000(Ft.)
Channel length thru subarea  =   630.000(Ft.)
Channel base width     =   10.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =      5.067(CFS)
Manning's 'N'    = 0.035
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =      5.067(CFS)
Depth of flow =   0.115(Ft.), Average velocity =   4.304(Ft/s)
Channel flow top width =   10.460(Ft.)
Flow Velocity =    4.30(Ft/s)
Travel time  =    2.44 min.
Time of concentration =   12.25 min.
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```
Critical depth =      0.197(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.700
SCS curve number for soil(AMC 2)  = 82.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.215(In/Hr)
Max Catchment Loss (Fm) =     0.215(In/Hr)
Rainfall intensity =      2.904(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.834
Subarea runoff =      8.366(CFS) for    3.500(Ac.)
Total runoff =      9.201(CFS)        Total area =        3.80(Ac.)
Area averaged Fm value =    0.214(In/Hr)
Depth of flow =   0.164(Ft.), Average velocity =   5.419(Ft/s)
Critical depth =      0.293(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   645.000(Ft.)
Downstream point elevation =   638.000(Ft.)
Channel length thru subarea  =   141.000(Ft.)
Channel base width     =   10.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Manning's 'N'    = 0.035
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =      9.201(CFS)
Depth of flow =   0.246(Ft.), Average velocity =   3.573(Ft/s)
Channel flow top width =   10.982(Ft.)
Flow Velocity =    3.57(Ft/s)
Travel time  =    0.66 min.
Time of concentration =   12.91 min.
Critical depth =      0.293(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.800(Ac.)
Runoff from this stream =      9.201(CFS)
Time of concentration =   12.91 min.
Rainfall intensity =     2.820(In/Hr)
Area averaged loss rate (Fm) =    0.2138(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      104.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =   817.000(Ft.)
Bottom (of initial area) elevation =   699.000(Ft.)
Difference in elevation =   118.000(Ft.)
Slope =    0.39333  s(%)=      39.33
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
```

```
Initial area time of concentration =    8.331 min.
Rainfall intensity =      3.613(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.850
Subarea runoff =      2.765(CFS)
Total initial stream area =        0.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   699.000(Ft.)
Downstream point elevation =   638.000(Ft.)
Channel length thru subarea  =   468.000(Ft.)
Channel base width     =   10.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =      8.277(CFS)
Manning's 'N'    = 0.035
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =      8.277(CFS)
Depth of flow =   0.173(Ft.), Average velocity =   4.629(Ft/s)
Channel flow top width =   10.691(Ft.)
Flow Velocity =    4.63(Ft/s)
Travel time  =    1.68 min.
Time of concentration =   10.02 min.
Critical depth =      0.273(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.900
SCS curve number for soil(AMC 2)  = 83.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.205(In/Hr)
Max Catchment Loss (Fm) =     0.205(In/Hr)
Rainfall intensity =      3.255(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.844
Subarea runoff =     10.966(CFS) for    4.100(Ac.)
Total runoff =     13.731(CFS)        Total area =        5.00(Ac.)
Area averaged Fm value =    0.204(In/Hr)
Depth of flow =   0.234(Ft.), Average velocity =   5.612(Ft/s)
Critical depth =      0.379(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      5.000(Ac.)
Runoff from this stream =     13.731(CFS)
Time of concentration =   10.02 min.
Rainfall intensity =     3.255(In/Hr)
Area averaged loss rate (Fm) =    0.2041(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1      3.80     9.201     12.91    0.214      2.820
2      5.00    13.731     10.02    0.204      3.255
Qmax(1) =
          1.000 *    1.000 *     9.201) +
          0.857 *    1.000 *    13.731) + =      20.971
Qmax(2) =
          1.167 *    0.776 *     9.201) +
          1.000 *    1.000 *    13.731) + =      22.062

Total of 2 streams to confluence:
```

```
Flow rates before confluence point:
       9.201      13.731
Maximum flow rates at confluence using above data:
       20.971       22.062
Area of streams before confluence:
        3.800        5.000
Effective area values after confluence:
        8.800        7.948
Results of confluence:
Total flow rate =     22.062(CFS)
Time of concentration =    10.016 min.
Effective stream area after confluence =      7.948(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.208(In/Hr)
Study area total (this main stream) =       8.80(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   638.000(Ft.)
Downstream point elevation =   609.000(Ft.)
Channel length thru subarea  =   663.000(Ft.)
Channel base width     =   30.000(Ft.)
Slope or 'Z' of left channel bank =   5.000
Slope or 'Z' of right channel bank =   5.000
Estimated mean flow rate at midpoint of channel =     30.744(CFS)
Manning's 'N'    = 0.035
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     30.744(CFS)
Depth of flow =   0.271(Ft.), Average velocity =   3.614(Ft/s)
Channel flow top width =   32.713(Ft.)
Flow Velocity =    3.61(Ft/s)
Travel time  =    3.06 min.
Time of concentration =   13.07 min.
Critical depth =      0.313(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.400
SCS curve number for soil(AMC 2)  = 81.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.230(In/Hr)
Max Catchment Loss (Fm) =     0.230(In/Hr)
Rainfall intensity =      2.800(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.829
Subarea runoff =     17.289(CFS) for    9.000(Ac.)
Total runoff =     39.351(CFS)       Total area =       16.95(Ac.)
Area averaged Fm value =    0.220(In/Hr)
Depth of flow =   0.314(Ft.), Average velocity =   3.968(Ft/s)
Critical depth =      0.367(Ft.)
End of computations, total study area =           17.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number (AMC 2) =  82.1
```

```
                    Orange County Rational Hydrology Program

                (Hydrology Manual Date(s) October 1986 & November 1996)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2004 Version 8.0
        Rational Hydrology Study, Date: 08/03/15  File Name: CVEXWE10.roc
----------------------------------------------------------------------
WATERSHED E
EXISTING CONDITIONS - CREEK F
10-YEAR STORM
BY FUSCOE ENGINEERING
----------------------------------------------------------------------


Program License Serial Number 6049

----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

----------------------------------------------------------------------

Rational hydrology study storm event year is    10.0

Decimal fraction of study above 2000 ft., 600M  =     0.0000
English Units Used for input data


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =   817.000(Ft.)
Bottom (of initial area) elevation =   765.000(Ft.)
Difference in elevation =    52.000(Ft.)
Slope =    0.17333  s(%)=      17.33
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.815 min.
Rainfall intensity =      2.758(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.835
Subarea runoff =      0.691(CFS)
Total initial stream area =        0.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   765.000(Ft.)
Downstream point elevation =   645.000(Ft.)
Channel length thru subarea  =   630.000(Ft.)
Channel base width     =   10.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =      4.139(CFS)
Manning's 'N'    = 0.035
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =      4.139(CFS)
Depth of flow =   0.102(Ft.), Average velocity =   3.979(Ft/s)
Channel flow top width =   10.408(Ft.)
Flow Velocity =    3.98(Ft/s)
Travel time  =    2.64 min.
Time of concentration =   12.45 min.
```

```
Critical depth =      0.172(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.700
SCS curve number for soil(AMC 2)  = 82.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.215(In/Hr)
Max Catchment Loss (Fm) =     0.215(In/Hr)
Rainfall intensity =      2.406(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.820
Subarea runoff =      6.808(CFS) for    3.500(Ac.)
Total runoff =      7.499(CFS)        Total area =        3.80(Ac.)
Area averaged Fm value =    0.214(In/Hr)
Depth of flow =   0.145(Ft.), Average velocity =   5.009(Ft/s)
Critical depth =      0.254(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   645.000(Ft.)
Downstream point elevation =   638.000(Ft.)
Channel length thru subarea  =   141.000(Ft.)
Channel base width     =   10.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Manning's 'N'    = 0.035
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =      7.499(CFS)
Depth of flow =   0.217(Ft.), Average velocity =   3.307(Ft/s)
Channel flow top width =   10.869(Ft.)
Flow Velocity =    3.31(Ft/s)
Travel time  =    0.71 min.
Time of concentration =   13.16 min.
Critical depth =      0.254(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.800(Ac.)
Runoff from this stream =      7.499(CFS)
Time of concentration =   13.16 min.
Rainfall intensity =     2.331(In/Hr)
Area averaged loss rate (Fm) =    0.2138(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      104.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =   817.000(Ft.)
Bottom (of initial area) elevation =   699.000(Ft.)
Difference in elevation =   118.000(Ft.)
Slope =    0.39333  s(%)=      39.33
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
```

```
Initial area time of concentration =    8.331 min.
Rainfall intensity =      3.030(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.841
Subarea runoff =      2.292(CFS)
Total initial stream area =        0.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   699.000(Ft.)
Downstream point elevation =   638.000(Ft.)
Channel length thru subarea  =   468.000(Ft.)
Channel base width     =   10.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =      6.802(CFS)
Manning's 'N'    = 0.035
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =      6.802(CFS)
Depth of flow =   0.154(Ft.), Average velocity =   4.293(Ft/s)
Channel flow top width =   10.615(Ft.)
Flow Velocity =    4.29(Ft/s)
Travel time  =    1.82 min.
Time of concentration =   10.15 min.
Critical depth =      0.238(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.900
SCS curve number for soil(AMC 2)  = 83.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.205(In/Hr)
Max Catchment Loss (Fm) =     0.205(In/Hr)
Rainfall intensity =      2.706(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.832
Subarea runoff =      8.966(CFS) for    4.100(Ac.)
Total runoff =     11.259(CFS)        Total area =        5.00(Ac.)
Area averaged Fm value =    0.204(In/Hr)
Depth of flow =   0.208(Ft.), Average velocity =   5.206(Ft/s)
Critical depth =      0.332(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      5.000(Ac.)
Runoff from this stream =     11.259(CFS)
Time of concentration =   10.15 min.
Rainfall intensity =     2.706(In/Hr)
Area averaged loss rate (Fm) =    0.2041(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1      3.80     7.499     13.16    0.214      2.331
2      5.00    11.259     10.15    0.204      2.706
Qmax(1) =
          1.000 *    1.000 *     7.499) +
          0.850 *    1.000 *    11.259) + =      17.070
Qmax(2) =
          1.177 *    0.771 *     7.499) +
          1.000 *    1.000 *    11.259) + =      18.063

Total of 2 streams to confluence:
```

```
Flow rates before confluence point:
       7.499      11.259
Maximum flow rates at confluence using above data:
       17.070       18.063
Area of streams before confluence:
        3.800        5.000
Effective area values after confluence:
        8.800        7.929
Results of confluence:
Total flow rate =     18.063(CFS)
Time of concentration =    10.148 min.
Effective stream area after confluence =      7.929(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.208(In/Hr)
Study area total (this main stream) =       8.80(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   638.000(Ft.)
Downstream point elevation =   609.000(Ft.)
Channel length thru subarea  =   663.000(Ft.)
Channel base width     =   30.000(Ft.)
Slope or 'Z' of left channel bank =   5.000
Slope or 'Z' of right channel bank =   5.000
Estimated mean flow rate at midpoint of channel =     24.924(CFS)
Manning's 'N'    = 0.035
Maximum depth of channel  =   20.000(Ft.)
Flow(q) thru subarea =     24.924(CFS)
Depth of flow =   0.239(Ft.), Average velocity =   3.336(Ft/s)
Channel flow top width =   32.395(Ft.)
Flow Velocity =    3.34(Ft/s)
Travel time  =    3.31 min.
Time of concentration =   13.46 min.
Critical depth =      0.273(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.400
SCS curve number for soil(AMC 2)  = 81.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.230(In/Hr)
Max Catchment Loss (Fm) =     0.230(In/Hr)
Rainfall intensity =      2.302(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.814
Subarea runoff =     13.657(CFS) for    9.000(Ac.)
Total runoff =     31.719(CFS)       Total area =       16.93(Ac.)
Area averaged Fm value =    0.220(In/Hr)
Depth of flow =   0.276(Ft.), Average velocity =   3.657(Ft/s)
Critical depth =      0.320(Ft.)
End of computations, total study area =           17.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number (AMC 2) =  82.1
```

Creek "B" (Upstream of Site)
Existing Rational Method Calculations
10, 25 & 100-Year Storms

```
                    Orange County Rational Hydrology Program

                (Hydrology Manual Date(s) October 1986 & November 1996)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2004 Version 8.0
        Rational Hydrology Study, Date: 07/30/15  File Name: EXBCREEK.roc
----------------------------------------------------------------------
PLANNING AREA 2
EXISTING CONDITION - CREEK B
100-YEAR STORM
BY FUSCOE ENGINEERING
----------------------------------------------------------------------


Program License Serial Number 6049

----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

----------------------------------------------------------------------

Rational hydrology study storm event year is   100.0

Decimal fraction of study above 2000 ft., 600M  =     0.0000
English Units Used for input data


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      240.000 to Point/Station      240.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.630
Decimal fraction soil group D = 0.370
SCS curve number for soil(AMC 2)  = 76.22
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.231(In/Hr)
Max Catchment Loss (Fm) =     0.231(In/Hr)
Rainfall intensity =      2.697(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  21.30 min.  Rain intensity =       2.70(In/Hr)
Total area =       181.14(Ac.)  Total runoff =    402.16(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      240.000 to Point/Station      201.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =    414.658(CFS)
Depth of flow =   3.212(Ft.), Average velocity =  11.300(Ft/s)
       ******* Irregular Channel Data ***********
-------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
-------------------------------------------------------------------
Sub-Channel flow  =    414.658(CFS)
  '     '       flow top width =     17.848(Ft.)
  '     '    velocity=   11.300(Ft/s)
  '     '       area =     36.694(Sq.Ft)
  '     '       Froude number =     1.389

Upstream point elevation =   695.000(Ft.)
Downstream point elevation =   654.000(Ft.)
Flow length =   665.000(Ft.)
Travel time  =    0.98 min.
Time of concentration =   22.28 min.
```

```
Depth of flow =   3.212(Ft.)
Average velocity =  11.300(Ft/s)
Total irregular channel flow =   414.658(CFS)
Irregular channel normal depth above invert elev. =   3.212(Ft.)
Average velocity of channel(s) =  11.300(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.800
SCS curve number for soil(AMC 2)  = 78.80
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.210(In/Hr)
Max Catchment Loss (Fm) =     0.210(In/Hr)
Rainfall intensity =      2.628(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.821
Subarea runoff =     24.893(CFS) for   16.700(Ac.)
Total runoff =    427.056(CFS)        Total area =      197.84(Ac.)
Area averaged Fm value =    0.230(In/Hr)
Depth of flow =   3.257(Ft.), Average velocity =  11.387(Ft/s)
End of computations, total study area =          197.84 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number (AMC 2) =  76.4
```

```
                    Orange County Rational Hydrology Program

                (Hydrology Manual Date(s) October 1986 & November 1996)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2004 Version 8.0
        Rational Hydrology Study, Date: 07/30/15  File Name: EXBCREEK25.roc
----------------------------------------------------------------------
PLANNING AREA 2
EXISTING CONDITION - CREEK B
25-YEAR STORM
BY FUSCOE ENGINEERING
----------------------------------------------------------------------


Program License Serial Number 6049

----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

----------------------------------------------------------------------

Rational hydrology study storm event year is    25.0

Decimal fraction of study above 2000 ft., 600M  =     0.0000
English Units Used for input data


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      240.000 to Point/Station      240.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.630
Decimal fraction soil group D = 0.370
SCS curve number for soil(AMC 2)  = 76.22
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.231(In/Hr)
Max Catchment Loss (Fm) =     0.231(In/Hr)
Rainfall intensity =      2.076(In/Hr) for a    25.0 year storm
User specified values are as follows:
TC =  22.17 min.  Rain intensity =       2.08(In/Hr)
Total area =       181.14(Ac.)  Total runoff =    301.00(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      240.000 to Point/Station      201.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =    310.126(CFS)
Depth of flow =   2.795(Ft.), Average velocity =  10.476(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
-----------------------------------------------------------------
Sub-Channel flow  =    310.126(CFS)
  '     '       flow top width =     16.181(Ft.)
  '     '    velocity=   10.476(Ft/s)
  '     '       area =     29.602(Sq.Ft)
  '     '       Froude number =     1.365

Upstream point elevation =   695.000(Ft.)
Downstream point elevation =   654.000(Ft.)
Flow length =   665.000(Ft.)
Travel time  =    1.06 min.
Time of concentration =   23.23 min.
```

```
Depth of flow =   2.795(Ft.)
Average velocity =  10.476(Ft/s)
Total irregular channel flow =   310.126(CFS)
Irregular channel normal depth above invert elev. =   2.795(Ft.)
Average velocity of channel(s) =  10.476(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.800
SCS curve number for soil(AMC 2)  = 78.80
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.210(In/Hr)
Max Catchment Loss (Fm) =     0.210(In/Hr)
Rainfall intensity =      2.022(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.798
Subarea runoff =     18.185(CFS) for   16.700(Ac.)
Total runoff =    319.180(CFS)        Total area =      197.84(Ac.)
Area averaged Fm value =    0.230(In/Hr)
Depth of flow =   2.834(Ft.), Average velocity =  10.556(Ft/s)
End of computations, total study area =          197.84 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number (AMC 2) =  76.4
```

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                    Orange County Rational Hydrology Program

                (Hydrology Manual Date(s) October 1986 & November 1996)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2004 Version 8.0
        Rational Hydrology Study, Date: 07/30/15  File Name: EXBCREEK10.roc
----------------------------------------------------------------------
PLANNING AREA 2
EXISTING CONDITION - CREEK B
10-YEAR STORM
BY FUSCOE ENGINEERING
----------------------------------------------------------------------


Program License Serial Number 6049

----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

----------------------------------------------------------------------

Rational hydrology study storm event year is    10.0

Decimal fraction of study above 2000 ft., 600M  =     0.0000
English Units Used for input data


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      240.000 to Point/Station      240.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.630
Decimal fraction soil group D = 0.370
SCS curve number for soil(AMC 2)  = 76.22
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.231(In/Hr)
Max Catchment Loss (Fm) =     0.231(In/Hr)
Rainfall intensity =      1.698(In/Hr) for a    10.0 year storm
User specified values are as follows:
TC =  22.89 min.  Rain intensity =       1.70(In/Hr)
Total area =       181.14(Ac.)  Total runoff =    239.22(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      240.000 to Point/Station      201.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =    246.257(CFS)
Depth of flow =   2.498(Ft.), Average velocity =   9.859(Ft/s)
       ******* Irregular Channel Data ***********
-------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
-------------------------------------------------------------------
Sub-Channel flow  =    246.257(CFS)
  '     '       flow top width =     14.994(Ft.)
  '     '    velocity=    9.859(Ft/s)
  '     '       area =     24.977(Sq.Ft)
  '     '       Froude number =     1.346

Upstream point elevation =   695.000(Ft.)
Downstream point elevation =   654.000(Ft.)
Flow length =   665.000(Ft.)
Travel time  =    1.12 min.
Time of concentration =   24.01 min.
```

```
Depth of flow =   2.498(Ft.)
Average velocity =   9.859(Ft/s)
Total irregular channel flow =   246.257(CFS)
Irregular channel normal depth above invert elev. =   2.498(Ft.)
Average velocity of channel(s) =   9.859(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.800
SCS curve number for soil(AMC 2)  = 78.80
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.210(In/Hr)
Max Catchment Loss (Fm) =     0.210(In/Hr)
Rainfall intensity =      1.652(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.775
Subarea runoff =     14.006(CFS) for   16.700(Ac.)
Total runoff =    253.228(CFS)        Total area =      197.84(Ac.)
Area averaged Fm value =    0.230(In/Hr)
Depth of flow =   2.533(Ft.), Average velocity =   9.932(Ft/s)
End of computations, total study area =          197.84 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number (AMC 2) =  76.4
```

Creek "F"
Existing Rational Method Calculations
10, 25 & 100-Year Storms

```
                    Orange County Rational Hydrology Program

                (Hydrology Manual Date(s) October 1986 & November 1996)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2004 Version 8.0
        Rational Hydrology Study, Date: 07/31/15  File Name: exfcreek.roc
----------------------------------------------------------------------
PLANNING AREA 2
EXISTING CONDITION - CREEK F
100-YEAR STORM
BY FUSCOE ENGINEERING
----------------------------------------------------------------------


Program License Serial Number 6049

----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

----------------------------------------------------------------------

Rational hydrology study storm event year is   100.0

Decimal fraction of study above 2000 ft., 600M  =     0.0000
English Units Used for input data


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      501.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.080
Decimal fraction soil group C = 0.490
Decimal fraction soil group D = 0.430
SCS curve number for soil(AMC 2)  = 75.54
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.232(In/Hr)
Max Catchment Loss (Fm) =     0.232(In/Hr)
Rainfall intensity =      2.604(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  22.65 min.  Rain intensity =       2.60(In/Hr)
Total area =      1366.51(Ac.)  Total runoff =   3401.84(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      603.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   8.958(Ft.), Average velocity =  16.573(Ft/s)
       ******* Irregular Channel Data ***********
-------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
-------------------------------------------------------------------
Sub-Channel flow  =   3401.833(CFS)
  '     '       flow top width =     40.831(Ft.)
  '     '    velocity=   16.573(Ft/s)
  '     '       area =    205.267(Sq.Ft)
  '     '       Froude number =     1.303

Upstream point elevation =   610.000(Ft.)
Downstream point elevation =   603.000(Ft.)
Flow length =   170.000(Ft.)
Travel time  =    0.17 min.
Time of concentration =   22.82 min.
Depth of flow =   8.958(Ft.)
```

```
Average velocity =  16.573(Ft/s)
Total irregular channel flow =  3401.836(CFS)
Irregular channel normal depth above invert elev. =   8.958(Ft.)
Average velocity of channel(s) =  16.573(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      603.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =   1366.510(Ac.)
Runoff from this stream =   3401.836(CFS)
Time of concentration =   22.82 min.
Rainfall intensity =     2.593(In/Hr)
Area averaged loss rate (Fm) =    0.2325(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      601.000 to Point/Station      602.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 61.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.300(In/Hr)
Max Catchment Loss (Fm) =     0.300(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =   650.000(Ft.)
Bottom (of initial area) elevation =   606.000(Ft.)
Difference in elevation =    44.000(Ft.)
Slope =    0.14667  s(%)=      14.67
TC = k(0.935)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.440 min.
Rainfall intensity =      3.511(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.823
Subarea runoff =      1.300(CFS)
Total initial stream area =        0.450(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      602.000 to Point/Station      603.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      3.497(CFS)
Depth of flow =   0.335(Ft.), Average velocity =   1.841(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
-----------------------------------------------------------------
Sub-Channel flow  =      3.497(CFS)
  '     '       flow top width =      6.340(Ft.)
  '     '    velocity=    1.841(Ft/s)
  '     '       area =      1.900(Sq.Ft)
  '     '       Froude number =     0.592

Upstream point elevation =   606.000(Ft.)
Downstream point elevation =   603.000(Ft.)
Flow length =   151.800(Ft.)
Travel time  =    1.37 min.
Time of concentration =   14.81 min.
Depth of flow =   0.335(Ft.)
```

```
Average velocity =   1.841(Ft/s)
Total irregular channel flow =     3.497(CFS)
Irregular channel normal depth above invert elev. =   0.335(Ft.)
Average velocity of channel(s) =   1.841(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.430
Decimal fraction soil group C = 0.550
Decimal fraction soil group D = 0.020
SCS curve number for soil(AMC 2)  = 68.53
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.271(In/Hr)
Max Catchment Loss (Fm) =     0.271(In/Hr)
Rainfall intensity =      3.321(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.825
Subarea runoff =      4.315(CFS) for    1.600(Ac.)
Total runoff =      5.615(CFS)       Total area =        2.05(Ac.)
Area averaged Fm value =    0.277(In/Hr)
Depth of flow =   0.441(Ft.), Average velocity =   2.162(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      602.000 to Point/Station      603.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.050(Ac.)
Runoff from this stream =      5.615(CFS)
Time of concentration =   14.81 min.
Rainfall intensity =     3.321(In/Hr)
Area averaged loss rate (Fm) =    0.2770(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1   1366.51  3401.836     22.82    0.232      2.593
2      2.05     5.615     14.81    0.277      3.321
Qmax(1) =
          1.000 *    1.000 *  3401.836) +
          0.761 *    1.000 *     5.615) + =    3406.108
Qmax(2) =
          1.308 *    0.649 *  3401.836) +
          1.000 *    1.000 *     5.615) + =    2895.627

Total of 2 streams to confluence:
Flow rates before confluence point:
    3401.836       5.615
Maximum flow rates at confluence using above data:
     3406.108     2895.627
Area of streams before confluence:
     1366.510        2.050
Effective area values after confluence:
     1368.560      889.287
Results of confluence:
Total flow rate =   3406.108(CFS)
Time of concentration =    22.817 min.
Effective stream area after confluence =   1368.560(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.233(In/Hr)
Study area total (this main stream) =    1368.56(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      603.000 to Point/Station      606.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   9.799(Ft.), Average velocity =  14.132(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
```

```
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
----------------------------------------------------------------
Sub-Channel flow  =   3406.108(CFS)
  '     '       flow top width =     44.194(Ft.)
  '     '    velocity=   14.132(Ft/s)
  '     '       area =    241.017(Sq.Ft)
  '     '       Froude number =     1.066

Upstream point elevation =   603.000(Ft.)
Downstream point elevation =   535.000(Ft.)
Flow length =  2528.000(Ft.)
Travel time  =    2.98 min.
Time of concentration =   25.80 min.
Depth of flow =   9.799(Ft.)
Average velocity =  14.132(Ft/s)
Total irregular channel flow =  3406.108(CFS)
Irregular channel normal depth above invert elev. =   9.799(Ft.)
Average velocity of channel(s) =  14.132(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      606.000 to Point/Station      606.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =   1368.560(Ac.)
Runoff from this stream =   3406.108(CFS)
Time of concentration =   25.80 min.
Rainfall intensity =     2.416(In/Hr)
Area averaged loss rate (Fm) =    0.2326(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      604.000 to Point/Station      605.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 80.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Initial subarea data:
Initial area flow distance =   304.500(Ft.)
Top (of initial area) elevation =   692.000(Ft.)
Bottom (of initial area) elevation =   641.000(Ft.)
Difference in elevation =    51.000(Ft.)
Slope =    0.16749  s(%)=      16.75
TC = k(0.935)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.166 min.
Rainfall intensity =      3.553(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.849
Subarea runoff =      2.444(CFS)
Total initial stream area =        0.810(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      605.000 to Point/Station      606.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     38.496(CFS)
Depth of flow =   1.029(Ft.), Average velocity =   5.301(Ft/s)
       ******* Irregular Channel Data ***********
----------------------------------------------------------------
```

```
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
----------------------------------------------------------------
Sub-Channel flow  =     38.496(CFS)
  '     '       flow top width =      9.116(Ft.)
  '     '    velocity=    5.301(Ft/s)
  '     '       area =      7.263(Sq.Ft)
  '     '       Froude number =     1.047

Upstream point elevation =   641.000(Ft.)
Downstream point elevation =   535.000(Ft.)
Flow length =  2296.600(Ft.)
Travel time  =    7.22 min.
Time of concentration =   20.39 min.
Depth of flow =   1.029(Ft.)
Average velocity =   5.301(Ft/s)
Total irregular channel flow =    38.496(CFS)
Irregular channel normal depth above invert elev. =   1.029(Ft.)
Average velocity of channel(s) =   5.301(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.510
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.290
SCS curve number for soil(AMC 2)  = 69.11
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.261(In/Hr)
Max Catchment Loss (Fm) =     0.261(In/Hr)
Rainfall intensity =      2.765(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.816
Subarea runoff =     72.024(CFS) for   32.210(Ac.)
Total runoff =     74.468(CFS)       Total area =       33.02(Ac.)
Area averaged Fm value =    0.260(In/Hr)
Depth of flow =   1.465(Ft.), Average velocity =   6.409(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      606.000 to Point/Station      606.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     33.020(Ac.)
Runoff from this stream =     74.468(CFS)
Time of concentration =   20.39 min.
Rainfall intensity =     2.765(In/Hr)
Area averaged loss rate (Fm) =    0.2595(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1   1368.56  3406.108     25.80    0.233      2.416
2     33.02    74.468     20.39    0.260      2.765
Qmax(1) =
          1.000 *    1.000 *  3406.108) +
          0.861 *    1.000 *    74.468) + =    3470.207
Qmax(2) =
          1.160 *    0.790 *  3406.108) +
          1.000 *    1.000 *    74.468) + =    3196.243

Total of 2 streams to confluence:
Flow rates before confluence point:
    3406.108      74.468
Maximum flow rates at confluence using above data:
     3470.207     3196.243
```

```
Area of streams before confluence:
     1368.560       33.020
Effective area values after confluence:
     1401.580     1114.528
Results of confluence:
Total flow rate =   3470.207(CFS)
Time of concentration =    25.798 min.
Effective stream area after confluence =   1401.580(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.233(In/Hr)
Study area total (this main stream) =    1401.58(Ac.)
End of computations, total study area =         1401.58 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number (AMC 2) =  75.4
```

```
                    Orange County Rational Hydrology Program

                (Hydrology Manual Date(s) October 1986 & November 1996)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2004 Version 8.0
        Rational Hydrology Study, Date: 08/02/15  File Name: EXFCREEK25.roc
----------------------------------------------------------------------
PLANNING AREA 2
EXISTING CONDITION - CREEK F
25-YEAR STORM
BY FUSCOE ENGINEERING
----------------------------------------------------------------------


Program License Serial Number 6049

----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

----------------------------------------------------------------------

Rational hydrology study storm event year is    25.0

Decimal fraction of study above 2000 ft., 600M  =     0.0000
English Units Used for input data


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      501.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.080
Decimal fraction soil group C = 0.490
Decimal fraction soil group D = 0.430
SCS curve number for soil(AMC 2)  = 75.54
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.232(In/Hr)
Max Catchment Loss (Fm) =     0.232(In/Hr)
Rainfall intensity =      2.001(In/Hr) for a    25.0 year storm
User specified values are as follows:
TC =  23.66 min.  Rain intensity =       2.00(In/Hr)
Total area =      1366.51(Ac.)  Total runoff =   2543.03(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      603.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   7.920(Ft.), Average velocity =  15.407(Ft/s)
       ******* Irregular Channel Data ***********
-------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
-------------------------------------------------------------------
Sub-Channel flow  =   2543.027(CFS)
  '     '       flow top width =     36.680(Ft.)
  '     '    velocity=   15.407(Ft/s)
  '     '       area =    165.052(Sq.Ft)
  '     '       Froude number =     1.280

Upstream point elevation =   610.000(Ft.)
Downstream point elevation =   603.000(Ft.)
Flow length =   170.000(Ft.)
Travel time  =    0.18 min.
Time of concentration =   23.85 min.
Depth of flow =   7.920(Ft.)
```

```
Average velocity =  15.407(Ft/s)
Total irregular channel flow =  2543.028(CFS)
Irregular channel normal depth above invert elev. =   7.920(Ft.)
Average velocity of channel(s) =  15.407(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      603.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =   1366.510(Ac.)
Runoff from this stream =   2543.028(CFS)
Time of concentration =   23.85 min.
Rainfall intensity =     1.992(In/Hr)
Area averaged loss rate (Fm) =    0.2325(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      601.000 to Point/Station      602.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 61.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.300(In/Hr)
Max Catchment Loss (Fm) =     0.300(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =   650.000(Ft.)
Bottom (of initial area) elevation =   606.000(Ft.)
Difference in elevation =    44.000(Ft.)
Slope =    0.14667  s(%)=      14.67
TC = k(0.935)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.440 min.
Rainfall intensity =      2.756(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.802
Subarea runoff =      0.995(CFS)
Total initial stream area =        0.450(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      602.000 to Point/Station      603.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      2.668(CFS)
Depth of flow =   0.286(Ft.), Average velocity =   1.675(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
-----------------------------------------------------------------
Sub-Channel flow  =      2.668(CFS)
  '     '       flow top width =      6.144(Ft.)
  '     '    velocity=    1.675(Ft/s)
  '     '       area =      1.593(Sq.Ft)
  '     '       Froude number =     0.580

Upstream point elevation =   606.000(Ft.)
Downstream point elevation =   603.000(Ft.)
Flow length =   151.800(Ft.)
Travel time  =    1.51 min.
Time of concentration =   14.95 min.
Depth of flow =   0.286(Ft.)
```

```
Average velocity =   1.675(Ft/s)
Total irregular channel flow =     2.668(CFS)
Irregular channel normal depth above invert elev. =   0.286(Ft.)
Average velocity of channel(s) =   1.675(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.430
Decimal fraction soil group C = 0.550
Decimal fraction soil group D = 0.020
SCS curve number for soil(AMC 2)  = 68.53
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.271(In/Hr)
Max Catchment Loss (Fm) =     0.271(In/Hr)
Rainfall intensity =      2.595(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.804
Subarea runoff =      3.282(CFS) for    1.600(Ac.)
Total runoff =      4.277(CFS)       Total area =        2.05(Ac.)
Area averaged Fm value =    0.277(In/Hr)
Depth of flow =   0.377(Ft.), Average velocity =   1.972(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      602.000 to Point/Station      603.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.050(Ac.)
Runoff from this stream =      4.277(CFS)
Time of concentration =   14.95 min.
Rainfall intensity =     2.595(In/Hr)
Area averaged loss rate (Fm) =    0.2770(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1   1366.51  2543.028     23.85    0.232      1.992
2      2.05     4.277     14.95    0.277      2.595
Qmax(1) =
          1.000 *    1.000 *  2543.028) +
          0.740 *    1.000 *     4.277) + =    2546.193
Qmax(2) =
          1.342 *    0.627 *  2543.028) +
          1.000 *    1.000 *     4.277) + =    2144.528

Total of 2 streams to confluence:
Flow rates before confluence point:
    2543.028       4.277
Maximum flow rates at confluence using above data:
     2546.193     2144.528
Area of streams before confluence:
     1366.510        2.050
Effective area values after confluence:
     1368.560      858.734
Results of confluence:
Total flow rate =   2546.193(CFS)
Time of concentration =    23.848 min.
Effective stream area after confluence =   1368.560(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.233(In/Hr)
Study area total (this main stream) =    1368.56(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      603.000 to Point/Station      606.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   8.672(Ft.), Average velocity =  13.140(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
```

```
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
----------------------------------------------------------------
Sub-Channel flow  =   2546.192(CFS)
  '     '       flow top width =     39.689(Ft.)
  '     '    velocity=   13.140(Ft/s)
  '     '       area =    193.781(Sq.Ft)
  '     '       Froude number =     1.048

Upstream point elevation =   603.000(Ft.)
Downstream point elevation =   535.000(Ft.)
Flow length =  2528.000(Ft.)
Travel time  =    3.21 min.
Time of concentration =   27.05 min.
Depth of flow =   8.672(Ft.)
Average velocity =  13.140(Ft/s)
Total irregular channel flow =  2546.193(CFS)
Irregular channel normal depth above invert elev. =   8.672(Ft.)
Average velocity of channel(s) =  13.140(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      606.000 to Point/Station      606.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =   1368.560(Ac.)
Runoff from this stream =   2546.193(CFS)
Time of concentration =   27.05 min.
Rainfall intensity =     1.855(In/Hr)
Area averaged loss rate (Fm) =    0.2326(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      604.000 to Point/Station      605.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 80.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Initial subarea data:
Initial area flow distance =   304.500(Ft.)
Top (of initial area) elevation =   692.000(Ft.)
Bottom (of initial area) elevation =   641.000(Ft.)
Difference in elevation =    51.000(Ft.)
Slope =    0.16749  s(%)=      16.75
TC = k(0.935)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.166 min.
Rainfall intensity =      2.789(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.835
Subarea runoff =      1.887(CFS)
Total initial stream area =        0.810(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      605.000 to Point/Station      606.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     28.908(CFS)
Depth of flow =   0.879(Ft.), Average velocity =   4.866(Ft/s)
       ******* Irregular Channel Data ***********
----------------------------------------------------------------
```

```
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
----------------------------------------------------------------
Sub-Channel flow  =     28.908(CFS)
  '     '       flow top width =      8.516(Ft.)
  '     '    velocity=    4.866(Ft/s)
  '     '       area =      5.941(Sq.Ft)
  '     '       Froude number =     1.027

Upstream point elevation =   641.000(Ft.)
Downstream point elevation =   535.000(Ft.)
Flow length =  2296.600(Ft.)
Travel time  =    7.87 min.
Time of concentration =   21.03 min.
Depth of flow =   0.879(Ft.)
Average velocity =   4.866(Ft/s)
Total irregular channel flow =    28.908(CFS)
Irregular channel normal depth above invert elev. =   0.879(Ft.)
Average velocity of channel(s) =   4.866(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.510
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.290
SCS curve number for soil(AMC 2)  = 69.11
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.261(In/Hr)
Max Catchment Loss (Fm) =     0.261(In/Hr)
Rainfall intensity =      2.139(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.791
Subarea runoff =     53.972(CFS) for   32.210(Ac.)
Total runoff =     55.859(CFS)       Total area =       33.02(Ac.)
Area averaged Fm value =    0.260(In/Hr)
Depth of flow =   1.258(Ft.), Average velocity =   5.907(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      606.000 to Point/Station      606.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     33.020(Ac.)
Runoff from this stream =     55.859(CFS)
Time of concentration =   21.03 min.
Rainfall intensity =     2.139(In/Hr)
Area averaged loss rate (Fm) =    0.2595(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1   1368.56  2546.193     27.05    0.233      1.855
2     33.02    55.859     21.03    0.260      2.139
Qmax(1) =
          1.000 *    1.000 *  2546.193) +
          0.849 *    1.000 *    55.859) + =    2593.609
Qmax(2) =
          1.175 *    0.777 *  2546.193) +
          1.000 *    1.000 *    55.859) + =    2381.952

Total of 2 streams to confluence:
Flow rates before confluence point:
    2546.193      55.859
Maximum flow rates at confluence using above data:
     2593.609     2381.952
```

```
Area of streams before confluence:
     1368.560       33.020
Effective area values after confluence:
     1401.580     1096.971
Results of confluence:
Total flow rate =   2593.609(CFS)
Time of concentration =    27.055 min.
Effective stream area after confluence =   1401.580(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.233(In/Hr)
Study area total (this main stream) =    1401.58(Ac.)
End of computations, total study area =         1401.58 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number (AMC 2) =  75.4
```

```
                    Orange County Rational Hydrology Program

                (Hydrology Manual Date(s) October 1986 & November 1996)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2004 Version 8.0
        Rational Hydrology Study, Date: 08/02/15  File Name: EXFCREEK10.roc
----------------------------------------------------------------------
PLANNING AREA 2
EXISTING CONDITION - CREEK F
10-YEAR STORM
BY FUSCOE ENGINEERING
----------------------------------------------------------------------


Program License Serial Number 6049

----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

----------------------------------------------------------------------

Rational hydrology study storm event year is    10.0

Decimal fraction of study above 2000 ft., 600M  =     0.0000
English Units Used for input data


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      501.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.080
Decimal fraction soil group C = 0.490
Decimal fraction soil group D = 0.430
SCS curve number for soil(AMC 2)  = 75.54
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.232(In/Hr)
Max Catchment Loss (Fm) =     0.232(In/Hr)
Rainfall intensity =      1.652(In/Hr) for a    10.0 year storm
User specified values are as follows:
TC =  24.00 min.  Rain intensity =       1.65(In/Hr)
Total area =      1366.51(Ac.)  Total runoff =   2044.07(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      603.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   7.214(Ft.), Average velocity =  14.586(Ft/s)
       ******* Irregular Channel Data ***********
-------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
-------------------------------------------------------------------
Sub-Channel flow  =   2044.063(CFS)
  '     '       flow top width =     33.855(Ft.)
  '     '    velocity=   14.586(Ft/s)
  '     '       area =    140.143(Sq.Ft)
  '     '       Froude number =     1.263

Upstream point elevation =   610.000(Ft.)
Downstream point elevation =   603.000(Ft.)
Flow length =   170.000(Ft.)
Travel time  =    0.19 min.
Time of concentration =   24.19 min.
Depth of flow =   7.214(Ft.)
```

```
Average velocity =  14.586(Ft/s)
Total irregular channel flow =  2044.065(CFS)
Irregular channel normal depth above invert elev. =   7.214(Ft.)
Average velocity of channel(s) =  14.586(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      603.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =   1366.510(Ac.)
Runoff from this stream =   2044.065(CFS)
Time of concentration =   24.19 min.
Rainfall intensity =     1.645(In/Hr)
Area averaged loss rate (Fm) =    0.2325(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      601.000 to Point/Station      602.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 61.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.300(In/Hr)
Max Catchment Loss (Fm) =     0.300(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =   650.000(Ft.)
Bottom (of initial area) elevation =   606.000(Ft.)
Difference in elevation =    44.000(Ft.)
Slope =    0.14667  s(%)=      14.67
TC = k(0.935)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.440 min.
Rainfall intensity =      2.304(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.783
Subarea runoff =      0.811(CFS)
Total initial stream area =        0.450(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      602.000 to Point/Station      603.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      2.170(CFS)
Depth of flow =   0.253(Ft.), Average velocity =   1.556(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
-----------------------------------------------------------------
Sub-Channel flow  =      2.170(CFS)
  '     '       flow top width =      6.013(Ft.)
  '     '    velocity=    1.556(Ft/s)
  '     '       area =      1.394(Sq.Ft)
  '     '       Froude number =     0.570

Upstream point elevation =   606.000(Ft.)
Downstream point elevation =   603.000(Ft.)
Flow length =   151.800(Ft.)
Travel time  =    1.63 min.
Time of concentration =   15.07 min.
Depth of flow =   0.253(Ft.)
```

```
Average velocity =   1.556(Ft/s)
Total irregular channel flow =     2.170(CFS)
Irregular channel normal depth above invert elev. =   0.253(Ft.)
Average velocity of channel(s) =   1.556(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.430
Decimal fraction soil group C = 0.550
Decimal fraction soil group D = 0.020
SCS curve number for soil(AMC 2)  = 68.53
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.271(In/Hr)
Max Catchment Loss (Fm) =     0.271(In/Hr)
Rainfall intensity =      2.158(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.784
Subarea runoff =      2.659(CFS) for    1.600(Ac.)
Total runoff =      3.470(CFS)       Total area =        2.05(Ac.)
Area averaged Fm value =    0.277(In/Hr)
Depth of flow =   0.334(Ft.), Average velocity =   1.836(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      602.000 to Point/Station      603.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.050(Ac.)
Runoff from this stream =      3.470(CFS)
Time of concentration =   15.07 min.
Rainfall intensity =     2.158(In/Hr)
Area averaged loss rate (Fm) =    0.2770(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1   1366.51  2044.065     24.19    0.232      1.645
2      2.05     3.470     15.07    0.277      2.158
Qmax(1) =
          1.000 *    1.000 *  2044.065) +
          0.727 *    1.000 *     3.470) + =    2046.589
Qmax(2) =
          1.363 *    0.623 *  2044.065) +
          1.000 *    1.000 *     3.470) + =    1738.550

Total of 2 streams to confluence:
Flow rates before confluence point:
    2044.065       3.470
Maximum flow rates at confluence using above data:
     2046.589     1738.550
Area of streams before confluence:
     1366.510        2.050
Effective area values after confluence:
     1368.560      852.958
Results of confluence:
Total flow rate =   2046.589(CFS)
Time of concentration =    24.194 min.
Effective stream area after confluence =   1368.560(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.233(In/Hr)
Study area total (this main stream) =    1368.56(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      603.000 to Point/Station      606.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   7.906(Ft.), Average velocity =  12.440(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
```

```
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
----------------------------------------------------------------
Sub-Channel flow  =   2046.587(CFS)
  '     '       flow top width =     36.622(Ft.)
  '     '    velocity=   12.440(Ft/s)
  '     '       area =    164.523(Sq.Ft)
  '     '       Froude number =     1.034

Upstream point elevation =   603.000(Ft.)
Downstream point elevation =   535.000(Ft.)
Flow length =  2528.000(Ft.)
Travel time  =    3.39 min.
Time of concentration =   27.58 min.
Depth of flow =   7.906(Ft.)
Average velocity =  12.440(Ft/s)
Total irregular channel flow =  2046.589(CFS)
Irregular channel normal depth above invert elev. =   7.906(Ft.)
Average velocity of channel(s) =  12.440(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      606.000 to Point/Station      606.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =   1368.560(Ac.)
Runoff from this stream =   2046.589(CFS)
Time of concentration =   27.58 min.
Rainfall intensity =     1.526(In/Hr)
Area averaged loss rate (Fm) =    0.2326(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      604.000 to Point/Station      605.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 80.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.200(In/Hr)
Initial subarea data:
Initial area flow distance =   304.500(Ft.)
Top (of initial area) elevation =   692.000(Ft.)
Bottom (of initial area) elevation =   641.000(Ft.)
Difference in elevation =    51.000(Ft.)
Slope =    0.16749  s(%)=      16.75
TC = k(0.935)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.166 min.
Rainfall intensity =      2.331(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.823
Subarea runoff =      1.553(CFS)
Total initial stream area =        0.810(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      605.000 to Point/Station      606.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     23.036(CFS)
Depth of flow =   0.775(Ft.), Average velocity =   4.539(Ft/s)
       ******* Irregular Channel Data ***********
----------------------------------------------------------------
```

```
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
----------------------------------------------------------------
Sub-Channel flow  =     23.036(CFS)
  '     '       flow top width =      8.099(Ft.)
  '     '    velocity=    4.540(Ft/s)
  '     '       area =      5.075(Sq.Ft)
  '     '       Froude number =     1.011

Upstream point elevation =   641.000(Ft.)
Downstream point elevation =   535.000(Ft.)
Flow length =  2296.600(Ft.)
Travel time  =    8.43 min.
Time of concentration =   21.60 min.
Depth of flow =   0.775(Ft.)
Average velocity =   4.539(Ft/s)
Total irregular channel flow =    23.036(CFS)
Irregular channel normal depth above invert elev. =   0.775(Ft.)
Average velocity of channel(s) =   4.539(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.510
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.290
SCS curve number for soil(AMC 2)  = 69.11
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.261(In/Hr)
Max Catchment Loss (Fm) =     0.261(In/Hr)
Rainfall intensity =      1.755(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.767
Subarea runoff =     42.900(CFS) for   32.210(Ac.)
Total runoff =     44.454(CFS)       Total area =       33.02(Ac.)
Area averaged Fm value =    0.260(In/Hr)
Depth of flow =   1.113(Ft.), Average velocity =   5.529(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      606.000 to Point/Station      606.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     33.020(Ac.)
Runoff from this stream =     44.454(CFS)
Time of concentration =   21.60 min.
Rainfall intensity =     1.755(In/Hr)
Area averaged loss rate (Fm) =    0.2595(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1   1368.56  2046.589     27.58    0.233      1.526
2     33.02    44.454     21.60    0.260      1.755
Qmax(1) =
          1.000 *    1.000 *  2046.589) +
          0.847 *    1.000 *    44.454) + =    2084.222
Qmax(2) =
          1.177 *    0.783 *  2046.589) +
          1.000 *    1.000 *    44.454) + =    1931.463

Total of 2 streams to confluence:
Flow rates before confluence point:
    2046.589      44.454
Maximum flow rates at confluence using above data:
     2084.222     1931.463
```

```
Area of streams before confluence:
     1368.560       33.020
Effective area values after confluence:
     1401.580     1104.683
Results of confluence:
Total flow rate =   2084.222(CFS)
Time of concentration =    27.581 min.
Effective stream area after confluence =   1401.580(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.233(In/Hr)
Study area total (this main stream) =    1401.58(Ac.)
End of computations, total study area =         1401.58 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number (AMC 2) =  75.4
```

Creek "A"
Proposed Unit Hydrograph Calculations
10, 25 & 100-Year Storms

U n i t H y d r o g r a p h A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989-2004, Version 7.0

Study date 08/04/15 File Name CieloVistaPrWshdAUH.out

++

Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6049

WATERSHED A
PROPOSED CONDITIONS - CREEK A
100-YEAR STORM
BY FUSCOE ENGINEERING

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
82.0	0.2	0.00	B	0.300	1.000	0.300
72.0	0.2	0.00	B	0.300	1.000	0.300
79.0	365.1	0.54	C	0.250	1.000	0.250
84.0	264.3	0.39	D	0.200	1.000	0.200
56.0	2.5	0.00	B	0.300	0.600	0.180
56.0	2.5	0.00	B	0.300	0.600	0.180
79.0	3.7	0.01	C	0.250	1.000	0.250
84.0	8.0	0.01	D	0.200	1.000	0.200
75.0	15.1	0.02	D	0.200	0.600	0.120
75.0	13.0	0.02	D	0.200	0.600	0.120

Area-averaged adjusted loss rate Fm (In/Hr) = 0.224

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
0.20	0.000	82.0	95.2	0.50	0.900
0.20	0.000	72.0	88.6	1.29	0.770
365.10	0.541	79.0	93.4	0.71	0.864
264.30	0.392	84.0	96.4	0.37	0.925
1.50	0.002	56.0	75.8	3.19	0.541
1.00	0.001	98.0	98.0	0.20	0.958
1.50	0.002	56.0	75.8	3.19	0.541
1.00	0.001	98.0	98.0	0.20	0.958
3.70	0.005	79.0	93.4	0.71	0.864
8.00	0.012	84.0	96.4	0.37	0.925
9.06	0.013	75.0	91.0	0.99	0.816
6.04	0.009	98.0	98.0	0.20	0.958

7.80	0.012	75.0	91.0	0.99	0.816
5.20	0.008	98.0	98.0	0.20	0.958

Area-averaged catchment yield fraction, Y = 0.887
Area-averaged low loss fraction, Yb = 0.113
++
User entry of time of concentration = 0.617 (hours)
Watershed area = 674.60(Ac.)
Catchment Lag time = 0.493 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 16.8937
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.224(In/Hr)
Average low loss rate fraction (Yb) = 0.113 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall = 0.520(In)
Computed peak 30-minute rainfall = 1.090(In)
Specified peak 1-hour rainfall = 1.450(In)
Computed peak 3-hour rainfall = 2.430(In)
Specified peak 6-hour rainfall = 3.360(In)
Specified peak 24-hour rainfall = 5.630(In)

Rainfall depth area reduction factors:
Using a total area of 674.60(Ac.) (Ref: fig. E-4)

5-minute factor = 0.968 Adjusted rainfall = 0.504(In)
30-minute factor = 0.968 Adjusted rainfall = 1.056(In)
1-hour factor = 0.968 Adjusted rainfall = 1.404(In)
3-hour factor = 0.996 Adjusted rainfall = 2.420(In)
6-hour factor = 0.998 Adjusted rainfall = 3.353(In)
24-hour factor = 0.999 Adjusted rainfall = 5.625(In)

U n i t H y d r o g r a p h
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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 8158.44 (CFS))	
1	1.077	87.839
2	3.933	233.055
3	8.078	338.135
4	13.921	476.690
5	22.799	724.358
6	39.604	1371.016
7	56.304	1362.464
8	64.238	647.246
9	69.997	469.854
10	74.376	357.244
11	78.182	310.541
12	81.338	257.499
13	84.009	217.861
14	86.347	190.790
15	88.387	166.398
16	90.138	142.856
17	91.689	126.569
18	93.043	110.469
19	94.202	94.545
20	95.205	81.805
21	96.018	66.342
22	96.729	57.971
23	97.339	49.806
24	97.802	37.767
25	98.067	21.599
26	98.269	16.539
27	98.470	16.358
28	98.646	14.342
29	98.815	13.783
30	98.978	13.335
31	99.092	9.251

32	99.193	8.270
33	99.298	8.541
34	99.428	10.599
35	99.563	11.026
36	99.690	10.381
37	99.766	6.247
38	99.834	5.513
39	99.897	5.134
40	99.935	3.069
41	99.968	2.757
42	100.000	2.579

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5036	0.5036
2	0.6705	0.1669
3	0.7927	0.1222
4	0.8928	0.1000
5	0.9790	0.0862
6	1.0555	0.0766
7	1.1247	0.0692
8	1.1883	0.0636
9	1.2473	0.0590
10	1.3026	0.0553
11	1.3547	0.0521
12	1.4041	0.0494
13	1.4610	0.0568
14	1.5156	0.0547
15	1.5683	0.0527
16	1.6193	0.0510
17	1.6687	0.0494
18	1.7166	0.0479
19	1.7633	0.0466
20	1.8087	0.0454
21	1.8529	0.0443
22	1.8961	0.0432
23	1.9384	0.0422
24	1.9797	0.0413
25	2.0201	0.0405
26	2.0598	0.0396
27	2.0987	0.0389
28	2.1368	0.0382
29	2.1743	0.0375
30	2.2112	0.0368
31	2.2474	0.0362
32	2.2830	0.0356
33	2.3181	0.0351
34	2.3527	0.0346
35	2.3867	0.0340
36	2.4203	0.0336
37	2.4517	0.0314
38	2.4826	0.0309
39	2.5131	0.0305
40	2.5432	0.0301
41	2.5729	0.0297
42	2.6022	0.0293
43	2.6312	0.0290
44	2.6598	0.0286
45	2.6880	0.0283
46	2.7160	0.0279
47	2.7436	0.0276
48	2.7709	0.0273
49	2.7979	0.0270
50	2.8246	0.0267
51	2.8510	0.0264
52	2.8772	0.0262
53	2.9030	0.0259
54	2.9287	0.0256
55	2.9540	0.0254
56	2.9792	0.0251
57	3.0041	0.0249
58	3.0288	0.0247
59	3.0532	0.0244

60	3.0774	0.0242
61	3.1014	0.0240
62	3.1252	0.0238
63	3.1489	0.0236
64	3.1723	0.0234
65	3.1955	0.0232
66	3.2185	0.0230
67	3.2413	0.0228
68	3.2640	0.0227
69	3.2865	0.0225
70	3.3088	0.0223
71	3.3309	0.0221
72	3.3529	0.0220
73	3.3702	0.0173
74	3.3874	0.0172
75	3.4044	0.0170
76	3.4213	0.0169
77	3.4380	0.0167
78	3.4546	0.0166
79	3.4711	0.0165
80	3.4874	0.0163
81	3.5036	0.0162
82	3.5197	0.0161
83	3.5357	0.0160
84	3.5515	0.0158
85	3.5672	0.0157
86	3.5828	0.0156
87	3.5983	0.0155
88	3.6137	0.0154
89	3.6290	0.0153
90	3.6441	0.0152
91	3.6592	0.0151
92	3.6742	0.0150
93	3.6890	0.0149
94	3.7038	0.0148
95	3.7184	0.0147
96	3.7330	0.0146
97	3.7475	0.0145
98	3.7618	0.0144
99	3.7761	0.0143
100	3.7903	0.0142
101	3.8044	0.0141
102	3.8184	0.0140
103	3.8323	0.0139
104	3.8462	0.0138
105	3.8600	0.0138
106	3.8736	0.0137
107	3.8872	0.0136
108	3.9008	0.0135
109	3.9142	0.0134
110	3.9276	0.0134
111	3.9409	0.0133
112	3.9541	0.0132
113	3.9672	0.0131
114	3.9803	0.0131
115	3.9933	0.0130
116	4.0062	0.0129
117	4.0191	0.0129
118	4.0318	0.0128
119	4.0446	0.0127
120	4.0572	0.0127
121	4.0698	0.0126
122	4.0823	0.0125
123	4.0948	0.0125
124	4.1072	0.0124
125	4.1195	0.0123
126	4.1318	0.0123
127	4.1440	0.0122
128	4.1561	0.0121
129	4.1682	0.0121
130	4.1803	0.0120
131	4.1922	0.0120
132	4.2041	0.0119

133	4.2160	0.0119
134	4.2278	0.0118
135	4.2396	0.0117
136	4.2513	0.0117
137	4.2629	0.0116
138	4.2745	0.0116
139	4.2860	0.0115
140	4.2975	0.0115
141	4.3089	0.0114
142	4.3203	0.0114
143	4.3316	0.0113
144	4.3429	0.0113
145	4.3542	0.0112
146	4.3653	0.0112
147	4.3765	0.0111
148	4.3876	0.0111
149	4.3986	0.0110
150	4.4096	0.0110
151	4.4206	0.0109
152	4.4315	0.0109
153	4.4423	0.0109
154	4.4531	0.0108
155	4.4639	0.0108
156	4.4746	0.0107
157	4.4853	0.0107
158	4.4960	0.0106
159	4.5066	0.0106
160	4.5171	0.0106
161	4.5276	0.0105
162	4.5381	0.0105
163	4.5485	0.0104
164	4.5589	0.0104
165	4.5693	0.0104
166	4.5796	0.0103
167	4.5899	0.0103
168	4.6001	0.0102
169	4.6103	0.0102
170	4.6205	0.0102
171	4.6306	0.0101
172	4.6407	0.0101
173	4.6508	0.0101
174	4.6608	0.0100
175	4.6708	0.0100
176	4.6807	0.0099
177	4.6906	0.0099
178	4.7005	0.0099
179	4.7103	0.0098
180	4.7201	0.0098
181	4.7299	0.0098
182	4.7396	0.0097
183	4.7493	0.0097
184	4.7590	0.0097
185	4.7687	0.0096
186	4.7783	0.0096
187	4.7878	0.0096
188	4.7974	0.0095
189	4.8069	0.0095
190	4.8164	0.0095
191	4.8258	0.0094
192	4.8352	0.0094
193	4.8446	0.0094
194	4.8540	0.0094
195	4.8633	0.0093
196	4.8726	0.0093
197	4.8818	0.0093
198	4.8911	0.0092
199	4.9003	0.0092
200	4.9095	0.0092
201	4.9186	0.0091
202	4.9277	0.0091
203	4.9368	0.0091
204	4.9459	0.0091
205	4.9549	0.0090

206	4.9639	0.0090
207	4.9729	0.0090
208	4.9819	0.0090
209	4.9908	0.0089
210	4.9997	0.0089
211	5.0086	0.0089
212	5.0174	0.0088
213	5.0262	0.0088
214	5.0350	0.0088
215	5.0438	0.0088
216	5.0525	0.0087
217	5.0612	0.0087
218	5.0699	0.0087
219	5.0786	0.0087
220	5.0872	0.0086
221	5.0959	0.0086
222	5.1045	0.0086
223	5.1130	0.0086
224	5.1216	0.0085
225	5.1301	0.0085
226	5.1386	0.0085
227	5.1471	0.0085
228	5.1555	0.0085
229	5.1640	0.0084
230	5.1724	0.0084
231	5.1807	0.0084
232	5.1891	0.0084
233	5.1974	0.0083
234	5.2058	0.0083
235	5.2140	0.0083
236	5.2223	0.0083
237	5.2306	0.0082
238	5.2388	0.0082
239	5.2470	0.0082
240	5.2552	0.0082
241	5.2633	0.0082
242	5.2715	0.0081
243	5.2796	0.0081
244	5.2877	0.0081
245	5.2958	0.0081
246	5.3038	0.0081
247	5.3119	0.0080
248	5.3199	0.0080
249	5.3279	0.0080
250	5.3359	0.0080
251	5.3438	0.0080
252	5.3518	0.0079
253	5.3597	0.0079
254	5.3676	0.0079
255	5.3755	0.0079
256	5.3833	0.0079
257	5.3911	0.0078
258	5.3990	0.0078
259	5.4068	0.0078
260	5.4146	0.0078
261	5.4223	0.0078
262	5.4301	0.0077
263	5.4378	0.0077
264	5.4455	0.0077
265	5.4532	0.0077
266	5.4609	0.0077
267	5.4685	0.0077
268	5.4761	0.0076
269	5.4838	0.0076
270	5.4914	0.0076
271	5.4989	0.0076
272	5.5065	0.0076
273	5.5141	0.0075
274	5.5216	0.0075
275	5.5291	0.0075
276	5.5366	0.0075
277	5.5441	0.0075
278	5.5515	0.0075

279	5.5590	0.0074
280	5.5664	0.0074
281	5.5738	0.0074
282	5.5812	0.0074
283	5.5886	0.0074
284	5.5960	0.0074
285	5.6033	0.0073
286	5.6106	0.0073
287	5.6180	0.0073
288	5.6253	0.0073

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0073	0.0008	0.0065
2	0.0073	0.0008	0.0065
3	0.0073	0.0008	0.0065
4	0.0074	0.0008	0.0065
5	0.0074	0.0008	0.0066
6	0.0074	0.0008	0.0066
7	0.0074	0.0008	0.0066
8	0.0075	0.0008	0.0066
9	0.0075	0.0008	0.0067
10	0.0075	0.0008	0.0067
11	0.0075	0.0008	0.0067
12	0.0076	0.0009	0.0067
13	0.0076	0.0009	0.0067
14	0.0076	0.0009	0.0068
15	0.0077	0.0009	0.0068
16	0.0077	0.0009	0.0068
17	0.0077	0.0009	0.0068
18	0.0077	0.0009	0.0069
19	0.0078	0.0009	0.0069
20	0.0078	0.0009	0.0069
21	0.0078	0.0009	0.0069
22	0.0078	0.0009	0.0070
23	0.0079	0.0009	0.0070
24	0.0079	0.0009	0.0070
25	0.0079	0.0009	0.0070
26	0.0080	0.0009	0.0071
27	0.0080	0.0009	0.0071
28	0.0080	0.0009	0.0071
29	0.0081	0.0009	0.0072
30	0.0081	0.0009	0.0072
31	0.0081	0.0009	0.0072
32	0.0081	0.0009	0.0072
33	0.0082	0.0009	0.0073
34	0.0082	0.0009	0.0073
35	0.0082	0.0009	0.0073
36	0.0083	0.0009	0.0073
37	0.0083	0.0009	0.0074
38	0.0083	0.0009	0.0074
39	0.0084	0.0009	0.0074
40	0.0084	0.0009	0.0075
41	0.0085	0.0010	0.0075
42	0.0085	0.0010	0.0075
43	0.0085	0.0010	0.0076
44	0.0085	0.0010	0.0076
45	0.0086	0.0010	0.0076
46	0.0086	0.0010	0.0076
47	0.0087	0.0010	0.0077
48	0.0087	0.0010	0.0077
49	0.0087	0.0010	0.0078
50	0.0088	0.0010	0.0078
51	0.0088	0.0010	0.0078
52	0.0088	0.0010	0.0079
53	0.0089	0.0010	0.0079
54	0.0089	0.0010	0.0079
55	0.0090	0.0010	0.0080
56	0.0090	0.0010	0.0080
57	0.0091	0.0010	0.0080
58	0.0091	0.0010	0.0081

59	0.0091	0.0010	0.0081
60	0.0092	0.0010	0.0081
61	0.0092	0.0010	0.0082
62	0.0093	0.0010	0.0082
63	0.0093	0.0010	0.0083
64	0.0094	0.0011	0.0083
65	0.0094	0.0011	0.0084
66	0.0094	0.0011	0.0084
67	0.0095	0.0011	0.0084
68	0.0095	0.0011	0.0085
69	0.0096	0.0011	0.0085
70	0.0096	0.0011	0.0086
71	0.0097	0.0011	0.0086
72	0.0097	0.0011	0.0086
73	0.0098	0.0011	0.0087
74	0.0098	0.0011	0.0087
75	0.0099	0.0011	0.0088
76	0.0099	0.0011	0.0088
77	0.0100	0.0011	0.0089
78	0.0101	0.0011	0.0089
79	0.0101	0.0011	0.0090
80	0.0102	0.0011	0.0090
81	0.0102	0.0012	0.0091
82	0.0103	0.0012	0.0091
83	0.0104	0.0012	0.0092
84	0.0104	0.0012	0.0092
85	0.0105	0.0012	0.0093
86	0.0105	0.0012	0.0093
87	0.0106	0.0012	0.0094
88	0.0106	0.0012	0.0094
89	0.0107	0.0012	0.0095
90	0.0108	0.0012	0.0096
91	0.0109	0.0012	0.0096
92	0.0109	0.0012	0.0097
93	0.0110	0.0012	0.0098
94	0.0110	0.0012	0.0098
95	0.0111	0.0013	0.0099
96	0.0112	0.0013	0.0099
97	0.0113	0.0013	0.0100
98	0.0113	0.0013	0.0101
99	0.0114	0.0013	0.0101
100	0.0115	0.0013	0.0102
101	0.0116	0.0013	0.0103
102	0.0116	0.0013	0.0103
103	0.0117	0.0013	0.0104
104	0.0118	0.0013	0.0105
105	0.0119	0.0013	0.0106
106	0.0120	0.0013	0.0106
107	0.0121	0.0014	0.0107
108	0.0121	0.0014	0.0108
109	0.0123	0.0014	0.0109
110	0.0123	0.0014	0.0109
111	0.0125	0.0014	0.0111
112	0.0125	0.0014	0.0111
113	0.0127	0.0014	0.0112
114	0.0127	0.0014	0.0113
115	0.0129	0.0014	0.0114
116	0.0129	0.0015	0.0115
117	0.0131	0.0015	0.0116
118	0.0131	0.0015	0.0117
119	0.0133	0.0015	0.0118
120	0.0134	0.0015	0.0119
121	0.0135	0.0015	0.0120
122	0.0136	0.0015	0.0121
123	0.0138	0.0015	0.0122
124	0.0138	0.0016	0.0123
125	0.0140	0.0016	0.0124
126	0.0141	0.0016	0.0125
127	0.0143	0.0016	0.0127
128	0.0144	0.0016	0.0128
129	0.0146	0.0016	0.0129
130	0.0147	0.0016	0.0130
131	0.0149	0.0017	0.0132

132	0.0150	0.0017	0.0133
133	0.0152	0.0017	0.0135
134	0.0153	0.0017	0.0136
135	0.0155	0.0017	0.0138
136	0.0156	0.0018	0.0139
137	0.0158	0.0018	0.0141
138	0.0160	0.0018	0.0142
139	0.0162	0.0018	0.0144
140	0.0163	0.0018	0.0145
141	0.0166	0.0019	0.0147
142	0.0167	0.0019	0.0149
143	0.0170	0.0019	0.0151
144	0.0172	0.0019	0.0152
145	0.0220	0.0025	0.0195
146	0.0221	0.0025	0.0197
147	0.0225	0.0025	0.0200
148	0.0227	0.0025	0.0201
149	0.0230	0.0026	0.0204
150	0.0232	0.0026	0.0206
151	0.0236	0.0027	0.0209
152	0.0238	0.0027	0.0211
153	0.0242	0.0027	0.0215
154	0.0244	0.0028	0.0217
155	0.0249	0.0028	0.0221
156	0.0251	0.0028	0.0223
157	0.0256	0.0029	0.0227
158	0.0259	0.0029	0.0230
159	0.0264	0.0030	0.0235
160	0.0267	0.0030	0.0237
161	0.0273	0.0031	0.0242
162	0.0276	0.0031	0.0245
163	0.0283	0.0032	0.0251
164	0.0286	0.0032	0.0254
165	0.0293	0.0033	0.0260
166	0.0297	0.0033	0.0264
167	0.0305	0.0034	0.0271
168	0.0309	0.0035	0.0275
169	0.0336	0.0038	0.0298
170	0.0340	0.0038	0.0302
171	0.0351	0.0039	0.0311
172	0.0356	0.0040	0.0316
173	0.0368	0.0041	0.0327
174	0.0375	0.0042	0.0333
175	0.0389	0.0044	0.0345
176	0.0396	0.0045	0.0352
177	0.0413	0.0046	0.0367
178	0.0422	0.0048	0.0375
179	0.0443	0.0050	0.0393
180	0.0454	0.0051	0.0403
181	0.0479	0.0054	0.0425
182	0.0494	0.0056	0.0438
183	0.0527	0.0059	0.0468
184	0.0547	0.0061	0.0485
185	0.0494	0.0056	0.0439
186	0.0521	0.0059	0.0463
187	0.0590	0.0066	0.0524
188	0.0636	0.0072	0.0564
189	0.0766	0.0086	0.0680
190	0.0862	0.0097	0.0765
191	0.1222	0.0138	0.1085
192	0.1669	0.0187	0.1483
193	0.5036	0.0187	0.4849
194	0.1000	0.0113	0.0888
195	0.0692	0.0078	0.0614
196	0.0553	0.0062	0.0491
197	0.0568	0.0064	0.0504
198	0.0510	0.0057	0.0452
199	0.0466	0.0052	0.0414
200	0.0432	0.0049	0.0384
201	0.0405	0.0046	0.0359
202	0.0382	0.0043	0.0339
203	0.0362	0.0041	0.0321
204	0.0346	0.0039	0.0307

205	0.0314	0.0035	0.0279
206	0.0301	0.0034	0.0267
207	0.0290	0.0033	0.0257
208	0.0279	0.0031	0.0248
209	0.0270	0.0030	0.0240
210	0.0262	0.0029	0.0232
211	0.0254	0.0029	0.0225
212	0.0247	0.0028	0.0219
213	0.0240	0.0027	0.0213
214	0.0234	0.0026	0.0208
215	0.0228	0.0026	0.0203
216	0.0223	0.0025	0.0198
217	0.0173	0.0019	0.0154
218	0.0169	0.0019	0.0150
219	0.0165	0.0019	0.0146
220	0.0161	0.0018	0.0143
221	0.0157	0.0018	0.0140
222	0.0154	0.0017	0.0137
223	0.0151	0.0017	0.0134
224	0.0148	0.0017	0.0131
225	0.0145	0.0016	0.0128
226	0.0142	0.0016	0.0126
227	0.0139	0.0016	0.0124
228	0.0137	0.0015	0.0121
229	0.0134	0.0015	0.0119
230	0.0132	0.0015	0.0117
231	0.0130	0.0015	0.0115
232	0.0128	0.0014	0.0113
233	0.0126	0.0014	0.0112
234	0.0124	0.0014	0.0110
235	0.0122	0.0014	0.0108
236	0.0120	0.0014	0.0107
237	0.0119	0.0013	0.0105
238	0.0117	0.0013	0.0104
239	0.0115	0.0013	0.0102
240	0.0114	0.0013	0.0101
241	0.0112	0.0013	0.0100
242	0.0111	0.0012	0.0098
243	0.0109	0.0012	0.0097
244	0.0108	0.0012	0.0096
245	0.0107	0.0012	0.0095
246	0.0106	0.0012	0.0094
247	0.0104	0.0012	0.0093
248	0.0103	0.0012	0.0092
249	0.0102	0.0011	0.0091
250	0.0101	0.0011	0.0090
251	0.0100	0.0011	0.0089
252	0.0099	0.0011	0.0088
253	0.0098	0.0011	0.0087
254	0.0097	0.0011	0.0086
255	0.0096	0.0011	0.0085
256	0.0095	0.0011	0.0084
257	0.0094	0.0011	0.0083
258	0.0093	0.0010	0.0082
259	0.0092	0.0010	0.0082
260	0.0091	0.0010	0.0081
261	0.0090	0.0010	0.0080
262	0.0090	0.0010	0.0079
263	0.0089	0.0010	0.0079
264	0.0088	0.0010	0.0078
265	0.0087	0.0010	0.0077
266	0.0086	0.0010	0.0077
267	0.0086	0.0010	0.0076
268	0.0085	0.0010	0.0075
269	0.0084	0.0009	0.0075
270	0.0084	0.0009	0.0074
271	0.0083	0.0009	0.0074
272	0.0082	0.0009	0.0073
273	0.0082	0.0009	0.0072
274	0.0081	0.0009	0.0072
275	0.0080	0.0009	0.0071
276	0.0080	0.0009	0.0071
277	0.0079	0.0009	0.0070

278	0.0079	0.0009	0.0070
279	0.0078	0.0009	0.0069
280	0.0077	0.0009	0.0069
281	0.0077	0.0009	0.0068
282	0.0076	0.0009	0.0068
283	0.0076	0.0009	0.0067
284	0.0075	0.0008	0.0067
285	0.0075	0.0008	0.0066
286	0.0074	0.0008	0.0066
287	0.0074	0.0008	0.0065
288	0.0073	0.0008	0.0065

Total soil rain loss = 0.59(In)
Total effective rainfall = 5.03(In)
Peak flow rate in flood hydrograph = 1217.45(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	325.0	650.0	975.0	1300.0
0+ 5	0.0039	0.57	Q	|	|	|	|
0+10	0.0182	2.08	Q	|	|	|	|
0+15	0.0477	4.28	Q	|	|	|	|
0+20	0.0985	7.38	Q	|	|	|	|
0+25	0.1818	12.09	Q	|	|	|	|
0+30	0.3264	21.01	Q	|	|	|	|
0+35	0.5323	29.89	Q	|	|	|	|
0+40	0.7677	34.18	VQ	|	|	|	|
0+45	1.0249	37.34	VQ	|	|	|	|
0+50	1.2988	39.77	VQ	|	|	|	|
0+55	1.5875	41.92	VQ	|	|	|	|
1+ 0	1.8887	43.73	VQ	|	|	|	|
1+ 5	2.2005	45.28	VQ	|	|	|	|
1+10	2.5220	46.67	VQ	|	|	|	|
1+15	2.8519	47.91	VQ	|	|	|	|
1+20	3.1894	49.00	VQ	|	|	|	|
1+25	3.5336	49.99	VQ	|	|	|	|
1+30	3.8840	50.87	VQ	|	|	|	|
1+35	4.2398	51.66	VQ	|	|	|	|
1+40	4.6005	52.37	VQ	|	|	|	|
1+45	4.9654	52.98	VQ	|	|	|	|
1+50	5.3341	53.55	VQ	|	|	|	|
1+55	5.7064	54.06	VQ	|	|	|	|
2+ 0	6.0817	54.49	VQ	|	|	|	|
2+ 5	6.4594	54.83	VQ	|	|	|	|
2+10	6.8391	55.13	VQ	|	|	|	|
2+15	7.2209	55.44	|Q	|	|	|	|
2+20	7.6047	55.73	|Q	|	|	|	|
2+25	7.9906	56.03	|Q	|	|	|	|
2+30	8.3784	56.32	|Q	|	|	|	|
2+35	8.7682	56.59	|Q	|	|	|	|
2+40	9.1597	56.85	|Q	|	|	|	|
2+45	9.5531	57.12	|Q	|	|	|	|
2+50	9.9484	57.40	|Q	|	|	|	|
2+55	10.3458	57.69	|Q	|	|	|	|
3+ 0	10.7451	57.98	|Q	|	|	|	|
3+ 5	11.1462	58.24	|Q	|	|	|	|
3+10	11.5491	58.50	|Q	|	|	|	|
3+15	11.9538	58.76	|Q	|	|	|	|
3+20	12.3602	59.01	|Q	|	|	|	|
3+25	12.7683	59.26	|Q	|	|	|	|
3+30	13.1782	59.51	|Q	|	|	|	|
3+35	13.5897	59.75	|Q	|	|	|	|
3+40	14.0028	59.99	|Q	|	|	|	|
3+45	14.4176	60.23	|QV	|	|	|	|
3+50	14.8341	60.47	|QV	|	|	|	|
3+55	15.2523	60.72	|QV	|	|	|	|

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 4+ 0      15.6722     60.97  |QV        |          |          |          |
 4+ 5      16.0938     61.22  |QV        |          |          |          |
 4+10      16.5172     61.48  |QV        |          |          |          |
 4+15      16.9424     61.73  |QV        |          |          |          |
 4+20      17.3693     61.99  |QV        |          |          |          |
 4+25      17.7981     62.26  |QV        |          |          |          |
 4+30      18.2287     62.52  |QV        |          |          |          |
 4+35      18.6611     62.79  |QV        |          |          |          |
 4+40      19.0955     63.06  |QV        |          |          |          |
 4+45      19.5317     63.34  |QV        |          |          |          |
 4+50      19.9699     63.62  |QV        |          |          |          |
 4+55      20.4099     63.90  |QV        |          |          |          |
 5+ 0      20.8520     64.19  |QV        |          |          |          |
 5+ 5      21.2960     64.47  |Q V       |          |          |          |
 5+10      21.7421     64.76  |Q V       |          |          |          |
 5+15      22.1901     65.06  | QV       |          |          |          |
 5+20      22.6403     65.36  | QV       |          |          |          |
 5+25      23.0925     65.66  | QV       |          |          |          |
 5+30      23.5468     65.97  | QV       |          |          |          |
 5+35      24.0033     66.28  | QV       |          |          |          |
 5+40      24.4619     66.59  | QV       |          |          |          |
 5+45      24.9227     66.91  | QV       |          |          |          |
 5+50      25.3857     67.23  | QV       |          |          |          |
 5+55      25.8509     67.55  | QV       |          |          |          |
 6+ 0      26.3184     67.88  | QV       |          |          |          |
 6+ 5      26.7882     68.22  | QV       |          |          |          |
 6+10      27.2604     68.55  | QV       |          |          |          |
 6+15      27.7349     68.90  | QV       |          |          |          |
 6+20      28.2118     69.24  | QV       |          |          |          |
 6+25      28.6911     69.60  | Q V      |          |          |          |
 6+30      29.1728     69.95  | Q V      |          |          |          |
 6+35      29.6571     70.31  | Q V      |          |          |          |
 6+40      30.1438     70.68  | Q V      |          |          |          |
 6+45      30.6331     71.05  | Q V      |          |          |          |
 6+50      31.1250     71.42  | Q V      |          |          |          |
 6+55      31.6196     71.81  | Q V      |          |          |          |
 7+ 0      32.1167     72.19  | Q V      |          |          |          |
 7+ 5      32.6166     72.58  | Q V      |          |          |          |
 7+10      33.1192     72.98  | Q V      |          |          |          |
 7+15      33.6246     73.38  | Q V      |          |          |          |
 7+20      34.1328     73.79  | Q V      |          |          |          |
 7+25      34.6439     74.21  | Q V      |          |          |          |
 7+30      35.1579     74.63  | Q V      |          |          |          |
 7+35      35.6748     75.06  | Q  V     |          |          |          |
 7+40      36.1947     75.49  | Q  V     |          |          |          |
 7+45      36.7176     75.93  | Q  V     |          |          |          |
 7+50      37.2436     76.38  | Q  V     |          |          |          |
 7+55      37.7727     76.83  | Q  V     |          |          |          |
 8+ 0      38.3050     77.29  | Q  V     |          |          |          |
 8+ 5      38.8406     77.76  | Q  V     |          |          |          |
 8+10      39.3794     78.23  | Q  V     |          |          |          |
 8+15      39.9215     78.72  | Q  V     |          |          |          |
 8+20      40.4670     79.21  | Q  V     |          |          |          |
 8+25      41.0160     79.71  | Q  V     |          |          |          |
 8+30      41.5684     80.22  | Q  V     |          |          |          |
 8+35      42.1244     80.73  | Q  V     |          |          |          |
 8+40      42.6840     81.26  | Q   V    |          |          |          |
 8+45      43.2473     81.79  | Q   V    |          |          |          |
 8+50      43.8144     82.33  | Q   V    |          |          |          |
 8+55      44.3852     82.89  | Q   V    |          |          |          |
 9+ 0      44.9599     83.45  | Q   V    |          |          |          |
 9+ 5      45.5386     84.02  | Q   V    |          |          |          |
 9+10      46.1212     84.60  | Q   V    |          |          |          |
 9+15      46.7080     85.20  | Q   V    |          |          |          |
 9+20      47.2989     85.80  | Q   V    |          |          |          |
 9+25      47.8940     86.42  | Q   V    |          |          |          |
 9+30      48.4935     87.04  | Q   V    |          |          |          |
 9+35      49.0973     87.68  | Q   V    |          |          |          |
 9+40      49.7057     88.33  | Q    V   |          |          |          |
 9+45      50.3186     89.00  | Q    V   |          |          |          |
 9+50      50.9362     89.67  | Q    V   |          |          |          |
 9+55      51.5585     90.36  | Q    V   |          |          |          |
10+ 0      52.1857     91.07  | Q    V   |          |          |          |
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10+ 5      52.8179     91.79  | Q    V  |         |         |         |
10+10      53.4551     92.52  | Q    V  |         |         |         |
10+15      54.0975     93.27  | Q    V  |         |         |         |
10+20      54.7451     94.04  | Q    V  |         |         |         |
10+25      55.3981     94.82  | Q    V  |         |         |         |
10+30      56.0567     95.62  | Q    V  |         |         |         |
10+35      56.7209     96.44  | Q     V |         |         |         |
10+40      57.3908     97.27  | Q     V |         |         |         |
10+45      58.0666     98.13  |  Q    V |         |         |         |
10+50      58.7485     99.00  |  Q    V |         |         |         |
10+55      59.4365     99.90  |  Q    V |         |         |         |
11+ 0      60.1308    100.82  |  Q    V |         |         |         |
11+ 5      60.8316    101.76  |  Q    V |         |         |         |
11+10      61.5390    102.72  |  Q    V |         |         |         |
11+15      62.2533    103.71  |  Q    V |         |         |         |
11+20      62.9745    104.72  |  Q    V |         |         |         |
11+25      63.7028    105.76  |  Q     V|         |         |         |
11+30      64.4385    106.82  |  Q     V|         |         |         |
11+35      65.1817    107.92  |  Q     V|         |         |         |
11+40      65.9327    109.04  |  Q     V|         |         |         |
11+45      66.6916    110.19  |  Q     V|         |         |         |
11+50      67.4587    111.38  |  Q     V|         |         |         |
11+55      68.2342    112.60  |  Q     V|         |         |         |
12+ 0      69.0183    113.86  |  Q     V|         |         |         |
12+ 5      69.8138    115.51  |  Q     V|         |         |         |
12+10      70.6249    117.77  |  Q     V|         |         |         |
12+15      71.4549    120.51  |  Q      V         |         |         |
12+20      72.3078    123.85  |  Q      V         |         |         |
12+25      73.1909    128.23  |  Q      V         |         |         |
12+30      74.1225    135.26  |   Q     V         |         |         |
12+35      75.1028    142.34  |   Q     V         |         |         |
12+40      76.1124    146.60  |   Q     V         |         |         |
12+45      77.1471    150.23  |   Q     V         |         |         |
12+50      78.2040    153.46  |   Q     |V        |         |         |
12+55      79.2824    156.59  |   Q     |V        |         |         |
13+ 0      80.3813    159.56  |   Q     |V        |         |         |
13+ 5      81.5001    162.45  |   Q     |V        |         |         |
13+10      82.6386    165.31  |    Q    |V        |         |         |
13+15      83.7966    168.15  |    Q    |V        |         |         |
13+20      84.9742    170.99  |    Q    | V       |         |         |
13+25      86.1716    173.85  |    Q    | V       |         |         |
13+30      87.3888    176.74  |    Q    | V       |         |         |
13+35      88.6263    179.69  |    Q    | V       |         |         |
13+40      89.8844    182.68  |    Q    | V       |         |         |
13+45      91.1636    185.74  |    Q    | V       |         |         |
13+50      92.4645    188.89  |    Q    |  V      |         |         |
13+55      93.7878    192.15  |    Q    |  V      |         |         |
14+ 0      95.1343    195.50  |     Q   |  V      |         |         |
14+ 5      96.5055    199.10  |     Q   |  V      |         |         |
14+10      97.9039    203.06  |     Q   |  V      |         |         |
14+15      99.3322    207.38  |     Q   |   V     |         |         |
14+20     100.7930    212.11  |     Q   |   V     |         |         |
14+25     102.2906    217.45  |     Q   |   V     |         |         |
14+30     103.8333    224.01  |     Q   |   V     |         |         |
14+35     105.4231    230.83  |      Q  |   V     |         |         |
14+40     107.0545    236.88  |      Q  |    V    |         |         |
14+45     108.7281    243.02  |      Q  |    V    |         |         |
14+50     110.4456    249.37  |      Q  |    V    |         |         |
14+55     112.2095    256.12  |      Q  |    V    |         |         |
15+ 0     114.0226    263.26  |       Q |     V   |         |         |
15+ 5     115.8885    270.93  |       Q |     V   |         |         |
15+10     117.8113    279.19  |       Q |     V   |         |         |
15+15     119.7963    288.22  |       Q |     V   |         |         |
15+20     121.8493    298.10  |        Q|      V  |         |         |
15+25     123.9726    308.31  |        Q|      V  |         |         |
15+30     126.1664    318.54  |        Q|      V  |         |         |
15+35     128.4358    329.51  |         Q       V |         |         |
15+40     130.7866    341.34  |         Q       V |         |         |
15+45     133.2238    353.89  |         Q       V |         |         |
15+50     135.7360    364.76  |         |Q       V|         |         |
15+55     138.3686    382.26  |         |Q       V|         |         |
16+ 0     141.2445    417.58  |         | Q      V|         |         |
16+ 5     144.6644    496.57  |         |    Q    V         |         |
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16+10     148.8172    602.99 |          |       Q |V        |         |
16+15     153.6329    699.23 |          |         |Q        |         |
16+20     159.2527    816.00 |          |         | V  Q    |         |
16+25     165.9539    973.01 |          |         |  V     Q|         |
16+30     174.3385   1217.45 |          |         |   V     |      Q  |
16+35     182.3077   1157.13 |          |         |    V    |    Q    |
16+40     187.9918    825.33 |          |         |    QV   |         |
16+45     192.8173    700.66 |          |         |Q     V  |         |
16+50     197.0987    621.66 |          |       Q|      V  |         |
16+55     201.0627    575.57 |          |     Q   |       V |         |
17+ 0     204.6928    527.09 |          |    Q    |       V |         |
17+ 5     208.0432    486.48 |          |  Q      |        V|         |
17+10     211.1615    452.78 |          | Q       |        V|         |
17+15     214.0693    422.22 |          |Q        |         V         |
17+20     216.7809    393.73 |          |Q        |         V         |
17+25     219.3229    369.10 |          |Q        |         |V        |
17+30     221.6983    344.91 |          Q         |         |V        |
17+35     223.9153    321.91 |         Q|         |         |V        |
17+40     225.9963    302.16 |         Q|         |         |V        |
17+45     227.9447    282.90 |        Q |         |         | V       |
17+50     229.7859    267.34 |        Q |         |         | V       |
17+55     231.5250    252.51 |       Q  |         |         | V       |
18+ 0     233.1575    237.05 |       Q  |         |         | V       |
18+ 5     234.6807    221.17 |      Q   |         |         |  V      |
18+10     236.1286    210.23 |      Q   |         |         |  V      |
18+15     237.5179    201.73 |      Q   |         |         |  V      |
18+20     238.8454    192.76 |     Q    |         |         |  V      |
18+25     240.1110    183.76 |     Q    |         |         |  V      |
18+30     241.2995    172.58 |     Q    |         |         |   V     |
18+35     242.4060    160.66 |    Q     |         |         |   V     |
18+40     243.4621    153.34 |    Q     |         |         |   V     |
18+45     244.4791    147.68 |    Q     |         |         |   V     |
18+50     245.4662    143.33 |    Q     |         |         |   V     |
18+55     246.4206    138.57 |    Q     |         |         |   V     |
19+ 0     247.3406    133.59 |    Q     |         |         |    V    |
19+ 5     248.2204    127.74 |  Q       |         |         |    V    |
19+10     249.0708    123.49 |  Q       |         |         |    V    |
19+15     249.8948    119.63 |  Q       |         |         |    V    |
19+20     250.6901    115.49 |  Q       |         |         |    V    |
19+25     251.4627    112.17 |  Q       |         |         |    V    |
19+30     252.2138    109.07 |  Q       |         |         |    V    |
19+35     252.9396    105.39 |  Q       |         |         |    V    |
19+40     253.6483    102.90 |  Q       |         |         |    V    |
19+45     254.3414    100.65 |  Q       |         |         |    V    |
19+50     255.0202     98.55 |  Q       |         |         |     V   |
19+55     255.6854     96.58 | Q        |         |         |     V   |
20+ 0     256.3379     94.75 | Q        |         |         |     V   |
20+ 5     256.9789     93.07 | Q        |         |         |     V   |
20+10     257.6090     91.49 | Q        |         |         |     V   |
20+15     258.2287     89.98 | Q        |         |         |     V   |
20+20     258.8384     88.54 | Q        |         |         |     V   |
20+25     259.4387     87.16 | Q        |         |         |     V   |
20+30     260.0299     85.84 | Q        |         |         |     V   |
20+35     260.6124     84.58 | Q        |         |         |     V   |
20+40     261.1866     83.38 | Q        |         |         |     V   |
20+45     261.7529     82.22 | Q        |         |         |      V  |
20+50     262.3114     81.09 | Q        |         |         |      V  |
20+55     262.8623     80.00 | Q        |         |         |      V  |
21+ 0     263.4060     78.94 | Q        |         |         |      V  |
21+ 5     263.9428     77.94 | Q        |         |         |      V  |
21+10     264.4729     76.97 | Q        |         |         |      V  |
21+15     264.9965     76.03 | Q        |         |         |      V  |
21+20     265.5140     75.13 | Q        |         |         |      V  |
21+25     266.0254     74.26 | Q        |         |         |      V  |
21+30     266.5310     73.42 | Q        |         |         |      V  |
21+35     267.0311     72.61 | Q        |         |         |      V  |
21+40     267.5257     71.82 | Q        |         |         |      V  |
21+45     268.0151     71.06 | Q        |         |         |      V  |
21+50     268.4993     70.31 | Q        |         |         |      V  |
21+55     268.9786     69.59 | Q        |         |         |       V |
22+ 0     269.4530     68.88 | Q        |         |         |       V |
22+ 5     269.9227     68.20 | Q        |         |         |       V |
22+10     270.3878     67.53 | Q        |         |         |       V |
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   22+15     270.8484     66.88  | Q       |         |         |       V |
   22+20     271.3046     66.25  | Q       |         |         |       V |
   22+25     271.7566     65.63  | Q       |         |         |       V |
   22+30     272.2044     65.02  | Q       |         |         |       V |
   22+35     272.6481     64.43  |Q        |         |         |       V |
   22+40     273.0879     63.86  |Q        |         |         |       V |
   22+45     273.5238     63.29  |Q        |         |         |       V |
   22+50     273.9559     62.74  |Q        |         |         |       V |
   22+55     274.3844     62.21  |Q        |         |         |       V |
   23+ 0     274.8092     61.68  |Q        |         |         |       V |
   23+ 5     275.2304     61.17  |Q        |         |         |       V |
   23+10     275.6482     60.66  |Q        |         |         |        V|
   23+15     276.0627     60.17  |Q        |         |         |        V|
   23+20     276.4737     59.69  |Q        |         |         |        V|
   23+25     276.8816     59.22  |Q        |         |         |        V|
   23+30     277.2862     58.76  |Q        |         |         |        V|
   23+35     277.6878     58.30  |Q        |         |         |        V|
   23+40     278.0863     57.86  |Q        |         |         |        V|
   23+45     278.4817     57.42  |Q        |         |         |        V|
   23+50     278.8743     57.00  |Q        |         |         |        V|
   23+55     279.2640     56.58  |Q        |         |         |        V|
   24+ 0     279.6508     56.17  |Q        |         |         |        V|
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U n i t H y d r o g r a p h A n a l y s i s

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Study date 08/04/15 File Name CieloVistaPrWshdAUH25.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6049

WATERSHED A
PROPOSED CONDITIONS - CREEK A
25-YEAR STORM
BY FUSCOE ENGINEERING

Storm Event Year = 25

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
82.0	0.2	0.00	B	0.300	1.000	0.300
72.0	0.2	0.00	B	0.300	1.000	0.300
79.0	365.1	0.54	C	0.250	1.000	0.250
84.0	264.3	0.39	D	0.200	1.000	0.200
56.0	2.5	0.00	B	0.300	0.600	0.180
56.0	2.5	0.00	B	0.300	0.600	0.180
79.0	3.7	0.01	C	0.250	1.000	0.250
84.0	8.0	0.01	D	0.200	1.000	0.200
75.0	15.1	0.02	D	0.200	0.600	0.120
75.0	13.0	0.02	D	0.200	0.600	0.120

Area-averaged adjusted loss rate Fm (In/Hr) = 0.224

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.20	0.000	82.0	82.0	2.20	0.585
0.20	0.000	72.0	72.0	3.89	0.404
365.10	0.541	79.0	79.0	2.66	0.527
264.30	0.392	84.0	84.0	1.90	0.625
1.50	0.002	56.0	56.0	7.86	0.176
1.00	0.001	98.0	98.0	0.20	0.947
1.50	0.002	56.0	56.0	7.86	0.176
1.00	0.001	98.0	98.0	0.20	0.947
3.70	0.005	79.0	79.0	2.66	0.527
8.00	0.012	84.0	84.0	1.90	0.625
9.06	0.013	75.0	75.0	3.33	0.455
6.04	0.009	98.0	98.0	0.20	0.947

7.80	0.012	75.0	75.0	3.33	0.455
5.20	0.008	98.0	98.0	0.20	0.947

Area-averaged catchment yield fraction, Y = 0.572
Area-averaged low loss fraction, Yb = 0.428
++
User entry of time of concentration = 0.670 (hours)
Watershed area = 674.60(Ac.)
Catchment Lag time = 0.536 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 15.5426
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.224(In/Hr)
Average low loss rate fraction (Yb) = 0.428 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall = 0.400(In)
Computed peak 30-minute rainfall = 0.870(In)
Specified peak 1-hour rainfall = 1.150(In)
Computed peak 3-hour rainfall = 1.940(In)
Specified peak 6-hour rainfall = 2.710(In)
Specified peak 24-hour rainfall = 4.490(In)

Rainfall depth area reduction factors:
Using a total area of 674.60(Ac.) (Ref: fig. E-4)

5-minute factor = 0.968 Adjusted rainfall = 0.387(In)
30-minute factor = 0.968 Adjusted rainfall = 0.842(In)
1-hour factor = 0.968 Adjusted rainfall = 1.114(In)
3-hour factor = 0.996 Adjusted rainfall = 1.932(In)
6-hour factor = 0.998 Adjusted rainfall = 2.704(In)
24-hour factor = 0.999 Adjusted rainfall = 4.486(In)

U n i t H y d r o g r a p h
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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 8158.44 (CFS))	
1	0.985	80.358
2	3.515	206.443
3	7.138	295.583
4	11.980	394.990
5	19.155	585.357
6	30.299	909.222
7	49.711	1583.658
8	59.911	832.225
9	66.264	518.277
10	71.169	400.150
11	75.015	313.763
12	78.461	281.172
13	81.343	235.093
14	83.815	201.698
15	86.002	178.424
16	87.909	155.617
17	89.618	139.419
18	91.100	120.887
19	92.403	106.319
20	93.586	96.497
21	94.591	81.996
22	95.440	69.271
23	96.172	59.691
24	96.810	52.086
25	97.361	44.926
26	97.789	34.919
27	98.043	20.707
28	98.229	15.216
29	98.416	15.214
30	98.585	13.831
31	98.741	12.680

32	98.896	12.680
33	99.030	10.932
34	99.124	7.681
35	99.217	7.608
36	99.316	8.085
37	99.438	9.955
38	99.563	10.144
39	99.682	9.746
40	99.756	5.996
41	99.818	5.072
42	99.880	5.031
43	99.921	3.390
44	99.952	2.536
45	99.983	2.536
46	100.000	1.363

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3874	0.3874
2	0.5232	0.1358
3	0.6238	0.1006
4	0.7066	0.0829
5	0.7784	0.0718
6	0.8425	0.0640
7	0.8964	0.0539
8	0.9459	0.0495
9	0.9919	0.0459
10	1.0348	0.0430
11	1.0753	0.0405
12	1.1136	0.0383
13	1.1593	0.0456
14	1.2032	0.0439
15	1.2455	0.0424
16	1.2865	0.0410
17	1.3262	0.0397
18	1.3648	0.0386
19	1.4023	0.0375
20	1.4389	0.0365
21	1.4745	0.0356
22	1.5093	0.0348
23	1.5433	0.0340
24	1.5766	0.0333
25	1.6093	0.0326
26	1.6412	0.0320
27	1.6726	0.0314
28	1.7034	0.0308
29	1.7336	0.0302
30	1.7634	0.0297
31	1.7926	0.0292
32	1.8214	0.0288
33	1.8497	0.0283
34	1.8776	0.0279
35	1.9051	0.0275
36	1.9322	0.0271
37	1.9581	0.0258
38	1.9836	0.0255
39	2.0087	0.0251
40	2.0335	0.0248
41	2.0580	0.0245
42	2.0822	0.0242
43	2.1061	0.0239
44	2.1297	0.0236
45	2.1531	0.0233
46	2.1761	0.0231
47	2.1990	0.0228
48	2.2215	0.0226
49	2.2439	0.0223
50	2.2659	0.0221
51	2.2878	0.0219
52	2.3095	0.0216
53	2.3309	0.0214
54	2.3521	0.0212
55	2.3731	0.0210

56	2.3940	0.0208
57	2.4146	0.0206
58	2.4351	0.0205
59	2.4553	0.0203
60	2.4754	0.0201
61	2.4954	0.0199
62	2.5151	0.0198
63	2.5347	0.0196
64	2.5541	0.0194
65	2.5734	0.0193
66	2.5925	0.0191
67	2.6115	0.0190
68	2.6304	0.0188
69	2.6490	0.0187
70	2.6676	0.0186
71	2.6860	0.0184
72	2.7043	0.0183
73	2.7179	0.0137
74	2.7315	0.0135
75	2.7449	0.0134
76	2.7582	0.0133
77	2.7714	0.0132
78	2.7845	0.0131
79	2.7975	0.0130
80	2.8103	0.0129
81	2.8231	0.0128
82	2.8358	0.0127
83	2.8484	0.0126
84	2.8609	0.0125
85	2.8732	0.0124
86	2.8855	0.0123
87	2.8978	0.0122
88	2.9099	0.0121
89	2.9219	0.0120
90	2.9338	0.0119
91	2.9457	0.0119
92	2.9575	0.0118
93	2.9692	0.0117
94	2.9808	0.0116
95	2.9923	0.0115
96	3.0038	0.0115
97	3.0152	0.0114
98	3.0265	0.0113
99	3.0377	0.0112
100	3.0489	0.0112
101	3.0600	0.0111
102	3.0710	0.0110
103	3.0820	0.0110
104	3.0929	0.0109
105	3.1037	0.0108
106	3.1145	0.0108
107	3.1252	0.0107
108	3.1358	0.0106
109	3.1464	0.0106
110	3.1569	0.0105
111	3.1673	0.0104
112	3.1777	0.0104
113	3.1880	0.0103
114	3.1983	0.0103
115	3.2085	0.0102
116	3.2187	0.0102
117	3.2288	0.0101
118	3.2388	0.0100
119	3.2488	0.0100
120	3.2588	0.0099
121	3.2687	0.0099
122	3.2785	0.0098
123	3.2883	0.0098
124	3.2980	0.0097
125	3.3077	0.0097
126	3.3174	0.0096
127	3.3269	0.0096
128	3.3365	0.0095

129	3.3460	0.0095
130	3.3554	0.0094
131	3.3648	0.0094
132	3.3742	0.0094
133	3.3835	0.0093
134	3.3928	0.0093
135	3.4020	0.0092
136	3.4112	0.0092
137	3.4203	0.0091
138	3.4294	0.0091
139	3.4384	0.0091
140	3.4475	0.0090
141	3.4564	0.0090
142	3.4654	0.0089
143	3.4743	0.0089
144	3.4831	0.0089
145	3.4919	0.0088
146	3.5007	0.0088
147	3.5094	0.0087
148	3.5181	0.0087
149	3.5268	0.0087
150	3.5354	0.0086
151	3.5440	0.0086
152	3.5525	0.0086
153	3.5611	0.0085
154	3.5695	0.0085
155	3.5780	0.0084
156	3.5864	0.0084
157	3.5948	0.0084
158	3.6031	0.0083
159	3.6114	0.0083
160	3.6197	0.0083
161	3.6280	0.0082
162	3.6362	0.0082
163	3.6443	0.0082
164	3.6525	0.0081
165	3.6606	0.0081
166	3.6687	0.0081
167	3.6767	0.0081
168	3.6848	0.0080
169	3.6928	0.0080
170	3.7007	0.0080
171	3.7087	0.0079
172	3.7166	0.0079
173	3.7244	0.0079
174	3.7323	0.0078
175	3.7401	0.0078
176	3.7479	0.0078
177	3.7557	0.0078
178	3.7634	0.0077
179	3.7711	0.0077
180	3.7788	0.0077
181	3.7864	0.0077
182	3.7940	0.0076
183	3.8016	0.0076
184	3.8092	0.0076
185	3.8168	0.0075
186	3.8243	0.0075
187	3.8318	0.0075
188	3.8392	0.0075
189	3.8467	0.0074
190	3.8541	0.0074
191	3.8615	0.0074
192	3.8689	0.0074
193	3.8762	0.0073
194	3.8835	0.0073
195	3.8908	0.0073
196	3.8981	0.0073
197	3.9054	0.0072
198	3.9126	0.0072
199	3.9198	0.0072
200	3.9270	0.0072
201	3.9341	0.0072

202	3.9413	0.0071
203	3.9484	0.0071
204	3.9555	0.0071
205	3.9625	0.0071
206	3.9696	0.0070
207	3.9766	0.0070
208	3.9836	0.0070
209	3.9906	0.0070
210	3.9976	0.0070
211	4.0045	0.0069
212	4.0114	0.0069
213	4.0183	0.0069
214	4.0252	0.0069
215	4.0320	0.0069
216	4.0389	0.0068
217	4.0457	0.0068
218	4.0525	0.0068
219	4.0593	0.0068
220	4.0660	0.0068
221	4.0728	0.0067
222	4.0795	0.0067
223	4.0862	0.0067
224	4.0929	0.0067
225	4.0995	0.0067
226	4.1062	0.0066
227	4.1128	0.0066
228	4.1194	0.0066
229	4.1260	0.0066
230	4.1326	0.0066
231	4.1391	0.0066
232	4.1457	0.0065
233	4.1522	0.0065
234	4.1587	0.0065
235	4.1651	0.0065
236	4.1716	0.0065
237	4.1781	0.0064
238	4.1845	0.0064
239	4.1909	0.0064
240	4.1973	0.0064
241	4.2037	0.0064
242	4.2100	0.0064
243	4.2164	0.0063
244	4.2227	0.0063
245	4.2290	0.0063
246	4.2353	0.0063
247	4.2416	0.0063
248	4.2478	0.0063
249	4.2541	0.0062
250	4.2603	0.0062
251	4.2665	0.0062
252	4.2727	0.0062
253	4.2789	0.0062
254	4.2851	0.0062
255	4.2912	0.0062
256	4.2974	0.0061
257	4.3035	0.0061
258	4.3096	0.0061
259	4.3157	0.0061
260	4.3218	0.0061
261	4.3278	0.0061
262	4.3339	0.0060
263	4.3399	0.0060
264	4.3459	0.0060
265	4.3519	0.0060
266	4.3579	0.0060
267	4.3639	0.0060
268	4.3699	0.0060
269	4.3758	0.0059
270	4.3817	0.0059
271	4.3877	0.0059
272	4.3936	0.0059
273	4.3994	0.0059
274	4.4053	0.0059

275	4.4112	0.0059
276	4.4170	0.0059
277	4.4229	0.0058
278	4.4287	0.0058
279	4.4345	0.0058
280	4.4403	0.0058
281	4.4461	0.0058
282	4.4519	0.0058
283	4.4576	0.0058
284	4.4634	0.0057
285	4.4691	0.0057
286	4.4748	0.0057
287	4.4805	0.0057
288	4.4862	0.0057

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0057	0.0024	0.0033
2	0.0057	0.0024	0.0033
3	0.0057	0.0025	0.0033
4	0.0057	0.0025	0.0033
5	0.0058	0.0025	0.0033
6	0.0058	0.0025	0.0033
7	0.0058	0.0025	0.0033
8	0.0058	0.0025	0.0033
9	0.0059	0.0025	0.0033
10	0.0059	0.0025	0.0034
11	0.0059	0.0025	0.0034
12	0.0059	0.0025	0.0034
13	0.0059	0.0025	0.0034
14	0.0059	0.0025	0.0034
15	0.0060	0.0026	0.0034
16	0.0060	0.0026	0.0034
17	0.0060	0.0026	0.0034
18	0.0060	0.0026	0.0034
19	0.0061	0.0026	0.0035
20	0.0061	0.0026	0.0035
21	0.0061	0.0026	0.0035
22	0.0061	0.0026	0.0035
23	0.0062	0.0026	0.0035
24	0.0062	0.0026	0.0035
25	0.0062	0.0027	0.0035
26	0.0062	0.0027	0.0036
27	0.0062	0.0027	0.0036
28	0.0063	0.0027	0.0036
29	0.0063	0.0027	0.0036
30	0.0063	0.0027	0.0036
31	0.0063	0.0027	0.0036
32	0.0064	0.0027	0.0036
33	0.0064	0.0027	0.0037
34	0.0064	0.0027	0.0037
35	0.0064	0.0028	0.0037
36	0.0065	0.0028	0.0037
37	0.0065	0.0028	0.0037
38	0.0065	0.0028	0.0037
39	0.0066	0.0028	0.0037
40	0.0066	0.0028	0.0038
41	0.0066	0.0028	0.0038
42	0.0066	0.0028	0.0038
43	0.0067	0.0029	0.0038
44	0.0067	0.0029	0.0038
45	0.0067	0.0029	0.0038
46	0.0067	0.0029	0.0039
47	0.0068	0.0029	0.0039
48	0.0068	0.0029	0.0039
49	0.0068	0.0029	0.0039
50	0.0069	0.0029	0.0039
51	0.0069	0.0030	0.0039
52	0.0069	0.0030	0.0040
53	0.0070	0.0030	0.0040
54	0.0070	0.0030	0.0040

55	0.0070	0.0030	0.0040
56	0.0070	0.0030	0.0040
57	0.0071	0.0030	0.0041
58	0.0071	0.0030	0.0041
59	0.0072	0.0031	0.0041
60	0.0072	0.0031	0.0041
61	0.0072	0.0031	0.0041
62	0.0072	0.0031	0.0041
63	0.0073	0.0031	0.0042
64	0.0073	0.0031	0.0042
65	0.0074	0.0032	0.0042
66	0.0074	0.0032	0.0042
67	0.0074	0.0032	0.0043
68	0.0075	0.0032	0.0043
69	0.0075	0.0032	0.0043
70	0.0075	0.0032	0.0043
71	0.0076	0.0033	0.0043
72	0.0076	0.0033	0.0044
73	0.0077	0.0033	0.0044
74	0.0077	0.0033	0.0044
75	0.0078	0.0033	0.0044
76	0.0078	0.0033	0.0045
77	0.0078	0.0034	0.0045
78	0.0079	0.0034	0.0045
79	0.0079	0.0034	0.0045
80	0.0080	0.0034	0.0046
81	0.0080	0.0034	0.0046
82	0.0081	0.0034	0.0046
83	0.0081	0.0035	0.0046
84	0.0081	0.0035	0.0047
85	0.0082	0.0035	0.0047
86	0.0082	0.0035	0.0047
87	0.0083	0.0036	0.0048
88	0.0083	0.0036	0.0048
89	0.0084	0.0036	0.0048
90	0.0084	0.0036	0.0048
91	0.0085	0.0036	0.0049
92	0.0086	0.0037	0.0049
93	0.0086	0.0037	0.0049
94	0.0087	0.0037	0.0050
95	0.0087	0.0037	0.0050
96	0.0088	0.0038	0.0050
97	0.0089	0.0038	0.0051
98	0.0089	0.0038	0.0051
99	0.0090	0.0038	0.0051
100	0.0090	0.0039	0.0052
101	0.0091	0.0039	0.0052
102	0.0091	0.0039	0.0052
103	0.0092	0.0039	0.0053
104	0.0093	0.0040	0.0053
105	0.0094	0.0040	0.0053
106	0.0094	0.0040	0.0054
107	0.0095	0.0041	0.0054
108	0.0095	0.0041	0.0055
109	0.0096	0.0041	0.0055
110	0.0097	0.0041	0.0055
111	0.0098	0.0042	0.0056
112	0.0098	0.0042	0.0056
113	0.0099	0.0043	0.0057
114	0.0100	0.0043	0.0057
115	0.0101	0.0043	0.0058
116	0.0102	0.0044	0.0058
117	0.0103	0.0044	0.0059
118	0.0103	0.0044	0.0059
119	0.0104	0.0045	0.0060
120	0.0105	0.0045	0.0060
121	0.0106	0.0046	0.0061
122	0.0107	0.0046	0.0061
123	0.0108	0.0046	0.0062
124	0.0109	0.0047	0.0062
125	0.0110	0.0047	0.0063
126	0.0111	0.0048	0.0063
127	0.0112	0.0048	0.0064

128	0.0113	0.0048	0.0065
129	0.0115	0.0049	0.0066
130	0.0115	0.0049	0.0066
131	0.0117	0.0050	0.0067
132	0.0118	0.0050	0.0067
133	0.0119	0.0051	0.0068
134	0.0120	0.0052	0.0069
135	0.0122	0.0052	0.0070
136	0.0123	0.0053	0.0070
137	0.0125	0.0053	0.0071
138	0.0126	0.0054	0.0072
139	0.0128	0.0055	0.0073
140	0.0129	0.0055	0.0074
141	0.0131	0.0056	0.0075
142	0.0132	0.0057	0.0075
143	0.0134	0.0057	0.0077
144	0.0135	0.0058	0.0077
145	0.0183	0.0078	0.0105
146	0.0184	0.0079	0.0105
147	0.0187	0.0080	0.0107
148	0.0188	0.0081	0.0108
149	0.0191	0.0082	0.0109
150	0.0193	0.0083	0.0110
151	0.0196	0.0084	0.0112
152	0.0198	0.0085	0.0113
153	0.0201	0.0086	0.0115
154	0.0203	0.0087	0.0116
155	0.0206	0.0088	0.0118
156	0.0208	0.0089	0.0119
157	0.0212	0.0091	0.0121
158	0.0214	0.0092	0.0123
159	0.0219	0.0094	0.0125
160	0.0221	0.0095	0.0126
161	0.0226	0.0097	0.0129
162	0.0228	0.0098	0.0130
163	0.0233	0.0100	0.0133
164	0.0236	0.0101	0.0135
165	0.0242	0.0104	0.0138
166	0.0245	0.0105	0.0140
167	0.0251	0.0108	0.0144
168	0.0255	0.0109	0.0146
169	0.0271	0.0116	0.0155
170	0.0275	0.0118	0.0157
171	0.0283	0.0121	0.0162
172	0.0288	0.0123	0.0165
173	0.0297	0.0127	0.0170
174	0.0302	0.0130	0.0173
175	0.0314	0.0134	0.0179
176	0.0320	0.0137	0.0183
177	0.0333	0.0143	0.0190
178	0.0340	0.0146	0.0195
179	0.0356	0.0153	0.0204
180	0.0365	0.0157	0.0209
181	0.0386	0.0165	0.0221
182	0.0397	0.0170	0.0227
183	0.0424	0.0181	0.0242
184	0.0439	0.0187	0.0252
185	0.0383	0.0164	0.0219
186	0.0405	0.0173	0.0231
187	0.0459	0.0187	0.0273
188	0.0495	0.0187	0.0308
189	0.0640	0.0187	0.0454
190	0.0718	0.0187	0.0531
191	0.1006	0.0187	0.0819
192	0.1358	0.0187	0.1172
193	0.3874	0.0187	0.3687
194	0.0829	0.0187	0.0642
195	0.0539	0.0187	0.0353
196	0.0430	0.0184	0.0246
197	0.0456	0.0187	0.0270
198	0.0410	0.0175	0.0234
199	0.0375	0.0161	0.0215
200	0.0348	0.0149	0.0199

201	0.0326	0.0140	0.0186
202	0.0308	0.0132	0.0176
203	0.0292	0.0125	0.0167
204	0.0279	0.0119	0.0160
205	0.0258	0.0111	0.0148
206	0.0248	0.0106	0.0142
207	0.0239	0.0102	0.0137
208	0.0231	0.0099	0.0132
209	0.0223	0.0096	0.0128
210	0.0216	0.0093	0.0124
211	0.0210	0.0090	0.0120
212	0.0205	0.0088	0.0117
213	0.0199	0.0085	0.0114
214	0.0194	0.0083	0.0111
215	0.0190	0.0081	0.0109
216	0.0186	0.0079	0.0106
217	0.0137	0.0058	0.0078
218	0.0133	0.0057	0.0076
219	0.0130	0.0056	0.0074
220	0.0127	0.0054	0.0072
221	0.0124	0.0053	0.0071
222	0.0121	0.0052	0.0069
223	0.0119	0.0051	0.0068
224	0.0116	0.0050	0.0066
225	0.0114	0.0049	0.0065
226	0.0112	0.0048	0.0064
227	0.0110	0.0047	0.0063
228	0.0108	0.0046	0.0062
229	0.0106	0.0045	0.0060
230	0.0104	0.0044	0.0059
231	0.0102	0.0044	0.0058
232	0.0100	0.0043	0.0057
233	0.0099	0.0042	0.0057
234	0.0097	0.0042	0.0056
235	0.0096	0.0041	0.0055
236	0.0094	0.0040	0.0054
237	0.0093	0.0040	0.0053
238	0.0092	0.0039	0.0052
239	0.0091	0.0039	0.0052
240	0.0089	0.0038	0.0051
241	0.0088	0.0038	0.0050
242	0.0087	0.0037	0.0050
243	0.0086	0.0037	0.0049
244	0.0085	0.0036	0.0048
245	0.0084	0.0036	0.0048
246	0.0083	0.0035	0.0047
247	0.0082	0.0035	0.0047
248	0.0081	0.0035	0.0046
249	0.0080	0.0034	0.0046
250	0.0079	0.0034	0.0045
251	0.0078	0.0033	0.0045
252	0.0077	0.0033	0.0044
253	0.0077	0.0033	0.0044
254	0.0076	0.0032	0.0043
255	0.0075	0.0032	0.0043
256	0.0074	0.0032	0.0042
257	0.0073	0.0031	0.0042
258	0.0073	0.0031	0.0042
259	0.0072	0.0031	0.0041
260	0.0071	0.0031	0.0041
261	0.0071	0.0030	0.0040
262	0.0070	0.0030	0.0040
263	0.0069	0.0030	0.0040
264	0.0069	0.0029	0.0039
265	0.0068	0.0029	0.0039
266	0.0068	0.0029	0.0039
267	0.0067	0.0029	0.0038
268	0.0066	0.0028	0.0038
269	0.0066	0.0028	0.0038
270	0.0065	0.0028	0.0037
271	0.0065	0.0028	0.0037
272	0.0064	0.0028	0.0037
273	0.0064	0.0027	0.0036

274	0.0063	0.0027	0.0036
275	0.0063	0.0027	0.0036
276	0.0062	0.0027	0.0036
277	0.0062	0.0026	0.0035
278	0.0061	0.0026	0.0035
279	0.0061	0.0026	0.0035
280	0.0060	0.0026	0.0035
281	0.0060	0.0026	0.0034
282	0.0060	0.0026	0.0034
283	0.0059	0.0025	0.0034
284	0.0059	0.0025	0.0034
285	0.0058	0.0025	0.0033
286	0.0058	0.0025	0.0033
287	0.0058	0.0025	0.0033
288	0.0057	0.0024	0.0033

Total soil rain loss = 1.66(In)
Total effective rainfall = 2.82(In)
Peak flow rate in flood hydrograph = 909.86(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

```
Time(h+m) Volume Ac.Ft   Q(CFS)  0      250.0     500.0     750.0    1000.0
-------------------------------------------------------------------------
  0+ 5       0.0018      0.26  Q         |         |         |         |
  0+10       0.0082      0.93  Q         |         |         |         |
  0+15       0.0213      1.90  Q         |         |         |         |
  0+20       0.0433      3.19  Q         |         |         |         |
  0+25       0.0785      5.11  Q         |         |         |         |
  0+30       0.1341      8.08  Q         |         |         |         |
  0+35       0.2255     13.26  Q         |         |         |         |
  0+40       0.3358     16.01  Q         |         |         |         |
  0+45       0.4580     17.76  Q         |         |         |         |
  0+50       0.5897     19.12  Q         |         |         |         |
  0+55       0.7288     20.20  Q         |         |         |         |
  1+ 0       0.8747     21.18  Q         |         |         |         |
  1+ 5       1.0264     22.02  Q         |         |         |         |
  1+10       1.1831     22.75  Q         |         |         |         |
  1+15       1.3443     23.41  Q         |         |         |         |
  1+20       1.5096     24.00  Q         |         |         |         |
  1+25       1.6786     24.54  Q         |         |         |         |
  1+30       1.8509     25.02  VQ        |         |         |         |
  1+35       2.0262     25.45  VQ        |         |         |         |
  1+40       2.2042     25.85  VQ        |         |         |         |
  1+45       2.3848     26.21  VQ        |         |         |         |
  1+50       2.5675     26.53  VQ        |         |         |         |
  1+55       2.7522     26.82  VQ        |         |         |         |
  2+ 0       2.9387     27.08  VQ        |         |         |         |
  2+ 5       3.1270     27.33  VQ        |         |         |         |
  2+10       3.3167     27.54  VQ        |         |         |         |
  2+15       3.5075     27.71  VQ        |         |         |         |
  2+20       3.6994     27.86  VQ        |         |         |         |
  2+25       3.8923     28.02  VQ        |         |         |         |
  2+30       4.0863     28.16  |Q        |         |         |         |
  2+35       4.2813     28.31  |Q        |         |         |         |
  2+40       4.4772     28.46  |Q        |         |         |         |
  2+45       4.6742     28.60  |Q        |         |         |         |
  2+50       4.8721     28.73  |Q        |         |         |         |
  2+55       5.0709     28.87  |Q        |         |         |         |
  3+ 0       5.2707     29.01  |Q        |         |         |         |
  3+ 5       5.4715     29.15  |Q        |         |         |         |
  3+10       5.6732     29.30  |Q        |         |         |         |
  3+15       5.8760     29.45  |Q        |         |         |         |
  3+20       6.0797     29.58  |Q        |         |         |         |
  3+25       6.2844     29.71  |Q        |         |         |         |
  3+30       6.4899     29.85  |Q        |         |         |         |
  3+35       6.6964     29.98  |Q        |         |         |         |
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3+40       6.9038     30.11  |Q         |          |          |
3+45       7.1120     30.24  |Q         |          |          |
3+50       7.3212     30.37  |Q         |          |          |
3+55       7.5312     30.49  |Q         |          |          |
4+ 0       7.7420     30.62  |Q         |          |          |
4+ 5       7.9538     30.75  |QV        |          |          |
4+10       8.1664     30.87  |QV        |          |          |
4+15       8.3800     31.01  |QV        |          |          |
4+20       8.5944     31.14  |QV        |          |          |
4+25       8.8098     31.27  |QV        |          |          |
4+30       9.0261     31.40  |QV        |          |          |
4+35       9.2433     31.54  |QV        |          |          |
4+40       9.4615     31.68  |QV        |          |          |
4+45       9.6806     31.82  |QV        |          |          |
4+50       9.9007     31.96  |QV        |          |          |
4+55      10.1218     32.10  |QV        |          |          |
5+ 0      10.3439     32.25  |QV        |          |          |
5+ 5      10.5670     32.40  |QV        |          |          |
5+10      10.7911     32.54  |QV        |          |          |
5+15      11.0163     32.69  |QV        |          |          |
5+20      11.2425     32.84  |QV        |          |          |
5+25      11.4697     33.00  |QV        |          |          |
5+30      11.6980     33.15  |QV        |          |          |
5+35      11.9274     33.31  |Q V       |          |          |
5+40      12.1579     33.46  |Q V       |          |          |
5+45      12.3895     33.63  |Q V       |          |          |
5+50      12.6222     33.79  |Q V       |          |          |
5+55      12.8560     33.96  |Q V       |          |          |
6+ 0      13.0910     34.12  |Q V       |          |          |
6+ 5      13.3272     34.29  |Q V       |          |          |
6+10      13.5645     34.46  |Q V       |          |          |
6+15      13.8031     34.64  |Q V       |          |          |
6+20      14.0428     34.81  |Q V       |          |          |
6+25      14.2838     34.99  |Q V       |          |          |
6+30      14.5260     35.17  |Q V       |          |          |
6+35      14.7695     35.35  |Q V       |          |          |
6+40      15.0142     35.54  |Q V       |          |          |
6+45      15.2602     35.73  |Q V       |          |          |
6+50      15.5076     35.91  |Q V       |          |          |
6+55      15.7563     36.11  |Q V       |          |          |
7+ 0      16.0063     36.30  |Q  V      |          |          |
7+ 5      16.2577     36.50  |Q  V      |          |          |
7+10      16.5105     36.70  |Q  V      |          |          |
7+15      16.7647     36.91  |Q  V      |          |          |
7+20      17.0203     37.11  |Q  V      |          |          |
7+25      17.2773     37.33  |Q  V      |          |          |
7+30      17.5359     37.54  |Q  V      |          |          |
7+35      17.7959     37.76  |Q  V      |          |          |
7+40      18.0574     37.97  |Q  V      |          |          |
7+45      18.3205     38.20  |Q  V      |          |          |
7+50      18.5851     38.42  |Q  V      |          |          |
7+55      18.8514     38.66  |Q  V      |          |          |
8+ 0      19.1192     38.89  |Q  V      |          |          |
8+ 5      19.3886     39.13  |Q  V      |          |          |
8+10      19.6597     39.36  |Q  V      |          |          |
8+15      19.9326     39.61  |Q   V     |          |          |
8+20      20.2071     39.86  |Q   V     |          |          |
8+25      20.4833     40.12  |Q   V     |          |          |
8+30      20.7614     40.37  |Q   V     |          |          |
8+35      21.0412     40.63  |Q   V     |          |          |
8+40      21.3228     40.89  |Q   V     |          |          |
8+45      21.6064     41.17  |Q   V     |          |          |
8+50      21.8918     41.44  |Q   V     |          |          |
8+55      22.1792     41.73  |Q   V     |          |          |
9+ 0      22.4684     42.00  |Q   V     |          |          |
9+ 5      22.7598     42.30  |Q   V     |          |          |
9+10      23.0531     42.59  |Q   V     |          |          |
9+15      23.3485     42.90  |Q   V     |          |          |
9+20      23.6460     43.20  |Q   V     |          |          |
9+25      23.9457     43.51  |Q    V    |          |          |
9+30      24.2475     43.82  |Q    V    |          |          |
9+35      24.5516     44.16  |Q    V    |          |          |
9+40      24.8579     44.48  |Q    V    |          |          |
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 9+45      25.1666     44.82  |Q    V   |          |          |          |
 9+50      25.4776     45.16  |Q    V   |          |          |          |
 9+55      25.7911     45.51  |Q    V   |          |          |          |
10+ 0      26.1070     45.86  |Q    V   |          |          |          |
10+ 5      26.4254     46.24  |Q    V   |          |          |          |
10+10      26.7463     46.60  |Q    V   |          |          |          |
10+15      27.0699     46.99  |Q    V   |          |          |          |
10+20      27.3962     47.37  |Q    V   |          |          |          |
10+25      27.7252     47.77  |Q    V   |          |          |          |
10+30      28.0569     48.17  |Q     V  |          |          |          |
10+35      28.3916     48.59  |Q     V  |          |          |          |
10+40      28.7291     49.01  |Q     V  |          |          |          |
10+45      29.0696     49.45  |Q     V  |          |          |          |
10+50      29.4131     49.88  |Q     V  |          |          |          |
10+55      29.7599     50.34  | Q    V  |          |          |          |
11+ 0      30.1097     50.80  | Q    V  |          |          |          |
11+ 5      30.4629     51.28  | Q    V  |          |          |          |
11+10      30.8194     51.76  | Q    V  |          |          |          |
11+15      31.1794     52.27  | Q    V  |          |          |          |
11+20      31.5428     52.77  | Q    V  |          |          |          |
11+25      31.9100     53.31  | Q     V |          |          |          |
11+30      32.2807     53.84  | Q     V |          |          |          |
11+35      32.6554     54.40  | Q     V |          |          |          |
11+40      33.0339     54.96  | Q     V |          |          |          |
11+45      33.4165     55.55  | Q     V |          |          |          |
11+50      33.8031     56.14  | Q     V |          |          |          |
11+55      34.1941     56.77  | Q     V |          |          |          |
12+ 0      34.5894     57.39  | Q     V |          |          |          |
12+ 5      34.9907     58.27  | Q     V |          |          |          |
12+10      35.4002     59.46  | Q     V |          |          |          |
12+15      35.8198     60.93  | Q      V|          |          |          |
12+20      36.2513     62.66  | Q      V|          |          |          |
12+25      36.6985     64.93  | Q      V|          |          |          |
12+30      37.1670     68.03  | Q      V|          |          |          |
12+35      37.6693     72.93  | Q      V|          |          |          |
12+40      38.1921     75.90  |  Q     V|          |          |          |
12+45      38.7302     78.14  |  Q     V|          |          |          |
12+50      39.2816     80.07  |  Q     V|          |          |          |
12+55      39.8453     81.85  |  Q      V          |          |          |
13+ 0      40.4207     83.54  |  Q      V          |          |          |
13+ 5      41.0074     85.19  |  Q      V          |          |          |
13+10      41.6048     86.75  |  Q      V          |          |          |
13+15      42.2132     88.34  |  Q      V          |          |          |
13+20      42.8321     89.86  |  Q      V          |          |          |
13+25      43.4618     91.44  |  Q      V          |          |          |
13+30      44.1021     92.97  |  Q      |V         |          |          |
13+35      44.7534     94.57  |  Q      |V         |          |          |
13+40      45.4155     96.14  |  Q      |V         |          |          |
13+45      46.0889     97.79  |  Q      |V         |          |          |
13+50      46.7736     99.41  |  Q      |V         |          |          |
13+55      47.4702    101.14  |   Q     |V         |          |          |
14+ 0      48.1785    102.86  |   Q     | V        |          |          |
14+ 5      48.9000    104.75  |   Q     | V        |          |          |
14+10      49.6348    106.69  |   Q     | V        |          |          |
14+15      50.3842    108.82  |   Q     | V        |          |          |
14+20      51.1486    111.00  |   Q     | V        |          |          |
14+25      51.9301    113.48  |   Q     |  V       |          |          |
14+30      52.7301    116.15  |   Q     |  V       |          |          |
14+35      53.5524    119.40  |   Q     |  V       |          |          |
14+40      54.3947    122.31  |   Q     |  V       |          |          |
14+45      55.2580    125.34  |    Q    |  V       |          |          |
14+50      56.1421    128.37  |    Q    |   V      |          |          |
14+55      57.0492    131.70  |    Q    |   V      |          |          |
15+ 0      57.9797    135.12  |    Q    |   V      |          |          |
15+ 5      58.9367    138.95  |    Q    |   V      |          |          |
15+10      59.9210    142.92  |    Q    |    V     |          |          |
15+15      60.9363    147.42  |    Q    |    V     |          |          |
15+20      61.9842    152.16  |     Q   |    V     |          |          |
15+25      63.0669    157.21  |     Q   |    V     |          |          |
15+30      64.1823    161.96  |     Q   |     V    |          |          |
15+35      65.3351    167.38  |     Q   |     V    |          |          |
15+40      66.5279    173.20  |     Q   |     V    |          |          |
15+45      67.7725    180.71  |      Q  |      V   |          |          |
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15+50      69.0781    189.58 |      Q  |      V  |         |         |
15+55      70.4606    200.74 |       Q |      V  |         |         |
16+ 0      72.0110    225.12 |        Q|       V |         |         |
16+ 5      73.9661    283.88 |         |Q      V |         |         |
16+10      76.4529    361.08 |         |   Q    V|         |         |
16+15      79.4640    437.22 |         |      Q  V         |         |
16+20      83.0123    515.21 |         |         Q         |         |
16+25      87.3282    626.67 |         |          | V  Q   |         |
16+30      92.5299    755.28 |         |          |  V     Q         |
16+35      98.7961    909.86 |         |          |   V    |     Q   |
16+40     103.2193    642.24 |         |          |    QV  |         |
16+45     106.6162    493.23 |         |        Q|     V  |         |
16+50     109.5024    419.09 |         |     Q   |      V |         |
16+55     112.0690    372.67 |         |   Q     |       V |         |
17+ 0     114.4267    342.33 |         |  Q      |       V |         |
17+ 5     116.5695    311.14 |         | Q       |        V|         |
17+10     118.5375    285.75 |         |Q        |        V|         |
17+15     120.3622    264.96 |         Q         |         V         |
17+20     122.0562    245.96 |        Q|         |         V         |
17+25     123.6378    229.65 |        Q|         |         |V        |
17+30     125.1088    213.60 |       Q |         |         |V        |
17+35     126.4810    199.24 |      Q  |         |         |V        |
17+40     127.7698    187.13 |      Q  |         |         | V       |
17+45     128.9715    174.48 |     Q   |         |         | V       |
17+50     130.0940    162.99 |     Q   |         |         | V       |
17+55     131.1479    153.03 |     Q   |         |         |  V      |
18+ 0     132.1405    144.13 |    Q    |         |         |  V      |
18+ 5     133.0729    135.37 |    Q    |         |         |  V      |
18+10     133.9396    125.85 |    Q    |         |         |  V      |
18+15     134.7375    115.85 |   Q     |         |         |  V      |
18+20     135.4885    109.05 |   Q     |         |         |   V     |
18+25     136.2050    104.03 |   Q     |         |         |   V     |
18+30     136.8814     98.21 |  Q      |         |         |   V     |
18+35     137.5078     90.95 |  Q      |         |         |   V     |
18+40     138.1008     86.10 |  Q      |         |         |   V     |
18+45     138.6640     81.77 |  Q      |         |         |   V     |
18+50     139.1987     77.64 |  Q      |         |         |    V    |
18+55     139.7147     74.93 | Q       |         |         |    V    |
19+ 0     140.2154     72.70 | Q       |         |         |    V    |
19+ 5     140.7044     70.99 | Q       |         |         |    V    |
19+10     141.1782     68.80 | Q       |         |         |    V    |
19+15     141.6352     66.36 | Q       |         |         |    V    |
19+20     142.0702     63.16 | Q       |         |         |    V    |
19+25     142.4898     60.93 | Q       |         |         |    V    |
19+30     142.8967     59.08 | Q       |         |         |     V   |
19+35     143.2888     56.94 | Q       |         |         |     V   |
19+40     143.6684     55.11 | Q       |         |         |     V   |
19+45     144.0376     53.61 | Q       |         |         |     V   |
19+50     144.3950     51.89 | Q       |         |         |     V   |
19+55     144.7412     50.27 | Q       |         |         |     V   |
20+ 0     145.0797     49.16 |Q        |         |         |     V   |
20+ 5     145.4114     48.16 |Q        |         |         |     V   |
20+10     145.7367     47.24 |Q        |         |         |     V   |
20+15     146.0562     46.39 |Q        |         |         |     V   |
20+20     146.3703     45.60 |Q        |         |         |     V   |
20+25     146.6792     44.85 |Q        |         |         |     V   |
20+30     146.9831     44.13 |Q        |         |         |      V  |
20+35     147.2823     43.44 |Q        |         |         |      V  |
20+40     147.5769     42.78 |Q        |         |         |      V  |
20+45     147.8672     42.15 |Q        |         |         |      V  |
20+50     148.1534     41.55 |Q        |         |         |      V  |
20+55     148.4356     40.97 |Q        |         |         |      V  |
21+ 0     148.7139     40.42 |Q        |         |         |      V  |
21+ 5     148.9885     39.87 |Q        |         |         |      V  |
21+10     149.2595     39.34 |Q        |         |         |      V  |
21+15     149.5270     38.83 |Q        |         |         |      V  |
21+20     149.7911     38.35 |Q        |         |         |      V  |
21+25     150.0520     37.88 |Q        |         |         |      V  |
21+30     150.3098     37.43 |Q        |         |         |      V  |
21+35     150.5646     37.00 |Q        |         |         |      V  |
21+40     150.8165     36.58 |Q        |         |         |       V |
21+45     151.0656     36.17 |Q        |         |         |       V |
21+50     151.3120     35.78 |Q        |         |         |       V |
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 21+55     151.5558     35.40  |Q         |          |          |        V |
 22+ 0     151.7970     35.03  |Q         |          |          |        V |
 22+ 5     152.0358     34.67  |Q         |          |          |        V |
 22+10     152.2721     34.32  |Q         |          |          |        V |
 22+15     152.5062     33.98  |Q         |          |          |        V |
 22+20     152.7379     33.65  |Q         |          |          |        V |
 22+25     152.9674     33.33  |Q         |          |          |        V |
 22+30     153.1948     33.01  |Q         |          |          |        V |
 22+35     153.4200     32.70  |Q         |          |          |        V |
 22+40     153.6432     32.40  |Q         |          |          |        V |
 22+45     153.8643     32.11  |Q         |          |          |        V |
 22+50     154.0835     31.82  |Q         |          |          |        V |
 22+55     154.3007     31.54  |Q         |          |          |        V |
 23+ 0     154.5161     31.27  |Q         |          |          |        V |
 23+ 5     154.7296     31.00  |Q         |          |          |         V|
 23+10     154.9414     30.74  |Q         |          |          |         V|
 23+15     155.1513     30.49  |Q         |          |          |         V|
 23+20     155.3596     30.24  |Q         |          |          |         V|
 23+25     155.5661     29.99  |Q         |          |          |         V|
 23+30     155.7710     29.75  |Q         |          |          |         V|
 23+35     155.9743     29.52  |Q         |          |          |         V|
 23+40     156.1760     29.29  |Q         |          |          |         V|
 23+45     156.3762     29.06  |Q         |          |          |         V|
 23+50     156.5748     28.84  |Q         |          |          |         V|
 23+55     156.7719     28.62  |Q         |          |          |         V|
 24+ 0     156.9676     28.41  |Q         |          |          |         V|
 24+ 5     157.1601     27.94  |Q         |          |          |         V|
 24+10     157.3465     27.07  |Q         |          |          |         V|
 24+15     157.5250     25.91  |Q         |          |          |         V|
 24+20     157.6933     24.45  Q          |          |          |         V|
 24+25     157.8474     22.37  Q          |          |          |         V|
 24+30     157.9800     19.26  Q          |          |          |         V|
 24+35     158.0763     13.98  Q          |          |          |         V|
 24+40     158.1533     11.18  Q          |          |          |         V|
 24+45     158.2182      9.42  Q          |          |          |         V|
 24+50     158.2736      8.05  Q          |          |          |         V|
 24+55     158.3216      6.97  Q          |          |          |         V|
 25+ 0     158.3630      6.01  Q          |          |          |         V|
 25+ 5     158.3988      5.20  Q          |          |          |         V|
 25+10     158.4299      4.51  Q          |          |          |         V|
 25+15     158.4567      3.90  Q          |          |          |         V|
 25+20     158.4799      3.36  Q          |          |          |         V|
 25+25     158.4998      2.89  Q          |          |          |         V|
 25+30     158.5168      2.47  Q          |          |          |         V|
 25+35     158.5314      2.11  Q          |          |          |         V|
 25+40     158.5436      1.78  Q          |          |          |         V|
 25+45     158.5540      1.50  Q          |          |          |         V|
 25+50     158.5627      1.27  Q          |          |          |         V|
 25+55     158.5701      1.07  Q          |          |          |         V|
 26+ 0     158.5762      0.89  Q          |          |          |         V|
 26+ 5     158.5813      0.74  Q          |          |          |         V|
 26+10     158.5855      0.62  Q          |          |          |         V|
 26+15     158.5893      0.55  Q          |          |          |         V|
 26+20     158.5927      0.49  Q          |          |          |         V|
 26+25     158.5957      0.44  Q          |          |          |         V|
 26+30     158.5984      0.39  Q          |          |          |         V|
 26+35     158.6008      0.35  Q          |          |          |         V|
 26+40     158.6029      0.30  Q          |          |          |         V|
 26+45     158.6048      0.27  Q          |          |          |         V|
 26+50     158.6064      0.24  Q          |          |          |         V|
 26+55     158.6079      0.21  Q          |          |          |         V|
 27+ 0     158.6092      0.19  Q          |          |          |         V|
 27+ 5     158.6102      0.15  Q          |          |          |         V|
 27+10     158.6110      0.12  Q          |          |          |         V|
 27+15     158.6116      0.09  Q          |          |          |         V|
 27+20     158.6121      0.07  Q          |          |          |         V|
 27+25     158.6124      0.05  Q          |          |          |         V|
 27+30     158.6127      0.03  Q          |          |          |         V|
 27+35     158.6128      0.02  Q          |          |          |         V|
 27+40     158.6129      0.01  Q          |          |          |         V|
 27+45     158.6129      0.00  Q          |          |          |         V|
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U n i t H y d r o g r a p h A n a l y s i s

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Study date 08/04/15 File Name CieloVistaPrWshdAUH10.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6049

WATERSHED A
PROPOSED CONDITIONS - CREEK A
10-YEAR STORM
BY FUSCOE ENGINEERING

Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
82.0	0.2	0.00	B	0.300	1.000	0.300
72.0	0.2	0.00	B	0.300	1.000	0.300
79.0	365.1	0.54	C	0.250	1.000	0.250
84.0	264.3	0.39	D	0.200	1.000	0.200
56.0	2.5	0.00	B	0.300	0.600	0.180
56.0	2.5	0.00	B	0.300	0.600	0.180
79.0	3.7	0.01	C	0.250	1.000	0.250
84.0	8.0	0.01	D	0.200	1.000	0.200
75.0	15.1	0.02	D	0.200	0.600	0.120
75.0	13.0	0.02	D	0.200	0.600	0.120

Area-averaged adjusted loss rate Fm (In/Hr) = 0.224

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.20	0.000	82.0	82.0	2.20	0.525
0.20	0.000	72.0	72.0	3.89	0.337
365.10	0.541	79.0	79.0	2.66	0.464
264.30	0.392	84.0	84.0	1.90	0.568
1.50	0.002	56.0	56.0	7.86	0.121
1.00	0.001	98.0	98.0	0.20	0.936
1.50	0.002	56.0	56.0	7.86	0.121
1.00	0.001	98.0	98.0	0.20	0.936
3.70	0.005	79.0	79.0	2.66	0.464
8.00	0.012	84.0	84.0	1.90	0.568
9.06	0.013	75.0	75.0	3.33	0.389
6.04	0.009	98.0	98.0	0.20	0.936

7.80	0.012	75.0	75.0	3.33	0.389
5.20	0.008	98.0	98.0	0.20	0.936

Area-averaged catchment yield fraction, Y = 0.512
Area-averaged low loss fraction, Yb = 0.488
++
User entry of time of concentration = 0.723 (hours)
Watershed area = 674.60(Ac.)
Catchment Lag time = 0.578 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 14.4115
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.224(In/Hr)
Average low loss rate fraction (Yb) = 0.488 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall = 0.340(In)
Computed peak 30-minute rainfall = 0.720(In)
Specified peak 1-hour rainfall = 0.950(In)
Computed peak 3-hour rainfall = 1.590(In)
Specified peak 6-hour rainfall = 2.200(In)
Specified peak 24-hour rainfall = 3.680(In)

Rainfall depth area reduction factors:
Using a total area of 674.60(Ac.) (Ref: fig. E-4)

5-minute factor = 0.968 Adjusted rainfall = 0.329(In)
30-minute factor = 0.968 Adjusted rainfall = 0.697(In)
1-hour factor = 0.968 Adjusted rainfall = 0.920(In)
3-hour factor = 0.996 Adjusted rainfall = 1.584(In)
6-hour factor = 0.998 Adjusted rainfall = 2.195(In)
24-hour factor = 0.999 Adjusted rainfall = 3.677(In)

U n i t H y d r o g r a p h
++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 8158.44 (CFS))	
1	0.913	74.465
2	3.173	184.424
3	6.383	261.880
4	10.595	343.641
5	16.518	483.220
6	24.901	683.876
7	40.633	1283.475
8	55.356	1201.228
9	62.562	587.889
10	67.895	435.110
11	72.147	346.860
12	75.613	282.772
13	78.739	255.029
14	81.394	216.614
15	83.691	187.427
16	85.741	167.190
17	87.535	146.384
18	89.191	135.078
19	90.595	114.574
20	91.881	104.945
21	93.031	93.808
22	94.030	81.521
23	94.929	73.355
24	95.656	59.296
25	96.319	54.039
26	96.900	47.415
27	97.393	40.266
28	97.790	32.362
29	98.029	19.478
30	98.202	14.109
31	98.375	14.109

32	98.539	13.403
33	98.684	11.817
34	98.828	11.758
35	98.969	11.538
36	99.070	8.188
37	99.156	7.055
38	99.243	7.055
39	99.339	7.877
40	99.454	9.375
41	99.569	9.406
42	99.681	9.090
43	99.750	5.646
44	99.808	4.703
45	99.865	4.703
46	99.911	3.756
47	99.940	2.364
48	99.969	2.352
49	100.000	1.176

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3292	0.3292
2	0.4401	0.1109
3	0.5216	0.0814
4	0.5884	0.0668
5	0.6460	0.0576
6	0.6972	0.0513
7	0.7416	0.0443
8	0.7822	0.0407
9	0.8200	0.0377
10	0.8553	0.0353
11	0.8885	0.0332
12	0.9200	0.0315
13	0.9571	0.0371
14	0.9928	0.0357
15	1.0273	0.0344
16	1.0606	0.0333
17	1.0928	0.0323
18	1.1242	0.0313
19	1.1546	0.0305
20	1.1843	0.0297
21	1.2132	0.0289
22	1.2414	0.0282
23	1.2690	0.0276
24	1.2960	0.0270
25	1.3224	0.0264
26	1.3483	0.0259
27	1.3737	0.0254
28	1.3986	0.0249
29	1.4231	0.0245
30	1.4471	0.0241
31	1.4708	0.0237
32	1.4940	0.0233
33	1.5170	0.0229
34	1.5395	0.0226
35	1.5617	0.0222
36	1.5836	0.0219
37	1.6042	0.0206
38	1.6245	0.0203
39	1.6445	0.0200
40	1.6642	0.0197
41	1.6837	0.0195
42	1.7029	0.0192
43	1.7219	0.0190
44	1.7407	0.0188
45	1.7592	0.0185
46	1.7775	0.0183
47	1.7956	0.0181
48	1.8135	0.0179
49	1.8313	0.0177
50	1.8488	0.0175
51	1.8661	0.0173
52	1.8833	0.0172

53	1.9002	0.0170
54	1.9170	0.0168
55	1.9337	0.0166
56	1.9502	0.0165
57	1.9665	0.0163
58	1.9827	0.0162
59	1.9987	0.0160
60	2.0146	0.0159
61	2.0304	0.0158
62	2.0460	0.0156
63	2.0615	0.0155
64	2.0768	0.0154
65	2.0921	0.0152
66	2.1072	0.0151
67	2.1222	0.0150
68	2.1370	0.0149
69	2.1518	0.0148
70	2.1664	0.0146
71	2.1809	0.0145
72	2.1954	0.0144
73	2.2067	0.0113
74	2.2179	0.0112
75	2.2290	0.0111
76	2.2400	0.0110
77	2.2509	0.0109
78	2.2617	0.0108
79	2.2725	0.0107
80	2.2831	0.0107
81	2.2937	0.0106
82	2.3042	0.0105
83	2.3146	0.0104
84	2.3249	0.0103
85	2.3352	0.0103
86	2.3454	0.0102
87	2.3555	0.0101
88	2.3655	0.0100
89	2.3755	0.0100
90	2.3854	0.0099
91	2.3952	0.0098
92	2.4050	0.0098
93	2.4147	0.0097
94	2.4243	0.0096
95	2.4338	0.0096
96	2.4433	0.0095
97	2.4528	0.0094
98	2.4622	0.0094
99	2.4715	0.0093
100	2.4807	0.0093
101	2.4899	0.0092
102	2.4991	0.0091
103	2.5082	0.0091
104	2.5172	0.0090
105	2.5262	0.0090
106	2.5351	0.0089
107	2.5440	0.0089
108	2.5528	0.0088
109	2.5616	0.0088
110	2.5703	0.0087
111	2.5789	0.0087
112	2.5876	0.0086
113	2.5961	0.0086
114	2.6047	0.0085
115	2.6131	0.0085
116	2.6216	0.0084
117	2.6299	0.0084
118	2.6383	0.0083
119	2.6466	0.0083
120	2.6548	0.0083
121	2.6630	0.0082
122	2.6712	0.0082
123	2.6793	0.0081
124	2.6874	0.0081
125	2.6955	0.0080

126	2.7035	0.0080
127	2.7114	0.0080
128	2.7193	0.0079
129	2.7272	0.0079
130	2.7351	0.0078
131	2.7429	0.0078
132	2.7507	0.0078
133	2.7584	0.0077
134	2.7661	0.0077
135	2.7737	0.0077
136	2.7814	0.0076
137	2.7890	0.0076
138	2.7965	0.0076
139	2.8040	0.0075
140	2.8115	0.0075
141	2.8190	0.0075
142	2.8264	0.0074
143	2.8338	0.0074
144	2.8411	0.0074
145	2.8485	0.0073
146	2.8558	0.0073
147	2.8630	0.0073
148	2.8703	0.0072
149	2.8775	0.0072
150	2.8846	0.0072
151	2.8918	0.0071
152	2.8989	0.0071
153	2.9060	0.0071
154	2.9130	0.0071
155	2.9200	0.0070
156	2.9270	0.0070
157	2.9340	0.0070
158	2.9409	0.0069
159	2.9478	0.0069
160	2.9547	0.0069
161	2.9616	0.0069
162	2.9684	0.0068
163	2.9752	0.0068
164	2.9820	0.0068
165	2.9887	0.0068
166	2.9955	0.0067
167	3.0022	0.0067
168	3.0088	0.0067
169	3.0155	0.0067
170	3.0221	0.0066
171	3.0287	0.0066
172	3.0353	0.0066
173	3.0418	0.0066
174	3.0484	0.0065
175	3.0549	0.0065
176	3.0614	0.0065
177	3.0678	0.0065
178	3.0743	0.0064
179	3.0807	0.0064
180	3.0871	0.0064
181	3.0934	0.0064
182	3.0998	0.0063
183	3.1061	0.0063
184	3.1124	0.0063
185	3.1187	0.0063
186	3.1250	0.0063
187	3.1312	0.0062
188	3.1374	0.0062
189	3.1436	0.0062
190	3.1498	0.0062
191	3.1559	0.0062
192	3.1621	0.0061
193	3.1682	0.0061
194	3.1743	0.0061
195	3.1804	0.0061
196	3.1864	0.0061
197	3.1925	0.0060
198	3.1985	0.0060

199	3.2045	0.0060
200	3.2105	0.0060
201	3.2164	0.0060
202	3.2224	0.0059
203	3.2283	0.0059
204	3.2342	0.0059
205	3.2401	0.0059
206	3.2460	0.0059
207	3.2518	0.0059
208	3.2577	0.0058
209	3.2635	0.0058
210	3.2693	0.0058
211	3.2751	0.0058
212	3.2808	0.0058
213	3.2866	0.0057
214	3.2923	0.0057
215	3.2980	0.0057
216	3.3037	0.0057
217	3.3094	0.0057
218	3.3151	0.0057
219	3.3207	0.0056
220	3.3263	0.0056
221	3.3320	0.0056
222	3.3376	0.0056
223	3.3431	0.0056
224	3.3487	0.0056
225	3.3543	0.0056
226	3.3598	0.0055
227	3.3653	0.0055
228	3.3708	0.0055
229	3.3763	0.0055
230	3.3818	0.0055
231	3.3873	0.0055
232	3.3927	0.0054
233	3.3981	0.0054
234	3.4036	0.0054
235	3.4090	0.0054
236	3.4144	0.0054
237	3.4197	0.0054
238	3.4251	0.0054
239	3.4304	0.0053
240	3.4358	0.0053
241	3.4411	0.0053
242	3.4464	0.0053
243	3.4517	0.0053
244	3.4570	0.0053
245	3.4622	0.0053
246	3.4675	0.0053
247	3.4727	0.0052
248	3.4779	0.0052
249	3.4832	0.0052
250	3.4884	0.0052
251	3.4935	0.0052
252	3.4987	0.0052
253	3.5039	0.0052
254	3.5090	0.0051
255	3.5141	0.0051
256	3.5193	0.0051
257	3.5244	0.0051
258	3.5295	0.0051
259	3.5346	0.0051
260	3.5396	0.0051
261	3.5447	0.0051
262	3.5497	0.0050
263	3.5548	0.0050
264	3.5598	0.0050
265	3.5648	0.0050
266	3.5698	0.0050
267	3.5748	0.0050
268	3.5798	0.0050
269	3.5847	0.0050
270	3.5897	0.0050
271	3.5946	0.0049

272	3.5995	0.0049
273	3.6045	0.0049
274	3.6094	0.0049
275	3.6143	0.0049
276	3.6191	0.0049
277	3.6240	0.0049
278	3.6289	0.0049
279	3.6337	0.0049
280	3.6386	0.0048
281	3.6434	0.0048
282	3.6482	0.0048
283	3.6530	0.0048
284	3.6578	0.0048
285	3.6626	0.0048
286	3.6674	0.0048
287	3.6721	0.0048
288	3.6769	0.0048

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0048	0.0023	0.0024
2	0.0048	0.0023	0.0024
3	0.0048	0.0023	0.0024
4	0.0048	0.0023	0.0025
5	0.0048	0.0024	0.0025
6	0.0048	0.0024	0.0025
7	0.0049	0.0024	0.0025
8	0.0049	0.0024	0.0025
9	0.0049	0.0024	0.0025
10	0.0049	0.0024	0.0025
11	0.0049	0.0024	0.0025
12	0.0049	0.0024	0.0025
13	0.0050	0.0024	0.0025
14	0.0050	0.0024	0.0025
15	0.0050	0.0024	0.0026
16	0.0050	0.0024	0.0026
17	0.0050	0.0025	0.0026
18	0.0050	0.0025	0.0026
19	0.0051	0.0025	0.0026
20	0.0051	0.0025	0.0026
21	0.0051	0.0025	0.0026
22	0.0051	0.0025	0.0026
23	0.0051	0.0025	0.0026
24	0.0051	0.0025	0.0026
25	0.0052	0.0025	0.0026
26	0.0052	0.0025	0.0027
27	0.0052	0.0025	0.0027
28	0.0052	0.0025	0.0027
29	0.0053	0.0026	0.0027
30	0.0053	0.0026	0.0027
31	0.0053	0.0026	0.0027
32	0.0053	0.0026	0.0027
33	0.0053	0.0026	0.0027
34	0.0053	0.0026	0.0027
35	0.0054	0.0026	0.0028
36	0.0054	0.0026	0.0028
37	0.0054	0.0026	0.0028
38	0.0054	0.0027	0.0028
39	0.0055	0.0027	0.0028
40	0.0055	0.0027	0.0028
41	0.0055	0.0027	0.0028
42	0.0055	0.0027	0.0028
43	0.0056	0.0027	0.0028
44	0.0056	0.0027	0.0029
45	0.0056	0.0027	0.0029
46	0.0056	0.0027	0.0029
47	0.0056	0.0028	0.0029
48	0.0057	0.0028	0.0029
49	0.0057	0.0028	0.0029
50	0.0057	0.0028	0.0029
51	0.0057	0.0028	0.0029

52	0.0058	0.0028	0.0030
53	0.0058	0.0028	0.0030
54	0.0058	0.0028	0.0030
55	0.0059	0.0029	0.0030
56	0.0059	0.0029	0.0030
57	0.0059	0.0029	0.0030
58	0.0059	0.0029	0.0030
59	0.0060	0.0029	0.0031
60	0.0060	0.0029	0.0031
61	0.0060	0.0029	0.0031
62	0.0060	0.0029	0.0031
63	0.0061	0.0030	0.0031
64	0.0061	0.0030	0.0031
65	0.0061	0.0030	0.0031
66	0.0062	0.0030	0.0032
67	0.0062	0.0030	0.0032
68	0.0062	0.0030	0.0032
69	0.0063	0.0031	0.0032
70	0.0063	0.0031	0.0032
71	0.0063	0.0031	0.0032
72	0.0063	0.0031	0.0032
73	0.0064	0.0031	0.0033
74	0.0064	0.0031	0.0033
75	0.0065	0.0032	0.0033
76	0.0065	0.0032	0.0033
77	0.0065	0.0032	0.0033
78	0.0066	0.0032	0.0034
79	0.0066	0.0032	0.0034
80	0.0066	0.0032	0.0034
81	0.0067	0.0033	0.0034
82	0.0067	0.0033	0.0034
83	0.0068	0.0033	0.0035
84	0.0068	0.0033	0.0035
85	0.0068	0.0033	0.0035
86	0.0069	0.0033	0.0035
87	0.0069	0.0034	0.0035
88	0.0069	0.0034	0.0036
89	0.0070	0.0034	0.0036
90	0.0070	0.0034	0.0036
91	0.0071	0.0035	0.0036
92	0.0071	0.0035	0.0036
93	0.0072	0.0035	0.0037
94	0.0072	0.0035	0.0037
95	0.0073	0.0035	0.0037
96	0.0073	0.0036	0.0037
97	0.0074	0.0036	0.0038
98	0.0074	0.0036	0.0038
99	0.0075	0.0036	0.0038
100	0.0075	0.0037	0.0038
101	0.0076	0.0037	0.0039
102	0.0076	0.0037	0.0039
103	0.0077	0.0037	0.0039
104	0.0077	0.0038	0.0039
105	0.0078	0.0038	0.0040
106	0.0078	0.0038	0.0040
107	0.0079	0.0038	0.0040
108	0.0079	0.0039	0.0041
109	0.0080	0.0039	0.0041
110	0.0080	0.0039	0.0041
111	0.0081	0.0040	0.0042
112	0.0082	0.0040	0.0042
113	0.0083	0.0040	0.0042
114	0.0083	0.0040	0.0042
115	0.0084	0.0041	0.0043
116	0.0084	0.0041	0.0043
117	0.0085	0.0042	0.0044
118	0.0086	0.0042	0.0044
119	0.0087	0.0042	0.0044
120	0.0087	0.0043	0.0045
121	0.0088	0.0043	0.0045
122	0.0089	0.0043	0.0045
123	0.0090	0.0044	0.0046
124	0.0090	0.0044	0.0046

125	0.0091	0.0045	0.0047
126	0.0092	0.0045	0.0047
127	0.0093	0.0045	0.0048
128	0.0094	0.0046	0.0048
129	0.0095	0.0046	0.0049
130	0.0096	0.0047	0.0049
131	0.0097	0.0047	0.0050
132	0.0098	0.0048	0.0050
133	0.0099	0.0048	0.0051
134	0.0100	0.0049	0.0051
135	0.0101	0.0049	0.0052
136	0.0102	0.0050	0.0052
137	0.0103	0.0050	0.0053
138	0.0104	0.0051	0.0053
139	0.0106	0.0052	0.0054
140	0.0107	0.0052	0.0055
141	0.0108	0.0053	0.0055
142	0.0109	0.0053	0.0056
143	0.0111	0.0054	0.0057
144	0.0112	0.0055	0.0057
145	0.0144	0.0070	0.0074
146	0.0145	0.0071	0.0074
147	0.0148	0.0072	0.0076
148	0.0149	0.0073	0.0076
149	0.0151	0.0074	0.0077
150	0.0152	0.0074	0.0078
151	0.0155	0.0076	0.0079
152	0.0156	0.0076	0.0080
153	0.0159	0.0078	0.0081
154	0.0160	0.0078	0.0082
155	0.0163	0.0080	0.0084
156	0.0165	0.0080	0.0084
157	0.0168	0.0082	0.0086
158	0.0170	0.0083	0.0087
159	0.0173	0.0085	0.0089
160	0.0175	0.0085	0.0090
161	0.0179	0.0087	0.0092
162	0.0181	0.0088	0.0093
163	0.0185	0.0090	0.0095
164	0.0188	0.0092	0.0096
165	0.0192	0.0094	0.0098
166	0.0195	0.0095	0.0100
167	0.0200	0.0098	0.0102
168	0.0203	0.0099	0.0104
169	0.0219	0.0107	0.0112
170	0.0222	0.0108	0.0114
171	0.0229	0.0112	0.0117
172	0.0233	0.0114	0.0119
173	0.0241	0.0117	0.0123
174	0.0245	0.0119	0.0125
175	0.0254	0.0124	0.0130
176	0.0259	0.0126	0.0133
177	0.0270	0.0132	0.0138
178	0.0276	0.0135	0.0141
179	0.0289	0.0141	0.0148
180	0.0297	0.0145	0.0152
181	0.0313	0.0153	0.0160
182	0.0323	0.0158	0.0165
183	0.0344	0.0168	0.0176
184	0.0357	0.0174	0.0183
185	0.0315	0.0154	0.0161
186	0.0332	0.0162	0.0170
187	0.0377	0.0184	0.0193
188	0.0407	0.0187	0.0220
189	0.0513	0.0187	0.0326
190	0.0576	0.0187	0.0390
191	0.0814	0.0187	0.0628
192	0.1109	0.0187	0.0922
193	0.3292	0.0187	0.3106
194	0.0668	0.0187	0.0481
195	0.0443	0.0187	0.0257
196	0.0353	0.0172	0.0181
197	0.0371	0.0181	0.0190

198	0.0333	0.0163	0.0170
199	0.0305	0.0149	0.0156
200	0.0282	0.0138	0.0144
201	0.0264	0.0129	0.0135
202	0.0249	0.0122	0.0128
203	0.0237	0.0115	0.0121
204	0.0226	0.0110	0.0115
205	0.0206	0.0100	0.0105
206	0.0197	0.0096	0.0101
207	0.0190	0.0093	0.0097
208	0.0183	0.0089	0.0094
209	0.0177	0.0086	0.0091
210	0.0172	0.0084	0.0088
211	0.0166	0.0081	0.0085
212	0.0162	0.0079	0.0083
213	0.0158	0.0077	0.0081
214	0.0154	0.0075	0.0079
215	0.0150	0.0073	0.0077
216	0.0146	0.0071	0.0075
217	0.0113	0.0055	0.0058
218	0.0110	0.0054	0.0056
219	0.0107	0.0052	0.0055
220	0.0105	0.0051	0.0054
221	0.0103	0.0050	0.0053
222	0.0100	0.0049	0.0051
223	0.0098	0.0048	0.0050
224	0.0096	0.0047	0.0049
225	0.0094	0.0046	0.0048
226	0.0093	0.0045	0.0047
227	0.0091	0.0044	0.0047
228	0.0089	0.0044	0.0046
229	0.0088	0.0043	0.0045
230	0.0086	0.0042	0.0044
231	0.0085	0.0041	0.0043
232	0.0083	0.0041	0.0043
233	0.0082	0.0040	0.0042
234	0.0081	0.0039	0.0041
235	0.0080	0.0039	0.0041
236	0.0078	0.0038	0.0040
237	0.0077	0.0038	0.0040
238	0.0076	0.0037	0.0039
239	0.0075	0.0037	0.0039
240	0.0074	0.0036	0.0038
241	0.0073	0.0036	0.0037
242	0.0072	0.0035	0.0037
243	0.0071	0.0035	0.0037
244	0.0071	0.0034	0.0036
245	0.0070	0.0034	0.0036
246	0.0069	0.0034	0.0035
247	0.0068	0.0033	0.0035
248	0.0067	0.0033	0.0034
249	0.0067	0.0032	0.0034
250	0.0066	0.0032	0.0034
251	0.0065	0.0032	0.0033
252	0.0064	0.0031	0.0033
253	0.0064	0.0031	0.0033
254	0.0063	0.0031	0.0032
255	0.0062	0.0030	0.0032
256	0.0062	0.0030	0.0032
257	0.0061	0.0030	0.0031
258	0.0061	0.0030	0.0031
259	0.0060	0.0029	0.0031
260	0.0059	0.0029	0.0030
261	0.0059	0.0029	0.0030
262	0.0058	0.0028	0.0030
263	0.0058	0.0028	0.0030
264	0.0057	0.0028	0.0029
265	0.0057	0.0028	0.0029
266	0.0056	0.0027	0.0029
267	0.0056	0.0027	0.0029
268	0.0055	0.0027	0.0028
269	0.0055	0.0027	0.0028
270	0.0054	0.0027	0.0028

271	0.0054	0.0026	0.0028
272	0.0054	0.0026	0.0027
273	0.0053	0.0026	0.0027
274	0.0053	0.0026	0.0027
275	0.0052	0.0026	0.0027
276	0.0052	0.0025	0.0027
277	0.0052	0.0025	0.0026
278	0.0051	0.0025	0.0026
279	0.0051	0.0025	0.0026
280	0.0050	0.0025	0.0026
281	0.0050	0.0024	0.0026
282	0.0050	0.0024	0.0025
283	0.0049	0.0024	0.0025
284	0.0049	0.0024	0.0025
285	0.0049	0.0024	0.0025
286	0.0048	0.0024	0.0025
287	0.0048	0.0023	0.0025
288	0.0048	0.0023	0.0024

Total soil rain loss = 1.56(In)
Total effective rainfall = 2.11(In)
Peak flow rate in flood hydrograph = 672.83(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	175.0	350.0	525.0	700.0
0+ 5	0.0012	0.18	Q	|	|	|	|
0+10	0.0056	0.63	Q	|	|	|	|
0+15	0.0143	1.27	Q	|	|	|	|
0+20	0.0289	2.11	Q	|	|	|	|
0+25	0.0515	3.29	Q	|	|	|	|
0+30	0.0857	4.97	Q	|	|	|	|
0+35	0.1416	8.11	Q	|	|	|	|
0+40	0.2177	11.05	Q	|	|	|	|
0+45	0.3039	12.52	Q	|	|	|	|
0+50	0.3978	13.62	Q	|	|	|	|
0+55	0.4977	14.51	Q	|	|	|	|
1+ 0	0.6027	15.25	Q	|	|	|	|
1+ 5	0.7123	15.92	Q	|	|	|	|
1+10	0.8260	16.50	Q	|	|	|	|
1+15	0.9431	17.01	Q	|	|	|	|
1+20	1.0635	17.48	Q	|	|	|	|
1+25	1.1867	17.89	VQ	|	|	|	|
1+30	1.3126	18.28	VQ	|	|	|	|
1+35	1.4409	18.62	VQ	|	|	|	|
1+40	1.5714	18.94	VQ	|	|	|	|
1+45	1.7039	19.24	VQ	|	|	|	|
1+50	1.8382	19.51	VQ	|	|	|	|
1+55	1.9743	19.75	VQ	|	|	|	|
2+ 0	2.1118	19.97	VQ	|	|	|	|
2+ 5	2.2507	20.17	VQ	|	|	|	|
2+10	2.3909	20.36	VQ	|	|	|	|
2+15	2.5323	20.53	VQ	|	|	|	|
2+20	2.6747	20.68	VQ	|	|	|	|
2+25	2.8180	20.80	VQ	|	|	|	|
2+30	2.9620	20.91	VQ	|	|	|	|
2+35	3.1068	21.03	|Q	|	|	|	|
2+40	3.2524	21.14	|Q	|	|	|	|
2+45	3.3987	21.24	|Q	|	|	|	|
2+50	3.5458	21.35	|Q	|	|	|	|
2+55	3.6936	21.46	|Q	|	|	|	|
3+ 0	3.8421	21.56	|Q	|	|	|	|
3+ 5	3.9912	21.66	|Q	|	|	|	|
3+10	4.1411	21.76	|Q	|	|	|	|
3+15	4.2917	21.87	|Q	|	|	|	|
3+20	4.4430	21.97	|Q	|	|	|	|

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3+25       4.5951     22.08  |Q         |          |          |
3+30       4.7479     22.19  |Q         |          |          |
3+35       4.9015     22.29  |Q         |          |          |
3+40       5.0557     22.39  |Q         |          |          |
3+45       5.2106     22.49  |Q         |          |          |
3+50       5.3662     22.59  |Q         |          |          |
3+55       5.5225     22.69  |Q         |          |          |
4+ 0       5.6794     22.79  |Q         |          |          |
4+ 5       5.8370     22.89  |Q         |          |          |
4+10       5.9953     22.98  |QV        |          |          |
4+15       6.1542     23.08  |QV        |          |          |
4+20       6.3138     23.17  |QV        |          |          |
4+25       6.4741     23.27  |QV        |          |          |
4+30       6.6350     23.37  |QV        |          |          |
4+35       6.7966     23.47  |QV        |          |          |
4+40       6.9590     23.57  |QV        |          |          |
4+45       7.1220     23.67  |QV        |          |          |
4+50       7.2857     23.78  |QV        |          |          |
4+55       7.4502     23.88  |QV        |          |          |
5+ 0       7.6154     23.99  |QV        |          |          |
5+ 5       7.7813     24.09  |QV        |          |          |
5+10       7.9480     24.20  |QV        |          |          |
5+15       8.1154     24.31  |QV        |          |          |
5+20       8.2836     24.42  |QV        |          |          |
5+25       8.4526     24.53  |QV        |          |          |
5+30       8.6223     24.65  |QV        |          |          |
5+35       8.7929     24.76  |QV        |          |          |
5+40       8.9642     24.88  |Q V       |          |          |
5+45       9.1364     25.00  |Q V       |          |          |
5+50       9.3093     25.11  |Q V       |          |          |
5+55       9.4831     25.24  |Q V       |          |          |
6+ 0       9.6578     25.36  |Q V       |          |          |
6+ 5       9.8332     25.48  |Q V       |          |          |
6+10      10.0096     25.61  |Q V       |          |          |
6+15      10.1868     25.73  |Q V       |          |          |
6+20      10.3649     25.86  |Q V       |          |          |
6+25      10.5439     25.99  |Q V       |          |          |
6+30      10.7239     26.12  |Q V       |          |          |
6+35      10.9047     26.26  |Q V       |          |          |
6+40      11.0865     26.39  |Q V       |          |          |
6+45      11.2692     26.53  |Q V       |          |          |
6+50      11.4529     26.67  |Q V       |          |          |
6+55      11.6375     26.81  |Q V       |          |          |
7+ 0      11.8231     26.95  |Q V       |          |          |
7+ 5      12.0098     27.10  |Q  V      |          |          |
7+10      12.1974     27.25  |Q  V      |          |          |
7+15      12.3861     27.39  |Q  V      |          |          |
7+20      12.5758     27.55  |Q  V      |          |          |
7+25      12.7666     27.70  |Q  V      |          |          |
7+30      12.9584     27.86  |Q  V      |          |          |
7+35      13.1513     28.01  |Q  V      |          |          |
7+40      13.3454     28.17  |Q  V      |          |          |
7+45      13.5405     28.34  |Q  V      |          |          |
7+50      13.7368     28.50  |Q  V      |          |          |
7+55      13.9343     28.67  |Q  V      |          |          |
8+ 0      14.1329     28.84  |Q  V      |          |          |
8+ 5      14.3327     29.01  |Q  V      |          |          |
8+10      14.5337     29.19  |Q  V      |          |          |
8+15      14.7360     29.37  |Q  V      |          |          |
8+20      14.9395     29.55  |Q   V     |          |          |
8+25      15.1442     29.73  |Q   V     |          |          |
8+30      15.3503     29.92  |Q   V     |          |          |
8+35      15.5577     30.11  |Q   V     |          |          |
8+40      15.7664     30.30  |Q   V     |          |          |
8+45      15.9765     30.50  |Q   V     |          |          |
8+50      16.1879     30.70  |Q   V     |          |          |
8+55      16.4008     30.91  |Q   V     |          |          |
9+ 0      16.6150     31.11  |Q   V     |          |          |
9+ 5      16.8308     31.32  |Q   V     |          |          |
9+10      17.0480     31.54  |Q   V     |          |          |
9+15      17.2667     31.76  |Q   V     |          |          |
9+20      17.4869     31.98  |Q   V     |          |          |
9+25      17.7087     32.21  |Q   V     |          |          |
```

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 9+30      17.9321     32.44  |Q    V   |          |          |          |
 9+35      18.1572     32.67  |Q    V   |          |          |          |
 9+40      18.3838     32.91  |Q    V   |          |          |          |
 9+45      18.6122     33.16  |Q    V   |          |          |          |
 9+50      18.8423     33.41  |Q    V   |          |          |          |
 9+55      19.0741     33.66  |Q    V   |          |          |          |
10+ 0      19.3077     33.92  |Q    V   |          |          |          |
10+ 5      19.5431     34.18  |Q    V   |          |          |          |
10+10      19.7804     34.45  |Q    V   |          |          |          |
10+15      20.0196     34.73  |Q    V   |          |          |          |
10+20      20.2607     35.01  | Q   V   |          |          |          |
10+25      20.5039     35.30  | Q   V   |          |          |          |
10+30      20.7490     35.59  | Q   V   |          |          |          |
10+35      20.9962     35.89  | Q    V  |          |          |          |
10+40      21.2455     36.20  | Q    V  |          |          |          |
10+45      21.4970     36.51  | Q    V  |          |          |          |
10+50      21.7506     36.83  | Q    V  |          |          |          |
10+55      22.0066     37.16  | Q    V  |          |          |          |
11+ 0      22.2648     37.50  | Q    V  |          |          |          |
11+ 5      22.5255     37.84  | Q    V  |          |          |          |
11+10      22.7885     38.20  | Q    V  |          |          |          |
11+15      23.0541     38.56  | Q    V  |          |          |          |
11+20      23.3222     38.93  | Q    V  |          |          |          |
11+25      23.5929     39.31  | Q    V  |          |          |          |
11+30      23.8663     39.70  | Q     V |          |          |          |
11+35      24.1424     40.10  | Q     V |          |          |          |
11+40      24.4214     40.51  | Q     V |          |          |          |
11+45      24.7033     40.93  | Q     V |          |          |          |
11+50      24.9882     41.36  | Q     V |          |          |          |
11+55      25.2761     41.81  | Q     V |          |          |          |
12+ 0      25.5672     42.27  | Q     V |          |          |          |
12+ 5      25.8623     42.85  | Q     V |          |          |          |
12+10      26.1628     43.63  | Q     V |          |          |          |
12+15      26.4695     44.53  | Q     V |          |          |          |
12+20      26.7834     45.58  | Q      V|          |          |          |
12+25      27.1062     46.87  | Q      V|          |          |          |
12+30      27.4401     48.48  | Q      V|          |          |          |
12+35      27.7917     51.05  | Q      V|          |          |          |
12+40      28.1603     53.51  |  Q     V|          |          |          |
12+45      28.5395     55.06  |  Q     V|          |          |          |
12+50      28.9278     56.38  |  Q     V|          |          |          |
12+55      29.3245     57.60  |  Q     V|          |          |          |
13+ 0      29.7290     58.74  |  Q      V          |          |          |
13+ 5      30.1413     59.86  |  Q      V          |          |          |
13+10      30.5611     60.95  |  Q      V          |          |          |
13+15      30.9883     62.03  |  Q      V          |          |          |
13+20      31.4229     63.11  |  Q      V          |          |          |
13+25      31.8650     64.19  |  Q      V          |          |          |
13+30      32.3146     65.28  |  Q      V          |          |          |
13+35      32.7717     66.38  |  Q      |V         |          |          |
13+40      33.2366     67.50  |  Q      |V         |          |          |
13+45      33.7094     68.65  |  Q      |V         |          |          |
13+50      34.1903     69.83  |  Q      |V         |          |          |
13+55      34.6796     71.04  |   Q     |V         |          |          |
14+ 0      35.1774     72.28  |   Q     |V         |          |          |
14+ 5      35.6844     73.61  |   Q     | V        |          |          |
14+10      36.2012     75.05  |   Q     | V        |          |          |
14+15      36.7287     76.59  |   Q     | V        |          |          |
14+20      37.2674     78.22  |   Q     | V        |          |          |
14+25      37.8183     80.00  |   Q     | V        |          |          |
14+30      38.3827     81.95  |   Q     | V        |          |          |
14+35      38.9634     84.32  |   Q     |  V       |          |          |
14+40      39.5608     86.74  |   Q     |  V       |          |          |
14+45      40.1736     88.98  |    Q    |  V       |          |          |
14+50      40.8021     91.25  |    Q    |  V       |          |          |
14+55      41.4470     93.64  |    Q    |  V       |          |          |
15+ 0      42.1092     96.15  |    Q    |   V      |          |          |
15+ 5      42.7900     98.85  |    Q    |   V      |          |          |
15+10      43.4907    101.74  |    Q    |   V      |          |          |
15+15      44.2131    104.89  |    Q    |   V      |          |          |
15+20      44.9590    108.31  |     Q   |    V     |          |          |
15+25      45.7293    111.84  |     Q   |    V     |          |          |
15+30      46.5237    115.35  |     Q   |    V     |          |          |
```

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15+35      47.3442    119.14 |     Q   |    V    |         |         |
15+40      48.1936    123.33 |      Q  |     V   |         |         |
15+45      49.0790    128.56 |      Q  |     V   |         |         |
15+50      50.0103    135.22 |      Q  |     V   |         |         |
15+55      50.9992    143.59 |       Q |      V  |         |         |
16+ 0      52.0936    158.91 |        Q|      V  |         |         |
16+ 5      53.4738    200.41 |         |Q      V |         |         |
16+10      55.2270    254.57 |         |   Q   V |         |         |
16+15      57.3393    306.70 |         |      Q V|         |         |
16+20      59.8397    363.06 |         |         Q         |         |
16+25      62.8586    438.35 |         |         |V   Q    |         |
16+30      66.4956    528.09 |         |         | V       Q         |
16+35      71.1294    672.83 |         |         |  V      |        Q |
16+40      75.3526    613.20 |         |         |    V    |    Q    |
16+45      78.2340    418.38 |         |         |  Q  V   |         |
16+50      80.5970    343.11 |         |       Q|      V  |         |
16+55      82.6597    299.51 |         |      Q  |      V  |         |
17+ 0      84.5119    268.94 |         |    Q    |       V |         |
17+ 5      86.2206    248.10 |         |   Q     |        V|         |
17+10      87.7806    226.52 |         | Q       |        V|         |
17+15      89.2166    208.50 |         |Q        |         V         |
17+20      90.5517    193.87 |         |Q        |         V         |
17+25      91.7923    180.13 |         Q         |         V         |
17+30      92.9570    169.12 |        Q|         |         |V        |
17+35      94.0341    156.39 |       Q |         |         |V        |
17+40      95.0451    146.80 |       Q |         |         | V       |
17+45      95.9932    137.67 |      Q  |         |         | V       |
17+50      96.8799    128.75 |      Q  |         |         | V       |
17+55      97.7139    121.09 |     Q   |         |         | V       |
18+ 0      98.4895    112.61 |     Q   |         |         |  V      |
18+ 5      99.2226    106.45 |     Q   |         |         |  V      |
18+10      99.9118    100.06 |    Q    |         |         |  V      |
18+15     100.5560     93.55 |    Q    |         |         |  V      |
18+20     101.1543     86.87 |   Q     |         |         |   V     |
18+25     101.7014     79.43 |   Q     |         |         |   V     |
18+30     102.2126     74.23 |   Q     |         |         |   V     |
18+35     102.6940     69.91 |  Q      |         |         |   V     |
18+40     103.1473     65.81 |  Q      |         |         |   V     |
18+45     103.5786     62.63 |  Q      |         |         |   V     |
18+50     103.9927     60.13 |  Q      |         |         |    V    |
18+55     104.3908     57.79 |  Q      |         |         |    V    |
19+ 0     104.7694     54.98 |  Q      |         |         |    V    |
19+ 5     105.1341     52.95 |  Q      |         |         |    V    |
19+10     105.4887     51.49 | Q       |         |         |    V    |
19+15     105.8356     50.37 | Q       |         |         |    V    |
19+20     106.1760     49.42 | Q       |         |         |    V    |
19+25     106.5071     48.07 | Q       |         |         |    V    |
19+30     106.8276     46.54 | Q       |         |         |    V    |
19+35     107.1331     44.35 | Q       |         |         |     V   |
19+40     107.4285     42.90 | Q       |         |         |     V   |
19+45     107.7160     41.74 | Q       |         |         |     V   |
19+50     107.9944     40.42 | Q       |         |         |     V   |
19+55     108.2633     39.06 | Q       |         |         |     V   |
20+ 0     108.5255     38.07 | Q       |         |         |     V   |
20+ 5     108.7795     36.87 | Q       |         |         |     V   |
20+10     109.0259     35.78 | Q       |         |         |     V   |
20+15     109.2674     35.06 | Q       |         |         |     V   |
20+20     109.5044     34.42 |Q        |         |         |     V   |
20+25     109.7374     33.83 |Q        |         |         |     V   |
20+30     109.9665     33.27 |Q        |         |         |      V  |
20+35     110.1920     32.74 |Q        |         |         |      V  |
20+40     110.4140     32.23 |Q        |         |         |      V  |
20+45     110.6326     31.75 |Q        |         |         |      V  |
20+50     110.8481     31.28 |Q        |         |         |      V  |
20+55     111.0604     30.84 |Q        |         |         |      V  |
21+ 0     111.2699     30.41 |Q        |         |         |      V  |
21+ 5     111.4765     30.00 |Q        |         |         |      V  |
21+10     111.6805     29.61 |Q        |         |         |      V  |
21+15     111.8818     29.23 |Q        |         |         |      V  |
21+20     112.0806     28.86 |Q        |         |         |      V  |
21+25     112.2768     28.50 |Q        |         |         |      V  |
21+30     112.4707     28.15 |Q        |         |         |      V  |
21+35     112.6623     27.82 |Q        |         |         |      V  |
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21+40     112.8517     27.50  |Q         |          |          |      V  |
21+45     113.0390     27.19  |Q         |          |          |       V |
21+50     113.2242     26.89  |Q         |          |          |       V |
21+55     113.4074     26.60  |Q         |          |          |       V |
22+ 0     113.5886     26.32  |Q         |          |          |       V |
22+ 5     113.7680     26.04  |Q         |          |          |       V |
22+10     113.9455     25.78  |Q         |          |          |       V |
22+15     114.1213     25.52  |Q         |          |          |       V |
22+20     114.2954     25.27  |Q         |          |          |       V |
22+25     114.4678     25.03  |Q         |          |          |       V |
22+30     114.6385     24.79  |Q         |          |          |       V |
22+35     114.8077     24.56  |Q         |          |          |       V |
22+40     114.9753     24.34  |Q         |          |          |       V |
22+45     115.1414     24.12  |Q         |          |          |       V |
22+50     115.3060     23.90  |Q         |          |          |       V |
22+55     115.4691     23.69  |Q         |          |          |       V |
23+ 0     115.6308     23.48  |Q         |          |          |       V |
23+ 5     115.7912     23.28  |Q         |          |          |       V |
23+10     115.9502     23.09  |Q         |          |          |        V|
23+15     116.1079     22.90  |Q         |          |          |        V|
23+20     116.2643     22.71  |Q         |          |          |        V|
23+25     116.4194     22.52  |Q         |          |          |        V|
23+30     116.5733     22.34  |Q         |          |          |        V|
23+35     116.7259     22.17  |Q         |          |          |        V|
23+40     116.8774     21.99  |Q         |          |          |        V|
23+45     117.0277     21.82  |Q         |          |          |        V|
23+50     117.1769     21.66  |Q         |          |          |        V|
23+55     117.3249     21.50  |Q         |          |          |        V|
24+ 0     117.4719     21.34  |Q         |          |          |        V|
24+ 5     117.6165     21.00  |Q         |          |          |        V|
24+10     117.7570     20.40  |Q         |          |          |        V|
24+15     117.8921     19.62  |Q         |          |          |        V|
24+20     118.0205     18.64  |Q         |          |          |        V|
24+25     118.1399     17.34  Q          |          |          |        V|
24+30     118.2470     15.56  Q          |          |          |        V|
24+35     118.3319     12.33  Q          |          |          |        V|
24+40     118.3962      9.33  Q          |          |          |        V|
24+45     118.4501      7.83  Q          |          |          |        V|
24+50     118.4964      6.72  Q          |          |          |        V|
24+55     118.5365      5.83  Q          |          |          |        V|
25+ 0     118.5717      5.10  Q          |          |          |        V|
25+ 5     118.6023      4.45  Q          |          |          |        V|
25+10     118.6291      3.89  Q          |          |          |        V|
25+15     118.6525      3.40  Q          |          |          |        V|
25+20     118.6730      2.97  Q          |          |          |        V|
25+25     118.6909      2.60  Q          |          |          |        V|
25+30     118.7064      2.25  Q          |          |          |        V|
25+35     118.7199      1.96  Q          |          |          |        V|
25+40     118.7315      1.69  Q          |          |          |        V|
25+45     118.7415      1.45  Q          |          |          |        V|
25+50     118.7500      1.24  Q          |          |          |        V|
25+55     118.7573      1.05  Q          |          |          |        V|
26+ 0     118.7635      0.90  Q          |          |          |        V|
26+ 5     118.7688      0.77  Q          |          |          |        V|
26+10     118.7732      0.64  Q          |          |          |        V|
26+15     118.7770      0.54  Q          |          |          |        V|
26+20     118.7801      0.46  Q          |          |          |        V|
26+25     118.7829      0.41  Q          |          |          |        V|
26+30     118.7855      0.37  Q          |          |          |        V|
26+35     118.7878      0.34  Q          |          |          |        V|
26+40     118.7899      0.30  Q          |          |          |        V|
26+45     118.7917      0.27  Q          |          |          |        V|
26+50     118.7934      0.24  Q          |          |          |        V|
26+55     118.7948      0.21  Q          |          |          |        V|
27+ 0     118.7961      0.19  Q          |          |          |        V|
27+ 5     118.7973      0.17  Q          |          |          |        V|
27+10     118.7983      0.15  Q          |          |          |        V|
27+15     118.7992      0.13  Q          |          |          |        V|
27+20     118.8000      0.11  Q          |          |          |        V|
27+25     118.8005      0.08  Q          |          |          |        V|
27+30     118.8010      0.06  Q          |          |          |        V|
27+35     118.8013      0.05  Q          |          |          |        V|
27+40     118.8015      0.04  Q          |          |          |        V|
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   27+45     118.8017      0.02  Q         |         |         |        V|
   27+50     118.8018      0.01  Q         |         |         |        V|
   27+55     118.8019      0.01  Q         |         |         |        V|
   28+ 0     118.8019      0.00  Q         |         |         |         V
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Creek "F" (at Property Line)
Proposed Rational Method Calculations
10, 25 & 100-Year Storms

```
                    Orange County Rational Hydrology Program

                (Hydrology Manual Date(s) October 1986 & November 1996)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2004 Version 8.0
        Rational Hydrology Study, Date: 08/07/15  File Name: PA2RAT.roc
----------------------------------------------------------------------
PLANNING AREA 2
PROPOSED CONDITIONS
100-YEAR STORM
BY FUSCOE ENGINEERING
----------------------------------------------------------------------


Program License Serial Number 6049

----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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Rational hydrology study storm event year is   100.0

Decimal fraction of study above 2000 ft., 600M  =     0.0000
English Units Used for input data


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      304.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.028
Decimal fraction soil group C = 0.587
Decimal fraction soil group D = 0.385
SCS curve number for soil(AMC 2)  = 75.95
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.232(In/Hr)
Max Catchment Loss (Fm) =     0.232(In/Hr)
Rainfall intensity =      2.748(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  20.61 min.  Rain intensity =       2.75(In/Hr)
Total area =       621.43(Ac.)  Total runoff =   1409.64(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      305.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =   1409.682(CFS)
Depth of flow =   6.172(Ft.), Average velocity =  13.169(Ft/s)
       ******* Irregular Channel Data ***********
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
----------------------------------------------------------------
Sub-Channel flow  =   1409.683(CFS)
  '     '       flow top width =     29.688(Ft.)
  '     '    velocity=   13.169(Ft/s)
  '     '       area =    107.048(Sq.Ft)
  '     '       Froude number =     1.222

Upstream point elevation =   665.000(Ft.)
Downstream point elevation =   647.500(Ft.)
Flow length =   435.000(Ft.)
Travel time  =    0.55 min.
Time of concentration =   21.16 min.
```

```
Depth of flow =   6.172(Ft.)
Average velocity =  13.169(Ft/s)
Total irregular channel flow =  1409.682(CFS)
Irregular channel normal depth above invert elev. =   6.172(Ft.)
Average velocity of channel(s) =  13.169(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.210
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.790
SCS curve number for soil(AMC 2)  = 76.01
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.221(In/Hr)
Max Catchment Loss (Fm) =     0.221(In/Hr)
The area added to the existing stream with this TC
does not add flow per Para 6b, Page D-15 of the OCHM,
therefore the upstream flow rate of Q =   1409.637(CFS) is being used
Rainfall intensity =      2.707(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.823
Subarea runoff =      0.000(CFS) for   10.220(Ac.)
Total runoff =   1409.637(CFS)       Total area =      631.65(Ac.)
Area averaged Fm value =    0.232(In/Hr)
Depth of flow =   6.172(Ft.), Average velocity =  13.169(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      305.000 to Point/Station      501.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =   1409.684(CFS)
Depth of flow =   6.295(Ft.), Average velocity =  12.733(Ft/s)
       ******* Irregular Channel Data ***********
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1             0.00             50.00
       2           100.00              0.00
       3           105.00              0.00
       4           205.00             50.00
Manning's 'N' friction factor =   0.050
----------------------------------------------------------------
Sub-Channel flow  =   1409.683(CFS)
  '     '       flow top width =     30.178(Ft.)
  '     '    velocity=   12.732(Ft/s)
  '     '       area =    110.715(Sq.Ft)
  '     '       Froude number =     1.171

Upstream point elevation =   647.500(Ft.)
Downstream point elevation =   610.000(Ft.)
Flow length =  1020.000(Ft.)
Travel time  =    1.34 min.
Time of concentration =   22.50 min.
Depth of flow =   6.295(Ft.)
Average velocity =  12.733(Ft/s)
Total irregular channel flow =  1409.684(CFS)
Irregular channel normal depth above invert elev. =   6.295(Ft.)
Average velocity of channel(s) =  12.733(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.201
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.799
SCS curve number for soil(AMC 2)  = 76.18
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.220(In/Hr)
Max Catchment Loss (Fm) =     0.220(In/Hr)
The area added to the existing stream with this TC
does not add flow per Para 6b, Page D-15 of the OCHM,
therefore the upstream flow rate of Q =   1409.637(CFS) is being used
Rainfall intensity =      2.614(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.820
```

```
Subarea runoff =      0.000(CFS) for   10.850(Ac.)
Total runoff =   1409.637(CFS)        Total area =      642.50(Ac.)
Area averaged Fm value =    0.232(In/Hr)
Depth of flow =   6.294(Ft.), Average velocity =  12.732(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      501.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =    642.500(Ac.)
Runoff from this stream =   1409.637(CFS)
Time of concentration =   22.50 min.
Rainfall intensity =     2.614(In/Hr)
Area averaged loss rate (Fm) =    0.2318(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


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Process from Point/Station      193.000 to Point/Station      501.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.200
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.500
SCS curve number for soil(AMC 2)  = 69.40
Pervious ratio(Ap) = 0.6000  Max loss rate(Fp)=     0.235(In/Hr)
Max Catchment Loss (Fm) =     0.141(In/Hr)
Rainfall intensity =      2.519(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  24.00 min.  Rain intensity =       2.52(In/Hr)
Total area =       435.56(Ac.)  Total runoff =   1580.77(CFS)


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Process from Point/Station      501.000 to Point/Station      501.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =    435.560(Ac.)
Runoff from this stream =   1580.770(CFS)
Time of concentration =   24.00 min.
Rainfall intensity =     2.519(In/Hr)
Area averaged loss rate (Fm) =    0.1410(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6000


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Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.710
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.290
SCS curve number for soil(AMC 2)  = 61.51
Pervious ratio(Ap) = 0.6000  Max loss rate(Fp)=     0.271(In/Hr)
Max Catchment Loss (Fm) =     0.163(In/Hr)
Initial subarea data:
Initial area flow distance =   222.220(Ft.)
Top (of initial area) elevation =   678.000(Ft.)
Bottom (of initial area) elevation =   675.000(Ft.)
Difference in elevation =     3.000(Ft.)
Slope =    0.01350  s(%)=       1.35
TC = k(0.412)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.463 min.
Rainfall intensity =      4.576(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.868
Subarea runoff =      1.748(CFS)
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Total initial stream area =        0.440(Ac.)

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Process from Point/Station      202.000 to Point/Station      203.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   675.000(Ft.)
End of street segment elevation =   647.200(Ft.)
Length of street segment  =   503.480(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     13.837(CFS)
Depth of flow =   0.340(Ft.), Average velocity =   5.492(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.644(Ft.)
Flow velocity =   5.49(Ft/s)
Travel time =    1.53 min.     TC =    9.99  min.
 Adding area flow to street
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.660
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.340
SCS curve number for soil(AMC 2)  = 62.46
Pervious ratio(Ap) = 0.6000  Max loss rate(Fp)=     0.266(In/Hr)
Max Catchment Loss (Fm) =     0.160(In/Hr)
Rainfall intensity =      4.161(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.865
Subarea runoff =     24.002(CFS) for    6.710(Ac.)
Total runoff =     25.750(CFS)       Total area =        7.15(Ac.)
Area averaged Fm value =    0.160(In/Hr)
Street flow at end of street =     25.750(CFS)
Half street flow at end of street =     12.875(CFS)
Depth of flow =   0.402(Ft.), Average velocity =   6.357(Ft/s)
Flow width (from curb towards crown)=  13.779(Ft.)


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Process from Point/Station      203.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   641.200(Ft.)
Downstream point/station elevation =   612.000(Ft.)
Pipe length  =   421.79(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    25.750(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    25.750(CFS)
Normal flow depth in pipe =   13.76(In.)
Flow top width inside pipe =   15.28(In.)
Critical depth could not be calculated.
Pipe flow velocity =     17.77(Ft/s)
Travel time through pipe =    0.40 min.
Time of concentration (TC) =    10.39 min.


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Process from Point/Station      204.000 to Point/Station      501.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   1.091(Ft.), Average velocity =   3.287(Ft/s)
```

```
       ******* Irregular Channel Data ***********
-------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
-------------------------------------------------------------
Sub-Channel flow  =     25.750(CFS)
  '     '       flow top width =      9.363(Ft.)
  '     '    velocity=    3.287(Ft/s)
  '     '       area =      7.833(Sq.Ft)
  '     '       Froude number =     0.633

Upstream point elevation =   612.000(Ft.)
Downstream point elevation =   610.000(Ft.)
Flow length =   120.000(Ft.)
Travel time  =    0.61 min.
Time of concentration =   11.00 min.
Depth of flow =   1.091(Ft.)
Average velocity =   3.287(Ft/s)
Total irregular channel flow =    25.750(CFS)
Irregular channel normal depth above invert elev. =   1.091(Ft.)
Average velocity of channel(s) =   3.287(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      501.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      7.150(Ac.)
Runoff from this stream =     25.750(CFS)
Time of concentration =   11.00 min.
Rainfall intensity =     3.939(In/Hr)
Area averaged loss rate (Fm) =    0.1598(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6000


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Process from Point/Station      240.000 to Point/Station      501.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.584
Decimal fraction soil group D = 0.416
SCS curve number for soil(AMC 2)  = 76.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.229(In/Hr)
Max Catchment Loss (Fm) =     0.229(In/Hr)
Rainfall intensity =      2.545(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  23.56 min.  Rain intensity =       2.55(In/Hr)
Total area =       217.68(Ac.)  Total runoff =    453.76(CFS)


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Process from Point/Station      501.000 to Point/Station      501.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 4
Stream flow area =    217.680(Ac.)
Runoff from this stream =    453.760(CFS)
Time of concentration =   23.56 min.
Rainfall intensity =     2.545(In/Hr)
Area averaged loss rate (Fm) =    0.2292(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
```

```
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1    642.50  1409.637     22.50    0.232      2.614
2    435.56  1580.770     24.00    0.141      2.519
3      7.15    25.750     11.00    0.160      3.939
4    217.68   453.760     23.56    0.229      2.545
Qmax(1) =
          1.000 *    1.000 *  1409.637) +
          1.040 *    0.937 *  1580.770) +
          0.649 *    1.000 *    25.750) +
          1.029 *    0.955 *   453.760) + =    3413.463
Qmax(2) =
          0.960 *    1.000 *  1409.637) +
          1.000 *    1.000 *  1580.770) +
          0.624 *    1.000 *    25.750) +
          0.988 *    1.000 *   453.760) + =    3398.735
Qmax(3) =
          1.557 *    0.489 *  1409.637) +
          1.597 *    0.458 *  1580.770) +
          1.000 *    1.000 *    25.750) +
          1.602 *    0.467 *   453.760) + =    2594.211
Qmax(4) =
          0.971 *    1.000 *  1409.637) +
          1.011 *    0.982 *  1580.770) +
          0.631 *    1.000 *    25.750) +
          1.000 *    1.000 *   453.760) + =    3408.605

Total of 4 streams to confluence:
Flow rates before confluence point:
    1409.637    1580.770      25.750     453.760
Maximum flow rates at confluence using above data:
     3413.463     3398.735     2594.211     3408.605
Area of streams before confluence:
      642.500      435.560        7.150      217.680
Effective area values after confluence:
     1265.811     1302.890      622.298     1294.905
Results of confluence:
Total flow rate =   3413.463(CFS)
Time of concentration =    22.498 min.
Effective stream area after confluence =   1265.811(Ac.)
Study area average Pervious fraction(Ap) =  0.864
Study area average soil loss rate(Fm) =    0.201(In/Hr)
Study area total (this main stream) =    1302.89(Ac.)


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Process from Point/Station      501.000 to Point/Station      501.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =   1265.811(Ac.)
Runoff from this stream =   3413.463(CFS)
Time of concentration =   22.50 min.
Rainfall intensity =     2.614(In/Hr)
Area averaged loss rate (Fm) =    0.2006(In/Hr)
Area averaged Pervious ratio (Ap) = 0.8641
Program is now starting with Main Stream No. 2
End of computations, total study area =         1302.89 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.864
Area averaged SCS curve number (AMC 2) =  73.8
```

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                    Orange County Rational Hydrology Program

                (Hydrology Manual Date(s) October 1986 & November 1996)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2004 Version 8.0
        Rational Hydrology Study, Date: 08/07/15  File Name: PA2RAT25.roc
----------------------------------------------------------------------
PLANNING AREA 2
PROPOSED CONDITIONS
25-YEAR STORM
BY FUSCOE ENGINEERING
----------------------------------------------------------------------


Program License Serial Number 6049

----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

----------------------------------------------------------------------

Rational hydrology study storm event year is    25.0

Decimal fraction of study above 2000 ft., 600M  =     0.0000
English Units Used for input data


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Process from Point/Station      304.000 to Point/Station      304.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.028
Decimal fraction soil group C = 0.587
Decimal fraction soil group D = 0.385
SCS curve number for soil(AMC 2)  = 75.95
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.232(In/Hr)
Max Catchment Loss (Fm) =     0.232(In/Hr)
Rainfall intensity =      2.114(In/Hr) for a    25.0 year storm
User specified values are as follows:
TC =  21.48 min.  Rain intensity =       2.11(In/Hr)
Total area =       621.43(Ac.)  Total runoff =   1054.86(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      305.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =   1054.890(CFS)
Depth of flow =   5.433(Ft.), Average velocity =  12.239(Ft/s)
       ******* Irregular Channel Data ***********
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
----------------------------------------------------------------
Sub-Channel flow  =   1054.890(CFS)
  '     '       flow top width =     26.730(Ft.)
  '     '    velocity=   12.239(Ft/s)
  '     '       area =     86.188(Sq.Ft)
  '     '       Froude number =     1.201

Upstream point elevation =   665.000(Ft.)
Downstream point elevation =   647.500(Ft.)
Flow length =   435.000(Ft.)
Travel time  =    0.59 min.
Time of concentration =   22.07 min.
```

```
Depth of flow =   5.433(Ft.)
Average velocity =  12.239(Ft/s)
Total irregular channel flow =  1054.890(CFS)
Irregular channel normal depth above invert elev. =   5.433(Ft.)
Average velocity of channel(s) =  12.239(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.210
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.790
SCS curve number for soil(AMC 2)  = 76.01
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.221(In/Hr)
Max Catchment Loss (Fm) =     0.221(In/Hr)
The area added to the existing stream with this TC
does not add flow per Para 6b, Page D-15 of the OCHM,
therefore the upstream flow rate of Q =   1054.856(CFS) is being used
Rainfall intensity =      2.082(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.800
Subarea runoff =      0.000(CFS) for   10.220(Ac.)
Total runoff =   1054.856(CFS)       Total area =      631.65(Ac.)
Area averaged Fm value =    0.232(In/Hr)
Depth of flow =   5.432(Ft.), Average velocity =  12.239(Ft/s)


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Process from Point/Station      305.000 to Point/Station      501.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =   1054.891(CFS)
Depth of flow =   5.542(Ft.), Average velocity =  11.834(Ft/s)
       ******* Irregular Channel Data ***********
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1             0.00             50.00
       2           100.00              0.00
       3           105.00              0.00
       4           205.00             50.00
Manning's 'N' friction factor =   0.050
----------------------------------------------------------------
Sub-Channel flow  =   1054.891(CFS)
  '     '       flow top width =     27.168(Ft.)
  '     '    velocity=   11.834(Ft/s)
  '     '       area =     89.138(Sq.Ft)
  '     '       Froude number =     1.151

Upstream point elevation =   647.500(Ft.)
Downstream point elevation =   610.000(Ft.)
Flow length =  1020.000(Ft.)
Travel time  =    1.44 min.
Time of concentration =   23.50 min.
Depth of flow =   5.542(Ft.)
Average velocity =  11.834(Ft/s)
Total irregular channel flow =  1054.891(CFS)
Irregular channel normal depth above invert elev. =   5.542(Ft.)
Average velocity of channel(s) =  11.834(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.201
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.799
SCS curve number for soil(AMC 2)  = 76.18
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.220(In/Hr)
Max Catchment Loss (Fm) =     0.220(In/Hr)
The area added to the existing stream with this TC
does not add flow per Para 6b, Page D-15 of the OCHM,
therefore the upstream flow rate of Q =   1054.856(CFS) is being used
Rainfall intensity =      2.009(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.796
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Subarea runoff =      0.000(CFS) for   10.850(Ac.)
Total runoff =   1054.856(CFS)        Total area =      642.50(Ac.)
Area averaged Fm value =    0.232(In/Hr)
Depth of flow =   5.542(Ft.), Average velocity =  11.834(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      501.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =    642.500(Ac.)
Runoff from this stream =   1054.856(CFS)
Time of concentration =   23.50 min.
Rainfall intensity =     2.009(In/Hr)
Area averaged loss rate (Fm) =    0.2318(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


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Process from Point/Station      193.000 to Point/Station      501.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.200
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.500
SCS curve number for soil(AMC 2)  = 69.40
Pervious ratio(Ap) = 0.6000  Max loss rate(Fp)=     0.235(In/Hr)
Max Catchment Loss (Fm) =     0.141(In/Hr)
Rainfall intensity =      1.985(In/Hr) for a    25.0 year storm
User specified values are as follows:
TC =  24.00 min.  Rain intensity =       1.99(In/Hr)
Total area =       435.56(Ac.)  Total runoff =   1160.74(CFS)


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Process from Point/Station      501.000 to Point/Station      501.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =    435.560(Ac.)
Runoff from this stream =   1160.740(CFS)
Time of concentration =   24.00 min.
Rainfall intensity =     1.985(In/Hr)
Area averaged loss rate (Fm) =    0.1410(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.710
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.290
SCS curve number for soil(AMC 2)  = 61.51
Pervious ratio(Ap) = 0.6000  Max loss rate(Fp)=     0.271(In/Hr)
Max Catchment Loss (Fm) =     0.163(In/Hr)
Initial subarea data:
Initial area flow distance =   222.220(Ft.)
Top (of initial area) elevation =   678.000(Ft.)
Bottom (of initial area) elevation =   675.000(Ft.)
Difference in elevation =     3.000(Ft.)
Slope =    0.01350  s(%)=       1.35
TC = k(0.412)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.463 min.
Rainfall intensity =      3.581(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.859
Subarea runoff =      1.354(CFS)
```

```
Total initial stream area =        0.440(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   675.000(Ft.)
End of street segment elevation =   647.200(Ft.)
Length of street segment  =   503.480(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     10.668(CFS)
Depth of flow =   0.317(Ft.), Average velocity =   5.175(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   9.508(Ft.)
Flow velocity =   5.18(Ft/s)
Travel time =    1.62 min.     TC =   10.08  min.
 Adding area flow to street
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.660
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.340
SCS curve number for soil(AMC 2)  = 62.46
Pervious ratio(Ap) = 0.6000  Max loss rate(Fp)=     0.266(In/Hr)
Max Catchment Loss (Fm) =     0.160(In/Hr)
Rainfall intensity =      3.243(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.856
Subarea runoff =     18.486(CFS) for    6.710(Ac.)
Total runoff =     19.839(CFS)       Total area =        7.15(Ac.)
Area averaged Fm value =    0.160(In/Hr)
Street flow at end of street =     19.839(CFS)
Half street flow at end of street =      9.920(CFS)
Depth of flow =   0.374(Ft.), Average velocity =   5.975(Ft/s)
Flow width (from curb towards crown)=  12.383(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   641.200(Ft.)
Downstream point/station elevation =   612.000(Ft.)
Pipe length  =   421.79(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.839(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    19.839(CFS)
Normal flow depth in pipe =   11.29(In.)
Flow top width inside pipe =   17.41(In.)
Critical depth could not be calculated.
Pipe flow velocity =     17.01(Ft/s)
Travel time through pipe =    0.41 min.
Time of concentration (TC) =    10.50 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      501.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   0.946(Ft.), Average velocity =   3.043(Ft/s)
```

```
       ******* Irregular Channel Data ***********
-------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
-------------------------------------------------------------
Sub-Channel flow  =     19.839(CFS)
  '     '       flow top width =      8.784(Ft.)
  '     '    velocity=    3.043(Ft/s)
  '     '       area =      6.520(Sq.Ft)
  '     '       Froude number =     0.622

Upstream point elevation =   612.000(Ft.)
Downstream point elevation =   610.000(Ft.)
Flow length =   120.000(Ft.)
Travel time  =    0.66 min.
Time of concentration =   11.16 min.
Depth of flow =   0.946(Ft.)
Average velocity =   3.043(Ft/s)
Total irregular channel flow =    19.839(CFS)
Irregular channel normal depth above invert elev. =   0.946(Ft.)
Average velocity of channel(s) =   3.043(Ft/s)


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Process from Point/Station      501.000 to Point/Station      501.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      7.150(Ac.)
Runoff from this stream =     19.839(CFS)
Time of concentration =   11.16 min.
Rainfall intensity =     3.063(In/Hr)
Area averaged loss rate (Fm) =    0.1598(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      240.000 to Point/Station      501.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.584
Decimal fraction soil group D = 0.416
SCS curve number for soil(AMC 2)  = 76.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.229(In/Hr)
Max Catchment Loss (Fm) =     0.229(In/Hr)
Rainfall intensity =      1.957(In/Hr) for a    25.0 year storm
User specified values are as follows:
TC =  24.61 min.  Rain intensity =       1.96(In/Hr)
Total area =       217.68(Ac.)  Total runoff =    338.53(CFS)


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Process from Point/Station      501.000 to Point/Station      501.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 4
Stream flow area =    217.680(Ac.)
Runoff from this stream =    338.534(CFS)
Time of concentration =   24.61 min.
Rainfall intensity =     1.957(In/Hr)
Area averaged loss rate (Fm) =    0.2292(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
```

```
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1    642.50  1054.856     23.50    0.232      2.009
2    435.56  1160.740     24.00    0.141      1.985
3      7.15    19.839     11.16    0.160      3.063
4    217.68   338.534     24.61    0.229      1.957
Qmax(1) =
          1.000 *    1.000 *  1054.856) +
          1.013 *    0.979 *  1160.740) +
          0.637 *    1.000 *    19.839) +
          1.030 *    0.955 *   338.534) + =    2551.789
Qmax(2) =
          0.987 *    1.000 *  1054.856) +
          1.000 *    1.000 *  1160.740) +
          0.629 *    1.000 *    19.839) +
          1.016 *    0.975 *   338.534) + =    2549.576
Qmax(3) =
          1.593 *    0.475 *  1054.856) +
          1.584 *    0.465 *  1160.740) +
          1.000 *    1.000 *    19.839) +
          1.640 *    0.453 *   338.534) + =    1923.875
Qmax(4) =
          0.971 *    1.000 *  1054.856) +
          0.985 *    1.000 *  1160.740) +
          0.619 *    1.000 *    19.839) +
          1.000 *    1.000 *   338.534) + =    2518.178

Total of 4 streams to confluence:
Flow rates before confluence point:
    1054.856    1160.740      19.839     338.534
Maximum flow rates at confluence using above data:
     2551.789     2549.576     1923.875     2518.178
Area of streams before confluence:
      642.500      435.560        7.150      217.680
Effective area values after confluence:
     1284.129     1297.494      613.200     1302.890
Results of confluence:
Total flow rate =   2551.789(CFS)
Time of concentration =    23.505 min.
Effective stream area after confluence =   1284.129(Ac.)
Study area average Pervious fraction(Ap) =  0.864
Study area average soil loss rate(Fm) =    0.201(In/Hr)
Study area total (this main stream) =    1302.89(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      501.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =   1284.129(Ac.)
Runoff from this stream =   2551.789(CFS)
Time of concentration =   23.50 min.
Rainfall intensity =     2.009(In/Hr)
Area averaged loss rate (Fm) =    0.2006(In/Hr)
Area averaged Pervious ratio (Ap) = 0.8641
Program is now starting with Main Stream No. 2
End of computations, total study area =         1302.89 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.864
Area averaged SCS curve number (AMC 2) =  73.8
```

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                    Orange County Rational Hydrology Program

                (Hydrology Manual Date(s) October 1986 & November 1996)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2004 Version 8.0
        Rational Hydrology Study, Date: 08/07/15  File Name: PA2RAT10.roc
----------------------------------------------------------------------
PLANNING AREA 2
PROPOSED CONDITIONS
10-YEAR STORM
BY FUSCOE ENGINEERING
----------------------------------------------------------------------


Program License Serial Number 6049

----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

----------------------------------------------------------------------

Rational hydrology study storm event year is    10.0

Decimal fraction of study above 2000 ft., 600M  =     0.0000
English Units Used for input data


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      304.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.028
Decimal fraction soil group C = 0.587
Decimal fraction soil group D = 0.385
SCS curve number for soil(AMC 2)  = 75.95
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.232(In/Hr)
Max Catchment Loss (Fm) =     0.232(In/Hr)
Rainfall intensity =      1.728(In/Hr) for a    10.0 year storm
User specified values are as follows:
TC =  22.19 min.  Rain intensity =       1.73(In/Hr)
Total area =       621.43(Ac.)  Total runoff =    841.46(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      305.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =    841.483(CFS)
Depth of flow =   4.912(Ft.), Average velocity =  11.558(Ft/s)
       ******* Irregular Channel Data ***********
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
----------------------------------------------------------------
Sub-Channel flow  =    841.483(CFS)
  '     '       flow top width =     24.646(Ft.)
  '     '    velocity=   11.558(Ft/s)
  '     '       area =     72.804(Sq.Ft)
  '     '       Froude number =     1.185

Upstream point elevation =   665.000(Ft.)
Downstream point elevation =   647.500(Ft.)
Flow length =   435.000(Ft.)
Travel time  =    0.63 min.
Time of concentration =   22.82 min.
```

```
Depth of flow =   4.912(Ft.)
Average velocity =  11.558(Ft/s)
Total irregular channel flow =   841.483(CFS)
Irregular channel normal depth above invert elev. =   4.912(Ft.)
Average velocity of channel(s) =  11.558(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.210
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.790
SCS curve number for soil(AMC 2)  = 76.01
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.221(In/Hr)
Max Catchment Loss (Fm) =     0.221(In/Hr)
The area added to the existing stream with this TC
does not add flow per Para 6b, Page D-15 of the OCHM,
therefore the upstream flow rate of Q =    841.456(CFS) is being used
Rainfall intensity =      1.701(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.777
Subarea runoff =      0.000(CFS) for   10.220(Ac.)
Total runoff =    841.456(CFS)       Total area =      631.65(Ac.)
Area averaged Fm value =    0.232(In/Hr)
Depth of flow =   4.911(Ft.), Average velocity =  11.558(Ft/s)


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Process from Point/Station      305.000 to Point/Station      501.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =    841.484(CFS)
Depth of flow =   5.012(Ft.), Average velocity =  11.176(Ft/s)
       ******* Irregular Channel Data ***********
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
----------------------------------------------------------------
Sub-Channel flow  =    841.484(CFS)
  '     '       flow top width =     25.047(Ft.)
  '     '    velocity=   11.176(Ft/s)
  '     '       area =     75.292(Sq.Ft)
  '     '       Froude number =     1.136

Upstream point elevation =   647.500(Ft.)
Downstream point elevation =   610.000(Ft.)
Flow length =  1020.000(Ft.)
Travel time  =    1.52 min.
Time of concentration =   24.34 min.
Depth of flow =   5.012(Ft.)
Average velocity =  11.176(Ft/s)
Total irregular channel flow =   841.484(CFS)
Irregular channel normal depth above invert elev. =   5.012(Ft.)
Average velocity of channel(s) =  11.176(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.201
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.799
SCS curve number for soil(AMC 2)  = 76.18
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.220(In/Hr)
Max Catchment Loss (Fm) =     0.220(In/Hr)
The area added to the existing stream with this TC
does not add flow per Para 6b, Page D-15 of the OCHM,
therefore the upstream flow rate of Q =    841.456(CFS) is being used
Rainfall intensity =      1.639(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.773
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Subarea runoff =      0.000(CFS) for   10.850(Ac.)
Total runoff =    841.456(CFS)        Total area =      642.50(Ac.)
Area averaged Fm value =    0.232(In/Hr)
Depth of flow =   5.012(Ft.), Average velocity =  11.176(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      501.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =    642.500(Ac.)
Runoff from this stream =    841.456(CFS)
Time of concentration =   24.34 min.
Rainfall intensity =     1.639(In/Hr)
Area averaged loss rate (Fm) =    0.2318(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      193.000 to Point/Station      501.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.200
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.500
SCS curve number for soil(AMC 2)  = 69.40
Pervious ratio(Ap) = 0.6000  Max loss rate(Fp)=     0.235(In/Hr)
Max Catchment Loss (Fm) =     0.141(In/Hr)
Rainfall intensity =      1.652(In/Hr) for a    10.0 year storm
User specified values are as follows:
TC =  24.00 min.  Rain intensity =       1.65(In/Hr)
Total area =       435.56(Ac.)  Total runoff =    946.00(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      501.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =    435.560(Ac.)
Runoff from this stream =    946.000(CFS)
Time of concentration =   24.00 min.
Rainfall intensity =     1.652(In/Hr)
Area averaged loss rate (Fm) =    0.1410(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.710
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.290
SCS curve number for soil(AMC 2)  = 61.51
Pervious ratio(Ap) = 0.6000  Max loss rate(Fp)=     0.271(In/Hr)
Max Catchment Loss (Fm) =     0.163(In/Hr)
Initial subarea data:
Initial area flow distance =   222.220(Ft.)
Top (of initial area) elevation =   678.000(Ft.)
Bottom (of initial area) elevation =   675.000(Ft.)
Difference in elevation =     3.000(Ft.)
Slope =    0.01350  s(%)=       1.35
TC = k(0.412)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.463 min.
Rainfall intensity =      3.003(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.851
Subarea runoff =      1.125(CFS)
```

```
Total initial stream area =        0.440(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   675.000(Ft.)
End of street segment elevation =   647.200(Ft.)
Length of street segment  =   503.480(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      8.814(CFS)
Depth of flow =   0.301(Ft.), Average velocity =   4.959(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   8.730(Ft.)
Flow velocity =   4.96(Ft/s)
Travel time =    1.69 min.     TC =   10.16  min.
 Adding area flow to street
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.660
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.340
SCS curve number for soil(AMC 2)  = 62.46
Pervious ratio(Ap) = 0.6000  Max loss rate(Fp)=     0.266(In/Hr)
Max Catchment Loss (Fm) =     0.160(In/Hr)
Rainfall intensity =      2.705(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.847
Subarea runoff =     15.253(CFS) for    6.710(Ac.)
Total runoff =     16.377(CFS)       Total area =        7.15(Ac.)
Area averaged Fm value =    0.160(In/Hr)
Street flow at end of street =     16.377(CFS)
Half street flow at end of street =      8.189(CFS)
Depth of flow =   0.355(Ft.), Average velocity =   5.712(Ft/s)
Flow width (from curb towards crown)=  11.433(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   641.200(Ft.)
Downstream point/station elevation =   612.000(Ft.)
Pipe length  =   421.79(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.377(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    16.377(CFS)
Normal flow depth in pipe =   11.83(In.)
Flow top width inside pipe =   12.25(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.78(Ft/s)
Travel time through pipe =    0.45 min.
Time of concentration (TC) =    10.60 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      501.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Depth of flow =   0.851(Ft.), Average velocity =   2.872(Ft/s)
```

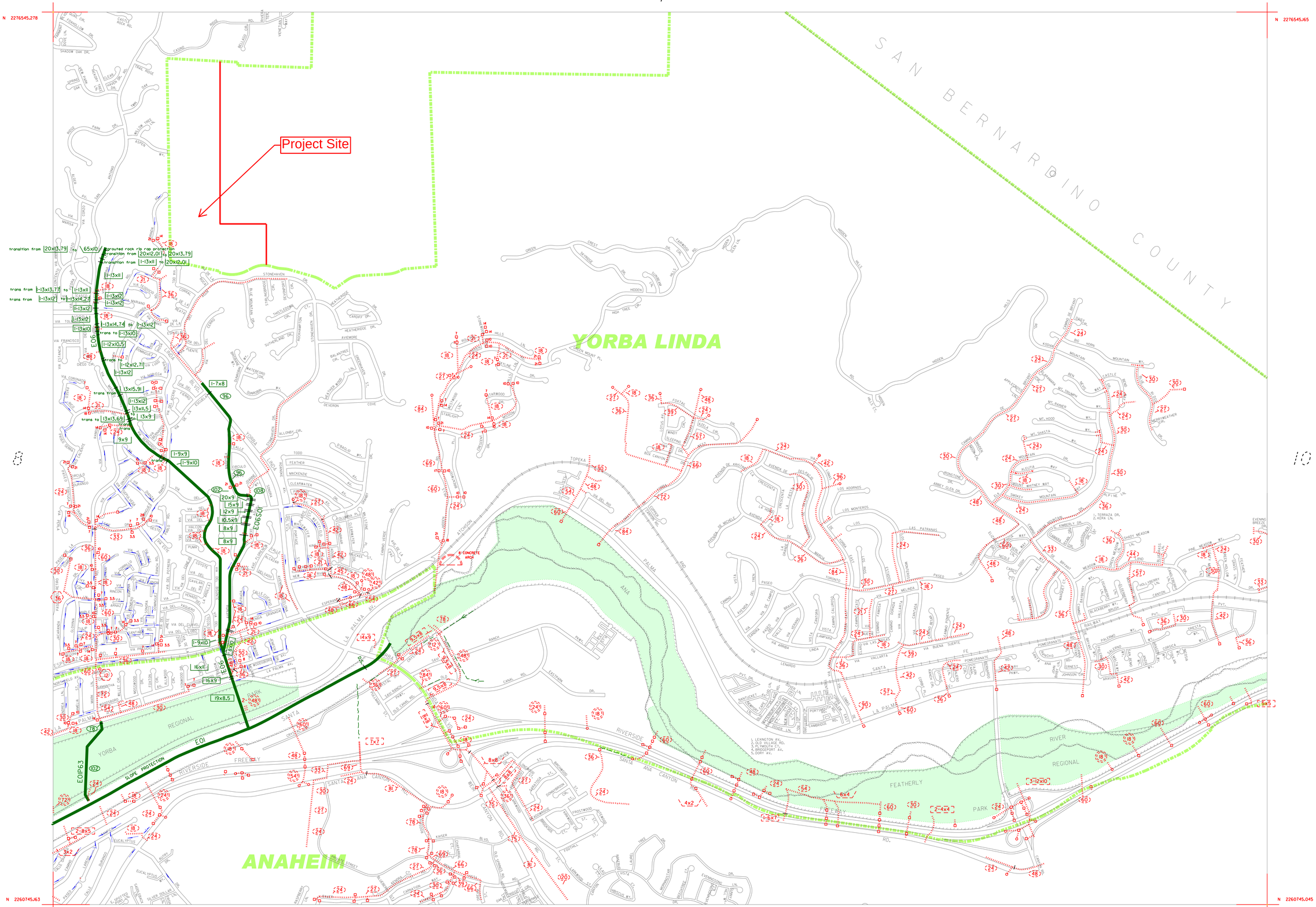
```
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             50.00
       2            100.00              0.00
       3            105.00              0.00
       4            205.00             50.00
Manning's 'N' friction factor =   0.050
-----------------------------------------------------------------
Sub-Channel flow  =     16.377(CFS)
  '     '       flow top width =      8.404(Ft.)
  '     '    velocity=    2.872(Ft/s)
  '     '       area =      5.702(Sq.Ft)
  '     '       Froude number =     0.614

Upstream point elevation =   612.000(Ft.)
Downstream point elevation =   610.000(Ft.)
Flow length =   120.000(Ft.)
Travel time  =    0.70 min.
Time of concentration =   11.30 min.
Depth of flow =   0.851(Ft.)
Average velocity =   2.872(Ft/s)
Total irregular channel flow =    16.377(CFS)
Irregular channel normal depth above invert elev. =   0.851(Ft.)
Average velocity of channel(s) =   2.872(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      501.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      7.150(Ac.)
Runoff from this stream =     16.377(CFS)
Time of concentration =   11.30 min.
Rainfall intensity =     2.545(In/Hr)
Area averaged loss rate (Fm) =    0.1598(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      240.000 to Point/Station      501.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.584
Decimal fraction soil group D = 0.416
SCS curve number for soil(AMC 2)  = 76.50
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.229(In/Hr)
Max Catchment Loss (Fm) =     0.229(In/Hr)
Rainfall intensity =      1.596(In/Hr) for a    10.0 year storm
User specified values are as follows:
TC =  25.49 min.  Rain intensity =       1.60(In/Hr)
Total area =       217.68(Ac.)  Total runoff =    267.82(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      501.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 4
Stream flow area =    217.680(Ac.)
Runoff from this stream =    267.820(CFS)
Time of concentration =   25.49 min.
Rainfall intensity =     1.596(In/Hr)
Area averaged loss rate (Fm) =    0.2292(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
```

```
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1    642.50   841.456     24.34    0.232      1.639
2    435.56   946.000     24.00    0.141      1.652
3      7.15    16.377     11.30    0.160      2.545
4    217.68   267.820     25.49    0.229      1.596
Qmax(1) =
          1.000 *    1.000 *   841.456) +
          0.991 *    1.000 *   946.000) +
          0.620 *    1.000 *    16.377) +
          1.031 *    0.955 *   267.820) + =    2053.047
Qmax(2) =
          1.009 *    0.986 *   841.456) +
          1.000 *    1.000 *   946.000) +
          0.626 *    1.000 *    16.377) +
          1.041 *    0.942 *   267.820) + =    2056.273
Qmax(3) =
          1.643 *    0.464 *   841.456) +
          1.590 *    0.471 *   946.000) +
          1.000 *    1.000 *    16.377) +
          1.694 *    0.443 *   267.820) + =    1567.428
Qmax(4) =
          0.970 *    1.000 *   841.456) +
          0.963 *    1.000 *   946.000) +
          0.602 *    1.000 *    16.377) +
          1.000 *    1.000 *   267.820) + =    2004.478

Total of 4 streams to confluence:
Flow rates before confluence point:
     841.456     946.000      16.377     267.820
Maximum flow rates at confluence using above data:
     2053.047     2056.273     1567.428     2004.478
Area of streams before confluence:
      642.500      435.560        7.150      217.680
Effective area values after confluence:
     1293.072     1281.182      606.877     1302.890
Results of confluence:
Total flow rate =   2056.273(CFS)
Time of concentration =    24.000 min.
Effective stream area after confluence =   1281.182(Ac.)
Study area average Pervious fraction(Ap) =  0.864
Study area average soil loss rate(Fm) =    0.201(In/Hr)
Study area total (this main stream) =    1302.89(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      501.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =   1281.182(Ac.)
Runoff from this stream =   2056.273(CFS)
Time of concentration =   24.00 min.
Rainfall intensity =     1.652(In/Hr)
Area averaged loss rate (Fm) =    0.2006(In/Hr)
Area averaged Pervious ratio (Ap) = 0.8641
Program is now starting with Main Stream No. 2
End of computations, total study area =         1302.89 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.864
Area averaged SCS curve number (AMC 2) =  73.8
```

APPENDIX D:

Preliminary Drainage Reports for Esperanza Hills Property
Prepared By KWC Engineers dated May 2013

APPENDIX E:
Existing Storm Drain Plans/Exhibits



NOTICE

The drainage information has been prepared for information purposes only. The location, ownership, facility information and limits have been determined from available information provided by public agencies, but may not be exact, accurate, or up-to-date. The user of this information is responsible for verifying exact location, ownership, accuracy, and the regional versus local character of drainage facilities.

Additional information may be obtained from public plans and recorded deeds. Facility designations included with this information are for convenience only and are not controlling or intended to imply ownership by the County or the Orange County Flood Control District (OCFCD). The information is being provided as a courtesy and neither the County of Orange nor OCFCD assume any liabilities for inaccuracy of the information.

To notify OC Public Works Flood Control Section of additions or corrections, please contact Sal Gutierrez at (714) 834-5396 or by email at sal.gutierrez@ocpw.ocgov.com

N

0 200 400 600 800
FEET

ORANGE COUNTY FLOOD CONTROL DISTRICT

BASE MAP OF DRAINAGE FACILITIES IN ORANGE COUNTY

REVISION	DATE	SHEET NO.	DWG. NO.
S. GUTIERREZ	JAN.12/2000	9	MAPS-113-3

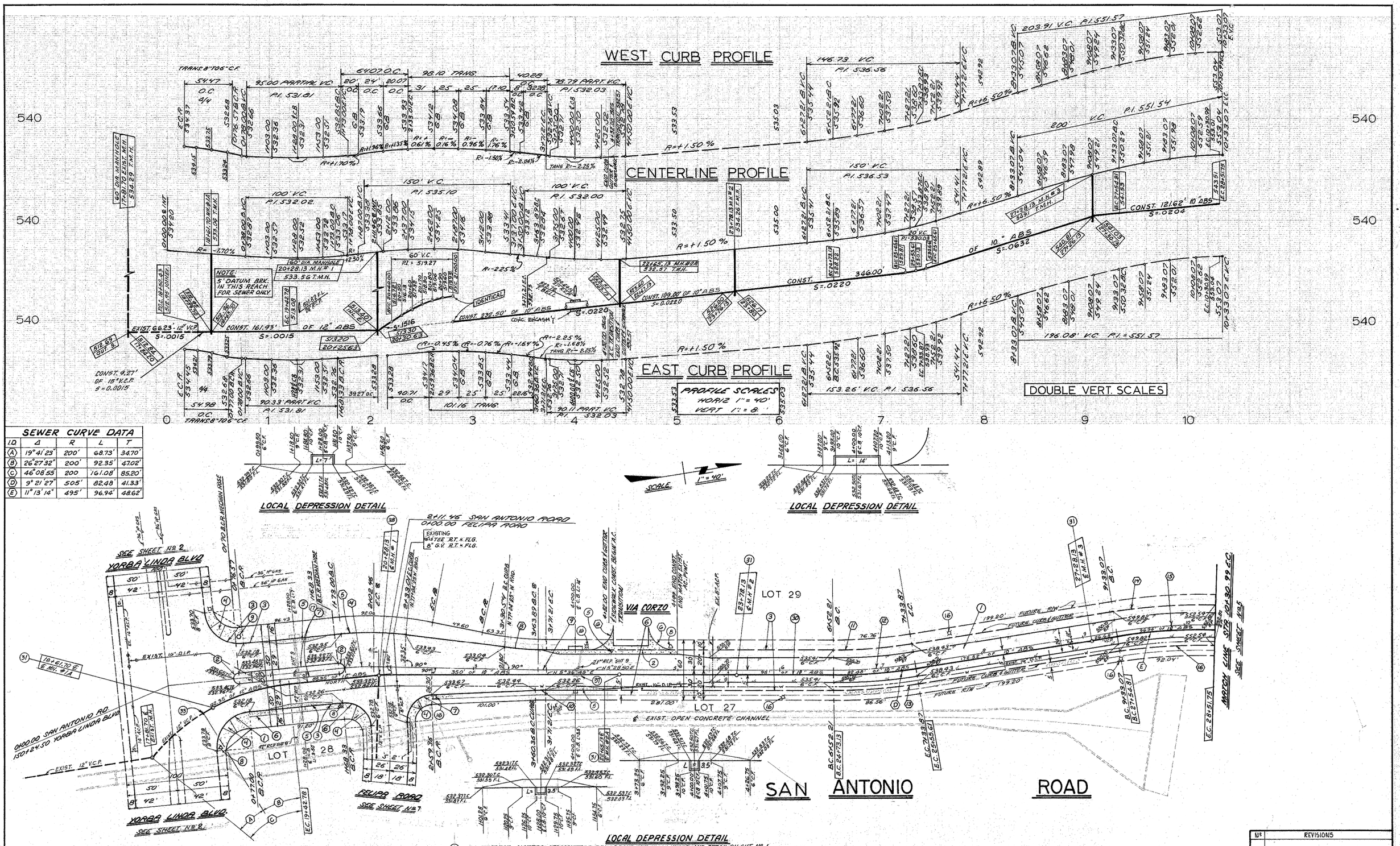
- Channel Drainage Area Boundary
- Major Sub-Area Drainage Boundary
- Minor Sub-Area Drainage Boundary
- Existing O.C.F.C.D. Facility
- Existing Local Facility
- Existing Retarding Basin or Reservoir
- Natural Watercourse
- City Limits
- G G Greenbelt
- P.S. P.S. Pump Station
- Catch Basin (length in feet)
- Drop Inlet or Other Entry
- OCFCD Basins or Reservoirs

Ownership (If other than City or County): Private = P State = S Federal = F

EXISTING FACILITIES

O.C.F.C.D.	LOCAL	
		Earth Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Rectangular Channel (base width by height in feet)
		Reinforced Concrete Box (RCB) (number of barrels-span by height in feet)
		Reinforced Concrete Pipe (RCP) (diameter in inches)
		Metal Sheet Channel (MSC) (Base width by pile height in feet /Sheet pile total length)
		Corrugated Metal Pipe (CMP) (diameter in inches)
		Concrete Pipe (diameter in inches)
		Concrete Oval Pipe (width by height in inches)
		Steel Pipe (diameter in inches)
		Reinforced Concrete Arch (base span by height in inches)
		Corrugated Metal Arch (base span by height in inches)

Storm Drain Inlet at
San Antonio Road (Esperanza Channel)



SEWER CURVE DATA				
I.D.	Δ	R	L	T
(A)	19°41'23"	200'	68.73'	34.70'
(B)	26°27'32"	200'	92.35'	47.02'
(C)	46°08'55"	200	161.08'	85.20'
(D)	9°21'27"	505'	82.48	41.33'
(E)	11°13'14"	495'	96.94'	48.62'

NO.	Δ	R	L	T	NO.	Δ	R	L	T	NO.	Δ	R	L	T
(6)	90°00'00	25'	39.27	25.00	(12)	9°21'27"	500'	81.65'	40.92					
(5)	12°55'35	284'	64.07	32.17	(11)	9°21'27"	480'	78.39	39.28					
(4)	6°45'05	250'	29.46	14.75	(10)	2°05'29	310'	11.32'	5.66'	(16)	11°13'14	480	94.00	47.15
(3)	89°10'03	35'	54.47	34.50	(9)	1°16'15"	330'	7.32'	3.66	(15)	11°13'14	500	97.92	49.12
(2)	180°00'00	5'	15.71	—	(8)	7°26'45	310'	40.28	20.17	(14)	11°13'14	520	101.83	51.08
(1)	90°00'00	35'	54.98	35.00	(7)	93°18'25	25'	40.71	26.49	(13)	9°21'27"	520'	84.92	42.58

STREET CURVE DATA

STREET CONSTRUCTION NOTES

(2) CONST. SLOTTED CROSSGUTTER PER O.C.M.A. STD. PLAN Nº 208 AND DETAIL ON SHT. Nº 1
(17) CONST. TYPICAL PAVEMENT SECTION AT MEDIAN CURB PER O.C.M.A. STD. PLAN 114.
(16) INSTALL STREET LIGHT, 5800 LUMEN
(9) INSTALL STOP SIGN
(8) INSTALL STREET NAME SIGN PER CITY OF YORBA LINDA STD.
(7) CONST. 6" CONC. CURB & GUTTER TYPE "A" PER O.C.M.A. STD. PLAN Nº 201 (MODIFIED)
(6) CONST. CONC. SIDEWALK PER O.C.M.A. STD. PLAN Nº 205.
(5) CONST. LOCAL DEPRESSION PER O.C.M.A. STD. PLAN Nº 308.
(4) CONST. ACCESS RAMP PER O.C.M.A. STD. PLAN Nº 111.
(3) CONST. 6" CONC. CURB & GUTTER TYPE "D" PER O.C.M.A. STD. PLAN Nº 201.
(1) CONST. A.C. PAVEMENT AND BASE PER TYP. SECTION ON SHEET Nº 1.

SEWER CONSTRUCTION NOTES

(38) CONST. STD. M.H. WITH 1 ECCENTRIC FLAT TOP OPENING TO BE ROTATED 90° TO THE TOP PER O.C.M.A. STD. PLAN Nº 506.
(37) ENCASE SEWER PIPE 5' EACH SIDE OF ℄ OF STORM DRAIN PER M.W.D. STD. PLAN S-3
(35) CONST. 60" I.D. MANHOLE PER Y.L.C.W.D. STD. PLAN Nº S.P.-
(33) REMOVE PLUG & JOIN EXIST.
(32) CONST. 4" ABS HOUSE LATERALS.
(31) CONST. STANDARD MANHOLE PER Y.L.C.W.D. STD. Nº S.P.-3
(30) CONST. ABS SEWER MAIN PER Y.L.C.W.D. STD. Nº S.P.-1

WATER CONSTRUCTION NOTES

INSTALL GATE VALVE.
INSTALL FIRE HYDRANT ASSEMBLY.
~~CONST. A.C.P. WATER MAIN~~

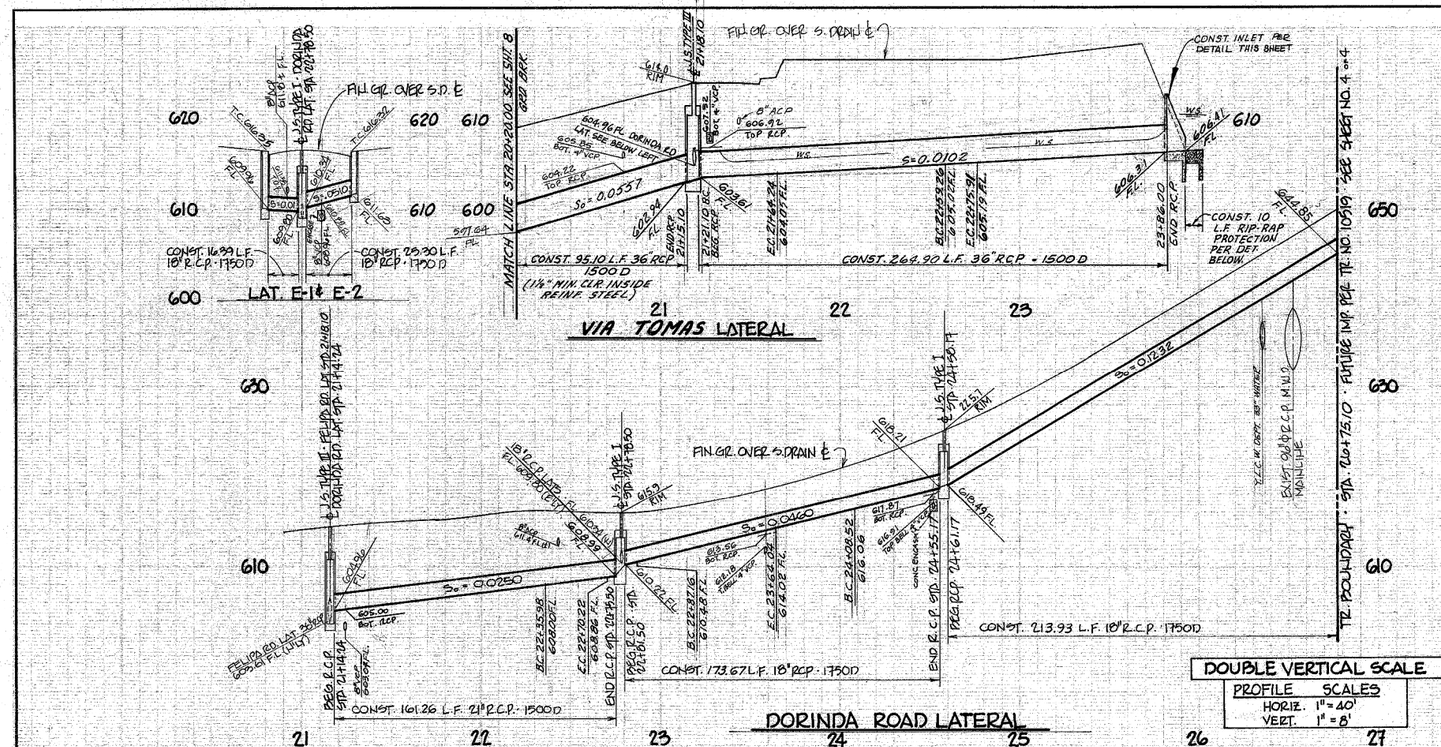
Nº	REVISIONS
0	RECORD DRAWING
1	℄ FUTURE R/W, C & G, PROFILE FUTURE REVISED STREET NORTH OF STA. 4+52, 72' LANES

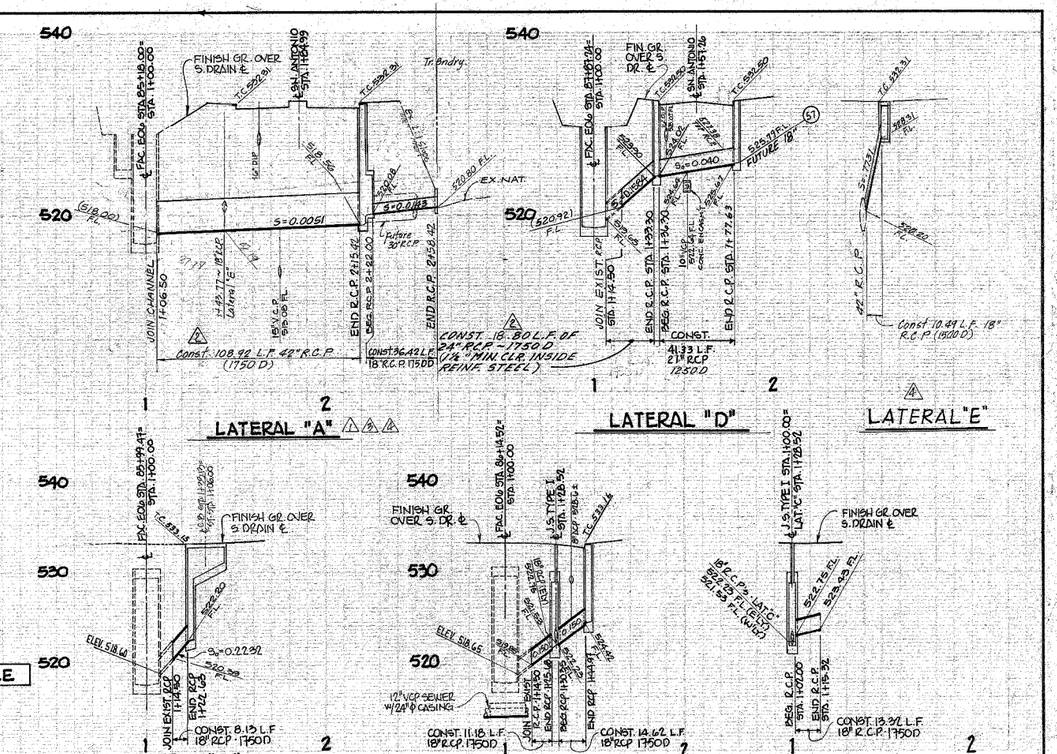
TRACT No. 10517

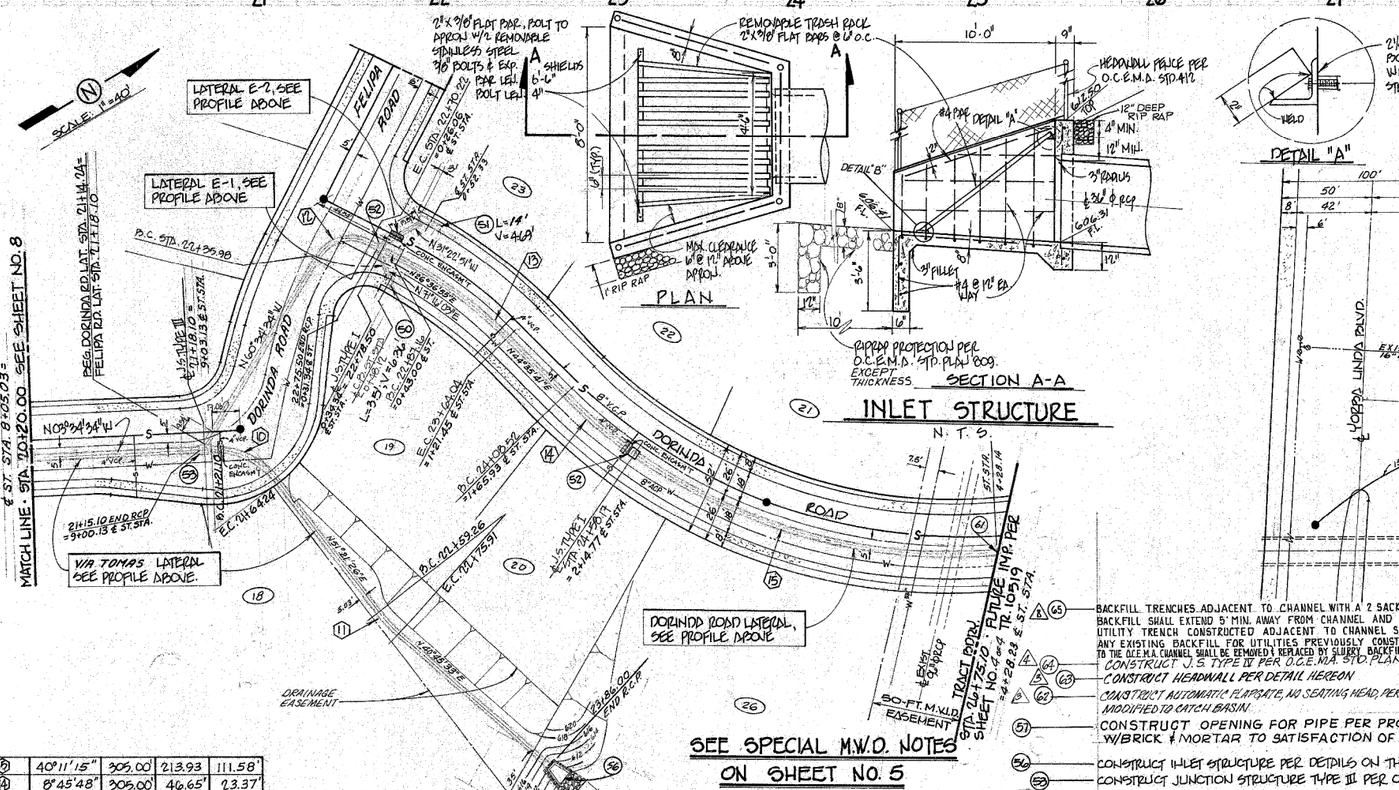
SAN ANTONIO RD.

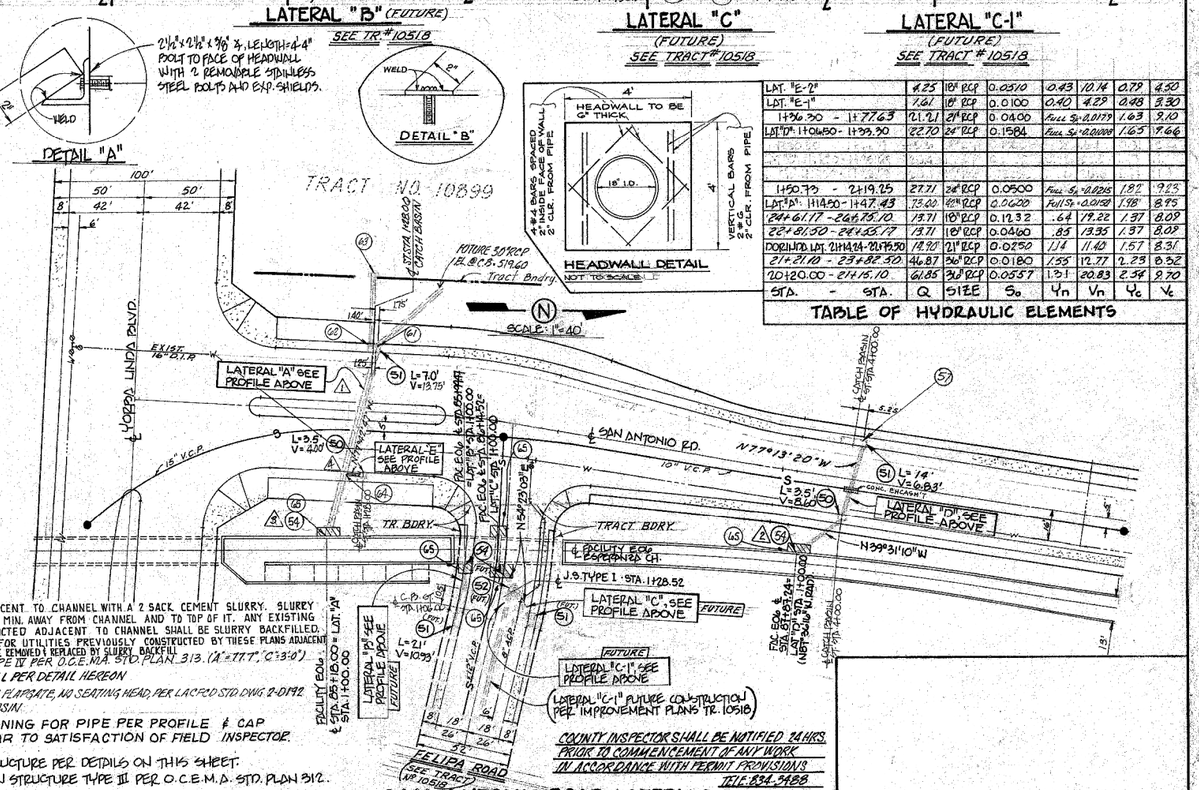
SHEET 4 OF 9 SHEETS

Storm Drain Inlet at
Dorinda Road (36-Inch RCP)









	LAT. "E-2"	4.25	18" RCP	0.0510	0.43	10.14	0.79	4.50
	LAT. "E-1"	1.61	18" RCP	0.0100	0.40	4.29	0.48	3.30
	1+76.30 - 1+77.63	22.21	21" RCP	0.0400	Full Sp = 0.0179		1.63	9.10
	LAT. "D": 1+04.80 - 1+39.30	22.70	24" RCP	0.1584	Full Sp = 0.0088		1.63	7.66
	1+50.70 - 2+19.25	27.71	24" RCP	0.0500	Full Sp = 0.0216		1.82	9.23
	LAT. "A": 1+14.50 - 1+47.43	75.00	42" RCP	0.0620	Full Sp = 0.0128		1.98	8.95
	24+61.77 - 24+75.10	19.71	18" RCP	0.1232	.64	19.22	1.97	8.09
	22+81.50 - 24+55.77	19.71	18" RCP	0.0460	.85	13.95	1.97	8.08
	DORINDA LAT. 21+14.14 - 21+79.50	18.90	21" RCP	0.0250	.14	11.40	1.57	8.31
	21+21.10 - 23+82.40	46.87	36" RCP	0.0180	1.55	12.77	2.23	8.52
	20+20.00 - 21+15.10	61.85	36" RCP	0.0557	1.31	20.83	2.54	9.70
	STA. - STA.	Q	SIZE	S_o	V_n	V_n	V_c	V_c

TABLE OF HYDRAULIC ELEMENTS

NO.	Δ	R	L	T
15	40°11'15"	305.00'	213.93	111.58'
14	8°45'48"	305.00'	46.65'	23.37'
13	17°58'40"	245.00'	76.88'	38.76'
12	87°11'29"	22.50'	34.24'	21.42'
11	10°35'39"	90.00'	16.65'	8.35'
10	54°56'00"	45.00'	43.14'	23.39'

CURVE DATA

№	REVISIONS
9	RECORD DRAWINGS
8	CHANNEL ENTRANCES ADDED NOTE 65 & REVISED ALL O.C.E.M.A. 21 MAR. 84
7	ADDED RIM ELEVATIONS 28 MAY 83
1	ADDED 33" WATER TO PLAN & PROFILE

CONSTRUCTION NOTES

65 BACKFILL TRENCHES ADJACENT TO CHANNEL WITH A 2 SACK CEMENT SLURRY. SLURRY BACKFILL SHALL EXTEND 5' MIN. AWAY FROM CHANNEL AND TO TOP OF IT. ANY EXISTING UTILITY TRENCH CONSTRUCTED ADJACENT TO CHANNEL SHALL BE SLURRY BACKFILLED. ANY EXISTING BACKFILL FOR UTILITIES PREVIOUSLY CONSTRUCTED BY THESE PLANS ADJACENT TO THE O.C.E.M.A. CHANNEL SHALL BE REMOVED & REPLACED BY SLURRY BACKFILL.

64 CONSTRUCT J.S. TYPE IV PER O.C.E.M.A. STD. PLAN 313. (A'=7'-7", C'=3'-0")

63 CONSTRUCT HEADWALL PER DETAIL HEREON

62 CONSTRUCT AUTOMATIC FLAPGATE, NO SEATING HEAD, PER L.A.C.F.C.D. STD. DWG. 2-D142 MODIFIED TO CATCH BASIN.

57 CONSTRUCT OPENING FOR PIPE PER PROFILE & CAP W/BRICK & MORTAR TO SATISFACTION OF FIELD INSPECTOR.

56 CONSTRUCT INLET STRUCTURE PER DETAILS ON THIS SHEET.

55 CONSTRUCT JUNCTION STRUCTURE TYPE II PER O.C.E.M.A. STD. PLAN 312.

61 CONSTRUCT BRICK & MORTAR SEAL.

54 CONNECT RCP TO EXIST. CHANNEL PER O.C.E.M.A. STD. PLAN 314.

52 CONSTRUCT JUNCTION STRUCTURE TYPE I PER O.C.E.M.A. STD. PLAN 310.

51 CONSTRUCT INLET TYPE II PER O.C.E.M.A. STD. PLAN 302.

50 CONSTRUCT INLET TYPE I PER O.C.E.M.A. STD. PLAN 301.

TRACT No. 10517

STORM DRAIN

SHEET 9 OF 9 SHEETS

Storm Drain Inlet at Stonehaven Drive (8' x 7' RCB)

71+00.00 - 74+39.00	1200	0.014	—	0.0205	7.65'	22.61	FULL	21.40
STA. TO STA.	Q	n	Sf	S	Dn	Vn	Dc	Vc

HYDRAULIC DATA

5	EXTENDED R.C.B. 10' 6-26-89 - M.L.L.	6/29/89	
1	ADDED SHTS 6 & 7 11-15-88 - M.L.L.	11/18/88	BRM
	REVISION DESCRIPTION	DATE	APP'D

	III	10° 32' 33"	250'	46.00'	23.07
EX.	II	21° 59' 00"	250'	95.92'	48.56'
EX.	I	7° 57' 27"	343'	47.64'	23.86'
	I.D.	Δ	R	L	T

℄ RCB. CURVE DATA

95 - CONST 8'H x 7'W. R.C.B. PER DETAIL(S) SHT. 7

CONST. MANHOLE FOR REINF. CONC. BOX CONDUIT PER E.M.A. STD. No 506 (DELETED)

94 - CONST. INLET STRUCTURE PER DETAIL ON SHEET No. 6

CONST. JUNCTION STRUCTURE TYPE II PER E.M.A. STD. No 314 WITH 4 LF. RCP (SIZE PER PLAN) STUB OUT AND SEAL WITH MORTAR AND BRICK.

CONSTRUCTION NOTES

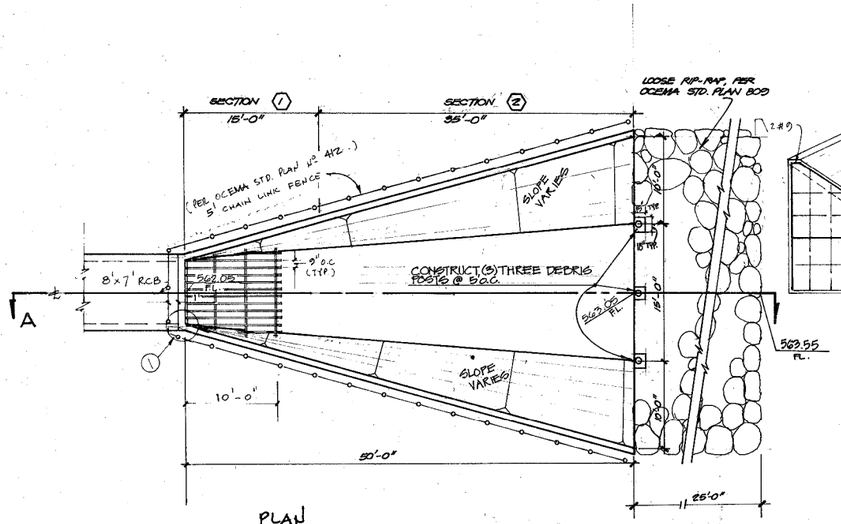
DRAWING OF RECORD

JAMES H PARDUE RCE 42758 EXP 3-31-91 — DATE 4-20-90 J-8636

TR. 13800 IMP'S
STORM DRAIN PLAN
~EXTENSION~
DWG. NO. E06S01-701-2

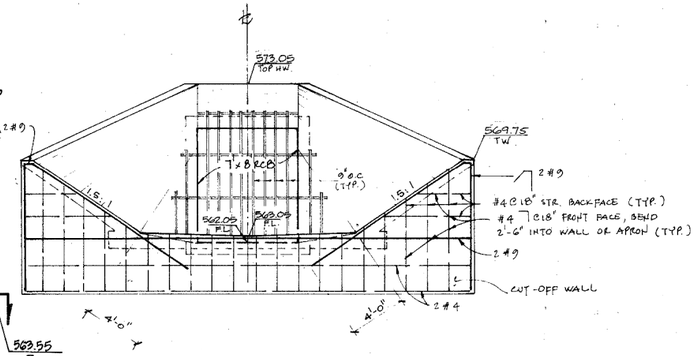
SHEET 6 OF 7 SHEETS 1

26-131



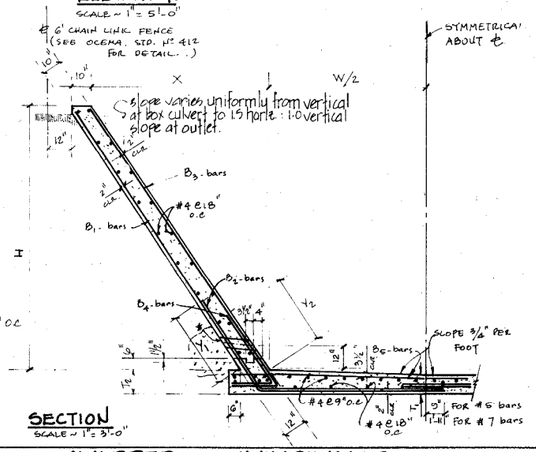
PLAN

SCALE ~ 1/8" = 1'-0"



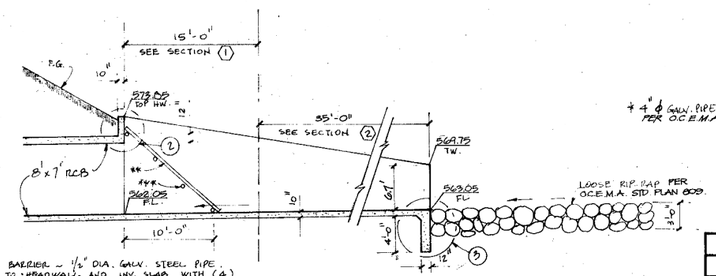
ELEVATION

SCALE ~ 1" = 5'-0"



SECTION

SCALE ~ 1" = 5'-0"



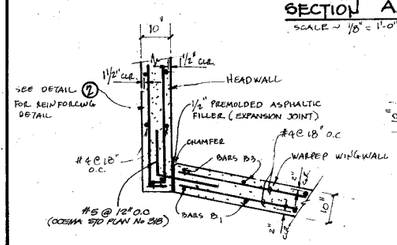
** DEBRIS BARRIER ~ 1½" DIA. GALV. STEEL PIPE. SECURE TO HEADWALL AND INV. SLAB WITH (4) 3/4" HEX. HEAD BOLTS AND EXPANSION SHIELDS.

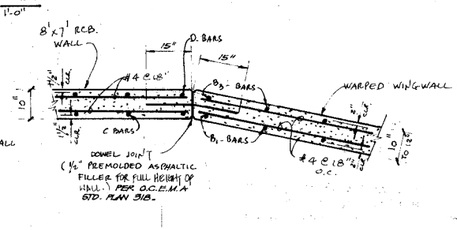
*** 1½" DIA. GALV. STEEL PIPE ~ EQ. SPACING.

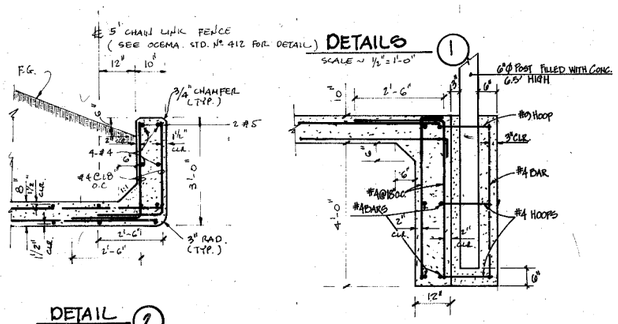
4" ϕ GALV. PIPE FOR WEEPHOLE @ 10' O.C. PER O.C.E.M.A. STD PLAN 323.

SECTION 'AA'

SCALE ~ 1/8" = 1'-0"







DETAILS 1

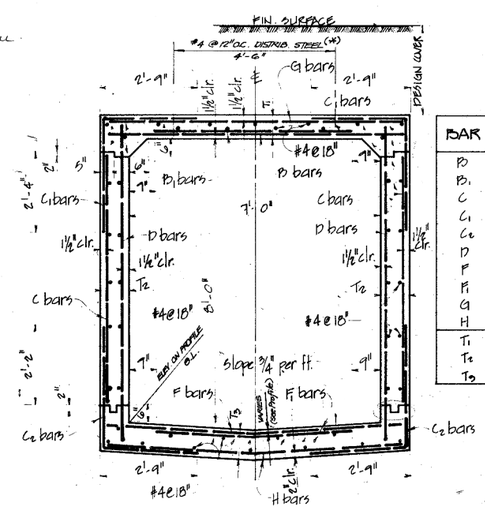
SCALE ~ 1/2" = 1'-0"

DETAIL 2

SCALE ~ 1/2" = 1'-0"

DETAIL 3

SCALE ~ 1/2" = 1'-0"



TYPICAL R.C.B SECTION

SCALE ~ 1/2" = 1'-0"

WARPED WINGWALLS

WALL DIMENSIONS AND REINFORCING

SECTION	W/2	X	H	T_1	T_2	Y_1	Y_2	BARS B_1	BARS B_2	BARS B_3	BARS B_4	BARS B_6
1	3'-6 to 5'-6	0" to 2'-0"	11'-0" to 8'-0"	9" min	12" min	3'-9"	3'-4"	#7 @ 12" o.c	#7 @ 12" o.c	#5 @ 12" o.c	#5 @ 12" o.c	#6 @ 6" o.c.
2	5'-6 to 7'-6	2'-9" to 7'-6"	8'-0" to 5'-0"	9" min	12" min	3'-9"	2'-0"	#5 @ 12" o.c	#5 @ 12" o.c	#5 @ 12" o.c	#5 @ 12" o.c	#5 @ 6" o.c

DESIGN CRITERIA

LIVE LOAD = HS 20-44
EARTH DENSITY = 130 #/FT³
LATERAL E.F.P. = 36 PSI.
f_c = 3250. PSI.
f_s = 1462 PSI.
n = 8.8
f_y = 60 KSI.

DESIGN COVER

BAR	A (*) 1.5' to 5.0'	B 5.1' to 8.0'	C 8.1' to 10.00'	D 10.1' to 13.0'
B_0	#5 @ 12" o.c.	#5 @ 12" o.c.	#5 @ 12" o.c.	#5 @ 12" o.c.
B_1	#5 @ 12" o.c.	#5 @ 12" o.c.	#5 @ 12" o.c.	#5 @ 12" o.c.
C	#4 @ 12" o.c.	#4 @ 9" o.c.	#4 @ 9" o.c.	#4 @ 9" o.c.
C_1	#4 @ 6" o.c.	#5 @ 6" o.c.	#5 @ 6" o.c.	#5 @ 6" o.c.
C_2	#4 @ 6" o.c.	#5 @ 6" o.c.	#5 @ 6" o.c.	#5 @ 6" o.c.
D	#5 @ 12" o.c.	#5 @ 9" o.c.	#5 @ 9" o.c.	#5 @ 9" o.c.
F	#5 @ 12" o.c.	#6 @ 12" o.c.	#6 @ 12" o.c.	#6 @ 12" o.c.
F_1	#5 @ 12" o.c.	#6 @ 12" o.c.	#6 @ 12" o.c.	#6 @ 12" o.c.
G	#4 @ 12" o.c.	#4 @ 12" o.c.	#4 @ 12" o.c.	#4 @ 12" o.c.
H	#4 @ 12" o.c.	#4 @ 12" o.c.	#4 @ 12" o.c.	#4 @ 12" o.c.
T_1	10"	10"	12"	14"
T_2	10"	10"	10"	10"
T_3	12"	12"	14"	16"

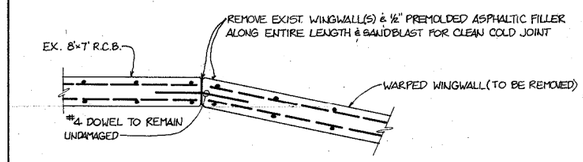
(*) CONSTRUCT TO DESIGN COVER D

STRUCTURAL SECTION

STATION TO STATION	CLASS
49+30.75 TO 53+30.00	B
53+30.00 TO 55+40.00	A
55+40.00 TO 59+20.00	B
59+20.00 TO 60+20.00	C
60+20.00 TO 72+60.00	B
72+60.00 TO 73+40.00	C
73+40.00 TO 74+60.00	D
74+60.00 TO 74+80.00	D
74+80.00 TO 75+05.00	B
75+05.00 TO 75+32.78	B

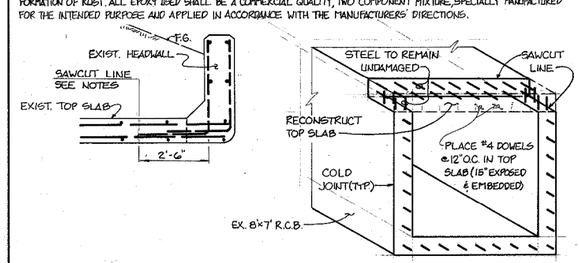
STRUCTURAL NOTES

1. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE TO FACE OF BAR AND SHALL BE 1½ INCHES UNLESS OTHERWISE SHOWN.
2. CONCRETE DIMENSIONS SHALL BE MEASURED HORIZONTALLY OR VERTICALLY ON THE PROFILE, AND PARALLEL TO OR AT RIGHT ANGLES (OR RADIALLY) TO CENTERLINE OF CONDUIT ON THE PLAN EXCEPT AS OTHERWISE SHOWN.
3. ALL BAR BENDS AND HOOKS SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" CHAPTER 7 (ACI 318-77)
4. PLACING OF REINFORCEMENT SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" CHAPTER 7 (ACI 318-77)
5. TRANSVERSE CONSTRUCTION JOINTS SHALL NOT BE PLACED WITHIN 30 INCHES OF MANHOLE OR JUNCTION STRUCTURE OPENINGS.
6. TRANSVERSE CONSTRUCTION JOINTS IN WALLS AND SLABS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED. TRANSVERSE CONSTRUCTION JOINTS SHALL BE NORMAL OR RADIAL TO THE CENTERLINE OF CONSTRUCTION.
7. THE TRANSVERSE REINFORCING STEEL SHALL TERMINATE ONE AND ONE-HALF INCHES FROM THE CONCRETE SURFACES UNLESS OTHERWISE SHOWN ON THE STRUCTURAL DETAILS.
8. EXPOSED EDGES OF CONCRETE MEMBERS SHALL BE 3/4" CHAMFERED.
9. NO SPLICES IN TRANSVERSE STEEL REINFORCEMENT WILL BE PERMITTED OTHER THAN SHOWN ON THE DRAWING WITHOUT APPROVAL OF THE ENGINEER. NO MORE THAN TWO SPLICES WILL BE PERMITTED IN ANY LONGITUDINAL BAR BETWEEN TRANSVERSE JOINTS. SPLICES SHALL BE STAGGERED.
10. LONGITUDINAL STEEL SHALL BE LAPPED 40 BAR DIAMETERS AT SPLICES. TRANSVERSE STEEL SHALL BE LAPPED 45 BAR DIAMETERS AT SPLICES.
11. EXPANSION JOINTS SHALL BE PLACED AT THE JUNCTION OF INLET AND OUTLET SECTIONS WITH CLOSED CONDUIT SECTIONS, PER O.C.E.M.A. STD. PLAN 318.
12. LONGITUDINAL STEEL SHALL BE CONTINUOUS AND EXTEND THROUGH ALL CONSTRUCTION JOINTS, UNLESS OTHERWISE SHOWN.
13. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, TRANSVERSE JOINT KEYWAYS (IN BOTH SLABS AND WALLS), AS DETAILED ON THE DRAWINGS SHALL BE PLACED AT THE END OF EACH POUR, BUT THE SPACING THEREOF SHALL NOT EXCEED 50 FEET OR BE LESS THAN 10 FEET.
14. UNLESS OTHERWISE SHOWN ON THE DETAILS, IN CURVED SECTIONS TRANSVERSE BARS SHALL BE PLACED RADIALLY, STRAIGHT TRANSVERSE BARS IN TOP AND BOTTOM SLABS SHALL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS; SPACING SHALL BE AT THE CENTERLINE OF CONSTRUCTION FOR SINGLE-BARREL BOXES. STRAIGHT BARS AND L-BARS IN WALLS SHALL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS, WITH THE SPACING MEASURED BETWEEN THE VERTICAL LEGS OF BARS.
15. CONCRETE SHALL BE 520-B-3250 FOR INVERT AND 520-C-3250 FOR WALLS AND DECKS.
16. CONSTRUCTION WILL BE BY THE ALTERNATE PANEL METHOD AND NO CONTINUOUS PLACEMENT THROUGH JOINTS WILL BE PERMITTED.
17. COUNTY INSPECTOR SHALL CERTIFY LINE AND GRADE PRIOR TO ANY CONCRETE PLACEMENT.
18. SHOTCRETE MAY BE USED IN WINGWALLS AT CONTRACTOR'S OPTION



CONCRETE REMOVAL NOTES:

1. WHERE EXIST. STEEL IS TO BE EXTENDED INTO NEW CONSTRUCTION A 1½" DEEP SAWCUT SHALL BE MADE TAKING CARE NOT TO DAMAGE THE EXIST. STEEL.
2. AFTER MAKING SAWCUTS THE CONC. SHALL BE REMOVED WITH HAND OPERATED EQUIPMENT. USE OF EXPLOSIVES, WRECKING BALLS, STOMPERS, OR OTHER EQUIPMENT WHICH WOULD CAUSE DAMAGE TO THE REMAINING CONC. WILL NOT BE PERMITTED. THE ENGINEER SHALL BE THE SOLE JUDGE OF THE USEAGE OF ANY EQUIPMENT FOR THE CONC. REM. OPERATION.
3. ANY SAWCUTS OR IRREGULARITIES IN THE SURFACES OF THE REMAINING WALL OR JOINT SHALL BE FILLED W/EPOXY GROUT MIXTURE TO OBTAIN A SMOOTH PLANE SURFACE. THE ENDS OF EXPOSED REINF. SHALL BE PAINTED W/AN EPOXY COATING TO INHIBIT THE FORMATION OF RUST. ALL EPOXY USED SHALL BE A COMMERCIAL QUALITY, TWO COMPONENT MIXTURE, SPECIALLY MANUFACTURED FOR THE INTENDED PURPOSE AND APPLIED IN ACCORDANCE WITH THE MANUFACTURERS' DIRECTIONS.



4 CONNECTION DETAILS & NOTES

N.T.S.

4	ADDED CONNECTION DETAILS & NOTES (4-3-89 - M.L.L.	4/12/89	B.M.
1	ADDED SHTS. 6 & 7 11-15-88 - M.L.L.	12/1/88	BMG
	REVISION DESCRIPTION	DATE	APP'D

DRAWING OF RECORD

JAMES H PARDUE RCE 12758 EXP 3-31-91 — 4-20-90 DATE — J-8636

TR 13800 IMPS

STORM DRAIN PLAN ~EXTENSION~

DWG. NO. E06501-701-2

SHEET 7 OF 7 SHEETS 1

Storm Drain Maintenance Correspondence

Craig Kwasniewski

From: Puneet Comar
Sent: Monday, August 10, 2015 5:40 PM
To: Craig Kwasniewski
Subject: As-Built Storm Drain Plan Request

From: Armando Jaime [mailto:AJaime@yorba-linda.org]
Sent: Wednesday, July 15, 2015 1:17 PM
To: Puneet Comar; Fredy Castillo; Lynnae Sisemore
Subject: RE: As-Built Storm Drain Plan Request

Hi Puneet,

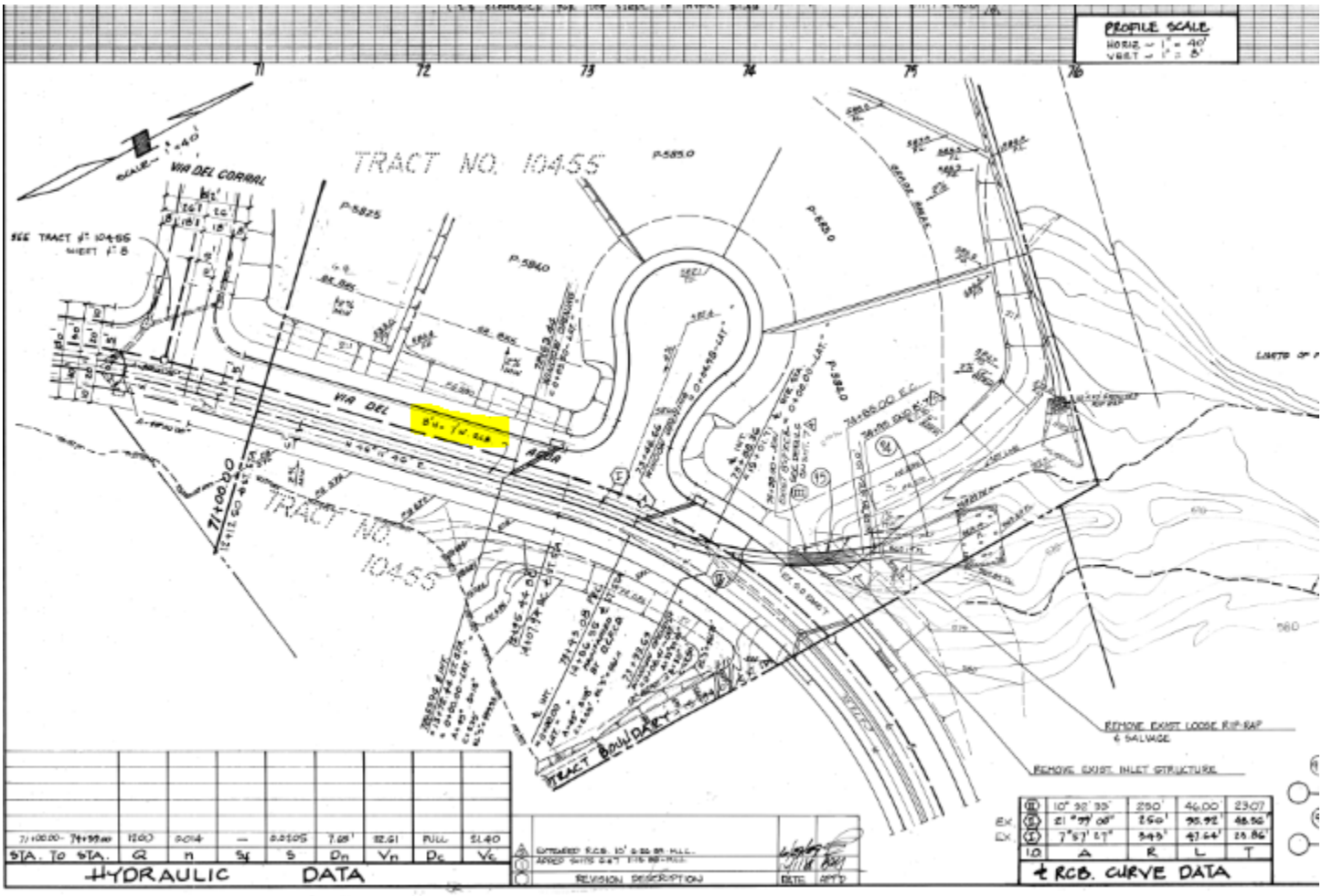
Yes the City maintains this portion of storm drain.

Armando

From: Puneet Comar [mailto:pcomar@fuscoe.com]
Sent: Wednesday, July 15, 2015 8:35 AM
To: Fredy Castillo; Lynnae Sisemore
Cc: Armando Jaime
Subject: RE: As-Built Storm Drain Plan Request

HI Fred, thank you for the follow up!

Just to confirm, we are talking about the storm drain system shown in the attached plan - DWG No. E06501-701-2



Puneet Comar, P.E., Q.S.D
Senior Project Manager
pcomar@fuscoe.com

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From: Fredy Castillo [mailto:fcastillo@yorba-linda.org]
Sent: Wednesday, July 15, 2015 8:02 AM

To: Lynnae Sisemore; Puneet Comar
Subject: RE: As-Built Storm Drain Plan Request

Thankee!

From: Lynnae Sisemore
Sent: Wednesday, July 15, 2015 8:02 AM
To: Puneet Comar
Cc: Fredy Castillo
Subject: FW: As-Built Storm Drain Plan Request

FYI

From: Armando Jaime
Sent: Wednesday, July 15, 2015 6:48 AM
To: Fredy Castillo
Subject: RE: As-Built Storm Drain Plan Request

HI Fredy,
Yes it will be maintained by the City.

Armando

From: Fredy Castillo
Sent: Thursday, July 09, 2015 1:55 PM
To: Puneet Comar
Cc: Lynnae Sisemore; Armando Jaime; Eric Lissner
Subject: RE: As-Built Storm Drain Plan Request

Armando should be able to provide this for you upon his return.

-Fredy

From: Puneet Comar [mailto:pcomar@fuscoe.com]
Sent: Thursday, July 09, 2015 1:52 PM
To: Fredy Castillo
Cc: Lynnae Sisemore; Armando Jaime; Eric Lissner
Subject: RE: As-Built Storm Drain Plan Request

Hi Fred,

Thanks for the follow up, the county has confirmed to us that they do not maintain the storm drain within Via Del Aqua. Therefore I am requesting a statement or documentation from the city that it is, or will be maintained by the city of Yorba Linda Please.

Puneet Comar, P.E., Q.S.D
Senior Project Manager
pcomar@fuscoe.com

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From: Fredy Castillo [mailto:fcastillo@yorba-linda.org]
Sent: Thursday, July 09, 2015 1:46 PM
To: Puneet Comar
Cc: Lynnae Sisemore; Armando Jaime
Subject: FW: As-Built Storm Drain Plan Request

Puneet,

The last conversation I had with our public works superintendent, Armando Jaime was that as long as the below information was confirmed with the County then he would add the remaining portion of the SD to his maintenance list. He was under the impression that the entire stretch was the County's.
Armando is currently on vacation but he will be back on the 15th if you would like to discuss this further with him. His phone number is 714-961-7170.

Thank you,

Fredy A. Castillo
Assistant Engineer
City of Yorba Linda Public Works
Phone: (714) 961-7170
Fax: (714) 986-1010
fcastillo@yorba-linda.org

From: Eric Lissner [mailto:elissner@fuscoe.com]
Sent: Friday, June 12, 2015 2:49 PM
To: Fredy Castillo; Armando Jaime
Cc: Jeff Davis
Subject: RE: As-Built Storm Drain Plan Request

Fredy,

Our discussions with the county and the associated map on the county's website indicate that the county's responsibility for the line in Via del Agua does not begin until Yorba Linda Blvd. Can you please confirm?

Eric Lissner, P.E.
Engineer
elissner@fuscoe.com

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fax 949.474.5315
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From: Fredy Castillo [mailto:fcastillo@yorba-linda.org]
Sent: Tuesday, June 09, 2015 2:22 PM
To: Eric Lissner; Armando Jaime
Cc: Jeff Davis
Subject: RE: As-Built Storm Drain Plan Request

Eric,

Sorry I haven't followed up I spoke with Armando about this a few days ago and he mentioned the Via del Agua facility is maintained by the County. The storm drain on Dorinda is maintained by the City.

Fredy A. Castillo
Assistant Engineer
City of Yorba Linda Public Works
Phone: (714) 961-7170
Fax: (714) 986-1010
fcastillo@yorba-linda.org

From: Eric Lissner [mailto:elissner@fuscoe.com]
Sent: Tuesday, June 09, 2015 9:45 AM
To: Fredy Castillo; Armando Jaime
Cc: Jeff Davis
Subject: RE: As-Built Storm Drain Plan Request

Armando,

Can you please confirm maintenance of the storm drain lines on the attached map? See below.

Fredy, thank you for the as-built plans.

Thanks!

Eric Lissner, P.E.
Engineer
elissner@fuscoe.com

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Irvine, CA 92606
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fax 949.474.5315
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From: Fredy Castillo [mailto:fcastillo@yorba-linda.org]
Sent: Monday, June 01, 2015 9:50 AM
To: Eric Lissner; Armando Jaime

Cc: Jeff Davis
Subject: RE: As-Built Storm Drain Plan Request

Eric,

The plans you requested have been uploaded to this link: https://app.box.com/s/72km7j5jiwlrkjlvn6kb9vzu0q3jo1bg

As far as I know the City maintains the lines in the area you highlighted.

Armando,

Can you confirm if we maintain the SD lines in the area highlighted on the attached map.

Thank you,

Fredy A. Castillo
Assistant Engineer
City of Yorba Linda Public Works
Phone: (714) 961-7170
Fax: (714) 986-1010
fcastillo@yorba-linda.org

From: Eric Lissner [mailto:elissner@fuscoe.com]
Sent: Wednesday, May 27, 2015 4:33 PM
To: Fredy Castillo
Cc: Jeff Davis
Subject: RE: As-Built Storm Drain Plan Request

Fredy,

As a followup to my previous email, we have an added request (see attached). We'd also like the as-built storm drain plans for the main in Dorinda Road and Via Tomas and its connection to the main in Yorba Linda Boulevard.

Additionally, can you please include information on which agency maintains each line?

Eric Lissner
Engineer
elissner@fuscoe.com

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Irvine, CA 92606
tel 949.474.1960
fax 949.474.5315
www.fuscoe.com

From: Eric Lissner
Sent: Wednesday, May 27, 2015 11:52 AM

To: 'fcastillo@yorba-linda.org'
Cc: Jeff Davis
Subject: As-Built Storm Drain Plan Request

Hi Fredy,

Per our phone conversation this morning, please see the attached exhibit with a request for as-built storm drain plans.

We're interested in plans for the mainline storm drain in Via Del Agua/Stonehaven and Yorba Linda Blvd until it becomes a county-maintained line downstream in Yorba Linda Blvd. We believe the storm drain has an 8'Hx7'W RCB cross-section for the majority of this stretch.

When we spoke on the phone, you mentioned that you would be able to provide us these plans by Friday or Monday. Thanks for your help!

Eric Lissner
Engineer
elissner@fuscoe.com

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CONCEPTUAL WATER QUALITY MANAGEMENT PLAN
(CWQMP)

CIELO VISTA

PLANNING APPLICATION NO. PA100004

Yorba Linda, California
County of Orange

Prepared for

North County BRS Project LLC
3 Corporate Plaza, Suite 102
Newport Beach, CA 92660
(949) 644-3514

Prepared by

Fuscoe Engineering, Inc.
16795 Von Karman, Suite 100
Irvine, California 92606
949.474.1960
www.fuscoe.com

Project Manager:
Puneet Comar, P.E.

Date Prepared: September 21, 2012
Date Revised: October 8, 2015
Job Number: 1296-001

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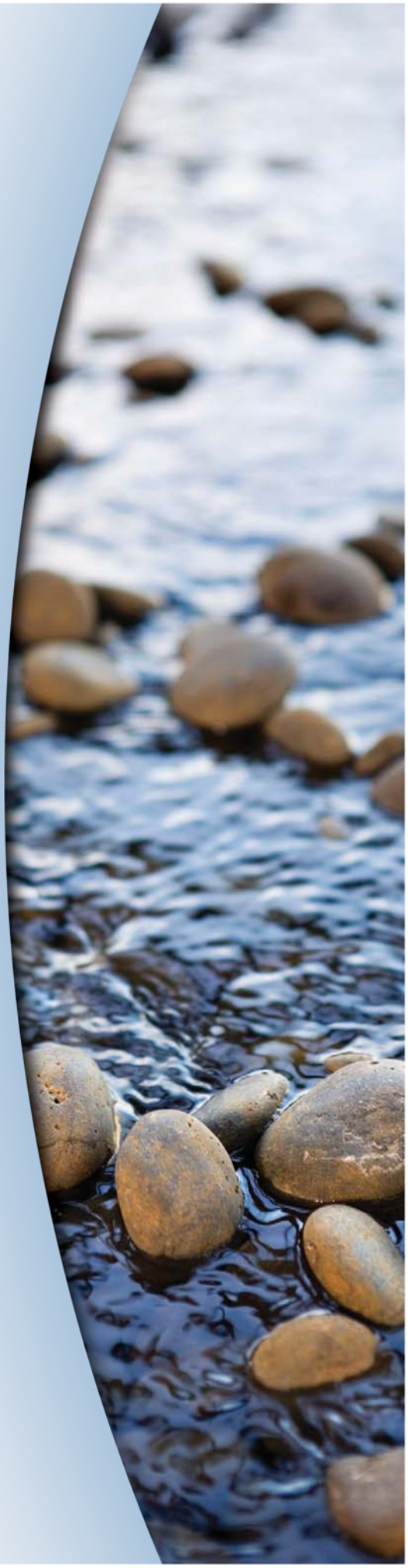

CONCEPTUAL
WATER QUALITY MANAGEMENT PLAN
(WQMP)

CIELO VISTA PROJECT

Yorba Linda, CA, County of Orange

TENTATIVE TRACT 17341
APN: 351-031-05 AND 351-031-17

Planning Application No. PA100004

Prepared for:

NORTH COUNTY BRS PROJECT, LLC
3 Corporate Plaza, Suite 102
Newport Beach, CA 92660
(949) 644-3514

Prepared by:

FUSCOE ENGINEERING, INC.
16795 Von Karman, Suite 100
Irvine, CA 92618
949.474.1960
Puneet Comar, P.E., Q.S.D.

Date Prepared: September 21, 2012
Date Revised: October 8, 2015

PROJECT OWNER'S CERTIFICATION			
Permit/Application No.:	PA10-004	**Grading Permit No.:**	TBD
Tract/Parcel Map and Lot(s)No.:	TTM 17341	**Building Permit No.:**	TBD
Address of Project Site and APN:	Yorba Linda, CA 351-031-05 and 351-031-17		

This Water Quality Management Plan (WQMP) has been prepared for NORTH COUNTY BRS PROJECT, LLC by FUSCOE ENGINEERING, INC. The WQMP is intended to comply with the requirements of the County of Orange NPDES Stormwater Program requiring the preparation of the plan.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan , including the ongoing operation and maintenance of all best management practices (BMPs), and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the current Orange County Drainage Area Management Plan (DAMP) and the intent of the non-point source NPDES Permit for Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the incorporated Cities of Orange County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement and amend the WQMP. An appropriate number of approved and signed copies of this document shall be available on the subject site in perpetuity.

OWNERS: Virginia Richards Revocable Intervivos Trust & The Travis Ranch Trusts			
Contact Name:	Larry Netherton		
Title:	Regional Manager		
Company:	North County BRS Project, LLC		
Address:	3 Corporate Plaza, Suite 102 Newport Beach, CA 92660		
Email:	lnetherton@sagecommunity.com		
Telephone #:	(949) 644-3514, ext. 24		
I understand my responsibility to implement the provisions of this WQMP including the ongoing operation and maintenance of the best management practices (BMPs) described herein.			
Owner Signature:		**Date:**	10-1-15

PREPARER (ENGINEER): Puneet Comar			
Title:	Senior Project Manager	**PE Registration #:**	C73065
Company:	Fuscoe Engineering, Inc.		
Address:	16795 Von Karman Suite 100, Irvine, CA 92606		
Email:	pcomar@fuscoe.com		
Telephone #:	949.474.1960		
I hereby certify that this Water Quality Management Plan is in compliance with, and meets the requirements set forth in, Order No. R8-2009-0030/NPDES No. CAS618030, of the Santa Ana Regional Water Quality Control Board.			
Preparer Signature:		**Date:**	10-1-15
Place Stamp Here:			

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APPENDICES

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Appendix C ..... Educational Materials (Reserved for Preliminary/Final WQMP)
Appendix D ..... BMP Maintenance Supplement / O&M Plan
Appendix E ..... Conditions of Approval (Reserved for Final WQMP)
Appendix F ..... Infiltration Test Results (Reserved for Preliminary/Final WQMP)

EXHIBITS & BMP DETAILS (INCLUDED IN SECTION VI)

- Vicinity Map
- Planning Area 1 (South Site) BMP Plan (Figure 1-1)
- Planning Area 2 (North Site) BMP Plan (Figure 1-2)
- Existing Hydromodification Exhibit – Planning Area 1
- Proposed Hydromodification Exhibit – Planning Area 1
- Existing Hydromodification Exhibit – Planning Area 2
- Proposed Hydromodification Exhibit – Planning Area 2
- Infiltration Basin Fact Sheet (INF-1)
- Bioretention with Underdrain (BIO-1)
- Modular Wetland Systems

SECTION I DISCRETIONARY PERMITS AND WATER QUALITY CONDITIONS

PROJECT INFORMATION			
Permit/Application No.:	PA10-0004	**Grading or Building Permit No.:**	TBD
Address of Project Site (or Tract Map and Lot Number if no address) and APN:	TRACT 17341, Yorba Linda, CA APN: 351-031-05 & 351-031-17		
WATER QUALITY CONDITIONS OF APPROVAL OR ISSUANCE			
Discretionary Permit(s):	TTM 17341		
Water Quality Conditions of Approval or Issuance applied to this project: **(Please list verbatim.)**	Pending – to be provided in Final WQMP		
CONCEPTUAL WQMP			
Was a Conceptual Water Quality Management Plan previously approved for this project?	No. This report is the initial WQMP for the site.		
WATERSHED-BASED PLAN CONDITIONS			
Applicable conditions from watershed - based plans including WIHMPs and TMDLs:	There are no TMDLs within the drainage watershed of the subject property.		

SECTION II PROJECT DESCRIPTION

II.1 PROJECT DESCRIPTION

The proposed Tract No. 17341 project site encompasses approximately 83.96 acres located in unincorporated Orange County. The project site is bounded by Dorinda Road and Aspen Way to the west; and Via Del Agua and Stonehaven Drive to the south. A Vicinity Map is included in Section VI.

Under existing conditions, the project site is vacant, with the exception of several operational and abandoned oil wells and various dirt access roads and trails that traverse the site. The project site has been subject to a mineral lease for oil production as part of the Esperanza Oil Field. Oil production facilities within the project site include five operational wells, one abandoned well, one idle well and tank batteries, unimproved oil field service roads, and unimproved drill pad sites scattered throughout the site. Contamination at the site of the oilfield production is minor and consistent with other such sites in a typical oilfield setting. A Southern California Gas Company easement of approximately 100 feet in width crosses the northwesterly edge of the project site. Also, a Metropolitan Water District (MWD) easement is located at the southern boundary within the project site. Adjacent land uses include residential properties to the west and south of the site.

The table below summarizes the proposed project.

DESCRIPTION OF PROPOSED PROJECT	
Development Category (Model WQMP, Table 7.11-2; or 7.11-3):	1. New development projects that create 10,000 square feet or more of impervious surface. This category includes commercial, industrial, residential housing subdivisions, mixed-use, and public projects on private or public property that falls under the planning and building authority or the Permittees. 4. Hillside development greater than 5,000 square feet. Hillside development is defined as any development which is located in an area with known erosive soil conditions or where the natural slope is twenty-five percent or greater.
Project Area (ft^2):	3,657,297.6 ft^2 (83.96 acres)
# of Dwelling Units:	112 Single-Family Residential Lots
SIC Code:	N/A – Residential Site

DESCRIPTION OF PROPOSED PROJECT				
Narrative Project Description:	The Project proposes to develop a maximum of 112 single-family dwellings and associated infrastructure within two Planning Areas. Planning Area 1, located in the southerly portion of the site, would include 95 residences within 41.3 gross acres with access provided from Via Del Agua along the south of the site. Planning Area 2, located in the northwesterly part of the site, would include 17 residences within 6.4 gross acres with access provided from Aspen Way to the west.			
Project Area:	**Pervious Area**	**Pervious Area Percentage**	**Impervious Area**	**Impervious Area Percentage**
Pre-Project Conditions:	83.96 ac	100%	0 ac	0%
Post-Project Conditions:	55.47 ac	66%	28.49 ac	34%

DESCRIPTION OF PROPOSED PROJECT	
Drainage Patterns/ Connections:	Under existing conditions, natural runoff from the undeveloped site area flows in a westerly direction towards three receiving storm drain systems located at Stonehaven Drive to the south, Dorinda Road to the southwest and San Antonio Road to the west of the project site. These are the three points of outlet within the project site. The proposed Planning Area 1 and Planning Area 2 sites are designed as stand-alone development areas. Each site has a different access point, independent utility connection points and downstream drainage connection points. Under proposed conditions, the Project will generally maintain existing natural drainage patterns, drainage facilities will be designed so discharging flows to the downstream facilities will be equal or less then conditions that exist prior to development or the hydraulic capacity of the existing system. Similar to existing conditions, drainage from the southern portion of the site (Planning Area 1) will join the existing 8-foot x 7-foot box culvert within Stonehaven Drive, which under existing conditions is functioning adequately during a 100-year storm event. Existing offsite runoff from the east will be intercepted by a proposed headwall at the end of the proposed "B" Street. Flows will be conveyed via storm drain, ultimately joining into said existing 8-foot x 7-foot box culvert. A portion of Planning Area 1 drains offsite toward the westerly property line and then in a southerly direction offsite toward an existing City of Yorba Linda maintained 36-inch storm drain line at Dorinda Road. Drainage from the northern portion of the site (Planning Area 2) will be directed towards the site's western boundary at a confluence of existing drainages just south of Aspen Way. Existing offsite flows from the north are intercepted by a headwall located north of Aspen Way and passed through the site. Existing offsite flows from the northeast will be intercepted by a proposed headwall located at the northern end of proposed "F" Street. These flows will be conveyed via storm drain through the site in a southerly direction, draining to a natural existing flow path south of Planning Area 2 and ultimately off-site.

PROJECT FEATURES	
Building Summary:	The range of proposed residential lot sizes on the TTM is from approximately 0.17 acres to approximately 0.77 acres. Home sizes have not yet been established but are expected to range from 2,200 SF to 3,200 SF, with an average footprint of 1,800 SF. A maximum of 112-single family detached residential units are proposed.

PROJECT FEATURES	
Amenities:	There are no amenities such as open space parks, tot lots, sports facilities, or recreation centers currently proposed for the project site.
Landscaped Areas:	The project site will include landscaping in the form of planters and gardens around the proposed residences, along the proposed private drive, and along the slopes/open space areas on-site. It is estimated that approximately 66% of the 83.96-acre site will consist of landscaping.
Parking Facilities:	On-site street parking will be provided in Planning Area 1 along Streets "B", "C", "D" and "E". On-site street parking will be provided in Planning Area 2 along Street "F".
Other Project Features:	The site is not anticipated to have any trash enclosures, below-grade loading docks, outdoor storage areas, community car wash racks, equipment wash areas, or commercial kitchens or other food preparation areas associated with food service establishments. Trash will be managed privately within each of the residential lots via individual receptacles.
Outdoor Activities:	Outdoor areas throughout the site will be used for recreational purposes. All other outdoor areas will be used for walkways, common areas and landscaping. No outdoor storage areas are proposed.
Materials Stored:	Materials used and stored on site will include those associated with residential land uses, such as normal cleaning supplies and maintenance materials. Materials will be stored totally within the buildings, and no outdoor storage areas are proposed.
Wastes Generated:	Wastes anticipated to be generated include those associated with residential land uses, including trash & debris, and landscape maintenance wastes. Any waste generated from maintenance activities will be disposed of properly. Wash water and other waste from maintenance activities is not to be discharged or disposed of into the storm drain system. Clippings from landscape maintenance (i.e. prunings) will be collected and disposed of properly off-site, and will not be washed into the streets, local area drains/conveyances, or catch basin inlets.

II.2 POTENTIAL STORM WATER POLLUTANTS

The table below, derived from Table 2 of the Countywide Model WQMP Technical Guidance Document (May 2011), summarizes the categories of land use or project features of concern and the general pollutant categories associated with them.

ANTICIPATED & POTENTIAL POLLUTANTS GENERATED BY LAND USE TYPE								
Priority Project Categories and/or Project Features	General Pollutant Categories							
	Suspended Solid/ Sediments	Nutrients	Heavy Metals	Pathogens (Bacteria/ Virus)	Pesticides	Oil & Grease	Toxic Organic Compounds	Trash & Debris
Detached Residential Development	E	E	N	E	E	E	N	E
Attached Residential Development	E	E	N	E	E	E(2)	N	E
Hillside Development >5,000 ft^2	E	E	N	E	E	E	N	E
Streets, Highways, & Freeways	E	E(1)	E	E(4)	E(1)	E	E	E

Notes:
E = expected to be of concern N = not expected to be of concern
(1) Expected pollutant if landscaping exists on-site, otherwise not expected.
(2) Expected pollutant if the project includes uncovered parking areas, otherwise not expected.
(3) Expected pollutant if land use involves food or animal waste products, otherwise not expected.
(4) Bacterial indicators are routinely detected in pavement runoff.
(5) Expected if outdoor storage or metal roofs, otherwise not expected.
Source: County of Orange. (2011, May 19). Technical Guidance Document for the Preparation of Conceptual/ Preliminary and/or Project Water Quality Management Plans (WQMPs). Table 2.1.

Priority Project Categories and/or Features: Detached Residential Development

POLLUTANTS OF CONCERN		
Pollutant	E = Expected to be of concern N =Not Expected to be of concern	Additional Information and Comments
Suspended Solid/ Sediment	E	
Nutrients	E	
Heavy Metals	N	
Pathogens (Bacteria/Virus)	E	Santa Ana River Reach 2 is 2012 303(d) listed for indicator bacteria impairment.
Pesticides	E	
Oil & Grease	E	
Toxic Organic Compounds	N	

POLLUTANTS OF CONCERN		
Pollutant	**E = Expected to be of concern N =Not Expected to be of concern**	**Additional Information and Comments**
Trash & Debris	E	

Due to Santa Ana River Reach 2 being 303(d) listed for indicator bacteria, the project's primary pollutant of concern is pathogens. Selected LID BMPs must consider and demonstrate pollutant removal effectiveness for bacteria.

II.3 HYDROLOGIC CONDITIONS OF CONCERN

The purpose of this section is to identify any hydrologic conditions of concern (HCOC) with respect to downstream flooding, erosion potential of natural channels downstream, impacts of increased flows on natural habitat, etc. As specified in Section 2.3.3 of the 2011 Model WQMP, projects must identify and mitigate any HCOCs. A HCOC is a combination of upland hydrologic conditions and stream biological and physical conditions that presents a condition of concern for physical and/or biological degradation of streams.

In the North Orange County permit area, HCOCs are considered to exist if any streams located downstream from the project are determined to be potentially susceptible to hydromodification impacts and either of the following conditions exists:

- Post-development runoff volume for the 2-yr, 24-hr storm exceeds the pre-development runoff volume for the 2-yr, 24-hr storm by more than 5 percent

or

- Time of concentration (Tc) of post-development runoff for the 2-yr, 24-hr storm event exceeds the time of concentration of the pre-development condition for the 2-yr, 24-hr storm event by more than 5 percent.

If these conditions do not exist or streams are not potentially susceptible to hydromodification impacts, an HCOC does not exist and hydromodification does not need to be considered further. In the North Orange County permit area, downstream channels are considered not susceptible to hydromodification, and therefore do not have the potential for a HCOC, if all downstream conveyance channels that will receive runoff from the project are engineered, hardened, and regularly maintained to ensure design flow capacity, and no sensitive habitat areas will be affected.

Is the proposed project potentially susceptible to hydromodification impacts?

☒ **Yes** ☐ **No (show map)**

Based on the 2011 Technical Guidance Document (TGD), much of Planning Area 1 (South Site) is located in an areas identified as "potential areas of erosion, habitat, & physical structure

susceptibility." Therefore the entire Planning Area 1 portion of the site will be considered potentially susceptible to hydromodification within the Santa Ana River Watershed (Figure XVI-3c, see Appendix A). In order to quantify the HCOC potential, the 2-year, 24-hour storm was evaluated for the existing and proposed conditions for the project.

The following Table II.3-1 and Table II.3-2 compare and identify the differences between the unmitigated Pre-development versus Proposed conditions for Planning Area 1. Table II.3-1 shows impact within the limits of development for portions that are tributary to the existing offsite 8'x7' RCB. Table II.3-2 shows the impact with the limits of development for portions that are draining offsite towards the existing 36" RCP.

Table II.3-1

PLANNING AREA 1 (8x7 RCB) - UNMITIGATED 2-YEAR, 24-HOUR STORM SUMMARY				
Condition	**Acreage**	**Tc (Lag Time)**	**Peak Runoff**	**Volume**
Pre-development	21.6 ac	5.9 min	26.93 cfs	0.80 ac-ft
Proposed	31.8 ac	2.9 min	42.14 cfs	2.56 ac-ft
Difference	**10.2 ac**	**–3.0 min**	**+15.21 cfs**	**+1.76 ac-ft**
% Change	**47%**	**-51%**	**+56%**	**+219%**

Table II.3-2

PLANNING AREA 1 (36" RCP) - UNMITIGATED 2-YEAR, 24-HOUR STORM SUMMARY				
Condition	**Acreage**	**Tc (Lag Time)**	**Peak Runoff**	**Volume**
Pre-development	12.5 ac	2.9 min	15.50 cfs	0.48 ac-ft
Proposed	2.3 ac	2.6 min	2.76 cfs	0.09 ac-ft
Difference	**-10.2 ac**	**–0.3 min**	**-12.74 cfs**	**-0.39 ac-ft**
% Change	**-82%**	**–10%**	**-82%**	**-81%**

The results indicate that for portions tributary to the 8'x7' RCB the 2-year time of concentration (Tc) decreases by 51%, the peak runoff increases by 56% and the volume increases by 219% as compared to the existing conditions. Due to the existing soil constraints (see Section III.2), infiltration of the increase in volume is not feasible, and reuse demands are not sufficient to draw down the volume within 48 hours. The 2011 Model WQMP (Section 7.II-2.4.2.2) and the 4th Term MS4 Permit, identifies the following criteria:

> "Where the Project WQMP documents that excess runoff volume from the two-year runoff event cannot feasibly be retained and where in-stream controls cannot be used to otherwise mitigate HCOCs, the project shall implement on-site or regional hydromodification controls to:
>
> - Retain the excess volume from the two-year runoff event to the MEP

- Implement on-site or regional hydromodification controls such that the post-development runoff two-year peak flow rate is no greater than 110 percent of the predevelopment runoff two-year peak flow rate."

The proposed project's will meet the above "110 percent" threshold by utilizing a split-flow structure proposed along storm drain Line "B" in "B" Street adjacent to Lot 8 that will bifurcate 12.74 cfs from the storm drain system and convey this flow rate southwesterly toward the offsite 36" RCP line. This mitigated condition will ensure that peak runoff conditions for 2-year 24-hour storm events at both points of discharge is no greater than 110 percent of predevelopment conditions, as summarized in the below tables 11.3-3 and 11.3-4.

Table II.3-3

PLANNING AREA 1 (8x7 RCB) - MITIGATED 2-YEAR, 24-HOUR STORM SUMMARY				
Condition	**Acreage**	**Tc (Lag Time)**	**Peak Runoff**	**Volume**
Pre-development	21.6 ac	5.9 min	26.93 cfs	0.80 ac-ft
Proposed	31.8 ac	2.9 min	29.40 cfs	2.56 ac-ft
Difference	**10.2 ac**	**–3.0 min**	**+2.47 cfs** (1)	**Mitigated** (2)
% Change	**47%**	**-51%**	**+9%**	**N/A**

Notes:

1. 12.74 cfs will be bifurcated from storm drain Line "B" in "B" Street adjacent to Lot 8 as labelled on Planning Area 1 BMP Plan (Figure 1-1) and conveyed toward the offsite 36" RCP to mitigate the required HCOC.
2. Retention for the project is not feasible, volume detention will be provided in retention water quality features

Table II.3-4

PLANNING AREA 1 (36" RCP) - MITIGATED 2-YEAR, 24-HOUR STORM SUMMARY				
Condition	**Acreage**	**Tc (Lag Time)**	**Peak Runoff**	**Volume**
Pre-development	12.5 ac	2.9 min	15.50 cfs	0.48 ac-ft
Proposed	2.3 ac	2.6 min	15.50 cfs	0.09 ac-ft
Difference	**-10.2 ac**	**–0.3 min**	**0.0 cfs** (1)	**Mitigated** (2)
% Change	**-82%**	**–10%**	**0%**	**N/A**

Notes:

1. 12.74 cfs will be bifurcated from storm drain Line "B" as described in Table II.3-3.
2. Retention for the project is not feasible, volume detention will be provided in retention water quality features

The above tables indicate that flows tributary to the 8'x7' RCB will be reduced by the proposed split-flow structure thus allowing for only a 9% increase in a 2-year 24-hour storm condition, which meets the County's requirements.

Based on the 2011 Technical Guidance Document (TGD), Planning Area 2 (North Site) of the project site is located in an areas identified as "potential areas of erosion, habitat, & physical structure

susceptibility" and therefore is susceptible to hydromodification within the Santa Ana River Watershed (Figure XVI-3c, see Appendix A).

Table II.3-5

PLANNING AREA 2 – UNMITIGATED 2-YEAR, 24-HOUR STORM SUMMARY				
Condition	**Acreage**	**Tc**	**Peak Runoff**	**Volume**
Pre-development	8.1	18.3 min	6.0 cfs	0.24 ac-ft
Proposed	8.1	10.9 min	9.4 cfs	0.66 ac-ft
Difference	**0**	**-7.4 min**	**3.4 cfs**	**0.42 ac-ft**
% Change		**40.4%**	**57.0%**	**174.0%**

The results indicate the 2-year time of concentration (Tc) decreases by 40.4% and the volume increases by 174.0% as compared to the existing conditions. Therefore, Planning Area 2 will need to retain the 2-year volume difference to effectively mitigate hydrologic conditions of concern.

An infiltration basin has been proposed within Lot E in order to accommodate the hydromodification requirements described above (see BMP INF-1 in Section VI of this report). Routing the 2-year 24 hour storm event through this system will reduce peak flow volumetric flow to comply with the hydromodification requirements and allowable discharge provisions. A summary table is provided below and hydrology calculations are provided in Appendix A.1 and A.2.

Table II.3-6

PLANNING AREA 2 - MITIGATED 2-YEAR, 24-HOUR STORM SUMMARY				
Condition	**Acreage**	**Tc**	**Peak Runoff**	**Volume**
Existing	8.1 ac	18.3 min	6.0 cfs	0.24 ac-ft
Proposed Mitigated	8.1 ac	10.9 min	6.0 cfs	0.66 ac-ft
Difference	**0**	**–7.4 min**	**0.0 cfs** (1)	**Mitigated** (1)
% Change		**40.4%**	**0%**	**N/A**

Notes:

3. A volume of 18,300 ft^3 provided by an infiltration basin within Lot E will mitigate the required HCOC. Basin routing calculations provided in the Preliminary WQMP as applicable.

The above table summarized the hydraulic calculations that have been performed to mitigate the proposed condition to meet the 4th Term MS4 Permit's and 2011 Model WQMP's Hydromodification requirements. The above table indicates that the proposed infiltration basin within Lot E will reduce the peak flow runoff of a 2-year 24 hour storm event as well as infiltrate the 0.42 acre-ft (18,300 ft^3) of runoff when compared to the peak flow runoff of the existing condition. Moreover, the hydromod mitigation volume is greater than the DCV of 9,109 ft^3 for Planning Area 2 (see Section IV). Therefore, implementing the proposed infiltration basin within Lot E will, in turn, satisfy LID performance capture volume requirements for Planning Area 2.

II.4 POST DEVELOPMENT DRAINAGE CHARACTERISTICS

Under proposed conditions for the North Site (Planning Area 2), new on-site area drains and terrace drains will be constructed to intercept offsite adjacent hillside runoff and convey the flows to a proposed storm drain in "F" Street. On-site runoff will be directed toward "F" Street and intercepted by proposed catch basins in "F" Street. The proposed "F" Street storm drain will divert the necessary amount of flows into a detention basin for water quality purposes. Existing offsite flows from the north is intercepted by a headwall located north of Aspen Way. Existing offsite flows from the northeast will be intercepted by a proposed headwall located at the northern end of proposed "F" Street. These flows will be conveyed via storm drain through the site in a southerly direction, draining to a natural existing flow path south of Planning Area 2 and ultimately off-site.

Under proposed conditions for the South Site (Planning Area 1), new on-site area drains and terrace drains will be constructed to intercept offsite adjacent hillside runoff that is directed on-site. On-site runoff will be directed toward proposed catch basins throughout the site. The proposed storm drain system generally flows in a southerly direction connecting offsite to the existing 8'x7' RCB in Via Del Agua/Stonehaven Drive. Offsite Existing offsite flows from the east Wire Springs Canyon (a.k.a. Blue Mud Canyon) will be intercepted by a debris basin and inlet that connects to a proposed bypass storm drain system that will direct the flows within the proposed streets toward the existing 8'x7' RCB in Via Del Agua/Stonehaven Drive. The westerly graded/landscaped slopes combines with the offsite tributary runoff and is directed south along the tract boundary toward the existing 36" storm drain system in Dorinda Road.

II.5 PROPERTY OWNERSHIP/MANAGEMENT

PROPERTY OWNERSHIP/MANAGEMENT	
Public Streets:	County of Orange
Private Streets:	North County BRS Project, LLC
Landscaped Areas:	North County BRS Project, LLC
Open Space:	North County BRS Project, LLC
Easements:	County of Orange, Southern California Edison, Metropolitan Water District
Parks:	N/A
Buildings:	North County BRS Project, LLC
Structural BMPs:	North County BRS Project, LLC

A Home Owners Association (HOA) will be formed upon project completion. The HOA will be responsible for inspecting and maintaining all BMPs prescribed for Cielo Vista. Until a HOA is formally established, North County BRS Project, LLC shall assume all BMP maintenance and inspection responsibilities for the proposed project. Inspection and maintenance responsibilities are outlined in Section V of this report.

SECTION III SITE DESCRIPTION

III.1 PHYSICAL SETTING

Planning Area/ Community Name:	Tract 17341
Address:	Via Del Agua at Stonehaven
Project Area Description:	Located north of Via Del Agua at Stonehaven Drive and east of Aspen Way in unincorporated Orange County (adjacent to Yorba Lida).
Land Use:	Suburban Residential – 1B
Zoning:	A1(0) – General Agricultural with Oil Production Overlay
Acreage:	83.96 Acres
Predominant Soil Type:	Soil Types C & D
Impervious Conditions:	Existing Impervious: 0% (100% Pervious) Proposed Impervious: 34% (66% Pervious)

III.2 SITE CHARACTERISTICS

Precipitation Zone:	0.90
Topography:	The existing site consists of rolling terrain that directs runoff in valley and creeks that slope southwesterly at slopes varying from 2% to areas as steep as 1.5:1. The project site is characterized by steep sloping hillsides vegetated by scrub and chaparral. Elevations range from approximately 560 feet above mean sea level (MSL) in the southern portions of the project site, to approximately 885 feet above MSL at the highest point in the northern portions of the project site. A westerly draining canyon of approximately 100 to 200 feet in depth bisects the project site. Side slopes within this canyon vary from 1.5:1 to 2:1 with locally steeper and flatter elements.

Drainage Patterns/ Connections:	The North Site runoff consists of three parts. The first part, offsite runoff from the Northwest Subarea "D" (Creek "D", which also includes tributary runoff from residential Tract 9813 [(1)]) will be conveyed through a storm drain between Lot 96 and Lot 97, then underneath the extended Aspen Way, before it outlets just upstream of Confluence BCD. The second part, runoff from the East Subarea "C" (Creek "C") is intercepted via debris basin/inlets along the toe of the landscaped slope adjacent to lots 101 through 112. The runoff is then directed southerly via a combination storm drain and above ground channel that outlets upstream of Confluence BCD. The third part consists of the North Site improvements that directs all runoff to the single retention basin. The fully mitigated runoff leaving the retention Basin outlets upstream of Confluence BCD. No improvements are proposed within Subarea "B" (Creek "B"). As a result, all drainage generated in Subarea "B" continues to Confluence BCD and is not affected by the proposed improvements. The South Site runoff consists of two parts: The first part, the westerly landscaped slope combines with offsite area and is directed southerly along the tract boundary. All runoff will settle in the proposed rip rap pad prior to leaving the tract boundary, ultimately draining toward the existing offsite 36" RCP at Dorinda Road. The second part, offsite runoff from the east Wire Springs Canyon a.k.a. Blue Mud Canyon, Area "A" (Creek "A") will be intercepted by a debris basin and inlet, and piped via a new 84" Bypass storm drain onsite RCP (exact size to be determined during final engineering) within the proposed streets and connects to the existing 8'x7' RCB storm drain at Via Del Agua/Stonehaven. All runoff generated within the South Site improvements (not including the westerly slope) is collected in onsite inlets and storm drains and is directed toward bioretention basins with the exception of the project entrance road, accounting for 0.5 acres, which is treated by two Modular Wetland Systems prior to discharging into the 84"RCP Bypass Storm drain.

Notes:

1. Previous drainage studies in support of the Project EIR include Tract 9813 within Creek 'D' tributaries and analyses.

Proposed Drainage Patterns/ Connections:	Under proposed conditions for the North Site (Planning Area 2), new on-site area drains and terrace drains will be constructed to intercept offsite adjacent hillside runoff and convey the flows to a proposed storm drain in "F" Street. On-site runoff will be directed toward "F" Street and intercepted by proposed catch basins in "F" Street. The proposed "F" Street storm drain will divert the necessary amount of flows into a detention basin for water quality purposes. Existing offsite flows from the north is intercepted by a headwall located north of Aspen Way. Existing offsite flows from the northeast will be intercepted by a proposed headwall located at the northern end of proposed "F" Street. These flows will be conveyed via storm drain through the site in a southerly direction, draining to a natural existing flow path south of Planning Area 2 and ultimately off-site. Under proposed conditions for the South Site (Planning Area 1), new on-site area drains and terrace drains will be constructed to intercept offsite adjacent hillside runoff that is directed on-site. On-site runoff will be directed toward proposed catch basins throughout the site. The proposed storm drain system generally flows in a southerly direction connecting offsite to the existing 8'x7' RCB in Via Del Agua/Stonehaven Drive. Offsite Existing offsite flows from the east Wire Springs Canyon (a.k.a. Blue Mud Canyon) will be intercepted by a debris basin and inlet that connects to a proposed bypass storm drain system that will direct the flows within the proposed streets toward the existing 8'x7' RCB in Via Del Agua/Stonehaven Drive. The westerly graded/landscaped slopes combines with the offsite tributary runoff and is directed south along the tract boundary toward the existing 36" storm drain system in Dorinda Road. Storm flows from the south easterly natural slope behind lots 87-92 will be intercepted prior to entering into the residential pads and conveyed towards the entrance of the project joining directly to the proposed storm drain system.
Soil Type, Geology, and Infiltration Properties:	Preliminary geotechnical studies performed for the project site indicate that a branch of the Whittier Fault Zone traverses the site in a generally northwesterly to southeasterly direction. The geotechnical studies also indicate a potential ancient landslide exists along the primarily northwest facing slope located within the northerly portion of the site. Per figure XVI-2b, the majority of the site is Soil Type D, with pockets of alluvial soil. Infiltration testing will not be performed at this EIR phase of this project's development. Site-specific infiltration rates will be evaluated at a later phase, such as final design. Infiltration feasibility will be documented in the project's future preliminary or final WQMP.

Hydrogeologic (Groundwater) Conditions:	To be determined during the geotechnical investigation.
Geotechnical Conditions (relevant to infiltration):	Per the soils investigation by LGC Geotechnical, stormwater infiltration is only recommended at the water quality basin in Planning Area 2 (the North site). LGC Geotechnical advises against infiltration in Planning Area 1 (the South site) due to existing soils conditions. Therefore, the geotechnical engineer's assessment shall serve as the determination for infiltration feasibility for this EIR phase. Percolation rate testing will not occur at this time.
Off-Site Drainage:	Under existing conditions, runoff from undeveloped properties to the west of the site drains onto the property.
Utility and Infrastructure Information:	There are several easements on the project site for utilities (Southern California Edison, Yorba Linda Water District and Metropolitan Water District) for ingress/egress and other public utility maintenance purposes. Refer to the WQMP Exhibit in Section VI for the location of the easement on the project site.

III.3 WATERSHED DESCRIPTION

Receiving Waters:	Santa Ana River – Reach 2
303(d) Listed Impairments:	Unknown Toxicity and Indicator Bacteria (2010 303d list)
Applicable TMDLs:	No downstream TMDL's for the project.
Pollutants of Concern for the Project:	Suspended Soils/Sediment, Nutrients, Heavy Metals, Pathogens (Bacteria/Virus), Pesticides, Oil & Grease, Toxic Organic Compounds, Trash & Debris
Hydrologic Conditions of Concern (HCOCs):	The project site is located in an areas identified as "potential areas of erosion, habitat, & physical structure susceptibility and therefore is susceptible to hydromodification.
Environmentally Sensitive and Special Biological Significant Areas:	There are no Environmentally Sensitive Areas (ESAs) or Areas of Special Biological Significance (ASBS) within the project site or within the project's vicinity.

SECTION IV BEST MANAGEMENT PRACTICES (BMPs)

IV.1 PROJECT PERFORMANCE CRITERIA

Is there an approved WIHMP or equivalent for the project area that includes more stringent LID feasibility criteria or if there are opportunities identified for implementing LID on regional or sub-regional basis?

☐ Yes ☒ No

PROJECT PERFORMANCE CRITERIA	
Hydromodification Control Performance Criteria: **(Model WQMP Section 7.II-2.4.2.2)**	If a hydrologic condition of concern (HCOC) exists, priority projects shall implement onsite or regional hydromodification controls such that: ▪ Post-development runoff volume for the two-year frequency storm does not exceed that of the predevelopment condition by more than five percent, and ▪ Time of concentration of post-development runoff for the two-year storm event is not less than that for the predevelopment condition by more than five percent. Where the Project WQMP documents that excess runoff volume from the two-year runoff event cannot feasibly be retained and where in-stream controls cannot be used to otherwise mitigate HCOCs, the project shall implement on-site or regional hydromodification controls to: ▪ Retain the excess volume from the two-year runoff event to the MEP, and ▪ Implement on-site or regional hydromodification controls such that the post-development runoff two-year peak flow rate is no greater than 110 percent of the predevelopment runoff two-year peak flow rate.
LID Performance Criteria: **(Model WQMP Section 7.II-2.4.3)**	Infiltrate, harvest and use, evapotranspire, or biotreat/biofilter, the 85th percentile, 24-hour storm event (Design Capture Volume). LID BMPs must be designed to retain, on-site, (infiltrate, harvest and use, or evapotranspire) storm water runoff up to 80 percent average annual capture efficiency.
Treatment Control BMP Performance Criteria: **(Model WQMP Section 7.II-3.2.2)**	If it is not feasible to meet LID performance criteria through retention and/or biotreatment provided on-site or at a sub-regional/regional scale, then treatment control BMPs shall be provided on-site or offsite prior to discharge to waters of the US. Sizing of treatment control BMP(s) shall be based on either the unmet volume after claiming applicable water quality credits, if appropriate.

PROJECT PERFORMANCE CRITERIA	
LID Design Storm Capture Volume:	DCV = C × d × A × 43560 sf/ac × 1/12 in/ft Where: DCV = design storm capture volume, cu-ft C = runoff coefficient = (0.75 × imp + 0.15) Imp = impervious fraction of drainage area (ranges from 0 to 1) d = storm depth (inches) A = tributary area (acres) to water quality BMP <u>Planning Area 1 (On-Site):</u> Imp = 39.4% d = 0.9 inches A = 29.78 acres *DCV* = *(0.75 x .394 +0.15) x 0.9 inches x 29.78 ac x 43560 sf/ac x 1/12 in/ft* = **43,364 ft^3** <u>Planning Area 2 (B2):</u> Imp = 40.0% d = 0.9 inches A = 6.20 acres *DCV* = *(0.75 x .40 +0.15) x 0.9 inches x 6.20 ac x 43560 sf/ac x 1/12 in/ft* = **9,109 ft^3** (mitigated by Lot E hydromodification BMP) *Refer to Section IV.2.2 for specific Drainage Manage Area (DMA) breakdown and Appendix A for detailed calculations (Worksheet B).*

IV.2 SITE DESIGN AND DRAINAGE PLAN

The following section describes the site design BMPs used in this project and the methods used to incorporate them. Careful consideration of site design is a critical first step in storm water pollution prevention from new developments and redevelopments.

IV.2.1 Site Design BMPs

Minimize Impervious Area

Though the project will increase impervious surfaces as compared to the existing conditions, landscaping will be provided throughout the site surrounding the future residences and along the re-

graded slopes. In addition, runoff from the proposed impervious surfaces will drain to landscaped bioretention features and systems.

Maximize Natural Infiltration Capacity

Based on existing soils characteristics, infiltration is not recommended in Planning Area 1.

The proposed retention basin in Lot E in Planning Area 2 is designed to allow for infiltration.

Preserve Existing Drainage Patterns and Time of Concentration

Runoff from the site will continue to flow similar to existing conditions.

Disconnect Impervious Areas

Landscaping will be provided throughout the site, including on the re-graded slopes, surrounding the proposed residences and adjacent to sidewalks/walkways.

Protect Existing Vegetation and Sensitive Areas, and Revegetate Disturbed Areas

There are no existing vegetated or sensitive areas to preserve on the project site. All disturbed areas will either be paved or landscaped.

Xeriscape Landscaping

Native and/or tolerant landscaping will be incorporated into the site design consistent with County guidelines.

IV.2.2 Drainage Management Areas

In accordance with the MS4 permit and the 2011 Model WQMP, the project site has been divided into Drainage Management Areas (DMAs) to be utilized for defining drainage areas and sizing LID and other treatment control BMPs. DMAs have been delineated based on the proposed site grading patterns, drainage patterns, storm drain and catch basin locations.

The design capture volumes (DCV) and treatment flow rates (Q_{Design}) for each DMA are summarized in the table below. These have been derived utilizing the "Simple Method" in accordance with the TGD Section III.1.1. Actual BMP sizing requirements, including 80 percent capture design volumes, flow rates, depths, and other design details for the specific BMPs proposed are provided in Sections IV.3.1 and IV.3.4 below. Locations of DMAs and associated LID and treatment BMPs are identified on the exhibits in Section VI. Additional calculations and TGD Worksheets are provided in Appendix A.

DRAINAGE MANAGEMENT AREAS (DMAs) – PA 1							
DMA/ Drainage Area ID(1)	Tributary Drainage Area (ft^2)	Tributary Drainage Area (ac)	% Imp.	Design Storm Depth(2) (in)	Estimated Tc (min)	Rainfall Intensity(3) (in/hr)	Simple Method DCV(4) (ft^3)
A1 Residential	407,247.47	9.35	40%	0.9	5	0.26	13,745

DRAINAGE MANAGEMENT AREAS (DMAs) – PA 1							
DMA/ Drainage Area ID(1)	Tributary Drainage Area (ft^2)	Tributary Drainage Area (ac)	% Imp.	Design Storm Depth(2) (in)	Estimated Tc (min)	Rainfall Intensity(3) (in/hr)	Simple Method DCV(4) (ft^3)
A2 Offsite Slope	98,563	2.26	5%	0.9	5	0.26	1,386
A3 Residential	202,883	4.66	40%	0.9	5	0.26	6,847
A4 Residential	258,715	5.94	31%	0.9	5	0.26	7,422
A5 Residential	262,996	6.04	46%	0.9	5	0.26	9,764
A6 Offsite Slope	14,329	0.33	5%	0.9	5	0.26	202
A7 Residential	70,140	1.61	40%	0.9	5	0.26	2,367
A8 Residential	95,390	2.19	40%	0.9	5	0.26	3,219
A9 Dwy Entrance	20,125	0.46	90%	0.9	5	0.26	1,245
A10 Offsite Slope	54,534	1.25	5%	0.9	5	0.26	767
Total On-Site	1,297,372	29.78	39.4%	0.9	5	0.26	43,364
Overall Site	1,484,931	34.09	36.2%	0.9	5	0.26	46,968

Notes:
1. Refer to exhibits in Section VI for locations of each DMA.
2. Per Figure XVI-1 of the Technical Guidance Document, dated December 20, 2013. See also Appendix A.
3. Per Figure III.4 of the Technical Guidance Document, dated December 20, 2013. See also Appendix A.
4. Per Section III.1.1 of the Technical Guidance Document.
5. Per Section III.3.3 and Worksheet D of the Technical Guidance Document.

DMAs A2, A6 and A10 are slope areas that are considered off-site and do not drain onto the proposed project site. These slopes will be planted with native landscaping and will only be irrigated for vegetation establishment. Once the slopes stabilized and established, they are considered returned to their natural condition similar to the surrounding natural terrain. These areas are not considered land development areas that require water quality treatment. As illustrated in the table above, DMAs A2, A6, A10 comprise approximately 2,355 ft^3 or 5% of the DCV for the overall site.

DRAINAGE MANAGEMENT AREAS (DMAs) – PA 2							
DMA/ Drainage Area ID(1)	Tributary Drainage Area (ft^2)	Tributary Drainage Area (ac)	% Imp.	Design Storm Depth(2) (in)	Estimated Tc (min)	Rainfall Intensity(3) (in/hr)	Simple Method DCV(4) (ft^3)
B1 Offsite Slope	24,285	0.56	5%	0.9	5	0.26	342

DRAINAGE MANAGEMENT AREAS (DMAs) – PA 2							
DMA/ Drainage Area ID(1)	Tributary Drainage Area (ft^2)	Tributary Drainage Area (ac)	% Imp.	Design Storm Depth(2) (in)	Estimated Tc (min)	Rainfall Intensity(3) (in/hr)	Simple Method DCV(4) (ft^3)
B2 Residential	269,898	6.20	40%	0.9	5	0.26	9,109
B3 Offsite Slope	9,181	0.21	5%	0.9	5	0.26	129
B4 Offsite Slope	32,149	0.74	5%	0.9	5	0.26	452
B5 Offsite Slope	24,683	0.57	5%	0.9	5	0.26	347
Total @ P.L. for PA - 2	360,197	8.27	31.23%	0.9	5	0.26	10,379

Notes:
1. Refer to exhibits in Section VI for locations of each DMA.
2. Per Figure XVI-1 of the Technical Guidance Document, dated December 20, 2013. See also Appendix A.
3. Per Figure III.4 of the Technical Guidance Document, dated December 20, 2013. See also Appendix A.
4. Per Section III.1.1 of the Technical Guidance Document.
5. Per Section III.3.3 and Worksheet D of the Technical Guidance Document.

Similar to Planning Area 1, DMAs B1, B3, B4 and B5, these off-site areas are comprised of natural slopes once native vegetation is re-established. The slopes do not drain onto the residential site of Planning Area 2 and, therefore, do not require water quality treatment. As a result, Planning Area 2 DCV is only comprised of DMA B2. And as mentioned in Section II.3, the resultant 9,109.06 ft^3 of runoff will be infiltrated as part of the 18,300 ft^3 of hydromodification mitigation volume required for Planning Area 2. No additional LID BMPs are necessary for the treatment of DCV for Planning Area 2.

IV.3 LID BMP SELECTION AND PROJECT CONFORMANCE ANALYSIS

Low Impact Development (LID) BMPs are required in addition to site design measures and source controls to reduce pollutants in storm water discharges. LID BMPs are engineered facilities that are designed to retain or biotreat runoff on the project site. The 4th Term MS4 Storm Water Permit (Order R8-2009-0030) requires the evaluation and use of LID features using the following hierarchy of treatment: infiltration, evapotranspiration, harvest/reuse, and biotreatment. The following sections summarize the LID BMPs proposed for the project in accordance with the permit hierarchy and performance criteria outlined in Section IV.1.

IV.3.1 Hydrologic Source Controls (HSCs)

Hydrologic source controls (HSCs) can be considered to be a hybrid between site design practices and LID BMPs. HSCs are distinguished from site design BMPs in that they do not reduce the tributary area or reduce the imperviousness of a drainage area; rather they reduce the runoff volume that would result from a drainage area with a given imperviousness compared to what would result if HSCs were not used.

HYDROLOGIC SOURCE CONTROLS		
ID	Name	Included?
HSC-1	Localized on-lot infiltration	☐
HSC-2	Impervious area dispersion (e.g. roof top disconnection)	☐
HSC-3	Street trees (canopy interception)	☐
HSC-4	Residential rain barrels (not actively managed)	☐
HSC-5	Green roofs/Brown roofs	☐
HSC-6	Blue roofs	☐
HSC-7	Impervious area reduction (e.g. permeable pavers, site design)	☐

Due to the projects conceptual design, HSCs have not been incorporated into this Conceptual WQMP. HSCs are final design level BMP features and will be considered at a later phase in the project's development. It is not feasible at this time to consider or quantify HSCs.

IV.3.2 Infiltration BMPs

Infiltration BMPs are LID BMPs that capture, store and infiltrate storm water runoff. These BMPs are engineered to store a specified volume of water and have no design surface discharge (underdrain or outlet structure) until this volume is exceeded. Examples of infiltration BMPs include infiltration trenches, bioretention without underdrains, drywells, permeable pavement, and underground infiltration galleries.

INFILTRATION		
ID	Name	Included?
INF-3 INF-4	Bioretention Without Underdrains	☐
	Rain Gardens	☐
	Porous Landscaping	☐
	Infiltration Planters	☐
	Retention Swales	☐
INF-2	Infiltration Trenches	☐
INF-1	Infiltration Basins	☒
INF-5	Drywells	☐
INF-7	Subsurface Infiltration Galleries	☐

INFILTRATION		
ID	Name	Included?
--	French Drains	☐
INF-6	Permeable Asphalt	☐
	Permeable Concrete	☐
	Permeable Concrete Pavers	☐
	Other:	☐

Infiltration Basins in Planning Area 1 are not feasible. The project soils engineer does not recommend stormwater runoff to percolate, saturate or load the underlying soils due to hillside terrain, liquefaction potential and landslide proximity.

Planning Area 2 will utilize infiltration basins (LID BMP INF-1) in order to capture, store and infiltrate storm water runoff. Basin design and sizing criteria are discussed in Section IV.3.5, since the hydromodification mitigation retention volume of 18,300 ft^3 is greater than the Planning Area 2 DCV of 9,109 ft^3. Since the infiltration basin will be utilized to address both LID and hydomodification control performance criteria, the hydromodification mitigation volume is the controlling design criteria because it is the larger volume.

IV.3.3 Evapotranspiration & Rainwater Harvesting BMPs

Evapotranspiration BMPs are a class of retention BMPs that discharges stored volume predominately to ET, though some infiltration may occur. ET includes both evaporation and transpiration, and ET BMPs may incorporate one or more of these processes. BMPs must be designed to achieve the maximum feasible ET, where required to demonstrate that the maximum amount of water has been retained on-site. Since ET is not the sole process in these BMPs, specific design and sizing criteria have not been developed for ET-based BMPs.

EVAPOTRANSPIRATION		
ID	Name	Included?
--	HSCs, *see Section IV.3.1*	☐
--	Surface-based infiltration BMPs	☒
--	Biotreatment BMPs, see *Section VI.3.4*	☒
	Other:	☐

Both Infiltration and Bioretention BMPs are proposed which utilize evapotranspiration as physical process for runoff volume reduction. Bioretention BMPs are described further in Section IV.3.4.

Harvest and use (aka. Rainwater Harvesting) BMPs are LID BMPs that capture and store storm water runoff for later use. These BMPs are engineered to store a specified volume of water and have no design surface discharge until this volume is exceeded. Harvest and use BMPs include both above-ground and below-ground cisterns. Examples of uses for harvested water include irrigation, toilet and urinal flushing, vehicle washing, evaporative cooling, industrial processes and other non-potable uses.

HARVEST & REUSE / RAINWATER HARVESTING		
ID	**Name**	**Included?**
HU-1	Above-ground cisterns and basins	☐
HU-2	Underground detention	☐
--	Other:	☐

Harvest and reuse is typically evaluated for outdoor irrigation demand and indoor toilet flushing demand. On a conceptual level, single-family detached housing with limited common area landscaping does not lend itself to a centralized harvest and reuse system. All the storm water must be collected at the downstream end of the project site and then pumped back up to each individual house through separate irrigation systems and separate storage systems. Based on the proposed site plan and the proposed grades, such a system is not practicable for single-family detached housing. Such systems are more practicable when there are common areas landscape facilities within a small footprint (i.e. commercial/retail or high density apartments). However, the incorporation of individual rain barrels for each house to collect rainfall and use via passive gravity flow following a rain event should be evaluated. The following evaluation is intended for this type of harvest and re-use system.

In order to quantify harvested water demand for the common areas of the project, the Modified Estimated Applied Water Use (EAWU) method was used, consistent with Appendix X of the Model WQMP's Technical Guidance Document (TGD), dated December 20, 2013.

The Modified EAWU method is modified from the OC Irrigation Code (County Ordinance No. 09-010) to account for the wet season demand and storm events (assuming that no irrigation would be applied for approximately 30% of the days in the wet season).

The equation used to calculate the Modified EAWU is:

$$Modified\ EAWU = \frac{(ETo_{wet} \times K_L \times LA \times 0.015)}{IE}$$

Where:

$Modified\ EAWU$ = estimated daily average water use during wet season
ETo_{wet} = average reference ET from November through April (inches per month) per Table X.2 of the TGD
K_L = landscape coefficient (Table X.4 of the TGD)
LA = landscape area irrigated with harvested water (square feet)
IE = irrigation efficiency (assumed at 90%)

Note: In the equation, the coefficient (0.015) accounts for unit conversions and shut down of irrigation during and for three days following a significant precipitation event.

For a system to be considered "feasible", the system must be designed with a storage volume equal to the DCV from the tributary area and achieve more than 40% capture. The system must also be able to drawdown in 30 days to meet the 40% capture value. In addition, Table X.6 of the Technical Guidance Document sets forth the demand thresholds for minimum partial capture.

TABLE X.6: HARVESTED WATER DEMAND THRESHOLDS FOR MINIMUM PARTIAL CAPTURE	
Design Capture Storm Depth, inches	**Wet Season Demand Required for Minimum Partial Capture, gpd per impervious acre**
0.60	490
0.65	530
0.70	570
0.75	610
0.80	650
0.85	690
0.90	730
0.95	770
1.00	810

Only Planning Area 1 is considered since Planning Area 2 will be treated by an infiltration basin. The following table summarizes the estimated applied water use for the common area landscaping of the project. Landscape type will be conservation, low water use type plants. Furthermore, the off-site slopes that are to remain natural, native landscaping were not accounted for since these slopes will not be irrigated once vegetation has been established. As a result, only DMAs A1, A3, and A4, totaling 27.76 acres are considered in this feasibility assessment for irrigation demand.

ESTIMATED APPLIED WATER USE (EAWU) FOR COMMON AREA LANDSCAPING									
Landscape Type	**Total Area (ac)**	**% Impervious**	**Impervious Tributary (ac)**	**Irrigated LS Area (ac)**	**ETo_{Wet} (1) (in/mo)**	**K_L (2)**	**Modified EAWU (gpd)**	**Modified EAWU per impervious acre (gpd/ac)**	**Minimum Capture Threshold (3) (gpd/ac)**
Conservation	27.76	47%	13.05	14.71	2.93	0.35	10,954	840	730
Design Capture Volume (gal)					**Drawdown (days)**				31.1

ESTIMATED APPLIED WATER USE (EAWU) FOR COMMON AREA LANDSCAPING									
Landscape Type	Total Area (ac)	% Impervious	Impervious Tributary (ac)	Irrigated LS Area (ac)	ETo_{Wet} (1) (in/mo)	K_L (2)	Modified EAWU (gpd)	Modified EAWU per impervious acre (gpd/ac)	Minimum Capture Threshold (3) (gpd/ac)

Notes:
1 Per Table X.2 for Santa Ana Region (similar climate type), Model WQMP Technical Guidance Document, dated December 20, 2013.
2 Per Table X.4 of the Model WQMP Technical Guidance Document, dated December 20, 2013.
3 Per Table X.6 of Model WQMP Technical Guidance Document, dated December 20, 2013.

Based on irrigation demand, the project does not meet minimum partial capture threshold. Though it achieves greater than 40% capture, the system would not be able to drawdown the DCV within 30 days to be feasible.

The proposed project also assessed feasibility for indoor toilet flushing demand but results showed that meeting minimum partial capture threshold was not feasible. Similar to landscaping irrigation demand, these systems are more practicable when there are a high number and density of fixtures within a small footprint (i.e. commercial/retail or high density apartments). The minimum TUTIA for partial capture, according to Table X.7 of the TGD is 110 toilet users/impervious acre for residential use. Based on 112 detached residential units with an average household of 4 persons, Planning Area 1 will have roughly 448 toilet users over 13.05 acres of impervious area. This results in 34.3 toilet users/impervious acre. Planning Area 1 does not meet the partial capture threshold for toilet flushing demand and is, therefore, insufficient for harvest and re-use to be feasible at this EIR phase. See Appendix A for detailed calculations and TGD Worksheets.

IV.3.4 Biotreatment BMPs

Biotreatment BMPs are a broad class of LID BMPs that reduce storm water volume to the maximum extent practicable, treat storm water using a suite of treatment mechanisms characteristic of biologically active systems, and discharge water to the downstream storm drain system or directly to receiving waters. Treatment mechanisms include media filtration (though biologically-active media), vegetative filtration (straining, sedimentation, interception, and stabilization of particles resulting from shallow flow through vegetation), general sorption processes (i.e., absorption, adsorption, ion-exchange, precipitation, surface complexation), biologically-mediated transformations, and other processes to address both suspended and dissolved constituents. Examples of biotreatment BMPs include bioretention with underdrains, vegetated swales, constructed wetlands, and proprietary biotreatment systems.

BIOTREATMENT		
ID	Name	Included?
BIO-1	Bioretention with underdrains	☒
	Storm Water planter boxes with underdrains	☐

BIOTREATMENT		
ID	**Name**	**Included?**
	Rain gardens with underdrains	☐
BIO-5	Constructed wetlands	☐
BIO-2	Vegetated swales	☐
BIO-3	Vegetated filter strips	☐
BIO-7	Proprietary vegetated biotreatment systems	☒
BIO-4	Wet extended detention basin	☐
BIO-6	Dry extended detention basins	☐
--	Other:	☐

Bioretention with Underdrains Biotreatment BMP

Due to the infeasibility of harvest and reuse, Planning Area 1 will incorporate biotreatment LID BMP for on-site water quality treatment. In particular, bioretention with underdrains (BIO-1) are proposed. According to Table 4.2 of the TGD, bioretention has a medium treatment performance rating for treating bacteria, which is the project's primary pollutant of concern. The locations of the bioretention facilities are identified in the WQMP exhibit in Section VI.

Bioretention with underdrains are plant-based biotreatment systems that typically consist of a ponding area, mulch layer, planting soils and plants. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded and sequestered by the soil and plants. Underdrains collect the treated water and return it back into the storm drain system.

Biotreatment BMP Sizing & Design

In accordance with the Model WQMP and TGD, the bioretention/biotreatment BMPs will be sized to treat runoff from the Design Capture Storm (85th percentile, 24-hour). Locations and tributary drainage areas (DMAs) are shown on the exhibits included in Section VI. BMP details and typical cross sections are also included in Section VI. Detailed calculations and associated TGD Worksheets are included in Appendix A. Operation and maintenance details are included in Section V and Appendix B (O&M Plan).

The bioretention with underdrains will each have a ponding depth of 1.5 feet to capture the DCV. They will have an additional 2 feet of media layer where the runoff will filter through. The treated runoff will then flow into an underdrain system and discharged into the storm drain system. High flows will bypass the bioretention treatment into the proposed storm drain, since low flows are bifurcated to the bioretention BMPs. The Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs was used for bioretention sizing. A total surface area of 12,287 ft^2 of bioretention with underdrain is required to treat the DCV for Planning Area 1.

However, due to impending adoption of the (currently) draft 5th Term MS4 Permit for North Orange County, Draft Order No. R8-2015-0001, biotreatment control BMPs must be sized and designed to treat 1.5 times the design capture volume not retained. In this case, Planning Area 1 bioretention facilities will need a total surface area of 18,430 ft^2. The table below summarizes the BMP footprint requirement for Planning Area 1.

BIORETENTION WITH UNDERDRAIN (BIO-1) DESIGN SUMMARY 80% CAPTURE EFFICIENCY METHOD							
DMA(1)	Total Drainage Area (acres)	% Imp.	DCV (ft^3)	80% Adjusted Storm Depth(3) (in)	80% Capture DCV x1.5(4,5) (ft^3)	BMP Surface Area for 1.5 times DCV(5) (ft^2)	BMP Surface Area Provided (ft^2)
A2	N/A Offsite Slope	5%	--	--	--	--	--
A3	4.66	40%	6,847	0.43	4,366	2,910	3,085 (BASIN C)
A4	5.94	31%	7,422	0.43	4,731	3,154	5,120 (BASIN A)
A5	6.04	46%	9,764	0.43	6,225	4,150	5,100 (BASIN B)
A6	N/A Offsite Slope	5%	--	--	--	--	--
A1	9.35	40%	13,745	0.43	8,762	5,841	8,400 (BASIN D)
A7	1.61	40%	2,367	0.43	1,509	1,006	
A8	2.19	40%	3,219	0.43	2,053	1,368	
A10	N/A Offsite Slope	5%	--	--	--	--	--
TOTAL	29.78	39%	43,364	0.43	65,047	18,430	

Notes:
1. Refer to WQMP Exhibit in Section VI for locations of BMPs.
2. Refer to Section IV.2.2 for individual DMA tributary areas.
3. Per Figure III.2 of the TGD.
4. Per Worksheet E, "Determining Capture Efficiency of Volume Based, Constant Drawdown BMP based on Design Volume. Copies are included in Appendix A.
5. Draft 5th Term MS4 Permit requirement (Draft Order No. R8-2015-0001, Section XII.G.7.)

Four bioretention BMPs are proposed for Planning Area 1, designated Basins A, B, C, and D. Together, they comprise approximately 21,705 ft^2 of BMP surface area. Basin A bioretention with

underdrain will be situated between Lots 65 and 66, and will treat DMA A4. Its footprint will be 5,120 ft^2 in size, which is larger than the required 3,154 ft^2. Basin B bioretention will be 5,100 ft^2 in size and is located between Lots 78 and 79, biofiltering runoff from DMA A5. Basin C bioretention will be within Lot 7, totaling 3,085 ft^2, and it will be treating DMA A3 of the project site. Basin D, located at Lot 95, will have a tributary drainage of DMAs A1, A7, and A8, totaling 13.15 acres. Its 8,400 ft^2 footprint will exceed the 8,215 ft^2 needed to treat its DMAs.

See WQMP Exhibit in Section VI for further details regarding bioretention BMP locations and tributary drainages.

Modular Wetland Biotreatment BMP

Since the main drive access for Planning Area 1 (off of Stonehaven Drive) lies downstream from the proposed bioretention facilities, the project will implement a series of proprietary biotreatment systems for water quality treatment to treat all pollutants of concern within the site access to a medium to high level of effectiveness.

The systems will include the Modular Wetlands Systems developed by Bio Clean Environmental Services, Inc. There are several advantages of the Modular Wetland System over traditional bioretention planters including the following reasons:

- Modular Wetlands are the only proprietary biotreatment device approved through the Washington State University TAPE (Technology Assessment Protocol – Ecology) program for basic storm water treatment and enhanced treatment including sediment, nutrients and heavy metals (all proposed pollutants of concern for the Upper and Lower Newport Bay watersheds). TAPE approval is based on a series of independent field studies using strict sampling criteria to validate vendor's claims. TAPE approval is considered one of the most stringent and most reliable in the Country.

- Modular Wetlands have a pre-treatment chamber that is specifically designed to capture fine sediments and particulates through a series of BioMediaGREEN sponges which prohibit the fines and particulates from entering the bioretention chamber and accelerating potential clogging of the bioretention soil. The City of Huntington Beach has installed a Modular Wetland for a residential neighborhood and has monitored the maintenance and functionality of the system for several years. Contact: Mark Birchfield, City of Huntington Beach (714-375-5041; MBirchfield@surfcity-hb.org)

- Modular Wetland systems are specifically designed for higher flow through treatment rates which reduce the potential for nutrient and copper leaching under more stagnant conditions (a common occurrence with planters that are left unmaintained).

Modular Wetlands by Modular Wetlands Systems, Inc. are proprietary biotreatment systems that utilize multi-stage treatment processes including screening media filtration, settling, and biofiltration. The pre-treatment chamber contains the first three stages of treatment, and includes a catch basin inlet filter to capture trash, debris, gross solids and sediments, a settling chamber for separating out larger solids, and a media filter cartridge for capturing fine TSS, metals, nutrients, and bacteria. Runoff then flows through the wetland chamber where treatment is achieved through a variety of physical,

chemical, and biological processes. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded and sequestered by the soil and plants, functioning similar to bioretention systems. The discharge chamber at the end of the unit collects treated flows and discharges back into the storm drain system.

These systems were selected based on their ability to treat the project's pollutants of concerns to a medium or high effectiveness, in accordance with the Model WQMP and TGD requirements. The table below summarizes the overall treatment effectiveness for a Bioretention System and Modular Wetlands, derived from Table 4.2 of the Technical Guidance Document and testing data provided by the manufacturer. Additional details for the Modular Wetland units included in Section VI of this WQMP.

POLLUTANTS OF CONCERN AND PERFORMANCE RATINGS		
Pollutant of Concern (1)	**Treatment Effectiveness**	
	Bioretention System (2)	**Modular Wetlands Proprietary Bioretention Units** (3)
Oil & Grease	High	High
Trash & Debris	High	High
Sediment	High	High
Nutrients	Medium	Medium-High
Pesticides	N/A	N/A
Primary Pollutant of Concern (303d listed impairments & TMDLs)		
Pathogens/Bacteria	Medium	Medium-High

Notes:
1 See Section II.2 of the PWQMP, revised September 27, 2012.
2 Per Table 4.2 of the Model WQMP's companion Technical Guidance Document dated December 20, 2013.
3 Based on Washington State University Technology Assessment Protocol – Ecology (TAPE) third-party independent field tests for a high-flow biotreatment system with raised under drain (Modular Wetland System-Linear). Refer to manufacturer documentation (attached) for specific removal efficiencies and source references.
4 Field and Lab Testing demonstrates 75-83% removal rates of Chemical Oxygen Demand (COD), a measure of the amount of organic pollutants commonly found in surface water. COD removals of this range would fall within the Medium-High effectiveness category.

Modular Wetland Biotreatment BMP Sizing & Design

In accordance with the Model WQMP and TGD, the Modular Wetland Biotreatment BMPs will be sized to treat runoff from the Design Capture Storm (85th percentile, 24-hour). Since Modular Wetlands are sized based on flow rate, they were sized utilizing the methodology for flow based BMPs (TGD Section III.1.2 and Worksheet D). Locations and tributary drainage areas are shown on the WQMP Exhibit included in Section VI. BMP details are also included in Section VI. Detailed calculations and associated TGD Worksheets are included in Appendix A. Operation and maintenance details are included in Section V and Appendix D (O&M Plan).

MODULAR WETLAND DESIGN SUMMARY						
DMA / BMP ID(1)(2)	BMP Name	BMP GPS Coordinate	Total Drainage Area (ac)	Q_{Design}(3) (cfs)	Sizes / Models(4)	Combined Treatment Capacity (5) (cfs)
A9	MWS #1	33.892928, -117.758544	0.5	0.099	MWS-L-4-8-C	0.116

Notes:
(1) See also Section IV.2.2.
(2) Refer to WQMP Exhibit in Section VI for locations of each drainage area and BMP.
(3) Detailed calculations and worksheets are included in Appendix A.
(4) Unit details and specifications are included in Section VI.
(5) Treatment capacities of each unit are based on wetland media design loading rate (controlled by downstream orifice) and perimeter surface area of wetland media provided. Individual unit sizing calculations provided by the manufacturer are included on each cut sheet/detail included in Section VI.

IV.3.5 Hydromodification Control BMPs

As described in Section II.3, hydromodification control BMPs will be needed in both Planning Area 1 and Planning Area 2. In Planning Area 1, a split-flow structure will be installed along storm drain Line "B" in "B" Street adjacent to Lot 8 that will bifurcate 12.74 cfs southwesterly toward the offsite 36" RCP line. This mitigated condition will ensure that peak runoff conditions for 2-year 24-hour storm events at both points of discharge is no greater than 110 percent of predevelopment conditions.

In order to mitigate hydrologic conditions of concern for Planning Area 2, an infiltration basin (BMP INF-1) with a capacity of 18,300 ft^3 will be implemented on Lot E. This capacity is more than sufficient to accommodate the DCV for Planning Area 2, which is 9,109 ft^3. As such, the proposed infiltration basin will address both LID and hydromodification performance criteria. Percolation testing will not be performed at the EIR phase of development. Infiltration rates will be measured at or prior to final design phase development of the project. Infiltration basin sizing details are provided below.

HYDROMODIFICATION CONTROLS	
BMP Name	BMP Description
PA1 – N/A	Split-Flow Structure to Bifurcate 12.74 cfs
PA2 – Infiltration Basin (INF-1)	Basin Depth = 6 ft Side Slope = 2:1 Footprint = 3,050 ft^2 Retention Capacity = 18,300 ft^3

See Section VI for further details regarding the proposed Infiltration Basin on Lot E.

IV.3.6 Regional/Sub-Regional LID BMPs

Not applicable. LID BMPs (infiltration and biotreatment) will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy identified at the beginning of this Section.

IV.3.7 Treatment Control BMPs

Not applicable. LID BMPs (infiltration and biotreatment) will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy identified at the beginning of this Section.

IV.3.8 Non-Structural Source Control BMPs

The table below indicates all BMPs to be incorporated in the project. For those designated as not applicable (N/A), a brief explanation why is provided.

NON-STRUCTURAL SOURCE CONTROL BMPs				
ID	Name	Included?	Not Applicable?	If Not Applicable, Provide Brief Reason
N1	Education for Property Owners, Tenants and Occupants	☒	☐	
N2	Activity Restrictions	☒	☐	
N3	Common Area Landscape Management	☒	☐	
N4	BMP Maintenance	☒	☐	
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	No hazardous materials anticipated.
N6	Local Water Quality Permit Compliance	☐	☒	The County of Orange does not issue water quality permits.
N7	Spill Contingency Plan	☐	☒	No activities that generate hazardous spills proposed.
N8	Underground Storage Tank Compliance	☐	☒	No USTs proposed.
N9	Hazardous Materials Disclosure Compliance	☐	☒	No hazardous materials anticipated.
N10	Uniform Fire Code Implementation	☐	☒	No hazardous materials anticipated.
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	

NON-STRUCTURAL SOURCE CONTROL BMPs				
ID	Name	Included?	Not Applicable?	If Not Applicable, Provide Brief Reason
N13	Housekeeping of Loading Docks	☐	☒	No loading docks proposed.
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☒	No RGOs proposed.

N1, Education for Property Owners, Tenants and Occupants

Educational materials will be provided to tenants, including brochures and restrictions to reduce pollutants from reaching the storm drain system. Examples include tips for pet care, household tips, and proper household hazardous waste disposal. Tenants will be provided with these materials by the property management prior to occupancy, and periodically thereafter. Refer to Section VII for a list of materials available and attached to this WQMP. Additional materials are available through the County of Orange Stormwater Program website (http://ocwatersheds.com/PublicEd/) and the California Stormwater Quality Association's (CASQA) BMP Handbooks (http://www.cabmphandbooks.com/).

N2, Activity Restrictions

The HOA shall develop ongoing activity restrictions that include those that have the potential to create adverse impacts on water quality. Activities include, but are not limited to: handling and disposal of contaminants, fertilizer and pesticide application restrictions, litter control and pick-up, and vehicle or equipment repair and maintenance in non-designated areas, as well as any other activities that may potentially contribute to water pollution.

N3, Common Area Landscape Management

Management programs will be designed and implemented by the HOA to maintain all the common areas within the project site. These programs will cover how to reduce the potential pollutant sources of fertilizer and pesticide uses, utilization of water-efficient landscaping practices and proper disposal of landscape wastes by the owner/developer and/or contractors.

N4, BMP Maintenance

The HOA will be responsible for the implementation and maintenance of each applicable non-structural BMP, as well as scheduling inspections and maintenance of all applicable structural BMP facilities through its staff, landscape contractor, and/or any other necessary maintenance contractors. Details on BMP maintenance are provided in Section V of this WQMP, and the O&M Plan is included in Appendix D.

N11, Common Area Litter Control

The HOA will be responsible for performing trash pickup and sweeping of littered common areas on a weekly basis or whenever necessary. Responsibilities will also include noting improper disposal materials by the public and reporting such violations for investigation.

N12, Employee Training

All employees of the HOA and any contractors will require training to ensure that employees are aware of maintenance activities that may result in pollutants reaching the storm drain. Training will include, but not be limited to, spill cleanup procedures, proper waste disposal, housekeeping practices, etc.

N14, Common Area Catch Basin Inspection

All on-site catch basin inlets and drainage facilities shall be inspected and maintained by the HOA at least once a year, prior to the rainy season, no later than October 1st of each year.

N15, Street Sweeping Private Streets and Parking Lots

The HOA shall be responsible for sweeping all on-site streets within the project on a minimum quarterly basis.

IV.3.9 Structural Source Control BMPs

The table below indicates all BMPs to be incorporated in the project. For those designated as not applicable (N/A), a brief explanation why is provided.

STRUCTURAL SOURCE CONTROL BMPs				
ID	Name	Included?	Not Applicable?	If Not Applicable, Provide Brief Reason
S1 SD-13	Provide storm drain system stenciling and signage	☒	☐	
S2 SD-34	Design and construct outdoor material storage areas to reduce pollution introduction	☐	☒	None proposed.
S3 SD-32	Design and construct trash and waste storage areas to reduce pollution introduction	☐	☒	None proposed.
S4 SD-12	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	☒	☐	
S5	Protect slopes and channels and provide energy dissipation	☒	☐	
S6 SD-31	Properly Design: Dock areas	☐	☒	None proposed.
S7 SD-31	Properly Design: Maintenance bays	☐	☒	None proposed.

STRUCTURAL SOURCE CONTROL BMPs				
ID	Name	Included?	Not Applicable?	If Not Applicable, Provide Brief Reason
S8 SD-33	Properly Design: Vehicle wash areas	☐	☒	None proposed.
S9 SD-36	Properly Design: Outdoor processing areas	☐	☒	None proposed.
S10	Properly Design: Equipment wash areas	☐	☒	None proposed.
S11 SD-30	Properly Design: Fueling areas	☐	☒	None proposed.
S12 SD-10	Properly Design: Hillside landscaping	☒	☐	
S13	Properly Design: Wash water control for food preparation areas	☐	☒	None proposed.
S14	Properly Design: Community car wash racks	☐	☒	None proposed.

S1/SD-13, Provide storm drain system stenciling and signage

The phrase "NO DUMPING! DRAINS TO OCEAN", or an equally effective phrase approved by the City, will be stenciled on all major storm drain inlets within the project site to alert the public to the destination of pollutants discharged into storm water. Stencils shall be in place prior to release of certificate of occupancy. Stencils shall be inspected for legibility on an annual basis and re-stenciled as necessary.

S4/SD-12, Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control

The HOA will be responsible for the installation and maintenance of all common landscape areas utilizing similar planting materials with similar water requirements to reduce excess irrigation runoff. The HOA will be responsible for implementing all efficient irrigation systems for common area landscaping including, but not limited to, provisions for water sensors and programmable irrigation cycles. This includes smart timers, rain sensors, and moisture shut-off valves. The irrigation systems shall be in conformance with water efficiency guidelines. Systems shall be tested twice per year, and water used during testing/flushing shall not be discharged to the storm drain system.

S5, Protect slopes and channels and provide energy dissipation

The site drainage design shall include appropriate BMPs to decrease the potential for erosion of slopes and/or channels. The design shall be consistent with Federal, State, and local standards (e.g., RWQCB, ACOE, CDFG). Where feasible, the following principles shall be considered: 1) convey runoff safely from the tops of slopes, 2) avoid disturbing steep or unstable slopes, as well as natural channels, 3) implement a permanent stabilization BMP on disturbed slopes and channels as quickly as

possible, such as native vegetation, and 4) install energy dissipaters at the outlets of new storm drains, culverts, or channels.

S12/SD-10, Properly Design: Hillside landscaping

All slopes shall be vegetated and stabilized to prevent erosion, in accordance with "Efficient Irrigation and Landscape Design" source control BMP to prevent erosion.

IV.4 ALTERNATIVE COMPLIANCE PLAN

IV.4.1 Water Quality Credits

Local jurisdictions may develop a water quality credit program that applies to certain types of development projects after they first evaluate the feasibility of meeting LID requirements on-site. If it is not feasible to meet the requirements for on-site LID, project proponents for specific project types can apply credits that would reduce project obligations for selecting and sizing other treatment BMPs or participating in other alternative programs.

WATER QUALITY CREDITS	
Credit	**Applicable?**
Redevelopment projects that reduce the overall impervious footprint of the project site.	☐
Brownfield redevelopment, meaning redevelopment, expansion, or reuse of real property which may be complicated by the presence or potential presence of hazardous substances, pollutants or contaminants, and which have the potential to contribute to adverse ground or surface water quality if not redeveloped.	☐
Higher density development projects which include two distinct categories (credits can only be taken for one category): those with more than seven units per acre of development (lower credit allowance); vertical density developments, for example, those with a Floor to Area Ratio (FAR) of 2 or those having more than 18 units per acre (greater credit allowance)	☐
Mixed use development, such as a combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that can demonstrate environmental benefits that would not be realized through single use projects (e.g. reduced vehicle trip traffic with the potential to reduce sources of water or air pollution).	☐
Transit-oriented developments, such as a mixed use residential or commercial area designed to maximize access to public transportation; similar to above criterion, but where the development center is within one half mile of a mass transit center (e.g. bus, rail, light rail or commuter train station). Such projects would not be able to take credit for both categories, but may have greater credit assigned	☐
Redevelopment projects in an established historic district, historic preservation area, or similar significant city area including core City Center areas (to be defined through mapping).	☐

WATER QUALITY CREDITS	
Credit	**Applicable?**
Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.	☐
Developments in a city center area.	☐
Developments in historic districts or historic preservation areas.	☐
Live-work developments, a variety of developments designed to support residential and vocational needs together – similar to criteria to mixed use development; would not be able to take credit for both categories.	☐
In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.	☐

Not applicable. Water quality credits will not be applied for the project. LID BMPs will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy identified at the beginning of this Section.

IV.4.2 Alternative Compliance Plan Information

Not applicable. LID BMPs (infiltration and biotreatment) will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy identified at the beginning of this Section.

SECTION V INSPECTION/MAINTENANCE RESPONSIBILITY FOR BMPs

It has been determined that North County BRS Project, LLC shall assume all BMP inspection and maintenance responsibilities for the Cielo Vista project.

Contact Name:	Larry Netherton
Title:	Regional Manager
Company:	North County BRS Project, LLC
Address:	3 Corporate Plaza, Suite 102 Newport Beach, CA 92660
Phone:	(949) 644-3514, ext. 24
Fax:	(949) 644-3977
Email:	lnetherton@sagecommunity.com

Should the maintenance responsibility be transferred at any time during the operational life of Cielo Vista Project, such as when an HOA or POA is formed for a project, a formal notice of transfer shall be submitted to the County of Orange at the time responsibility of the property subject to this WQMP is transferred. The transfer of responsibility shall be incorporated into this WQMP as an amendment.

The HOA shall verify BMP implementation and ongoing maintenance through inspection, self-certification, survey, or other equally effective measure. The certification shall verify that, at a minimum, the inspection and maintenance of all structural BMPs including inspection and performance of any required maintenance in the late summer / early fall, prior to the start of the rainy season. A form that may be used to record implementation, maintenance, and inspection of BMPs is included in Appendix D.

The County of Orange may conduct verifications to assure that implementation and appropriate maintenance of structural and non-structural BMPs prescribed within this WQMP is taking place at the project site. The HOA shall retain operations, inspections and maintenance records of these BMPs and they will be made available to the City or County upon request. All records must be maintained for at least five (5) years after the recorded inspection date for the lifetime of the project.

Long-term funding for BMP maintenance shall be funded through fees paid into the HOA. North County BRS Project, LLC, which will set up the HOA shall oversee that adequate funding for BMP maintenance is included within the HOA fee structure including annual maintenance fees and long-term maintenance reserve funds.

The Operations and Maintenance (O&M) Plan can be found in Appendix D.

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
INFILTRATION BMPs				
INF-1	Infiltration Basin	Inspect BMPs semi-annually or after major storm events to check for maintenance needs and function. Routine maintenance shall be performed in conjunction with routine maintenance activities to ensure consistently high performance and extend facility life. Routine maintenance activities include: ▪ Check for debris/sediment accumulation, rake surface, and remove sediment (if any), and evaluate potential sources of sediment and vegetative or other debris. ▪ Determine if it is necessary to remove the top layer of native soil to restore infiltrative capacity. ▪ Remove and dispose of trash and debris, as needed, but at least prior to the start of the wet season. ▪ Eliminate standing water to prevent vector breeding. ▪ Maintain vegetation as needed to sustain the aesthetic appearance of the site. ▪ Re-establish vegetation, which may require replanting and/or reseeding, following sediment removal activities. ▪ Inspect overflow devices for obstructions or debris, which should be removed immediately. Repair or replace damaged pipes upon discovery.	2x per year	HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
BIOTREATMENT BMPs				
BIO-1	Bioretention with Underdrain (4)	Inspect BMPs semi-annually or after major storm events to check for maintenance needs and function. Routine maintenance shall be performed in conjunction with routine maintenance activities to ensure consistently high performance and extend facility life. Routine maintenance activities include: ▪ Maintain vegetation and media to perpetuate a robust vegetative and microbial community (thin/trim vegetation, replace spent media and mulch). ▪ Periodically remove dead vegetative biomass to prevent export of nutrients or clogging of the system. ▪ Remove accumulated sediment before it significantly interferes with system function. ▪ Conduct maintenance to prevent surface clogging (surface scarring, raking, mulch replacement, etc.). ▪ Maintain splash blocks/energy dissipation and scour-protection as required based on facility inspection. ▪ Routinely remove accumulated sediment at the inlet and outlet and trash and debris from the area. ▪ Repair torn or broken liners as necessary.	2x per year	HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
BIO-7	Proprietary Biotreatment: Modular Wetlands	The Modular Wetland units shall be maintained in accordance with manufacturer's specifications. The system shall be inspected at a minimum of once every six months, prior to the start of the rainy season (October 1) each year, and after major storm events. Typical maintenance includes removing trash & debris from the catch basin screening filter (by hand), removal of sediment and solids in the settlement chamber (vacuum truck), replacement of the BioMediaGREEN™ filter cartridge, and replacement of the BioMediaGREEN™ drain down filter (if equipped). In addition, plants within the wetland chamber will require trimming as needed in conjunction with routine landscape maintenance activities. No fertilizer shall be used in this chamber. Wetland chamber should be inspected during rain events to verify flow through the system. If little to no flow is observed from the lower valve or orifice plate, the wetland media may require replacement. If prior treatment stages are properly maintained, the life of the wetland media can be up to 20 years.	2x per year	BIO-7
NON-STRUCTURAL SOURCE CONTROL BMPs				
N1	Education for Property Owners, Tenants and Occupants	Educational materials will be provided to tenants annually. Materials to be distributed are found in Appendix C of this WQMP. Tenants will be provided these materials by Property Management prior to occupancy and annually thereafter.	Annually	HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
N2	Activity Restrictions	The Owner will prescribe activity restrictions to protect surface water quality, through lease terms or equally effective measure, for the property. Restrictions include but are not limited to prohibiting vehicle maintenance or vehicle washing.	Ongoing	HOA
N3	Common Area Landscape Management	Maintenance shall be consistent with County requirements. Fertilizer and/or pesticide usage shall be consistent with County Management Guidelines for Use of Fertilizers (OC DAMP § 5.5). Maintenance includes mowing, weeding, and debris removal on a weekly basis. Trimming, replanting, and replacement of mulch shall be performed on an as-needed basis to prevent exposure of erodible surfaces. Trimmings, clippings, and other landscape wastes shall be properly disposed of in accordance with local regulations. Materials temporarily stockpiled during maintenance activities shall be placed away from water courses and drain inlets.	Monthly	HOA
N4	BMP Maintenance	Maintenance of structural BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP (Appendix B). Records of inspections and BMP maintenance shall be kept by the Owner and shall be available for review upon request.	Ongoing	HOA
N5	Title 22 CCR Compliance (How development will comply)		--	--
N6	Local Industrial Permit Compliance	Not Applicable	--	--
N7	Spill Contingency Plan	Not Applicable	--	--

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
N8	Underground Storage Tank Compliance	Not Applicable	--	--
N9	Hazardous Materials Disclosure Compliance	Not Applicable	--	--
N10	Uniform Fire Code Implementation	Not Applicable	--	--
N11	Common Area Litter Control	Litter patrol, violations investigations, reporting and other litter control activities shall be performed on a weekly basis and in conjunction with routine maintenance activities.	Weekly	HOA
N12	Employee Training	The Owner shall educate all new employees/managers on storm water pollution prevention, particularly good housekeeping practices, prior to the start of the rainy season (October 1). Refresher courses shall be conducted on an as needed basis. Materials that may be utilized on BMP maintenance are included in Appendix B.	Annually	HOA
N13	Housekeeping of Loading Docks	Not Applicable	--	--
N14	Common Area Catch Basin Inspection	On-site catch basin inlets shall be inspected and, if necessary, cleaned prior to the storm season by October 1st each year.	Annually	HOA
N15	Street Sweeping Private Streets and Parking Lots	All private streets, drive aisles and exposed parking areas within the project shall be swept at a minimum frequency quarterly as well as once per year prior to the storm season, no later than October 1 each year.	Quarterly	HOA
N16	Retail Gasoline Outlets	Not Applicable	--	--

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
STRUCTURAL SOURCE CONTROL BMPs				
S1 SD-13	Provide storm drain system stenciling and signage	On-site storm drain stencils shall be inspected for legibility, at minimum, once prior to the storm season, no later than October 1st each year. Those determined to be illegible will be re-stenciled as soon as possible.	Annually	HOA
S2 SD-34	Design and construct outdoor material storage areas to reduce pollution introduction	Not Applicable	--	--
S3 SD-32	Design and construct trash and waste storage areas to reduce pollution introduction	Not Applicable	--	--
S4 SD-12	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	In conjunction with routine maintenance, verify that landscape design continues to function properly by adjusting systems to eliminate overspray to hardscape areas and to verify that irrigation timing and cycle lengths are adjusted in accordance to water demands, given the time of year, weather, and day or nighttime temperatures. System testing shall occur twice per year. Water from testing/flushing shall be collected and properly disposed to the sewer system and shall not discharge to the storm drain system.	2x per year	HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
S5	Protect slopes and channels and provide energy dissipation	To be performed in conjunction with maintenance activities. Maintain vegetative cover and/or mulch to eliminate exposed soils. Any eroded surfaces to be repaired immediately. Inspections to be performed twice each year (spring and fall) and after major storm events to check for signs of erosion, gullies, and sloughing.	Monthly	HOA
S6 SD-31	Properly Design: Dock areas	Not Applicable	--	--
S7 SD-31	Properly Design: Maintenance bays	Not Applicable	--	--
S8 SD-33	Properly Design: Vehicle wash areas	Not Applicable	--	--
S9 SD-36	Properly Design: Outdoor processing areas	Not Applicable	--	--
S10	Properly Design: Equipment wash areas	Not Applicable	--	--
S11 SD-30	Properly Design: Fueling areas	Not Applicable	--	--
S12 SD-10	Properly Design: Hillside landscaping	To be performed in conjunction with maintenance activities. Maintain vegetative cover and/or mulch to eliminate exposed soils. Any eroded surfaces to be repaired immediately. Inspections to be performed twice each year (spring and fall) and after major storm events to check for signs of erosion, gullies, and sloughing.	Monthly	HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
S13	Properly Design: Wash water control for food preparation areas	Not Applicable	--	--
S14	Properly Design: Community car wash racks	Not Applicable	--	--

Any waste generated from maintenance activities will be disposed of properly. Wash water and other waste from maintenance activities is not to be discharged or disposed of into the storm drain system. Clippings from landscape maintenance (i.e. prunings) will be collected and disposed of properly off-site, and will not be washed into the streets, local area drains/conveyances, or catch basin inlets.

SECTION VI SITE PLAN AND DRAINAGE PLAN

The exhibits provided in this section are to illustrate the post construction BMPs prescribed within this WQMP. Drainage flow information of the proposed project, such as general surface flow lines, concrete or other surface drainage conveyances, and storm drain facilities are also depicted. All structural source control and treatment control BMPs are shown as well.

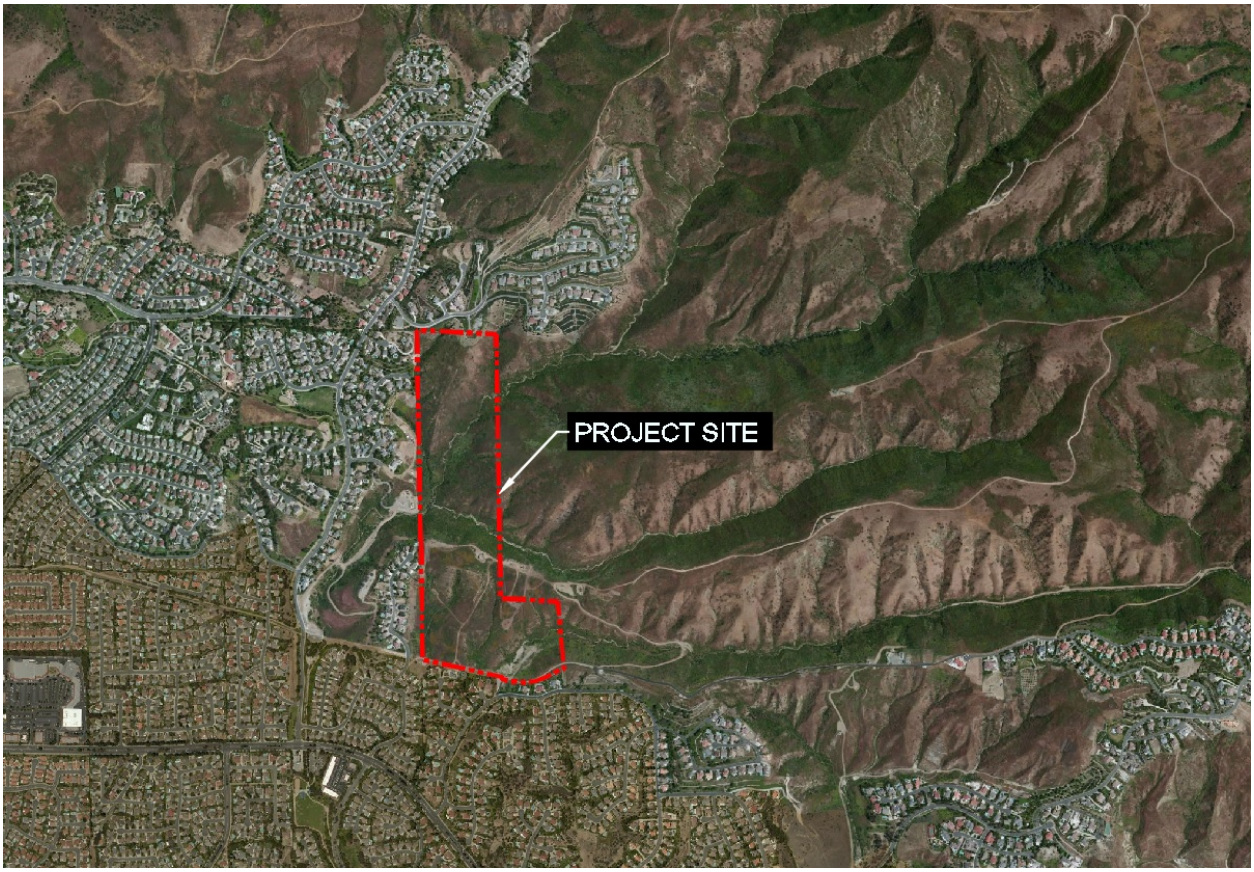
EXHIBITS

- Vicinity Map
- Planning Area 1 (South Site) BMP Plan (Figure 1-1)
- Planning Area 2 (North Site) BMP Plan (Figure 1-2)
- Existing Hydromodification Exhibit – Planning Area 1
- Proposed Hydromodification Exhibit – Planning Area 1
- Existing Hydromodification Exhibit – Planning Area 2
- Proposed Hydromodification Exhibit – Planning Area 2

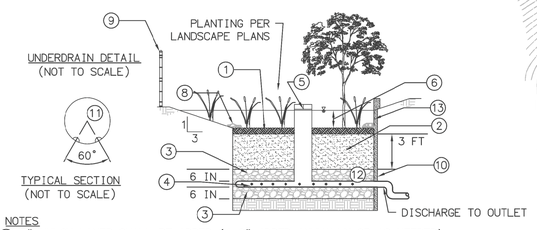
BMP DETAILS & FACT SHEETS

- Infiltration Basin Fact Sheet (INF-1)
- Bioretention with Underdrain Fact Sheet (BIO-1)
- Proprietary Biotreatment (BIO-7)
- Modular Wetland Systems

VICINITY MAP



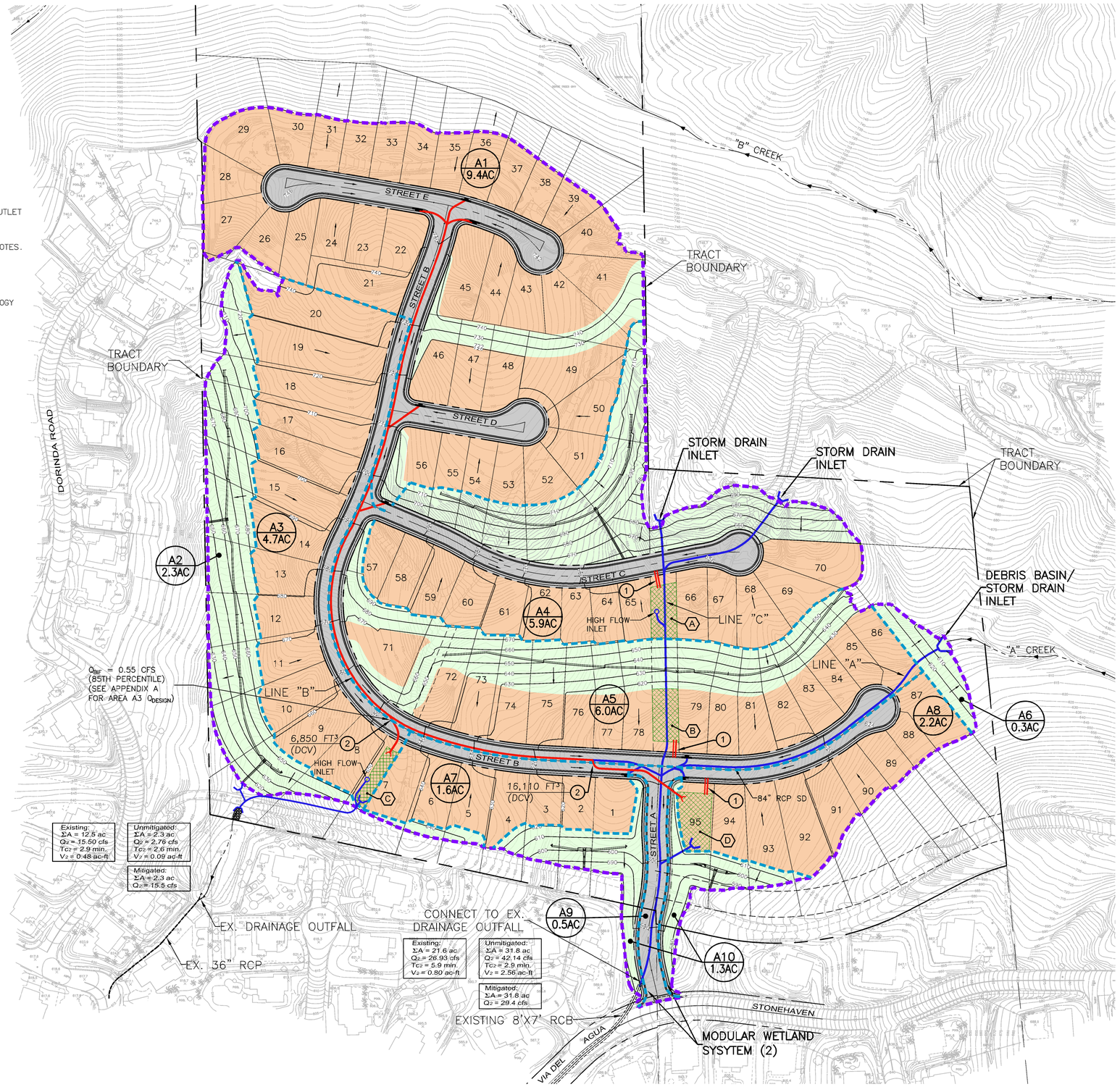
[Planning Area 1 (South Site) BMP Plan (Figure 1-1)]

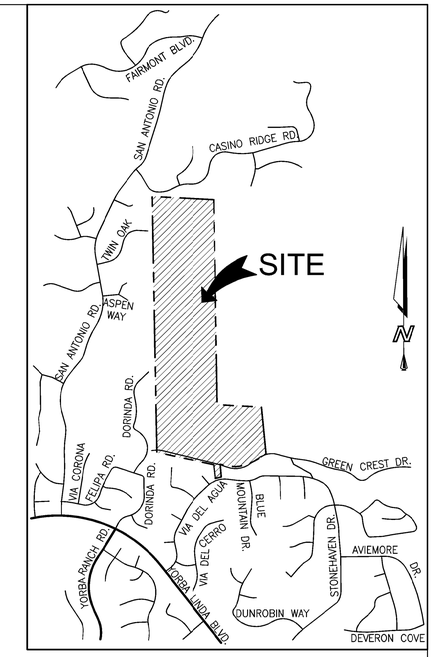


NOTES

1. 3" MULCH LAYER SHALL BE ADDED (1-2" ADDED ANNUALLY OR AS NEEDED).
2. 2'-3' ENGINEERED SOIL DEPTH (3' DEPTH IS PREFERRED). SEE MEDIA STORAGE NOTES.
3. UNDERDRAIN SHALL BE SURROUNDED BY 6" OF WASHED AGGREGATE.
4. 6" PVC WITH A 0.5% MINIMUM SLOPE. SEE ALSO NOTE 11 AND 12.
5. OVERFLOW RISER SHALL BE SIZED TO CONVEY LARGE STORM EVENTS PER OC HYDROLOGY MANUAL.
6. PONDING DEPTH SHOULD NOT EXCEED 18".
7. 12" WIDE MINIMUM CURB OPENING.
8. ENERGY DISSIPATOR SHALL BE SIZED BY ENGINEER.

BIORETENTION WITH UNDERDRAIN SECTION





LOCATION MAP

N.T.S.

LEGEND

- STREETS
- INDIVIDUAL LOT LANDSCAPE/HARDSCAPE
- H.O.A. MAINTAINED LANDSCAPING
- BIORETENTION WITH UNDERDRAIN
- OVERALL DRAINAGE BOUNDARY
- SUB AREA DRAINAGE AREA PER BMP CALCULATIONS
- DRAINAGE FLOWLINE
- DIRECTION OF FLOW
- PROPOSED CATCH BAIN
- UNTREATED STORMWATER
- TREATED / CLEAN STORMWATER
- (A) BIORETENTION BASIN I.D.
- (A1 / 9.4AC) SUB AREAS WITH ACREAGE

NOTES

1. Untreated runoff directed via parkway culvert to basin for bioretention. (Areas A4, A5, A8)
2. Bifurcate untreated runoff for bioretention. Equivalent DCV diversion flow indicated on plan. (Areas A1, A3, A7)

BMP SUMMARY TABLE (SOUTH SIDE)

SUBAREA	AREA (ACRES)	DCV (FT³)	BMP PROPOSED
A1	9.4	13,740	BIORETENTION-BASIN D
A2	2.3		N/A-OFFSITE SLOPE
A3	4.7	6,850	BIORETENTION-BASIN C
A4	5.9	7,420	BIORETENTION-BASIN A
A5	6.0	9,760	BIORETENTION-BASIN B
A6	0.3		N/A-OFFSITE SLOPE
A7	1.6	2,370	BIORETENTION-BASIN D
A8	2.2	3,220	BIORETENTION-BASIN D
A9	0.5	1,870	MODULAR WETLANDS
A10	1.3		N/A-OFFISTE SLOPE

FIGURE 1-1

FUSCOE ENGINEERING
16795 Von Karman, Suite 100
Irvine, California 92606
tel 949.474.1960 • fax 949.474.5315
www.fuscoe.com

100' 0' 50' 100'
SCALE: 1" = 100'

PLANNING APPLICATION NO. PA100004
GRADING PERMIT NO. GAXXXXXX
WATER QUALITY NO. WQXXXXX
APN 351-031-05 AND 351-031-17

OWNER:
NORTH COUNTY BRS PROJECT, LLC
3 CORPORATE PLAZA, SUITE 102
NEWPORT BEACH, CA 92660
(949) 644-3514

PLANNING AREA 1 BMP PLAN

TRACT 17341 COUNTY OF ORANGE

Exhibit Date: 9/30/2015

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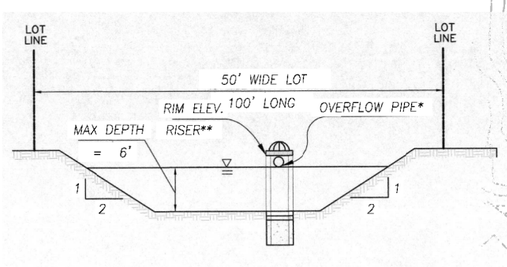
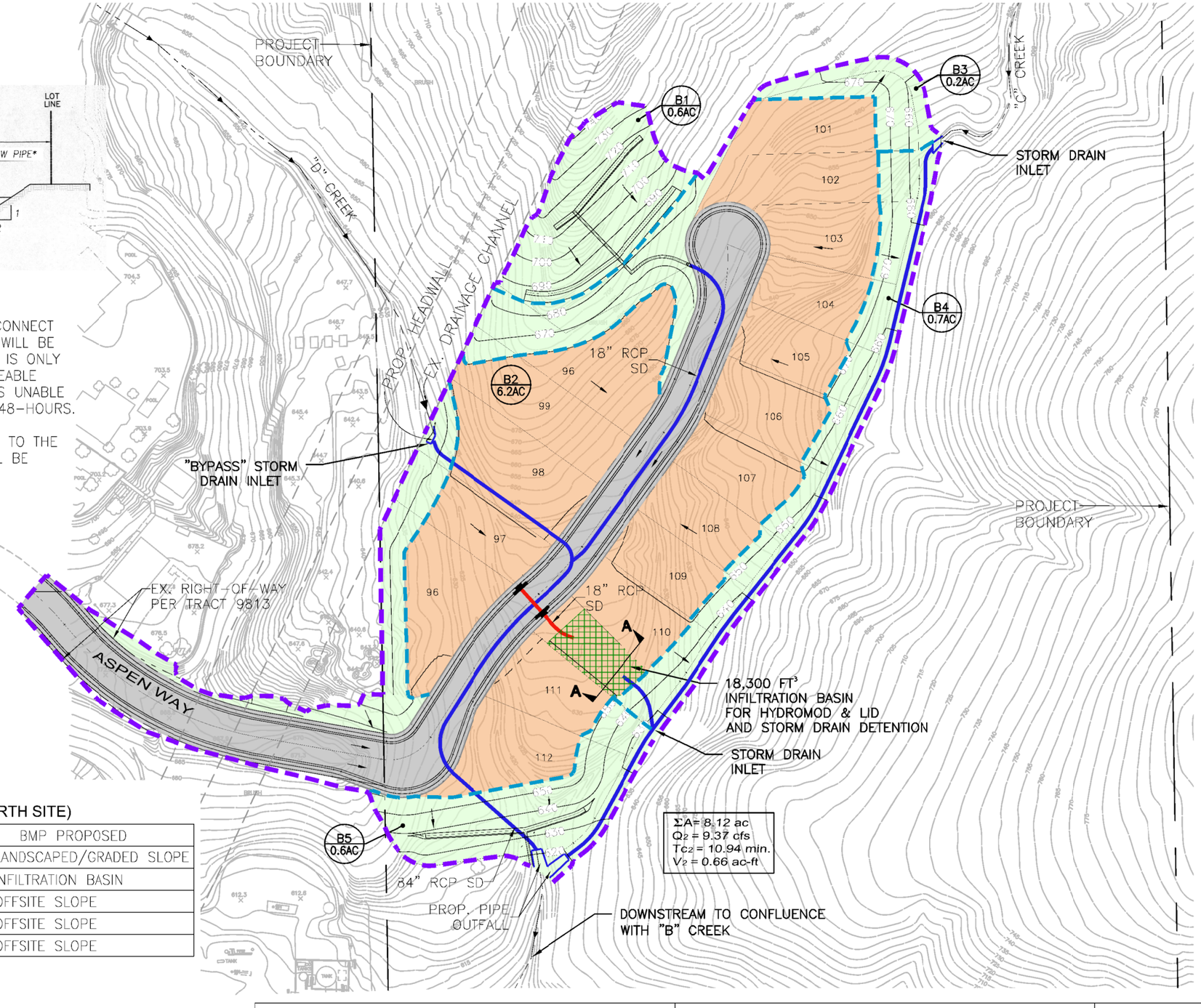
[Planning Area 2 (North Site) BMP Plan (Figure 1-2)]

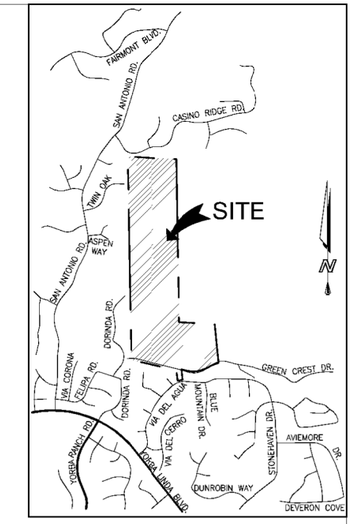


SECTION A-A RETENTION BASIN

* THE OVER-FLOW PIPE/RISER WILL CONNECT TO PERIMETER STORM SYSTEM AND WILL BE DESIGNED AND SIZED SUCH THAT IT IS ONLY ACTIVATED IN THE EVENT THE PERMEABLE BOTTOM OF THE RETENTION BASIN IS UNABLE TO ADEQUATELY DRAWDOWN WITHIN 48-HOURS.

* THE LOW-FLOW PIPE WILL CONNECT TO THE PERIMETER STORM SYSTEM AND WILL BE DESIGNED AND SIZED SUCH THAT.





LOCATION MAP
N.T.S.

LEGEND

- STREETS
- INDIVIDUAL LOT LANDSCAPE/HARDSCAPE
- H.O.A. MAINTAINED LANDSCAPING
- INFILTRATION BASIN
- OVERALL DRAINAGE BOUNDARY
- SUB AREA DRAINAGE AREA PER BMP CALCULATIONS
- DIRECTION OF FLOW
- DRAINAGE FLOWLINE
- PROPOSED CATCH BASIN
- UNTREATED STORMWATER
- TREATED / CLEAN STORMWATER
- A1 / 9.4AC — SUB AREAS WITH ACREAGE

N

SCALE: 1"=120'

BMP SUMMARY TABLE (NORTH SITE)

SUBAREA	AREA (ACRES)	DCV (FT³)	BMP PROPOSED
B1	0.6	340	LANDSCAPED/GRADED SLOPE
B2	6.2	9,110	INFILTRATION BASIN
B3	0.2	130	OFFSITE SLOPE
B4	0.7	450	OFFSITE SLOPE
B5	0.6	350	OFFSITE SLOPE

FIGURE 1-2

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www.fuscoe.com

PLANNING APPLICATION NO. PA100004

GRADING PERMIT NO. GAXXXXXX

WATER QUALITY NO. WQXXXXX

APN 351-031-05 AND 351-031-17

OWNER:

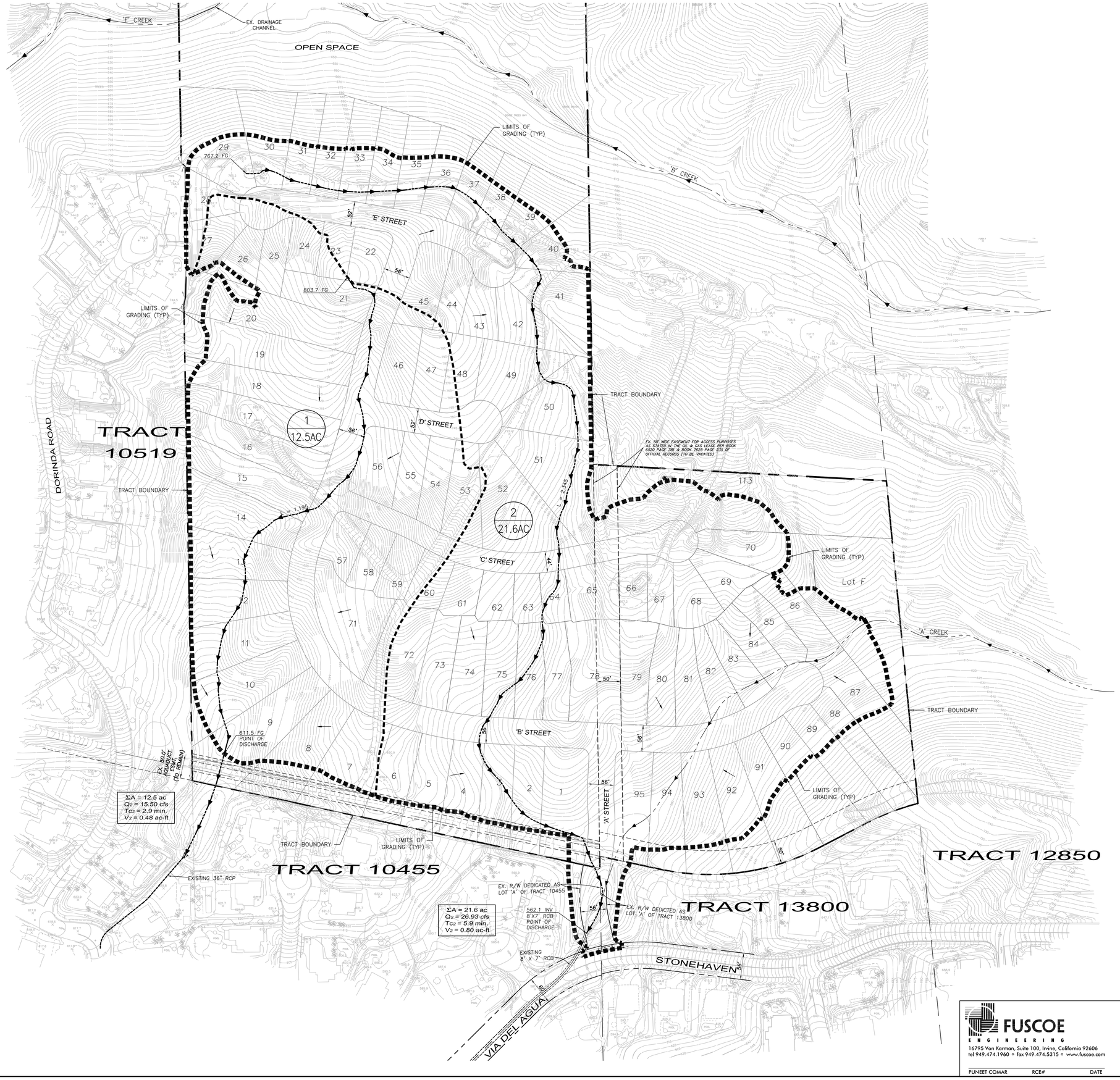
NORTH COUNTY BRS PROJECT, LLC
3 CORPORATE PLAZA, SUITE 102
NEWPORT BEACH, CA 92660
(949) 644-3514

PLANNING AREA 2 BMP PLAN

TRACT 17341
COUNTY OF ORANGE

Exhibit Date: 2/20/2015

[Existing Hydromodification Exhibit – Planning Area 1]



LEGEND

- TRACT BOUNDARY
- LIMITS OF GRADING
- STREET CENTER LINE
- LOT LINE
- DRAINAGE FLOWLINE
- EXISTING CONTOUR
- A1 / 0.3AC — SUBAREAS WITH ACREAGE
- 110 / 263 — NODE / ELEVATION

7/27/2015 | TRACT 17341, COUNTY OF ORANGE, CALIFORNIA | DRAINAGE-TREATMENT | PLAN SET: A

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PUNEET COMAR | RCE# | DATE

PLANNING AREA 1 EXISTING CONDITION HYDROMODIFICATION EXHIBIT

TRACT 17341
COUNTY OF ORANGE, CALIFORNIA

DRAWN:	CK
DESIGN:	CK
CHECKED:	PC
SCALE:	1"=80'
JOB NO.:	1296-001
DATE:	9/28/15

SHEET 1 OF 2

[Proposed Hydromodification Exhibit – Planning Area 1]

LEGEND

- TRACT BOUNDARY
- LIMITS OF GRADING
- STREET CENTER LINE
- LOT LINE
- EXISTING DRAINAGE FLOWLINE
- PROPOSED DRAINAGE FLOWLINE
- PROPOSED CONTOUR (650)
- EXISTING CONTOUR (650)
- 77 / 651.3 — LOT NO. / PAD ELEV.
- P.B. DRAINAGE AREA
- BIORETENTION WITH UNDERDRAIN
- V-DITCH
- A1 / 0.3AC — SUBAREAS WITH ACREAGE
- 110 / 263 — NODE / ELEVATION
- CATCH BASIN
- STORM DRAIN / SD JUNCTION STRUCTURE

PLAN SET: A

7/27/2015 | TRACT 17341, COUNTY OF ORANGE, CALIFORNIA | DRAINAGE-TREATMENT

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PUNEET COMAR	RCE#	DATE

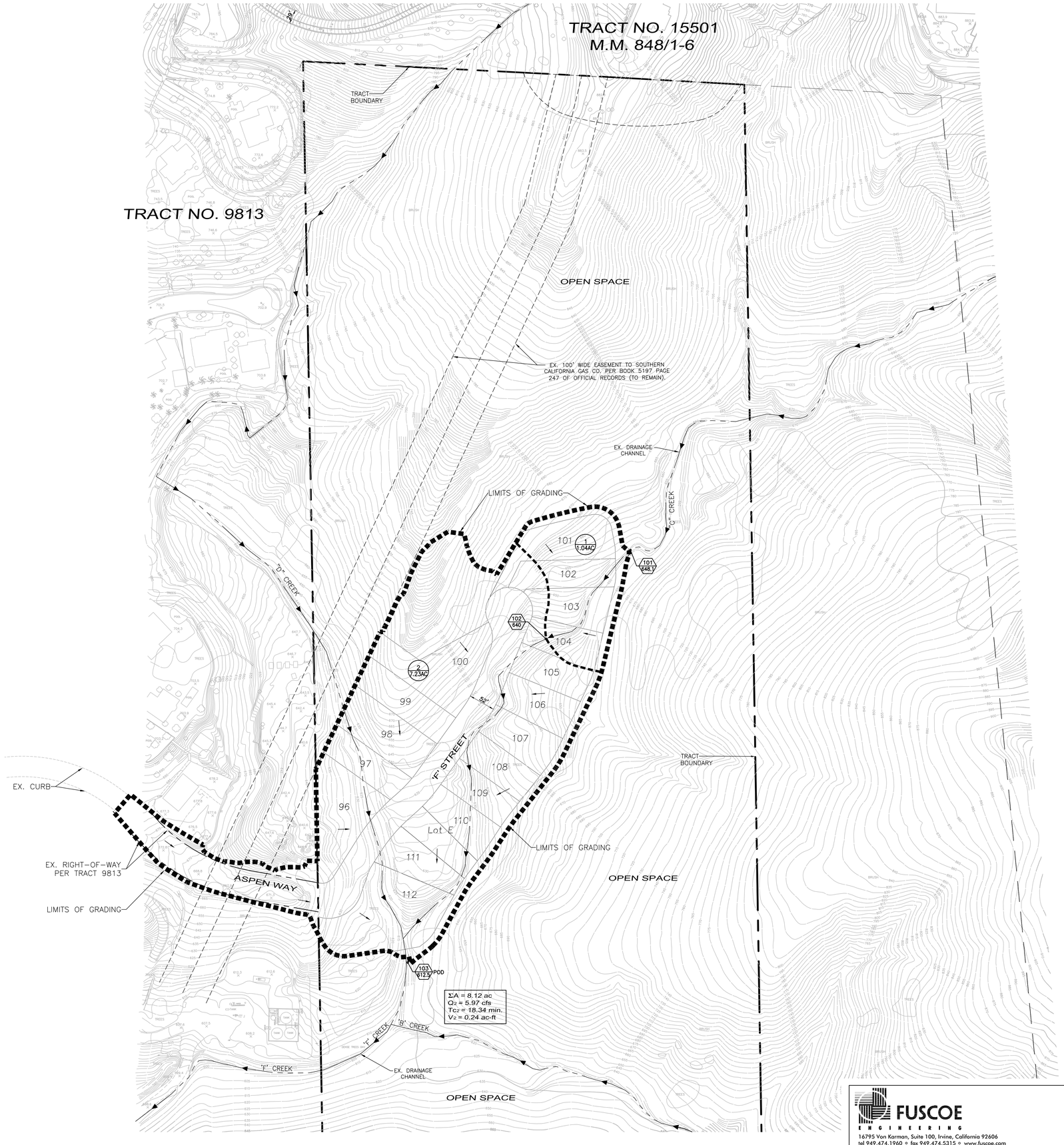
PLANNING AREA 1 PROPOSED CONDITION HYDROMODIFICATION EXHIBIT

TRACT 17341
COUNTY OF ORANGE, CALIFORNIA

DRAWN:	CK
DESIGN:	CK
CHECKED:	PC
SCALE:	1"=80'
JOB NO.:	1296-001
DATE:	9/28/15

SHEET 2 OF 2

[Existing Hydromodification Exhibit – Planning Area 2]



LEGEND

- TRACT BOUNDARY
- LIMITS OF GRADING
- STREET CENTER LINE
- LOT LINE
- DRAINAGE FLOWLINE
- EXISTING CONTOUR
- A1 / 0.3AC — SUBAREAS WITH ACREAGE
- 110 / 263 — NODE / ELEVATION

N

80' 0' 40' 80'

SCALE: 1" = 80'

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PUNEET COMAR RCE# DATE

PLANNING AREA 2
EXISTING CONDITION
HYDROMODIFICATION EXHIBIT

TRACT 17341
COUNTY OF ORANGE, CALIFORNIA

DRAWN:	CK
DESIGN:	CK
CHECKED:	PC
SCALE:	1"=80'
JOB NO.:	1296-001
DATE:	9/28/15
SHEET	1 OF 2

PLAN SET: A

TRACT 17341, COUNTY OF ORANGE, CALIFORNIA
DRAINAGE-TREATMENT

7/27/2015

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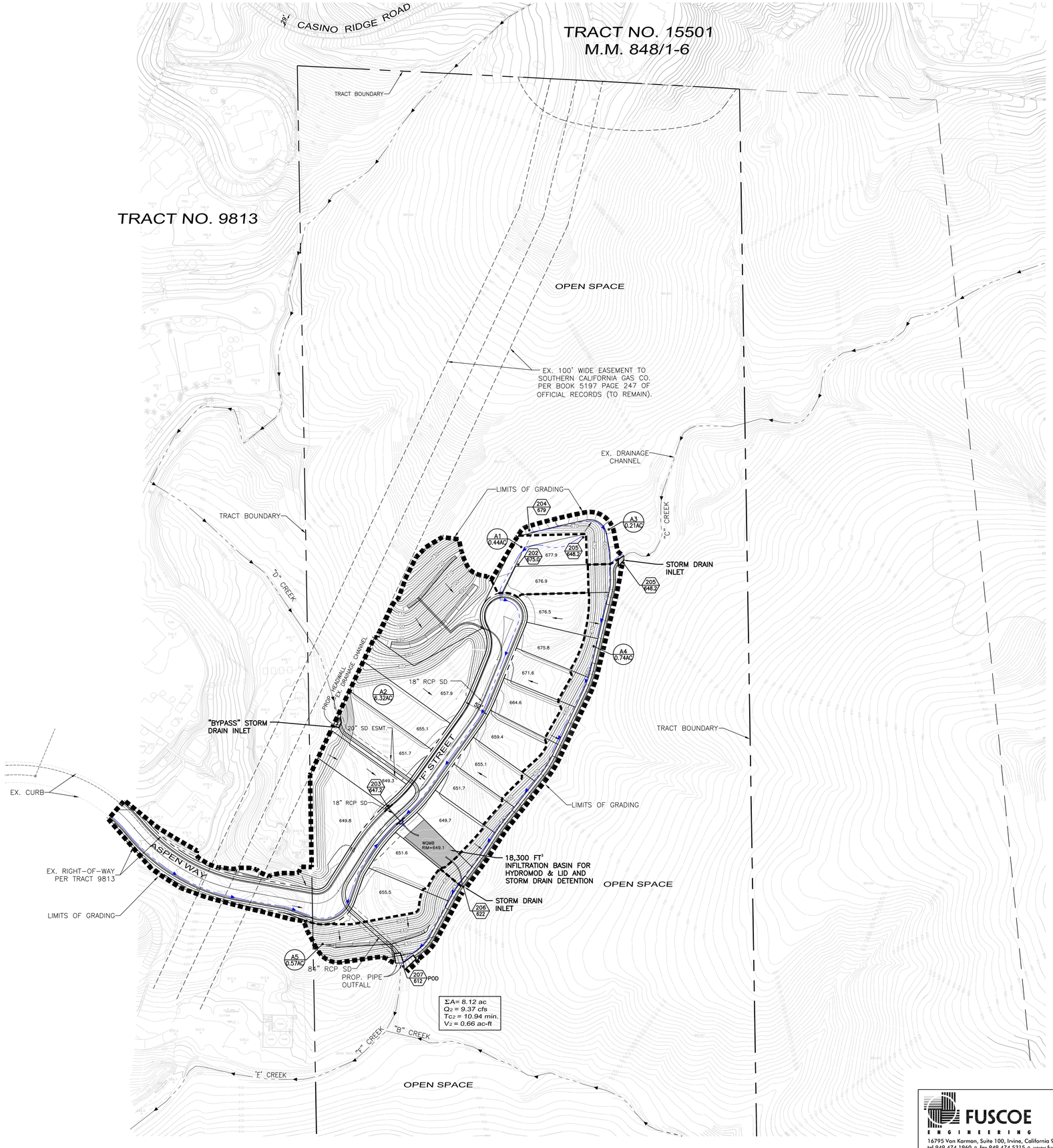
[Proposed Hydromodification Exhibit – Planning Area 2]



LEGEND

- TRACT BOUNDARY
- LIMITS OF GRADING
- STREET CENTER LINE
- LOT LINE
- EXISTING DRAINAGE FLOWLINE
- PROPOSED DRAINAGE FLOWLINE
- PROPOSED CONTOUR (650)
- EXISTING CONTOUR (650)
- LOT NO. 77 / PAD ELEV. 651.3
- P.B. DRAINAGE AREA
- V-DITCH
- SUBAREAS WITH ACREAGE (A1 0.3AC)
- NODE (110) / ELEVATION (263)
- CATCH BASIN
- STORM DRAIN / SD JUNCTION STRUCTURE

N

80' 0' 40' 80'
SCALE: 1" = 80'

PLAN SET: A

TRACT 17341, COUNTY OF ORANGE, CALIFORNIA
DRAINAGE-TREATMENT

7/27/2015

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PUNEET COMAR RCE# DATE

PLANNING AREA 2
PROPOSED CONDITION
HYDROMODIFICATION EXHIBIT

TRACT 17341
COUNTY OF ORANGE, CALIFORNIA

DRAWN:	CK
DESIGN:	CK
CHECKED:	PC
SCALE:	1"=80'
JOB NO.:	1296-001
DATE:	9/28/15

SHEET 2 OF 2

Infiltration Basin (INF-1) Fact Sheet

XIV.3. Infiltration BMP Fact Sheets (INF)

INF-1: Infiltration Basin Fact Sheet

An infiltration basin consists of an earthen basin constructed in naturally pervious soils (Type A or B soils) with a flat bottom. An energy dissipating inlet must be provided, along with an emergency spillway to control excess flows. An optional relief underdrain may be provided to drain the basin if standing water conditions occur. A forebay settling basin or separate treatment control measure must be provided as pretreatment. An infiltration basin retains the stormwater quality design volume in the basin and allows the retained runoff to percolate into the underlying soils in 72 hours or less. The bottom of an infiltration basin is typically vegetated with dryland grasses or irrigated turf grass; however other types of vegetation are permissible if they can survive periodic inundation and long inter-event dry periods.

Feasibility Screening Considerations

- Infiltration bains shall pass infeasibility screening criteria to be considered for use
- Infiltration basins pose a potential risk of groundwater contamination if underlying soils have very high permeability and low pollutant assimilation capacity; pretreatment should always be provided.
- Evaporation tends to be minor, therefore increases in infiltration compared to natural conditions may result.
- The potential for groundwater mounding should be evaluated if depth to seasonally high groundwater (unmounded) is less than 15 feet.

Also known as:

- *Recharge basins*
- *Infiltration pond*

Infiltration Basin

Source: Pennsylvania Stormwater BMP Manual

Opportunity Criteria

- Soils are adequate for infiltration or can be amended to provide an adequate infiltration rate.
- Typically need 2-5 percent of drainage area available for infiltration.
- Space available for pretreatment (biotreatment or treatment control BMP as described below).
- Potential for groundwater contamination can be mitigated through isolation of pollutant sources, pretreatment of inflow, and/or demonstration of adequate treatment capacity of underlying soils.
- Infiltration is into native soil, or
- The depth of engineered fill is ≤ 5 feet from the bottom of the facility to native material and infiltration into fill is approved by a geotechnical professional.
- Tributary area land uses include mixed-use and commercial, sngle-family and multi-family, roads and parking lots, and parks and open spaces. Basins can be integrated into parks and open spaces. High pollutant land uses should not be tributary to infiltration BMPs.

OC-Specific Design Criteria and Considerations

☐ Placement of BMPs shall observe geotechnical recommendations with respect to geological hazards (e.g. landslides, liquefaction zones, erosion, etc.) and set-backs (e.g., foundations,

utilities, roadways, etc.)

- ☐ For facilities with tributary area less than 5 acres, minimum separation to mounded seasonally high groundwater of 5 feet shall be observed.
- ☐ For facilities with tributary area greater than 5 acres, minimum separation to mounded seasonally high groundwater of 10 feet shall be observed.
- ☐ Minimum pretreatment (settling forebay or separate BMP) should be provided upstream of the infiltration basin, and water bypassing pretreatment should not be directed to the infiltration basin.
- ☐ If a settling forebay is used, forebay should have a volume equal to 25% of facility volume and have a minimum length to width ratio of 2:1
- ☐ Infiltration basins should not be used for drainage areas with high sediment production potential unless preceded by full treatment control with a BMP effective for sediment removal.
- ☐ Side-slopes should be no steeper than 3H:1V.
- ☐ Design infiltration rate should be determined consistent with guidance contained in **Appendix VII**.
- ☐ Energy dissipators should be provided at inlet and outlet to prevent erosion.
- ☐ An overflow device must be provided if basin is on-line.
- ☐ A minimum freeboard of one foot should be provided above the overflow device (for an on-line basin) or the outlet (for an off-line basin).
- ☐ Infiltration basin bottom must be as flat as possible.
- ☐ Basin length to width ratio should be a minimum of 2:1 L:W.

Simple Sizing Method for Infiltration Basins

If the Simple DCV Sizing Method is used to size an infiltration basin, the user calculates the DCV and designs the BMP geometry required to draw down the DCV in 48 hours. The sizing steps are as follows:

Step 1: Determine Infiltration Basin DCV

Calculate the DCV using the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1**.

Step 2: Determine the 48-hour Depth

The depth of water that can be drawn down in 48 hours can be calculated using the following equation:

$$d_{48} = K_{DESIGN} \times 4$$

Where:

d_{48} = basin 48-hour drawdown depth, ft

K_{DESIGN} = basin design infiltration rate, in/hr (See **Appendix VII**)

This is the maximum depth of the basin below the overflow device to achieve drawdown in 48 hours.

Step 3: Calculate the Required Infiltrating Area

The required infiltrating area (i.e. basin area at mid ponding depth) can be calculated using the following equation:

$$A = DCV / (d_P)$$

Where:

A = required basin infiltrating area, sq-ft (assumed to be the basin area at mid-ponding depth)

DCV = design capture volume, cu-ft (see Step 1)

d_P = ponding depth, ft (should be equal to or less than d_{48})

Capture Efficiency Method for Infiltration Basins

If BMP geometry has already been defined and deviates from the 48 hour drawdown time, the designer can use the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**) to determine the fraction of the DCV that must be provided to manage 80 percent of average annual runoff volume. This method accounts for drawdown time different than 48 hours.

Step 1: Determine the drawdown time associated with the selected basin geometry

$$DD = (d_P / K_{DESIGN}) \times 12$$

Where:

DD = time to completely drain infiltration basin ponding depth, hours

d_P = ponding depth below overflow device, ft

K_{DESIGN} = basin design infiltration rate, in/hr (See **Appendix VII**)

Step 2: Determine the Required Adjusted DCV for this Drawdown Time

Use the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (**Appendix III.3.2**) to calculate the fraction of the DCV the basin must hold to achieve 80 percent capture of average annual stormwater runoff volume based on the basin drawdown time calculated above.

Step 3: Determine the Basin Infiltrating Area Needed

The required infiltrating area (i.e. basin bottom) can be calculated using the following equation:

$$A = DCV/ ((d_P)$$

Where:

A = required basin infiltrating area, sq-ft (assumed to be the basin area at mid-ponding depth)

DCV = design capture volume, adjusted for drawdown time, cu-ft (see Step 1)

d_P = ponding depth, ft

If the area required is greater than the selected basin area, adjust surface area or adjust ponding depth and recalculate required area until the required area is achieved.

Configuration for Use in a Treatment Train

- Infiltration basins may be preceeded in a treatment train by HSCs in the drainage area, which would reduce the required design volume of the basins.
- Infiltration basins must be preceeded by some form of pretreatment, which may be biotreatment or a treatment control BMP; if an approved biotreatment BMP is used as pretreatment, the overflow from the infiltration basin may be considered “biotreated” for the purposes of meeting the LID requirements.
- The overflow or bypass from an infiltration basin can be routed to a downstream biotreatment BMP and/or a treatment control BMP if additional control is required to achieve LID or treatment control requirements.

Additional References for Design Guidance

- CASQA BMP Handbook for New and Redevelopment:
  http://www.cabmphandbooks.com/Documents/Development/TC-11.pdf
- SMC LID Manual (pp 139):
  http://www.lowimpactdevelopment.org/guest75/pub/All_Projects/SoCal_LID_Manual/SoCalLID_Manual_FINAL_040910.pdf
- Los Angeles County Stormwater BMP Design and Maintenance Manual, Chapter 6:
  http://dpw.lacounty.gov/DES/design_manuals/StormwaterBMPDesignandMaintenance.pdf
- City of Portland Stormwater Management Manual (Basin, page 2-57)
  http://www.portlandonline.com/bes/index.cfm?c=47954&a=202883
- San Diego County LID Handbook Appendix 4 (Factsheet 2):
  http://www.sdcounty.ca.gov/dplu/docs/LID-Appendices.pdf

Bioretention with Underdrain (BIO-1) Fact Sheet

XIV.5. Biotreatment BMP Fact Sheets (BIO)

Conceptual criteria for biotreatment BMP selection, design, and maintenance are contained in **Appendix XII**. These criteria are generally applicable to the design of biotreatment BMPs in Orange County and BMP-specific guidance is provided in the following fact sheets. [24]

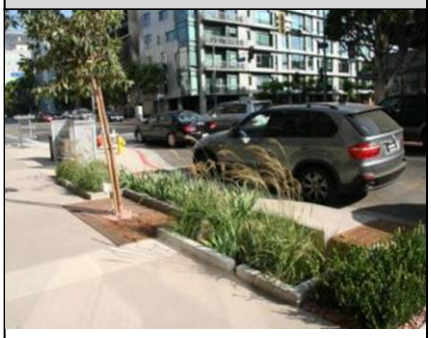
*Note: Biotreatment BMPs shall be designed to provide the maximum feasible infiltration and ET based on criteria contained in **Appendix XI.2**.*

BIO-1: Bioretention with Underdrains

Bioretention stormwater treatment facilities are landscaped shallow depressions that capture and filter stormwater runoff. These facilities function as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. The facilities normally consist of a ponding area, mulch layer, planting soils, and plants. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded, and sequestered by the soil and plants. Bioretention with an underdrain are utilized for areas with low permeability native soils or steep slopes where the underdrain system that routes the treated runoff to the storm drain system rather than depending entirely on infiltration. **Bioretention must be designed without an underdrain** in areas of high soil permeability.

Also known as:

- *Rain gardens with underdrains*
- *Vegetated media filter*
- *Downspout planter boxes*



Bioretention
Source: Geosyntec Consultants

Feasibility Screening Considerations

- If there are no hazards associated with infiltration (such as groundwater concerns, contaminant plumes or geotechnical concerns), **bioinfiltration facilities**, which achieve partial infiltration, should be used to maximize infiltration.

[24] Not all BMPs presented in this section are considered "biofiltration BMPs" under the South Orange County Permit Area. Biofiltration BMPs are vegetated treat-and-release BMPs that filter stormwater through amended soil media that is biologically active, support plant growth, and also promote infiltration and/or evapotranspiration. For projects in South Orange County, the total volume of storage in surface ponding and pores spaces is required to be at least 75% of the remaining DCV that the biofiltration BMP is designed to address. This prevents significant down-sizing of BMPs which otherwise may be possible via routing calculations. Biotreatment BMPs that do not meet this definition are not considered to be LID BMPs, but may be used as treatment control or pre-treatment BMPs. See Section III.7 and Worksheet SOC-1 for guidance.

- Bioretention with underdrain facilities should be lined if contaminant plumes or geotechnical concerns exist. If high groundwater is the reason for infiltration infeasibility, bioretention facilities with underdrains do not need to be lined.

Opportunity Criteria

- Land use may include commercial, residential, mixed use, institutional, and subdivisions. Bioretention may also be applied in parking lot islands, cul-de-sacs, traffic circles, road shoulders, road medians, and next to buildings in planter boxes.
- Drainage area is ≤ 5 acres.
- Area is available for infiltration.
- Site must have adequate relief between land surface and the stormwater conveyance system to permit vertical percolation through the soil media and collection and conveyance in underdrain to stormwater conveyance system.

OC-Specific Design Criteria and Considerations

☐ Ponding depth should not exceed 18 inches; fencing may be required if ponding depth is greater than 6 inches to mitigate drowning.

☐ The minimum soil depth is 2 feet (3 feet is preferred).

☐ The maximum drawdown time of the bioretention ponding area is 48 hours. The maximum drawdown time of the planting media and gravel drainage layer is 96 hours, if applicable.

☐ Infiltration pathways may need to be restricted due to the close proximity of roads, foundations, or other infrastructure. A geomembrane liner, or other equivalent water proofing, may be placed along the vertical walls to reduce lateral flows. This liner should have a minimum thickness of 30 mils.

☐ If infiltration in bioretention location is hazardous due to groundwater or geotechnical concerns, a geomembrane liner must be installed at the base of the bioretention facility. This liner should have a minimum thickness of 30 mils.

☐ The planting media placed in the cell shall be designed per the recommendations contained in MISC-1: Planting/Storage Media

☐ Plant materials should be tolerant of summer drought, ponding fluctuations, and saturated soil conditions for 48 hours; native place species and/or hardy cultivars that are not invasive and do not require chemical inputs should be used to the maximum extent feasible

☐ The bioretention area should be covered with 2-4 inches (average 3 inches) or mulch at the start and an additional placement of 1-2 inches of mulch should be added annually.

☐ Underdrain should be sized with a 6 inch minimum diameter and have a 0.5% minimum slope. Underdrain should be slotted polyvinyl chloride (PVC) pipe; underdrain pipe should be more than 5 feet from tree locations (if space allows).

☐ A gravel blanket or bedding is required for the underdrain pipe(s). At least 0.5 feet of washed aggregate must be placed below, to the top, and to the sides of the underdrain pipe(s).

☐ An overflow device is required at the top of the bioretention area ponding depth.

☐ Dispersed flow or energy dissipation (i.e. splash rocks) for piped inlets should be provided at basin inlet to prevent erosion.

☐ Ponding area side slopes shall be no steeper than 3:1 (H:V) unless designed as a planter box BMP with appropriate consideration for trip and fall hazards.

Simple Sizing Method for Bioretention with Underdrain

If the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1** is used to size a bioretention with underdrain facility, the user selects the basin depth and then determines the appropriate surface area to capture the DCV. The sizing steps are as follows:

Step 1: Determine DCV

Calculate the DCV using the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1**.

Step 2: Verify that the Ponding Depth will Draw Down within 48 Hours

The ponding area drawdown time can be calculated using the following equation:

$DD_P = (d_P / K_{MEDIA}) \times 12$ in/ft

Where:

DD_P = time to drain ponded water, hours

d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

K_{MEDIA} = media design infiltration rate, in/hr (equivalent to the media hydraulic conductivity with a factor of safety of 2; K_{MEDIA} of 2.5 in/hr should be used unless other information is available)

If the drawdown time exceeds 48 hours, adjust ponding depth and/or media infiltration rate until 48 hour drawdown time is achieved.

Step 3: Determine the Depth of Water Filtered During Design Capture Storm

The depth of water filtered during the design capture storm can be estimated as the amount routed through the media during the storm, or the ponding depth, whichever is smaller.

$d_{FILTERED}$ = Minimum [$((K_{MEDIA} \times T_{ROUTING})/12)$, d_P]

Where:

$d_{FILTERED}$ = depth of water that may be considered to be filtered during the design storm event, ft

K_{MEDIA} = media design infiltration rate, in/hr (equivalent to the media hydraulic conductivity with a factor of safety of 2; K_{MEDIA} of 2.5 in/hr should be used unless other information is available)

$T_{ROUTING}$ = storm duration that may be assumed for routing calculations; this should be assumed to be no greater than 3 hours. If the designer desires to account for further routing effects, the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**) should be used.

d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

Step 4: Determine the Facility Surface Area

$A = DCV/ (d_P + d_{FILTERED})$

Where:

A = required area of bioretention facility, sq-ft

DCV = design capture volume, cu-ft

$d_{FILTERED}$ = depth of water that may be considered to be filtered during the design storm event, ft

d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

In South Orange County, the provided ponding plus pore volume must be checked to demonstrate that it is greater than 0.75 of the remaining DCV that this BMP is designed to address. See Section III.7 and Worksheet SOC-1.

Capture Efficiency Method for Bioretention with Underdrains

If the bioretention geometry has already been defined and the user wishes to account more explicitly for routing, the user can determine the required footprint area using the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**) to determine the fraction of the DCV that must be provided to manage 80 percent of average annual runoff volume. This method accounts for drawdown time different than 48 hours.

Step 1: Determine the drawdown time associated with the selected basin geometry

$DD = (d_p / K_{DESIGN}) \times 12$ in/ft

Where:

DD = time to completely drain infiltration basin ponding depth, hours

d_P = bioretention ponding depth, ft (should be less than or equal to 1.5 ft)

K_{DESIGN} = design media infiltration rate, in/hr (assume 2.5 inches per hour unless otherwise proposed)

If drawdown is less than 3 hours, the drawdown time should be rounded to 3 hours or the Capture Efficiency Method for Flow-based BMPs (See **Appendix III.3.3**) shall be used.

Step 2: Determine the Required Adjusted DCV for this Drawdown Time

Use the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**) to calculate the fraction of the DCV the basin must hold to achieve 80 percent capture of average annual stormwater runoff volume based on the basin drawdown time calculated above.

Step 3: Determine the Basin Infiltrating Area Needed

The required infiltrating area (i.e. the surface area of the top of the media layer) can be calculated using the following equation:

$A = \text{Design Volume} / d_p$

Where:

A = required infiltrating area, sq-ft (measured at the media surface)

Design Volume = fraction of DCV, adjusted for drawdown, cu-ft (see Step 2)

d_p = ponding depth of water stored in bioretention area, ft (from Step 1)

This does not include the side slopes, access roads, etc. which would increase bioretention footprint. If the area required is greater than the selected basin area, adjust surface area or adjust ponding depth and recalculate required area until the required area is achieved.

In South Orange County, the provided ponding plus pore volume must be checked to demonstrate that it is greater than 0.75 of the remaining DCV that this BMP is designed to address. See Section III.7 and Worksheet SOC-1.

Configuration for Use in a Treatment Train

- Bioretention areas may be preceeded in a treatment train by HSCs in the drainage area, which would reduce the required design volume of the bioretention cell. For example, bioretention could be used to manage overflow from a cistern.
- Bioretention areas can be used to provide pretreatment for underground infiltration systems.

Additional References for Design Guidance

- CASQA BMP Handbook for New and Redevelopment: **http://www.cabmphandbooks.com/Documents/Development/TC-32.pdf**

- SMC LID Manual (pp 68): **http://www.lowimpactdevelopment.org/guest75/pub/All_Projects/SoCal_LID_Manual/SoCalLID_Manual_FINAL_040910.pdf**
- Los Angeles County Stormwater BMP Design and Maintenance Manual, Chapter 5: **http://dpw.lacounty.gov/DES/design_manuals/StormwaterBMPDesignandMaintenance.pdf**
- San Diego County LID Handbook Appendix 4 (Factsheet 7): **http://www.sdcounty.ca.gov/dplu/docs/LID-Appendices.pdf**

  Los Angeles Unified School District (LAUSD) Stormwater Technical Manual, Chapter 4: **http://www.laschools.org/employee/design/fs-studies-and-reports/download/white_paper_report_material/Storm_Water_Technical_Manual_2009-opt-red.pdf?version_id=76975850**
- County of Los Angeles Low Impact Development Standards Manual, Chapter 5: **http://dpw.lacounty.gov/wmd/LA_County_LID_Manual.pdf**

Proprietary Biotreatment (BIO-7) Fact Sheet

BIO-7: Proprietary Biotreatment

Proprietary biotreatment devices are devices that are manufactured to mimic natural systems such as bioretention areas by incorporating plants, soil, and microbes engineered to provide treatment at higher flow rates or volumes and with smaller footprints than their natural counterparts. Incoming flows are typically filtered through a planting media (mulch, compost, soil, plants, microbes, etc.) and either infiltrated or collected by an underdrain and delivered to the storm water conveyance system. Tree box filters are an increasingly common type of proprietary biotreatment device that are installed at curb level and filled with a bioretention type soil. For low to moderate flows they operate similarly to bioretention systems and are bypassed during high flows. Tree box filters are highly adaptable solutions that can be used in all types of development and in all types of soils but are especially applicable to dense urban parking lots, street, and roadways.

Also known as:

- *Catch basin planter box*
- *Bioretention vault*
- *Tree box filter*

Proprietary biotreatment
Source: http://www.americastusa.com /index.php/filterra/

Feasibility Screening Considerations

- Proprietary biotreatment devices that are unlined may cause incidental infiltration. Therefore, an evaluation of site conditions should be conducted to evaluate whether the BMP should include an impermeable liner to avoid infiltration into the subsurface.

Opportunity Criteria

- Drainage areas of 0.25 to 1.0 acres.
- Land use may include commercial, residential, mixed use, institutional, and subdivisions. Proprietary biotreatment facilities may also be applied in parking lot islands, traffic circles, road shoulders, and road medians.
- Must not adversely affect the level of flood protection provided by the drainage system.

OC-Specific Design Criteria and Considerations

☐ Frequent maintenance and the use of screens and grates to keep trash out may decrease the likelihood of clogging and prevent obstruction and bypass of incoming flows.

☐ Consult proprietors for specific criteria concerning the design and performance.

☐ Proprietary biotreatment may include specific media to address pollutants of concern. However, for proprietary device to be considered a biotreatment device the media must be capable of supporting rigorous growth of vegetation.

☐ Proprietary systems must be acceptable to the reviewing agency. Reviewing agencies shall have the discretion to request performance information. Reviewing agencies shall have the discretion to deny the use of a proprietary BMP on the grounds of performance, maintenance considerations, or other relevant factors.

☐ In right of way areas, plant selection should not impair traffic lines of site. Local jurisdictions may also limit plant selection in keeping with landscaping themes.

Computing Sizing Criteria for Proprietary Biotreatment Device

- Proprietary biotreatment devices can be volume based or flow-based BMPs.
- Volume-based proprietary devices should be sized using the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1** or the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs described in **Appendix III.3.2**.
- The required design flowrate for flow-based proprietary devices should be computed using the Capture Efficiency Method for Flow-based BMPs described in **Appendix III.3.3)**.

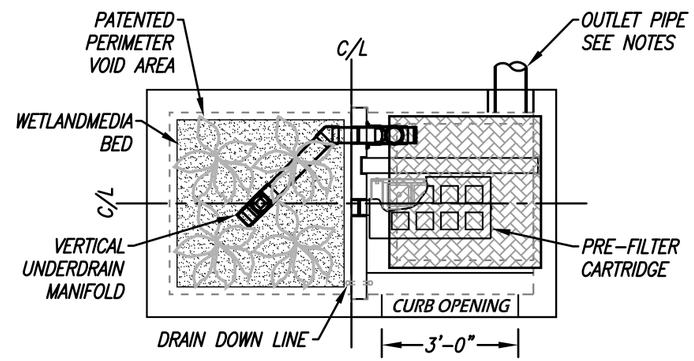
In South Orange County, the provided ponding plus pore volume must be checked to demonstrate that it is greater than 0.75 of the remaining DCV that this BMP is designed to address. Many propretary biotreatment BMPs will not be able to meet the definition of "biofiltration" that applies in South Orange County. See Section III.7 and Worksheet SOC-1.

Additional References for Design Guidance

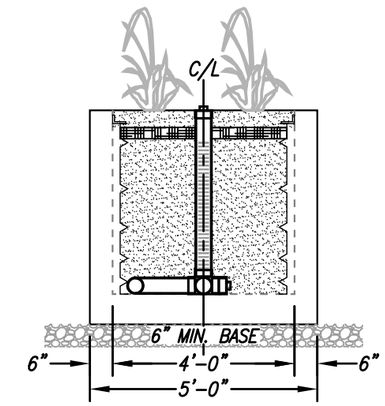
- Los Angeles Unified School District (LAUSD) Stormwater Technical Manual, Chapter 4: **http://www.laschools.org/employee/design/fs-studies-and-reports/download/white_paper_report_material/Storm_Water_Technical_Manual_2009-opt-red.pdf?version_id=76975850**
- Los Angeles County Stormwater BMP Design and Maintenance Manual, Chapter 9: **http://dpw.lacounty.gov/DES/design_manuals/StormwaterBMPDesignandMaintenance.pdf**
- Santa Barbara BMP Guidance Manual, Chapter 6: **http://www.santabarbaraca.gov/NR/rdonlyres/91D1FA75-C185-491E-A882-49EE17789DF8/0/Manual_071008_Final.pdf**

Modular Wetland Systems

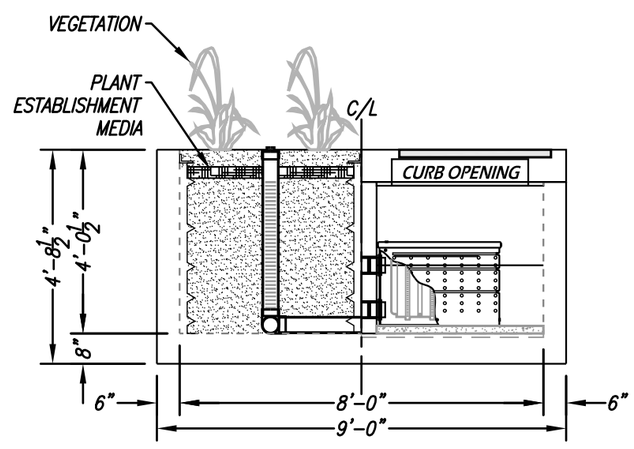
SITE SPECIFIC DATA			
PROJECT NAME		Cielo Vista Project	
PROJECT LOCATION		Yorba Linda, CA-County of Orange	
STRUCTURE ID		BMP ID A9	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
1,245 (combined)		0.116 cfs (combined)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PARKWAY	OPEN PLANTER	PARKWAY
FRAME & COVER	36" X 36"	N/A	N/A
WETLANDMEDIA VOLUME (CY)			2.03
WETLANDMEDIA DELIVERY METHOD			TBD
ORIFICE SIZE (DIA. INCHES)			ø1.53"
MAXIMUM PICK WEIGHT (LBS)			15000
NOTES: Conceptual Report - SD inverts and rim elevations are TBD.			



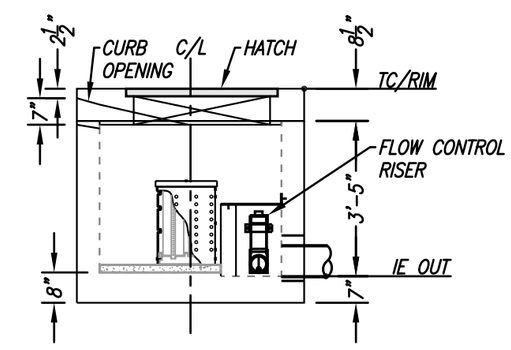
PLAN VIEW



LEFT END VIEW
BIOFILTRATION



ELEVATION VIEW



RIGHT END VIEW
PRETREATMENT/DISCHARGE

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON–SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.

TREATMENT FLOW (CFS)	0.115
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	TBD
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

THE PRODUCT DESCRIBED MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

PROPRIETARY AND CONFIDENTIAL:

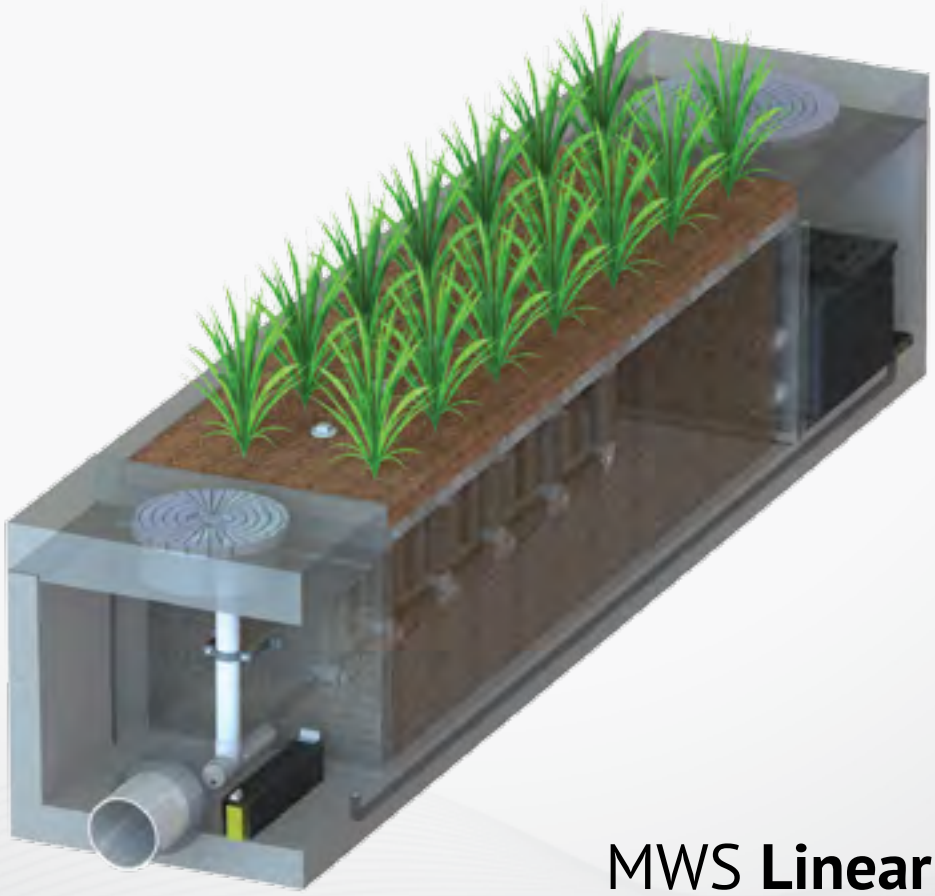
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF MODULAR WETLANDS SYSTEMS. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF MODULAR WETLANDS SYSTEMS IS PROHIBITED.

MODULAR WETLANDS
www.ModularWetlands.com | (855) 5MOD-WET

MWS-L-4-8-C
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

MODULAR WETLANDS™

*Advanced **Stormwater** Biofiltration*



MWS **Linear**

Contents

1 Introduction

2 Applications

3 Configurations

4 Advantages

5 Operation

6 Orientations | Bypass

7 Performance | Approvals

8 Sizing

9 Installation | Maintenance | Plants

The Urban Impact

For hundreds of years natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as our cities grow and develop, these natural wetlands have perished under countless roads, rooftops, and parking lots.

Plant A Wetland

Without natural wetlands our cities are deprived of water purification, flood control, and land stability. Modular Wetlands and the MWS Linear re-establish nature's presence and rejuvenate water ways in urban areas.

MWS Linear

The Modular Wetland System Linear represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint and higher treatment capacity. While most biofilters use little or no pre-treatment, the MWS Linear incorporates an advanced pre-treatment chamber that includes separation and pre-filter cartridges. In this chamber sediment and hydrocarbons are removed from runoff before it enters the biofiltration chamber, in turn reducing maintenance costs and improving performance.

Applications

The MWS Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications - treating rooftops, streetscapes, parking lots, and industrial sites.

Industrial

Many states enforce strict regulations for discharges from industrial sites. The MWS Linear has helped various sites meet difficult EPA mandated effluent limits for dissolved metals and other pollutants.

Residential

Low to high density developments can benefit from the versatile design of the MWS Linear. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.

Streets

Street applications can be challenging due to limited space. The MWS Linear is very adaptable, and offers the smallest footprint to work around the constraints of existing utilities on retrofit projects.

Parking Lots

Parking lots are designed to maximize space and the MWS Linear's 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.

Commercial

Compared to bioretention systems, the MWS Linear can treat far more area in less space - meeting treatment and volume control requirements.

Mixed Use

The MWS Linear can be installed as a raised planter to treat runoff from rooftops or patios, making it perfect for sustainable "live-work" spaces.

More applications are available on our website: www.ModularWetlands.com/Applications

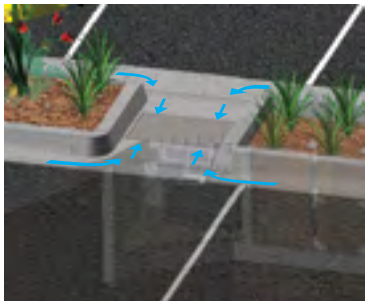
- Agriculture
- Reuse
- Low Impact Development
- Waste Water

Configurations

The MWS Linear is the preferred biofiltration system of Civil Engineers across the country due to its versatile design. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your stormdrain design.

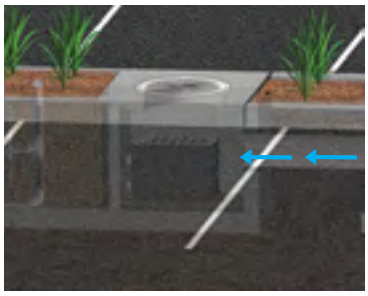
Curb Type

The *Curb Type* configuration accepts sheet flow through a curb opening and is commonly used along road ways and parking lots. It can be used in sump or flow by conditions. Length of curb opening varies based on model and size.



Grate Type

The *Grate Type* configuration offers the same features and benefits as the *Curb Type* but with a grated/drop inlet above the systems pre-treatment chamber. It has the added benefit of allowing for pedestrian access over the inlet. ADA compliant grates are available to assure easy and safe access. The *Grate Type* can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



Vault Type

The system's patented horizontal flow biofilter is able to accept inflow pipes directly into the pre-treatment chamber, meaning the MWS Linear can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/bioretention systems. Another benefit of the "pipe in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.

Downspout Type

The *Downspout Type* is a variation of the *Vault Type* and is designed to accept a vertical downspout pipe from roof top and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

Advantages & Operation

The MWS Linear is the most efficient and versatile biofiltration system on the market, and the only system with horizontal flow which improves performance, reduces footprint, and minimizes maintenance. Figure-1 and Figure-2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.

Featured Advantages

- Horizontal Flow Biofiltration
- Greater Filter Surface Area
- Pre-Treatment Chamber
- Patented Perimeter Void Area
- Flow Control
- No Depressed Planter Area

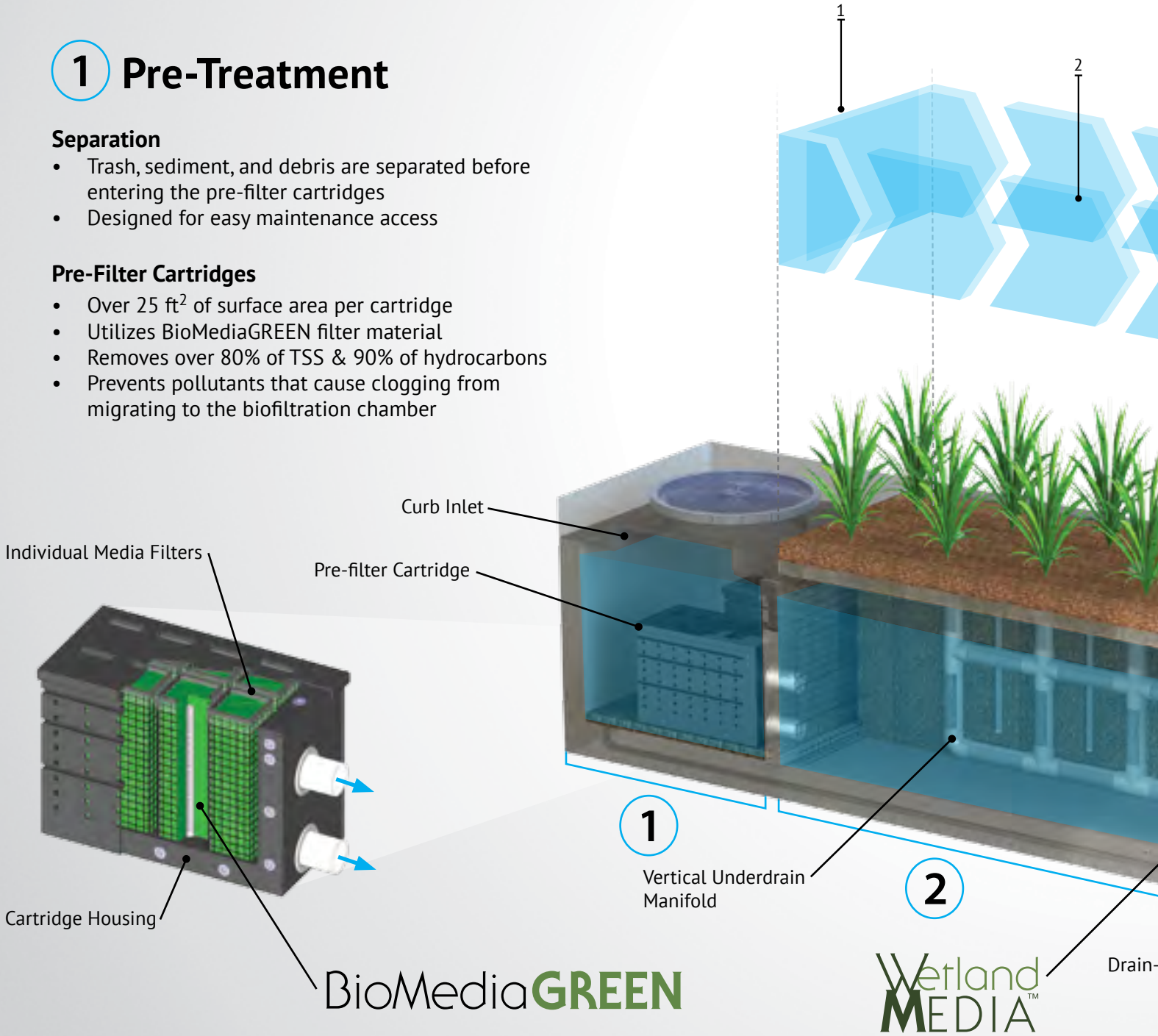
1 Pre-Treatment

Separation

- Trash, sediment, and debris are separated before entering the pre-filter cartridges
- Designed for easy maintenance access

Pre-Filter Cartridges

- Over 25 ft^2 of surface area per cartridge
- Utilizes BioMediaGREEN filter material
- Removes over 80% of TSS & 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber



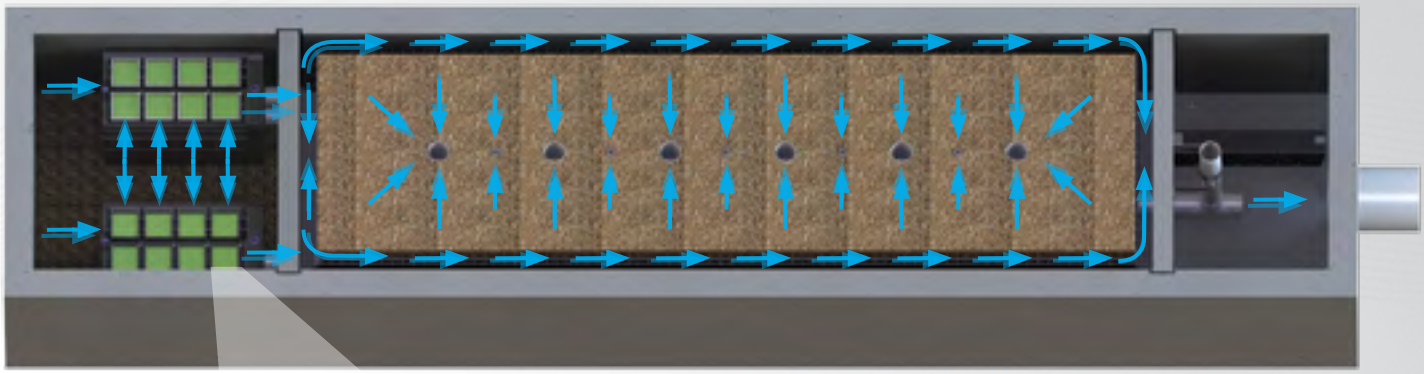


Fig. 2 - Top View

2x to 3x More Surface Area Than Traditional Downward Flow Bioretention Systems.

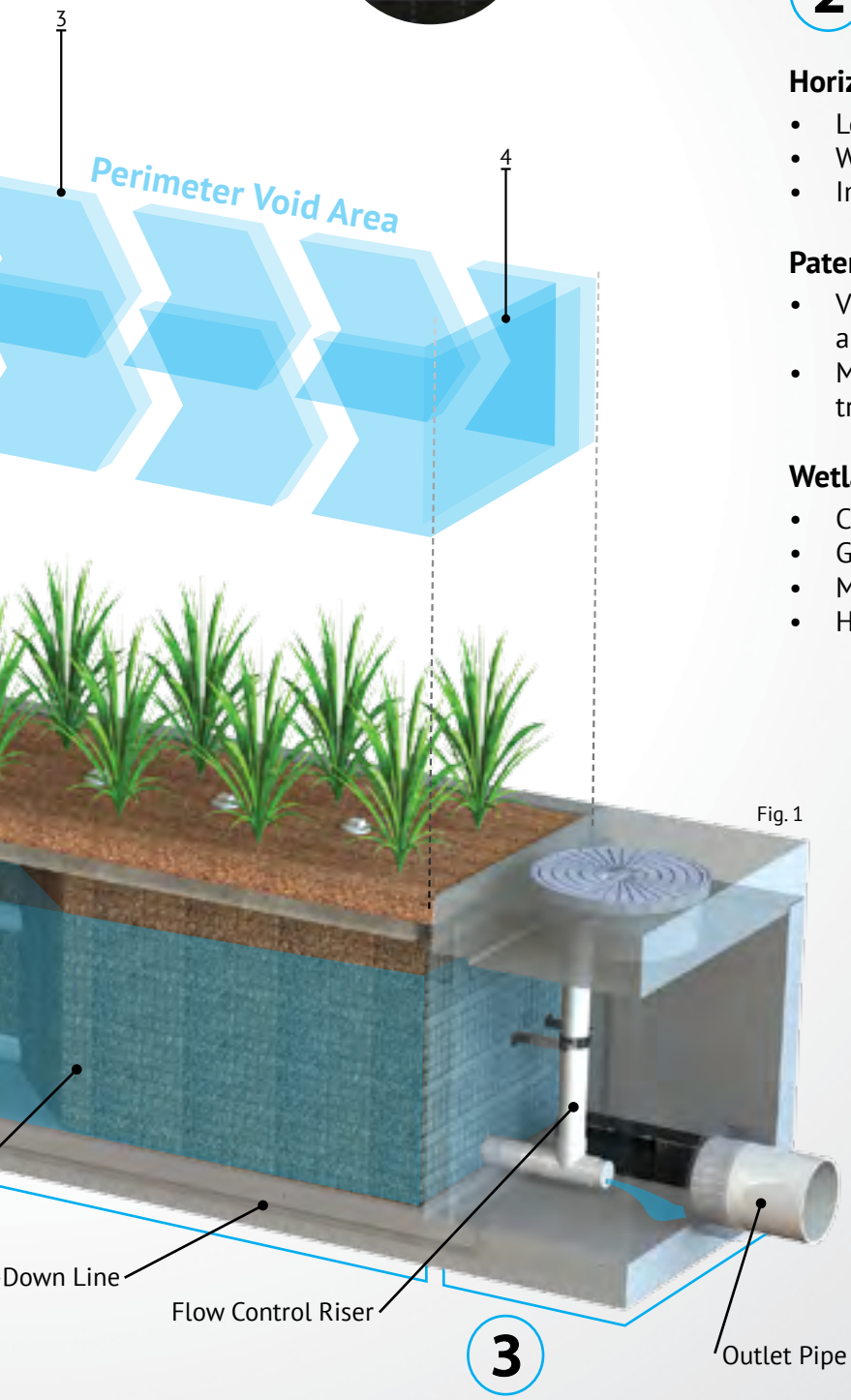


Fig. 1

2 Biofiltration

Horizontal Flow

- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

Patented Perimeter Void Area

- Vertically extends void area between the walls and the WetlandMEDIA on all four sides.
- Maximizes surface area of the media for higher treatment capacity

WetlandMEDIA

- Contains no organics and removes phosphorus
- Greater surface area and 48% void space
- Maximum evapotranspiration
- High ion exchange capacity and light weight

3 Discharge

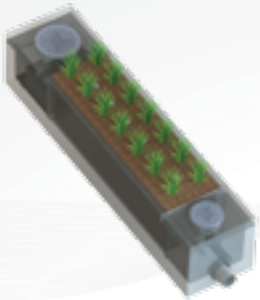
Flow Control

- Orifice plate controls flow of water through WetlandMEDIA to a level lower than the media's capacity.
- Extends the life of the media and improves performance

Drain-Down Filter

- The Drain-Down is an optional feature that completely drains the pre-treatment chamber
- Water that drains from the pre-treatment chamber between storm events will be treated

Orientations



Side-By-Side

The *Side-By-Side* orientation places the pre-treatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk. This orientation also offers internal bypass options as discussed below.

End-To-End

The *End-To-End* orientation places the pre-treatment and discharge chambers on opposite ends of the biofiltration chamber therefore minimizing the width of the system to 5 ft (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation. One limitation of this orientation is bypass must be external.

Bypass

Internal Bypass Weir (Side-by-Side Only)

The *Side-By-Side* orientation places the pre-treatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system's treatment capacity, thus allowing bypass from the pre-treatment chamber directly to the discharge chamber.

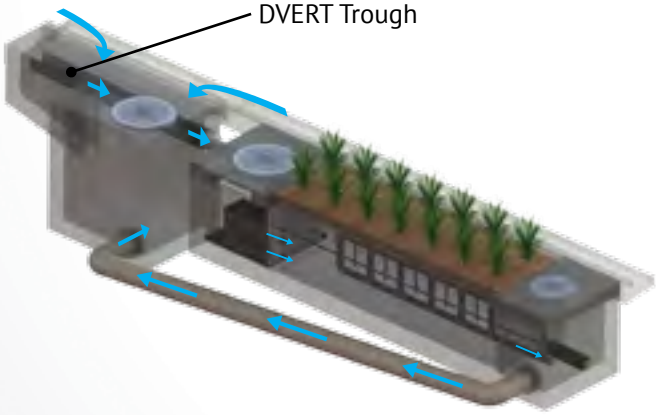
External Diversion Weir Structure

This traditional offline diversion method can be used with the MWS Linear in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the MWS Linear for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

Flow By Design

This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the MWS Linear and into the standard inlet downstream.

DVERT Low Flow Diversion



This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the MWS Linear via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels them over to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allows the MWS Linear to be installed anywhere space is available.

Performance

The MWS Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons and bacteria. Since 2007 the MWS Linear has been field tested on numerous sites across the country. With it's advanced pre-treatment chamber and innovative horizontal flow biofilter, the system is able to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. With the same biological processes found in natural wetlands, the MWS Linear harnesses natures ability to process, transform, and remove even the most harmful pollutants.

Approvals

The MWS Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation, and perhaps the world.

Washington State TAPE Approved

The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft^2 loading rate. The highest performing BMP on the market for all main pollutant categories.

TSS	Total Phosphorus	Ortho Phosphorus	Nitrogen	Dissolved Zinc	Dissolved Copper	Total Zinc	Total Copper	Motor Oil
85%	64%	67%	45%	66%	38%	69%	50%	95%

DEQ Assignment

The Virginia Department of Environmental Quality assigned the MWS Linear, the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) Technical Criteria.

MASTEP Evaluation

The University of Massachusetts at Amherst – Water Resources Research Center, issued a technical evaluation report noting removal rates up to 84% TSS, 70% Total Phosphorus, 68.5% Total Zinc, and more.

Rhode Island DEM Approved

Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% Pathogens, 30% Total Phosphorus for discharges to freshwater systems, and 30% Total Nitrogen for discharges to saltwater or tidal systems.

Flow Based Sizing

The MWS Linear can be used in stand alone applications to meet treatment flow requirements. Since the MWS Linear is the only biofiltration system that can accept inflow pipes several feet below the surface it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

Treatment Flow Sizing Table

Model #	Dimensions	WetlandMedia Surface Area	Treatment Flow Rate (cfs)
MWS-L-4-4	4' x 4'	23 ft^2	0.052
MWS-L-4-6	4' x 6'	32 ft^2	0.073
MWS-L-4-8	4' x 8'	50 ft^2	0.115
MWS-L-4-13	4' x 13'	63 ft^2	0.144
MWS-L-4-15	4' x 15'	76 ft^2	0.175
MWS-L-4-17	4' x 17'	90 ft^2	0.206
MWS-L-4-19	4' x 19'	103 ft^2	0.237
MWS-L-4-21	4' x 21'	117 ft^2	0.268
MWS-L-8-8	8' x 8'	100 ft^2	0.230
MWS-L-8-12	8' x 12'	151 ft^2	0.346
MWS-L-8-16	8' x 16'	201 ft^2	0.462

Volume Based Sizing

Many states require treatment of a water quality volume and do not offer the option of flow based design. The MWS Linear and its unique horizontal flow makes it the only biofilter that can be used in volume based design installed downstream of ponds, detention basins, and underground storage systems.

Treatment Volume Sizing Table

Model #	Treatment Capacity (cu. ft.) @ 24-Hour Drain Down	Treatment Capacity (cu. ft.) @ 48-Hour Drain Down
MWS-L-4-4	1140	2280
MWS-L-4-6	1600	3200
MWS-L-4-8	2518	5036
MWS-L-4-13	3131	6261
MWS-L-4-15	3811	7623
MWS-L-4-17	4492	8984
MWS-L-4-19	5172	10345
MWS-L-4-21	5853	11706
MWS-L-8-8	5036	10072
MWS-L-8-12	7554	15109
MWS-L-8-16	10073	20145

Installation

The MWS Linear is simple, easy to install, and has a space efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles pre-cast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians are available to supervise installations and provide technical support.

Maintenance

Reduce your maintenance costs, man hours, and materials with the MWS Linear. Unlike other biofiltration systems that provide no pre-treatment, the MWS Linear is a self-contained treatment train which incorporates simple and effective pre-treatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pre-treatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pre-treatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter cartridges is required for long term operation and there is absolutely no need to replace expensive biofiltration media.

Plant Selection

Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the MWS Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the MWS Linear, giving the plants more "contact time" so that pollutants are more successfully decomposed, volatilized and incorporated into the biomass of The MWS Linear's micro/macro flora and fauna.

A wide range of plants are suitable for use in the MWS Linear, but selections vary by location and climate. View suitable plants by selecting the list relative to your project location's hardy zone.

Please visit www.ModularWetlands.com/Plants for more information and various plant lists.

SECTION VII EDUCATIONAL MATERIALS

The educational materials included in this WQMP are provided to inform people involved in future uses, activities, or ownership of the site about the potential pitfalls associated with careless storm water management. "The Ocean Begins at Your Front Door" provides users with information about storm water that is/will be generated on site, what happens when water enters a storm drain, and its ultimate fate, discharging into the ocean. Also included are activities guidelines to educate anyone who is or will be associated with activities that have a potential to impact storm water runoff quality, and provide a menu of BMPs to effectively reduce the generation of storm water runoff pollutants from a variety of activities. The educational materials that may be used for the proposed project will be included in Appendix C of the preliminary and/or final WQMP to be developed in the future, and are listed below.

EDUCATION MATERIALS			
Residential Materials (http://www.ocwatersheds.com)	**Check If Attached**	**Business Materials (http://www.ocwatersheds.com)**	**Check If Attached**
The Ocean Begins at Your Front Door	☒	Tips for the Automotive Industry	☐
Tips for Car Wash Fund-raisers	☐	Tips for Using Concrete and Mortar	☐
Tips for the Home Mechanic	☐	Tips for the Food Service Industry	☐
Homeowners Guide for Sustainable Water Use	☒	Proper Maintenance Practices for Your Business	☐
Household Tips	☒	**Other Materials (http://www.ocwatersheds.com) (http://www.cabmphandbooks.com)**	**Check If Attached**
Proper Disposal of Household Hazardous Waste	☒		
Recycle at Your Local Used Oil Collection Center (North County)	☒	DF-1 Drainage System Operation & Maintenance	☒
Recycle at Your Local Used Oil Collection Center (Central County)	☐	R-1 Automobile Repair & Maintenance	☐
Recycle at Your Local Used Oil Collection Center (South County)	☐	R-2 Automobile Washing	☐
Tips for Maintaining Septic Tank Systems	☐	R-3 Automobile Parking	☒
Responsible Pest Control	☒	R-4 Home & Garden Care Activities	☒
Sewer Spill	☒	R-5 Disposal of Pet Waste	☐
Tips for the Home Improvement Projects	☒	R-6 Disposal of Green Waste	☒
Tips for Horse Care	☐	R-7 Household Hazardous Waste	☒
Tips for Landscaping and Gardening	☒	R-8 Water Conservation	☒
Tips for Pet Care	☐	SD-10 Site Design & Landscape Planning	☒
Tips for Pool Maintenance	☒	SD-11 Roof Runoff Controls	☒
Tips for Residential Pool, Landscape and Hardscape Drains	☒	SD-12 Efficient Irrigation	☒
Tips for Projects Using Paint	☒	SD-13 Storm Drain Signage	☒
Tips for Protecting Your Watershed	☒	SD-31 Maintenance Bays & Docs	☐
Other: Children's Brochure	☐	SD-32 Trash Storage Areas	☐

APPENDICES

Appendix A ..... Supporting Calculations
Appendix A.1 ..... Existing Condition Hydrology Calculations for Hydromodification
Appendix A.2 ..... Proposed Condition Hydrology Calculations for Hydromodification
Appendix B ..... Notice of Transfer of Responsibility
Appendix C ..... Educational Materials (Reserved for Preliminary/Final WQMP)
Appendix D ..... BMP Maintenance Supplement / O&M Plan
Appendix E ..... Conditions of Approval (Reserved for Final WQMP)
Appendix F ..... Infiltration Test Results (Reserved for Preliminary/Final WQMP)

Appendix A

Supporting Calculations

Worksheet J: Summary of Harvested Water Demand and Feasibility

1	What demands for harvested water exist in the tributary area (check all that apply):			
2	Toilet and urinal flushing		X	
3	Landscape irrigation		X	
4	Other:_____			
5	What is the design capture storm depth? (Figure III.1)	d	0.9	inches
6	What is the project size?	A	27.76	ac
7	What is the acreage of impervious area?	IA	13.05	ac
For projects with multiple types of demand (toilet flushing, irrigation demand, and/or other demand)				
8	What is the minimum use required for partial capture? (Table X.6)			gpd
9	What is the project estimated wet season total daily use (Section X.2)?			gpd
10	Is partial capture potentially feasible? (Line 9 > Line 8?)			
For projects with only toilet flushing demand				
11	What is the minimum TUTIA for partial capture? (Table X.7)	110		
12	What is the project estimated TUTIA?	34.3		
13	Is partial capture potentially feasible? (Line 12 > Line 11?)	No		
For projects with only irrigation demand				
14	What is the minimum irrigation area required based on conservation landscape design? (Table X.8)	1.01		ac
15	What is the proposed project irrigated area? (multiply conservation landscaping by 1; multiply active turf by 2)	1.12		ac
16	Is partial capture potentially feasible? (Line 15 > Line 14?)	No*		

Provide supporting assumptions and citations for controlling demand calculation:
See Irrigation Demand Calculations Worksheet attached for EAWU method and Drawdown times.

<u>Lines Items</u>
(12) 112 residences x 4 per household / 13.05 ac impervious = 34.3 toilet users/impervious acre
(15) 14.71 ac irrigated area / 13.05 ac impervious area = 1.12
(16) *Achieves 40% capture but takes 31.1 days to drawdown DCV. Therefore it is **not feasible**. See attached Worksheet.

Harvest & Reuse Irrigation Demand Calculations - Planning Area 1

Project: CIELO VISTA
6-Aug-15

Storm Water Design Caputre Volume (SQDV)

Drainage Area / Land Use Type	Impervious Area (ac)	Irrigated Area (ac)	% impervious	Runoff Coefficient	Design Storm Depth (in)	Drainage Area (acres)	DCV (ft^3)	DCV (gal)
Planning Area 1	13.05	14.71	47%	0.5025	0.9	27.760	**45,572.7**	**340,884**

	Eto
Irvine	3.00
Laguna Beach	2.75
Santa Ana	2.93

Modified

$$EAWU = \frac{(Eto \times KL \times LA \times 0.015)}{IE}$$

$$EIATA = \frac{LA \times KL}{(IE \times \text{Tributary Imp. Area})}$$

Low Water Use Landscaping

Drainage Area / Land Use Type	Total Area (ac)	Total Area (sf)	% Impervious	Impervious (sf)	Pervious / LA (sf)	Eto	KL	Modified EAWU	EAWU/ Impervious Acre	Minimum EAWU/ Impervious Acre (Table X.6)	Feasible?	EIATA	Minimum EIATA (Table X.8)	Drawdown (days)	Drawdown (hours)
Planning Area 1	27.760	1,209,226	47%	568,336	640,890	2.93	0.35	10,953.87	839.56	730	Yes	0.44	1.01	31.1	747

TABLE X.6: HARVESTED WATER DEMAND THRESHOLDS FOR MINIMUM PARTIAL CAPTURE

Design Capture Storm Depth, inches	Wet Season Demand Required for Minimum Partial Capture, gpd per impervious acre
0.60	490
0.65	530
0.70	570
0.75	610
0.80	650
0.85	690
0.90	730
0.95	770
1.00	810

TABLE X.8: MINIMUM IRRIGATED AREA FOR POTENTIAL PARTIAL CAPTURE FEASIBILITY

General Landscape Type	Conservation Design: KL = 0.35			Active Turf Areas: KL = 0.7		
Closest ET Station	Irvine	Santa Ana	Laguna	Irvine	Santa Ana	Laguna
Design Capture Storm Depth, inches	Minimum Required Irrigated Area per Tributary Impervious Acre for Potential Partial Capture, ac/ac					
0.60	0.66	0.68	0.72	0.33	0.34	0.36
0.65	0.72	0.73	0.78	0.36	0.37	0.39
0.70	0.77	0.79	0.84	0.39	0.39	0.42
0.75	0.83	0.84	0.9	0.41	0.42	0.45
0.80	0.88	0.9	0.96	0.44	0.45	0.48
0.85	0.93	0.95	1.02	0.47	0.48	0.51
0.90	0.99	1.01	1.08	0.49	0.51	0.54
0.95	1.04	1.07	1.14	0.52	0.53	0.57
1.00	1.1	1.12	1.2	0.55	0.56	0.6

Source: Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs). March 22, 2011. Appendix X.

Worksheet C: Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs

Project: CIELO VISTA PLANNING AREA 1

Date: August 6, 2015

			DMA A1	DMA A3	DMA A4	DMA A5	DMA A7	DMA A8	
Step 1: Determine the design capture storm depth used for calculating volume									
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	1.35	1.35	1.35	1.35	1.35	1.35	inches
2	Enter calculated drawdown time of the proposed BMP based on equation provided in applicable BMP Fact Sheet, *T* (hours)	T=	7.20	7.20	7.20	7.20	7.20	7.20	hours
3	Using Figure III.2, determine the "fraction of design capture storm depth" at which the BMP drawdown time (T) line achieves 80% capture efficiency, X_1	X_1=	0.43	0.43	0.43	0.43	0.43	0.43	
4	Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0	0	0	0	0	0	inches
5	Enter capture efficiency corresponding to d_{HSC}, Y_2 *(Worksheet A)*	Y_2=	0%	0%	0%	0%	0%	0%	%
6	Using Figure III.2, determine the fraction of "design capture storm depth" at which the drawdown time (T) achieves the equivalent of the upstream capture efficiency (Y_2), X_2	X_2=	0	0	0	0	0	0	
7	Calculate the fraction of design volume that must be provided by BMP, *fraction* = $X_1 - X_2$	fraction=	0.43	0.43	0.43	0.43	0.43	0.43	
8	Calculate the resultant design capture storm depth (inches), $d_{fraction}$ = *fraction* × *d*	$d_{fraction}$=	0.5738	0.5738	0.5738	0.5738	0.5738	0.5738	inches
Step 2: Calculate the DCV									
1	Enter Project area tributary to BMP(s), *A* (acres)	A=	9.349	4.658	5.939	6.038	1.610	2.190	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	40.0%	40.0%	31.0%	46.0%	40.0%	40.0%	%
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	0.450	0.450	0.383	0.495	0.450	0.450	
4	Calculate runoff volume, V_{design} = *(C x* $d_{rfraction}$ *x A x 43560 x (1/12))*	V_{design}=	8,762.1	4,365.6	4,731.2	6,224.8	1,508.9	2,052.5	cu-ft
Supporting Calculations									
Describe System:									
Bioretention BMP Sizing accounts for 1.5 times DCV not retained by converting design storm depth from 0.9" to 1.35"									
		Bioretention with Underdrains (BIO-1)							
		Ponding Depth (d_p) =	*1.5*	*1.5*	*1.5*	*1.5*	*1.5*	*1.5*	ft
		Media Filtration Rate (K_{design}) =	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	in/hr
		Surface Area Needed (Amin) =	*5841.4*	*2910.4*	*3154.2*	*4149.9*	*1006.0*	*1368.3*	ft^2
		Surface Area Provided (A) =	*8400*	*3085*	*5120*	*5100*	*8400*	*8400*	ft^2
		Total Volume Bio-Treated (V) =	*12600*	*4627.5*	*7680*	*7650*	*12600*	*12600*	ft^3
			Basin D	*Basin C*	*Basin A*	*Basin B*	*Basin D*	*Basin D*	
Provide drawdown time calculations per applicable BMP Fact Sheet:									
		Per Fact Sheet BIO-1, Drawdown (T) = (dp / Kdesign) x 12							
		Drawdown (T) =	*7.20*	*7.20*	*7.20*	*7.20*	*7.20*	*7.20*	hours

Storm Water Quality Design Calculations

CIELO VISTA PLANNING AREA 1
6-Aug-15

Drainage Area Name / DMA	BMP	Total Drainage Area (ft^2)	Total Drainage Area (acres)	Total Pervious Area (ft^2)	Calculated % impervious	Assumed % impervious	Runoff Coefficient	Design Storm Depth (in)	Average or Estimated Tc (min)	Rainfall Intensity (in/hr)	Simple Method DCV (ft^3)	Q_{Design} (cfs)
Planning Area 1		1484931.40	34.089		100%	34%	0.406	1.35	5	0.26	**67,769.3**	**3.596**
DMA A1	**Basin D (BIO-1)**	407247.47	9.349		100%	40%	0.450	1.35	5	0.26	**20,616.6**	**1.094**
DMA A2	Off-site Slope	98562.74	2.263		100%	5%	0.188	1.35	5	0.26	**2,079.3**	**0.110**
DMA A3	**Basin C (BIO-1)**	202882.56	4.658		100%	40%	0.450	1.35	5	0.26	**10,271.9**	**0.545**
DMA A4	**Basin A (BIO-1)**	258714.97	5.939		100%	31%	0.383	1.35	5	0.26	**11,132.3**	**0.591**
DMA A5	**Basin B (BIO-1)**	262996.36	6.038		100%	46%	0.495	1.35	5	0.26	**14,646.7**	**0.777**
DMA A6	Off-site Slope	14328.90	0.329		100%	5%	0.188	1.35	5	0.26	**302.3**	**0.016**
DMA A7	**Basin D (BIO-1)**	70140.18	1.610		100%	40%	0.450	1.35	5	0.26	**3,550.4**	**0.188**
DMA A8	**Basin D (BIO-1)**	95,390.3	2.190		100%	40%	0.450	1.35	5	0.26	**4,829.4**	**0.256**
DMA A9	**Modular Wetland**	20,125.1	0.462		100%	90%	0.825	1.35	5	0.26	**1,867.8**	**0.099**
DMA A10	Off-site Slope	54,533.7	1.252		100%	5%	0.188	1.35	5	0.26	**1,150.4**	**0.061**

80% Capture Efficiency Method (Worksheet C)

CIELO VISTA PLANNING AREA 1
6-Aug-15

Drainage Area Name / DMA	BMP	Total Drainage Area (ft^2)	Total Drainage Area (acres)	Total Pervious Area (ft^2)	Calculated % impervious	Assumed % impervious	Runoff Coefficient	Original Design Storm Depth (in)	BMP Ponding Depth (ft)	Effective Depth (equals ponding depth for biotreatment)	Infiltration or Filtration Rate (in/hr)	Calculated Drawdown (hours)	Fraction of Design Capture Storm Depth (Fig. III.2)	New Design Storm Depth (in)	Adjusted DCV (ft^3)	BMP Surface Area Needed (ft^2)	BMP Surface Area Provided (ft^2)	Total Volume Bio-Treated (ft^3)
Planning Area 1	0	1,484,931.4	34.089	0.0	100.0%	34%	0.4057	1.35	1.5	1.5	2.5	7.2	0.43	0.5738	28,801.9	19,201.3		0.0
DMA A1	**Basin D (BIO-1)**	407,247.5	9.349	0.0	100.0%	40%	0.4500	1.35	1.5	1.5	2.5	7.2	0.43	0.5738	**8,762.1**	**5,841.4**	**8,400.0**	**12,600.0**
DMA A2	Off-site Slope	98,562.7	2.263	0.0	100.0%	5%	0.1875	1.35	1.5	1.5	2.5	7.2	0.43	0.5738	**883.7**	**589.1**		0.0
DMA A3	**Basin C (BIO-1)**	202,882.6	4.658	0.0	100.0%	40%	0.4500	1.35	1.5	1.5	2.5	7.2	0.43	0.5738	**4,365.6**	**2,910.4**	**3,085.0**	**4,627.5**
DMA A4	**Basin A (BIO-1)**	258,715.0	5.939	0.0	100.0%	31%	0.3825	1.35	1.5	1.5	2.5	7.2	0.43	0.5738	**4,731.2**	**3,154.2**	**5,120.0**	**7,680.0**
DMA A5	**Basin B (BIO-1)**	262,996.4	6.038	0.0	100.0%	46%	0.4950	1.35	1.5	1.5	2.5	7.2	0.43	0.5738	**6,224.8**	**4,149.9**	**5,100.0**	**7,650.0**
DMA A6	Off-site Slope	14,328.9	0.329	0.0	100.0%	5%	0.1875	1.35	1.5	1.5	2.5	7.2	0.43	0.5738	**128.5**	**85.7**		0.0
DMA A7	**Basin D (BIO-1)**	70,140.2	1.610	0.0	100.0%	40%	0.4500	1.35	1.5	1.5	2.5	7.2	0.43	0.5738	**1,508.9**	**1,006.0**	**8,400.0**	**12,600.0**
DMA A8	**Basin D (BIO-1)**	95,390.3	2.190	0.0	100.0%	40%	0.4500	1.35	1.5	1.5	2.5	7.2	0.43	0.5738	**2,052.5**	**1,368.3**	**8,400.0**	**12,600.0**
DMA A9	**Modular Wetland**	20,125.1	0.462	0.0	100.0%	90%	0.8250	1.35	1.5	1.5	2.5	7.2	0.43	0.5738	**793.8**	**529.2**		0.0
DMA A10	Off-site Slope	54,533.7	1.252	0.0	100.0%	5%	0.1875	1.35	1.5	1.5	2.5	7.2	0.43	0.5738	**488.9**	**325.9**		0.0

Worksheet B: Simple Design Capture Volume Sizing Method

Project: CIELO VIST PLANNING AREA 2

Date: August 6, 2015

			DMA B2	
Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	0.90	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0	inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	0.90	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	6.1960	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	40.0%	%
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	0.4500	
4	Calculate runoff volume, $V_{design} = (C \times d_{remainder} \times A \times 43560 \times (1/12))$	V_{design}=	9,109.0	cu-ft
Step 3: Design BMPs to ensure full retention of the DCV				
Step 3a: Determine design infiltration rate				
1	Enter measured infiltration rate, $K_{measured}$ (in/hr) (Appendix VII)	$K_{measured}$=	*3.00**	in/hr
2	Enter combined safety factor from Worksheet H, S_{final} (unitless)	S_{final}=	*2.00*	
3	Calculate design infiltration rate, $K_{design} = K_{measured} / S_{final}$	K_{design}=	*1.50*	in/hr
Step 3b: Determine minimum BMP footprint				
4	Enter drawdown time, *T* (max 48 hours)	T=	*48.00*	hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D_{max}=	*6.00*	feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=	*1518.17*	sq-ft

** Infiltration tests to be conducted at final design.*

Storm Water Quality Design Calculations

CIELO VISTA PLANNING AREA 2
6-Aug-15

Drainage Area Name / DMA	BMP	Total Drainage Area (ft^2)	Total Drainage Area (acres)	Total Pervious Area (ft^2)	Calculated % impervious	Assumed % impervious	Runoff Coefficient	Design Storm Depth (in)	Average or Estimated Tc (min)	Rainfall Intensity (in/hr)	Simple Method DCV (ft^3)	Q_{Design} (cfs)
Planning Area 2		360,196.8	8.269		100.0%	31%	0.384	0.9	5	0.26	10,379.8	0.826
DMA B1	Offsite Slope	24,285.16	0.558		100.0%	5%	0.188	0.9	5	0.26	**341.8**	**0.027**
DMA B2	**Basin (INF-1)**	269,898.10	6.196		100.0%	40%	0.450	0.9	5	0.26	**9,109.0**	**0.725**
DMA B3	Offsite Slope	9,181.47	0.211		100.0%	5%	0.188	0.9	5	0.26	**129.3**	**0.010**
DMA B4	Offsite Slope	32,149.02	0.738		100.0%	5%	0.188	0.9	5	0.26	**452.1**	**0.036**
DMA B5	Offsite Slope	24,683.05	0.567		100.0%	5%	0.188	0.9	5	0.26	**347.3**	**0.028**

Figure III.2. Capture Efficiency Nomograph for Constant Drawdown Systems in Orange County

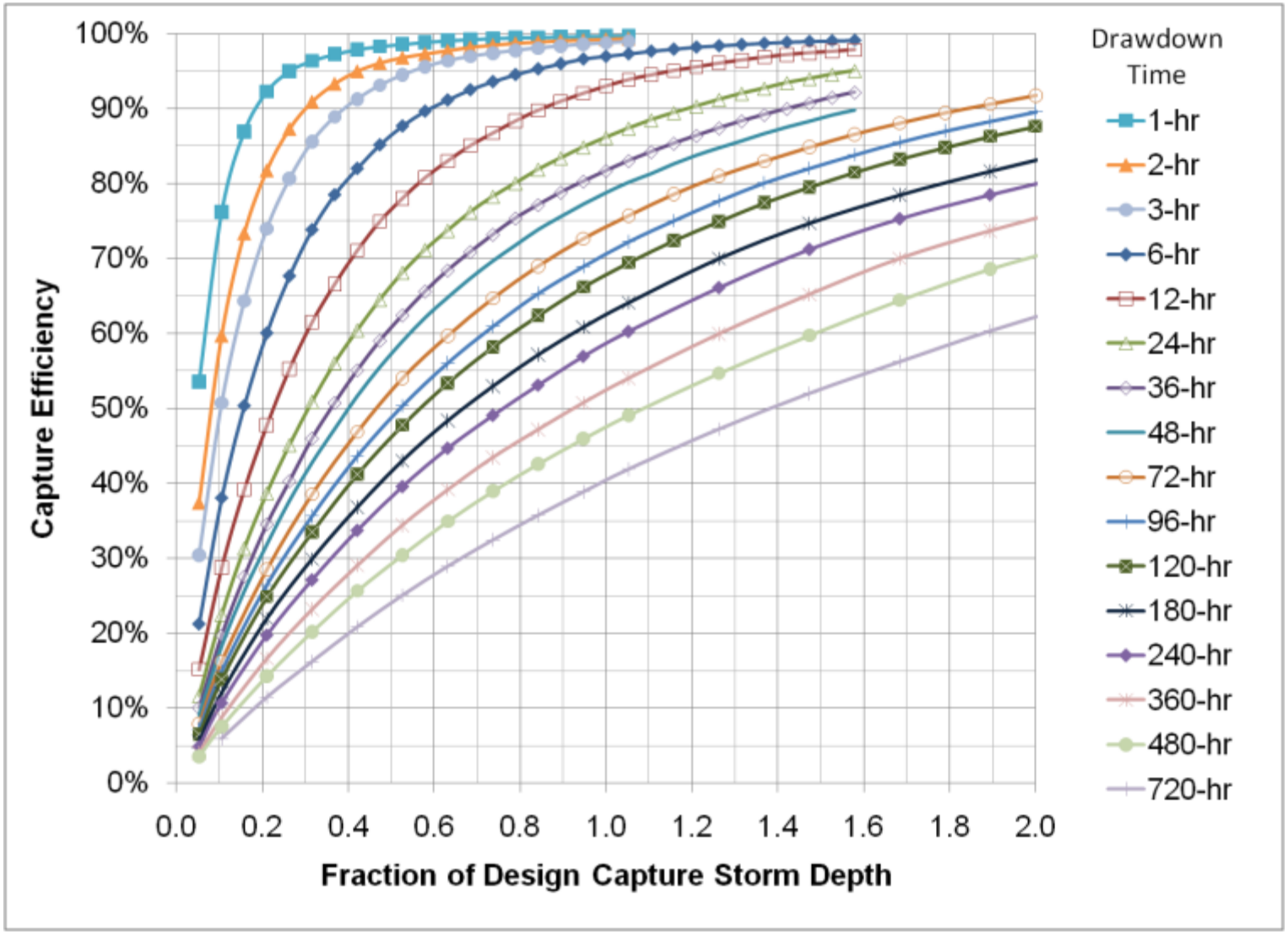
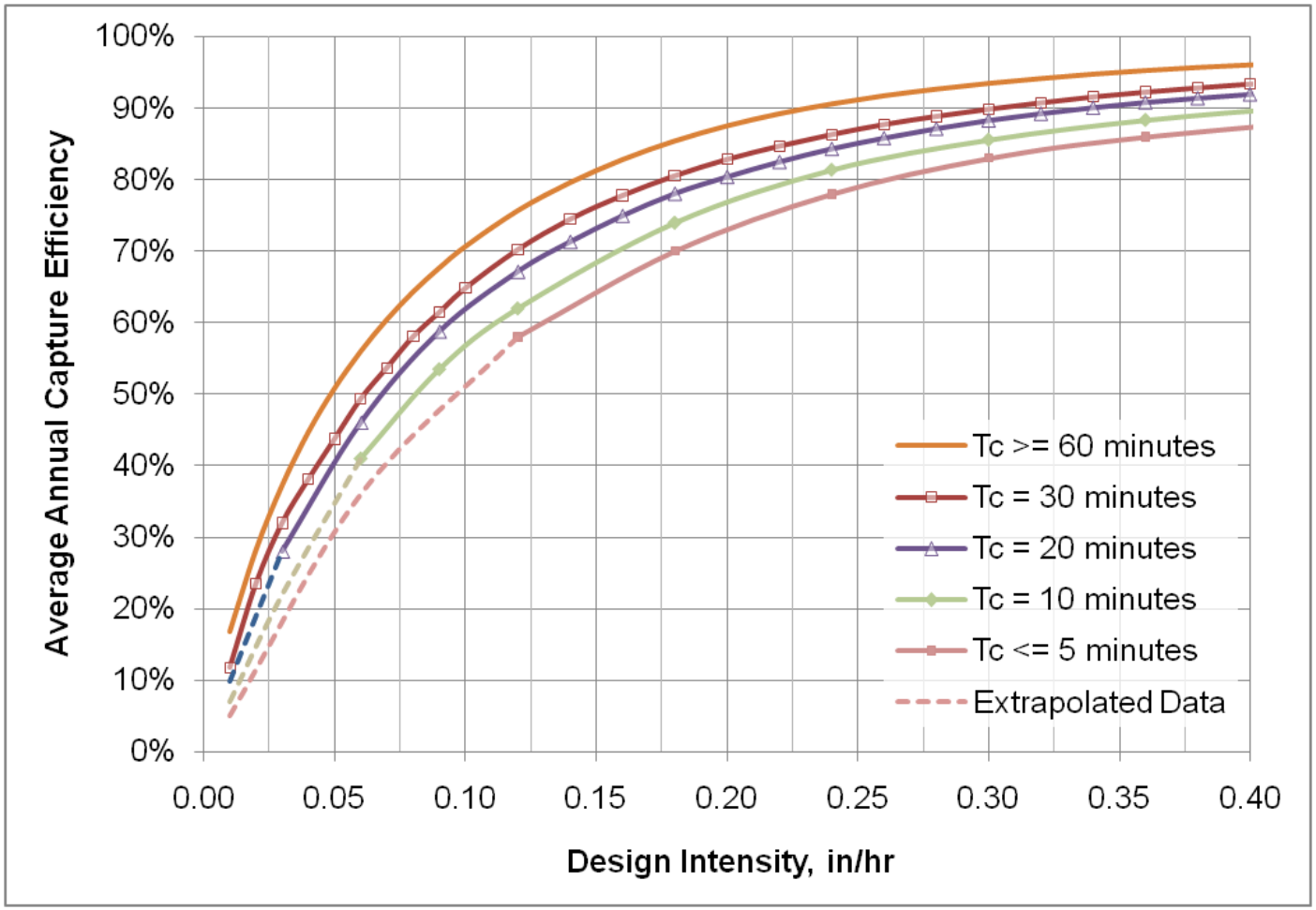
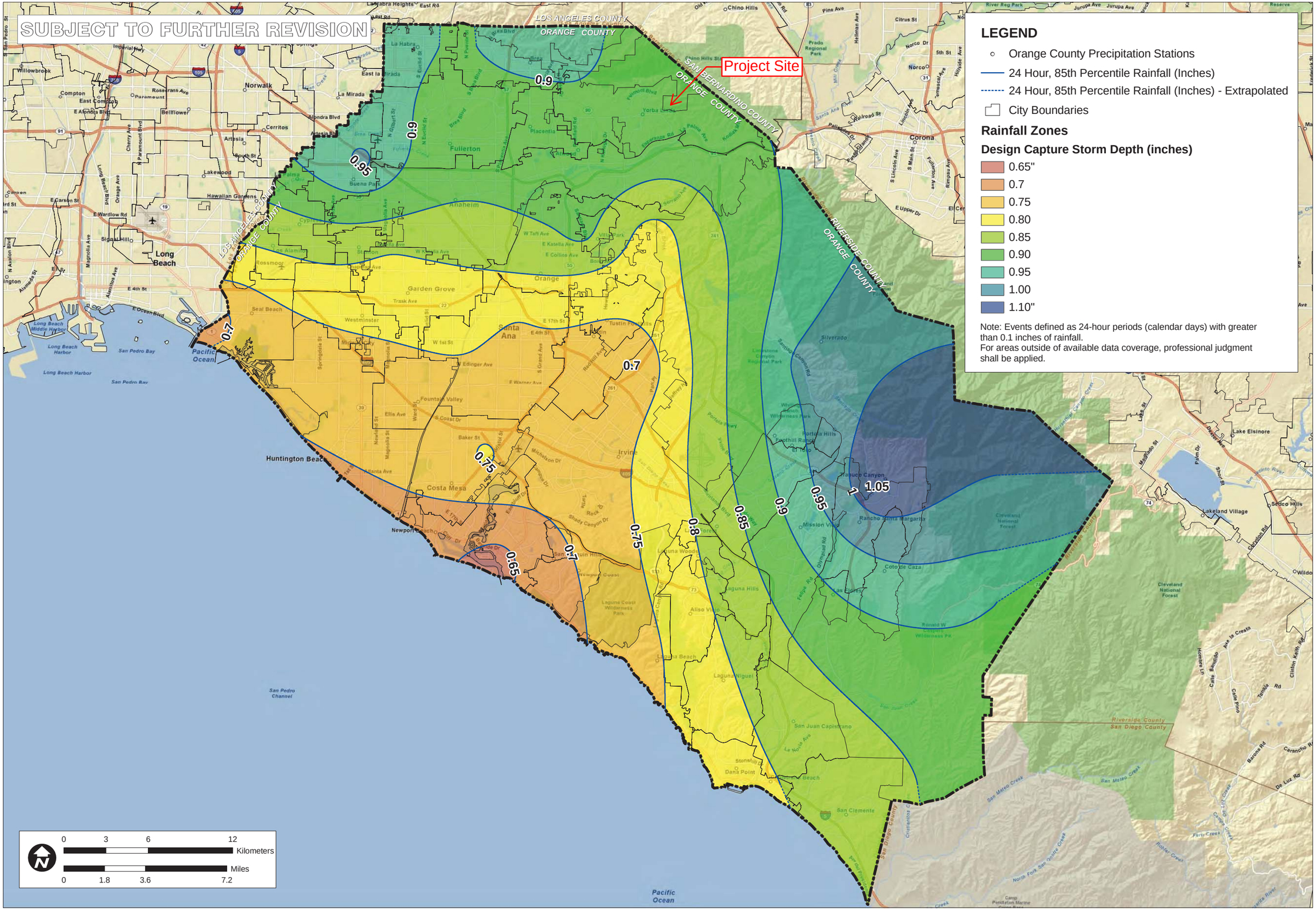


Figure III.4. Capture Efficiency Nomograph for Off-line Flow-based Systems in Orange County





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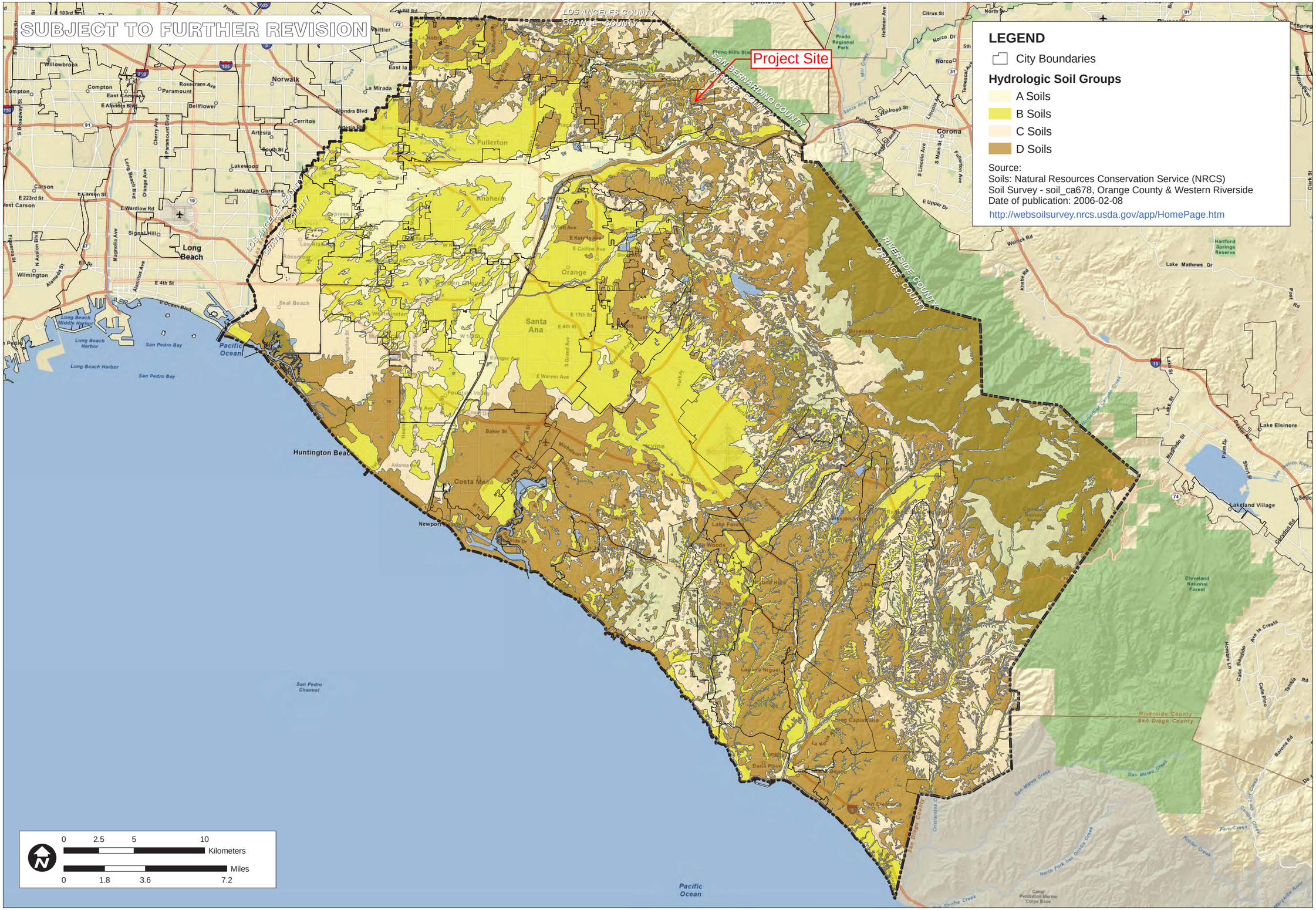
TITLE
RAINFALL ZONES

JOB
ORANGE COUNTY
TECHNICAL GUIDANCE
DOCUMENT
ORANGE CO. CA

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/22/10
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-1



NRCS HYDROLOGIC SOILS GROUPS

TITLE

ORANGE COUNTY INFILTRATION STUDY

CA

JOB

ORANGE CO.

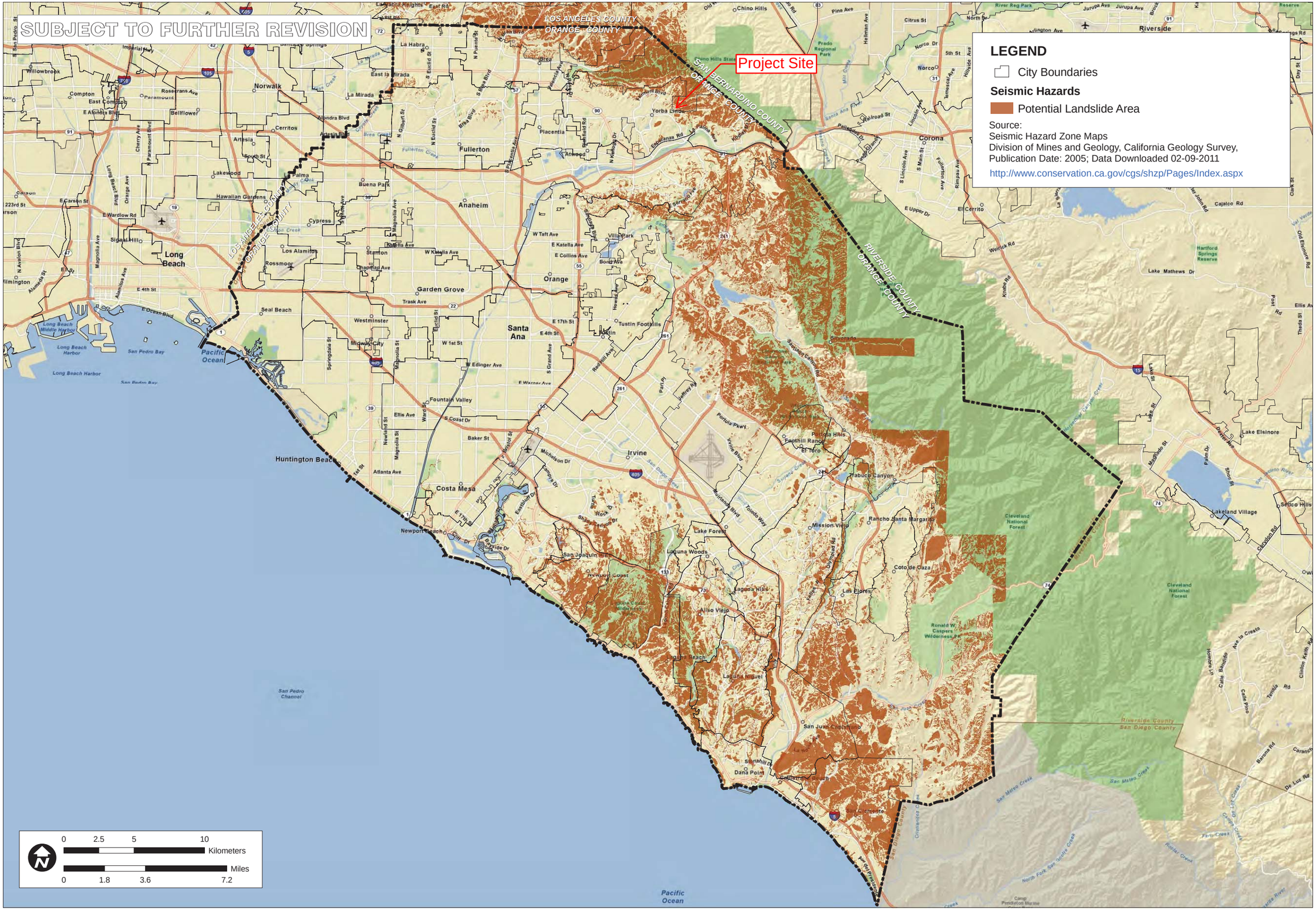
SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE Advanced Water Engineering

FIGURE

XVI-2a

P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-2a_HydroSoils_20110215.mxd



P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-2c_Landslides_20110215.mxd

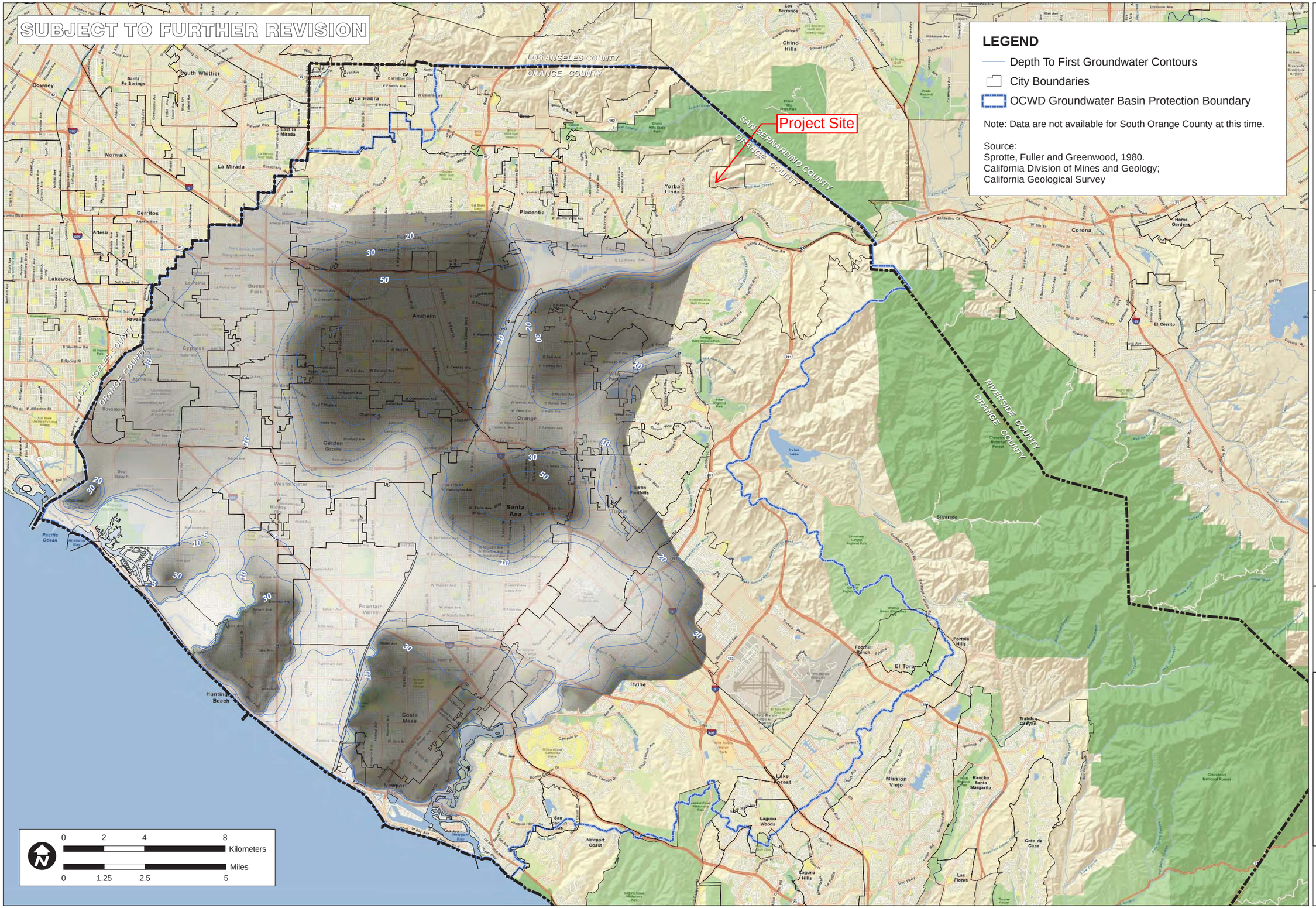
TITLE
HYDROLOGIC SOIL GROUP
TYPE D NRCS SOIL SURVEY

JOB
ORANGE COUNTY
INFILTRATION STUDY
ORANGE CO. CA

SCALE	1" = 1.25 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2c



TITLE
NORTH ORANGE COUNTY
MAPPED DEPTH TO FIRST
GROUNDWATER

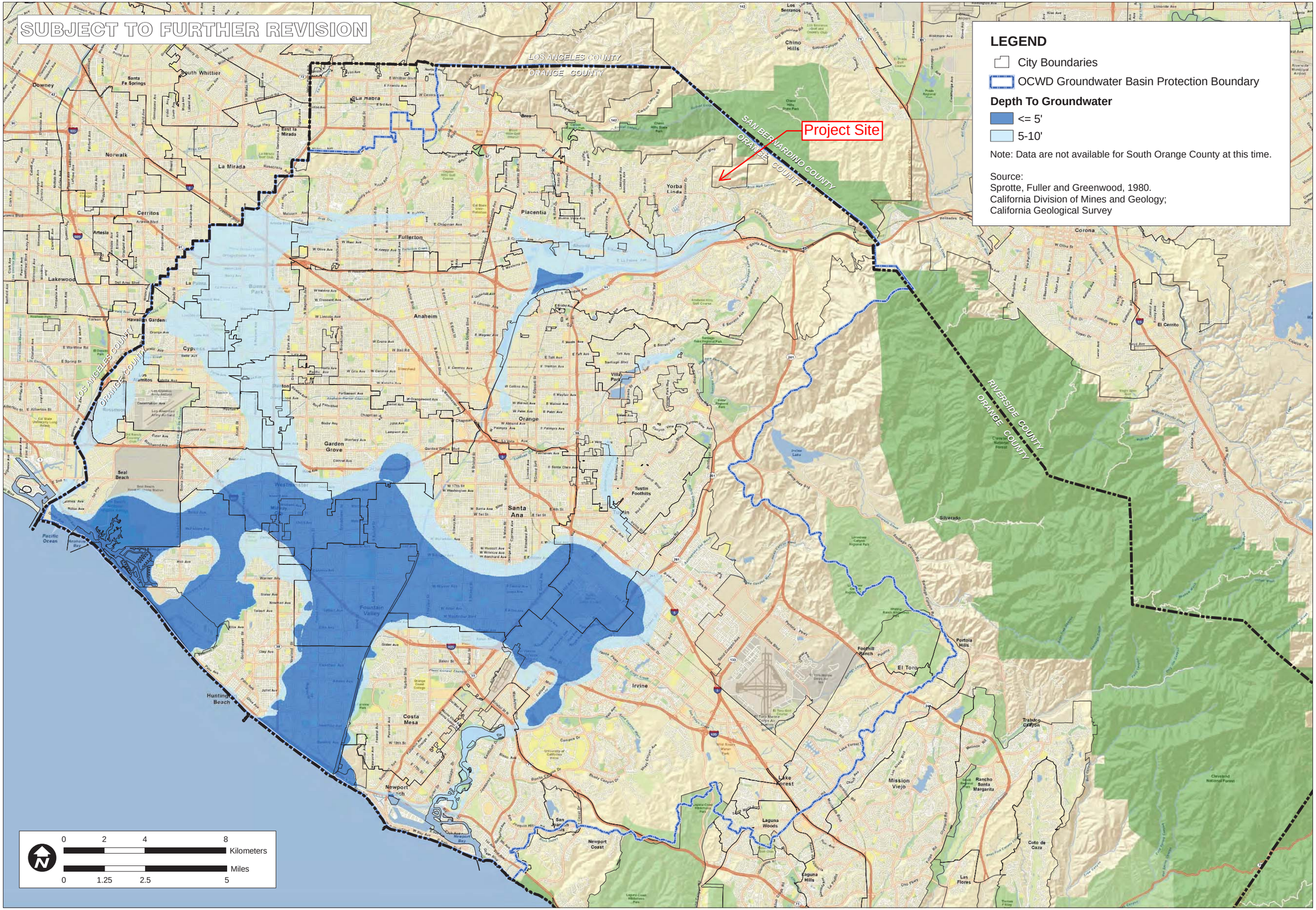
JOB
ORANGE COUNTY
INFILTRATION STUDY
ORANGE CO. CA

SCALE	1" = 1.25 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2d

P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-2d_DepthToGroundwaterOverview_20110215.mxd



TITLE
NORTH ORANGE COUNTY
MAPPED SHALLOW GROUNDWATER

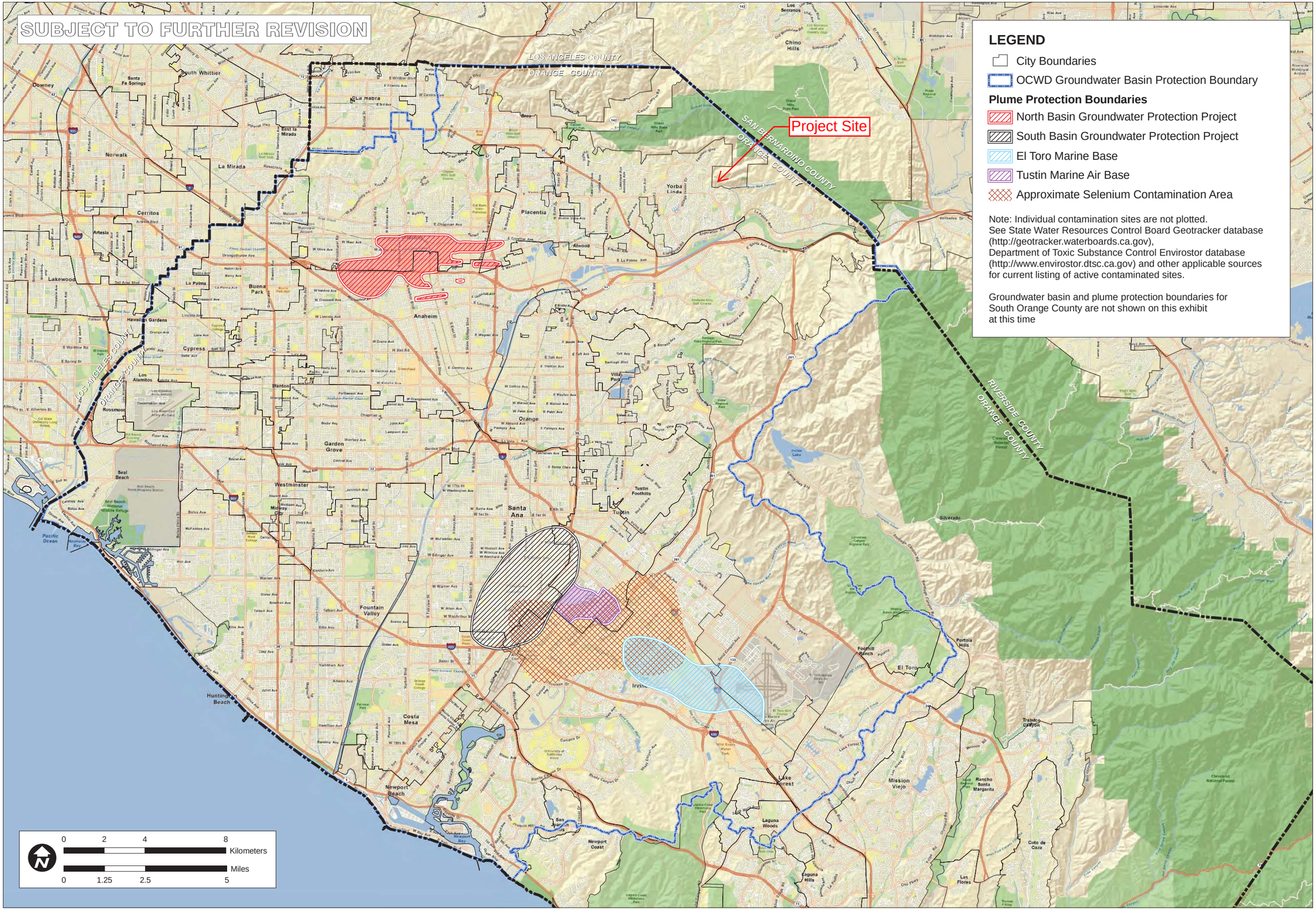
JOB
ORANGE COUNTY
INFILTRATION STUDY
ORANGE CO. CA

SCALE	1" = 1.25 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2e

P:\9526E\6-GIS\Mxds\Reports\Infiltration Feasability_20110215\9526E_FigureXVI-2e_DepthToGroundwater15ft_20110215.mxd



TITLE
NORTH ORANGE COUNTY GROUNDWATER PROTECTION AREAS

JOB
ORANGE COUNTY INFILTRATION STUDY
ORANGE CO. CA

SCALE	1" = 1.25 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/22/10
JOB NO.	9526-E

PACE Advanced Water Engineering

FIGURE
XVI-2f

P:\9526E\6-GIS\Mxds\Reports\Infiltration\Feasability_20110215\9526E_FigureXVI-2f_NorthOCGroundwaterProtectionAreasStreetMap_20110215.mxd

SUBJECT TO FURTHER REVISION

Project Site

LEGEND

- OCWD Groundwater Basin Protection Boundary
- City Boundaries

Infiltration Constraints

- 1 Constraint
- 2 Overlapping Constraints
- 3 Overlapping Constraints
- 4 Overlapping Constraints

Analysis Layers Included: 1. Hydrologic Soil Group D, 2. Landslide Hazard Zone, 3. Groundwater Protection Areas 4. Approximate Selinium Area, 5. Depth to Groundwater <= 5'

Note: Screening datasets are not exhaustive. The applicant should always conduct a review of available site-specific information relative to infiltration constraints as part of assessing the feasibility of stormwater infiltration.
Source;
Infiltration Constraint Analysis: PACE/Geosyntec

0 2.5 5 10 Kilometers
0 1.8 3.6 7.2 Miles

TITLE
INFILTRATION ANALYSIS
OVERLAPPING CONSTRAINT
LOCATIONS

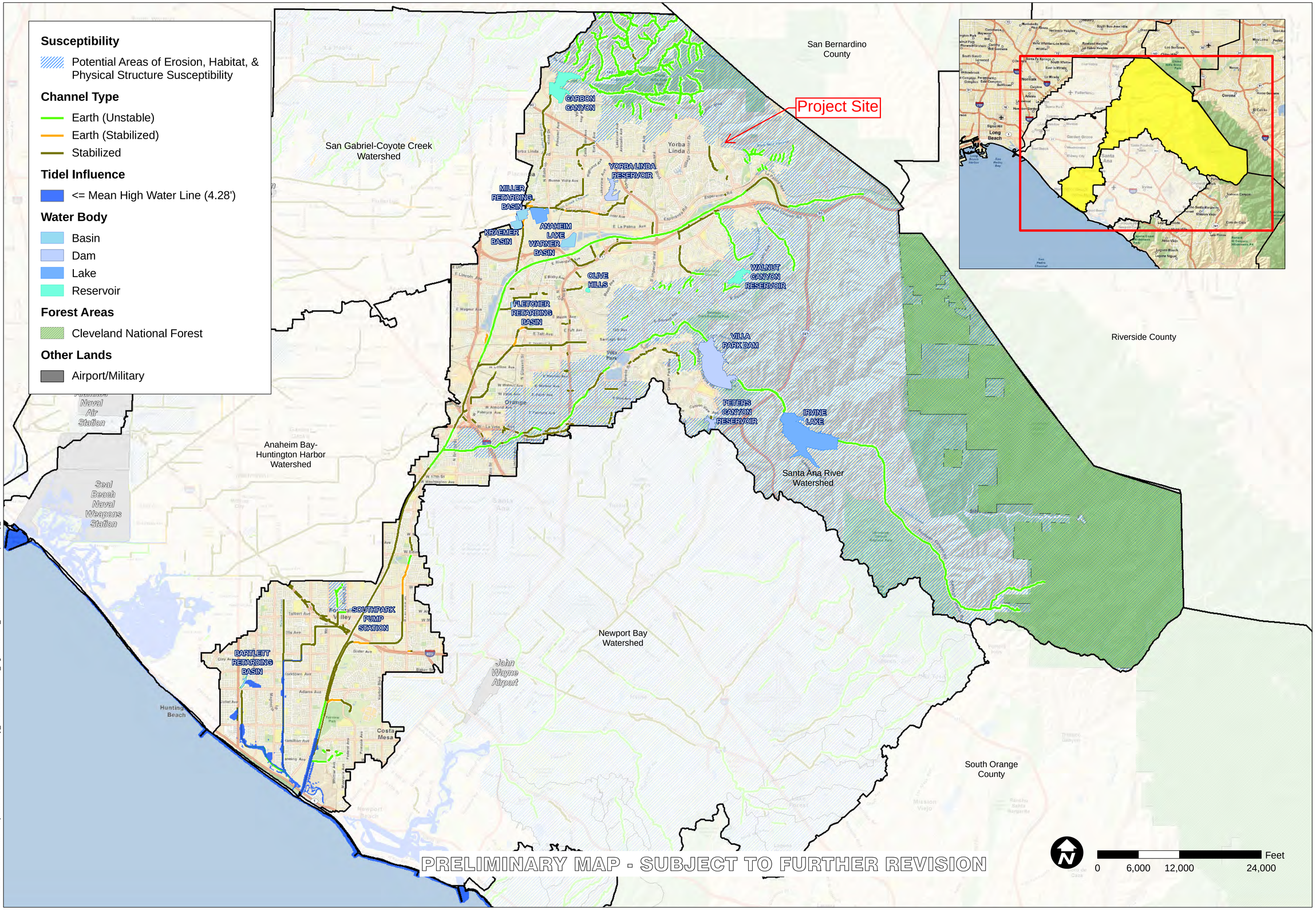
JOB
ORANGE COUNTY
INFILTRATION STUDY
ORANGE CO. CA

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/22/10
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2g

P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-2g_InfiltrationFinal_20110215.mxd



TITLE
SUSCEPTIBILITY ANALYIS
SANTA ANA RIVER

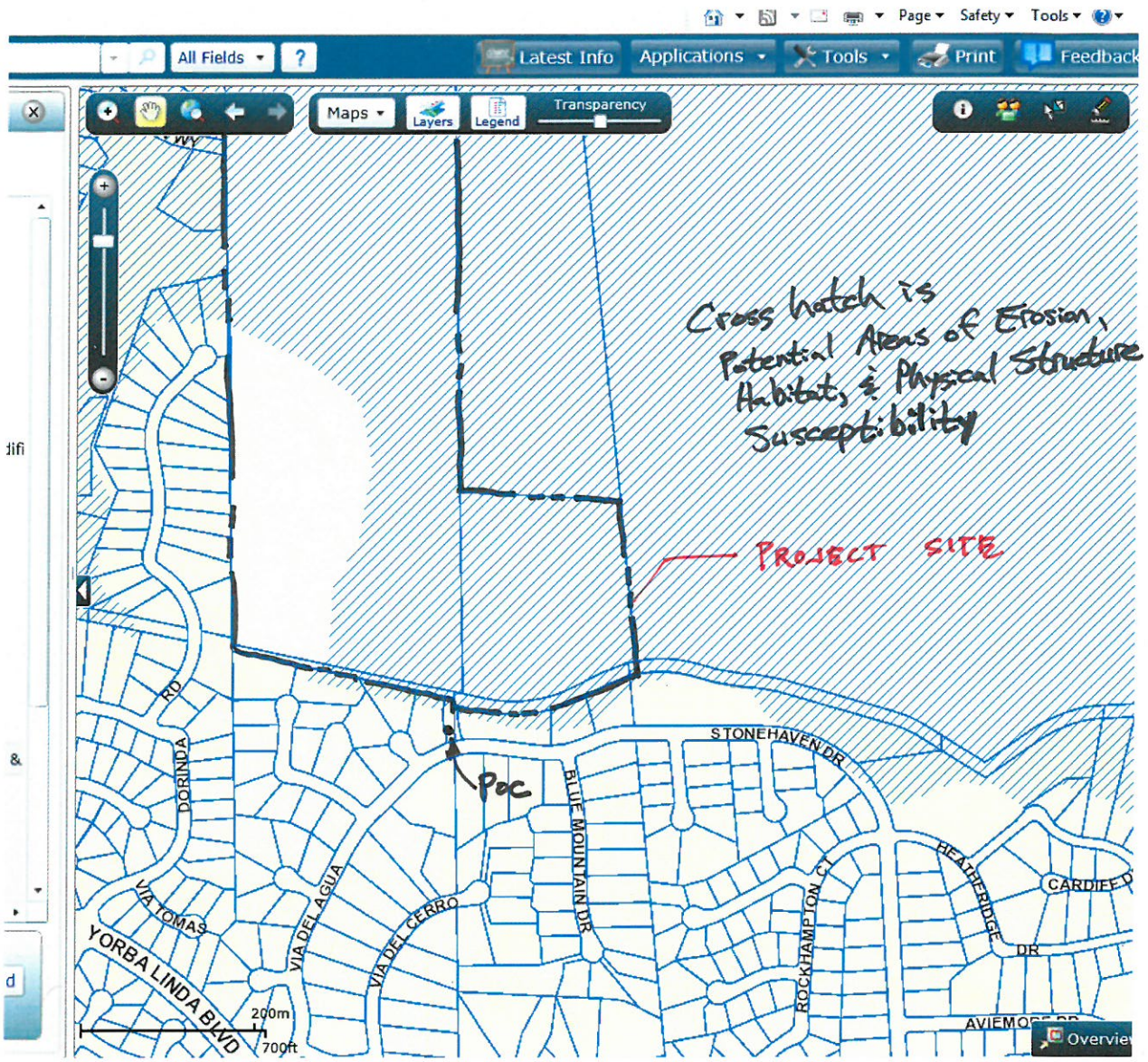
JOB
ORANGE COUNTY
WATERSHED
MASTER PLANNING
ORANGE CO.
CA

SCALE	1" = 6000'
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/30/10
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-3c

P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-3c_SantaAnaRiverSusceptibility_20100430.mxd



From OC Land Records website

Attachment 2A

APPENDIX A.1

EXISTING CONDITION HYDROLOGY CALCULATIONS FOR HYDROMODIFICATION (2-YEAR, 24-HOUR STORM)

Planning Area 1 (South Site)

U n i t H y d r o g r a p h A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989-2014, Version 9.0

Study date 09/29/15 File Name EXPA1HYME.out

++

Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6103

PLANNING AREA 1 - 8'x7' RCB
EXISTING CONDITIONS - HYDROMOD CALCULATIONS
2-YEAR 24-HOUR STORM
BY FUSCOE ENGINEERING

Storm Event Year = 2

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
69.0	3.9	0.18	B	0.300	1.000	0.300
79.0	0.6	0.03	C	0.250	1.000	0.250
84.0	17.1	0.79	D	0.200	1.000	0.200

Area-averaged adjusted loss rate Fm (In/Hr) = 0.219

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
3.90	0.181	69.0	49.8	10.08	0.000
0.60	0.028	79.0	61.8	6.18	0.046
17.10	0.792	84.0	68.6	4.58	0.110

Area-averaged catchment yield fraction, Y = 0.088
Area-averaged low loss fraction, Yb = 0.912
++
Watercourse length = 2345.27(Ft.)
Length from concentration point to centroid = 1363.63(Ft.)
Elevation difference along watercourse = 205.10(Ft.)
Mannings friction factor along watercourse = 0.030
Watershed area = 21.60(Ac.)
Catchment Lag time = 0.099 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 84.5410
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.219(In/Hr)
Average low loss rate fraction (Yb) = 0.912 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall = 0.190(In)
Computed peak 30-minute rainfall = 0.400(In)
Specified peak 1-hour rainfall = 0.530(In)
Computed peak 3-hour rainfall = 0.890(In)
Specified peak 6-hour rainfall = 1.220(In)
Specified peak 24-hour rainfall = 2.050(In)

Rainfall depth area reduction factors:

Using a total area of 21.60(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.190(In)
30-minute factor = 0.999 Adjusted rainfall = 0.400(In)
1-hour factor = 0.999 Adjusted rainfall = 0.529(In)
3-hour factor = 1.000 Adjusted rainfall = 0.890(In)
6-hour factor = 1.000 Adjusted rainfall = 1.220(In)
24-hour factor = 1.000 Adjusted rainfall = 2.050(In)

U n i t H y d r o g r a p h

(K = 261.23 (CFS))

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
1	9.978	26.064
2	60.958	133.173
3	83.680	59.355
4	92.874	24.018
5	97.200	11.302
6	98.640	3.760
7	99.318	1.771
8	99.826	1.329
9	100.000	0.453

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.1898	0.1898
2	0.2532	0.0633
3	0.2996	0.0464
4	0.3376	0.0380
5	0.3704	0.0328
6	0.3996	0.0292
7	0.4254	0.0258
8	0.4491	0.0237
9	0.4711	0.0220
10	0.4917	0.0206
11	0.5111	0.0194
12	0.5295	0.0184
13	0.5499	0.0204
14	0.5695	0.0196
15	0.5884	0.0189
16	0.6066	0.0182
17	0.6242	0.0176
18	0.6413	0.0171
19	0.6579	0.0166
20	0.6740	0.0161
21	0.6898	0.0157
22	0.7051	0.0153
23	0.7201	0.0150
24	0.7347	0.0146
25	0.7490	0.0143
26	0.7630	0.0140
27	0.7768	0.0137
28	0.7902	0.0135
29	0.8034	0.0132
30	0.8164	0.0130
31	0.8292	0.0128
32	0.8417	0.0125
33	0.8540	0.0123
34	0.8662	0.0121
35	0.8781	0.0119
36	0.8899	0.0118
37	0.9011	0.0112
38	0.9121	0.0110
39	0.9229	0.0108
40	0.9336	0.0107
41	0.9441	0.0106
42	0.9546	0.0104
43	0.9648	0.0103
44	0.9750	0.0101
45	0.9850	0.0100
46	0.9949	0.0099
47	1.0047	0.0098

48	1.0144	0.0097
49	1.0239	0.0096
50	1.0334	0.0095
51	1.0427	0.0094
52	1.0520	0.0093
53	1.0612	0.0092
54	1.0702	0.0091
55	1.0792	0.0090
56	1.0881	0.0089
57	1.0969	0.0088
58	1.1056	0.0087
59	1.1142	0.0086
60	1.1228	0.0086
61	1.1313	0.0085
62	1.1397	0.0084
63	1.1480	0.0083
64	1.1562	0.0083
65	1.1644	0.0082
66	1.1726	0.0081
67	1.1806	0.0081
68	1.1886	0.0080
69	1.1965	0.0079
70	1.2044	0.0079
71	1.2122	0.0078
72	1.2199	0.0077
73	1.2262	0.0063
74	1.2325	0.0063
75	1.2387	0.0062
76	1.2449	0.0062
77	1.2510	0.0061
78	1.2570	0.0061
79	1.2630	0.0060
80	1.2690	0.0060
81	1.2749	0.0059
82	1.2808	0.0059
83	1.2866	0.0058
84	1.2924	0.0058
85	1.2981	0.0057
86	1.3038	0.0057
87	1.3095	0.0057
88	1.3151	0.0056
89	1.3207	0.0056
90	1.3262	0.0055
91	1.3317	0.0055
92	1.3372	0.0055
93	1.3426	0.0054
94	1.3480	0.0054
95	1.3533	0.0054
96	1.3587	0.0053
97	1.3639	0.0053
98	1.3692	0.0052
99	1.3744	0.0052
100	1.3796	0.0052
101	1.3847	0.0051
102	1.3898	0.0051
103	1.3949	0.0051
104	1.4000	0.0051
105	1.4050	0.0050
106	1.4100	0.0050
107	1.4150	0.0050
108	1.4199	0.0049
109	1.4248	0.0049
110	1.4297	0.0049
111	1.4345	0.0049
112	1.4394	0.0048
113	1.4442	0.0048
114	1.4489	0.0048
115	1.4537	0.0047
116	1.4584	0.0047
117	1.4631	0.0047
118	1.4678	0.0047
119	1.4724	0.0046
120	1.4770	0.0046
121	1.4816	0.0046
122	1.4862	0.0046
123	1.4908	0.0045

124	1.4953	0.0045
125	1.4998	0.0045
126	1.5043	0.0045
127	1.5087	0.0045
128	1.5132	0.0044
129	1.5176	0.0044
130	1.5220	0.0044
131	1.5263	0.0044
132	1.5307	0.0044
133	1.5350	0.0043
134	1.5393	0.0043
135	1.5436	0.0043
136	1.5479	0.0043
137	1.5521	0.0043
138	1.5564	0.0042
139	1.5606	0.0042
140	1.5648	0.0042
141	1.5690	0.0042
142	1.5731	0.0042
143	1.5773	0.0041
144	1.5814	0.0041
145	1.5855	0.0041
146	1.5896	0.0041
147	1.5936	0.0041
148	1.5977	0.0041
149	1.6017	0.0040
150	1.6057	0.0040
151	1.6097	0.0040
152	1.6137	0.0040
153	1.6177	0.0040
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163	1.6565	0.0038
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182	1.7263	0.0036
183	1.7298	0.0035
184	1.7334	0.0035
185	1.7369	0.0035
186	1.7404	0.0035
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188	1.7474	0.0035
189	1.7509	0.0035
190	1.7543	0.0035
191	1.7578	0.0035
192	1.7612	0.0034
193	1.7646	0.0034
194	1.7681	0.0034
195	1.7715	0.0034
196	1.7749	0.0034
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199	1.7850	0.0034

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202	1.7950	0.0033
203	1.7983	0.0033
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209	1.8181	0.0033
210	1.8213	0.0033
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213	1.8310	0.0032
214	1.8342	0.0032
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216	1.8406	0.0032
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218	1.8470	0.0032
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223	1.8627	0.0031
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226	1.8721	0.0031
227	1.8752	0.0031
228	1.8783	0.0031
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231	1.8875	0.0031
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255	1.9586	0.0029
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265	1.9871	0.0028
266	1.9899	0.0028
267	1.9927	0.0028
268	1.9954	0.0028
269	1.9982	0.0028
270	2.0010	0.0028
271	2.0038	0.0028
272	2.0065	0.0028
273	2.0093	0.0028
274	2.0121	0.0028
275	2.0148	0.0027

276	2.0175	0.0027
277	2.0203	0.0027
278	2.0230	0.0027
279	2.0257	0.0027
280	2.0284	0.0027
281	2.0311	0.0027
282	2.0338	0.0027
283	2.0365	0.0027
284	2.0392	0.0027
285	2.0419	0.0027
286	2.0446	0.0027
287	2.0473	0.0027
288	2.0499	0.0027

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0027	0.0024	0.0002
2	0.0027	0.0024	0.0002
3	0.0027	0.0024	0.0002
4	0.0027	0.0025	0.0002
5	0.0027	0.0025	0.0002
6	0.0027	0.0025	0.0002
7	0.0027	0.0025	0.0002
8	0.0027	0.0025	0.0002
9	0.0027	0.0025	0.0002
10	0.0027	0.0025	0.0002
11	0.0028	0.0025	0.0002
12	0.0028	0.0025	0.0002
13	0.0028	0.0025	0.0002
14	0.0028	0.0025	0.0002
15	0.0028	0.0026	0.0002
16	0.0028	0.0026	0.0002
17	0.0028	0.0026	0.0002
18	0.0028	0.0026	0.0002
19	0.0028	0.0026	0.0003
20	0.0028	0.0026	0.0003
21	0.0029	0.0026	0.0003
22	0.0029	0.0026	0.0003
23	0.0029	0.0026	0.0003
24	0.0029	0.0026	0.0003
25	0.0029	0.0026	0.0003
26	0.0029	0.0027	0.0003
27	0.0029	0.0027	0.0003
28	0.0029	0.0027	0.0003
29	0.0029	0.0027	0.0003
30	0.0030	0.0027	0.0003
31	0.0030	0.0027	0.0003
32	0.0030	0.0027	0.0003
33	0.0030	0.0027	0.0003
34	0.0030	0.0027	0.0003
35	0.0030	0.0027	0.0003
36	0.0030	0.0028	0.0003
37	0.0030	0.0028	0.0003
38	0.0030	0.0028	0.0003
39	0.0031	0.0028	0.0003
40	0.0031	0.0028	0.0003
41	0.0031	0.0028	0.0003
42	0.0031	0.0028	0.0003
43	0.0031	0.0028	0.0003
44	0.0031	0.0028	0.0003
45	0.0031	0.0029	0.0003
46	0.0031	0.0029	0.0003
47	0.0032	0.0029	0.0003
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57	0.0033	0.0030	0.0003
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59	0.0033	0.0030	0.0003
60	0.0034	0.0031	0.0003
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62	0.0034	0.0031	0.0003
63	0.0034	0.0031	0.0003
64	0.0034	0.0031	0.0003
65	0.0034	0.0031	0.0003
66	0.0035	0.0031	0.0003
67	0.0035	0.0032	0.0003
68	0.0035	0.0032	0.0003
69	0.0035	0.0032	0.0003
70	0.0035	0.0032	0.0003
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78	0.0037	0.0033	0.0003
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81	0.0037	0.0034	0.0003
82	0.0038	0.0034	0.0003
83	0.0038	0.0034	0.0003
84	0.0038	0.0035	0.0003
85	0.0038	0.0035	0.0003
86	0.0038	0.0035	0.0003
87	0.0039	0.0035	0.0003
88	0.0039	0.0035	0.0003
89	0.0039	0.0036	0.0003
90	0.0039	0.0036	0.0003
91	0.0040	0.0036	0.0004
92	0.0040	0.0036	0.0004
93	0.0040	0.0037	0.0004
94	0.0040	0.0037	0.0004
95	0.0041	0.0037	0.0004
96	0.0041	0.0037	0.0004
97	0.0041	0.0038	0.0004
98	0.0041	0.0038	0.0004
99	0.0042	0.0038	0.0004
100	0.0042	0.0038	0.0004
101	0.0042	0.0039	0.0004
102	0.0043	0.0039	0.0004
103	0.0043	0.0039	0.0004
104	0.0043	0.0039	0.0004
105	0.0044	0.0040	0.0004
106	0.0044	0.0040	0.0004
107	0.0044	0.0040	0.0004
108	0.0044	0.0040	0.0004
109	0.0045	0.0041	0.0004
110	0.0045	0.0041	0.0004
111	0.0045	0.0041	0.0004
112	0.0046	0.0042	0.0004
113	0.0046	0.0042	0.0004
114	0.0046	0.0042	0.0004
115	0.0047	0.0043	0.0004
116	0.0047	0.0043	0.0004
117	0.0048	0.0044	0.0004
118	0.0048	0.0044	0.0004
119	0.0049	0.0044	0.0004
120	0.0049	0.0044	0.0004
121	0.0049	0.0045	0.0004
122	0.0050	0.0045	0.0004
123	0.0050	0.0046	0.0004
124	0.0051	0.0046	0.0004
125	0.0051	0.0047	0.0005
126	0.0051	0.0047	0.0005
127	0.0052	0.0048	0.0005
128	0.0052	0.0048	0.0005
129	0.0053	0.0048	0.0005
130	0.0054	0.0049	0.0005
131	0.0054	0.0049	0.0005
132	0.0055	0.0050	0.0005
133	0.0055	0.0050	0.0005
134	0.0056	0.0051	0.0005

135	0.0057	0.0052	0.0005
136	0.0057	0.0052	0.0005
137	0.0058	0.0053	0.0005
138	0.0058	0.0053	0.0005
139	0.0059	0.0054	0.0005
140	0.0060	0.0054	0.0005
141	0.0061	0.0055	0.0005
142	0.0061	0.0056	0.0005
143	0.0062	0.0057	0.0005
144	0.0063	0.0057	0.0006
145	0.0077	0.0071	0.0007
146	0.0078	0.0071	0.0007
147	0.0079	0.0072	0.0007
148	0.0080	0.0073	0.0007
149	0.0081	0.0074	0.0007
150	0.0082	0.0075	0.0007
151	0.0083	0.0076	0.0007
152	0.0084	0.0077	0.0007
153	0.0086	0.0078	0.0008
154	0.0086	0.0079	0.0008
155	0.0088	0.0080	0.0008
156	0.0089	0.0081	0.0008
157	0.0091	0.0083	0.0008
158	0.0092	0.0084	0.0008
159	0.0094	0.0085	0.0008
160	0.0095	0.0086	0.0008
161	0.0097	0.0088	0.0009
162	0.0098	0.0089	0.0009
163	0.0100	0.0091	0.0009
164	0.0101	0.0093	0.0009
165	0.0104	0.0095	0.0009
166	0.0106	0.0096	0.0009
167	0.0108	0.0099	0.0010
168	0.0110	0.0100	0.0010
169	0.0118	0.0107	0.0010
170	0.0119	0.0109	0.0011
171	0.0123	0.0112	0.0011
172	0.0125	0.0114	0.0011
173	0.0130	0.0118	0.0011
174	0.0132	0.0120	0.0012
175	0.0137	0.0125	0.0012
176	0.0140	0.0128	0.0012
177	0.0146	0.0133	0.0013
178	0.0150	0.0136	0.0013
179	0.0157	0.0143	0.0014
180	0.0161	0.0147	0.0014
181	0.0171	0.0156	0.0015
182	0.0176	0.0161	0.0016
183	0.0189	0.0172	0.0017
184	0.0196	0.0179	0.0017
185	0.0184	0.0168	0.0016
186	0.0194	0.0177	0.0017
187	0.0220	0.0183	0.0037
188	0.0237	0.0183	0.0054
189	0.0292	0.0183	0.0109
190	0.0328	0.0183	0.0145
191	0.0464	0.0183	0.0282
192	0.0633	0.0183	0.0451
193	0.1898	0.0183	0.1715
194	0.0380	0.0183	0.0198
195	0.0258	0.0183	0.0075
196	0.0206	0.0183	0.0023
197	0.0204	0.0183	0.0021
198	0.0182	0.0166	0.0016
199	0.0166	0.0151	0.0015
200	0.0153	0.0140	0.0014
201	0.0143	0.0130	0.0013
202	0.0135	0.0123	0.0012
203	0.0128	0.0116	0.0011
204	0.0121	0.0111	0.0011
205	0.0112	0.0102	0.0010
206	0.0107	0.0098	0.0009
207	0.0103	0.0094	0.0009
208	0.0099	0.0090	0.0009
209	0.0096	0.0087	0.0008
210	0.0093	0.0084	0.0008

211	0.0090	0.0082	0.0008
212	0.0087	0.0079	0.0008
213	0.0085	0.0077	0.0007
214	0.0083	0.0075	0.0007
215	0.0081	0.0073	0.0007
216	0.0079	0.0072	0.0007
217	0.0063	0.0058	0.0006
218	0.0062	0.0056	0.0005
219	0.0060	0.0055	0.0005
220	0.0059	0.0054	0.0005
221	0.0057	0.0052	0.0005
222	0.0056	0.0051	0.0005
223	0.0055	0.0050	0.0005
224	0.0054	0.0049	0.0005
225	0.0053	0.0048	0.0005
226	0.0052	0.0047	0.0005
227	0.0051	0.0046	0.0004
228	0.0050	0.0046	0.0004
229	0.0049	0.0045	0.0004
230	0.0048	0.0044	0.0004
231	0.0047	0.0043	0.0004
232	0.0047	0.0043	0.0004
233	0.0046	0.0042	0.0004
234	0.0045	0.0041	0.0004
235	0.0045	0.0041	0.0004
236	0.0044	0.0040	0.0004
237	0.0043	0.0039	0.0004
238	0.0043	0.0039	0.0004
239	0.0042	0.0038	0.0004
240	0.0042	0.0038	0.0004
241	0.0041	0.0037	0.0004
242	0.0041	0.0037	0.0004
243	0.0040	0.0036	0.0004
244	0.0040	0.0036	0.0003
245	0.0039	0.0036	0.0003
246	0.0039	0.0035	0.0003
247	0.0038	0.0035	0.0003
248	0.0038	0.0034	0.0003
249	0.0037	0.0034	0.0003
250	0.0037	0.0034	0.0003
251	0.0036	0.0033	0.0003
252	0.0036	0.0033	0.0003
253	0.0036	0.0033	0.0003
254	0.0035	0.0032	0.0003
255	0.0035	0.0032	0.0003
256	0.0035	0.0032	0.0003
257	0.0034	0.0031	0.0003
258	0.0034	0.0031	0.0003
259	0.0034	0.0031	0.0003
260	0.0033	0.0030	0.0003
261	0.0033	0.0030	0.0003
262	0.0033	0.0030	0.0003
263	0.0032	0.0030	0.0003
264	0.0032	0.0029	0.0003
265	0.0032	0.0029	0.0003
266	0.0032	0.0029	0.0003
267	0.0031	0.0029	0.0003
268	0.0031	0.0028	0.0003
269	0.0031	0.0028	0.0003
270	0.0031	0.0028	0.0003
271	0.0030	0.0028	0.0003
272	0.0030	0.0027	0.0003
273	0.0030	0.0027	0.0003
274	0.0030	0.0027	0.0003
275	0.0029	0.0027	0.0003
276	0.0029	0.0027	0.0003
277	0.0029	0.0026	0.0003
278	0.0029	0.0026	0.0003
279	0.0029	0.0026	0.0003
280	0.0028	0.0026	0.0003
281	0.0028	0.0026	0.0002
282	0.0028	0.0025	0.0002
283	0.0028	0.0025	0.0002
284	0.0028	0.0025	0.0002
285	0.0027	0.0025	0.0002
286	0.0027	0.0025	0.0002

```
287              0.0027           0.0025              0.0002
288              0.0027           0.0024              0.0002
-------------------------------------------------------------------
-------------------------------------------------------------------
Total soil rain loss =      1.60(In)
Total effective rainfall =      0.45(In)
Peak flow rate in flood hydrograph =     26.93(CFS)
----------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - H O U R    S T O R M
                R u n o f f      H y d r o g r a p h
-------------------------------------------------------------------
            Hydrograph in   5   Minute intervals ((CFS))

-------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
-------------------------------------------------------------------
  0+ 5       0.0000      0.01  Q          |          |          |          |
  0+10       0.0003      0.04  Q          |          |          |          |
  0+15       0.0007      0.05  Q          |          |          |          |
  0+20       0.0011      0.06  Q          |          |          |          |
  0+25       0.0015      0.06  Q          |          |          |          |
  0+30       0.0019      0.06  Q          |          |          |          |
  0+35       0.0023      0.06  Q          |          |          |          |
  0+40       0.0027      0.06  Q          |          |          |          |
  0+45       0.0032      0.06  Q          |          |          |          |
  0+50       0.0036      0.06  Q          |          |          |          |
  0+55       0.0041      0.06  Q          |          |          |          |
  1+ 0       0.0045      0.06  Q          |          |          |          |
  1+ 5       0.0049      0.06  Q          |          |          |          |
  1+10       0.0054      0.06  Q          |          |          |          |
  1+15       0.0058      0.06  Q          |          |          |          |
  1+20       0.0063      0.06  Q          |          |          |          |
  1+25       0.0067      0.06  Q          |          |          |          |
  1+30       0.0071      0.06  Q          |          |          |          |
  1+35       0.0076      0.07  Q          |          |          |          |
  1+40       0.0080      0.07  Q          |          |          |          |
  1+45       0.0085      0.07  Q          |          |          |          |
  1+50       0.0089      0.07  Q          |          |          |          |
  1+55       0.0094      0.07  Q          |          |          |          |
  2+ 0       0.0099      0.07  Q          |          |          |          |
  2+ 5       0.0103      0.07  Q          |          |          |          |
  2+10       0.0108      0.07  Q          |          |          |          |
  2+15       0.0112      0.07  Q          |          |          |          |
  2+20       0.0117      0.07  Q          |          |          |          |
  2+25       0.0122      0.07  Q          |          |          |          |
  2+30       0.0126      0.07  Q          |          |          |          |
  2+35       0.0131      0.07  Q          |          |          |          |
  2+40       0.0136      0.07  Q          |          |          |          |
  2+45       0.0140      0.07  Q          |          |          |          |
  2+50       0.0145      0.07  Q          |          |          |          |
  2+55       0.0150      0.07  Q          |          |          |          |
  3+ 0       0.0155      0.07  Q          |          |          |          |
  3+ 5       0.0159      0.07  Q          |          |          |          |
  3+10       0.0164      0.07  Q          |          |          |          |
  3+15       0.0169      0.07  Q          |          |          |          |
  3+20       0.0174      0.07  Q          |          |          |          |
  3+25       0.0179      0.07  Q          |          |          |          |
  3+30       0.0184      0.07  Q          |          |          |          |
  3+35       0.0189      0.07  Q          |          |          |          |
  3+40       0.0194      0.07  Q          |          |          |          |
  3+45       0.0199      0.07  Q          |          |          |          |
  3+50       0.0204      0.07  QV         |          |          |          |
  3+55       0.0209      0.07  QV         |          |          |          |
  4+ 0       0.0214      0.07  QV         |          |          |          |
  4+ 5       0.0219      0.07  QV         |          |          |          |
  4+10       0.0224      0.07  QV         |          |          |          |
  4+15       0.0229      0.07  QV         |          |          |          |
  4+20       0.0234      0.07  QV         |          |          |          |
  4+25       0.0239      0.07  QV         |          |          |          |
  4+30       0.0244      0.07  QV         |          |          |          |
  4+35       0.0249      0.08  QV         |          |          |          |
  4+40       0.0254      0.08  QV         |          |          |          |
  4+45       0.0260      0.08  QV         |          |          |          |
  4+50       0.0265      0.08  QV         |          |          |          |
  4+55       0.0270      0.08  QV         |          |          |          |
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5+ 0	0.0275	0.08	QV				
5+ 5	0.0281	0.08	QV				
5+10	0.0286	0.08	QV				
5+15	0.0292	0.08	QV				
5+20	0.0297	0.08	QV				
5+25	0.0302	0.08	QV				
5+30	0.0308	0.08	QV				
5+35	0.0313	0.08	QV				
5+40	0.0319	0.08	QV				
5+45	0.0324	0.08	QV				
5+50	0.0330	0.08	QV				
5+55	0.0335	0.08	QV				
6+ 0	0.0341	0.08	QV				
6+ 5	0.0347	0.08	QV				
6+10	0.0352	0.08	QV				
6+15	0.0358	0.08	QV				
6+20	0.0364	0.08	QV				
6+25	0.0370	0.08	QV				
6+30	0.0375	0.08	QV				
6+35	0.0381	0.08	QV				
6+40	0.0387	0.09	QV				
6+45	0.0393	0.09	QV				
6+50	0.0399	0.09	QV				
6+55	0.0405	0.09	Q V				
7+ 0	0.0411	0.09	Q V				
7+ 5	0.0417	0.09	Q V				
7+10	0.0423	0.09	Q V				
7+15	0.0429	0.09	Q V				
7+20	0.0435	0.09	Q V				
7+25	0.0441	0.09	Q V				
7+30	0.0447	0.09	Q V				
7+35	0.0454	0.09	Q V				
7+40	0.0460	0.09	Q V				
7+45	0.0466	0.09	Q V				
7+50	0.0473	0.09	Q V				
7+55	0.0479	0.09	Q V				
8+ 0	0.0485	0.09	Q V				
8+ 5	0.0492	0.09	Q V				
8+10	0.0498	0.09	Q V				
8+15	0.0505	0.10	Q V				
8+20	0.0512	0.10	Q V				
8+25	0.0518	0.10	Q V				
8+30	0.0525	0.10	Q V				
8+35	0.0532	0.10	Q V				
8+40	0.0538	0.10	Q V				
8+45	0.0545	0.10	Q V				
8+50	0.0552	0.10	Q V				
8+55	0.0559	0.10	Q V				
9+ 0	0.0566	0.10	Q V				
9+ 5	0.0573	0.10	Q V				
9+10	0.0580	0.10	Q V				
9+15	0.0587	0.10	Q V				
9+20	0.0594	0.10	Q V				
9+25	0.0602	0.11	Q V				
9+30	0.0609	0.11	Q V				
9+35	0.0616	0.11	Q V				
9+40	0.0624	0.11	Q V				
9+45	0.0631	0.11	Q V				
9+50	0.0639	0.11	Q V				
9+55	0.0646	0.11	Q V				
10+ 0	0.0654	0.11	Q V				
10+ 5	0.0662	0.11	Q V				
10+10	0.0670	0.11	Q V				
10+15	0.0677	0.11	Q V				
10+20	0.0685	0.12	Q V				
10+25	0.0693	0.12	Q V				
10+30	0.0701	0.12	Q V				
10+35	0.0710	0.12	Q V				
10+40	0.0718	0.12	Q V				
10+45	0.0726	0.12	Q V				
10+50	0.0735	0.12	Q V				
10+55	0.0743	0.12	Q V				
11+ 0	0.0752	0.12	Q V				
11+ 5	0.0760	0.13	Q V				
11+10	0.0769	0.13	Q V				
11+15	0.0778	0.13	Q V				

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11+20       0.0787      0.13  Q  V      |          |          |          |
11+25       0.0796      0.13  Q  V      |          |          |          |
11+30       0.0805      0.13  Q   V     |          |          |          |
11+35       0.0814      0.13  Q   V     |          |          |          |
11+40       0.0823      0.14  Q   V     |          |          |          |
11+45       0.0833      0.14  Q   V     |          |          |          |
11+50       0.0842      0.14  Q   V     |          |          |          |
11+55       0.0852      0.14  Q   V     |          |          |          |
12+ 0       0.0862      0.14  Q   V     |          |          |          |
12+ 5       0.0872      0.15  Q   V     |          |          |          |
12+10       0.0883      0.16  Q   V     |          |          |          |
12+15       0.0895      0.17  Q   V     |          |          |          |
12+20       0.0908      0.18  Q   V     |          |          |          |
12+25       0.0920      0.18  Q   V     |          |          |          |
12+30       0.0933      0.19  Q   V     |          |          |          |
12+35       0.0946      0.19  Q   V     |          |          |          |
12+40       0.0959      0.19  Q   V     |          |          |          |
12+45       0.0972      0.19  Q   V     |          |          |          |
12+50       0.0986      0.20  Q   V     |          |          |          |
12+55       0.0999      0.20  Q   V     |          |          |          |
13+ 0       0.1013      0.20  Q    V    |          |          |          |
13+ 5       0.1027      0.20  Q    V    |          |          |          |
13+10       0.1041      0.21  Q    V    |          |          |          |
13+15       0.1056      0.21  Q    V    |          |          |          |
13+20       0.1071      0.21  Q    V    |          |          |          |
13+25       0.1086      0.22  Q    V    |          |          |          |
13+30       0.1101      0.22  Q    V    |          |          |          |
13+35       0.1116      0.22  Q    V    |          |          |          |
13+40       0.1132      0.23  Q    V    |          |          |          |
13+45       0.1148      0.23  Q    V    |          |          |          |
13+50       0.1164      0.24  Q    V    |          |          |          |
13+55       0.1181      0.24  Q    V    |          |          |          |
14+ 0       0.1198      0.25  Q    V    |          |          |          |
14+ 5       0.1215      0.25  Q     V   |          |          |          |
14+10       0.1233      0.26  Q     V   |          |          |          |
14+15       0.1252      0.27  Q     V   |          |          |          |
14+20       0.1271      0.28  Q     V   |          |          |          |
14+25       0.1291      0.29  Q     V   |          |          |          |
14+30       0.1311      0.29  Q     V   |          |          |          |
14+35       0.1332      0.30  Q     V   |          |          |          |
14+40       0.1353      0.31  Q     V   |          |          |          |
14+45       0.1375      0.32  Q     V   |          |          |          |
14+50       0.1398      0.33  Q     V   |          |          |          |
14+55       0.1422      0.34  Q      V  |          |          |          |
15+ 0       0.1446      0.35  Q      V  |          |          |          |
15+ 5       0.1471      0.37  Q      V  |          |          |          |
15+10       0.1498      0.38  Q      V  |          |          |          |
15+15       0.1525      0.40  Q      V  |          |          |          |
15+20       0.1554      0.42  Q      V  |          |          |          |
15+25       0.1584      0.44  Q      V  |          |          |          |
15+30       0.1614      0.43  Q       V |          |          |          |
15+35       0.1648      0.49  Q       V |          |          |          |
15+40       0.1704      0.81  |Q      V |          |          |          |
15+45       0.1793      1.30  |Q      V |          |          |          |
15+50       0.1949      2.27  |  Q     V|          |          |          |
15+55       0.2190      3.50  |   Q     V          |          |          |
16+ 0       0.2612      6.13  |        Q | V       |          |          |
16+ 5       0.3483     12.64  |          |     QV  |          |          |
16+10       0.5337     26.93  |          |         |     V    |    Q     |
16+15       0.6335     14.49  |          |        Q|          |V         |
16+20       0.6818      7.01  |         Q|         |          |  V       |
16+25       0.7057      3.46  |   Q      |         |          |    V     |
16+30       0.7169      1.63  | Q        |         |          |    V     |
16+35       0.7236      0.97  |Q         |         |          |     V    |
16+40       0.7285      0.71  Q          |         |          |     V    |
16+45       0.7319      0.49  Q          |         |          |     V    |
16+50       0.7344      0.36  Q          |         |          |     V    |
16+55       0.7367      0.33  Q          |         |          |     V    |
17+ 0       0.7388      0.31  Q          |         |          |     V    |
17+ 5       0.7408      0.29  Q          |         |          |     V    |
17+10       0.7426      0.27  Q          |         |          |     V    |
17+15       0.7444      0.26  Q          |         |          |      V   |
17+20       0.7461      0.24  Q          |         |          |      V   |
17+25       0.7477      0.23  Q          |         |          |      V   |
17+30       0.7492      0.23  Q          |         |          |      V   |
17+35       0.7507      0.22  Q          |         |          |      V   |
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17+40       0.7522      0.21  Q          |          |          |      V  |
17+45       0.7536      0.20  Q          |          |          |      V  |
17+50       0.7550      0.20  Q          |          |          |      V  |
17+55       0.7563      0.19  Q          |          |          |      V  |
18+ 0       0.7576      0.19  Q          |          |          |      V  |
18+ 5       0.7588      0.18  Q          |          |          |      V  |
18+10       0.7600      0.16  Q          |          |          |      V  |
18+15       0.7610      0.15  Q          |          |          |      V  |
18+20       0.7620      0.14  Q          |          |          |      V  |
18+25       0.7629      0.14  Q          |          |          |      V  |
18+30       0.7639      0.13  Q          |          |          |       V |
18+35       0.7648      0.13  Q          |          |          |       V |
18+40       0.7656      0.13  Q          |          |          |       V |
18+45       0.7665      0.13  Q          |          |          |       V |
18+50       0.7674      0.12  Q          |          |          |       V |
18+55       0.7682      0.12  Q          |          |          |       V |
19+ 0       0.7690      0.12  Q          |          |          |       V |
19+ 5       0.7698      0.12  Q          |          |          |       V |
19+10       0.7706      0.11  Q          |          |          |       V |
19+15       0.7714      0.11  Q          |          |          |       V |
19+20       0.7721      0.11  Q          |          |          |       V |
19+25       0.7729      0.11  Q          |          |          |       V |
19+30       0.7736      0.11  Q          |          |          |       V |
19+35       0.7743      0.11  Q          |          |          |       V |
19+40       0.7751      0.10  Q          |          |          |       V |
19+45       0.7758      0.10  Q          |          |          |       V |
19+50       0.7765      0.10  Q          |          |          |       V |
19+55       0.7771      0.10  Q          |          |          |       V |
20+ 0       0.7778      0.10  Q          |          |          |       V |
20+ 5       0.7785      0.10  Q          |          |          |       V |
20+10       0.7791      0.10  Q          |          |          |       V |
20+15       0.7798      0.09  Q          |          |          |       V |
20+20       0.7804      0.09  Q          |          |          |       V |
20+25       0.7811      0.09  Q          |          |          |       V |
20+30       0.7817      0.09  Q          |          |          |       V |
20+35       0.7823      0.09  Q          |          |          |       V |
20+40       0.7829      0.09  Q          |          |          |       V |
20+45       0.7835      0.09  Q          |          |          |       V |
20+50       0.7841      0.09  Q          |          |          |        V|
20+55       0.7847      0.09  Q          |          |          |        V|
21+ 0       0.7853      0.08  Q          |          |          |        V|
21+ 5       0.7859      0.08  Q          |          |          |        V|
21+10       0.7864      0.08  Q          |          |          |        V|
21+15       0.7870      0.08  Q          |          |          |        V|
21+20       0.7876      0.08  Q          |          |          |        V|
21+25       0.7881      0.08  Q          |          |          |        V|
21+30       0.7887      0.08  Q          |          |          |        V|
21+35       0.7892      0.08  Q          |          |          |        V|
21+40       0.7897      0.08  Q          |          |          |        V|
21+45       0.7903      0.08  Q          |          |          |        V|
21+50       0.7908      0.08  Q          |          |          |        V|
21+55       0.7913      0.08  Q          |          |          |        V|
22+ 0       0.7918      0.08  Q          |          |          |        V|
22+ 5       0.7924      0.07  Q          |          |          |        V|
22+10       0.7929      0.07  Q          |          |          |        V|
22+15       0.7934      0.07  Q          |          |          |        V|
22+20       0.7939      0.07  Q          |          |          |        V|
22+25       0.7944      0.07  Q          |          |          |        V|
22+30       0.7949      0.07  Q          |          |          |        V|
22+35       0.7953      0.07  Q          |          |          |        V|
22+40       0.7958      0.07  Q          |          |          |        V|
22+45       0.7963      0.07  Q          |          |          |        V|
22+50       0.7968      0.07  Q          |          |          |        V|
22+55       0.7973      0.07  Q          |          |          |        V|
23+ 0       0.7977      0.07  Q          |          |          |        V|
23+ 5       0.7982      0.07  Q          |          |          |        V|
23+10       0.7987      0.07  Q          |          |          |        V|
23+15       0.7991      0.07  Q          |          |          |        V|
23+20       0.7996      0.07  Q          |          |          |        V|
23+25       0.8000      0.07  Q          |          |          |        V|
23+30       0.8005      0.07  Q          |          |          |        V|
23+35       0.8009      0.06  Q          |          |          |        V|
23+40       0.8014      0.06  Q          |          |          |        V|
23+45       0.8018      0.06  Q          |          |          |        V|
23+50       0.8022      0.06  Q          |          |          |        V|
23+55       0.8027      0.06  Q          |          |          |        V|
```
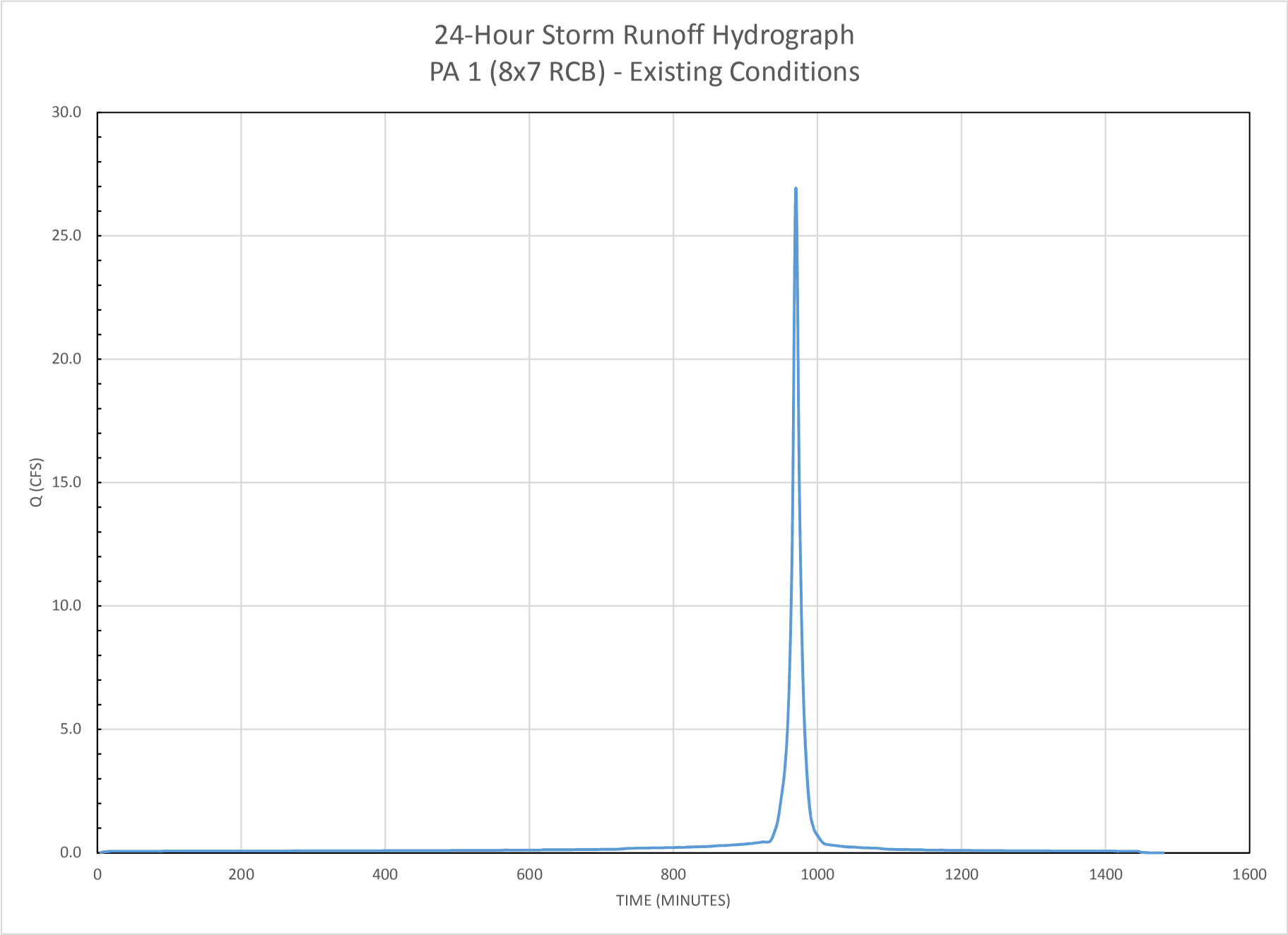

```
   24+ 0       0.8031      0.06  Q          |          |          |         V|
   24+ 5       0.8035      0.06  Q          |          |          |         V|
   24+10       0.8036      0.02  Q          |          |          |         V|
   24+15       0.8037      0.01  Q          |          |          |         V|
   24+20       0.8037      0.00  Q          |          |          |         V|
   24+25       0.8038      0.00  Q          |          |          |         V|
   24+30       0.8038      0.00  Q          |          |          |         V|
   24+35       0.8038      0.00  Q          |          |          |         V|
   24+40       0.8038      0.00  Q          |          |          |          V
-----------------------------------------------------------------------
```


24-Hour Storm Runoff Hydrograph
PA 1 (8x7 RCB) - Existing Conditions
Q (CFS)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0
200
400
600
800
1000
1200
1400
1600
TIME (MINUTES)

U n i t H y d r o g r a p h A n a l y s i s

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Study date 09/29/15 File Name EXPA1HYMW.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6103

PLANNING AREA 1 - 36" RCP
EXISTING CONDITIONS - HYDROMOD CALCULATIONS
2-YEAR 24-HOUR STORM
BY FUSCOE ENGINEERING

Storm Event Year = 2

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
79.0	2.9	0.23	C	0.250	1.000	0.250
84.0	9.6	0.77	D	0.200	1.000	0.200

Area-averaged adjusted loss rate Fm (In/Hr) = 0.212

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
2.90	0.232	79.0	61.8	6.18	0.046
9.60	0.768	84.0	68.6	4.58	0.110

Area-averaged catchment yield fraction, Y = 0.095
Area-averaged low loss fraction, Yb = 0.905
++
Watercourse length = 1194.90(Ft.)
Length from concentration point to centroid = 549.94(Ft.)
Elevation difference along watercourse = 192.20(Ft.)
Mannings friction factor along watercourse = 0.030
Watershed area = 12.50(Ac.)
Catchment Lag time = 0.048 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 173.1820
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.212(In/Hr)
Average low loss rate fraction (Yb) = 0.905 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall = 0.190(In)
Computed peak 30-minute rainfall = 0.400(In)
Specified peak 1-hour rainfall = 0.530(In)
Computed peak 3-hour rainfall = 0.890(In)
Specified peak 6-hour rainfall = 1.220(In)
Specified peak 24-hour rainfall = 2.050(In)

Rainfall depth area reduction factors:
Using a total area of 12.50(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.190(In)

30-minute factor = 0.999 Adjusted rainfall = 0.400(In)
1-hour factor = 0.999 Adjusted rainfall = 0.530(In)
3-hour factor = 1.000 Adjusted rainfall = 0.890(In)
6-hour factor = 1.000 Adjusted rainfall = 1.220(In)
24-hour factor = 1.000 Adjusted rainfall = 2.050(In)

U n i t H y d r o g r a p h

++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 151.17 (CFS))	
1	36.448	55.100
2	88.904	79.298
3	98.102	13.904
4	99.645	2.333
5	100.000	0.537

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.1899	0.1899
2	0.2533	0.0634
3	0.2997	0.0465
4	0.3378	0.0381
5	0.3706	0.0328
6	0.3998	0.0292
7	0.4256	0.0258
8	0.4493	0.0237
9	0.4713	0.0220
10	0.4919	0.0206
11	0.5113	0.0194
12	0.5297	0.0184
13	0.5501	0.0204
14	0.5697	0.0196
15	0.5886	0.0189
16	0.6068	0.0182
17	0.6244	0.0176
18	0.6415	0.0171
19	0.6581	0.0166
20	0.6742	0.0161
21	0.6899	0.0157
22	0.7053	0.0153
23	0.7202	0.0150
24	0.7348	0.0146
25	0.7491	0.0143
26	0.7632	0.0140
27	0.7769	0.0137
28	0.7903	0.0135
29	0.8035	0.0132
30	0.8165	0.0130
31	0.8293	0.0127
32	0.8418	0.0125
33	0.8541	0.0123
34	0.8662	0.0121
35	0.8782	0.0119
36	0.8899	0.0118
37	0.9011	0.0112
38	0.9121	0.0110
39	0.9229	0.0108
40	0.9336	0.0107
41	0.9442	0.0106
42	0.9546	0.0104
43	0.9649	0.0103
44	0.9750	0.0101
45	0.9850	0.0100
46	0.9949	0.0099
47	1.0047	0.0098
48	1.0144	0.0097
49	1.0240	0.0096
50	1.0334	0.0095
51	1.0428	0.0094
52	1.0520	0.0093
53	1.0612	0.0092
54	1.0703	0.0091

55	1.0792	0.0090
56	1.0881	0.0089
57	1.0969	0.0088
58	1.1056	0.0087
59	1.1143	0.0086
60	1.1228	0.0086
61	1.1313	0.0085
62	1.1397	0.0084
63	1.1480	0.0083
64	1.1563	0.0083
65	1.1645	0.0082
66	1.1726	0.0081
67	1.1806	0.0081
68	1.1886	0.0080
69	1.1966	0.0079
70	1.2044	0.0079
71	1.2122	0.0078
72	1.2200	0.0077
73	1.2263	0.0063
74	1.2325	0.0063
75	1.2387	0.0062
76	1.2449	0.0062
77	1.2510	0.0061
78	1.2571	0.0061
79	1.2631	0.0060
80	1.2690	0.0060
81	1.2750	0.0059
82	1.2808	0.0059
83	1.2866	0.0058
84	1.2924	0.0058
85	1.2982	0.0057
86	1.3039	0.0057
87	1.3095	0.0057
88	1.3151	0.0056
89	1.3207	0.0056
90	1.3262	0.0055
91	1.3317	0.0055
92	1.3372	0.0055
93	1.3426	0.0054
94	1.3480	0.0054
95	1.3534	0.0054
96	1.3587	0.0053
97	1.3640	0.0053
98	1.3692	0.0052
99	1.3744	0.0052
100	1.3796	0.0052
101	1.3848	0.0051
102	1.3899	0.0051
103	1.3950	0.0051
104	1.4000	0.0051
105	1.4050	0.0050
106	1.4100	0.0050
107	1.4150	0.0050
108	1.4199	0.0049
109	1.4248	0.0049
110	1.4297	0.0049
111	1.4346	0.0049
112	1.4394	0.0048
113	1.4442	0.0048
114	1.4490	0.0048
115	1.4537	0.0047
116	1.4584	0.0047
117	1.4631	0.0047
118	1.4678	0.0047
119	1.4724	0.0046
120	1.4771	0.0046
121	1.4817	0.0046
122	1.4862	0.0046
123	1.4908	0.0045
124	1.4953	0.0045
125	1.4998	0.0045
126	1.5043	0.0045
127	1.5088	0.0045
128	1.5132	0.0044
129	1.5176	0.0044
130	1.5220	0.0044

131	1.5264	0.0044
132	1.5307	0.0044
133	1.5351	0.0043
134	1.5394	0.0043
135	1.5437	0.0043
136	1.5479	0.0043
137	1.5522	0.0043
138	1.5564	0.0042
139	1.5606	0.0042
140	1.5648	0.0042
141	1.5690	0.0042
142	1.5732	0.0042
143	1.5773	0.0041
144	1.5814	0.0041
145	1.5855	0.0041
146	1.5896	0.0041
147	1.5937	0.0041
148	1.5977	0.0041
149	1.6018	0.0040
150	1.6058	0.0040
151	1.6098	0.0040
152	1.6137	0.0040
153	1.6177	0.0040
154	1.6217	0.0040
155	1.6256	0.0039
156	1.6295	0.0039
157	1.6334	0.0039
158	1.6373	0.0039
159	1.6412	0.0039
160	1.6450	0.0039
161	1.6489	0.0038
162	1.6527	0.0038
163	1.6565	0.0038
164	1.6603	0.0038
165	1.6641	0.0038
166	1.6679	0.0038
167	1.6716	0.0038
168	1.6754	0.0037
169	1.6791	0.0037
170	1.6828	0.0037
171	1.6865	0.0037
172	1.6902	0.0037
173	1.6939	0.0037
174	1.6975	0.0037
175	1.7012	0.0036
176	1.7048	0.0036
177	1.7084	0.0036
178	1.7120	0.0036
179	1.7156	0.0036
180	1.7192	0.0036
181	1.7228	0.0036
182	1.7263	0.0036
183	1.7299	0.0035
184	1.7334	0.0035
185	1.7369	0.0035
186	1.7404	0.0035
187	1.7439	0.0035
188	1.7474	0.0035
189	1.7509	0.0035
190	1.7544	0.0035
191	1.7578	0.0035
192	1.7612	0.0034
193	1.7647	0.0034
194	1.7681	0.0034
195	1.7715	0.0034
196	1.7749	0.0034
197	1.7783	0.0034
198	1.7817	0.0034
199	1.7850	0.0034
200	1.7884	0.0034
201	1.7917	0.0033
202	1.7950	0.0033
203	1.7984	0.0033
204	1.8017	0.0033
205	1.8050	0.0033
206	1.8083	0.0033

207	1.8116	0.0033
208	1.8148	0.0033
209	1.8181	0.0033
210	1.8213	0.0033
211	1.8246	0.0032
212	1.8278	0.0032
213	1.8310	0.0032
214	1.8343	0.0032
215	1.8375	0.0032
216	1.8407	0.0032
217	1.8438	0.0032
218	1.8470	0.0032
219	1.8502	0.0032
220	1.8533	0.0032
221	1.8565	0.0031
222	1.8596	0.0031
223	1.8628	0.0031
224	1.8659	0.0031
225	1.8690	0.0031
226	1.8721	0.0031
227	1.8752	0.0031
228	1.8783	0.0031
229	1.8814	0.0031
230	1.8844	0.0031
231	1.8875	0.0031
232	1.8906	0.0031
233	1.8936	0.0030
234	1.8966	0.0030
235	1.8997	0.0030
236	1.9027	0.0030
237	1.9057	0.0030
238	1.9087	0.0030
239	1.9117	0.0030
240	1.9147	0.0030
241	1.9177	0.0030
242	1.9207	0.0030
243	1.9236	0.0030
244	1.9266	0.0030
245	1.9295	0.0030
246	1.9325	0.0029
247	1.9354	0.0029
248	1.9384	0.0029
249	1.9413	0.0029
250	1.9442	0.0029
251	1.9471	0.0029
252	1.9500	0.0029
253	1.9529	0.0029
254	1.9558	0.0029
255	1.9587	0.0029
256	1.9615	0.0029
257	1.9644	0.0029
258	1.9673	0.0029
259	1.9701	0.0029
260	1.9730	0.0028
261	1.9758	0.0028
262	1.9786	0.0028
263	1.9814	0.0028
264	1.9843	0.0028
265	1.9871	0.0028
266	1.9899	0.0028
267	1.9927	0.0028
268	1.9955	0.0028
269	1.9983	0.0028
270	2.0010	0.0028
271	2.0038	0.0028
272	2.0066	0.0028
273	2.0093	0.0028
274	2.0121	0.0028
275	2.0148	0.0027
276	2.0176	0.0027
277	2.0203	0.0027
278	2.0230	0.0027
279	2.0257	0.0027
280	2.0285	0.0027
281	2.0312	0.0027
282	2.0339	0.0027

283	2.0366	0.0027
284	2.0393	0.0027
285	2.0419	0.0027
286	2.0446	0.0027
287	2.0473	0.0027
288	2.0500	0.0027

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0027	0.0024	0.0003
2	0.0027	0.0024	0.0003
3	0.0027	0.0024	0.0003
4	0.0027	0.0024	0.0003
5	0.0027	0.0024	0.0003
6	0.0027	0.0025	0.0003
7	0.0027	0.0025	0.0003
8	0.0027	0.0025	0.0003
9	0.0027	0.0025	0.0003
10	0.0027	0.0025	0.0003
11	0.0028	0.0025	0.0003
12	0.0028	0.0025	0.0003
13	0.0028	0.0025	0.0003
14	0.0028	0.0025	0.0003
15	0.0028	0.0025	0.0003
16	0.0028	0.0025	0.0003
17	0.0028	0.0025	0.0003
18	0.0028	0.0026	0.0003
19	0.0028	0.0026	0.0003
20	0.0028	0.0026	0.0003
21	0.0029	0.0026	0.0003
22	0.0029	0.0026	0.0003
23	0.0029	0.0026	0.0003
24	0.0029	0.0026	0.0003
25	0.0029	0.0026	0.0003
26	0.0029	0.0026	0.0003
27	0.0029	0.0026	0.0003
28	0.0029	0.0027	0.0003
29	0.0029	0.0027	0.0003
30	0.0030	0.0027	0.0003
31	0.0030	0.0027	0.0003
32	0.0030	0.0027	0.0003
33	0.0030	0.0027	0.0003
34	0.0030	0.0027	0.0003
35	0.0030	0.0027	0.0003
36	0.0030	0.0027	0.0003
37	0.0030	0.0027	0.0003
38	0.0030	0.0028	0.0003
39	0.0031	0.0028	0.0003
40	0.0031	0.0028	0.0003
41	0.0031	0.0028	0.0003
42	0.0031	0.0028	0.0003
43	0.0031	0.0028	0.0003
44	0.0031	0.0028	0.0003
45	0.0031	0.0028	0.0003
46	0.0031	0.0028	0.0003
47	0.0032	0.0029	0.0003
48	0.0032	0.0029	0.0003
49	0.0032	0.0029	0.0003
50	0.0032	0.0029	0.0003
51	0.0032	0.0029	0.0003
52	0.0032	0.0029	0.0003
53	0.0033	0.0029	0.0003
54	0.0033	0.0030	0.0003
55	0.0033	0.0030	0.0003
56	0.0033	0.0030	0.0003
57	0.0033	0.0030	0.0003
58	0.0033	0.0030	0.0003
59	0.0033	0.0030	0.0003
60	0.0034	0.0030	0.0003
61	0.0034	0.0031	0.0003
62	0.0034	0.0031	0.0003
63	0.0034	0.0031	0.0003
64	0.0034	0.0031	0.0003
65	0.0034	0.0031	0.0003

66	0.0035	0.0031	0.0003
67	0.0035	0.0031	0.0003
68	0.0035	0.0032	0.0003
69	0.0035	0.0032	0.0003
70	0.0035	0.0032	0.0003
71	0.0035	0.0032	0.0003
72	0.0036	0.0032	0.0003
73	0.0036	0.0032	0.0003
74	0.0036	0.0033	0.0003
75	0.0036	0.0033	0.0003
76	0.0036	0.0033	0.0003
77	0.0037	0.0033	0.0003
78	0.0037	0.0033	0.0003
79	0.0037	0.0033	0.0004
80	0.0037	0.0034	0.0004
81	0.0037	0.0034	0.0004
82	0.0038	0.0034	0.0004
83	0.0038	0.0034	0.0004
84	0.0038	0.0034	0.0004
85	0.0038	0.0035	0.0004
86	0.0038	0.0035	0.0004
87	0.0039	0.0035	0.0004
88	0.0039	0.0035	0.0004
89	0.0039	0.0035	0.0004
90	0.0039	0.0036	0.0004
91	0.0040	0.0036	0.0004
92	0.0040	0.0036	0.0004
93	0.0040	0.0036	0.0004
94	0.0040	0.0036	0.0004
95	0.0041	0.0037	0.0004
96	0.0041	0.0037	0.0004
97	0.0041	0.0037	0.0004
98	0.0041	0.0037	0.0004
99	0.0042	0.0038	0.0004
100	0.0042	0.0038	0.0004
101	0.0042	0.0038	0.0004
102	0.0043	0.0038	0.0004
103	0.0043	0.0039	0.0004
104	0.0043	0.0039	0.0004
105	0.0044	0.0039	0.0004
106	0.0044	0.0040	0.0004
107	0.0044	0.0040	0.0004
108	0.0044	0.0040	0.0004
109	0.0045	0.0041	0.0004
110	0.0045	0.0041	0.0004
111	0.0045	0.0041	0.0004
112	0.0046	0.0041	0.0004
113	0.0046	0.0042	0.0004
114	0.0046	0.0042	0.0004
115	0.0047	0.0042	0.0004
116	0.0047	0.0043	0.0004
117	0.0048	0.0043	0.0005
118	0.0048	0.0043	0.0005
119	0.0049	0.0044	0.0005
120	0.0049	0.0044	0.0005
121	0.0049	0.0045	0.0005
122	0.0050	0.0045	0.0005
123	0.0050	0.0045	0.0005
124	0.0051	0.0046	0.0005
125	0.0051	0.0046	0.0005
126	0.0051	0.0047	0.0005
127	0.0052	0.0047	0.0005
128	0.0052	0.0047	0.0005
129	0.0053	0.0048	0.0005
130	0.0054	0.0048	0.0005
131	0.0054	0.0049	0.0005
132	0.0055	0.0049	0.0005
133	0.0055	0.0050	0.0005
134	0.0056	0.0050	0.0005
135	0.0057	0.0051	0.0005
136	0.0057	0.0052	0.0005
137	0.0058	0.0052	0.0006
138	0.0058	0.0053	0.0006
139	0.0059	0.0054	0.0006
140	0.0060	0.0054	0.0006
141	0.0061	0.0055	0.0006

142	0.0061	0.0055	0.0006
143	0.0062	0.0056	0.0006
144	0.0063	0.0057	0.0006
145	0.0077	0.0070	0.0007
146	0.0078	0.0071	0.0007
147	0.0079	0.0072	0.0008
148	0.0080	0.0072	0.0008
149	0.0081	0.0073	0.0008
150	0.0082	0.0074	0.0008
151	0.0083	0.0075	0.0008
152	0.0084	0.0076	0.0008
153	0.0086	0.0077	0.0008
154	0.0086	0.0078	0.0008
155	0.0088	0.0080	0.0008
156	0.0089	0.0080	0.0008
157	0.0091	0.0082	0.0009
158	0.0092	0.0083	0.0009
159	0.0094	0.0085	0.0009
160	0.0095	0.0086	0.0009
161	0.0097	0.0088	0.0009
162	0.0098	0.0089	0.0009
163	0.0100	0.0091	0.0010
164	0.0101	0.0092	0.0010
165	0.0104	0.0094	0.0010
166	0.0106	0.0095	0.0010
167	0.0108	0.0098	0.0010
168	0.0110	0.0100	0.0010
169	0.0118	0.0106	0.0011
170	0.0119	0.0108	0.0011
171	0.0123	0.0112	0.0012
172	0.0125	0.0113	0.0012
173	0.0130	0.0117	0.0012
174	0.0132	0.0120	0.0013
175	0.0137	0.0124	0.0013
176	0.0140	0.0127	0.0013
177	0.0146	0.0132	0.0014
178	0.0150	0.0135	0.0014
179	0.0157	0.0142	0.0015
180	0.0161	0.0146	0.0015
181	0.0171	0.0155	0.0016
182	0.0176	0.0159	0.0017
183	0.0189	0.0171	0.0018
184	0.0196	0.0176	0.0020
185	0.0184	0.0166	0.0017
186	0.0194	0.0176	0.0018
187	0.0220	0.0176	0.0044
188	0.0237	0.0176	0.0061
189	0.0292	0.0176	0.0115
190	0.0328	0.0176	0.0152
191	0.0465	0.0176	0.0288
192	0.0634	0.0176	0.0457
193	0.1899	0.0176	0.1723
194	0.0381	0.0176	0.0204
195	0.0258	0.0176	0.0082
196	0.0206	0.0176	0.0030
197	0.0204	0.0176	0.0028
198	0.0182	0.0165	0.0017
199	0.0166	0.0150	0.0016
200	0.0153	0.0139	0.0015
201	0.0143	0.0129	0.0014
202	0.0135	0.0122	0.0013
203	0.0127	0.0115	0.0012
204	0.0121	0.0110	0.0012
205	0.0112	0.0101	0.0011
206	0.0107	0.0097	0.0010
207	0.0103	0.0093	0.0010
208	0.0099	0.0090	0.0009
209	0.0096	0.0087	0.0009
210	0.0093	0.0084	0.0009
211	0.0090	0.0081	0.0009
212	0.0087	0.0079	0.0008
213	0.0085	0.0077	0.0008
214	0.0083	0.0075	0.0008
215	0.0081	0.0073	0.0008
216	0.0079	0.0071	0.0007
217	0.0063	0.0057	0.0006

218	0.0062	0.0056	0.0006
219	0.0060	0.0054	0.0006
220	0.0059	0.0053	0.0006
221	0.0057	0.0052	0.0005
222	0.0056	0.0051	0.0005
223	0.0055	0.0050	0.0005
224	0.0054	0.0049	0.0005
225	0.0053	0.0048	0.0005
226	0.0052	0.0047	0.0005
227	0.0051	0.0046	0.0005
228	0.0050	0.0045	0.0005
229	0.0049	0.0044	0.0005
230	0.0048	0.0044	0.0005
231	0.0047	0.0043	0.0005
232	0.0047	0.0042	0.0004
233	0.0046	0.0042	0.0004
234	0.0045	0.0041	0.0004
235	0.0045	0.0040	0.0004
236	0.0044	0.0040	0.0004
237	0.0043	0.0039	0.0004
238	0.0043	0.0039	0.0004
239	0.0042	0.0038	0.0004
240	0.0042	0.0038	0.0004
241	0.0041	0.0037	0.0004
242	0.0041	0.0037	0.0004
243	0.0040	0.0036	0.0004
244	0.0040	0.0036	0.0004
245	0.0039	0.0035	0.0004
246	0.0039	0.0035	0.0004
247	0.0038	0.0034	0.0004
248	0.0038	0.0034	0.0004
249	0.0037	0.0034	0.0004
250	0.0037	0.0033	0.0004
251	0.0036	0.0033	0.0003
252	0.0036	0.0033	0.0003
253	0.0036	0.0032	0.0003
254	0.0035	0.0032	0.0003
255	0.0035	0.0032	0.0003
256	0.0035	0.0031	0.0003
257	0.0034	0.0031	0.0003
258	0.0034	0.0031	0.0003
259	0.0034	0.0030	0.0003
260	0.0033	0.0030	0.0003
261	0.0033	0.0030	0.0003
262	0.0033	0.0030	0.0003
263	0.0032	0.0029	0.0003
264	0.0032	0.0029	0.0003
265	0.0032	0.0029	0.0003
266	0.0032	0.0029	0.0003
267	0.0031	0.0028	0.0003
268	0.0031	0.0028	0.0003
269	0.0031	0.0028	0.0003
270	0.0031	0.0028	0.0003
271	0.0030	0.0027	0.0003
272	0.0030	0.0027	0.0003
273	0.0030	0.0027	0.0003
274	0.0030	0.0027	0.0003
275	0.0029	0.0027	0.0003
276	0.0029	0.0026	0.0003
277	0.0029	0.0026	0.0003
278	0.0029	0.0026	0.0003
279	0.0029	0.0026	0.0003
280	0.0028	0.0026	0.0003
281	0.0028	0.0025	0.0003
282	0.0028	0.0025	0.0003
283	0.0028	0.0025	0.0003
284	0.0028	0.0025	0.0003
285	0.0027	0.0025	0.0003
286	0.0027	0.0025	0.0003
287	0.0027	0.0024	0.0003
288	0.0027	0.0024	0.0003

Total soil rain loss = 1.59(In)
Total effective rainfall = 0.46(In)
Peak flow rate in flood hydrograph = 15.50(CFS)

```
     ----------------------------------------------------------------------
     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                         24 - H O U R    S T O R M
                     R u n o f f     H y d r o g r a p h
     ----------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

     ----------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0001      0.01  Q         |         |         |         |
  0+10       0.0003      0.03  Q         |         |         |         |
  0+15       0.0006      0.04  Q         |         |         |         |
  0+20       0.0009      0.04  Q         |         |         |         |
  0+25       0.0011      0.04  Q         |         |         |         |
  0+30       0.0014      0.04  Q         |         |         |         |
  0+35       0.0017      0.04  Q         |         |         |         |
  0+40       0.0019      0.04  Q         |         |         |         |
  0+45       0.0022      0.04  Q         |         |         |         |
  0+50       0.0025      0.04  Q         |         |         |         |
  0+55       0.0027      0.04  Q         |         |         |         |
  1+ 0       0.0030      0.04  Q         |         |         |         |
  1+ 5       0.0033      0.04  Q         |         |         |         |
  1+10       0.0036      0.04  Q         |         |         |         |
  1+15       0.0038      0.04  Q         |         |         |         |
  1+20       0.0041      0.04  Q         |         |         |         |
  1+25       0.0044      0.04  Q         |         |         |         |
  1+30       0.0047      0.04  Q         |         |         |         |
  1+35       0.0050      0.04  Q         |         |         |         |
  1+40       0.0052      0.04  Q         |         |         |         |
  1+45       0.0055      0.04  Q         |         |         |         |
  1+50       0.0058      0.04  Q         |         |         |         |
  1+55       0.0061      0.04  Q         |         |         |         |
  2+ 0       0.0064      0.04  Q         |         |         |         |
  2+ 5       0.0067      0.04  Q         |         |         |         |
  2+10       0.0069      0.04  Q         |         |         |         |
  2+15       0.0072      0.04  Q         |         |         |         |
  2+20       0.0075      0.04  Q         |         |         |         |
  2+25       0.0078      0.04  Q         |         |         |         |
  2+30       0.0081      0.04  Q         |         |         |         |
  2+35       0.0084      0.04  Q         |         |         |         |
  2+40       0.0087      0.04  Q         |         |         |         |
  2+45       0.0090      0.04  Q         |         |         |         |
  2+50       0.0093      0.04  Q         |         |         |         |
  2+55       0.0096      0.04  Q         |         |         |         |
  3+ 0       0.0099      0.04  Q         |         |         |         |
  3+ 5       0.0102      0.04  Q         |         |         |         |
  3+10       0.0105      0.04  Q         |         |         |         |
  3+15       0.0108      0.04  Q         |         |         |         |
  3+20       0.0111      0.04  Q         |         |         |         |
  3+25       0.0114      0.04  Q         |         |         |         |
  3+30       0.0117      0.04  Q         |         |         |         |
  3+35       0.0120      0.04  Q         |         |         |         |
  3+40       0.0123      0.04  QV        |         |         |         |
  3+45       0.0126      0.04  QV        |         |         |         |
  3+50       0.0129      0.05  QV        |         |         |         |
  3+55       0.0132      0.05  QV        |         |         |         |
  4+ 0       0.0136      0.05  QV        |         |         |         |
  4+ 5       0.0139      0.05  QV        |         |         |         |
  4+10       0.0142      0.05  QV        |         |         |         |
  4+15       0.0145      0.05  QV        |         |         |         |
  4+20       0.0148      0.05  QV        |         |         |         |
  4+25       0.0152      0.05  QV        |         |         |         |
  4+30       0.0155      0.05  QV        |         |         |         |
  4+35       0.0158      0.05  QV        |         |         |         |
  4+40       0.0161      0.05  QV        |         |         |         |
  4+45       0.0165      0.05  QV        |         |         |         |
  4+50       0.0168      0.05  QV        |         |         |         |
  4+55       0.0171      0.05  QV        |         |         |         |
  5+ 0       0.0174      0.05  QV        |         |         |         |
  5+ 5       0.0178      0.05  QV        |         |         |         |
  5+10       0.0181      0.05  QV        |         |         |         |
  5+15       0.0184      0.05  QV        |         |         |         |
  5+20       0.0188      0.05  QV        |         |         |         |
  5+25       0.0191      0.05  QV        |         |         |         |
  5+30       0.0195      0.05  QV        |         |         |         |
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5+35	0.0198	0.05	QV			
5+40	0.0201	0.05	QV			
5+45	0.0205	0.05	QV			
5+50	0.0208	0.05	QV			
5+55	0.0212	0.05	QV			
6+ 0	0.0215	0.05	QV			
6+ 5	0.0219	0.05	QV			
6+10	0.0222	0.05	QV			
6+15	0.0226	0.05	QV			
6+20	0.0230	0.05	QV			
6+25	0.0233	0.05	QV			
6+30	0.0237	0.05	QV			
6+35	0.0241	0.05	QV			
6+40	0.0244	0.05	Q V			
6+45	0.0248	0.05	Q V			
6+50	0.0252	0.05	Q V			
6+55	0.0255	0.05	Q V			
7+ 0	0.0259	0.05	Q V			
7+ 5	0.0263	0.05	Q V			
7+10	0.0267	0.06	Q V			
7+15	0.0270	0.06	Q V			
7+20	0.0274	0.06	Q V			
7+25	0.0278	0.06	Q V			
7+30	0.0282	0.06	Q V			
7+35	0.0286	0.06	Q V			
7+40	0.0290	0.06	Q V			
7+45	0.0294	0.06	Q V			
7+50	0.0298	0.06	Q V			
7+55	0.0302	0.06	Q V			
8+ 0	0.0306	0.06	Q V			
8+ 5	0.0310	0.06	Q V			
8+10	0.0314	0.06	Q V			
8+15	0.0318	0.06	Q V			
8+20	0.0322	0.06	Q V			
8+25	0.0326	0.06	Q V			
8+30	0.0331	0.06	Q V			
8+35	0.0335	0.06	Q V			
8+40	0.0339	0.06	Q V			
8+45	0.0343	0.06	Q V			
8+50	0.0348	0.06	Q V			
8+55	0.0352	0.06	Q V			
9+ 0	0.0356	0.06	Q V			
9+ 5	0.0361	0.06	Q V			
9+10	0.0365	0.06	Q V			
9+15	0.0370	0.06	Q V			
9+20	0.0374	0.07	Q V			
9+25	0.0379	0.07	Q V			
9+30	0.0383	0.07	Q V			
9+35	0.0388	0.07	Q V			
9+40	0.0393	0.07	Q V			
9+45	0.0397	0.07	Q V			
9+50	0.0402	0.07	Q V			
9+55	0.0407	0.07	Q V			
10+ 0	0.0412	0.07	Q V			
10+ 5	0.0416	0.07	Q V			
10+10	0.0421	0.07	Q V			
10+15	0.0426	0.07	Q V			
10+20	0.0431	0.07	Q V			
10+25	0.0436	0.07	Q V			
10+30	0.0441	0.07	Q V			
10+35	0.0446	0.07	Q V			
10+40	0.0452	0.08	Q V			
10+45	0.0457	0.08	Q V			
10+50	0.0462	0.08	Q V			
10+55	0.0467	0.08	Q V			
11+ 0	0.0473	0.08	Q V			
11+ 5	0.0478	0.08	Q V			
11+10	0.0484	0.08	Q V			
11+15	0.0489	0.08	Q V			
11+20	0.0495	0.08	Q V			
11+25	0.0501	0.08	Q V			
11+30	0.0506	0.08	Q V			
11+35	0.0512	0.08	Q V			
11+40	0.0518	0.09	Q V			
11+45	0.0524	0.09	Q V			
11+50	0.0530	0.09	Q V			

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11+55       0.0536      0.09  Q   V     |         |         |         |
12+ 0       0.0542      0.09  Q   V     |         |         |         |
12+ 5       0.0549      0.10  Q   V     |         |         |         |
12+10       0.0556      0.11  Q   V     |         |         |         |
12+15       0.0564      0.11  Q   V     |         |         |         |
12+20       0.0572      0.11  Q   V     |         |         |         |
12+25       0.0580      0.12  Q   V     |         |         |         |
12+30       0.0588      0.12  Q   V     |         |         |         |
12+35       0.0596      0.12  Q   V     |         |         |         |
12+40       0.0604      0.12  Q   V     |         |         |         |
12+45       0.0613      0.12  Q    V    |         |         |         |
12+50       0.0621      0.12  Q    V    |         |         |         |
12+55       0.0630      0.12  Q    V    |         |         |         |
13+ 0       0.0639      0.13  Q    V    |         |         |         |
13+ 5       0.0647      0.13  Q    V    |         |         |         |
13+10       0.0656      0.13  Q    V    |         |         |         |
13+15       0.0666      0.13  Q    V    |         |         |         |
13+20       0.0675      0.13  Q    V    |         |         |         |
13+25       0.0684      0.14  Q    V    |         |         |         |
13+30       0.0694      0.14  Q    V    |         |         |         |
13+35       0.0704      0.14  Q    V    |         |         |         |
13+40       0.0714      0.14  Q    V    |         |         |         |
13+45       0.0724      0.15  Q    V    |         |         |         |
13+50       0.0734      0.15  Q     V   |         |         |         |
13+55       0.0745      0.15  Q     V   |         |         |         |
14+ 0       0.0755      0.16  Q     V   |         |         |         |
14+ 5       0.0766      0.16  Q     V   |         |         |         |
14+10       0.0778      0.17  Q     V   |         |         |         |
14+15       0.0790      0.17  Q     V   |         |         |         |
14+20       0.0802      0.18  Q     V   |         |         |         |
14+25       0.0815      0.18  Q     V   |         |         |         |
14+30       0.0828      0.19  Q     V   |         |         |         |
14+35       0.0841      0.19  Q     V   |         |         |         |
14+40       0.0855      0.20  Q      V  |         |         |         |
14+45       0.0869      0.20  Q      V  |         |         |         |
14+50       0.0883      0.21  Q      V  |         |         |         |
14+55       0.0898      0.22  Q      V  |         |         |         |
15+ 0       0.0914      0.23  Q      V  |         |         |         |
15+ 5       0.0930      0.24  Q      V  |         |         |         |
15+10       0.0947      0.25  Q      V  |         |         |         |
15+15       0.0965      0.26  Q      V  |         |         |         |
15+20       0.0984      0.28  Q       V |         |         |         |
15+25       0.1003      0.28  Q       V |         |         |         |
15+30       0.1022      0.27  Q       V |         |         |         |
15+35       0.1051      0.42  Q       V |         |         |         |
15+40       0.1100      0.71  |Q       V|         |         |         |
15+45       0.1182      1.18  | Q      V|         |         |         |
15+50       0.1309      1.85  |  Q      V         |         |         |
15+55       0.1513      2.97  |    Q    | V       |         |         |
16+ 0       0.1861      5.05  |         Q    V    |         |         |
16+ 5       0.2795     13.56  |         |         |  V   Q  |         |
16+10       0.3862     15.50  |         |         |         QV        |
16+15       0.4178      4.59  |        Q|         |         |   V     |
16+20       0.4283      1.52  |  Q      |         |         |    V    |
16+25       0.4327      0.64  |Q        |         |         |    V    |
16+30       0.4354      0.39  Q         |         |         |    V    |
16+35       0.4373      0.27  Q         |         |         |     V   |
16+40       0.4389      0.24  Q         |         |         |     V   |
16+45       0.4404      0.22  Q         |         |         |     V   |
16+50       0.4418      0.20  Q         |         |         |     V   |
16+55       0.4431      0.19  Q         |         |         |     V   |
17+ 0       0.4444      0.18  Q         |         |         |     V   |
17+ 5       0.4455      0.17  Q         |         |         |     V   |
17+10       0.4466      0.16  Q         |         |         |     V   |
17+15       0.4477      0.15  Q         |         |         |      V  |
17+20       0.4487      0.15  Q         |         |         |      V  |
17+25       0.4497      0.14  Q         |         |         |      V  |
17+30       0.4506      0.14  Q         |         |         |      V  |
17+35       0.4515      0.13  Q         |         |         |      V  |
17+40       0.4524      0.13  Q         |         |         |      V  |
17+45       0.4533      0.12  Q         |         |         |      V  |
17+50       0.4541      0.12  Q         |         |         |      V  |
17+55       0.4549      0.12  Q         |         |         |      V  |
18+ 0       0.4557      0.12  Q         |         |         |      V  |
18+ 5       0.4564      0.11  Q         |         |         |      V  |
18+10       0.4571      0.09  Q         |         |         |      V  |
```

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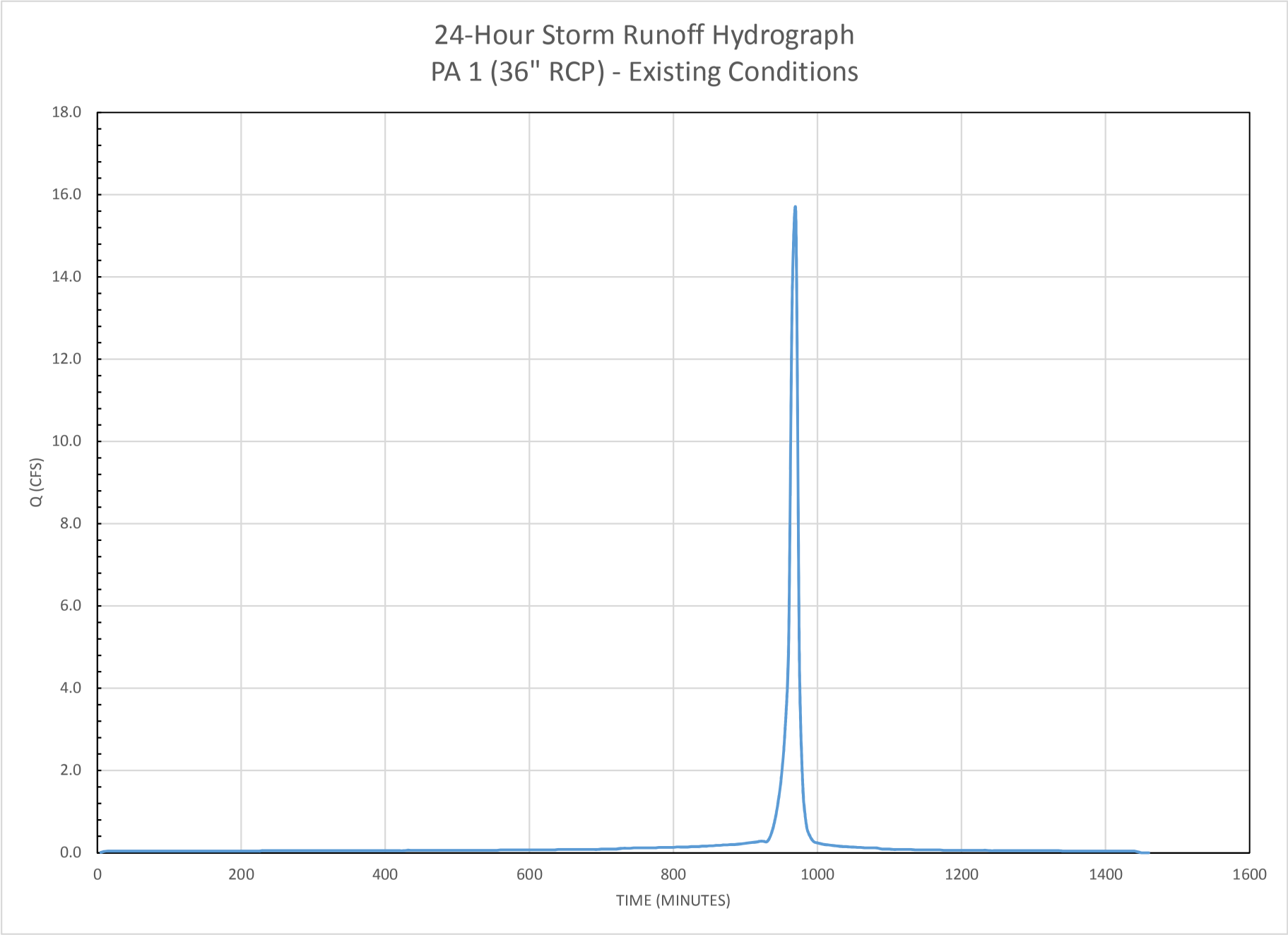
   18+15       0.4577      0.09  Q          |          |          |      V  |
   18+20       0.4583      0.09  Q          |          |          |      V  |
   18+25       0.4589      0.08  Q          |          |          |      V  |
   18+30       0.4594      0.08  Q          |          |          |      V  |
   18+35       0.4600      0.08  Q          |          |          |       V |
   18+40       0.4605      0.08  Q          |          |          |       V |
   18+45       0.4610      0.08  Q          |          |          |       V |
   18+50       0.4616      0.08  Q          |          |          |       V |
   18+55       0.4621      0.07  Q          |          |          |       V |
   19+ 0       0.4626      0.07  Q          |          |          |       V |
   19+ 5       0.4631      0.07  Q          |          |          |       V |
   19+10       0.4636      0.07  Q          |          |          |       V |
   19+15       0.4640      0.07  Q          |          |          |       V |
   19+20       0.4645      0.07  Q          |          |          |       V |
   19+25       0.4650      0.07  Q          |          |          |       V |
   19+30       0.4654      0.07  Q          |          |          |       V |
   19+35       0.4659      0.06  Q          |          |          |       V |
   19+40       0.4663      0.06  Q          |          |          |       V |
   19+45       0.4667      0.06  Q          |          |          |       V |
   19+50       0.4672      0.06  Q          |          |          |       V |
   19+55       0.4676      0.06  Q          |          |          |       V |
   20+ 0       0.4680      0.06  Q          |          |          |       V |
   20+ 5       0.4684      0.06  Q          |          |          |       V |
   20+10       0.4688      0.06  Q          |          |          |       V |
   20+15       0.4692      0.06  Q          |          |          |       V |
   20+20       0.4696      0.06  Q          |          |          |       V |
   20+25       0.4700      0.06  Q          |          |          |       V |
   20+30       0.4704      0.06  Q          |          |          |       V |
   20+35       0.4708      0.06  Q          |          |          |       V |
   20+40       0.4711      0.05  Q          |          |          |       V |
   20+45       0.4715      0.05  Q          |          |          |       V |
   20+50       0.4719      0.05  Q          |          |          |        V|
   20+55       0.4723      0.05  Q          |          |          |        V|
   21+ 0       0.4726      0.05  Q          |          |          |        V|
   21+ 5       0.4730      0.05  Q          |          |          |        V|
   21+10       0.4733      0.05  Q          |          |          |        V|
   21+15       0.4737      0.05  Q          |          |          |        V|
   21+20       0.4740      0.05  Q          |          |          |        V|
   21+25       0.4744      0.05  Q          |          |          |        V|
   21+30       0.4747      0.05  Q          |          |          |        V|
   21+35       0.4750      0.05  Q          |          |          |        V|
   21+40       0.4754      0.05  Q          |          |          |        V|
   21+45       0.4757      0.05  Q          |          |          |        V|
   21+50       0.4760      0.05  Q          |          |          |        V|
   21+55       0.4763      0.05  Q          |          |          |        V|
   22+ 0       0.4767      0.05  Q          |          |          |        V|
   22+ 5       0.4770      0.05  Q          |          |          |        V|
   22+10       0.4773      0.05  Q          |          |          |        V|
   22+15       0.4776      0.05  Q          |          |          |        V|
   22+20       0.4779      0.04  Q          |          |          |        V|
   22+25       0.4782      0.04  Q          |          |          |        V|
   22+30       0.4785      0.04  Q          |          |          |        V|
   22+35       0.4788      0.04  Q          |          |          |        V|
   22+40       0.4791      0.04  Q          |          |          |        V|
   22+45       0.4794      0.04  Q          |          |          |        V|
   22+50       0.4797      0.04  Q          |          |          |        V|
   22+55       0.4800      0.04  Q          |          |          |        V|
   23+ 0       0.4803      0.04  Q          |          |          |        V|
   23+ 5       0.4806      0.04  Q          |          |          |        V|
   23+10       0.4809      0.04  Q          |          |          |        V|
   23+15       0.4812      0.04  Q          |          |          |        V|
   23+20       0.4815      0.04  Q          |          |          |        V|
   23+25       0.4817      0.04  Q          |          |          |        V|
   23+30       0.4820      0.04  Q          |          |          |        V|
   23+35       0.4823      0.04  Q          |          |          |        V|
   23+40       0.4826      0.04  Q          |          |          |        V|
   23+45       0.4828      0.04  Q          |          |          |        V|
   23+50       0.4831      0.04  Q          |          |          |        V|
   23+55       0.4834      0.04  Q          |          |          |        V|
   24+ 0       0.4836      0.04  Q          |          |          |        V|
   24+ 5       0.4838      0.02  Q          |          |          |        V|
   24+10       0.4838      0.00  Q          |          |          |        V|
   24+15       0.4838      0.00  Q          |          |          |        V|
   24+20       0.4838      0.00  Q          |          |          |         V
-----------------------------------------------------------------------
```


24-Hour Storm Runoff Hydrograph
PA 1 (36" RCP) - Existing Conditions
Q (CFS)
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0
200
400
600
800
1000
1200
1400
1600
TIME (MINUTES)

Planning Area 2 (North Site)

```
                    Orange County Rational Hydrology Program

                (Hydrology Manual Date(s) October 1986 & November 1996)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2004 Version 8.0
        Rational Hydrology Study, Date: 07/17/15  File Name: CVEXRAT2.roc
----------------------------------------------------------------------
CIELO VISTA PROJECT
EXISTING CONDITION
2-YEAR 24-HOUR STORM EVENT
BY FUSCOE ENGINEERING
----------------------------------------------------------------------


Program License Serial Number 6049

----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

----------------------------------------------------------------------

Rational hydrology study storm event year is     2.0

Decimal fraction of study above 2000 ft., 600M  =     0.0000
English Units Used for input data


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.920
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.080
SCS curve number for soil(AMC 2)  = 70.20
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.292(In/Hr)
Max Catchment Loss (Fm) =     0.292(In/Hr)
Initial subarea data:
Initial area flow distance =   251.130(Ft.)
Top (of initial area) elevation =   648.100(Ft.)
Bottom (of initial area) elevation =   640.000(Ft.)
Difference in elevation =     8.100(Ft.)
Slope =    0.03225  s(%)=       3.23
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.795 min.
Rainfall intensity =      1.320(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.701
Subarea runoff =      0.962(CFS)
Total initial stream area =        1.040(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   640.000(Ft.)
Downstream point elevation =   612.500(Ft.)
Channel length thru subarea  =   757.140(Ft.)
Channel base width     =    6.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =      3.499(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =      3.499(CFS)
Depth of flow =   0.237(Ft.), Average velocity =   2.277(Ft/s)
Channel flow top width =    6.949(Ft.)
Flow Velocity =    2.28(Ft/s)
Travel time  =    5.54 min.
Time of concentration =   18.34 min.
```

```
Critical depth =      0.215(Ft.)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.690
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.310
SCS curve number for soil(AMC 2)  = 73.65
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.269(In/Hr)
Max Catchment Loss (Fm) =     0.269(In/Hr)
Rainfall intensity =      1.074(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.672
Subarea runoff =      5.005(CFS) for    7.230(Ac.)
Total runoff =      5.968(CFS)        Total area =        8.27(Ac.)
Area averaged Fm value =    0.272(In/Hr)
Depth of flow =   0.325(Ft.), Average velocity =   2.759(Ft/s)
Critical depth =      0.301(Ft.)
End of computations, total study area =            8.27 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number (AMC 2) =  73.2
```

U n i t H y d r o g r a p h A n a l y s i s

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Study date 07/20/15 File Name CVEXUNIT.out

++

Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6049

CIELO VISTA PROJECT
EXISTING CONDITION
2-YEAR 24-HOUR STORM EVENT
BY FUSCOE ENGINEERING

Storm Event Year = 2

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
57.0	6.0	0.72	B	0.300	1.000	0.300
78.0	2.3	0.28	D	0.200	1.000	0.200

Area-averaged adjusted loss rate Fm (In/Hr) = 0.272

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
5.95	0.719	57.0	37.0	17.03	0.057
2.32	0.281	78.0	60.6	6.50	0.038

Area-averaged catchment yield fraction, Y = 0.052
Area-averaged low loss fraction, Yb = 0.948
++
User entry of time of concentration = 0.310 (hours)
Watershed area = 8.27(Ac.)
Catchment Lag time = 0.248 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 33.6022
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.272(In/Hr)
Average low loss rate fraction (Yb) = 0.948 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall = 0.190(In)
Computed peak 30-minute rainfall = 0.400(In)
Specified peak 1-hour rainfall = 0.530(In)
Computed peak 3-hour rainfall = 0.890(In)
Specified peak 6-hour rainfall = 1.220(In)
Specified peak 24-hour rainfall = 2.050(In)

Rainfall depth area reduction factors:
Using a total area of 8.27(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.190(In)

30-minute factor = 1.000 Adjusted rainfall = 0.400(In)
1-hour factor = 1.000 Adjusted rainfall = 0.530(In)
3-hour factor = 1.000 Adjusted rainfall = 0.890(In)
6-hour factor = 1.000 Adjusted rainfall = 1.220(In)
24-hour factor = 1.000 Adjusted rainfall = 2.050(In)

U n i t H y d r o g r a p h

(K = 100.02 (CFS))

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
1	2.487	2.488
2	10.895	8.409
3	30.731	19.838
4	59.961	29.235
5	71.964	12.005
6	79.566	7.603
7	85.014	5.449
8	89.115	4.102
9	92.239	3.124
10	94.601	2.363
11	96.290	1.689
12	97.512	1.223
13	98.140	0.628
14	98.531	0.391
15	98.871	0.340
16	99.125	0.254
17	99.340	0.215
18	99.603	0.263
19	99.787	0.184
20	99.907	0.120
21	100.000	0.094

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.1899	0.1899
2	0.2533	0.0634
3	0.2998	0.0465
4	0.3379	0.0381
5	0.3707	0.0328
6	0.3998	0.0292
7	0.4257	0.0258
8	0.4494	0.0237
9	0.4714	0.0220
10	0.4920	0.0206
11	0.5114	0.0194
12	0.5298	0.0184
13	0.5502	0.0204
14	0.5698	0.0196
15	0.5887	0.0189
16	0.6069	0.0182
17	0.6245	0.0176
18	0.6416	0.0171
19	0.6582	0.0166
20	0.6743	0.0161
21	0.6900	0.0157
22	0.7053	0.0153
23	0.7203	0.0150
24	0.7349	0.0146
25	0.7492	0.0143
26	0.7632	0.0140
27	0.7769	0.0137
28	0.7904	0.0135
29	0.8036	0.0132
30	0.8166	0.0130
31	0.8293	0.0127
32	0.8418	0.0125
33	0.8541	0.0123
34	0.8663	0.0121
35	0.8782	0.0119

36	0.8900	0.0118
37	0.9011	0.0112
38	0.9121	0.0110
39	0.9230	0.0108
40	0.9337	0.0107
41	0.9442	0.0105
42	0.9546	0.0104
43	0.9649	0.0103
44	0.9750	0.0101
45	0.9851	0.0100
46	0.9950	0.0099
47	1.0048	0.0098
48	1.0144	0.0097
49	1.0240	0.0096
50	1.0334	0.0095
51	1.0428	0.0094
52	1.0521	0.0093
53	1.0612	0.0092
54	1.0703	0.0091
55	1.0793	0.0090
56	1.0881	0.0089
57	1.0969	0.0088
58	1.1057	0.0087
59	1.1143	0.0086
60	1.1228	0.0086
61	1.1313	0.0085
62	1.1397	0.0084
63	1.1480	0.0083
64	1.1563	0.0083
65	1.1645	0.0082
66	1.1726	0.0081
67	1.1807	0.0081
68	1.1886	0.0080
69	1.1966	0.0079
70	1.2044	0.0079
71	1.2122	0.0078
72	1.2200	0.0077
73	1.2263	0.0063
74	1.2325	0.0063
75	1.2388	0.0062
76	1.2449	0.0062
77	1.2510	0.0061
78	1.2571	0.0061
79	1.2631	0.0060
80	1.2691	0.0060
81	1.2750	0.0059
82	1.2808	0.0059
83	1.2867	0.0058
84	1.2924	0.0058
85	1.2982	0.0057
86	1.3039	0.0057
87	1.3095	0.0057
88	1.3152	0.0056
89	1.3207	0.0056
90	1.3263	0.0055
91	1.3318	0.0055
92	1.3372	0.0055
93	1.3426	0.0054
94	1.3480	0.0054
95	1.3534	0.0054
96	1.3587	0.0053
97	1.3640	0.0053
98	1.3692	0.0052
99	1.3744	0.0052
100	1.3796	0.0052
101	1.3848	0.0051
102	1.3899	0.0051
103	1.3950	0.0051
104	1.4000	0.0051
105	1.4051	0.0050
106	1.4101	0.0050
107	1.4150	0.0050
108	1.4200	0.0049

109	1.4249	0.0049
110	1.4297	0.0049
111	1.4346	0.0049
112	1.4394	0.0048
113	1.4442	0.0048
114	1.4490	0.0048
115	1.4537	0.0047
116	1.4585	0.0047
117	1.4631	0.0047
118	1.4678	0.0047
119	1.4725	0.0046
120	1.4771	0.0046
121	1.4817	0.0046
122	1.4863	0.0046
123	1.4908	0.0045
124	1.4953	0.0045
125	1.4998	0.0045
126	1.5043	0.0045
127	1.5088	0.0045
128	1.5132	0.0044
129	1.5176	0.0044
130	1.5220	0.0044
131	1.5264	0.0044
132	1.5307	0.0044
133	1.5351	0.0043
134	1.5394	0.0043
135	1.5437	0.0043
136	1.5479	0.0043
137	1.5522	0.0043
138	1.5564	0.0042
139	1.5606	0.0042
140	1.5648	0.0042
141	1.5690	0.0042
142	1.5732	0.0042
143	1.5773	0.0041
144	1.5814	0.0041
145	1.5855	0.0041
146	1.5896	0.0041
147	1.5937	0.0041
148	1.5977	0.0041
149	1.6018	0.0040
150	1.6058	0.0040
151	1.6098	0.0040
152	1.6138	0.0040
153	1.6177	0.0040
154	1.6217	0.0040
155	1.6256	0.0039
156	1.6295	0.0039
157	1.6334	0.0039
158	1.6373	0.0039
159	1.6412	0.0039
160	1.6451	0.0039
161	1.6489	0.0038
162	1.6527	0.0038
163	1.6565	0.0038
164	1.6603	0.0038
165	1.6641	0.0038
166	1.6679	0.0038
167	1.6716	0.0038
168	1.6754	0.0037
169	1.6791	0.0037
170	1.6828	0.0037
171	1.6865	0.0037
172	1.6902	0.0037
173	1.6939	0.0037
174	1.6975	0.0037
175	1.7012	0.0036
176	1.7048	0.0036
177	1.7084	0.0036
178	1.7120	0.0036
179	1.7156	0.0036
180	1.7192	0.0036
181	1.7228	0.0036

182	1.7263	0.0036
183	1.7299	0.0035
184	1.7334	0.0035
185	1.7369	0.0035
186	1.7405	0.0035
187	1.7439	0.0035
188	1.7474	0.0035
189	1.7509	0.0035
190	1.7544	0.0035
191	1.7578	0.0035
192	1.7613	0.0034
193	1.7647	0.0034
194	1.7681	0.0034
195	1.7715	0.0034
196	1.7749	0.0034
197	1.7783	0.0034
198	1.7817	0.0034
199	1.7850	0.0034
200	1.7884	0.0034
201	1.7917	0.0033
202	1.7951	0.0033
203	1.7984	0.0033
204	1.8017	0.0033
205	1.8050	0.0033
206	1.8083	0.0033
207	1.8116	0.0033
208	1.8148	0.0033
209	1.8181	0.0033
210	1.8214	0.0033
211	1.8246	0.0032
212	1.8278	0.0032
213	1.8311	0.0032
214	1.8343	0.0032
215	1.8375	0.0032
216	1.8407	0.0032
217	1.8438	0.0032
218	1.8470	0.0032
219	1.8502	0.0032
220	1.8534	0.0032
221	1.8565	0.0031
222	1.8596	0.0031
223	1.8628	0.0031
224	1.8659	0.0031
225	1.8690	0.0031
226	1.8721	0.0031
227	1.8752	0.0031
228	1.8783	0.0031
229	1.8814	0.0031
230	1.8845	0.0031
231	1.8875	0.0031
232	1.8906	0.0031
233	1.8936	0.0030
234	1.8967	0.0030
235	1.8997	0.0030
236	1.9027	0.0030
237	1.9057	0.0030
238	1.9087	0.0030
239	1.9117	0.0030
240	1.9147	0.0030
241	1.9177	0.0030
242	1.9207	0.0030
243	1.9236	0.0030
244	1.9266	0.0030
245	1.9296	0.0030
246	1.9325	0.0029
247	1.9354	0.0029
248	1.9384	0.0029
249	1.9413	0.0029
250	1.9442	0.0029
251	1.9471	0.0029
252	1.9500	0.0029
253	1.9529	0.0029
254	1.9558	0.0029

255	1.9587	0.0029
256	1.9615	0.0029
257	1.9644	0.0029
258	1.9673	0.0029
259	1.9701	0.0029
260	1.9730	0.0028
261	1.9758	0.0028
262	1.9786	0.0028
263	1.9815	0.0028
264	1.9843	0.0028
265	1.9871	0.0028
266	1.9899	0.0028
267	1.9927	0.0028
268	1.9955	0.0028
269	1.9983	0.0028
270	2.0010	0.0028
271	2.0038	0.0028
272	2.0066	0.0028
273	2.0093	0.0028
274	2.0121	0.0028
275	2.0148	0.0027
276	2.0176	0.0027
277	2.0203	0.0027
278	2.0230	0.0027
279	2.0258	0.0027
280	2.0285	0.0027
281	2.0312	0.0027
282	2.0339	0.0027
283	2.0366	0.0027
284	2.0393	0.0027
285	2.0420	0.0027
286	2.0446	0.0027
287	2.0473	0.0027
288	2.0500	0.0027

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0027	0.0025	0.0001
2	0.0027	0.0025	0.0001
3	0.0027	0.0025	0.0001
4	0.0027	0.0026	0.0001
5	0.0027	0.0026	0.0001
6	0.0027	0.0026	0.0001
7	0.0027	0.0026	0.0001
8	0.0027	0.0026	0.0001
9	0.0027	0.0026	0.0001
10	0.0027	0.0026	0.0001
11	0.0028	0.0026	0.0001
12	0.0028	0.0026	0.0001
13	0.0028	0.0026	0.0001
14	0.0028	0.0026	0.0001
15	0.0028	0.0027	0.0001
16	0.0028	0.0027	0.0001
17	0.0028	0.0027	0.0001
18	0.0028	0.0027	0.0001
19	0.0028	0.0027	0.0001
20	0.0028	0.0027	0.0001
21	0.0029	0.0027	0.0001
22	0.0029	0.0027	0.0001
23	0.0029	0.0027	0.0001
24	0.0029	0.0027	0.0001
25	0.0029	0.0028	0.0002
26	0.0029	0.0028	0.0002
27	0.0029	0.0028	0.0002
28	0.0029	0.0028	0.0002
29	0.0029	0.0028	0.0002
30	0.0030	0.0028	0.0002
31	0.0030	0.0028	0.0002
32	0.0030	0.0028	0.0002
33	0.0030	0.0028	0.0002
34	0.0030	0.0028	0.0002

35	0.0030	0.0029	0.0002
36	0.0030	0.0029	0.0002
37	0.0030	0.0029	0.0002
38	0.0030	0.0029	0.0002
39	0.0031	0.0029	0.0002
40	0.0031	0.0029	0.0002
41	0.0031	0.0029	0.0002
42	0.0031	0.0029	0.0002
43	0.0031	0.0030	0.0002
44	0.0031	0.0030	0.0002
45	0.0031	0.0030	0.0002
46	0.0031	0.0030	0.0002
47	0.0032	0.0030	0.0002
48	0.0032	0.0030	0.0002
49	0.0032	0.0030	0.0002
50	0.0032	0.0030	0.0002
51	0.0032	0.0031	0.0002
52	0.0032	0.0031	0.0002
53	0.0033	0.0031	0.0002
54	0.0033	0.0031	0.0002
55	0.0033	0.0031	0.0002
56	0.0033	0.0031	0.0002
57	0.0033	0.0031	0.0002
58	0.0033	0.0031	0.0002
59	0.0033	0.0032	0.0002
60	0.0034	0.0032	0.0002
61	0.0034	0.0032	0.0002
62	0.0034	0.0032	0.0002
63	0.0034	0.0032	0.0002
64	0.0034	0.0032	0.0002
65	0.0034	0.0033	0.0002
66	0.0035	0.0033	0.0002
67	0.0035	0.0033	0.0002
68	0.0035	0.0033	0.0002
69	0.0035	0.0033	0.0002
70	0.0035	0.0033	0.0002
71	0.0035	0.0034	0.0002
72	0.0036	0.0034	0.0002
73	0.0036	0.0034	0.0002
74	0.0036	0.0034	0.0002
75	0.0036	0.0034	0.0002
76	0.0036	0.0034	0.0002
77	0.0037	0.0035	0.0002
78	0.0037	0.0035	0.0002
79	0.0037	0.0035	0.0002
80	0.0037	0.0035	0.0002
81	0.0037	0.0035	0.0002
82	0.0038	0.0036	0.0002
83	0.0038	0.0036	0.0002
84	0.0038	0.0036	0.0002
85	0.0038	0.0036	0.0002
86	0.0038	0.0036	0.0002
87	0.0039	0.0037	0.0002
88	0.0039	0.0037	0.0002
89	0.0039	0.0037	0.0002
90	0.0039	0.0037	0.0002
91	0.0040	0.0038	0.0002
92	0.0040	0.0038	0.0002
93	0.0040	0.0038	0.0002
94	0.0040	0.0038	0.0002
95	0.0041	0.0039	0.0002
96	0.0041	0.0039	0.0002
97	0.0041	0.0039	0.0002
98	0.0041	0.0039	0.0002
99	0.0042	0.0040	0.0002
100	0.0042	0.0040	0.0002
101	0.0042	0.0040	0.0002
102	0.0043	0.0040	0.0002
103	0.0043	0.0041	0.0002
104	0.0043	0.0041	0.0002
105	0.0044	0.0041	0.0002
106	0.0044	0.0041	0.0002
107	0.0044	0.0042	0.0002

108	0.0044	0.0042	0.0002
109	0.0045	0.0042	0.0002
110	0.0045	0.0043	0.0002
111	0.0045	0.0043	0.0002
112	0.0046	0.0043	0.0002
113	0.0046	0.0044	0.0002
114	0.0046	0.0044	0.0002
115	0.0047	0.0045	0.0002
116	0.0047	0.0045	0.0002
117	0.0048	0.0045	0.0002
118	0.0048	0.0045	0.0002
119	0.0049	0.0046	0.0003
120	0.0049	0.0046	0.0003
121	0.0049	0.0047	0.0003
122	0.0050	0.0047	0.0003
123	0.0050	0.0048	0.0003
124	0.0051	0.0048	0.0003
125	0.0051	0.0049	0.0003
126	0.0051	0.0049	0.0003
127	0.0052	0.0049	0.0003
128	0.0052	0.0050	0.0003
129	0.0053	0.0050	0.0003
130	0.0054	0.0051	0.0003
131	0.0054	0.0051	0.0003
132	0.0055	0.0052	0.0003
133	0.0055	0.0052	0.0003
134	0.0056	0.0053	0.0003
135	0.0057	0.0054	0.0003
136	0.0057	0.0054	0.0003
137	0.0058	0.0055	0.0003
138	0.0058	0.0055	0.0003
139	0.0059	0.0056	0.0003
140	0.0060	0.0057	0.0003
141	0.0061	0.0057	0.0003
142	0.0061	0.0058	0.0003
143	0.0062	0.0059	0.0003
144	0.0063	0.0059	0.0003
145	0.0077	0.0073	0.0004
146	0.0078	0.0074	0.0004
147	0.0079	0.0075	0.0004
148	0.0080	0.0076	0.0004
149	0.0081	0.0077	0.0004
150	0.0082	0.0078	0.0004
151	0.0083	0.0079	0.0004
152	0.0084	0.0080	0.0004
153	0.0086	0.0081	0.0004
154	0.0086	0.0082	0.0004
155	0.0088	0.0083	0.0005
156	0.0089	0.0084	0.0005
157	0.0091	0.0086	0.0005
158	0.0092	0.0087	0.0005
159	0.0094	0.0089	0.0005
160	0.0095	0.0090	0.0005
161	0.0097	0.0092	0.0005
162	0.0098	0.0093	0.0005
163	0.0100	0.0095	0.0005
164	0.0101	0.0096	0.0005
165	0.0104	0.0099	0.0005
166	0.0105	0.0100	0.0005
167	0.0108	0.0103	0.0006
168	0.0110	0.0104	0.0006
169	0.0118	0.0111	0.0006
170	0.0119	0.0113	0.0006
171	0.0123	0.0117	0.0006
172	0.0125	0.0119	0.0006
173	0.0130	0.0123	0.0007
174	0.0132	0.0125	0.0007
175	0.0137	0.0130	0.0007
176	0.0140	0.0133	0.0007
177	0.0146	0.0139	0.0008
178	0.0150	0.0142	0.0008
179	0.0157	0.0149	0.0008
180	0.0161	0.0153	0.0008

181	0.0171	0.0162	0.0009
182	0.0176	0.0167	0.0009
183	0.0189	0.0179	0.0010
184	0.0196	0.0186	0.0010
185	0.0184	0.0174	0.0010
186	0.0194	0.0184	0.0010
187	0.0220	0.0209	0.0011
188	0.0237	0.0225	0.0012
189	0.0292	0.0227	0.0065
190	0.0328	0.0227	0.0102
191	0.0465	0.0227	0.0238
192	0.0634	0.0227	0.0407
193	0.1899	0.0227	0.1673
194	0.0381	0.0227	0.0154
195	0.0258	0.0227	0.0032
196	0.0206	0.0195	0.0011
197	0.0204	0.0193	0.0011
198	0.0182	0.0173	0.0009
199	0.0166	0.0157	0.0009
200	0.0153	0.0145	0.0008
201	0.0143	0.0136	0.0007
202	0.0135	0.0128	0.0007
203	0.0127	0.0121	0.0007
204	0.0121	0.0115	0.0006
205	0.0112	0.0106	0.0006
206	0.0107	0.0101	0.0006
207	0.0103	0.0097	0.0005
208	0.0099	0.0094	0.0005
209	0.0096	0.0091	0.0005
210	0.0093	0.0088	0.0005
211	0.0090	0.0085	0.0005
212	0.0087	0.0083	0.0005
213	0.0085	0.0080	0.0004
214	0.0083	0.0078	0.0004
215	0.0081	0.0076	0.0004
216	0.0079	0.0075	0.0004
217	0.0063	0.0060	0.0003
218	0.0062	0.0058	0.0003
219	0.0060	0.0057	0.0003
220	0.0059	0.0056	0.0003
221	0.0057	0.0054	0.0003
222	0.0056	0.0053	0.0003
223	0.0055	0.0052	0.0003
224	0.0054	0.0051	0.0003
225	0.0053	0.0050	0.0003
226	0.0052	0.0049	0.0003
227	0.0051	0.0048	0.0003
228	0.0050	0.0047	0.0003
229	0.0049	0.0047	0.0003
230	0.0048	0.0046	0.0002
231	0.0047	0.0045	0.0002
232	0.0047	0.0044	0.0002
233	0.0046	0.0044	0.0002
234	0.0045	0.0043	0.0002
235	0.0045	0.0042	0.0002
236	0.0044	0.0042	0.0002
237	0.0043	0.0041	0.0002
238	0.0043	0.0041	0.0002
239	0.0042	0.0040	0.0002
240	0.0042	0.0039	0.0002
241	0.0041	0.0039	0.0002
242	0.0041	0.0038	0.0002
243	0.0040	0.0038	0.0002
244	0.0040	0.0037	0.0002
245	0.0039	0.0037	0.0002
246	0.0039	0.0037	0.0002
247	0.0038	0.0036	0.0002
248	0.0038	0.0036	0.0002
249	0.0037	0.0035	0.0002
250	0.0037	0.0035	0.0002
251	0.0036	0.0035	0.0002
252	0.0036	0.0034	0.0002
253	0.0036	0.0034	0.0002

254	0.0035	0.0034	0.0002
255	0.0035	0.0033	0.0002
256	0.0035	0.0033	0.0002
257	0.0034	0.0033	0.0002
258	0.0034	0.0032	0.0002
259	0.0034	0.0032	0.0002
260	0.0033	0.0032	0.0002
261	0.0033	0.0031	0.0002
262	0.0033	0.0031	0.0002
263	0.0032	0.0031	0.0002
264	0.0032	0.0030	0.0002
265	0.0032	0.0030	0.0002
266	0.0032	0.0030	0.0002
267	0.0031	0.0030	0.0002
268	0.0031	0.0029	0.0002
269	0.0031	0.0029	0.0002
270	0.0031	0.0029	0.0002
271	0.0030	0.0029	0.0002
272	0.0030	0.0029	0.0002
273	0.0030	0.0028	0.0002
274	0.0030	0.0028	0.0002
275	0.0029	0.0028	0.0002
276	0.0029	0.0028	0.0002
277	0.0029	0.0027	0.0001
278	0.0029	0.0027	0.0001
279	0.0029	0.0027	0.0001
280	0.0028	0.0027	0.0001
281	0.0028	0.0027	0.0001
282	0.0028	0.0026	0.0001
283	0.0028	0.0026	0.0001
284	0.0028	0.0026	0.0001
285	0.0027	0.0026	0.0001
286	0.0027	0.0026	0.0001
287	0.0027	0.0026	0.0001
288	0.0027	0.0025	0.0001

Total soil rain loss = 1.70(In)
Total effective rainfall = 0.35(In)
Peak flow rate in flood hydrograph = 5.99(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0000	0.00	Q	|	|	|	|
0+15	0.0000	0.00	Q	|	|	|	|
0+20	0.0001	0.01	Q	|	|	|	|
0+25	0.0002	0.01	Q	|	|	|	|
0+30	0.0002	0.01	Q	|	|	|	|
0+35	0.0003	0.01	Q	|	|	|	|
0+40	0.0004	0.01	Q	|	|	|	|
0+45	0.0005	0.01	Q	|	|	|	|
0+50	0.0006	0.01	Q	|	|	|	|
0+55	0.0007	0.01	Q	|	|	|	|
1+ 0	0.0008	0.01	Q	|	|	|	|
1+ 5	0.0009	0.01	Q	|	|	|	|
1+10	0.0010	0.01	Q	|	|	|	|
1+15	0.0011	0.01	Q	|	|	|	|
1+20	0.0012	0.01	Q	|	|	|	|
1+25	0.0013	0.01	Q	|	|	|	|
1+30	0.0014	0.01	Q	|	|	|	|
1+35	0.0015	0.01	Q	|	|	|	|
1+40	0.0016	0.01	Q	|	|	|	|
1+45	0.0017	0.01	Q	|	|	|	|
1+50	0.0018	0.01	Q	|	|	|	|
1+55	0.0019	0.01	Q	|	|	|	|

2+ 0	0.0020	0.01	Q				
2+ 5	0.0021	0.01	Q				
2+10	0.0022	0.01	Q				
2+15	0.0023	0.01	Q				
2+20	0.0024	0.01	Q				
2+25	0.0025	0.02	Q				
2+30	0.0026	0.02	Q				
2+35	0.0027	0.02	Q				
2+40	0.0028	0.02	Q				
2+45	0.0029	0.02	Q				
2+50	0.0030	0.02	Q				
2+55	0.0031	0.02	Q				
3+ 0	0.0032	0.02	Q				
3+ 5	0.0033	0.02	Q				
3+10	0.0034	0.02	Q				
3+15	0.0035	0.02	Q				
3+20	0.0036	0.02	Q				
3+25	0.0038	0.02	Q				
3+30	0.0039	0.02	Q				
3+35	0.0040	0.02	Q				
3+40	0.0041	0.02	Q				
3+45	0.0042	0.02	Q				
3+50	0.0043	0.02	Q				
3+55	0.0044	0.02	Q				
4+ 0	0.0045	0.02	Q				
4+ 5	0.0046	0.02	Q				
4+10	0.0047	0.02	Q				
4+15	0.0049	0.02	Q				
4+20	0.0050	0.02	Q				
4+25	0.0051	0.02	Q				
4+30	0.0052	0.02	Q				
4+35	0.0053	0.02	Q				
4+40	0.0054	0.02	Q				
4+45	0.0055	0.02	Q				
4+50	0.0057	0.02	Q				
4+55	0.0058	0.02	Q				
5+ 0	0.0059	0.02	Q				
5+ 5	0.0060	0.02	Q				
5+10	0.0061	0.02	QV				
5+15	0.0063	0.02	QV				
5+20	0.0064	0.02	QV				
5+25	0.0065	0.02	QV				
5+30	0.0066	0.02	QV				
5+35	0.0067	0.02	QV				
5+40	0.0069	0.02	QV				
5+45	0.0070	0.02	QV				
5+50	0.0071	0.02	QV				
5+55	0.0072	0.02	QV				
6+ 0	0.0074	0.02	QV				
6+ 5	0.0075	0.02	QV				
6+10	0.0076	0.02	QV				
6+15	0.0077	0.02	QV				
6+20	0.0079	0.02	QV				
6+25	0.0080	0.02	QV				
6+30	0.0081	0.02	QV				
6+35	0.0082	0.02	QV				
6+40	0.0084	0.02	QV				
6+45	0.0085	0.02	QV				
6+50	0.0086	0.02	QV				
6+55	0.0088	0.02	QV				
7+ 0	0.0089	0.02	QV				
7+ 5	0.0090	0.02	QV				
7+10	0.0092	0.02	QV				
7+15	0.0093	0.02	QV				
7+20	0.0094	0.02	QV				
7+25	0.0096	0.02	QV				
7+30	0.0097	0.02	QV				
7+35	0.0098	0.02	QV				
7+40	0.0100	0.02	QV				
7+45	0.0101	0.02	QV				
7+50	0.0103	0.02	QV				
7+55	0.0104	0.02	QV				
8+ 0	0.0105	0.02	QV				

8+ 5	0.0107	0.02	QV			
8+10	0.0108	0.02	QV			
8+15	0.0110	0.02	QV			
8+20	0.0111	0.02	QV			
8+25	0.0113	0.02	QV			
8+30	0.0114	0.02	QV			
8+35	0.0116	0.02	QV			
8+40	0.0117	0.02	QV			
8+45	0.0119	0.02	QV			
8+50	0.0120	0.02	QV			
8+55	0.0122	0.02	Q V			
9+ 0	0.0123	0.02	Q V			
9+ 5	0.0125	0.02	Q V			
9+10	0.0126	0.02	Q V			
9+15	0.0128	0.02	Q V			
9+20	0.0130	0.02	Q V			
9+25	0.0131	0.02	Q V			
9+30	0.0133	0.02	Q V			
9+35	0.0134	0.02	Q V			
9+40	0.0136	0.02	Q V			
9+45	0.0138	0.02	Q V			
9+50	0.0139	0.02	Q V			
9+55	0.0141	0.02	Q V			
10+ 0	0.0143	0.02	Q V			
10+ 5	0.0144	0.02	Q V			
10+10	0.0146	0.02	Q V			
10+15	0.0148	0.03	Q V			
10+20	0.0150	0.03	Q V			
10+25	0.0151	0.03	Q V			
10+30	0.0153	0.03	Q V			
10+35	0.0155	0.03	Q V			
10+40	0.0157	0.03	Q V			
10+45	0.0159	0.03	Q V			
10+50	0.0160	0.03	Q V			
10+55	0.0162	0.03	Q V			
11+ 0	0.0164	0.03	Q V			
11+ 5	0.0166	0.03	Q V			
11+10	0.0168	0.03	Q V			
11+15	0.0170	0.03	Q V			
11+20	0.0172	0.03	Q V			
11+25	0.0174	0.03	Q V			
11+30	0.0176	0.03	Q V			
11+35	0.0178	0.03	Q V			
11+40	0.0180	0.03	Q V			
11+45	0.0182	0.03	Q V			
11+50	0.0184	0.03	Q V			
11+55	0.0186	0.03	Q V			
12+ 0	0.0188	0.03	Q V			
12+ 5	0.0190	0.03	Q V			
12+10	0.0193	0.03	Q V			
12+15	0.0195	0.03	Q V			
12+20	0.0198	0.04	Q V			
12+25	0.0200	0.04	Q V			
12+30	0.0203	0.04	Q V			
12+35	0.0206	0.04	Q V			
12+40	0.0208	0.04	Q V			
12+45	0.0211	0.04	Q V			
12+50	0.0214	0.04	Q V			
12+55	0.0217	0.04	Q V			
13+ 0	0.0220	0.04	Q V			
13+ 5	0.0223	0.04	Q V			
13+10	0.0226	0.04	Q V			
13+15	0.0229	0.05	Q V			
13+20	0.0233	0.05	Q V			
13+25	0.0236	0.05	Q V			
13+30	0.0239	0.05	Q V			
13+35	0.0242	0.05	Q V			
13+40	0.0246	0.05	Q V			
13+45	0.0249	0.05	Q V			
13+50	0.0253	0.05	Q V			
13+55	0.0256	0.05	Q V			
14+ 0	0.0260	0.05	Q V			
14+ 5	0.0264	0.05	Q V			

```
14+10       0.0267      0.06  Q   V     |         |         |         |
14+15       0.0271      0.06  Q   V     |         |         |         |
14+20       0.0275      0.06  Q   V     |         |         |         |
14+25       0.0280      0.06  Q   V     |         |         |         |
14+30       0.0284      0.06  Q   V     |         |         |         |
14+35       0.0288      0.06  Q   V     |         |         |         |
14+40       0.0293      0.07  Q   V     |         |         |         |
14+45       0.0297      0.07  Q   V     |         |         |         |
14+50       0.0302      0.07  Q   V     |         |         |         |
14+55       0.0307      0.07  Q    V    |         |         |         |
15+ 0       0.0312      0.07  Q    V    |         |         |         |
15+ 5       0.0317      0.08  Q    V    |         |         |         |
15+10       0.0323      0.08  Q    V    |         |         |         |
15+15       0.0328      0.08  Q    V    |         |         |         |
15+20       0.0334      0.09  Q    V    |         |         |         |
15+25       0.0340      0.09  Q    V    |         |         |         |
15+30       0.0347      0.09  Q    V    |         |         |         |
15+35       0.0353      0.09  Q    V    |         |         |         |
15+40       0.0360      0.10  Q    V    |         |         |         |
15+45       0.0368      0.12  Q     V   |         |         |         |
15+50       0.0380      0.18  Q     V   |         |         |         |
15+55       0.0404      0.35  |Q    V   |         |         |         |
16+ 0       0.0455      0.74  | Q    V  |         |         |         |
16+ 5       0.0568      1.64  |     Q  V|         |         |         |
16+10       0.0784      3.14  |         | Q       |         |         |
16+15       0.1133      5.06  |         |       V Q         |         |
16+20       0.1545      5.99  |         |         |  Q V    |         |
16+25       0.1754      3.04  |         | Q       |         V|        |
16+30       0.1889      1.95  |       Q |         |         |V        |
16+35       0.1986      1.41  |    Q    |         |         | V       |
16+40       0.2060      1.08  |   Q     |         |         |   V     |
16+45       0.2118      0.83  |  Q      |         |         |    V    |
16+50       0.2161      0.64  | Q       |         |         |    V    |
16+55       0.2194      0.47  |Q        |         |         |     V   |
17+ 0       0.2218      0.35  |Q        |         |         |     V   |
17+ 5       0.2234      0.23  Q         |         |         |     V   |
17+10       0.2246      0.17  Q         |         |         |      V  |
17+15       0.2256      0.15  Q         |         |         |      V  |
17+20       0.2265      0.13  Q         |         |         |      V  |
17+25       0.2273      0.12  Q         |         |         |      V  |
17+30       0.2281      0.12  Q         |         |         |      V  |
17+35       0.2287      0.10  Q         |         |         |      V  |
17+40       0.2293      0.08  Q         |         |         |      V  |
17+45       0.2297      0.07  Q         |         |         |       V |
17+50       0.2301      0.05  Q         |         |         |       V |
17+55       0.2304      0.05  Q         |         |         |       V |
18+ 0       0.2307      0.05  Q         |         |         |       V |
18+ 5       0.2310      0.04  Q         |         |         |       V |
18+10       0.2313      0.04  Q         |         |         |       V |
18+15       0.2316      0.04  Q         |         |         |       V |
18+20       0.2319      0.04  Q         |         |         |       V |
18+25       0.2321      0.04  Q         |         |         |       V |
18+30       0.2323      0.03  Q         |         |         |       V |
18+35       0.2326      0.03  Q         |         |         |       V |
18+40       0.2328      0.03  Q         |         |         |       V |
18+45       0.2330      0.03  Q         |         |         |       V |
18+50       0.2332      0.03  Q         |         |         |       V |
18+55       0.2334      0.03  Q         |         |         |       V |
19+ 0       0.2336      0.03  Q         |         |         |       V |
19+ 5       0.2338      0.03  Q         |         |         |       V |
19+10       0.2340      0.03  Q         |         |         |       V |
19+15       0.2341      0.03  Q         |         |         |       V |
19+20       0.2343      0.03  Q         |         |         |       V |
19+25       0.2345      0.03  Q         |         |         |       V |
19+30       0.2347      0.03  Q         |         |         |       V |
19+35       0.2348      0.02  Q         |         |         |       V |
19+40       0.2350      0.02  Q         |         |         |       V |
19+45       0.2352      0.02  Q         |         |         |       V |
19+50       0.2353      0.02  Q         |         |         |       V |
19+55       0.2355      0.02  Q         |         |         |       V |
20+ 0       0.2356      0.02  Q         |         |         |       V |
20+ 5       0.2358      0.02  Q         |         |         |        V|
20+10       0.2359      0.02  Q         |         |         |        V|
```

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  20+15       0.2361      0.02  Q          |          |          |         V|
  20+20       0.2362      0.02  Q          |          |          |         V|
  20+25       0.2364      0.02  Q          |          |          |         V|
  20+30       0.2365      0.02  Q          |          |          |         V|
  20+35       0.2367      0.02  Q          |          |          |         V|
  20+40       0.2368      0.02  Q          |          |          |         V|
  20+45       0.2370      0.02  Q          |          |          |         V|
  20+50       0.2371      0.02  Q          |          |          |         V|
  20+55       0.2372      0.02  Q          |          |          |         V|
  21+ 0       0.2374      0.02  Q          |          |          |         V|
  21+ 5       0.2375      0.02  Q          |          |          |         V|
  21+10       0.2376      0.02  Q          |          |          |         V|
  21+15       0.2378      0.02  Q          |          |          |         V|
  21+20       0.2379      0.02  Q          |          |          |         V|
  21+25       0.2380      0.02  Q          |          |          |         V|
  21+30       0.2381      0.02  Q          |          |          |         V|
  21+35       0.2383      0.02  Q          |          |          |         V|
  21+40       0.2384      0.02  Q          |          |          |         V|
  21+45       0.2385      0.02  Q          |          |          |         V|
  21+50       0.2386      0.02  Q          |          |          |         V|
  21+55       0.2388      0.02  Q          |          |          |         V|
  22+ 0       0.2389      0.02  Q          |          |          |         V|
  22+ 5       0.2390      0.02  Q          |          |          |         V|
  22+10       0.2391      0.02  Q          |          |          |         V|
  22+15       0.2392      0.02  Q          |          |          |         V|
  22+20       0.2393      0.02  Q          |          |          |         V|
  22+25       0.2395      0.02  Q          |          |          |         V|
  22+30       0.2396      0.02  Q          |          |          |         V|
  22+35       0.2397      0.02  Q          |          |          |         V|
  22+40       0.2398      0.02  Q          |          |          |         V|
  22+45       0.2399      0.02  Q          |          |          |         V|
  22+50       0.2400      0.02  Q          |          |          |         V|
  22+55       0.2401      0.02  Q          |          |          |         V|
  23+ 0       0.2402      0.02  Q          |          |          |         V|
  23+ 5       0.2403      0.02  Q          |          |          |         V|
  23+10       0.2404      0.02  Q          |          |          |         V|
  23+15       0.2405      0.02  Q          |          |          |         V|
  23+20       0.2406      0.02  Q          |          |          |         V|
  23+25       0.2407      0.01  Q          |          |          |         V|
  23+30       0.2408      0.01  Q          |          |          |         V|
  23+35       0.2409      0.01  Q          |          |          |         V|
  23+40       0.2411      0.01  Q          |          |          |         V|
  23+45       0.2412      0.01  Q          |          |          |         V|
  23+50       0.2413      0.01  Q          |          |          |         V|
  23+55       0.2413      0.01  Q          |          |          |         V|
  24+ 0       0.2414      0.01  Q          |          |          |         V|
  24+ 5       0.2415      0.01  Q          |          |          |         V|
  24+10       0.2416      0.01  Q          |          |          |         V|
  24+15       0.2417      0.01  Q          |          |          |         V|
  24+20       0.2417      0.01  Q          |          |          |         V|
  24+25       0.2418      0.00  Q          |          |          |         V|
  24+30       0.2418      0.00  Q          |          |          |         V|
  24+35       0.2418      0.00  Q          |          |          |         V|
  24+40       0.2418      0.00  Q          |          |          |         V|
  24+45       0.2418      0.00  Q          |          |          |         V|
  24+50       0.2418      0.00  Q          |          |          |         V|
  24+55       0.2418      0.00  Q          |          |          |         V|
  25+ 0       0.2418      0.00  Q          |          |          |         V|
  25+ 5       0.2418      0.00  Q          |          |          |         V|
  25+10       0.2418      0.00  Q          |          |          |         V|
  25+15       0.2418      0.00  Q          |          |          |         V|
  25+20       0.2418      0.00  Q          |          |          |         V|
  25+25       0.2418      0.00  Q          |          |          |         V|
  25+30       0.2418      0.00  Q          |          |          |         V|
  25+35       0.2418      0.00  Q          |          |          |         V|
  25+40       0.2418      0.00  Q          |          |          |          V
-----------------------------------------------------------------------
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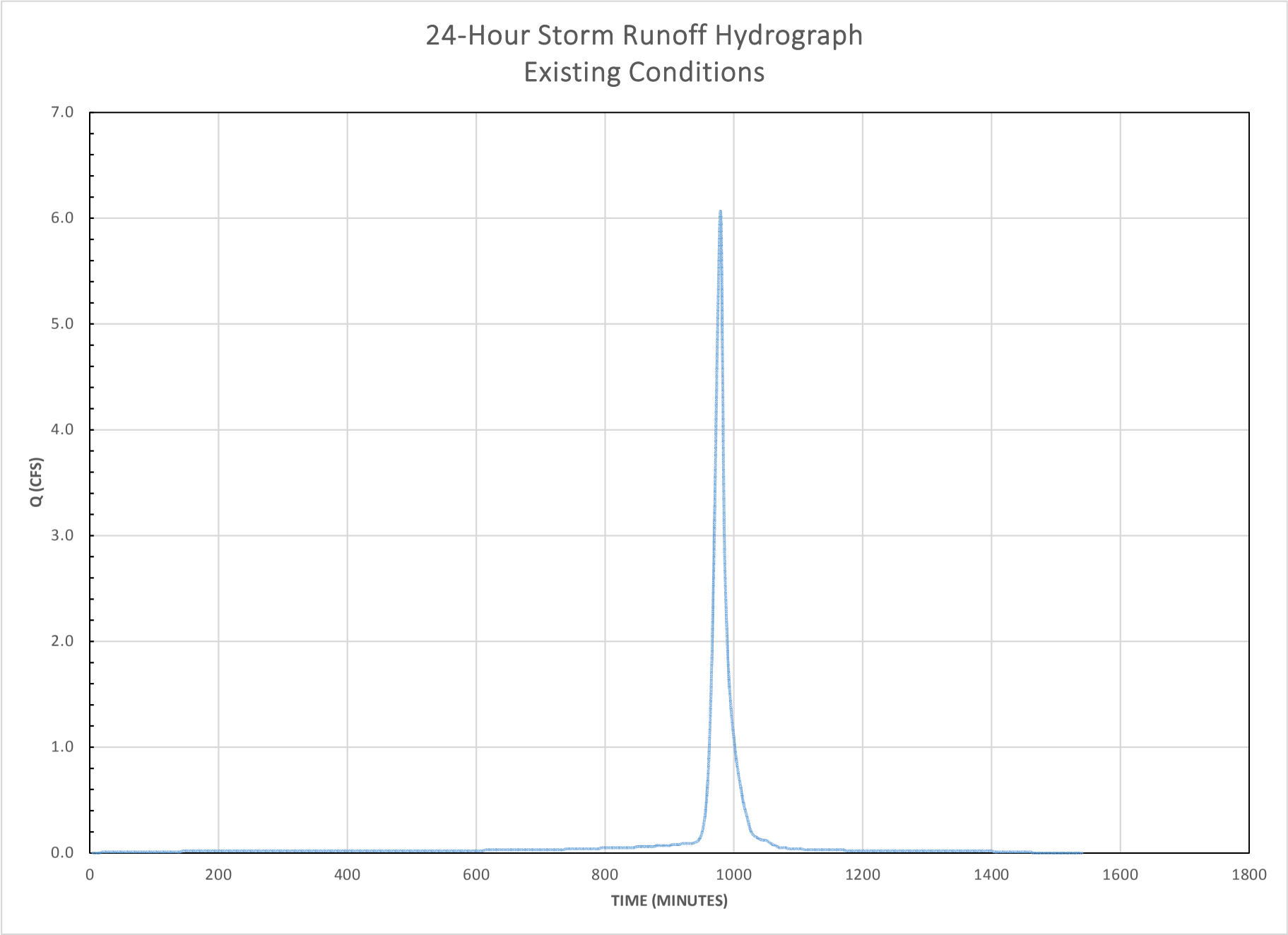
24-Hour Storm Runoff Hydrograph
Existing Conditions
Q (CFS)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
200
400
600
800
1000
1200
1400
1600
1800
TIME (MINUTES)

APPENDIX A.2

PROPOSED CONDITION HYDROLOGY CALCULATIONS FOR HYDROMODIFICATION (2-YEAR, 24-HOUR STORM)

Planning Area 1 (South Site)

U n i t H y d r o g r a p h A n a l y s i s

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Study date 09/29/15 File Name PRPA1HYME.out

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Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6103

PLANNING AREA 1 - 8'x7' RCB
PROPOSED CONDITIONS - HYDROMOD CALCULATIONS
2-YEAR 24-HOUR STORM
BY FUSCOE ENGINEERING

Storm Event Year = 2

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
56.0	3.9	0.12	B	0.300	0.600	0.180
69.0	2.2	0.07	C	0.250	0.600	0.150
75.0	25.7	0.81	D	0.200	0.600	0.120

Area-averaged adjusted loss rate Fm (In/Hr) = 0.129

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
2.34	0.074	56.0	36.0	17.78	0.068
1.56	0.049	98.0	98.0	0.20	0.890
1.32	0.042	69.0	49.8	10.08	0.000
0.88	0.028	98.0	98.0	0.20	0.890
15.42	0.485	75.0	57.0	7.54	0.018
10.28	0.323	98.0	98.0	0.20	0.890

Area-averaged catchment yield fraction, Y = 0.369
Area-averaged low loss fraction, Yb = 0.631
++
Watercourse length = 2549.18(Ft.)
Length from concentration point to centroid = 1109.41(Ft.)
Elevation difference along watercourse = 186.10(Ft.)
Mannings friction factor along watercourse = 0.015
Watershed area = 31.80(Ac.)
Catchment Lag time = 0.049 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 171.1934
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.129(In/Hr)
Average low loss rate fraction (Yb) = 0.631 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall = 0.190(In)
Computed peak 30-minute rainfall = 0.400(In)
Specified peak 1-hour rainfall = 0.530(In)
Computed peak 3-hour rainfall = 0.890(In)
Specified peak 6-hour rainfall = 1.220(In)
Specified peak 24-hour rainfall = 2.050(In)

Rainfall depth area reduction factors:
Using a total area of 31.80(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.190(In)
30-minute factor = 0.999 Adjusted rainfall = 0.399(In)
1-hour factor = 0.999 Adjusted rainfall = 0.529(In)
3-hour factor = 1.000 Adjusted rainfall = 0.890(In)
6-hour factor = 1.000 Adjusted rainfall = 1.220(In)
24-hour factor = 1.000 Adjusted rainfall = 2.050(In)

U n i t H y d r o g r a p h

(K = 384.58 (CFS))

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
1	35.976	138.356
2	88.604	202.399
3	98.016	36.197
4	99.610	6.130
5	100.000	1.499

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.1897	0.1897
2	0.2530	0.0633
3	0.2995	0.0464
4	0.3375	0.0380
5	0.3703	0.0328
6	0.3994	0.0291
7	0.4252	0.0258
8	0.4489	0.0237
9	0.4709	0.0220
10	0.4915	0.0206
11	0.5108	0.0194
12	0.5292	0.0184
13	0.5496	0.0204
14	0.5692	0.0196
15	0.5881	0.0189
16	0.6064	0.0182
17	0.6240	0.0176
18	0.6411	0.0171
19	0.6577	0.0166
20	0.6738	0.0162
21	0.6896	0.0157
22	0.7049	0.0153
23	0.7199	0.0150
24	0.7345	0.0146
25	0.7489	0.0143
26	0.7629	0.0140
27	0.7766	0.0137
28	0.7901	0.0135
29	0.8033	0.0132
30	0.8163	0.0130
31	0.8291	0.0128
32	0.8416	0.0125
33	0.8540	0.0123
34	0.8661	0.0121
35	0.8781	0.0120
36	0.8898	0.0118
37	0.9010	0.0112
38	0.9120	0.0110
39	0.9228	0.0108
40	0.9335	0.0107
41	0.9441	0.0106
42	0.9545	0.0104
43	0.9648	0.0103
44	0.9749	0.0101
45	0.9850	0.0100
46	0.9949	0.0099
47	1.0046	0.0098
48	1.0143	0.0097

49	1.0239	0.0096
50	1.0333	0.0095
51	1.0427	0.0094
52	1.0519	0.0093
53	1.0611	0.0092
54	1.0702	0.0091
55	1.0791	0.0090
56	1.0880	0.0089
57	1.0968	0.0088
58	1.1055	0.0087
59	1.1142	0.0086
60	1.1227	0.0086
61	1.1312	0.0085
62	1.1396	0.0084
63	1.1479	0.0083
64	1.1562	0.0083
65	1.1644	0.0082
66	1.1725	0.0081
67	1.1806	0.0081
68	1.1886	0.0080
69	1.1965	0.0079
70	1.2043	0.0079
71	1.2121	0.0078
72	1.2199	0.0077
73	1.2262	0.0063
74	1.2325	0.0063
75	1.2387	0.0062
76	1.2448	0.0062
77	1.2509	0.0061
78	1.2570	0.0061
79	1.2630	0.0060
80	1.2690	0.0060
81	1.2749	0.0059
82	1.2807	0.0059
83	1.2866	0.0058
84	1.2924	0.0058
85	1.2981	0.0057
86	1.3038	0.0057
87	1.3094	0.0057
88	1.3151	0.0056
89	1.3206	0.0056
90	1.3262	0.0055
91	1.3317	0.0055
92	1.3371	0.0055
93	1.3426	0.0054
94	1.3479	0.0054
95	1.3533	0.0054
96	1.3586	0.0053
97	1.3639	0.0053
98	1.3691	0.0052
99	1.3744	0.0052
100	1.3795	0.0052
101	1.3847	0.0051
102	1.3898	0.0051
103	1.3949	0.0051
104	1.3999	0.0051
105	1.4050	0.0050
106	1.4100	0.0050
107	1.4149	0.0050
108	1.4199	0.0049
109	1.4248	0.0049
110	1.4297	0.0049
111	1.4345	0.0049
112	1.4393	0.0048
113	1.4441	0.0048
114	1.4489	0.0048
115	1.4536	0.0047
116	1.4584	0.0047
117	1.4631	0.0047
118	1.4677	0.0047
119	1.4724	0.0046
120	1.4770	0.0046
121	1.4816	0.0046
122	1.4862	0.0046
123	1.4907	0.0045
124	1.4952	0.0045

125	1.4997	0.0045
126	1.5042	0.0045
127	1.5087	0.0045
128	1.5131	0.0044
129	1.5175	0.0044
130	1.5219	0.0044
131	1.5263	0.0044
132	1.5307	0.0044
133	1.5350	0.0043
134	1.5393	0.0043
135	1.5436	0.0043
136	1.5479	0.0043
137	1.5521	0.0043
138	1.5563	0.0042
139	1.5606	0.0042
140	1.5648	0.0042
141	1.5689	0.0042
142	1.5731	0.0042
143	1.5772	0.0041
144	1.5813	0.0041
145	1.5854	0.0041
146	1.5895	0.0041
147	1.5936	0.0041
148	1.5977	0.0041
149	1.6017	0.0040
150	1.6057	0.0040
151	1.6097	0.0040
152	1.6137	0.0040
153	1.6177	0.0040
154	1.6216	0.0040
155	1.6255	0.0039
156	1.6295	0.0039
157	1.6334	0.0039
158	1.6372	0.0039
159	1.6411	0.0039
160	1.6450	0.0039
161	1.6488	0.0038
162	1.6526	0.0038
163	1.6565	0.0038
164	1.6603	0.0038
165	1.6640	0.0038
166	1.6678	0.0038
167	1.6716	0.0038
168	1.6753	0.0037
169	1.6790	0.0037
170	1.6827	0.0037
171	1.6864	0.0037
172	1.6901	0.0037
173	1.6938	0.0037
174	1.6975	0.0037
175	1.7011	0.0036
176	1.7047	0.0036
177	1.7084	0.0036
178	1.7120	0.0036
179	1.7156	0.0036
180	1.7191	0.0036
181	1.7227	0.0036
182	1.7263	0.0036
183	1.7298	0.0035
184	1.7333	0.0035
185	1.7369	0.0035
186	1.7404	0.0035
187	1.7439	0.0035
188	1.7474	0.0035
189	1.7508	0.0035
190	1.7543	0.0035
191	1.7577	0.0035
192	1.7612	0.0034
193	1.7646	0.0034
194	1.7680	0.0034
195	1.7714	0.0034
196	1.7748	0.0034
197	1.7782	0.0034
198	1.7816	0.0034
199	1.7850	0.0034
200	1.7883	0.0034

201	1.7917	0.0033
202	1.7950	0.0033
203	1.7983	0.0033
204	1.8016	0.0033
205	1.8049	0.0033
206	1.8082	0.0033
207	1.8115	0.0033
208	1.8148	0.0033
209	1.8180	0.0033
210	1.8213	0.0033
211	1.8245	0.0032
212	1.8278	0.0032
213	1.8310	0.0032
214	1.8342	0.0032
215	1.8374	0.0032
216	1.8406	0.0032
217	1.8438	0.0032
218	1.8470	0.0032
219	1.8501	0.0032
220	1.8533	0.0032
221	1.8564	0.0031
222	1.8596	0.0031
223	1.8627	0.0031
224	1.8658	0.0031
225	1.8689	0.0031
226	1.8720	0.0031
227	1.8751	0.0031
228	1.8782	0.0031
229	1.8813	0.0031
230	1.8844	0.0031
231	1.8874	0.0031
232	1.8905	0.0031
233	1.8936	0.0030
234	1.8966	0.0030
235	1.8996	0.0030
236	1.9026	0.0030
237	1.9057	0.0030
238	1.9087	0.0030
239	1.9117	0.0030
240	1.9147	0.0030
241	1.9176	0.0030
242	1.9206	0.0030
243	1.9236	0.0030
244	1.9265	0.0030
245	1.9295	0.0030
246	1.9324	0.0029
247	1.9354	0.0029
248	1.9383	0.0029
249	1.9412	0.0029
250	1.9441	0.0029
251	1.9470	0.0029
252	1.9500	0.0029
253	1.9528	0.0029
254	1.9557	0.0029
255	1.9586	0.0029
256	1.9615	0.0029
257	1.9643	0.0029
258	1.9672	0.0029
259	1.9701	0.0029
260	1.9729	0.0028
261	1.9757	0.0028
262	1.9786	0.0028
263	1.9814	0.0028
264	1.9842	0.0028
265	1.9870	0.0028
266	1.9898	0.0028
267	1.9926	0.0028
268	1.9954	0.0028
269	1.9982	0.0028
270	2.0010	0.0028
271	2.0037	0.0028
272	2.0065	0.0028
273	2.0093	0.0028
274	2.0120	0.0028
275	2.0148	0.0027
276	2.0175	0.0027

277	2.0202	0.0027
278	2.0230	0.0027
279	2.0257	0.0027
280	2.0284	0.0027
281	2.0311	0.0027
282	2.0338	0.0027
283	2.0365	0.0027
284	2.0392	0.0027
285	2.0419	0.0027
286	2.0446	0.0027
287	2.0473	0.0027
288	2.0499	0.0027

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0027	0.0017	0.0010
2	0.0027	0.0017	0.0010
3	0.0027	0.0017	0.0010
4	0.0027	0.0017	0.0010
5	0.0027	0.0017	0.0010
6	0.0027	0.0017	0.0010
7	0.0027	0.0017	0.0010
8	0.0027	0.0017	0.0010
9	0.0027	0.0017	0.0010
10	0.0027	0.0017	0.0010
11	0.0028	0.0017	0.0010
12	0.0028	0.0017	0.0010
13	0.0028	0.0018	0.0010
14	0.0028	0.0018	0.0010
15	0.0028	0.0018	0.0010
16	0.0028	0.0018	0.0010
17	0.0028	0.0018	0.0010
18	0.0028	0.0018	0.0010
19	0.0028	0.0018	0.0010
20	0.0028	0.0018	0.0011
21	0.0029	0.0018	0.0011
22	0.0029	0.0018	0.0011
23	0.0029	0.0018	0.0011
24	0.0029	0.0018	0.0011
25	0.0029	0.0018	0.0011
26	0.0029	0.0018	0.0011
27	0.0029	0.0018	0.0011
28	0.0029	0.0018	0.0011
29	0.0029	0.0019	0.0011
30	0.0030	0.0019	0.0011
31	0.0030	0.0019	0.0011
32	0.0030	0.0019	0.0011
33	0.0030	0.0019	0.0011
34	0.0030	0.0019	0.0011
35	0.0030	0.0019	0.0011
36	0.0030	0.0019	0.0011
37	0.0030	0.0019	0.0011
38	0.0030	0.0019	0.0011
39	0.0031	0.0019	0.0011
40	0.0031	0.0019	0.0011
41	0.0031	0.0019	0.0011
42	0.0031	0.0020	0.0011
43	0.0031	0.0020	0.0012
44	0.0031	0.0020	0.0012
45	0.0031	0.0020	0.0012
46	0.0031	0.0020	0.0012
47	0.0032	0.0020	0.0012
48	0.0032	0.0020	0.0012
49	0.0032	0.0020	0.0012
50	0.0032	0.0020	0.0012
51	0.0032	0.0020	0.0012
52	0.0032	0.0020	0.0012
53	0.0033	0.0021	0.0012
54	0.0033	0.0021	0.0012
55	0.0033	0.0021	0.0012
56	0.0033	0.0021	0.0012
57	0.0033	0.0021	0.0012
58	0.0033	0.0021	0.0012
59	0.0033	0.0021	0.0012

60	0.0034	0.0021	0.0012
61	0.0034	0.0021	0.0012
62	0.0034	0.0021	0.0013
63	0.0034	0.0021	0.0013
64	0.0034	0.0022	0.0013
65	0.0034	0.0022	0.0013
66	0.0035	0.0022	0.0013
67	0.0035	0.0022	0.0013
68	0.0035	0.0022	0.0013
69	0.0035	0.0022	0.0013
70	0.0035	0.0022	0.0013
71	0.0035	0.0022	0.0013
72	0.0036	0.0022	0.0013
73	0.0036	0.0023	0.0013
74	0.0036	0.0023	0.0013
75	0.0036	0.0023	0.0013
76	0.0036	0.0023	0.0013
77	0.0037	0.0023	0.0014
78	0.0037	0.0023	0.0014
79	0.0037	0.0023	0.0014
80	0.0037	0.0023	0.0014
81	0.0037	0.0024	0.0014
82	0.0038	0.0024	0.0014
83	0.0038	0.0024	0.0014
84	0.0038	0.0024	0.0014
85	0.0038	0.0024	0.0014
86	0.0038	0.0024	0.0014
87	0.0039	0.0024	0.0014
88	0.0039	0.0025	0.0014
89	0.0039	0.0025	0.0014
90	0.0039	0.0025	0.0015
91	0.0040	0.0025	0.0015
92	0.0040	0.0025	0.0015
93	0.0040	0.0025	0.0015
94	0.0040	0.0025	0.0015
95	0.0041	0.0026	0.0015
96	0.0041	0.0026	0.0015
97	0.0041	0.0026	0.0015
98	0.0041	0.0026	0.0015
99	0.0042	0.0026	0.0015
100	0.0042	0.0026	0.0015
101	0.0042	0.0027	0.0016
102	0.0043	0.0027	0.0016
103	0.0043	0.0027	0.0016
104	0.0043	0.0027	0.0016
105	0.0044	0.0027	0.0016
106	0.0044	0.0028	0.0016
107	0.0044	0.0028	0.0016
108	0.0044	0.0028	0.0016
109	0.0045	0.0028	0.0017
110	0.0045	0.0028	0.0017
111	0.0045	0.0029	0.0017
112	0.0046	0.0029	0.0017
113	0.0046	0.0029	0.0017
114	0.0046	0.0029	0.0017
115	0.0047	0.0030	0.0017
116	0.0047	0.0030	0.0017
117	0.0048	0.0030	0.0018
118	0.0048	0.0030	0.0018
119	0.0049	0.0031	0.0018
120	0.0049	0.0031	0.0018
121	0.0049	0.0031	0.0018
122	0.0050	0.0031	0.0018
123	0.0050	0.0032	0.0019
124	0.0051	0.0032	0.0019
125	0.0051	0.0032	0.0019
126	0.0051	0.0032	0.0019
127	0.0052	0.0033	0.0019
128	0.0052	0.0033	0.0019
129	0.0053	0.0034	0.0020
130	0.0054	0.0034	0.0020
131	0.0054	0.0034	0.0020
132	0.0055	0.0034	0.0020
133	0.0055	0.0035	0.0020
134	0.0056	0.0035	0.0021
135	0.0057	0.0036	0.0021

136	0.0057	0.0036	0.0021
137	0.0058	0.0036	0.0021
138	0.0058	0.0037	0.0022
139	0.0059	0.0037	0.0022
140	0.0060	0.0038	0.0022
141	0.0061	0.0038	0.0022
142	0.0061	0.0039	0.0023
143	0.0062	0.0039	0.0023
144	0.0063	0.0039	0.0023
145	0.0077	0.0049	0.0029
146	0.0078	0.0049	0.0029
147	0.0079	0.0050	0.0029
148	0.0080	0.0050	0.0030
149	0.0081	0.0051	0.0030
150	0.0082	0.0052	0.0030
151	0.0083	0.0053	0.0031
152	0.0084	0.0053	0.0031
153	0.0086	0.0054	0.0032
154	0.0086	0.0054	0.0032
155	0.0088	0.0055	0.0033
156	0.0089	0.0056	0.0033
157	0.0091	0.0057	0.0033
158	0.0092	0.0058	0.0034
159	0.0094	0.0059	0.0035
160	0.0095	0.0060	0.0035
161	0.0097	0.0061	0.0036
162	0.0098	0.0062	0.0036
163	0.0100	0.0063	0.0037
164	0.0101	0.0064	0.0037
165	0.0104	0.0066	0.0038
166	0.0106	0.0067	0.0039
167	0.0108	0.0068	0.0040
168	0.0110	0.0069	0.0041
169	0.0118	0.0074	0.0044
170	0.0120	0.0075	0.0044
171	0.0123	0.0078	0.0046
172	0.0125	0.0079	0.0046
173	0.0130	0.0082	0.0048
174	0.0132	0.0083	0.0049
175	0.0137	0.0087	0.0051
176	0.0140	0.0088	0.0052
177	0.0146	0.0092	0.0054
178	0.0150	0.0094	0.0055
179	0.0157	0.0099	0.0058
180	0.0162	0.0102	0.0060
181	0.0171	0.0108	0.0063
182	0.0176	0.0108	0.0069
183	0.0189	0.0108	0.0081
184	0.0196	0.0108	0.0088
185	0.0184	0.0108	0.0076
186	0.0194	0.0108	0.0086
187	0.0220	0.0108	0.0112
188	0.0237	0.0108	0.0129
189	0.0291	0.0108	0.0184
190	0.0328	0.0108	0.0220
191	0.0464	0.0108	0.0356
192	0.0633	0.0108	0.0525
193	0.1897	0.0108	0.1789
194	0.0380	0.0108	0.0272
195	0.0258	0.0108	0.0150
196	0.0206	0.0108	0.0098
197	0.0204	0.0108	0.0096
198	0.0182	0.0108	0.0074
199	0.0166	0.0105	0.0061
200	0.0153	0.0097	0.0057
201	0.0143	0.0090	0.0053
202	0.0135	0.0085	0.0050
203	0.0128	0.0080	0.0047
204	0.0121	0.0077	0.0045
205	0.0112	0.0070	0.0041
206	0.0107	0.0067	0.0040
207	0.0103	0.0065	0.0038
208	0.0099	0.0062	0.0037
209	0.0096	0.0060	0.0035
210	0.0093	0.0058	0.0034
211	0.0090	0.0057	0.0033

212	0.0087	0.0055	0.0032
213	0.0085	0.0053	0.0031
214	0.0083	0.0052	0.0031
215	0.0081	0.0051	0.0030
216	0.0079	0.0050	0.0029
217	0.0063	0.0040	0.0023
218	0.0062	0.0039	0.0023
219	0.0060	0.0038	0.0022
220	0.0059	0.0037	0.0022
221	0.0057	0.0036	0.0021
222	0.0056	0.0035	0.0021
223	0.0055	0.0035	0.0020
224	0.0054	0.0034	0.0020
225	0.0053	0.0033	0.0020
226	0.0052	0.0033	0.0019
227	0.0051	0.0032	0.0019
228	0.0050	0.0031	0.0018
229	0.0049	0.0031	0.0018
230	0.0048	0.0030	0.0018
231	0.0047	0.0030	0.0018
232	0.0047	0.0029	0.0017
233	0.0046	0.0029	0.0017
234	0.0045	0.0029	0.0017
235	0.0045	0.0028	0.0016
236	0.0044	0.0028	0.0016
237	0.0043	0.0027	0.0016
238	0.0043	0.0027	0.0016
239	0.0042	0.0027	0.0016
240	0.0042	0.0026	0.0015
241	0.0041	0.0026	0.0015
242	0.0041	0.0026	0.0015
243	0.0040	0.0025	0.0015
244	0.0040	0.0025	0.0015
245	0.0039	0.0025	0.0014
246	0.0039	0.0024	0.0014
247	0.0038	0.0024	0.0014
248	0.0038	0.0024	0.0014
249	0.0037	0.0023	0.0014
250	0.0037	0.0023	0.0014
251	0.0036	0.0023	0.0013
252	0.0036	0.0023	0.0013
253	0.0036	0.0023	0.0013
254	0.0035	0.0022	0.0013
255	0.0035	0.0022	0.0013
256	0.0035	0.0022	0.0013
257	0.0034	0.0022	0.0013
258	0.0034	0.0021	0.0013
259	0.0034	0.0021	0.0012
260	0.0033	0.0021	0.0012
261	0.0033	0.0021	0.0012
262	0.0033	0.0021	0.0012
263	0.0032	0.0020	0.0012
264	0.0032	0.0020	0.0012
265	0.0032	0.0020	0.0012
266	0.0032	0.0020	0.0012
267	0.0031	0.0020	0.0012
268	0.0031	0.0020	0.0011
269	0.0031	0.0019	0.0011
270	0.0031	0.0019	0.0011
271	0.0030	0.0019	0.0011
272	0.0030	0.0019	0.0011
273	0.0030	0.0019	0.0011
274	0.0030	0.0019	0.0011
275	0.0029	0.0019	0.0011
276	0.0029	0.0018	0.0011
277	0.0029	0.0018	0.0011
278	0.0029	0.0018	0.0011
279	0.0029	0.0018	0.0011
280	0.0028	0.0018	0.0010
281	0.0028	0.0018	0.0010
282	0.0028	0.0018	0.0010
283	0.0028	0.0017	0.0010
284	0.0028	0.0017	0.0010
285	0.0027	0.0017	0.0010
286	0.0027	0.0017	0.0010
287	0.0027	0.0017	0.0010

```
288              0.0027           0.0017              0.0010
-----------------------------------------------------------------------
-----------------------------------------------------------------------
Total soil rain loss =      1.08(In)
Total effective rainfall =      0.97(In)
Peak flow rate in flood hydrograph =     42.14(CFS)
-----------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - H O U R    S T O R M
                R u n o f f      H y d r o g r a p h
-----------------------------------------------------------------------
            Hydrograph in   5   Minute intervals ((CFS))

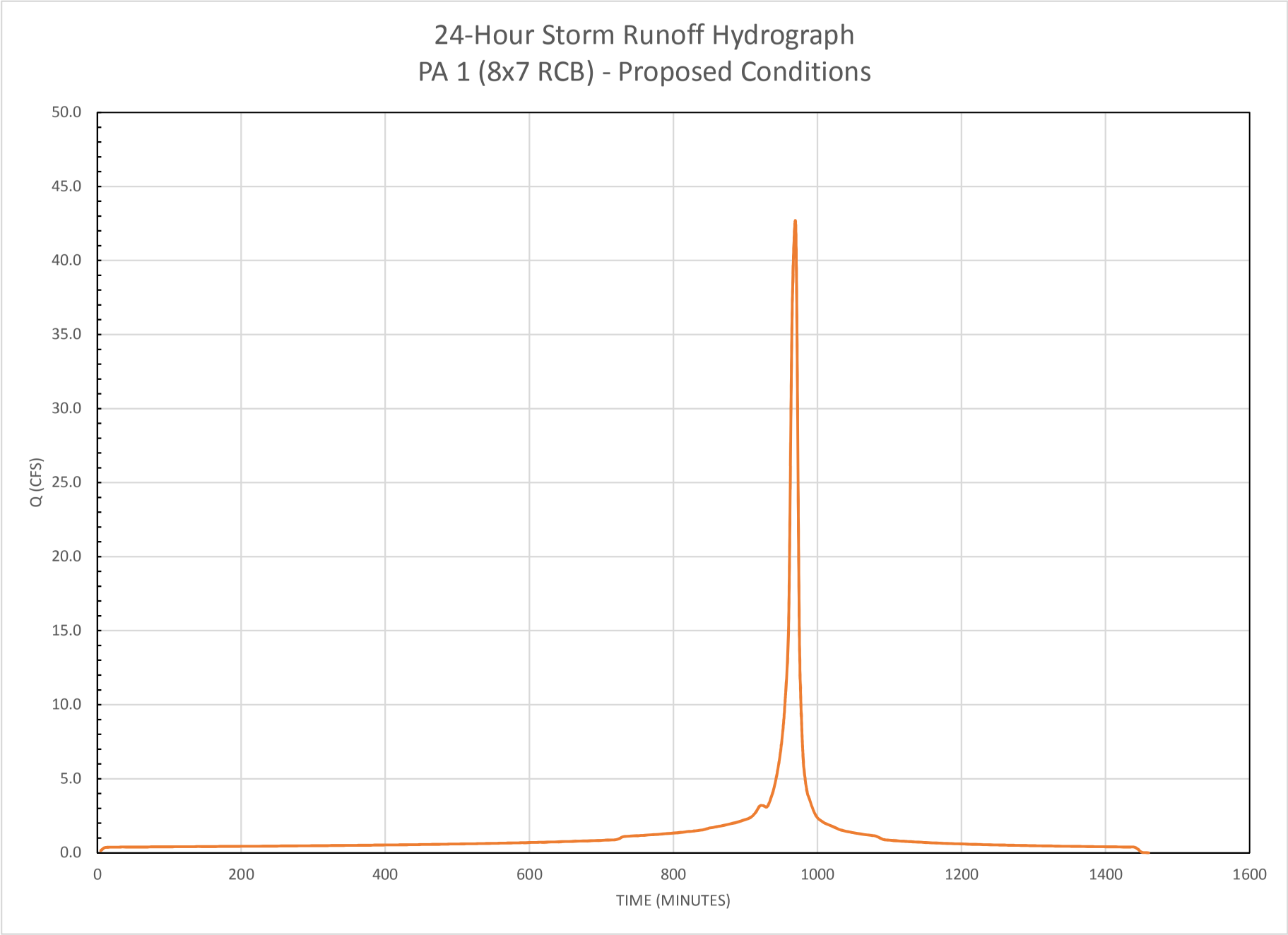
-----------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0       12.5      25.0      37.5      50.0
-----------------------------------------------------------------------
  0+ 5       0.0009      0.14  Q         |         |         |         |
  0+10       0.0033      0.34  Q         |         |         |         |
  0+15       0.0058      0.37  Q         |         |         |         |
  0+20       0.0084      0.38  Q         |         |         |         |
  0+25       0.0111      0.38  Q         |         |         |         |
  0+30       0.0137      0.38  Q         |         |         |         |
  0+35       0.0164      0.39  Q         |         |         |         |
  0+40       0.0190      0.39  Q         |         |         |         |
  0+45       0.0217      0.39  Q         |         |         |         |
  0+50       0.0244      0.39  Q         |         |         |         |
  0+55       0.0271      0.39  Q         |         |         |         |
  1+ 0       0.0298      0.39  Q         |         |         |         |
  1+ 5       0.0325      0.39  Q         |         |         |         |
  1+10       0.0352      0.39  Q         |         |         |         |
  1+15       0.0379      0.40  Q         |         |         |         |
  1+20       0.0407      0.40  Q         |         |         |         |
  1+25       0.0434      0.40  Q         |         |         |         |
  1+30       0.0462      0.40  Q         |         |         |         |
  1+35       0.0490      0.40  Q         |         |         |         |
  1+40       0.0517      0.40  Q         |         |         |         |
  1+45       0.0545      0.40  Q         |         |         |         |
  1+50       0.0573      0.41  Q         |         |         |         |
  1+55       0.0601      0.41  Q         |         |         |         |
  2+ 0       0.0629      0.41  Q         |         |         |         |
  2+ 5       0.0658      0.41  QV        |         |         |         |
  2+10       0.0686      0.41  QV        |         |         |         |
  2+15       0.0715      0.41  QV        |         |         |         |
  2+20       0.0743      0.42  QV        |         |         |         |
  2+25       0.0772      0.42  QV        |         |         |         |
  2+30       0.0801      0.42  QV        |         |         |         |
  2+35       0.0830      0.42  QV        |         |         |         |
  2+40       0.0859      0.42  QV        |         |         |         |
  2+45       0.0888      0.42  QV        |         |         |         |
  2+50       0.0917      0.43  QV        |         |         |         |
  2+55       0.0947      0.43  QV        |         |         |         |
  3+ 0       0.0976      0.43  QV        |         |         |         |
  3+ 5       0.1006      0.43  QV        |         |         |         |
  3+10       0.1035      0.43  QV        |         |         |         |
  3+15       0.1065      0.43  QV        |         |         |         |
  3+20       0.1095      0.44  QV        |         |         |         |
  3+25       0.1125      0.44  QV        |         |         |         |
  3+30       0.1156      0.44  QV        |         |         |         |
  3+35       0.1186      0.44  QV        |         |         |         |
  3+40       0.1216      0.44  QV        |         |         |         |
  3+45       0.1247      0.44  QV        |         |         |         |
  3+50       0.1278      0.45  QV        |         |         |         |
  3+55       0.1309      0.45  Q V       |         |         |         |
  4+ 0       0.1340      0.45  Q V       |         |         |         |
  4+ 5       0.1371      0.45  Q V       |         |         |         |
  4+10       0.1402      0.45  Q V       |         |         |         |
  4+15       0.1434      0.46  Q V       |         |         |         |
  4+20       0.1465      0.46  Q V       |         |         |         |
  4+25       0.1497      0.46  Q V       |         |         |         |
  4+30       0.1529      0.46  Q V       |         |         |         |
  4+35       0.1561      0.46  Q V       |         |         |         |
  4+40       0.1593      0.47  Q V       |         |         |         |
  4+45       0.1625      0.47  Q V       |         |         |         |
  4+50       0.1657      0.47  Q V       |         |         |         |
  4+55       0.1690      0.47  Q V       |         |         |         |
  5+ 0       0.1723      0.48  Q V       |         |         |         |
```

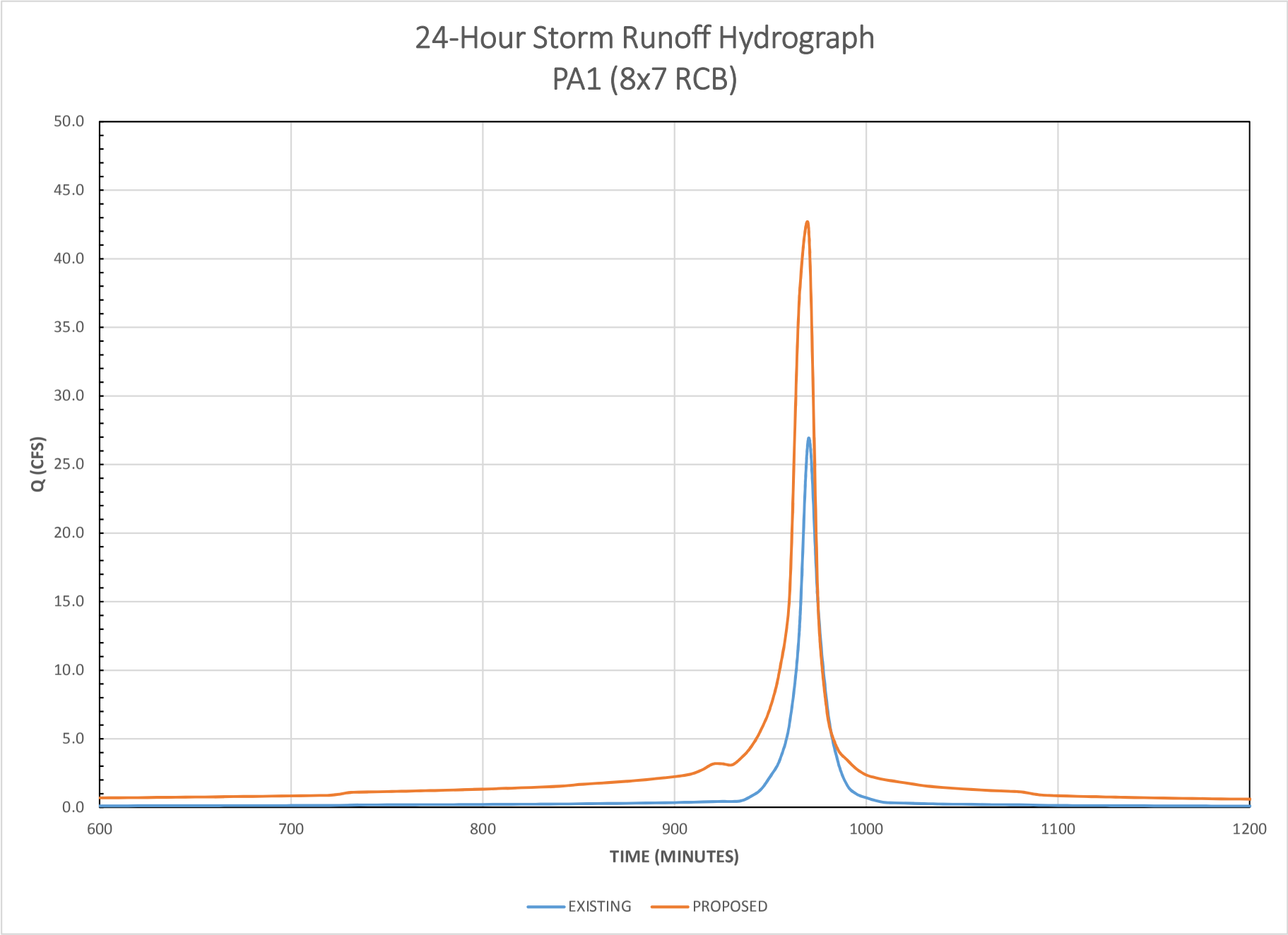
5+ 5	0.1756	0.48	Q V				
5+10	0.1789	0.48	Q V				
5+15	0.1822	0.48	Q V				
5+20	0.1855	0.48	Q V				
5+25	0.1889	0.49	Q V				
5+30	0.1922	0.49	Q V				
5+35	0.1956	0.49	Q V				
5+40	0.1990	0.49	Q V				
5+45	0.2024	0.50	Q V				
5+50	0.2059	0.50	Q V				
5+55	0.2093	0.50	Q V				
6+ 0	0.2128	0.50	Q V				
6+ 5	0.2163	0.51	Q V				
6+10	0.2198	0.51	Q V				
6+15	0.2233	0.51	Q V				
6+20	0.2269	0.51	Q V				
6+25	0.2304	0.52	Q V				
6+30	0.2340	0.52	Q V				
6+35	0.2376	0.52	Q V				
6+40	0.2412	0.53	Q V				
6+45	0.2449	0.53	Q V				
6+50	0.2485	0.53	Q V				
6+55	0.2522	0.53	Q V				
7+ 0	0.2559	0.54	Q V				
7+ 5	0.2596	0.54	Q V				
7+10	0.2634	0.54	Q V				
7+15	0.2671	0.55	Q V				
7+20	0.2709	0.55	Q V				
7+25	0.2747	0.55	Q V				
7+30	0.2786	0.56	Q V				
7+35	0.2824	0.56	Q V				
7+40	0.2863	0.56	Q V				
7+45	0.2902	0.57	Q V				
7+50	0.2942	0.57	Q V				
7+55	0.2981	0.57	Q V				
8+ 0	0.3021	0.58	Q V				
8+ 5	0.3061	0.58	Q V				
8+10	0.3101	0.59	Q V				
8+15	0.3142	0.59	Q V				
8+20	0.3183	0.59	Q V				
8+25	0.3224	0.60	Q V				
8+30	0.3266	0.60	Q V				
8+35	0.3307	0.61	Q V				
8+40	0.3349	0.61	Q V				
8+45	0.3392	0.61	Q V				
8+50	0.3434	0.62	Q V				
8+55	0.3477	0.62	Q V				
9+ 0	0.3520	0.63	Q V				
9+ 5	0.3564	0.63	Q V				
9+10	0.3608	0.64	Q V				
9+15	0.3652	0.64	Q V				
9+20	0.3696	0.65	Q V				
9+25	0.3741	0.65	Q V				
9+30	0.3787	0.66	Q V				
9+35	0.3832	0.66	Q V				
9+40	0.3878	0.67	Q V				
9+45	0.3924	0.67	Q V				
9+50	0.3971	0.68	Q V				
9+55	0.4018	0.68	Q V				
10+ 0	0.4066	0.69	Q V				
10+ 5	0.4114	0.70	Q V				
10+10	0.4162	0.70	Q V				
10+15	0.4211	0.71	Q V				
10+20	0.4260	0.71	Q V				
10+25	0.4310	0.72	Q V				
10+30	0.4360	0.73	Q V				
10+35	0.4410	0.73	Q V				
10+40	0.4461	0.74	Q V				
10+45	0.4513	0.75	Q V				
10+50	0.4565	0.76	Q V				
10+55	0.4618	0.76	Q V				
11+ 0	0.4671	0.77	Q V				
11+ 5	0.4724	0.78	Q V				
11+10	0.4779	0.79	Q V				
11+15	0.4833	0.80	Q V				
11+20	0.4889	0.80	Q V				

```
11+25       0.4945      0.81  Q      V  |         |         |         |
11+30       0.5001      0.82  Q      V  |         |         |         |
11+35       0.5059      0.83  Q      V  |         |         |         |
11+40       0.5117      0.84  Q      V  |         |         |         |
11+45       0.5175      0.85  Q       V |         |         |         |
11+50       0.5234      0.86  Q       V |         |         |         |
11+55       0.5295      0.87  Q       V |         |         |         |
12+ 0       0.5355      0.88  Q       V |         |         |         |
12+ 5       0.5422      0.96  Q       V |         |         |         |
12+10       0.5496      1.08  Q       V |         |         |         |
12+15       0.5572      1.11  Q       V |         |         |         |
12+20       0.5650      1.13  Q       V |         |         |         |
12+25       0.5729      1.14  Q       V |         |         |         |
12+30       0.5808      1.15  Q        V|         |         |         |
12+35       0.5889      1.17  Q        V|         |         |         |
12+40       0.5970      1.18  Q        V|         |         |         |
12+45       0.6053      1.20  Q        V|         |         |         |
12+50       0.6137      1.22  Q        V|         |         |         |
12+55       0.6222      1.23  Q        V|         |         |         |
13+ 0       0.6308      1.25  |Q       V|         |         |         |
13+ 5       0.6395      1.27  |Q       V|         |         |         |
13+10       0.6484      1.29  |Q        V         |         |         |
13+15       0.6574      1.31  |Q        V         |         |         |
13+20       0.6666      1.33  |Q        V         |         |         |
13+25       0.6759      1.35  |Q        V         |         |         |
13+30       0.6854      1.38  |Q        V         |         |         |
13+35       0.6950      1.40  |Q        V         |         |         |
13+40       0.7049      1.43  |Q        |V        |         |         |
13+45       0.7149      1.45  |Q        |V        |         |         |
13+50       0.7251      1.48  |Q        |V        |         |         |
13+55       0.7355      1.51  |Q        |V        |         |         |
14+ 0       0.7461      1.54  |Q        |V        |         |         |
14+ 5       0.7571      1.60  |Q        |V        |         |         |
14+10       0.7686      1.67  |Q        |V        |         |         |
14+15       0.7804      1.71  |Q        | V       |         |         |
14+20       0.7925      1.76  |Q        | V       |         |         |
14+25       0.8049      1.80  |Q        | V       |         |         |
14+30       0.8176      1.85  |Q        | V       |         |         |
14+35       0.8307      1.90  |Q        | V       |         |         |
14+40       0.8442      1.96  |Q        |  V      |         |         |
14+45       0.8581      2.02  |Q        |  V      |         |         |
14+50       0.8725      2.09  |Q        |  V      |         |         |
14+55       0.8874      2.16  |Q        |  V      |         |         |
15+ 0       0.9028      2.24  |Q        |   V     |         |         |
15+ 5       0.9189      2.33  |Q        |   V     |         |         |
15+10       0.9360      2.49  |Q        |   V     |         |         |
15+15       0.9552      2.78  | Q       |   V     |         |         |
15+20       0.9769      3.16  | Q       |    V    |         |         |
15+25       0.9988      3.18  | Q       |    V    |         |         |
15+30       1.0202      3.10  | Q       |    V    |         |         |
15+35       1.0452      3.63  | Q       |     V   |         |         |
15+40       1.0756      4.42  |  Q      |     V   |         |         |
15+45       1.1143      5.62  |   Q     |      V  |         |         |
15+50       1.1647      7.31  |    Q    |       V |         |         |
15+55       1.2345     10.14  |       Q |        V|         |         |
16+ 0       1.3407     15.41  |         | Q       V         |         |
16+ 5       1.5944     36.84  |         |         |   V     Q|         |
16+10       1.8846     42.14  |         |         |         V|  Q      |
16+15       1.9840     14.44  |         |Q        |         V         |
16+20       2.0292      6.55  |    Q    |         |         |V        |
16+25       2.0587      4.29  |  Q      |         |         | V       |
16+30       2.0826      3.47  | Q       |         |         | V       |
16+35       2.1018      2.79  | Q       |         |         | V       |
16+40       2.1181      2.37  |Q        |         |         |  V      |
16+45       2.1330      2.16  |Q        |         |         |  V      |
16+50       2.1469      2.01  |Q        |         |         |  V      |
16+55       2.1599      1.90  |Q        |         |         |  V      |
17+ 0       2.1723      1.80  |Q        |         |         |  V      |
17+ 5       2.1839      1.69  |Q        |         |         |   V     |
17+10       2.1948      1.58  |Q        |         |         |   V     |
17+15       2.2052      1.51  |Q        |         |         |   V     |
17+20       2.2152      1.45  |Q        |         |         |   V     |
17+25       2.2248      1.40  |Q        |         |         |   V     |
17+30       2.2341      1.35  |Q        |         |         |   V     |
17+35       2.2431      1.31  |Q        |         |         |    V    |
17+40       2.2518      1.27  |Q        |         |         |    V    |
```

```
17+45       2.2603      1.23  Q          |          |          |    V    |
17+50       2.2686      1.20  Q          |          |          |    V    |
17+55       2.2766      1.17  Q          |          |          |    V    |
18+ 0       2.2844      1.14  Q          |          |          |    V    |
18+ 5       2.2916      1.04  Q          |          |          |    V    |
18+10       2.2979      0.92  Q          |          |          |    V    |
18+15       2.3039      0.87  Q          |          |          |    V    |
18+20       2.3098      0.85  Q          |          |          |     V   |
18+25       2.3155      0.83  Q          |          |          |     V   |
18+30       2.3211      0.81  Q          |          |          |     V   |
18+35       2.3266      0.79  Q          |          |          |     V   |
18+40       2.3319      0.78  Q          |          |          |     V   |
18+45       2.3372      0.76  Q          |          |          |     V   |
18+50       2.3423      0.75  Q          |          |          |     V   |
18+55       2.3474      0.73  Q          |          |          |     V   |
19+ 0       2.3523      0.72  Q          |          |          |     V   |
19+ 5       2.3572      0.71  Q          |          |          |     V   |
19+10       2.3620      0.69  Q          |          |          |     V   |
19+15       2.3667      0.68  Q          |          |          |     V   |
19+20       2.3713      0.67  Q          |          |          |      V  |
19+25       2.3759      0.66  Q          |          |          |      V  |
19+30       2.3804      0.65  Q          |          |          |      V  |
19+35       2.3848      0.64  Q          |          |          |      V  |
19+40       2.3891      0.63  Q          |          |          |      V  |
19+45       2.3934      0.62  Q          |          |          |      V  |
19+50       2.3976      0.61  Q          |          |          |      V  |
19+55       2.4018      0.61  Q          |          |          |      V  |
20+ 0       2.4059      0.60  Q          |          |          |      V  |
20+ 5       2.4100      0.59  Q          |          |          |      V  |
20+10       2.4140      0.58  Q          |          |          |      V  |
20+15       2.4179      0.57  Q          |          |          |      V  |
20+20       2.4218      0.57  Q          |          |          |      V  |
20+25       2.4257      0.56  Q          |          |          |      V  |
20+30       2.4295      0.55  Q          |          |          |      V  |
20+35       2.4333      0.55  Q          |          |          |      V  |
20+40       2.4370      0.54  Q          |          |          |       V |
20+45       2.4407      0.53  Q          |          |          |       V |
20+50       2.4443      0.53  Q          |          |          |       V |
20+55       2.4479      0.52  Q          |          |          |       V |
21+ 0       2.4515      0.52  Q          |          |          |       V |
21+ 5       2.4550      0.51  Q          |          |          |       V |
21+10       2.4585      0.51  Q          |          |          |       V |
21+15       2.4619      0.50  Q          |          |          |       V |
21+20       2.4653      0.50  Q          |          |          |       V |
21+25       2.4687      0.49  Q          |          |          |       V |
21+30       2.4721      0.49  Q          |          |          |       V |
21+35       2.4754      0.48  Q          |          |          |       V |
21+40       2.4787      0.48  Q          |          |          |       V |
21+45       2.4819      0.47  Q          |          |          |       V |
21+50       2.4851      0.47  Q          |          |          |       V |
21+55       2.4883      0.46  Q          |          |          |       V |
22+ 0       2.4915      0.46  Q          |          |          |       V |
22+ 5       2.4947      0.46  Q          |          |          |       V |
22+10       2.4978      0.45  Q          |          |          |       V |
22+15       2.5008      0.45  Q          |          |          |        V|
22+20       2.5039      0.44  Q          |          |          |        V|
22+25       2.5069      0.44  Q          |          |          |        V|
22+30       2.5099      0.44  Q          |          |          |        V|
22+35       2.5129      0.43  Q          |          |          |        V|
22+40       2.5159      0.43  Q          |          |          |        V|
22+45       2.5188      0.43  Q          |          |          |        V|
22+50       2.5217      0.42  Q          |          |          |        V|
22+55       2.5246      0.42  Q          |          |          |        V|
23+ 0       2.5275      0.42  Q          |          |          |        V|
23+ 5       2.5304      0.41  Q          |          |          |        V|
23+10       2.5332      0.41  Q          |          |          |        V|
23+15       2.5360      0.41  Q          |          |          |        V|
23+20       2.5388      0.40  Q          |          |          |        V|
23+25       2.5415      0.40  Q          |          |          |        V|
23+30       2.5443      0.40  Q          |          |          |        V|
23+35       2.5470      0.40  Q          |          |          |        V|
23+40       2.5497      0.39  Q          |          |          |        V|
23+45       2.5524      0.39  Q          |          |          |        V|
23+50       2.5551      0.39  Q          |          |          |        V|
23+55       2.5577      0.39  Q          |          |          |        V|
24+ 0       2.5604      0.38  Q          |          |          |        V|
```

```
   24+ 5       2.5621      0.24  Q          |          |          |         V|
   24+10       2.5624      0.04  Q          |          |          |         V|
   24+15       2.5624      0.01  Q          |          |          |         V|
   24+20       2.5624      0.00  Q          |          |          |         V|
----------------------------------------------------------------------------
```


24-Hour Storm Runoff Hydrograph
PA 1 (8x7 RCB) - Proposed Conditions
Q (CFS)
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0
200
400
600
800
1000
1200
1400
1600
TIME (MINUTES)


24-Hour Storm Runoff Hydrograph
PA1 (8x7 RCB)
Q (CFS)
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
600
700
800
900
1000
1100
1200
TIME (MINUTES)
EXISTING
PROPOSED

U n i t H y d r o g r a p h A n a l y s i s

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Study date 09/29/15 File Name PRPA1HYMW.out

++

Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6103

PLANNING AREA 1 - 36" RCP
PROPOSED CONDITIONS - HYDROMOD CALCULATIONS
2-YEAR 24-HOUR STORM
BY FUSCOE ENGINEERING

Storm Event Year = 2

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
69.0	1.4	0.61	C	0.250	0.900	0.225
75.0	0.9	0.39	D	0.200	0.900	0.180

Area-averaged adjusted loss rate Fm (In/Hr) = 0.207

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
1.26	0.548	69.0	49.8	10.08	0.000
0.14	0.061	98.0	98.0	0.20	0.890
0.81	0.352	75.0	57.0	7.54	0.018
0.09	0.039	98.0	98.0	0.20	0.890

Area-averaged catchment yield fraction, Y = 0.095
Area-averaged low loss fraction, Yb = 0.905
++
Watercourse length = 1033.25(Ft.)
Length from concentration point to centroid = 628.93(Ft.)
Elevation difference along watercourse = 116.00(Ft.)
Mannings friction factor along watercourse = 0.025
Watershed area = 2.30(Ac.)
Catchment Lag time = 0.043 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 194.9175
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.207(In/Hr)
Average low loss rate fraction (Yb) = 0.905 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall = 0.190(In)
Computed peak 30-minute rainfall = 0.400(In)
Specified peak 1-hour rainfall = 0.530(In)
Computed peak 3-hour rainfall = 0.890(In)
Specified peak 6-hour rainfall = 1.220(In)
Specified peak 24-hour rainfall = 2.050(In)

Rainfall depth area reduction factors:
Using a total area of 2.30(Ac.) (Ref: fig. E-4)

```
5-minute factor = 1.000     Adjusted rainfall =  0.190(In)
30-minute factor = 1.000    Adjusted rainfall =  0.400(In)
1-hour factor = 1.000       Adjusted rainfall =  0.530(In)
3-hour factor = 1.000       Adjusted rainfall =  0.890(In)
6-hour factor = 1.000       Adjusted rainfall =  1.220(In)
24-hour factor = 1.000 Adjusted rainfall =  2.050(In)
----------------------------------------------------------------------

                      U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
----------------------------------------------------------------------
               (K =        27.82 (CFS))

  1               41.245                  11.472
  2               91.739                  14.045
  3               98.783                   1.959
  4              100.000                   0.339
----------------------------------------------------------------------
Peak Unit   Adjusted mass rainfall  Unit rainfall
Number              (In)                (In)
  1              0.1900               0.1900
  2              0.2534               0.0634
  3              0.2999               0.0465
  4              0.3379               0.0381
  5              0.3708               0.0328
  6              0.4000               0.0292
  7              0.4258               0.0258
  8              0.4495               0.0237
  9              0.4715               0.0220
 10              0.4921               0.0206
 11              0.5115               0.0194
 12              0.5299               0.0184
 13              0.5503               0.0204
 14              0.5699               0.0196
 15              0.5888               0.0189
 16              0.6070               0.0182
 17              0.6246               0.0176
 18              0.6417               0.0171
 19              0.6583               0.0166
 20              0.6744               0.0161
 21              0.6901               0.0157
 22              0.7054               0.0153
 23              0.7204               0.0150
 24              0.7350               0.0146
 25              0.7493               0.0143
 26              0.7633               0.0140
 27              0.7770               0.0137
 28              0.7905               0.0135
 29              0.8037               0.0132
 30              0.8166               0.0130
 31              0.8294               0.0127
 32              0.8419               0.0125
 33              0.8542               0.0123
 34              0.8663               0.0121
 35              0.8782               0.0119
 36              0.8900               0.0118
 37              0.9012               0.0112
 38              0.9122               0.0110
 39              0.9230               0.0108
 40              0.9337               0.0107
 41              0.9442               0.0105
 42              0.9547               0.0104
 43              0.9649               0.0103
 44              0.9751               0.0101
 45              0.9851               0.0100
 46              0.9950               0.0099
 47              1.0048               0.0098
 48              1.0145               0.0097
 49              1.0240               0.0096
 50              1.0335               0.0095
 51              1.0428               0.0094
 52              1.0521               0.0093
 53              1.0612               0.0092
```

54	1.0703	0.0091
55	1.0793	0.0090
56	1.0882	0.0089
57	1.0970	0.0088
58	1.1057	0.0087
59	1.1143	0.0086
60	1.1229	0.0086
61	1.1313	0.0085
62	1.1397	0.0084
63	1.1481	0.0083
64	1.1563	0.0083
65	1.1645	0.0082
66	1.1726	0.0081
67	1.1807	0.0081
68	1.1887	0.0080
69	1.1966	0.0079
70	1.2045	0.0079
71	1.2123	0.0078
72	1.2200	0.0077
73	1.2263	0.0063
74	1.2326	0.0063
75	1.2388	0.0062
76	1.2449	0.0062
77	1.2510	0.0061
78	1.2571	0.0061
79	1.2631	0.0060
80	1.2691	0.0060
81	1.2750	0.0059
82	1.2809	0.0059
83	1.2867	0.0058
84	1.2925	0.0058
85	1.2982	0.0057
86	1.3039	0.0057
87	1.3096	0.0057
88	1.3152	0.0056
89	1.3208	0.0056
90	1.3263	0.0055
91	1.3318	0.0055
92	1.3372	0.0055
93	1.3427	0.0054
94	1.3481	0.0054
95	1.3534	0.0054
96	1.3587	0.0053
97	1.3640	0.0053
98	1.3693	0.0052
99	1.3745	0.0052
100	1.3796	0.0052
101	1.3848	0.0051
102	1.3899	0.0051
103	1.3950	0.0051
104	1.4001	0.0051
105	1.4051	0.0050
106	1.4101	0.0050
107	1.4150	0.0050
108	1.4200	0.0049
109	1.4249	0.0049
110	1.4298	0.0049
111	1.4346	0.0049
112	1.4394	0.0048
113	1.4442	0.0048
114	1.4490	0.0048
115	1.4538	0.0047
116	1.4585	0.0047
117	1.4632	0.0047
118	1.4678	0.0047
119	1.4725	0.0046
120	1.4771	0.0046
121	1.4817	0.0046
122	1.4863	0.0046
123	1.4908	0.0045
124	1.4953	0.0045
125	1.4999	0.0045
126	1.5043	0.0045
127	1.5088	0.0045
128	1.5132	0.0044
129	1.5176	0.0044

130	1.5220	0.0044
131	1.5264	0.0044
132	1.5308	0.0044
133	1.5351	0.0043
134	1.5394	0.0043
135	1.5437	0.0043
136	1.5480	0.0043
137	1.5522	0.0043
138	1.5564	0.0042
139	1.5607	0.0042
140	1.5649	0.0042
141	1.5690	0.0042
142	1.5732	0.0042
143	1.5773	0.0041
144	1.5814	0.0041
145	1.5855	0.0041
146	1.5896	0.0041
147	1.5937	0.0041
148	1.5978	0.0041
149	1.6018	0.0040
150	1.6058	0.0040
151	1.6098	0.0040
152	1.6138	0.0040
153	1.6178	0.0040
154	1.6217	0.0040
155	1.6256	0.0039
156	1.6296	0.0039
157	1.6335	0.0039
158	1.6373	0.0039
159	1.6412	0.0039
160	1.6451	0.0039
161	1.6489	0.0038
162	1.6527	0.0038
163	1.6566	0.0038
164	1.6604	0.0038
165	1.6641	0.0038
166	1.6679	0.0038
167	1.6717	0.0038
168	1.6754	0.0037
169	1.6791	0.0037
170	1.6828	0.0037
171	1.6865	0.0037
172	1.6902	0.0037
173	1.6939	0.0037
174	1.6976	0.0037
175	1.7012	0.0036
176	1.7048	0.0036
177	1.7085	0.0036
178	1.7121	0.0036
179	1.7157	0.0036
180	1.7192	0.0036
181	1.7228	0.0036
182	1.7264	0.0036
183	1.7299	0.0035
184	1.7334	0.0035
185	1.7370	0.0035
186	1.7405	0.0035
187	1.7440	0.0035
188	1.7475	0.0035
189	1.7509	0.0035
190	1.7544	0.0035
191	1.7578	0.0035
192	1.7613	0.0034
193	1.7647	0.0034
194	1.7681	0.0034
195	1.7715	0.0034
196	1.7749	0.0034
197	1.7783	0.0034
198	1.7817	0.0034
199	1.7851	0.0034
200	1.7884	0.0034
201	1.7917	0.0033
202	1.7951	0.0033
203	1.7984	0.0033
204	1.8017	0.0033
205	1.8050	0.0033

206	1.8083	0.0033
207	1.8116	0.0033
208	1.8149	0.0033
209	1.8181	0.0033
210	1.8214	0.0033
211	1.8246	0.0032
212	1.8278	0.0032
213	1.8311	0.0032
214	1.8343	0.0032
215	1.8375	0.0032
216	1.8407	0.0032
217	1.8439	0.0032
218	1.8470	0.0032
219	1.8502	0.0032
220	1.8534	0.0032
221	1.8565	0.0031
222	1.8597	0.0031
223	1.8628	0.0031
224	1.8659	0.0031
225	1.8690	0.0031
226	1.8721	0.0031
227	1.8752	0.0031
228	1.8783	0.0031
229	1.8814	0.0031
230	1.8845	0.0031
231	1.8875	0.0031
232	1.8906	0.0031
233	1.8936	0.0030
234	1.8967	0.0030
235	1.8997	0.0030
236	1.9027	0.0030
237	1.9057	0.0030
238	1.9087	0.0030
239	1.9117	0.0030
240	1.9147	0.0030
241	1.9177	0.0030
242	1.9207	0.0030
243	1.9237	0.0030
244	1.9266	0.0030
245	1.9296	0.0030
246	1.9325	0.0029
247	1.9355	0.0029
248	1.9384	0.0029
249	1.9413	0.0029
250	1.9442	0.0029
251	1.9471	0.0029
252	1.9500	0.0029
253	1.9529	0.0029
254	1.9558	0.0029
255	1.9587	0.0029
256	1.9616	0.0029
257	1.9644	0.0029
258	1.9673	0.0029
259	1.9701	0.0029
260	1.9730	0.0028
261	1.9758	0.0028
262	1.9787	0.0028
263	1.9815	0.0028
264	1.9843	0.0028
265	1.9871	0.0028
266	1.9899	0.0028
267	1.9927	0.0028
268	1.9955	0.0028
269	1.9983	0.0028
270	2.0011	0.0028
271	2.0038	0.0028
272	2.0066	0.0028
273	2.0094	0.0028
274	2.0121	0.0028
275	2.0149	0.0027
276	2.0176	0.0027
277	2.0203	0.0027
278	2.0231	0.0027
279	2.0258	0.0027
280	2.0285	0.0027
281	2.0312	0.0027

282	2.0339	0.0027
283	2.0366	0.0027
284	2.0393	0.0027
285	2.0420	0.0027
286	2.0447	0.0027
287	2.0473	0.0027
288	2.0500	0.0027

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0027	0.0024	0.0003
2	0.0027	0.0024	0.0003
3	0.0027	0.0024	0.0003
4	0.0027	0.0024	0.0003
5	0.0027	0.0024	0.0003
6	0.0027	0.0025	0.0003
7	0.0027	0.0025	0.0003
8	0.0027	0.0025	0.0003
9	0.0027	0.0025	0.0003
10	0.0027	0.0025	0.0003
11	0.0028	0.0025	0.0003
12	0.0028	0.0025	0.0003
13	0.0028	0.0025	0.0003
14	0.0028	0.0025	0.0003
15	0.0028	0.0025	0.0003
16	0.0028	0.0025	0.0003
17	0.0028	0.0025	0.0003
18	0.0028	0.0026	0.0003
19	0.0028	0.0026	0.0003
20	0.0028	0.0026	0.0003
21	0.0029	0.0026	0.0003
22	0.0029	0.0026	0.0003
23	0.0029	0.0026	0.0003
24	0.0029	0.0026	0.0003
25	0.0029	0.0026	0.0003
26	0.0029	0.0026	0.0003
27	0.0029	0.0026	0.0003
28	0.0029	0.0027	0.0003
29	0.0029	0.0027	0.0003
30	0.0030	0.0027	0.0003
31	0.0030	0.0027	0.0003
32	0.0030	0.0027	0.0003
33	0.0030	0.0027	0.0003
34	0.0030	0.0027	0.0003
35	0.0030	0.0027	0.0003
36	0.0030	0.0027	0.0003
37	0.0030	0.0027	0.0003
38	0.0030	0.0028	0.0003
39	0.0031	0.0028	0.0003
40	0.0031	0.0028	0.0003
41	0.0031	0.0028	0.0003
42	0.0031	0.0028	0.0003
43	0.0031	0.0028	0.0003
44	0.0031	0.0028	0.0003
45	0.0031	0.0028	0.0003
46	0.0031	0.0028	0.0003
47	0.0032	0.0029	0.0003
48	0.0032	0.0029	0.0003
49	0.0032	0.0029	0.0003
50	0.0032	0.0029	0.0003
51	0.0032	0.0029	0.0003
52	0.0032	0.0029	0.0003
53	0.0033	0.0029	0.0003
54	0.0033	0.0030	0.0003
55	0.0033	0.0030	0.0003
56	0.0033	0.0030	0.0003
57	0.0033	0.0030	0.0003
58	0.0033	0.0030	0.0003
59	0.0033	0.0030	0.0003
60	0.0034	0.0030	0.0003
61	0.0034	0.0031	0.0003
62	0.0034	0.0031	0.0003
63	0.0034	0.0031	0.0003
64	0.0034	0.0031	0.0003

65	0.0034	0.0031	0.0003
66	0.0035	0.0031	0.0003
67	0.0035	0.0031	0.0003
68	0.0035	0.0032	0.0003
69	0.0035	0.0032	0.0003
70	0.0035	0.0032	0.0003
71	0.0035	0.0032	0.0003
72	0.0036	0.0032	0.0003
73	0.0036	0.0032	0.0003
74	0.0036	0.0033	0.0003
75	0.0036	0.0033	0.0003
76	0.0036	0.0033	0.0003
77	0.0037	0.0033	0.0003
78	0.0037	0.0033	0.0003
79	0.0037	0.0033	0.0004
80	0.0037	0.0034	0.0004
81	0.0037	0.0034	0.0004
82	0.0038	0.0034	0.0004
83	0.0038	0.0034	0.0004
84	0.0038	0.0034	0.0004
85	0.0038	0.0035	0.0004
86	0.0038	0.0035	0.0004
87	0.0039	0.0035	0.0004
88	0.0039	0.0035	0.0004
89	0.0039	0.0035	0.0004
90	0.0039	0.0036	0.0004
91	0.0040	0.0036	0.0004
92	0.0040	0.0036	0.0004
93	0.0040	0.0036	0.0004
94	0.0040	0.0036	0.0004
95	0.0041	0.0037	0.0004
96	0.0041	0.0037	0.0004
97	0.0041	0.0037	0.0004
98	0.0041	0.0037	0.0004
99	0.0042	0.0038	0.0004
100	0.0042	0.0038	0.0004
101	0.0042	0.0038	0.0004
102	0.0043	0.0038	0.0004
103	0.0043	0.0039	0.0004
104	0.0043	0.0039	0.0004
105	0.0044	0.0039	0.0004
106	0.0044	0.0040	0.0004
107	0.0044	0.0040	0.0004
108	0.0044	0.0040	0.0004
109	0.0045	0.0041	0.0004
110	0.0045	0.0041	0.0004
111	0.0045	0.0041	0.0004
112	0.0046	0.0041	0.0004
113	0.0046	0.0042	0.0004
114	0.0046	0.0042	0.0004
115	0.0047	0.0042	0.0004
116	0.0047	0.0043	0.0004
117	0.0048	0.0043	0.0005
118	0.0048	0.0043	0.0005
119	0.0049	0.0044	0.0005
120	0.0049	0.0044	0.0005
121	0.0049	0.0045	0.0005
122	0.0050	0.0045	0.0005
123	0.0050	0.0045	0.0005
124	0.0051	0.0046	0.0005
125	0.0051	0.0046	0.0005
126	0.0051	0.0047	0.0005
127	0.0052	0.0047	0.0005
128	0.0052	0.0047	0.0005
129	0.0053	0.0048	0.0005
130	0.0054	0.0048	0.0005
131	0.0054	0.0049	0.0005
132	0.0055	0.0049	0.0005
133	0.0055	0.0050	0.0005
134	0.0056	0.0050	0.0005
135	0.0057	0.0051	0.0005
136	0.0057	0.0052	0.0005
137	0.0058	0.0052	0.0006
138	0.0058	0.0053	0.0006
139	0.0059	0.0054	0.0006
140	0.0060	0.0054	0.0006

141	0.0061	0.0055	0.0006
142	0.0061	0.0055	0.0006
143	0.0062	0.0056	0.0006
144	0.0063	0.0057	0.0006
145	0.0077	0.0070	0.0007
146	0.0078	0.0071	0.0007
147	0.0079	0.0072	0.0008
148	0.0080	0.0072	0.0008
149	0.0081	0.0073	0.0008
150	0.0082	0.0074	0.0008
151	0.0083	0.0075	0.0008
152	0.0084	0.0076	0.0008
153	0.0086	0.0077	0.0008
154	0.0086	0.0078	0.0008
155	0.0088	0.0080	0.0008
156	0.0089	0.0080	0.0008
157	0.0091	0.0082	0.0009
158	0.0092	0.0083	0.0009
159	0.0094	0.0085	0.0009
160	0.0095	0.0086	0.0009
161	0.0097	0.0088	0.0009
162	0.0098	0.0089	0.0009
163	0.0100	0.0091	0.0010
164	0.0101	0.0092	0.0010
165	0.0104	0.0094	0.0010
166	0.0105	0.0095	0.0010
167	0.0108	0.0098	0.0010
168	0.0110	0.0100	0.0010
169	0.0118	0.0106	0.0011
170	0.0119	0.0108	0.0011
171	0.0123	0.0111	0.0012
172	0.0125	0.0113	0.0012
173	0.0130	0.0117	0.0012
174	0.0132	0.0119	0.0013
175	0.0137	0.0124	0.0013
176	0.0140	0.0127	0.0013
177	0.0146	0.0132	0.0014
178	0.0150	0.0135	0.0014
179	0.0157	0.0142	0.0015
180	0.0161	0.0146	0.0015
181	0.0171	0.0155	0.0016
182	0.0176	0.0159	0.0017
183	0.0189	0.0171	0.0018
184	0.0196	0.0173	0.0023
185	0.0184	0.0166	0.0018
186	0.0194	0.0173	0.0021
187	0.0220	0.0173	0.0047
188	0.0237	0.0173	0.0064
189	0.0292	0.0173	0.0119
190	0.0328	0.0173	0.0155
191	0.0465	0.0173	0.0292
192	0.0634	0.0173	0.0461
193	0.1900	0.0173	0.1727
194	0.0381	0.0173	0.0208
195	0.0258	0.0173	0.0085
196	0.0206	0.0173	0.0033
197	0.0204	0.0173	0.0031
198	0.0182	0.0165	0.0017
199	0.0166	0.0150	0.0016
200	0.0153	0.0139	0.0015
201	0.0143	0.0129	0.0014
202	0.0135	0.0122	0.0013
203	0.0127	0.0115	0.0012
204	0.0121	0.0110	0.0012
205	0.0112	0.0101	0.0011
206	0.0107	0.0097	0.0010
207	0.0103	0.0093	0.0010
208	0.0099	0.0090	0.0009
209	0.0096	0.0087	0.0009
210	0.0093	0.0084	0.0009
211	0.0090	0.0081	0.0009
212	0.0087	0.0079	0.0008
213	0.0085	0.0077	0.0008
214	0.0083	0.0075	0.0008
215	0.0081	0.0073	0.0008
216	0.0079	0.0071	0.0007

217	0.0063	0.0057	0.0006
218	0.0062	0.0056	0.0006
219	0.0060	0.0054	0.0006
220	0.0059	0.0053	0.0006
221	0.0057	0.0052	0.0005
222	0.0056	0.0051	0.0005
223	0.0055	0.0050	0.0005
224	0.0054	0.0049	0.0005
225	0.0053	0.0048	0.0005
226	0.0052	0.0047	0.0005
227	0.0051	0.0046	0.0005
228	0.0050	0.0045	0.0005
229	0.0049	0.0044	0.0005
230	0.0048	0.0044	0.0005
231	0.0047	0.0043	0.0005
232	0.0047	0.0042	0.0004
233	0.0046	0.0042	0.0004
234	0.0045	0.0041	0.0004
235	0.0045	0.0040	0.0004
236	0.0044	0.0040	0.0004
237	0.0043	0.0039	0.0004
238	0.0043	0.0039	0.0004
239	0.0042	0.0038	0.0004
240	0.0042	0.0038	0.0004
241	0.0041	0.0037	0.0004
242	0.0041	0.0037	0.0004
243	0.0040	0.0036	0.0004
244	0.0040	0.0036	0.0004
245	0.0039	0.0035	0.0004
246	0.0039	0.0035	0.0004
247	0.0038	0.0034	0.0004
248	0.0038	0.0034	0.0004
249	0.0037	0.0034	0.0004
250	0.0037	0.0033	0.0004
251	0.0036	0.0033	0.0003
252	0.0036	0.0033	0.0003
253	0.0036	0.0032	0.0003
254	0.0035	0.0032	0.0003
255	0.0035	0.0032	0.0003
256	0.0035	0.0031	0.0003
257	0.0034	0.0031	0.0003
258	0.0034	0.0031	0.0003
259	0.0034	0.0030	0.0003
260	0.0033	0.0030	0.0003
261	0.0033	0.0030	0.0003
262	0.0033	0.0030	0.0003
263	0.0032	0.0029	0.0003
264	0.0032	0.0029	0.0003
265	0.0032	0.0029	0.0003
266	0.0032	0.0029	0.0003
267	0.0031	0.0028	0.0003
268	0.0031	0.0028	0.0003
269	0.0031	0.0028	0.0003
270	0.0031	0.0028	0.0003
271	0.0030	0.0027	0.0003
272	0.0030	0.0027	0.0003
273	0.0030	0.0027	0.0003
274	0.0030	0.0027	0.0003
275	0.0029	0.0027	0.0003
276	0.0029	0.0026	0.0003
277	0.0029	0.0026	0.0003
278	0.0029	0.0026	0.0003
279	0.0029	0.0026	0.0003
280	0.0028	0.0026	0.0003
281	0.0028	0.0025	0.0003
282	0.0028	0.0025	0.0003
283	0.0028	0.0025	0.0003
284	0.0028	0.0025	0.0003
285	0.0027	0.0025	0.0003
286	0.0027	0.0025	0.0003
287	0.0027	0.0024	0.0003
288	0.0027	0.0024	0.0003

Total soil rain loss = 1.58(In)
Total effective rainfall = 0.47(In)

Peak flow rate in flood hydrograph = 2.76(CFS)

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24 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0001	0.01	Q	|	|	|	|
0+15	0.0001	0.01	Q	|	|	|	|
0+20	0.0002	0.01	Q	|	|	|	|
0+25	0.0002	0.01	Q	|	|	|	|
0+30	0.0003	0.01	Q	|	|	|	|
0+35	0.0003	0.01	Q	|	|	|	|
0+40	0.0004	0.01	Q	|	|	|	|
0+45	0.0004	0.01	Q	|	|	|	|
0+50	0.0005	0.01	Q	|	|	|	|
0+55	0.0005	0.01	Q	|	|	|	|
1+ 0	0.0006	0.01	Q	|	|	|	|
1+ 5	0.0006	0.01	Q	|	|	|	|
1+10	0.0007	0.01	Q	|	|	|	|
1+15	0.0007	0.01	Q	|	|	|	|
1+20	0.0008	0.01	Q	|	|	|	|
1+25	0.0008	0.01	Q	|	|	|	|
1+30	0.0009	0.01	Q	|	|	|	|
1+35	0.0009	0.01	Q	|	|	|	|
1+40	0.0010	0.01	Q	|	|	|	|
1+45	0.0010	0.01	Q	|	|	|	|
1+50	0.0011	0.01	Q	|	|	|	|
1+55	0.0011	0.01	Q	|	|	|	|
2+ 0	0.0012	0.01	Q	|	|	|	|
2+ 5	0.0012	0.01	Q	|	|	|	|
2+10	0.0013	0.01	Q	|	|	|	|
2+15	0.0013	0.01	Q	|	|	|	|
2+20	0.0014	0.01	Q	|	|	|	|
2+25	0.0014	0.01	Q	|	|	|	|
2+30	0.0015	0.01	Q	|	|	|	|
2+35	0.0016	0.01	Q	|	|	|	|
2+40	0.0016	0.01	Q	|	|	|	|
2+45	0.0017	0.01	Q	|	|	|	|
2+50	0.0017	0.01	Q	|	|	|	|
2+55	0.0018	0.01	Q	|	|	|	|
3+ 0	0.0018	0.01	Q	|	|	|	|
3+ 5	0.0019	0.01	Q	|	|	|	|
3+10	0.0019	0.01	Q	|	|	|	|
3+15	0.0020	0.01	Q	|	|	|	|
3+20	0.0020	0.01	Q	|	|	|	|
3+25	0.0021	0.01	Q	|	|	|	|
3+30	0.0022	0.01	Q	|	|	|	|
3+35	0.0022	0.01	Q	|	|	|	|
3+40	0.0023	0.01	QV	|	|	|	|
3+45	0.0023	0.01	QV	|	|	|	|
3+50	0.0024	0.01	QV	|	|	|	|
3+55	0.0024	0.01	QV	|	|	|	|
4+ 0	0.0025	0.01	QV	|	|	|	|
4+ 5	0.0026	0.01	QV	|	|	|	|
4+10	0.0026	0.01	QV	|	|	|	|
4+15	0.0027	0.01	QV	|	|	|	|
4+20	0.0027	0.01	QV	|	|	|	|
4+25	0.0028	0.01	QV	|	|	|	|
4+30	0.0029	0.01	QV	|	|	|	|
4+35	0.0029	0.01	QV	|	|	|	|
4+40	0.0030	0.01	QV	|	|	|	|
4+45	0.0030	0.01	QV	|	|	|	|
4+50	0.0031	0.01	QV	|	|	|	|
4+55	0.0032	0.01	QV	|	|	|	|
5+ 0	0.0032	0.01	QV	|	|	|	|
5+ 5	0.0033	0.01	QV	|	|	|	|
5+10	0.0033	0.01	QV	|	|	|	|
5+15	0.0034	0.01	QV	|	|	|	|
5+20	0.0035	0.01	QV	|	|	|	|
5+25	0.0035	0.01	QV	|	|	|	|

5+30	0.0036	0.01	QV				
5+35	0.0037	0.01	QV				
5+40	0.0037	0.01	QV				
5+45	0.0038	0.01	QV				
5+50	0.0038	0.01	QV				
5+55	0.0039	0.01	QV				
6+ 0	0.0040	0.01	QV				
6+ 5	0.0040	0.01	QV				
6+10	0.0041	0.01	QV				
6+15	0.0042	0.01	QV				
6+20	0.0042	0.01	QV				
6+25	0.0043	0.01	QV				
6+30	0.0044	0.01	QV				
6+35	0.0044	0.01	QV				
6+40	0.0045	0.01	Q V				
6+45	0.0046	0.01	Q V				
6+50	0.0046	0.01	Q V				
6+55	0.0047	0.01	Q V				
7+ 0	0.0048	0.01	Q V				
7+ 5	0.0048	0.01	Q V				
7+10	0.0049	0.01	Q V				
7+15	0.0050	0.01	Q V				
7+20	0.0051	0.01	Q V				
7+25	0.0051	0.01	Q V				
7+30	0.0052	0.01	Q V				
7+35	0.0053	0.01	Q V				
7+40	0.0053	0.01	Q V				
7+45	0.0054	0.01	Q V				
7+50	0.0055	0.01	Q V				
7+55	0.0056	0.01	Q V				
8+ 0	0.0056	0.01	Q V				
8+ 5	0.0057	0.01	Q V				
8+10	0.0058	0.01	Q V				
8+15	0.0059	0.01	Q V				
8+20	0.0059	0.01	Q V				
8+25	0.0060	0.01	Q V				
8+30	0.0061	0.01	Q V				
8+35	0.0062	0.01	Q V				
8+40	0.0063	0.01	Q V				
8+45	0.0063	0.01	Q V				
8+50	0.0064	0.01	Q V				
8+55	0.0065	0.01	Q V				
9+ 0	0.0066	0.01	Q V				
9+ 5	0.0067	0.01	Q V				
9+10	0.0067	0.01	Q V				
9+15	0.0068	0.01	Q V				
9+20	0.0069	0.01	Q V				
9+25	0.0070	0.01	Q V				
9+30	0.0071	0.01	Q V				
9+35	0.0072	0.01	Q V				
9+40	0.0072	0.01	Q V				
9+45	0.0073	0.01	Q V				
9+50	0.0074	0.01	Q V				
9+55	0.0075	0.01	Q V				
10+ 0	0.0076	0.01	Q V				
10+ 5	0.0077	0.01	Q V				
10+10	0.0078	0.01	Q V				
10+15	0.0079	0.01	Q V				
10+20	0.0079	0.01	Q V				
10+25	0.0080	0.01	Q V				
10+30	0.0081	0.01	Q V				
10+35	0.0082	0.01	Q V				
10+40	0.0083	0.01	Q V				
10+45	0.0084	0.01	Q V				
10+50	0.0085	0.01	Q V				
10+55	0.0086	0.01	Q V				
11+ 0	0.0087	0.01	Q V				
11+ 5	0.0088	0.01	Q V				
11+10	0.0089	0.01	Q V				
11+15	0.0090	0.01	Q V				
11+20	0.0091	0.02	Q V				
11+25	0.0092	0.02	Q V				
11+30	0.0093	0.02	Q V				
11+35	0.0094	0.02	Q V				
11+40	0.0095	0.02	Q V				
11+45	0.0097	0.02	Q V				

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11+50       0.0098      0.02  Q   V     |         |         |         |
11+55       0.0099      0.02  Q   V     |         |         |         |
12+ 0       0.0100      0.02  Q   V     |         |         |         |
12+ 5       0.0101      0.02  Q   V     |         |         |         |
12+10       0.0103      0.02  Q   V     |         |         |         |
12+15       0.0104      0.02  Q   V     |         |         |         |
12+20       0.0105      0.02  Q   V     |         |         |         |
12+25       0.0107      0.02  Q   V     |         |         |         |
12+30       0.0108      0.02  Q   V     |         |         |         |
12+35       0.0110      0.02  Q   V     |         |         |         |
12+40       0.0111      0.02  Q   V     |         |         |         |
12+45       0.0113      0.02  Q    V    |         |         |         |
12+50       0.0115      0.02  Q    V    |         |         |         |
12+55       0.0116      0.02  Q    V    |         |         |         |
13+ 0       0.0118      0.02  Q    V    |         |         |         |
13+ 5       0.0119      0.02  Q    V    |         |         |         |
13+10       0.0121      0.02  Q    V    |         |         |         |
13+15       0.0123      0.02  Q    V    |         |         |         |
13+20       0.0124      0.02  Q    V    |         |         |         |
13+25       0.0126      0.03  Q    V    |         |         |         |
13+30       0.0128      0.03  Q    V    |         |         |         |
13+35       0.0130      0.03  Q    V    |         |         |         |
13+40       0.0132      0.03  Q    V    |         |         |         |
13+45       0.0133      0.03  Q    V    |         |         |         |
13+50       0.0135      0.03  Q     V   |         |         |         |
13+55       0.0137      0.03  Q     V   |         |         |         |
14+ 0       0.0139      0.03  Q     V   |         |         |         |
14+ 5       0.0141      0.03  Q     V   |         |         |         |
14+10       0.0143      0.03  Q     V   |         |         |         |
14+15       0.0146      0.03  Q     V   |         |         |         |
14+20       0.0148      0.03  Q     V   |         |         |         |
14+25       0.0150      0.03  Q     V   |         |         |         |
14+30       0.0153      0.03  Q     V   |         |         |         |
14+35       0.0155      0.04  Q     V   |         |         |         |
14+40       0.0158      0.04  Q      V  |         |         |         |
14+45       0.0160      0.04  Q      V  |         |         |         |
14+50       0.0163      0.04  Q      V  |         |         |         |
14+55       0.0166      0.04  Q      V  |         |         |         |
15+ 0       0.0169      0.04  Q      V  |         |         |         |
15+ 5       0.0172      0.04  Q      V  |         |         |         |
15+10       0.0175      0.05  Q      V  |         |         |         |
15+15       0.0178      0.05  Q      V  |         |         |         |
15+20       0.0182      0.06  Q       V |         |         |         |
15+25       0.0186      0.06  Q       V |         |         |         |
15+30       0.0189      0.05  Q       V |         |         |         |
15+35       0.0196      0.09  Q       V |         |         |         |
15+40       0.0205      0.15  Q        V|         |         |         |
15+45       0.0222      0.24  Q        V|         |         |         |
15+50       0.0247      0.36  |Q        V         |         |         |
15+55       0.0286      0.58  | Q       | V       |         |         |
16+ 0       0.0354      0.97  |  Q      |    V    |         |         |
16+ 5       0.0539      2.69  |         Q         |  V      |         |
16+10       0.0729      2.76  |         |Q        |         | V       |
16+15       0.0781      0.74  | Q       |         |         |   V     |
16+20       0.0798      0.26  |Q        |         |         |    V    |
16+25       0.0806      0.11  Q         |         |         |    V    |
16+30       0.0811      0.07  Q         |         |         |     V   |
16+35       0.0814      0.05  Q         |         |         |     V   |
16+40       0.0817      0.04  Q         |         |         |     V   |
16+45       0.0820      0.04  Q         |         |         |     V   |
16+50       0.0822      0.04  Q         |         |         |     V   |
16+55       0.0825      0.04  Q         |         |         |     V   |
17+ 0       0.0827      0.03  Q         |         |         |     V   |
17+ 5       0.0829      0.03  Q         |         |         |     V   |
17+10       0.0831      0.03  Q         |         |         |     V   |
17+15       0.0833      0.03  Q         |         |         |      V  |
17+20       0.0835      0.03  Q         |         |         |      V  |
17+25       0.0837      0.03  Q         |         |         |      V  |
17+30       0.0838      0.03  Q         |         |         |      V  |
17+35       0.0840      0.02  Q         |         |         |      V  |
17+40       0.0842      0.02  Q         |         |         |      V  |
17+45       0.0843      0.02  Q         |         |         |      V  |
17+50       0.0845      0.02  Q         |         |         |      V  |
17+55       0.0846      0.02  Q         |         |         |      V  |
18+ 0       0.0848      0.02  Q         |         |         |      V  |
18+ 5       0.0849      0.02  Q         |         |         |      V  |
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   18+10       0.0850      0.02  Q          |          |          |      V  |
   18+15       0.0851      0.02  Q          |          |          |      V  |
   18+20       0.0853      0.02  Q          |          |          |      V  |
   18+25       0.0854      0.02  Q          |          |          |      V  |
   18+30       0.0855      0.02  Q          |          |          |       V |
   18+35       0.0856      0.01  Q          |          |          |       V |
   18+40       0.0857      0.01  Q          |          |          |       V |
   18+45       0.0858      0.01  Q          |          |          |       V |
   18+50       0.0859      0.01  Q          |          |          |       V |
   18+55       0.0860      0.01  Q          |          |          |       V |
   19+ 0       0.0860      0.01  Q          |          |          |       V |
   19+ 5       0.0861      0.01  Q          |          |          |       V |
   19+10       0.0862      0.01  Q          |          |          |       V |
   19+15       0.0863      0.01  Q          |          |          |       V |
   19+20       0.0864      0.01  Q          |          |          |       V |
   19+25       0.0865      0.01  Q          |          |          |       V |
   19+30       0.0866      0.01  Q          |          |          |       V |
   19+35       0.0866      0.01  Q          |          |          |       V |
   19+40       0.0867      0.01  Q          |          |          |       V |
   19+45       0.0868      0.01  Q          |          |          |       V |
   19+50       0.0869      0.01  Q          |          |          |       V |
   19+55       0.0870      0.01  Q          |          |          |       V |
   20+ 0       0.0870      0.01  Q          |          |          |       V |
   20+ 5       0.0871      0.01  Q          |          |          |       V |
   20+10       0.0872      0.01  Q          |          |          |       V |
   20+15       0.0873      0.01  Q          |          |          |       V |
   20+20       0.0873      0.01  Q          |          |          |       V |
   20+25       0.0874      0.01  Q          |          |          |       V |
   20+30       0.0875      0.01  Q          |          |          |       V |
   20+35       0.0876      0.01  Q          |          |          |       V |
   20+40       0.0876      0.01  Q          |          |          |       V |
   20+45       0.0877      0.01  Q          |          |          |       V |
   20+50       0.0878      0.01  Q          |          |          |        V|
   20+55       0.0878      0.01  Q          |          |          |        V|
   21+ 0       0.0879      0.01  Q          |          |          |        V|
   21+ 5       0.0880      0.01  Q          |          |          |        V|
   21+10       0.0880      0.01  Q          |          |          |        V|
   21+15       0.0881      0.01  Q          |          |          |        V|
   21+20       0.0881      0.01  Q          |          |          |        V|
   21+25       0.0882      0.01  Q          |          |          |        V|
   21+30       0.0883      0.01  Q          |          |          |        V|
   21+35       0.0883      0.01  Q          |          |          |        V|
   21+40       0.0884      0.01  Q          |          |          |        V|
   21+45       0.0885      0.01  Q          |          |          |        V|
   21+50       0.0885      0.01  Q          |          |          |        V|
   21+55       0.0886      0.01  Q          |          |          |        V|
   22+ 0       0.0886      0.01  Q          |          |          |        V|
   22+ 5       0.0887      0.01  Q          |          |          |        V|
   22+10       0.0888      0.01  Q          |          |          |        V|
   22+15       0.0888      0.01  Q          |          |          |        V|
   22+20       0.0889      0.01  Q          |          |          |        V|
   22+25       0.0889      0.01  Q          |          |          |        V|
   22+30       0.0890      0.01  Q          |          |          |        V|
   22+35       0.0890      0.01  Q          |          |          |        V|
   22+40       0.0891      0.01  Q          |          |          |        V|
   22+45       0.0891      0.01  Q          |          |          |        V|
   22+50       0.0892      0.01  Q          |          |          |        V|
   22+55       0.0893      0.01  Q          |          |          |        V|
   23+ 0       0.0893      0.01  Q          |          |          |        V|
   23+ 5       0.0894      0.01  Q          |          |          |        V|
   23+10       0.0894      0.01  Q          |          |          |        V|
   23+15       0.0895      0.01  Q          |          |          |        V|
   23+20       0.0895      0.01  Q          |          |          |        V|
   23+25       0.0896      0.01  Q          |          |          |        V|
   23+30       0.0896      0.01  Q          |          |          |        V|
   23+35       0.0897      0.01  Q          |          |          |        V|
   23+40       0.0897      0.01  Q          |          |          |        V|
   23+45       0.0898      0.01  Q          |          |          |        V|
   23+50       0.0898      0.01  Q          |          |          |        V|
   23+55       0.0899      0.01  Q          |          |          |        V|
   24+ 0       0.0899      0.01  Q          |          |          |        V|
   24+ 5       0.0899      0.00  Q          |          |          |        V|
   24+10       0.0900      0.00  Q          |          |          |        V|
   24+15       0.0900      0.00  Q          |          |          |        V|
----------------------------------------------------------------------
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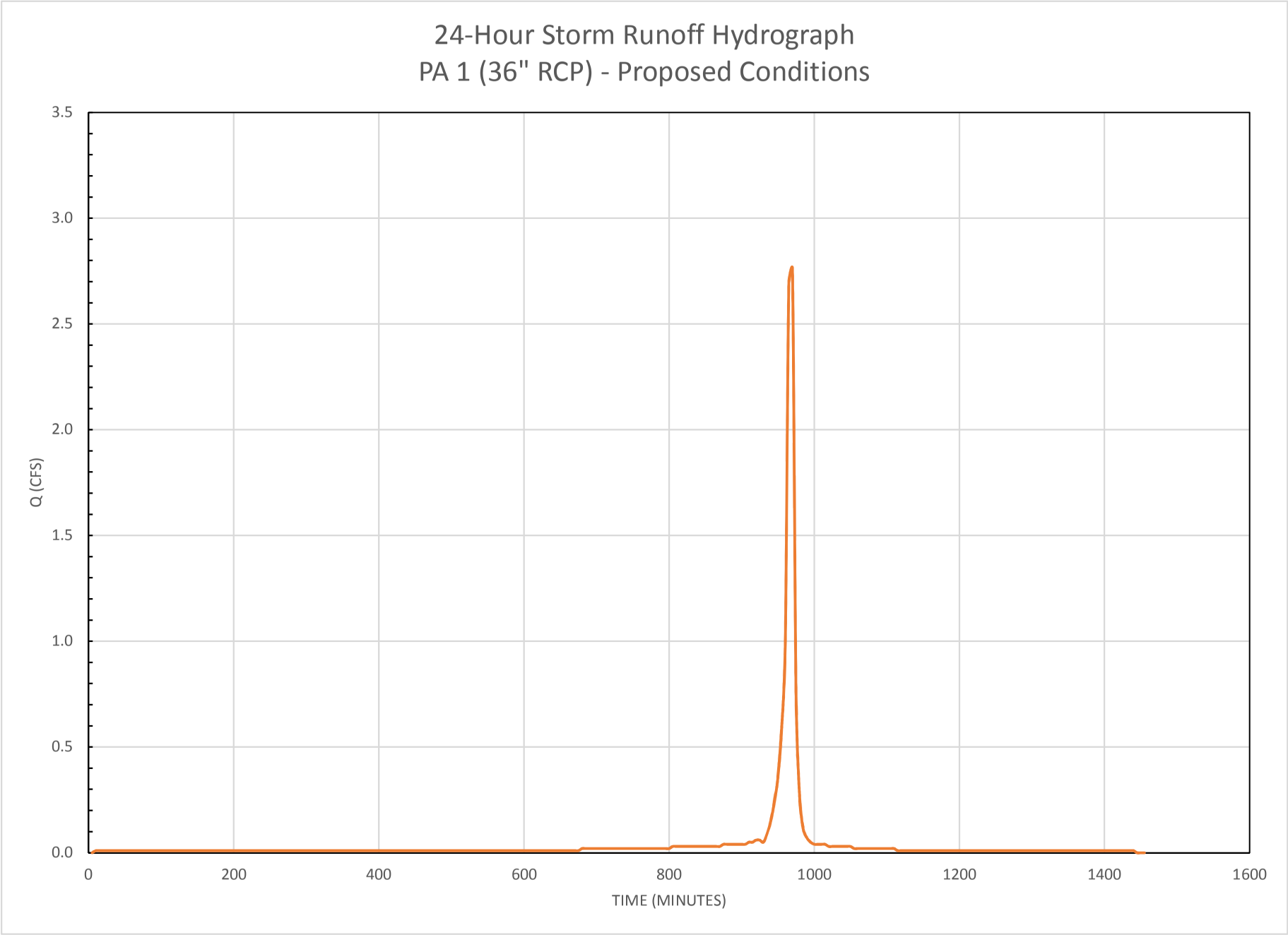
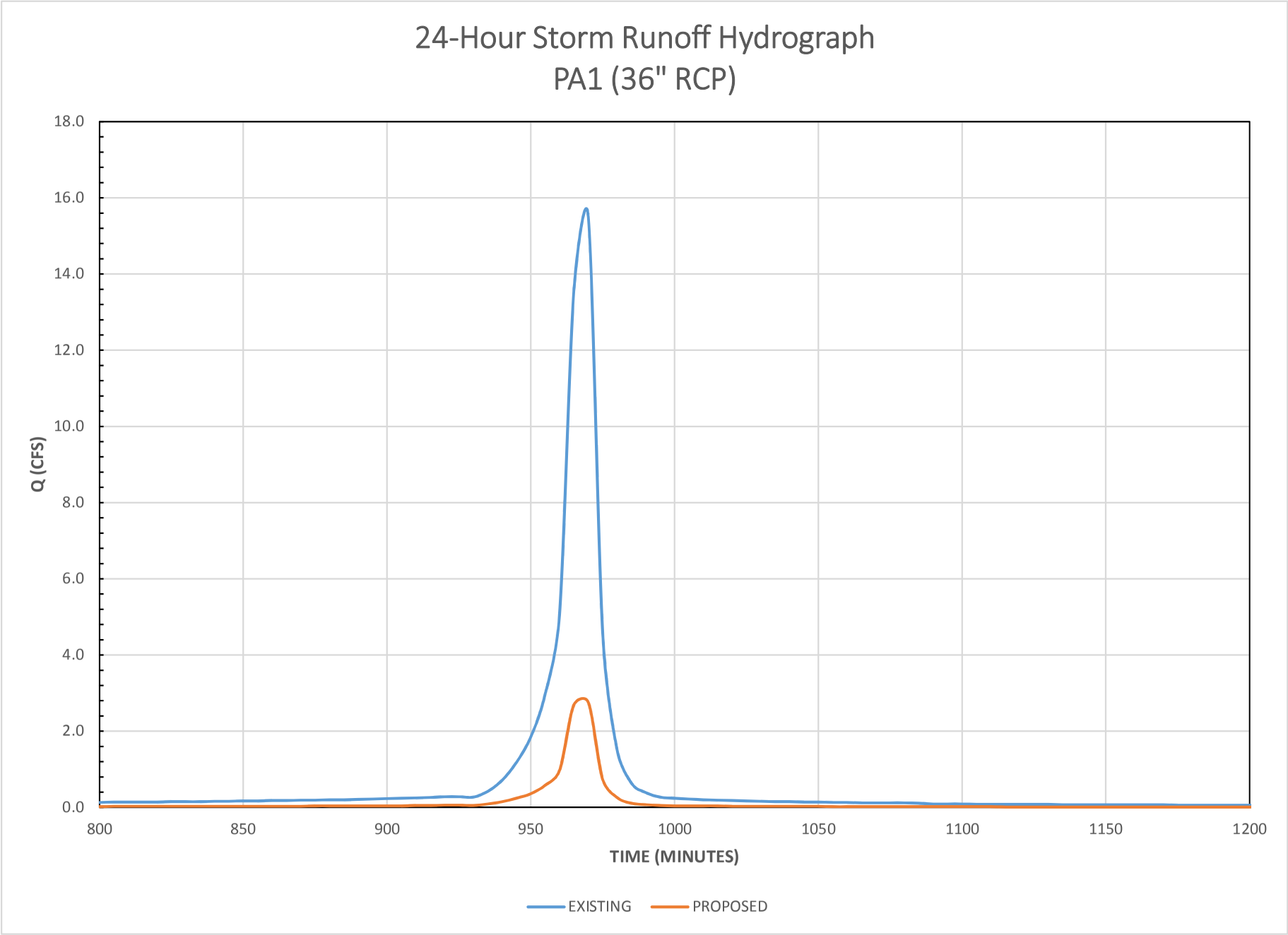

24-Hour Storm Runoff Hydrograph
PA 1 (36" RCP) - Proposed Conditions
Q (CFS)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
200
400
600
800
1000
1200
1400
1600
TIME (MINUTES)


24-Hour Storm Runoff Hydrograph
PA1 (36" RCP)
Q (CFS)
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
800
850
900
950
1000
1050
1100
1150
1200
TIME (MINUTES)
EXISTING
PROPOSED

Planning Area 2 (North Site)

```
                    Orange County Rational Hydrology Program

                (Hydrology Manual Date(s) October 1986 & November 1996)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2004 Version 8.0
        Rational Hydrology Study, Date: 07/20/15  File Name: CVPRRAT.roc
----------------------------------------------------------------------
CIELO VISTA PROJECT
PROPOSED CONDITION
2-YEAR 24-HOUR STORM EVENT
BY FUSCOE ENGINEERING
----------------------------------------------------------------------


Program License Serial Number 6049

----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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Rational hydrology study storm event year is     2.0

Decimal fraction of study above 2000 ft., 600M  =     0.0000
English Units Used for input data


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.710
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.290
SCS curve number for soil(AMC 2)  = 61.51
Pervious ratio(Ap) = 0.6000  Max loss rate(Fp)=     0.271(In/Hr)
Max Catchment Loss (Fm) =     0.163(In/Hr)
Initial subarea data:
Initial area flow distance =   222.220(Ft.)
Top (of initial area) elevation =   678.000(Ft.)
Bottom (of initial area) elevation =   675.000(Ft.)
Difference in elevation =     3.000(Ft.)
Slope =    0.01350  s(%)=       1.35
TC = k(0.412)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.463 min.
Rainfall intensity =      1.673(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.813
Subarea runoff =      0.598(CFS)
Total initial stream area =        0.440(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   675.000(Ft.)
End of street segment elevation =   647.200(Ft.)
Length of street segment  =   503.480(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
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 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      4.405(CFS)
Depth of flow =   0.251(Ft.), Average velocity =   4.294(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   6.215(Ft.)
Flow velocity =   4.29(Ft/s)
Travel time =    1.95 min.     TC =   10.42  min.
 Adding area flow to street
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.660
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.340
SCS curve number for soil(AMC 2)  = 62.46
Pervious ratio(Ap) = 0.6000  Max loss rate(Fp)=     0.266(In/Hr)
Max Catchment Loss (Fm) =     0.160(In/Hr)
Rainfall intensity =      1.485(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.803
Subarea runoff =      7.466(CFS) for    6.320(Ac.)
Total runoff =      8.065(CFS)       Total area =        6.76(Ac.)
Area averaged Fm value =    0.160(In/Hr)
Street flow at end of street =      8.065(CFS)
Half street flow at end of street =      4.032(CFS)
Depth of flow =   0.294(Ft.), Average velocity =   4.863(Ft/s)
Flow width (from curb towards crown)=   8.382(Ft.)


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Process from Point/Station      203.000 to Point/Station      206.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   641.200(Ft.)
Downstream point/station elevation =   622.000(Ft.)
Pipe length  =   218.79(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.065(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     8.065(CFS)
Normal flow depth in pipe =    5.62(In.)
Flow top width inside pipe =   20.33(In.)
Critical Depth =   12.13(In.)
Pipe flow velocity =     14.40(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =    10.67 min.


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Process from Point/Station      203.000 to Point/Station      206.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      6.760(Ac.)
Runoff from this stream =      8.065(CFS)
Time of concentration =   10.67 min.
Rainfall intensity =     1.465(In/Hr)
Area averaged loss rate (Fm) =    0.1598(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      205.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.850
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.150
SCS curve number for soil(AMC 2)  = 79.65
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.285(In/Hr)
Max Catchment Loss (Fm) =     0.285(In/Hr)
Initial subarea data:
Initial area flow distance =   249.120(Ft.)
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Top (of initial area) elevation =   679.000(Ft.)
Bottom (of initial area) elevation =   650.000(Ft.)
Difference in elevation =    29.000(Ft.)
Slope =    0.11641  s(%)=      11.64
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.337 min.
Rainfall intensity =      1.816(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.759
Subarea runoff =      0.289(CFS)
Total initial stream area =        0.210(Ac.)


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Process from Point/Station      205.000 to Point/Station      206.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   648.200(Ft.)
Downstream point/station elevation =   622.000(Ft.)
Pipe length  =   729.39(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.289(CFS)
Given pipe size =     48.00(In.)
Calculated individual pipe flow  =     0.289(CFS)
Normal flow depth in pipe =    1.19(In.)
Flow top width inside pipe =   14.91(In.)
Critical depth could not be calculated.
Pipe flow velocity =      3.51(Ft/s)
Travel time through pipe =    3.46 min.
Time of concentration (TC) =    10.80 min.


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Process from Point/Station      205.000 to Point/Station      206.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 78.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.300(In/Hr)
Max Catchment Loss (Fm) =     0.300(In/Hr)
Time of concentration =    10.80 min.
Rainfall intensity =      1.455(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.716
Subarea runoff =      0.701(CFS) for    0.740(Ac.)
Total runoff =      0.990(CFS)       Total area =        0.95(Ac.)
Area averaged Fm value =    0.297(In/Hr)


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Process from Point/Station      205.000 to Point/Station      206.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.950(Ac.)
Runoff from this stream =      0.990(CFS)
Time of concentration =   10.80 min.
Rainfall intensity =     1.455(In/Hr)
Area averaged loss rate (Fm) =    0.2967(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1      6.76     8.065     10.67    0.160      1.465
2      0.95     0.990     10.80    0.297      1.455
Qmax(1) =
          1.000 *    1.000 *     8.065) +
          1.009 *    0.988 *     0.990) + =       9.052
```

```
Qmax(2) =
          0.992 *    1.000 *     8.065) +
          1.000 *    1.000 *     0.990) + =       8.993

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.065       0.990
Maximum flow rates at confluence using above data:
        9.052        8.993
Area of streams before confluence:
        6.760        0.950
Effective area values after confluence:
        7.699        7.710
Results of confluence:
Total flow rate =      9.052(CFS)
Time of concentration =    10.671 min.
Effective stream area after confluence =      7.699(Ac.)
Study area average Pervious fraction(Ap) =  0.649
Study area average soil loss rate(Fm) =    0.177(In/Hr)
Study area total (this main stream) =       7.71(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      206.000 to Point/Station      207.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   622.000(Ft.)
Downstream point/station elevation =   612.000(Ft.)
Pipe length  =   203.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.052(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     9.052(CFS)
Normal flow depth in pipe =    8.65(In.)
Flow top width inside pipe =   14.82(In.)
Critical Depth =   13.89(In.)
Pipe flow velocity =     12.36(Ft/s)
Travel time through pipe =    0.27 min.
Time of concentration (TC) =    10.94 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      206.000 to Point/Station      207.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 78.00
Pervious ratio(Ap) = 1.0000  Max loss rate(Fp)=     0.300(In/Hr)
Max Catchment Loss (Fm) =     0.300(In/Hr)
Time of concentration =    10.94 min.
Rainfall intensity =      1.444(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.785
Subarea runoff =      0.315(CFS) for    0.570(Ac.)
Total runoff =      9.367(CFS)       Total area =        8.27(Ac.)
Area averaged Fm value =    0.185(In/Hr)
End of computations, total study area =            8.28 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.673
Area averaged SCS curve number (AMC 2) =  65.3
```

U n i t H y d r o g r a p h A n a l y s i s

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Study date 07/20/15 File Name CVPRUNIT2.out

++

Orange County Unit Hydrograph Hydrology Method
Manual Date(s) - October 1986, November 1996

Program License Serial Number 6049

CIELO VISTA PROJECT
PROPOSED CONDITION
2-YEAR 24-HOUR STORM EVENT
BY FUSCOE ENGINEERING

Storm Event Year = 2

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used
++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	Area (Ac.)	Area Fraction	Soil Group	Fp (In/Hr)	Ap (dec.)	Fm (In/Hr)
56.0	6.0	0.72	B	0.300	0.600	0.180
75.0	2.3	0.28	D	0.200	0.600	0.120

Area-averaged adjusted loss rate Fm (In/Hr) = 0.163

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
3.57	0.432	56.0	36.0	17.78	0.068
2.38	0.288	98.0	98.0	0.20	0.890
1.39	0.168	75.0	57.0	7.54	0.018
0.93	0.112	98.0	98.0	0.20	0.890

Area-averaged catchment yield fraction, Y = 0.388
Area-averaged low loss fraction, Yb = 0.612
++
User entry of time of concentration = 0.180 (hours)
Watershed area = 8.27(Ac.)
Catchment Lag time = 0.144 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 57.8704
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.163(In/Hr)
Average low loss rate fraction (Yb) = 0.612 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall = 0.190(In)
Computed peak 30-minute rainfall = 0.400(In)
Specified peak 1-hour rainfall = 0.530(In)
Computed peak 3-hour rainfall = 0.890(In)
Specified peak 6-hour rainfall = 1.220(In)
Specified peak 24-hour rainfall = 2.050(In)

Rainfall depth area reduction factors:
Using a total area of 8.27(Ac.) (Ref: fig. E-4)

```
5-minute factor = 1.000     Adjusted rainfall =  0.190(In)
30-minute factor = 1.000    Adjusted rainfall =  0.400(In)
1-hour factor = 1.000       Adjusted rainfall =  0.530(In)
3-hour factor = 1.000       Adjusted rainfall =  0.890(In)
6-hour factor = 1.000       Adjusted rainfall =  1.220(In)
24-hour factor = 1.000 Adjusted rainfall =  2.050(In)
----------------------------------------------------------------------

                      U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
----------------------------------------------------------------------
               (K =       100.02 (CFS))

  1                5.297                   5.298
  2               34.628                  29.336
  3               69.724                  35.101
  4               82.516                  12.795
  5               89.900                   7.385
  6               94.486                   4.587
  7               97.148                   2.662
  8               98.305                   1.157
  9               98.904                   0.599
 10               99.313                   0.409
 11               99.715                   0.402
 12               99.928                   0.213
 13              100.000                   0.072
----------------------------------------------------------------------
Peak Unit   Adjusted mass rainfall  Unit rainfall
Number              (In)                (In)
  1             0.1899              0.1899
  2             0.2533              0.0634
  3             0.2998              0.0465
  4             0.3379              0.0381
  5             0.3707              0.0328
  6             0.3998              0.0292
  7             0.4257              0.0258
  8             0.4494              0.0237
  9             0.4714              0.0220
 10             0.4920              0.0206
 11             0.5114              0.0194
 12             0.5298              0.0184
 13             0.5502              0.0204
 14             0.5698              0.0196
 15             0.5887              0.0189
 16             0.6069              0.0182
 17             0.6245              0.0176
 18             0.6416              0.0171
 19             0.6582              0.0166
 20             0.6743              0.0161
 21             0.6900              0.0157
 22             0.7053              0.0153
 23             0.7203              0.0150
 24             0.7349              0.0146
 25             0.7492              0.0143
 26             0.7632              0.0140
 27             0.7769              0.0137
 28             0.7904              0.0135
 29             0.8036              0.0132
 30             0.8166              0.0130
 31             0.8293              0.0127
 32             0.8418              0.0125
 33             0.8541              0.0123
 34             0.8663              0.0121
 35             0.8782              0.0119
 36             0.8900              0.0118
 37             0.9011              0.0112
 38             0.9121              0.0110
 39             0.9230              0.0108
 40             0.9337              0.0107
 41             0.9442              0.0105
```

42	0.9546	0.0104
43	0.9649	0.0103
44	0.9750	0.0101
45	0.9851	0.0100
46	0.9950	0.0099
47	1.0048	0.0098
48	1.0144	0.0097
49	1.0240	0.0096
50	1.0334	0.0095
51	1.0428	0.0094
52	1.0521	0.0093
53	1.0612	0.0092
54	1.0703	0.0091
55	1.0793	0.0090
56	1.0881	0.0089
57	1.0969	0.0088
58	1.1057	0.0087
59	1.1143	0.0086
60	1.1228	0.0086
61	1.1313	0.0085
62	1.1397	0.0084
63	1.1480	0.0083
64	1.1563	0.0083
65	1.1645	0.0082
66	1.1726	0.0081
67	1.1807	0.0081
68	1.1886	0.0080
69	1.1966	0.0079
70	1.2044	0.0079
71	1.2122	0.0078
72	1.2200	0.0077
73	1.2263	0.0063
74	1.2325	0.0063
75	1.2388	0.0062
76	1.2449	0.0062
77	1.2510	0.0061
78	1.2571	0.0061
79	1.2631	0.0060
80	1.2691	0.0060
81	1.2750	0.0059
82	1.2808	0.0059
83	1.2867	0.0058
84	1.2924	0.0058
85	1.2982	0.0057
86	1.3039	0.0057
87	1.3095	0.0057
88	1.3152	0.0056
89	1.3207	0.0056
90	1.3263	0.0055
91	1.3318	0.0055
92	1.3372	0.0055
93	1.3426	0.0054
94	1.3480	0.0054
95	1.3534	0.0054
96	1.3587	0.0053
97	1.3640	0.0053
98	1.3692	0.0052
99	1.3744	0.0052
100	1.3796	0.0052
101	1.3848	0.0051
102	1.3899	0.0051
103	1.3950	0.0051
104	1.4000	0.0051
105	1.4051	0.0050
106	1.4101	0.0050
107	1.4150	0.0050
108	1.4200	0.0049
109	1.4249	0.0049
110	1.4297	0.0049
111	1.4346	0.0049
112	1.4394	0.0048
113	1.4442	0.0048
114	1.4490	0.0048

115	1.4537	0.0047
116	1.4585	0.0047
117	1.4631	0.0047
118	1.4678	0.0047
119	1.4725	0.0046
120	1.4771	0.0046
121	1.4817	0.0046
122	1.4863	0.0046
123	1.4908	0.0045
124	1.4953	0.0045
125	1.4998	0.0045
126	1.5043	0.0045
127	1.5088	0.0045
128	1.5132	0.0044
129	1.5176	0.0044
130	1.5220	0.0044
131	1.5264	0.0044
132	1.5307	0.0044
133	1.5351	0.0043
134	1.5394	0.0043
135	1.5437	0.0043
136	1.5479	0.0043
137	1.5522	0.0043
138	1.5564	0.0042
139	1.5606	0.0042
140	1.5648	0.0042
141	1.5690	0.0042
142	1.5732	0.0042
143	1.5773	0.0041
144	1.5814	0.0041
145	1.5855	0.0041
146	1.5896	0.0041
147	1.5937	0.0041
148	1.5977	0.0041
149	1.6018	0.0040
150	1.6058	0.0040
151	1.6098	0.0040
152	1.6138	0.0040
153	1.6177	0.0040
154	1.6217	0.0040
155	1.6256	0.0039
156	1.6295	0.0039
157	1.6334	0.0039
158	1.6373	0.0039
159	1.6412	0.0039
160	1.6451	0.0039
161	1.6489	0.0038
162	1.6527	0.0038
163	1.6565	0.0038
164	1.6603	0.0038
165	1.6641	0.0038
166	1.6679	0.0038
167	1.6716	0.0038
168	1.6754	0.0037
169	1.6791	0.0037
170	1.6828	0.0037
171	1.6865	0.0037
172	1.6902	0.0037
173	1.6939	0.0037
174	1.6975	0.0037
175	1.7012	0.0036
176	1.7048	0.0036
177	1.7084	0.0036
178	1.7120	0.0036
179	1.7156	0.0036
180	1.7192	0.0036
181	1.7228	0.0036
182	1.7263	0.0036
183	1.7299	0.0035
184	1.7334	0.0035
185	1.7369	0.0035
186	1.7405	0.0035
187	1.7439	0.0035

188	1.7474	0.0035
189	1.7509	0.0035
190	1.7544	0.0035
191	1.7578	0.0035
192	1.7613	0.0034
193	1.7647	0.0034
194	1.7681	0.0034
195	1.7715	0.0034
196	1.7749	0.0034
197	1.7783	0.0034
198	1.7817	0.0034
199	1.7850	0.0034
200	1.7884	0.0034
201	1.7917	0.0033
202	1.7951	0.0033
203	1.7984	0.0033
204	1.8017	0.0033
205	1.8050	0.0033
206	1.8083	0.0033
207	1.8116	0.0033
208	1.8148	0.0033
209	1.8181	0.0033
210	1.8214	0.0033
211	1.8246	0.0032
212	1.8278	0.0032
213	1.8311	0.0032
214	1.8343	0.0032
215	1.8375	0.0032
216	1.8407	0.0032
217	1.8438	0.0032
218	1.8470	0.0032
219	1.8502	0.0032
220	1.8534	0.0032
221	1.8565	0.0031
222	1.8596	0.0031
223	1.8628	0.0031
224	1.8659	0.0031
225	1.8690	0.0031
226	1.8721	0.0031
227	1.8752	0.0031
228	1.8783	0.0031
229	1.8814	0.0031
230	1.8845	0.0031
231	1.8875	0.0031
232	1.8906	0.0031
233	1.8936	0.0030
234	1.8967	0.0030
235	1.8997	0.0030
236	1.9027	0.0030
237	1.9057	0.0030
238	1.9087	0.0030
239	1.9117	0.0030
240	1.9147	0.0030
241	1.9177	0.0030
242	1.9207	0.0030
243	1.9236	0.0030
244	1.9266	0.0030
245	1.9296	0.0030
246	1.9325	0.0029
247	1.9354	0.0029
248	1.9384	0.0029
249	1.9413	0.0029
250	1.9442	0.0029
251	1.9471	0.0029
252	1.9500	0.0029
253	1.9529	0.0029
254	1.9558	0.0029
255	1.9587	0.0029
256	1.9615	0.0029
257	1.9644	0.0029
258	1.9673	0.0029
259	1.9701	0.0029
260	1.9730	0.0028

261	1.9758	0.0028
262	1.9786	0.0028
263	1.9815	0.0028
264	1.9843	0.0028
265	1.9871	0.0028
266	1.9899	0.0028
267	1.9927	0.0028
268	1.9955	0.0028
269	1.9983	0.0028
270	2.0010	0.0028
271	2.0038	0.0028
272	2.0066	0.0028
273	2.0093	0.0028
274	2.0121	0.0028
275	2.0148	0.0027
276	2.0176	0.0027
277	2.0203	0.0027
278	2.0230	0.0027
279	2.0258	0.0027
280	2.0285	0.0027
281	2.0312	0.0027
282	2.0339	0.0027
283	2.0366	0.0027
284	2.0393	0.0027
285	2.0420	0.0027
286	2.0446	0.0027
287	2.0473	0.0027
288	2.0500	0.0027

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0027	0.0016	0.0010
2	0.0027	0.0016	0.0010
3	0.0027	0.0016	0.0010
4	0.0027	0.0016	0.0010
5	0.0027	0.0017	0.0010
6	0.0027	0.0017	0.0011
7	0.0027	0.0017	0.0011
8	0.0027	0.0017	0.0011
9	0.0027	0.0017	0.0011
10	0.0027	0.0017	0.0011
11	0.0028	0.0017	0.0011
12	0.0028	0.0017	0.0011
13	0.0028	0.0017	0.0011
14	0.0028	0.0017	0.0011
15	0.0028	0.0017	0.0011
16	0.0028	0.0017	0.0011
17	0.0028	0.0017	0.0011
18	0.0028	0.0017	0.0011
19	0.0028	0.0017	0.0011
20	0.0028	0.0017	0.0011
21	0.0029	0.0017	0.0011
22	0.0029	0.0018	0.0011
23	0.0029	0.0018	0.0011
24	0.0029	0.0018	0.0011
25	0.0029	0.0018	0.0011
26	0.0029	0.0018	0.0011
27	0.0029	0.0018	0.0011
28	0.0029	0.0018	0.0011
29	0.0029	0.0018	0.0011
30	0.0030	0.0018	0.0011
31	0.0030	0.0018	0.0012
32	0.0030	0.0018	0.0012
33	0.0030	0.0018	0.0012
34	0.0030	0.0018	0.0012
35	0.0030	0.0018	0.0012
36	0.0030	0.0018	0.0012
37	0.0030	0.0019	0.0012
38	0.0030	0.0019	0.0012
39	0.0031	0.0019	0.0012
40	0.0031	0.0019	0.0012

41	0.0031	0.0019	0.0012
42	0.0031	0.0019	0.0012
43	0.0031	0.0019	0.0012
44	0.0031	0.0019	0.0012
45	0.0031	0.0019	0.0012
46	0.0031	0.0019	0.0012
47	0.0032	0.0019	0.0012
48	0.0032	0.0019	0.0012
49	0.0032	0.0020	0.0012
50	0.0032	0.0020	0.0012
51	0.0032	0.0020	0.0013
52	0.0032	0.0020	0.0013
53	0.0033	0.0020	0.0013
54	0.0033	0.0020	0.0013
55	0.0033	0.0020	0.0013
56	0.0033	0.0020	0.0013
57	0.0033	0.0020	0.0013
58	0.0033	0.0020	0.0013
59	0.0033	0.0020	0.0013
60	0.0034	0.0021	0.0013
61	0.0034	0.0021	0.0013
62	0.0034	0.0021	0.0013
63	0.0034	0.0021	0.0013
64	0.0034	0.0021	0.0013
65	0.0034	0.0021	0.0013
66	0.0035	0.0021	0.0013
67	0.0035	0.0021	0.0013
68	0.0035	0.0021	0.0014
69	0.0035	0.0021	0.0014
70	0.0035	0.0022	0.0014
71	0.0035	0.0022	0.0014
72	0.0036	0.0022	0.0014
73	0.0036	0.0022	0.0014
74	0.0036	0.0022	0.0014
75	0.0036	0.0022	0.0014
76	0.0036	0.0022	0.0014
77	0.0037	0.0022	0.0014
78	0.0037	0.0022	0.0014
79	0.0037	0.0023	0.0014
80	0.0037	0.0023	0.0014
81	0.0037	0.0023	0.0015
82	0.0038	0.0023	0.0015
83	0.0038	0.0023	0.0015
84	0.0038	0.0023	0.0015
85	0.0038	0.0023	0.0015
86	0.0038	0.0024	0.0015
87	0.0039	0.0024	0.0015
88	0.0039	0.0024	0.0015
89	0.0039	0.0024	0.0015
90	0.0039	0.0024	0.0015
91	0.0040	0.0024	0.0015
92	0.0040	0.0024	0.0015
93	0.0040	0.0025	0.0016
94	0.0040	0.0025	0.0016
95	0.0041	0.0025	0.0016
96	0.0041	0.0025	0.0016
97	0.0041	0.0025	0.0016
98	0.0041	0.0025	0.0016
99	0.0042	0.0026	0.0016
100	0.0042	0.0026	0.0016
101	0.0042	0.0026	0.0016
102	0.0043	0.0026	0.0017
103	0.0043	0.0026	0.0017
104	0.0043	0.0026	0.0017
105	0.0044	0.0027	0.0017
106	0.0044	0.0027	0.0017
107	0.0044	0.0027	0.0017
108	0.0044	0.0027	0.0017
109	0.0045	0.0027	0.0017
110	0.0045	0.0028	0.0017
111	0.0045	0.0028	0.0018
112	0.0046	0.0028	0.0018
113	0.0046	0.0028	0.0018

114	0.0046	0.0028	0.0018
115	0.0047	0.0029	0.0018
116	0.0047	0.0029	0.0018
117	0.0048	0.0029	0.0019
118	0.0048	0.0029	0.0019
119	0.0049	0.0030	0.0019
120	0.0049	0.0030	0.0019
121	0.0049	0.0030	0.0019
122	0.0050	0.0030	0.0019
123	0.0050	0.0031	0.0020
124	0.0051	0.0031	0.0020
125	0.0051	0.0031	0.0020
126	0.0051	0.0032	0.0020
127	0.0052	0.0032	0.0020
128	0.0052	0.0032	0.0020
129	0.0053	0.0033	0.0021
130	0.0054	0.0033	0.0021
131	0.0054	0.0033	0.0021
132	0.0055	0.0033	0.0021
133	0.0055	0.0034	0.0021
134	0.0056	0.0034	0.0022
135	0.0057	0.0035	0.0022
136	0.0057	0.0035	0.0022
137	0.0058	0.0035	0.0022
138	0.0058	0.0036	0.0023
139	0.0059	0.0036	0.0023
140	0.0060	0.0036	0.0023
141	0.0061	0.0037	0.0024
142	0.0061	0.0037	0.0024
143	0.0062	0.0038	0.0024
144	0.0063	0.0038	0.0024
145	0.0077	0.0047	0.0030
146	0.0078	0.0048	0.0030
147	0.0079	0.0048	0.0031
148	0.0080	0.0049	0.0031
149	0.0081	0.0050	0.0032
150	0.0082	0.0050	0.0032
151	0.0083	0.0051	0.0032
152	0.0084	0.0051	0.0033
153	0.0086	0.0052	0.0033
154	0.0086	0.0053	0.0034
155	0.0088	0.0054	0.0034
156	0.0089	0.0054	0.0034
157	0.0091	0.0055	0.0035
158	0.0092	0.0056	0.0036
159	0.0094	0.0057	0.0036
160	0.0095	0.0058	0.0037
161	0.0097	0.0059	0.0038
162	0.0098	0.0060	0.0038
163	0.0100	0.0061	0.0039
164	0.0101	0.0062	0.0039
165	0.0104	0.0064	0.0040
166	0.0105	0.0065	0.0041
167	0.0108	0.0066	0.0042
168	0.0110	0.0067	0.0043
169	0.0118	0.0072	0.0046
170	0.0119	0.0073	0.0046
171	0.0123	0.0075	0.0048
172	0.0125	0.0077	0.0049
173	0.0130	0.0079	0.0050
174	0.0132	0.0081	0.0051
175	0.0137	0.0084	0.0053
176	0.0140	0.0086	0.0054
177	0.0146	0.0089	0.0057
178	0.0150	0.0092	0.0058
179	0.0157	0.0096	0.0061
180	0.0161	0.0099	0.0063
181	0.0171	0.0105	0.0066
182	0.0176	0.0108	0.0068
183	0.0189	0.0115	0.0073
184	0.0196	0.0120	0.0076
185	0.0184	0.0113	0.0071
186	0.0194	0.0119	0.0075

187	0.0220	0.0135	0.0085
188	0.0237	0.0136	0.0101
189	0.0292	0.0136	0.0156
190	0.0328	0.0136	0.0192
191	0.0465	0.0136	0.0329
192	0.0634	0.0136	0.0498
193	0.1899	0.0136	0.1763
194	0.0381	0.0136	0.0245
195	0.0258	0.0136	0.0122
196	0.0206	0.0126	0.0080
197	0.0204	0.0125	0.0079
198	0.0182	0.0111	0.0071
199	0.0166	0.0101	0.0064
200	0.0153	0.0094	0.0059
201	0.0143	0.0087	0.0056
202	0.0135	0.0082	0.0052
203	0.0127	0.0078	0.0049
204	0.0121	0.0074	0.0047
205	0.0112	0.0068	0.0043
206	0.0107	0.0065	0.0042
207	0.0103	0.0063	0.0040
208	0.0099	0.0061	0.0038
209	0.0096	0.0059	0.0037
210	0.0093	0.0057	0.0036
211	0.0090	0.0055	0.0035
212	0.0087	0.0053	0.0034
213	0.0085	0.0052	0.0033
214	0.0083	0.0051	0.0032
215	0.0081	0.0049	0.0031
216	0.0079	0.0048	0.0031
217	0.0063	0.0039	0.0025
218	0.0062	0.0038	0.0024
219	0.0060	0.0037	0.0023
220	0.0059	0.0036	0.0023
221	0.0057	0.0035	0.0022
222	0.0056	0.0034	0.0022
223	0.0055	0.0034	0.0021
224	0.0054	0.0033	0.0021
225	0.0053	0.0032	0.0021
226	0.0052	0.0032	0.0020
227	0.0051	0.0031	0.0020
228	0.0050	0.0031	0.0019
229	0.0049	0.0030	0.0019
230	0.0048	0.0030	0.0019
231	0.0047	0.0029	0.0018
232	0.0047	0.0029	0.0018
233	0.0046	0.0028	0.0018
234	0.0045	0.0028	0.0018
235	0.0045	0.0027	0.0017
236	0.0044	0.0027	0.0017
237	0.0043	0.0026	0.0017
238	0.0043	0.0026	0.0017
239	0.0042	0.0026	0.0016
240	0.0042	0.0025	0.0016
241	0.0041	0.0025	0.0016
242	0.0041	0.0025	0.0016
243	0.0040	0.0024	0.0016
244	0.0040	0.0024	0.0015
245	0.0039	0.0024	0.0015
246	0.0039	0.0024	0.0015
247	0.0038	0.0023	0.0015
248	0.0038	0.0023	0.0015
249	0.0037	0.0023	0.0014
250	0.0037	0.0023	0.0014
251	0.0036	0.0022	0.0014
252	0.0036	0.0022	0.0014
253	0.0036	0.0022	0.0014
254	0.0035	0.0022	0.0014
255	0.0035	0.0021	0.0014
256	0.0035	0.0021	0.0013
257	0.0034	0.0021	0.0013
258	0.0034	0.0021	0.0013
259	0.0034	0.0021	0.0013

260	0.0033	0.0020	0.0013
261	0.0033	0.0020	0.0013
262	0.0033	0.0020	0.0013
263	0.0032	0.0020	0.0013
264	0.0032	0.0020	0.0012
265	0.0032	0.0019	0.0012
266	0.0032	0.0019	0.0012
267	0.0031	0.0019	0.0012
268	0.0031	0.0019	0.0012
269	0.0031	0.0019	0.0012
270	0.0031	0.0019	0.0012
271	0.0030	0.0019	0.0012
272	0.0030	0.0018	0.0012
273	0.0030	0.0018	0.0012
274	0.0030	0.0018	0.0011
275	0.0029	0.0018	0.0011
276	0.0029	0.0018	0.0011
277	0.0029	0.0018	0.0011
278	0.0029	0.0018	0.0011
279	0.0029	0.0017	0.0011
280	0.0028	0.0017	0.0011
281	0.0028	0.0017	0.0011
282	0.0028	0.0017	0.0011
283	0.0028	0.0017	0.0011
284	0.0028	0.0017	0.0011
285	0.0027	0.0017	0.0011
286	0.0027	0.0017	0.0011
287	0.0027	0.0017	0.0010
288	0.0027	0.0016	0.0010

Total soil rain loss = 1.09(In)
Total effective rainfall = 0.96(In)
Peak flow rate in flood hydrograph = 8.01(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

```
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-------------------------------------------------------------------------
  0+ 5       0.0000      0.01  Q         |         |         |         |
  0+10       0.0003      0.04  Q         |         |         |         |
  0+15       0.0008      0.07  Q         |         |         |         |
  0+20       0.0014      0.09  Q         |         |         |         |
  0+25       0.0020      0.09  Q         |         |         |         |
  0+30       0.0027      0.10  Q         |         |         |         |
  0+35       0.0034      0.10  Q         |         |         |         |
  0+40       0.0041      0.10  Q         |         |         |         |
  0+45       0.0048      0.10  Q         |         |         |         |
  0+50       0.0056      0.11  Q         |         |         |         |
  0+55       0.0063      0.11  Q         |         |         |         |
  1+ 0       0.0070      0.11  Q         |         |         |         |
  1+ 5       0.0078      0.11  Q         |         |         |         |
  1+10       0.0085      0.11  Q         |         |         |         |
  1+15       0.0092      0.11  Q         |         |         |         |
  1+20       0.0100      0.11  Q         |         |         |         |
  1+25       0.0107      0.11  Q         |         |         |         |
  1+30       0.0115      0.11  Q         |         |         |         |
  1+35       0.0122      0.11  Q         |         |         |         |
  1+40       0.0130      0.11  Q         |         |         |         |
  1+45       0.0137      0.11  Q         |         |         |         |
  1+50       0.0145      0.11  Q         |         |         |         |
  1+55       0.0153      0.11  Q         |         |         |         |
  2+ 0       0.0160      0.11  Q         |         |         |         |
  2+ 5       0.0168      0.11  QV        |         |         |         |
  2+10       0.0176      0.11  QV        |         |         |         |
  2+15       0.0183      0.11  QV        |         |         |         |
  2+20       0.0191      0.11  QV        |         |         |         |
  2+25       0.0199      0.11  QV        |         |         |         |
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2+30       0.0207      0.11  QV         |          |          |          |
2+35       0.0215      0.11  QV         |          |          |          |
2+40       0.0223      0.11  QV         |          |          |          |
2+45       0.0231      0.12  QV         |          |          |          |
2+50       0.0238      0.12  QV         |          |          |          |
2+55       0.0246      0.12  QV         |          |          |          |
3+ 0       0.0254      0.12  QV         |          |          |          |
3+ 5       0.0263      0.12  QV         |          |          |          |
3+10       0.0271      0.12  QV         |          |          |          |
3+15       0.0279      0.12  QV         |          |          |          |
3+20       0.0287      0.12  QV         |          |          |          |
3+25       0.0295      0.12  QV         |          |          |          |
3+30       0.0303      0.12  QV         |          |          |          |
3+35       0.0311      0.12  QV         |          |          |          |
3+40       0.0320      0.12  QV         |          |          |          |
3+45       0.0328      0.12  QV         |          |          |          |
3+50       0.0336      0.12  Q V        |          |          |          |
3+55       0.0345      0.12  Q V        |          |          |          |
4+ 0       0.0353      0.12  Q V        |          |          |          |
4+ 5       0.0362      0.12  Q V        |          |          |          |
4+10       0.0370      0.12  Q V        |          |          |          |
4+15       0.0379      0.12  Q V        |          |          |          |
4+20       0.0387      0.12  Q V        |          |          |          |
4+25       0.0396      0.12  Q V        |          |          |          |
4+30       0.0404      0.13  Q V        |          |          |          |
4+35       0.0413      0.13  Q V        |          |          |          |
4+40       0.0422      0.13  Q V        |          |          |          |
4+45       0.0431      0.13  Q V        |          |          |          |
4+50       0.0439      0.13  Q V        |          |          |          |
4+55       0.0448      0.13  Q V        |          |          |          |
5+ 0       0.0457      0.13  Q V        |          |          |          |
5+ 5       0.0466      0.13  Q V        |          |          |          |
5+10       0.0475      0.13  Q V        |          |          |          |
5+15       0.0484      0.13  Q V        |          |          |          |
5+20       0.0493      0.13  Q V        |          |          |          |
5+25       0.0502      0.13  Q  V       |          |          |          |
5+30       0.0511      0.13  Q  V       |          |          |          |
5+35       0.0520      0.13  Q  V       |          |          |          |
5+40       0.0530      0.13  Q  V       |          |          |          |
5+45       0.0539      0.13  Q  V       |          |          |          |
5+50       0.0548      0.14  Q  V       |          |          |          |
5+55       0.0558      0.14  Q  V       |          |          |          |
6+ 0       0.0567      0.14  Q  V       |          |          |          |
6+ 5       0.0577      0.14  Q  V       |          |          |          |
6+10       0.0586      0.14  Q  V       |          |          |          |
6+15       0.0596      0.14  Q  V       |          |          |          |
6+20       0.0605      0.14  Q  V       |          |          |          |
6+25       0.0615      0.14  Q  V       |          |          |          |
6+30       0.0625      0.14  Q  V       |          |          |          |
6+35       0.0634      0.14  Q  V       |          |          |          |
6+40       0.0644      0.14  Q  V       |          |          |          |
6+45       0.0654      0.14  Q  V       |          |          |          |
6+50       0.0664      0.14  Q   V      |          |          |          |
6+55       0.0674      0.14  Q   V      |          |          |          |
7+ 0       0.0684      0.15  Q   V      |          |          |          |
7+ 5       0.0694      0.15  Q   V      |          |          |          |
7+10       0.0704      0.15  Q   V      |          |          |          |
7+15       0.0714      0.15  Q   V      |          |          |          |
7+20       0.0725      0.15  Q   V      |          |          |          |
7+25       0.0735      0.15  Q   V      |          |          |          |
7+30       0.0745      0.15  Q   V      |          |          |          |
7+35       0.0756      0.15  Q   V      |          |          |          |
7+40       0.0766      0.15  Q   V      |          |          |          |
7+45       0.0777      0.15  Q   V      |          |          |          |
7+50       0.0788      0.15  Q   V      |          |          |          |
7+55       0.0798      0.16  Q   V      |          |          |          |
8+ 0       0.0809      0.16  Q   V      |          |          |          |
8+ 5       0.0820      0.16  Q   V      |          |          |          |
8+10       0.0831      0.16  Q    V     |          |          |          |
8+15       0.0842      0.16  Q    V     |          |          |          |
8+20       0.0853      0.16  Q    V     |          |          |          |
8+25       0.0864      0.16  Q    V     |          |          |          |
8+30       0.0875      0.16  Q    V     |          |          |          |
```

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 8+35       0.0886      0.16  Q    V    |          |          |          |
 8+40       0.0898      0.16  Q    V    |          |          |          |
 8+45       0.0909      0.17  Q    V    |          |          |          |
 8+50       0.0921      0.17  Q    V    |          |          |          |
 8+55       0.0932      0.17  Q    V    |          |          |          |
 9+ 0       0.0944      0.17  Q    V    |          |          |          |
 9+ 5       0.0956      0.17  Q    V    |          |          |          |
 9+10       0.0968      0.17  Q    V    |          |          |          |
 9+15       0.0980      0.17  Q    V    |          |          |          |
 9+20       0.0992      0.17  Q    V    |          |          |          |
 9+25       0.1004      0.18  Q     V   |          |          |          |
 9+30       0.1016      0.18  Q     V   |          |          |          |
 9+35       0.1028      0.18  Q     V   |          |          |          |
 9+40       0.1041      0.18  Q     V   |          |          |          |
 9+45       0.1053      0.18  Q     V   |          |          |          |
 9+50       0.1066      0.18  Q     V   |          |          |          |
 9+55       0.1079      0.18  Q     V   |          |          |          |
10+ 0       0.1091      0.19  Q     V   |          |          |          |
10+ 5       0.1104      0.19  Q     V   |          |          |          |
10+10       0.1117      0.19  Q     V   |          |          |          |
10+15       0.1130      0.19  Q     V   |          |          |          |
10+20       0.1144      0.19  Q     V   |          |          |          |
10+25       0.1157      0.19  Q     V   |          |          |          |
10+30       0.1171      0.20  Q      V  |          |          |          |
10+35       0.1184      0.20  Q      V  |          |          |          |
10+40       0.1198      0.20  Q      V  |          |          |          |
10+45       0.1212      0.20  Q      V  |          |          |          |
10+50       0.1226      0.20  Q      V  |          |          |          |
10+55       0.1240      0.21  Q      V  |          |          |          |
11+ 0       0.1254      0.21  Q      V  |          |          |          |
11+ 5       0.1269      0.21  Q      V  |          |          |          |
11+10       0.1283      0.21  Q      V  |          |          |          |
11+15       0.1298      0.21  Q      V  |          |          |          |
11+20       0.1313      0.22  Q      V  |          |          |          |
11+25       0.1328      0.22  Q       V |          |          |          |
11+30       0.1343      0.22  Q       V |          |          |          |
11+35       0.1359      0.22  Q       V |          |          |          |
11+40       0.1374      0.23  Q       V |          |          |          |
11+45       0.1390      0.23  Q       V |          |          |          |
11+50       0.1406      0.23  Q       V |          |          |          |
11+55       0.1422      0.23  Q       V |          |          |          |
12+ 0       0.1438      0.24  Q       V |          |          |          |
12+ 5       0.1455      0.24  Q       V |          |          |          |
12+10       0.1473      0.26  |Q      V |          |          |          |
12+15       0.1493      0.28  |Q       V|          |          |          |
12+20       0.1513      0.29  |Q       V|          |          |          |
12+25       0.1533      0.30  |Q       V|          |          |          |
12+30       0.1555      0.31  |Q       V|          |          |          |
12+35       0.1576      0.31  |Q       V|          |          |          |
12+40       0.1598      0.32  |Q       V|          |          |          |
12+45       0.1620      0.32  |Q       V|          |          |          |
12+50       0.1642      0.33  |Q       V|          |          |          |
12+55       0.1665      0.33  |Q        V          |          |          |
13+ 0       0.1688      0.33  |Q        V          |          |          |
13+ 5       0.1712      0.34  |Q        V          |          |          |
13+10       0.1735      0.34  |Q        V          |          |          |
13+15       0.1759      0.35  |Q        V          |          |          |
13+20       0.1784      0.36  |Q        V          |          |          |
13+25       0.1809      0.36  |Q        V          |          |          |
13+30       0.1834      0.37  |Q        |V         |          |          |
13+35       0.1860      0.37  |Q        |V         |          |          |
13+40       0.1886      0.38  |Q        |V         |          |          |
13+45       0.1912      0.39  |Q        |V         |          |          |
13+50       0.1939      0.39  |Q        |V         |          |          |
13+55       0.1967      0.40  |Q        |V         |          |          |
14+ 0       0.1995      0.41  |Q        | V        |          |          |
14+ 5       0.2024      0.42  |Q        | V        |          |          |
14+10       0.2054      0.43  |Q        | V        |          |          |
14+15       0.2085      0.45  |Q        | V        |          |          |
14+20       0.2116      0.46  |Q        | V        |          |          |
14+25       0.2149      0.47  |Q        | V        |          |          |
14+30       0.2182      0.48  |Q        |  V       |          |          |
14+35       0.2217      0.50  |Q        |  V       |          |          |
```

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14+40       0.2252      0.51  | Q        |  V      |         |         |
14+45       0.2288      0.53  | Q        |  V      |         |         |
14+50       0.2326      0.54  | Q        |   V     |         |         |
14+55       0.2364      0.56  | Q        |   V     |         |         |
15+ 0       0.2404      0.58  | Q        |   V     |         |         |
15+ 5       0.2446      0.60  | Q        |   V     |         |         |
15+10       0.2489      0.63  | Q        |    V    |         |         |
15+15       0.2534      0.65  | Q        |    V    |         |         |
15+20       0.2581      0.69  | Q        |    V    |         |         |
15+25       0.2630      0.72  | Q        |    V    |         |         |
15+30       0.2680      0.72  | Q        |     V   |         |         |
15+35       0.2731      0.73  | Q        |     V   |         |         |
15+40       0.2785      0.79  |  Q       |     V   |         |         |
15+45       0.2847      0.90  |  Q       |      V  |         |         |
15+50       0.2926      1.15  |   Q      |      V  |         |         |
15+55       0.3033      1.55  |     Q    |       V |         |         |
16+ 0       0.3189      2.26  |        Q|        V|         |         |
16+ 5       0.3464      4.00  |         |    Q    V         |         |
16+10       0.3997      7.73  |         |         |   V     Q         |
16+15       0.4548      8.01  |         |         |      V  | Q       |
16+20       0.4832      4.12  |         |     Q   |        V|         |
16+25       0.5016      2.68  |         Q         |         V         |
16+30       0.5146      1.89  |       Q |         |         |V        |
16+35       0.5242      1.39  |     Q   |         |         |V        |
16+40       0.5311      1.01  |   Q     |         |         | V       |
16+45       0.5368      0.82  |  Q      |         |         | V       |
16+50       0.5418      0.72  | Q       |         |         | V       |
16+55       0.5463      0.66  | Q       |         |         | V       |
17+ 0       0.5504      0.59  | Q       |         |         |  V      |
17+ 5       0.5540      0.53  | Q       |         |         |  V      |
17+10       0.5573      0.48  |Q        |         |         |  V      |
17+15       0.5604      0.45  |Q        |         |         |  V      |
17+20       0.5633      0.43  |Q        |         |         |   V     |
17+25       0.5661      0.41  |Q        |         |         |   V     |
17+30       0.5689      0.39  |Q        |         |         |   V     |
17+35       0.5715      0.38  |Q        |         |         |   V     |
17+40       0.5740      0.37  |Q        |         |         |   V     |
17+45       0.5764      0.35  |Q        |         |         |   V     |
17+50       0.5788      0.34  |Q        |         |         |   V     |
17+55       0.5811      0.33  |Q        |         |         |    V    |
18+ 0       0.5833      0.32  |Q        |         |         |    V    |
18+ 5       0.5854      0.31  |Q        |         |         |    V    |
18+10       0.5874      0.29  |Q        |         |         |    V    |
18+15       0.5893      0.26  |Q        |         |         |    V    |
18+20       0.5910      0.25  |Q        |         |         |    V    |
18+25       0.5926      0.24  Q         |         |         |    V    |
18+30       0.5943      0.23  Q         |         |         |    V    |
18+35       0.5958      0.23  Q         |         |         |    V    |
18+40       0.5973      0.22  Q         |         |         |     V   |
18+45       0.5988      0.22  Q         |         |         |     V   |
18+50       0.6003      0.21  Q         |         |         |     V   |
18+55       0.6017      0.21  Q         |         |         |     V   |
19+ 0       0.6031      0.20  Q         |         |         |     V   |
19+ 5       0.6045      0.20  Q         |         |         |     V   |
19+10       0.6058      0.20  Q         |         |         |     V   |
19+15       0.6071      0.19  Q         |         |         |     V   |
19+20       0.6084      0.19  Q         |         |         |     V   |
19+25       0.6097      0.19  Q         |         |         |     V   |
19+30       0.6110      0.18  Q         |         |         |     V   |
19+35       0.6122      0.18  Q         |         |         |     V   |
19+40       0.6134      0.18  Q         |         |         |      V  |
19+45       0.6146      0.17  Q         |         |         |      V  |
19+50       0.6158      0.17  Q         |         |         |      V  |
19+55       0.6170      0.17  Q         |         |         |      V  |
20+ 0       0.6181      0.17  Q         |         |         |      V  |
20+ 5       0.6192      0.16  Q         |         |         |      V  |
20+10       0.6204      0.16  Q         |         |         |      V  |
20+15       0.6215      0.16  Q         |         |         |      V  |
20+20       0.6225      0.16  Q         |         |         |      V  |
20+25       0.6236      0.16  Q         |         |         |      V  |
20+30       0.6247      0.15  Q         |         |         |      V  |
20+35       0.6257      0.15  Q         |         |         |      V  |
20+40       0.6268      0.15  Q         |         |         |      V  |
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   20+45       0.6278      0.15  Q          |          |          |      V  |
   20+50       0.6288      0.15  Q          |          |          |      V  |
   20+55       0.6298      0.15  Q          |          |          |       V |
   21+ 0       0.6308      0.14  Q          |          |          |       V |
   21+ 5       0.6318      0.14  Q          |          |          |       V |
   21+10       0.6327      0.14  Q          |          |          |       V |
   21+15       0.6337      0.14  Q          |          |          |       V |
   21+20       0.6346      0.14  Q          |          |          |       V |
   21+25       0.6356      0.14  Q          |          |          |       V |
   21+30       0.6365      0.13  Q          |          |          |       V |
   21+35       0.6374      0.13  Q          |          |          |       V |
   21+40       0.6383      0.13  Q          |          |          |       V |
   21+45       0.6392      0.13  Q          |          |          |       V |
   21+50       0.6401      0.13  Q          |          |          |       V |
   21+55       0.6410      0.13  Q          |          |          |       V |
   22+ 0       0.6419      0.13  Q          |          |          |       V |
   22+ 5       0.6428      0.13  Q          |          |          |       V |
   22+10       0.6436      0.13  Q          |          |          |       V |
   22+15       0.6445      0.12  Q          |          |          |       V |
   22+20       0.6453      0.12  Q          |          |          |       V |
   22+25       0.6462      0.12  Q          |          |          |        V|
   22+30       0.6470      0.12  Q          |          |          |        V|
   22+35       0.6478      0.12  Q          |          |          |        V|
   22+40       0.6486      0.12  Q          |          |          |        V|
   22+45       0.6495      0.12  Q          |          |          |        V|
   22+50       0.6503      0.12  Q          |          |          |        V|
   22+55       0.6511      0.12  Q          |          |          |        V|
   23+ 0       0.6519      0.12  Q          |          |          |        V|
   23+ 5       0.6526      0.11  Q          |          |          |        V|
   23+10       0.6534      0.11  Q          |          |          |        V|
   23+15       0.6542      0.11  Q          |          |          |        V|
   23+20       0.6550      0.11  Q          |          |          |        V|
   23+25       0.6557      0.11  Q          |          |          |        V|
   23+30       0.6565      0.11  Q          |          |          |        V|
   23+35       0.6572      0.11  Q          |          |          |        V|
   23+40       0.6580      0.11  Q          |          |          |        V|
   23+45       0.6587      0.11  Q          |          |          |        V|
   23+50       0.6595      0.11  Q          |          |          |        V|
   23+55       0.6602      0.11  Q          |          |          |        V|
   24+ 0       0.6609      0.11  Q          |          |          |        V|
   24+ 5       0.6616      0.10  Q          |          |          |        V|
   24+10       0.6621      0.07  Q          |          |          |        V|
   24+15       0.6623      0.03  Q          |          |          |        V|
   24+20       0.6624      0.02  Q          |          |          |        V|
   24+25       0.6625      0.01  Q          |          |          |        V|
   24+30       0.6626      0.01  Q          |          |          |        V|
   24+35       0.6626      0.00  Q          |          |          |        V|
   24+40       0.6626      0.00  Q          |          |          |        V|
   24+45       0.6626      0.00  Q          |          |          |        V|
   24+50       0.6626      0.00  Q          |          |          |        V|
   24+55       0.6626      0.00  Q          |          |          |        V|
   25+ 0       0.6626      0.00  Q          |          |          |        V|
----------------------------------------------------------------------------
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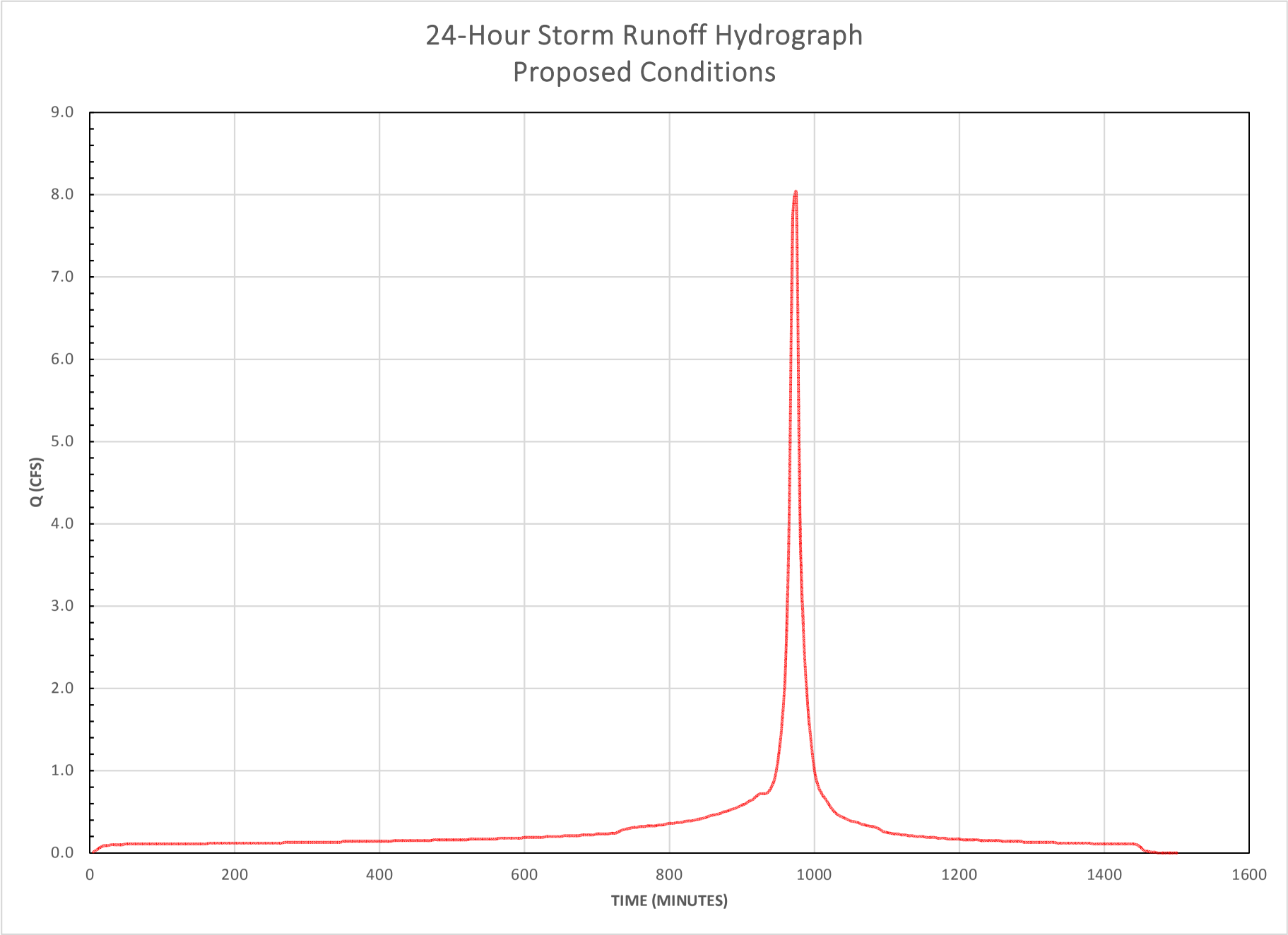
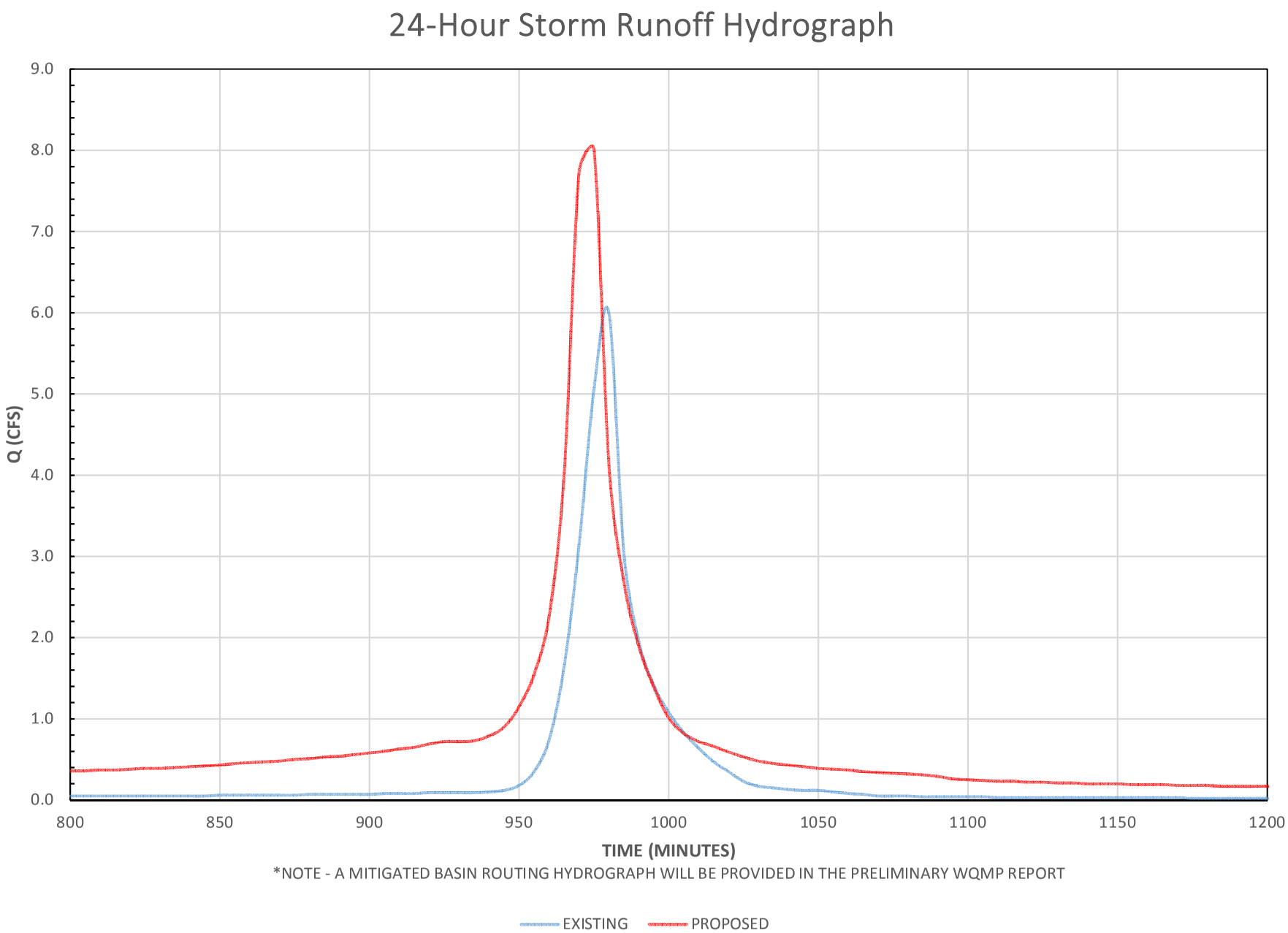

24-Hour Storm Runoff Hydrograph
Proposed Conditions
Q (CFS)
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
200
400
600
800
1000
1200
1400
1600
TIME (MINUTES)


24-Hour Storm Runoff Hydrograph
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Q (CFS)
800
850
900
950
1000
1050
1100
1150
1200
TIME (MINUTES)
*NOTE - A MITIGATED BASIN ROUTING HYDROGRAPH WILL BE PROVIDED IN THE PRELIMINARY WQMP REPORT
EXISTING
PROPOSED

APPENDIX B

NOTICE OF TRANSFER OF RESPONSIBILITY

NOTICE OF TRANSFER OF RESPONSIBILITY

WATER QUALITY MANAGEMENT PLAN

CIELO VISTA
TENTATIVE TRACT 17341
APN: 351-031-05 AND 351-031-17

Submission of this Notice Of Transfer of Responsibility constitutes notice to the County of Orange/City of Yorba Linda that responsibility for the Water Quality Management Plan ("WQMP") for the subject property identified below, and implementation of that plan, is being transferred from the Previous Owner (and his/her agent) of the site (or a portion thereof) to the New Owner, as further described below.

I. Previous Owner/ Previous Responsible Party Information

Company/ Individual Name:		Contact Person:	
Street Address:		Title:	
City:	State:	ZIP:	Phone:

II. Information about Site Transferred

Name of Project (if applicable):	
Title of WQMP Applicable to site:	
Street Address of Site (if applicable):	
Planning Area (PA) and/ or Tract Number(s) for Site:	Lot Numbers (if Site is a portion of a tract):
Date WQMP Prepared (and revised if applicable):	

III. New Owner/ New Responsible Party Information

Company/ Individual Name:		Contact Person:	
Street Address:		Title:	
City:	State:	ZIP:	Phone:

IV. Ownership Transfer Information

General Description of Site Transferred to New Owner:	General Description of Portion of Project/ Parcel Subject to WQMP Retained by Owner (if any):
Lot/ Tract Numbers of Site Transferred to New Owner:	
Remaining Lot/ Tract Numbers Subject to WQMP Still Held by Owner (if any):	
Date of Ownership Transfer:	

Note: When the Previous Owner is transferring a Site that is a portion of a larger project/ parcel addressed by the WQMP, as opposed to the entire project/parcel addressed by the WQMP, the General Description of the Site transferred and the remainder of the project/ parcel no transferred shall be set forth as maps attached to this notice. These maps shall show those portions of a project/ parcel addressed by the WQMP that are transferred to the New Owner (the Transferred Site), those portions retained by the Previous Owner, and those portions previously transferred by Previous Owner. Those portions retained by Previous Owner shall be labeled as "Previously Transferred".

V. Purpose of Notice of Transfer

The purposes of this Notice of Transfer of Responsibility are: 1) to track transfer of responsibility for implementation and amendment of the WQMP when property to which the WQMP is transferred from the Previous Owner to the New Owner, and 2) to facilitate notification to a transferee of property subject to a WQMP that such New Order is now the Responsible Party of record for the WQMP for those portions of the site that it owns.

VI. Certifications

A. Previous Owner

I certify under penalty of law that I am no longer the owner of the Transferred Site as described in Section II above. I have provided the New Owner with a copy of the WQMP applicable to the Transferred Site that the New Owner is acquiring from the Previous Owner.

Printed Name of Previous Owner Representative:	Title:
Signature of Previous Owner Representative:	Date:

B. New Owner

I certify under penalty of law that I am the owner of the Transferred Site, as described in Section II above, that I have been provided a copy of the WQMP, and that I have informed myself and understand the New Owner's responsibilities related to the WQMP, its implementation, and Best Management Practices associated with it. I understand that by signing this notice, the New Owner is accepting all ongoing responsibilities for implementation and amendment of the WQMP for the Transferred Site, which the New Owner has acquired from the Previous Owner.

Printed Name of New Owner Representative:	Title:

Signature:	Date:

APPENDIX C

EDUCATIONAL MATERIALS
(RESERVED FOR PRELIMINARY/FINAL WQMP)

APPENDIX D

BMP MAINTENANCE SUPPLEMENT / O&M PLAN

Infiltration Facility Operations and Maintenance

General Requirements

Infiltration facility maintenance should include frequent inspections to ensure that water infiltrates into the subsurface completely within the recommended infiltration time of 72 hours or less after a storm (see Appendix E for guidance on facility inspection and Appendix F for an infiltration inspection and maintenance checklist).

Maintenance and regular inspections are of primary importance if infiltration basins and trenches are to continue to function as originally designed. A specific maintenance plan shall be developed specific to each facility outlining the schedule and scope of maintenance operations, as well as the documentation and reporting requirements. The following are general maintenance requirements:

1. Regular inspection should determine if the sediment pretreatment structures require routine maintenance.

2. If water is noticed in the basin more than 72 hours after a major storm or in the observation well of the infiltration trench more than 48 hours after a major storm, the infiltration facility may be clogged. Maintenance activities triggered by a potentially clogged facility include:

   - Check for debris/sediment accumulation, rake surface and remove sediment (if any) and evaluate potential sources of sediment and vegetative or other debris (e.g., embankment erosion, channel scour, overhanging trees, etc). If suspected upland sources are outside of the County's jurisdiction, additional pretreatment operations (e.g., trash racks, vegetated swales, etc.) may be necessary.

   - For basins, removal of the top layer of native soil may be required to restore infiltrative capacity.

   - For trenches, assess the condition of the top aggregate layer for sediment buildup and crusting. Remove top layer of pea gravel and replace. If slow draining conditions persist, entire trench may need to be excavated and replaced.

3. Any debris or algae growth located on top of the infiltration facility should be removed and disposed of properly.

4. Facilities should be inspected annually. Trash and debris should be removed as needed, but at least annually prior to the beginning of the wet season.

5. Site vegetation should be maintained as frequently as necessary to maintain the aesthetic appearance of the site, and as follows:

   - Vegetation, large shrubs, or trees that limit access or interfere with basin operation should be pruned or removed.

- Slope areas that have become bare should be revegetated and eroded areas should be regraded prior to being revegetated.
- Grass should be mowed to 4"-9" high and grass clippings should be removed.
- Fallen leaves and debris from deciduous plant foliage should be raked and removed.
- Invasive vegetation, such as Alligatorweed (*Alternanthera philoxeroides*), Halogeton (*Halogeton glomeratus*), Spotted Knapweed (*Centaurea maculosa*), Giant Reed (*Arundo donax*), Castor Bean (*Ricinus communis*), Perennial Pepperweed (*Lepidium latifolium*), and Yellow Starthistle (*Centaurea solstitalis*) must be removed and replaced with non-invasive species. Invasive species should never contribute more than 25% of the vegetated area. For more information on invasive weeds, including biology and control of listed weeds, look at the "encycloweedia" located at the California Department of Food and Agriculture website at http://www.cdfa.ca.gov/wma or the California Invasive Plant Council website at http://portal.cal-ipc.org/weedlist. .
- Dead vegetation should be removed if it exceeds 10% of area coverage. Vegetation should be replaced immediately to maintain cover density and control erosion where soils are exposed.

6. For infiltration basins, sediment buildup exceeding 50% of the forebay sediment storage capacity, as indicated by the steel markers, should be removed. Sediment from the remainder of the basin should be removed when 6 inches of sediment accumulates. Sediments should be tested for toxic substance accumulation in compliance with current disposal requirements if visual or olfactory indications of pollution are noticed. If toxic substances are encountered at concentrations exceeding thresholds of Title 22, Section 66261 of the California Code of Regulations, the sediment must be disposed of in a hazardous waste landfill and the source of the contaminated sediments should be investigated and mitigated to the extent possible.

7. Following sediment removal activities, replanting and/or reseeding of vegetation may be required for reestablishment.

Maintenance Standards

A summary of the routine and major maintenance activities recommended for infiltration facilities is shown in Table 6-1. Detailed routine and major maintenance standards are listed in Tables 6-2 and 6-3.

Table 6-1: Infiltration Facility Routine and Major Maintenance Quick Guide

Inspection and Maintenance Activities Summary	
Routine Maintenance	• Remove trash and debris as required • Repair and reseed erosion near inlet if necessary • Remove any visual evidence of contamination from floatables such as oil and grease • Clean under-drain (if present) and outlet piping to alleviate ponding and restore infiltrative capacity. • Remove minor sediment accumulation, debris and obstructions near inlet and outlet structures as needed • Mow routinely to maintain ideal grass height and to suppress weeds • Periodically observe function under wet weather conditions • Take photographs before and after maintenance (encouraged)
Major Maintenance	• Clean out under-drains if present to alleviate ponding. Replace media if ponding or loss of infiltrative capacity persists and revegetate • Repair structural damage to flow control structures including inlet, outlet and overflow structures • De-thatch grass to remove accumulated sediment and aerate compacted areas to promote infiltration

Table 6-2: Routine Maintenance – Infiltration Facilities

Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed	Frequency
Trash & Debris	Any trash and debris which exceed 5 cubic feet per 1,000 square feet (one standard garbage can). In general, there should be no visual evidence of dumping. If less than threshold, all trash and debris will be removed as part of next scheduled maintenance.	Trash and debris cleared from site.	Annually prior to wet season. After major storm events (>0.75 in/24 hrs) if spot checks indicate widespread damage/ maintenance needs. Litter removal is dependent on site conditions and desired aesthetics and should be done at a frequency to meet those objectives.
Inlet Erosion	Visible evidence of erosion occurring near inlet structures.	Eroded areas repaired/reseeded	
Visual Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants.	No contaminants or pollutants present.	
Slow Drain Time	Standing water long after storm has passed (after 48 to 72 hours), or visual inspection of wells (if available) indicates that design drain times are not being achieved.	Water drains within 48 to 72 hours. Drainage pipe is cleared, accumulated litter on surface is removed, and top 1-2" of soil is raked or replaced.	
Inlets Blocked	Trash and debris or sediment blocking inlet structures.	Inlets clear and free of trash and debris.	
Appearance of Poisonous, Noxious or Nuisance Vegetation	Excessive grass and weed growth. Noxious weeds, woody vegetation establishing, Turf growing over rock filter.	Vegetation is mowed or trimmed to restore function. Weeds are removed to prevent noxious and nuisance plants from becoming established.	Monthly (or as dictated by agreement between County and landscape contractor).

Table 6-3: Major Maintenance – Infiltration Facilities

Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed	Frequency
Standing Water	Standing water long after storm has passed (after 24 to 48 hours), or visual inspection of wells (if available) indicates that design drain times are not being achieved	Design infiltration rate restored, either through excavation and filter media replacement or surface sediment removal. If applicable, underdrain cleaned, reset or replaced.	As needed

Bioretention Operations and Maintenance

General Requirements

Bioretention areas require annual plant, soil, and mulch layer maintenance to ensure optimum infiltration, storage, and pollutant removal capabilities. In general, bioretention maintenance requirements are typical landscape care procedures and include:

1. Watering: Plants should be selected to be drought tolerant and not require watering after establishment (2 to 3 years). Watering may be required during prolonged dry periods after plants are established.

2. Erosion control: Inspect flow entrances, ponding area, and surface overflow areas periodically, and replace soil, plant material, and/or mulch layer in areas if erosion has occurred (see Appendix E for guidance on facility inspection and Appendix F for a bioretention inspection and maintenance checklist). Properly designed facilities with appropriate flow velocities should not have erosion problems except perhaps in extreme events. If erosion problems occur the following should be reassessed: (1) flow velocities and gradients within the cell, and (2) flow dissipation and erosion protection strategies in the pretreatment area and flow entrance. If sediment is deposited in the bioretention area, immediately determine the source within the contributing area, stabilize, and remove excess surface deposits.

3. Plant material: Depending on aesthetic requirements, occasional pruning and removing of dead plant material may be necessary. Replace all dead plants and if specific plants have a high mortality rate, assess the cause and, if necessary, replace with more appropriate species. Periodic weeding is necessary until plants are established. The weeding schedule should become less frequent if the appropriate plant species and planting density have been used and, as a result, undesirable plants excluded.

4. Nutrient and pesticides: The soil mix and plants are selected for optimum fertility, plant establishment, and growth. Nutrient and pesticide inputs should not be required and may degrade the pollutant processing capability of the bioretention area, as well as contribute pollutant loads to receiving waters. By design, bioretention facilities are located in areas where phosphorous and nitrogen levels are often elevated and these should not be limiting nutrients. If in question, have soil analyzed for fertility.

5. Mulch: Replace mulch annually in bioretention facilities where heavy metal deposition is likely (e.g., contributing areas that include industrial and auto dealer/repair parking lots and roads). In residential lots or other areas where metal deposition is not a concern, replace or add mulch as needed to maintain a 2 to 3 inch depth at least once every two years.

6. Soil: Soil mixes for bioretention facilities are designed to maintain long-term fertility and pollutant processing capability. Estimates from metal attenuation research suggest that metal accumulation should not present an environmental concern for at least 20 years in bioretention systems. Replacing mulch in bioretention facilities where heavy metal

deposition is likely provides an additional level of protection for prolonged performance. If in question, have soil analyzed for fertility and pollutant levels.

Maintenance Standards

A summary of the routine and major maintenance activities recommended for bioretention areas is shown in Table 5-1. Detailed Routine and major maintenance standards are listed in Tables 5-2 and 5-3.

Table 5-1: Bioretention Routine and Major Maintenance Quick Guide

Inspection and Maintenance Activities Summary	
Routine Maintenance	• Repair small eroded areas and ruts by filling with gravel. Overseed bare areas to reestablish vegetation • Remove trash and debris and rake surface soils to mitigate ponding • Remove accumulated fine sediments, dead leaves and trash to restore surface permeability • Remove any evidence of visual contamination from floatables such as oil and grease • Eradicate weeds and prune back excess plant growth that interferes with facility operation. Remove invasive vegetation and replace with non-invasive species • Remove sediment and debris accumulation near inlet and outlet structures to alleviate clogging • Clean and reset flow spreaders (if present) as needed to restore original function • Mow routinely to maintain ideal grass height and to suppress weeds • Periodically observe function under wet weather conditions
Major Maintenance	• Repair structural damage to flow control structures including inlet, outlet and overflow structures • Clean out under-drain, if present, to alleviate ponding. Replace media if ponding or loss of infiltrative capacity persists and revegetate • Regrade and revegetate to repair damage from severe erosion/scour channelization and to restore sheet flow • Take photographs before and after major maintenance (encouraged)

Table 5-2: Routine Maintenance – Bioretention

Defect or Problem	**Condition When Maintenance is Needed**	**Results Expected When Maintenance Is Performed**	**Frequency**
Erosion	Splash pads or spreader incorrectly placed; eroded or scoured areas due to flow channelization, or higher flows.	No erosion on surface of basin. No erosion or scouring evident. For ruts or bare areas less than 12 inches wide, damaged areas repaired by filling with crushed gravel. The grass will creep in over the rock in time.	Annually prior to wet season. After major storm events (>0.75 in/24 hrs) if spot checks of some basins indicate widespread damage/ maintenance needs
Standing Water	When water stands in the basin between storms and does not drain freely (with 36- 48 hours after storm event).	Water drains completely from basin as designed and surface is clear of trash and debris. Underdrains (if installed) are cleared.	
Loss of Surface Permeability	Accumulation of fine sediments, dead leaves, trash and other debris on surface	Surface permeability restored. Surface layer removed and replaced with fresh mulch.	
Visual Contaminants and Pollution	Any visual evidence of oil, gasoline, contaminants or other pollutants.	No visual contaminants or pollutants present.	Monthly (or as dictated by agreement between County and landscape contractor
Vegetation	Weeds, excessive plant growth, plants interfering with basin operation, plants diseased or dying	Basin tidy, plants healthy and pruned. Any plants that interfere with function are removed. Invasive or non-acclimated plants replaced.	
Inlet/Overflow	Inlet/outlet areas clogged with sediment and/or debris.	Material removed so that there is no clogging or blockage of the inlet or overflow area.	
Trash and Debris	Any trash and debris which exceed 5 cubic feet per 1,000 square feet (one standard garbage can).	Trash and debris removed and facility looks well kept.	

Table 5-3: Major Maintenance – Bioretention

Defect or Problem	**Condition When Maintenance is Needed**	**Results Expected When Maintenance Is Performed**	**Frequency**
Standing water	When water stands in the basin between storms and does not drain freely (with 36- 48 hours after storm event).	Filter media (sand, gravel, and topsoil) and vegetation removed and replaced.	Annually prior to wet season
Erosion/ Scouring	Bare spots greater than 12 inches	No erosion on surface of basin. Large bare areas are regraded and reseeded/replanted.	As needed

APPENDIX E

CONDITIONS OF APPROVAL
(RESERVED FOR FINAL WQMP)

APPENDIX F

INFILTRATION TEST RESULTS
(RESERVED FOR PRELIMINARY/FINAL WQMP)