5.8 Hydrology and Water Quality

This section analyzes the surface drainage and on-site hydrological conditions as well as whether implementation of the Proposed Project would violate any water quality standards or waste discharge requirements, deplete ground-water supplies or interfere with ground water recharge, result in substantial erosion or siltation on-site or off-site, or provide substantial additional sources of polluted runoff. Issues concerning water supply and distribution systems are discussed in 5.15, Utilities and Service Systems (beginning on page 5-625).

The following analysis is based on the "Preliminary Drainage Reports for Esperanza Hills Property, Options 1 and 2" prepared by KWC Engineers, dated June 2013 (Drainage Reports, Appendix K) and the "Conceptual Water Quality Management Plan, Option 1 and Option 2" prepared by KWC Engineers, dated May 8,2013 (CWQMP, Appendix K). The studies provide the needed information to ensure that the Proposed Project's drainage facilities and water quality features are located and sized appropriately to meet regulatory criteria. The Drainage Reports and the Conceptual Water Quality Management Plans (CWQMPs) are also part of the CEQA review for all discretionary projects in the County of Orange. This eliminates the need for additional CEQA review later on when final project drainage facilities are designed and approved that conform to what was previously reviewed under this DEIR.

Acronyms used in this section:

AMSL	above mean sea level
ACOE	U.S. Army Corps of Engineers
BMP	Best Management Practice
CC&Rs	Covenants, Conditions, & Restrictions
CEQA	California Environmental Quality Act
CDFW	California Department of Fish and Wildlife
cfs	cubic feet per second
COA	Condition of Approval
CTR	California Toxics Rule
CWQMP	Conceptual Water Quality Management Plan
DAMP	Drainage Area Management Plan
DCV	Design Capture Volume
DEIR	Draft Environmental Impact Report
DMA	Drainage Management Area
DOGGR	California Department of Oil, Gas, and Geothermal Resources
EPA	Environmental Protection Agency
ESCP	Erosion and Sediment Control Plan
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
HCOC	Hydrologic Condition of Concern
HOA	homeowners' association
LID	Low Impact Development
MG	million gallons
NPDES	National Pollution Discharge Elimination System
NTR	National Toxics Rule
PDF	Project Design Feature
RWQCB-SA	Regional Water Quality Control Board – Santa Ana
SCAQMD	Southern California Air Quality management District
SFHA	Special Hazard Area
SWPPP	Storm Water Pollution Prevention Plan
TMDL	total maximum daily load
USFWS	U.S. Fish & Wildlife Services
USGS	United States Geological Survey
VTTM	Vesting Tentative Tract Map
WQMP	Water Quality Management Plan

5.8.1 Existing Conditions

1. Setting

The Proposed Project is located in unincorporated Orange County in the Chino Hills, also known as Puente Hills, and is generally characterized by a series of east-west trending hills separated by steep V-shaped canyons. Site elevations range from 600 to 1,540 above mean

sea level (AMSL). The site generally drains from northeast to southwest, in a natural canyon flow condition, with the flow line having an average slope of about 15% to 25%. Upstream adjacent land uses to the Proposed Project are undeveloped open space lands, Chino Hills State Park, and Tract 16186 (Casino Ridge), and the downstream land uses are developed residential tracts and proposed VTTM 17341 (Sage/Cielo Vista property). The Proposed Project is within the Santa Ana River watershed, the largest watershed in Orange County, covering 153.2 square miles, and is in the jurisdiction of the Santa Ana Regional Water Quality Control Board, Region 8 (RWQCB-SA). The river begins almost 75 miles away in the San Bernardino Mountains, crossing central Orange County before emptying into the Pacific Ocean. The river serves as the main tributary to the watershed. Project Site storm water runoff ultimately discharges into the Santa Ana River – Reach 2, located approximately 1.25 miles south of the Project Site.

Existing contaminants on-site consist of oil staining of soils in the area of oil wells and above-ground storage tanks, conveyance piping from the existing oil wells, and trash from illegal dumping and human activity. There have been no spills, leaks, or emergency responses requiring clean-up of the site. The oil wells have received California Department of Oil, Gas, and Geothermal Resources (DOGGR) permits and are in compliance with Southern California Air Quality Management District (SCAQMD) permits for carbon filter recovery systems for storage tanks.

2. On-Site Regulatory Drainage

The drainage in the vicinity of the Project Site consists of surface water runoff flowing only during rainfall and for a short duration after rainfall in the canyons that drain to the Santa Ana River to the south and southwest of the Project Site. There are three USGS (United States Geological Survey) designated drainage areas on-site (Exhibit 5-82 – Esperanza Hills Existing Topography and Drainage Areas). Canyon B joins with Canyon A west of the Project Site at the end of Aspen Way and then flow through a natural drainage in an open space area on land between San Antonio Road and Dorinda Road owned by the City of Yorba Linda (City), prior to flowing into the Orange County Esperanza Channel (Facility E06 Orange County Flood Control District) located along San Antonio Road between Via Corzo and Alder Avenue (see Exhibit 5-83 – Orange County Flood Control District, Existing Facilities, Sheet 9 Maps, 113-3. The entry is a rip-rap protected pad entrance to a 13′ wide × 11′ high trapezoidal channel about one mile downstream west from the property line. On the southern edge of the site lies Blue Mud Canyon, which has intermittent flow and is a drainage area under the jurisdiction of the U.S. Army Corps of Engineers (ACOE).

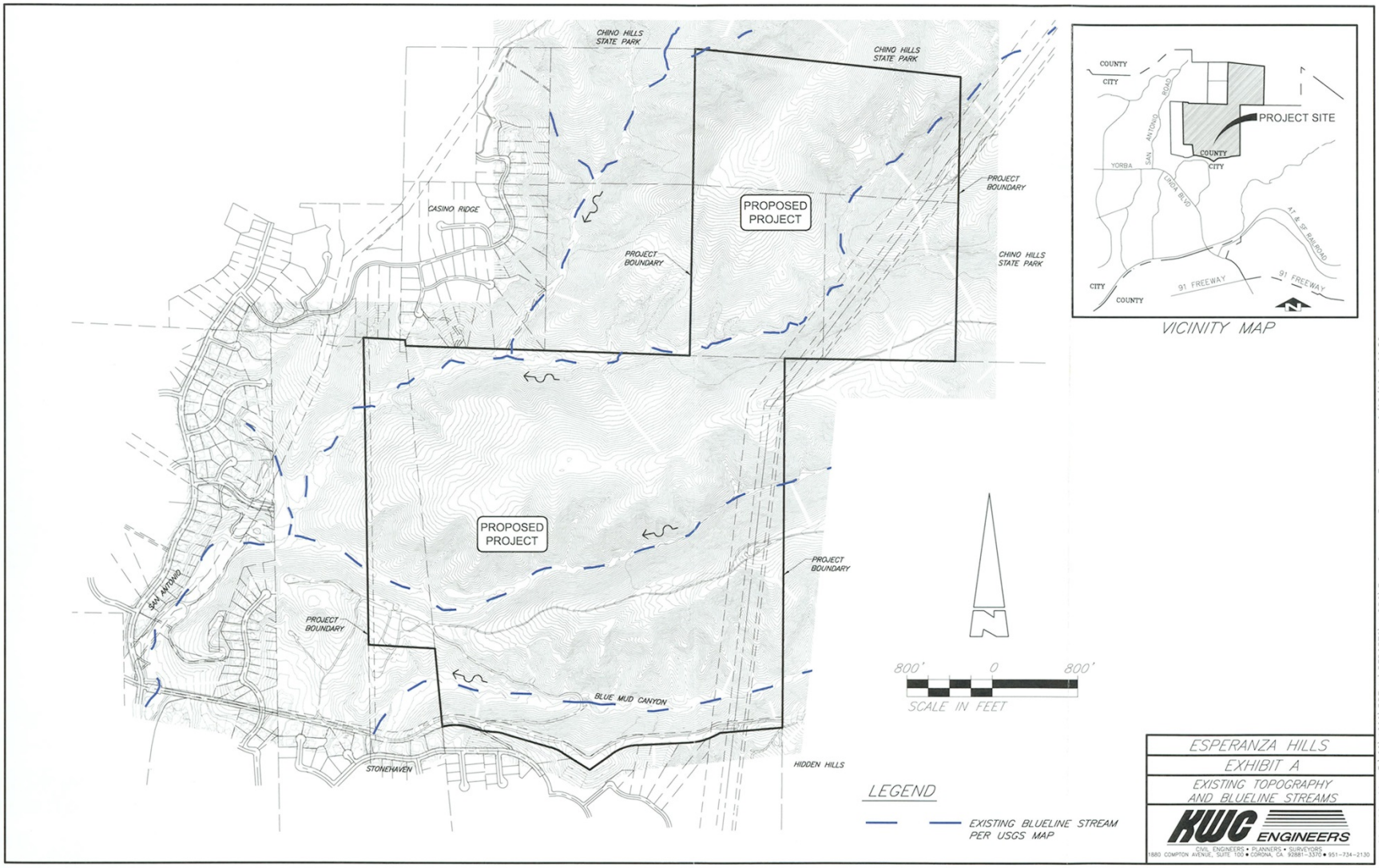


Exhibit 5-82– Esperanza Hills Existing Topography and Drainage Areas

3. Hydrology Conditions

The Puente Formation sediments found throughout the site have low permeability and limit deep percolation of rain water, thereby restricting groundwater to the canyon drainages. Storm water has a high runoff rate due to the steep hillsides and clayey soils.

Wet-weather and dry-weather runoff typically contains similar pollutants of concern. However, except for the first-flush concentrations following a long dry period between rainfalls, the concentration levels found in wet weather flows are typically lower than found in dry weather flows, because the larger wet weather flows dilute the amount of pollutants in runoff waters.

Development Options 1 and 2 differ in existing condition hydrology calculations given the different grading and drainage schemes for each access option, which results in different drainage areas for each development option. The Project Site is divided into two sub-drainage areas for analysis. The Orange County Modified Rational Method Hydrologic calculations (as described in the Orange County Hydrology Manual) were performed using the Civil Design Hydrology/Hydraulics computer program package 2005 by Bonadiman and Associates, Inc. Drainage hydrology is calculated using a "Return Period" that is defined as the long-term average number of years between occurrences of an event (precipitation) of a given depth (inches of rainfall) and duration (24-hour period). The Orange County Hydrology Manual uses a Return Period of 10-year, 25-year, and 100-year storm event to describe drainage characteristics and capacity. The existing condition watershed boundaries were delineated using aerial topography and USGS topographic maps. Soil types were determined by overlaying the Hydrologic Classification of Soils from the Orange County Hydrology Manual onto the existing topography and calculating the areas of each soil type within each sub-area. There are no existing drainage facilities upstream or within the Proposed Project boundaries, and storm runoff is conveyed via natural channel flow through the Project Site.

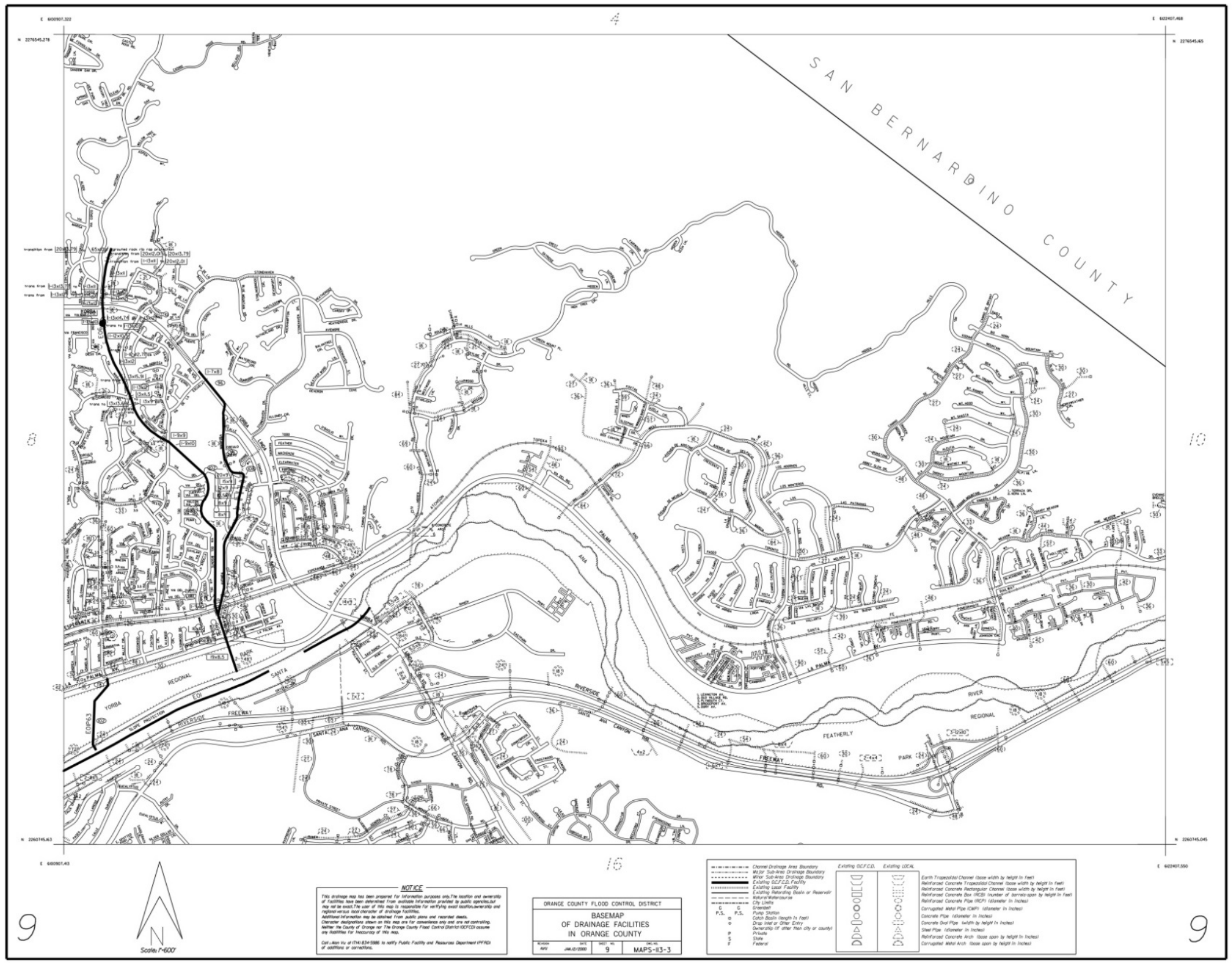


Exhibit 5-83– Orange County Flood Control District, Existing Facilities, Sheet 9 Maps, 113-3

- Option 1: Exhibit 5-84 shows the locations of the drainage sub-areas and peak flows at each sub-area. Under existing conditions, Canyon A, Canyon B and Canyon C drain into the site and have a total drainage area of 882.7 acres that generate 1,838 cubic feet per second (cfs) in the 100-year event, 1,374 cfs in the 25-year event, and 1091 cfs in the 10-year event, which must be accepted and conveyed through the site. Canyon C drains along the southerly side of the Project and has a total area of 647.3 acres that generate 1,140 cfs in the 100-year event, 845 cfs in the 25-year event, and 665 cfs in the 10-year event. This corresponds generally to a 1.2:1 ratio between the peak flow rate and the drainage area for the 10-year storm event.
- Option 2: Exhibit 5-85 shows the locations of the drainage sub-areas and peak flows at each sub-area. Under existing conditions, Canyon A, Canyon B, and Canyon C drain into the site from off-site waters. The total site drainage area comprises 1,366.5 acres that generate 3,401 cfs in the 100-year event, 2,543 cfs in the 25-year event, and 2,044 cfs in the 10-year event, which must be accepted and conveyed through the site. This corresponds generally to a 1.5:1 ratio between the peak flow rate and the drainage area for the 10-year storm event.

4. Flooding/Site Inundation

The National Flood Insurance Act (1968) established the National Flood Insurance Program, which is based on the minimal requirements for floodplain management and is designed to minimize flood damage within Special Flood Hazard Areas (SFHA). The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program. SFHAs are defined as areas that have a 1% chance of flooding within a given year. This is also referred to as the 100-year flood. Flood Insurance Rate Maps (FIRMs) were developed to identify areas of flood hazards within a community.

According to the FIRM catalog, there are two FIRMS produced by FEMA for the Project Site: Map Numbers 06059C0069J and O6059C0090J, revised December 3, 2009. The complete site is located within Zone X, which is an area outside the 0.2% annual chance of flood (500-year). However, these areas may be subject to flooding from severe storm activity or local drainage problems. Concerning site inundation from flooding, there are no floodways recognized by FEMA within the vicinity of the Project Site.

5. Ground Water

The Project Site is located north of the Santa Ana River and the Santa Ana River recharge area. The water flow regime in the vicinity of the Project Site consists of surface water runoff in the canyons that drain to the Santa Ana River to the south and southwest of the project. The low permeability of the Puente Formation sediments

(Soil Types C[13] and D[14]) throughout the Project Site limits deep percolation of rainwater restricting groundwater to the incised canyons drainages. Ground water in the site vicinity is confined to young alluvial sediments within the incised canyons. The direction of flow is controlled by local topographic conditions.

5.8.2 Regulatory Setting

The Esperanza Hills project may be required to process applications through the following resource agencies because of potential project impacts to intermittent drainage areas subject to the jurisdiction of the ACOE, other drainage systems, and potential surface water quality issues.

- U.S. Army Corps of Engineers (ACOE) approval of permits under Section 404 of the Clean Water Act
- California Department of Fish and Wildlife (CDFW) approval of future potential streambed alteration agreements, pursuant to §1600 of the *California Fish and Game Code*
- U.S. Fish & Wildlife Services (USFWS) consultation related to biological impact assessment, if requested by the ACOE
- Regional Water Quality Control Board, Santa Ana District (RWQCB-SA), National Pollutant Discharge Elimination System (NPDES) permits under Section 402 of the Clean Water Act as well as approval of Section 401 Water Quality Certification
- County of Orange

- The Clean Water Act[15] is the principal federal statute governing water quality. The goal of the Clean Water Act is to protect the physical, chemical, and biological integrity of the waters of the United States. The Clean Water Act requires the state to adopt water quality standards for water bodies and have those standards approved by the Environmental Protection Agency (EPA). Water quality standards consist of a designated use or uses for a particular water body, along with water quality criteria based upon these uses[16]. Designated uses of water bodies describe the appropriate uses of that water body, such as contact recreation, warm water wildlife propagation, and municipal or drinking water uses. Water quality criteria are set concentrations or levels of constituents (e.g., lead, suspended sediments, and fecal coliform bacteria) or narrative statements that represent the quality of water that support a particular use.

[13] *Class C Soil* is characterized as slow infiltration rates. Soils have layers impeding downward movement of water, or soils with moderately fine or fine textures.

[14] *Class D Soil* is characterized as very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

[15] *U.S. Code*, Title 33, §§1251, et seq.

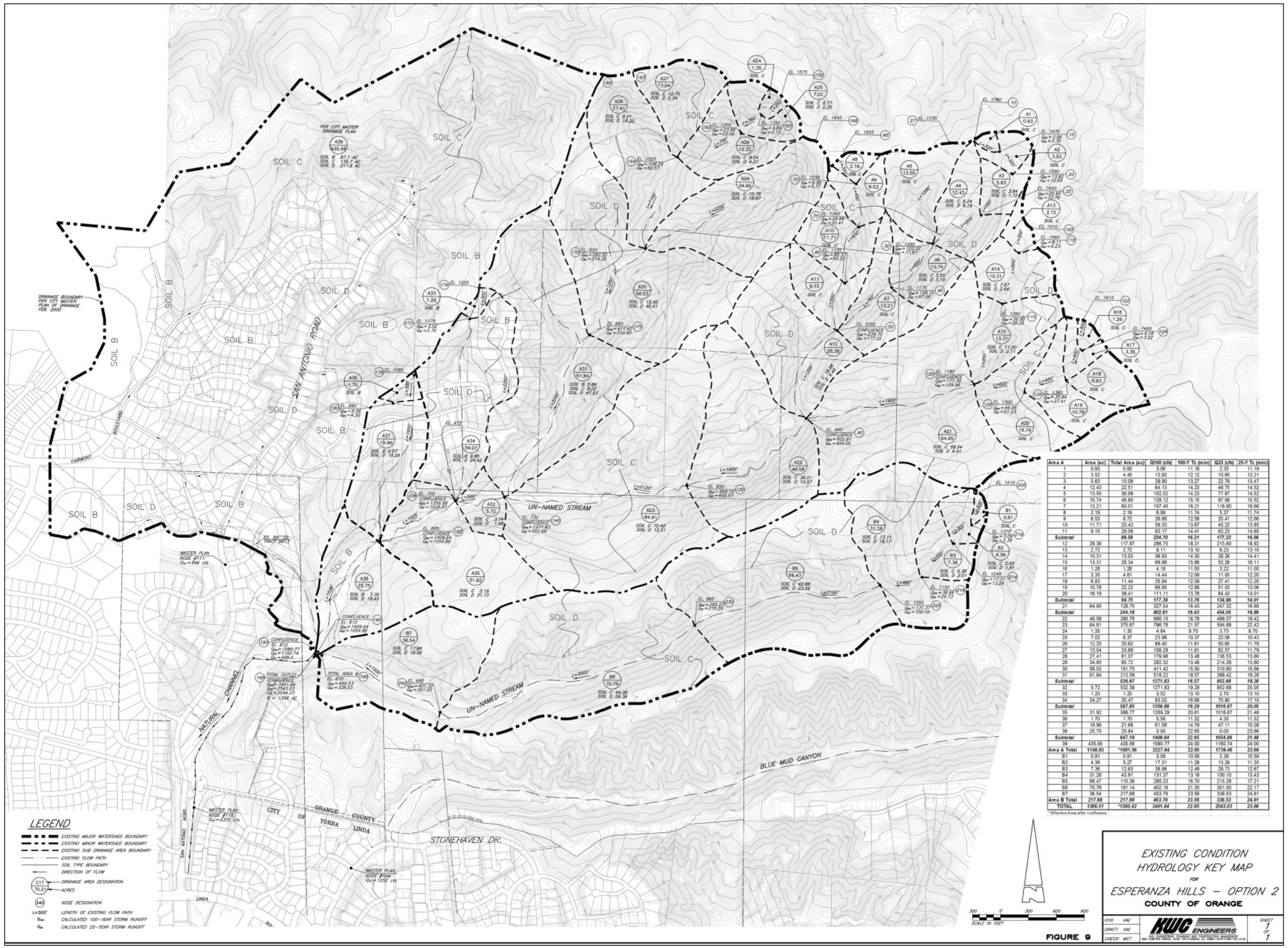
[16] *Code of Federal Regulations*, Title 40, §131.3(i))

Area A	Area (ac)	Total Area (ac)	Q100 (cfs)	100-Y Tc (min)	Q25 (cfs)	25-Y Tc (min)
1	0.93	0.93	3.06	11.19	2.35	11.19
2	3.52	4.45	13.92	12.12	10.65	12.21
3	5.63	10.08	29.90	13.27	22.79	13.47
4	12.43	22.51	64.13	14.23	48.75	14.52
5	13.55	36.06	102.52	14.23	77.87	14.52
6	10.74	46.80	128.12	15.15	97.08	15.52
7	13.21	60.01	157.40	16.21	118.90	16.66
8	2.19	2.19	6.99	11.74	5.37	11.74
9	6.53	8.72	26.66	12.58	20.41	12.66
10	11.71	20.43	59.33	13.67	45.22	13.85
11	9.15	29.58	83.17	14.41	63.23	14.65
Subtotal		***89.59***	***234.70***	***16.21***	***177.22***	***16.66***
12	28.38	117.97	286.75	18.31	215.60	18.92
13	2.72	2.72	8.11	13.10	6.23	13.10
14	10.31	13.03	36.93	14.30	28.26	14.41
15	13.31	26.34	69.98	15.86	53.26	16.11
16	1.26	1.26	4.18	11.00	3.22	11.00
17	3.35	4.61	14.44	12.09	11.05	12.20
18	6.83	11.44	35.84	12.09	27.41	12.20
19	10.78	22.22	66.95	12.88	51.03	13.06
20	16.19	38.41	111.11	13.76	84.43	14.01
Subtotal		***64.75***	***177.39***	***13.76***	***134.96***	***14.01***
21	64.95	129.70	327.54	16.43	247.32	16.89
Subtotal		***244.18***	***607.81***	***16.43***	***454.95***	***16.89***
22	46.58	290.76	666.15	18.78	499.57	19.42
23	84.91	375.67	796.78	21.57	594.88	22.42
24	1.35	1.35	4.84	8.70	3.73	8.70
25	7.02	8.37	23.98	10.37	22.09	10.43
26	12.25	20.62	66.40	11.61	50.65	11.79
27	13.04	33.66	108.29	11.61	82.57	11.79
28	27.41	61.07	179.96	13.48	136.53	13.80
29	34.65	95.72	282.32	13.48	214.26	13.80
30	56.03	151.75	411.42	15.50	310.90	15.98
31	61.84	213.59	518.22	18.57	389.42	19.28
Subtotal		***526.67***	***1271.83***	***18.57***	***952.68***	***19.28***
32	5.72	532.39	1271.83	19.29	952.68	20.05
33	1.20	1.20	3.52	13.10	2.70	13.10
34	34.27	35.47	93.02	16.69	70.80	17.10
Subtotal		***567.85***	***1356.98***	***19.29***	***1016.87***	***20.05***
35	31.92	599.77	1359.29	20.61	1016.87	21.48
36	1.70	1.70	5.56	11.52	4.30	11.52
37	19.96	21.66	61.56	14.79	47.11	15.08
38	25.75	25.84	0.00	22.65	0.00	23.66
Subtotal		***647.19***	***1409.64***	***22.65***	***1054.86***	***21.48***
39	435.56	435.56	1580.77	24.00	1160.74	24.00
Area A Total	**1148.83**	****1081.56***	**2327.94**	**22.65**	**1739.46**	**23.66**
B1	0.91	0.91	3.09	10.59	2.38	10.59
B2	4.36	5.27	17.31	11.28	13.28	11.35
B3	7.36	12.63	38.96	12.49	29.73	12.67
B4	31.28	43.91	131.37	13.19	100.10	13.43
B5	66.47	110.38	285.23	16.70	215.29	17.21
B6	70.76	181.14	402.16	21.30	301.00	22.17
B7	36.54	217.68	453.76	23.56	338.53	24.61
Area B Total	**217.68**	***217.68***	***453.76***	***23.56***	***338.53***	***24.61***
TOTAL	***1366.51***	****1300.42***	***3401.84***	***22.65***	***2543.03***	***23.66***

* Effective Area after confluence

	Area (sf)	Area (ac)	Total Area (ac)	Q100 (cfs)	100-Y Tc (min)	Q25 (cfs)	25-Y Tc (min)
K1	55600	1.28	1.28	4.10	11.65	3.16	11.65
K2	171993	3.95	5.23	15.97	12.60	12.22	12.69
K3	1208368	27.74	32.97	95.31	13.77	72.60	13.97
K4	612348	14.06	47.03	136.12	13.77	103.73	13.97
K5	2206918	50.66	97.69	259.54	18.01	196.98	18.38
K6	3521778	80.85	178.54	430.84	18.66	324.99	19.23
K7	2818661	64.71	243.26	535.47	21.57	401.65	22.36
Subtotal		***243.26***	***243.26***	***535.47***	***21.57***	***401.65***	***22.36***
K8	101421	2.33	2.33	8.23	10.15	6.36	10.15
K9	1768408	40.60	42.93	138.04	11.84	106.55	11.77
K10	4558265	104.64	147.57	404.66	15.16	309.64	15.55
Subtotal		***390.83***	***390.83***	***873.40***	***15.16***	***657.74***	***15.55***
K11	2843268	65.27	456.10	956.67	17.68	717.26	18.26
K12	5542582	127.30	583.40	1092.81	22.61	813.70	23.56
K13	2794732	64.16	647.56	1139.94	25.47	845.57	26.66
Total		***647.56***	***647.56***	***1139.94***	***25.47***	***845.57***	***26.66***

Exhibit 5-84 – Existing Condition Hydrology Key Map and Hydrology Summary Table – Option 1



Area A	Area (ac)	Total Area (ac)	Q100 (cfs)	100-Y Tc (min)	Q25 (cfs)	25-Y Tc (min)
1	0.93	0.93	3.06	11.19	2.35	11.19
2	3.52	4.45	13.92	12.12	10.85	12.21
3	5.63	10.08	29.90	13.27	22.79	13.47
4	12.43	22.51	64.13	14.23	48.75	14.52
5	13.55	36.06	102.52	14.23	77.87	14.52
6	10.74	46.80	128.12	15.15	97.08	15.52
7	13.21	60.01	157.40	16.21	118.90	16.66
8	2.19	2.19	8.99	11.74	5.37	11.74
9	6.53	8.72	26.66	12.58	20.41	12.66
10	11.71	20.43	59.33	13.67	45.22	13.85
11	9.15	29.58	83.17	14.41	63.23	14.65
Subtotal		**89.59**	**234.70**	**16.21**	**177.22**	**16.66**
12	28.38	117.97	286.75	18.31	215.60	18.92
13	2.72	2.72	8.11	13.10	6.23	13.10
14	10.31	13.03	36.93	14.30	28.26	14.41
15	13.31	26.34	69.98	15.86	53.26	16.11
16	1.26	1.26	4.18	11.00	3.22	11.00
17	3.35	4.61	14.44	12.09	11.05	12.20
18	6.83	11.44	35.84	12.09	27.41	12.20
19	10.78	22.22	66.95	12.88	51.03	13.06
20	16.19	38.41	111.11	13.76	84.43	14.01
Subtotal		**64.75**	**177.39**	**13.76**	**134.96**	**14.01**
21	64.95	129.70	327.54	16.43	247.32	16.89
Subtotal		**244.18**	**602.81**	**16.43**	**454.05**	**16.89**
22	46.58	290.76	695.15	18.78	499.57	19.42
23	84.91	375.67	796.78	21.57	594.88	22.42
24	1.35	1.35	4.84	9.70	3.73	9.70
25	7.02	8.37	23.98	10.37	22.09	10.43
26	12.25	20.62	66.40	11.61	50.65	11.79
27	13.04	33.66	108.29	11.61	82.57	11.79
28	27.41	61.07	179.96	13.48	136.53	13.80
29	34.65	95.72	282.32	13.48	214.26	13.80
30	56.03	151.75	411.42	15.50	310.90	15.98
31	61.84	213.59	518.22	18.57	389.42	19.28
Subtotal		**526.67**	**1271.83**	**18.57**	**952.68**	**19.28**
32	5.72	532.38	1271.83	19.29	952.68	20.05
33	1.20	1.20	3.52	13.10	2.70	13.10
34	34.27	35.47	93.02	16.89	70.80	17.10
Subtotal		**567.85**	**1356.98**	**19.29**	**1016.87**	**20.05**
35	31.92	599.77	1359.29	20.61	1016.87	21.48
36	1.70	1.70	5.56	11.52	4.30	11.52
37	19.96	21.66	61.56	14.79	47.11	15.08
38	25.75	25.84	0.00	22.65	0.00	23.66
Subtotal		**647.19**	**1409.64**	**22.65**	**1054.88**	**21.48**
39	435.56	435.56	1580.77	24.00	1160.74	24.00
Area A Total	**1148.83**	***1081.56**	**2327.94**	**22.65**	**1739.46**	**23.66**
B1	0.91	0.91	3.09	10.59	2.38	10.59
B2	4.36	5.27	17.31	11.28	13.38	11.35
B3	7.36	12.63	38.96	12.49	29.73	12.67
B4	31.28	43.91	131.37	13.19	100.10	13.43
B5	66.47	110.38	285.23	16.70	215.29	17.21
B6	70.76	181.14	402.16	21.30	301.00	22.17
B7	36.54	217.68	453.76	23.56	338.53	24.61
Area B Total	**217.68**	**217.68**	**453.76**	**23.56**	**338.53**	**24.61**
TOTAL	**1366.51**	***1300.42**	**2781.84**	**22.65**	**2543.03**	**23.66**

* Effective Area after confluence

Exhibit 5-85– Existing Condition Hydrology Key Map and Hydrology Summary Table – Option 2

Numeric water quality criteria for receiving waters have been established by EPA in the form of the National Toxics Rule (NTR)[17] and the California Toxics Rule (CTR)[18]. The NTR and the CTR provide water quality criteria that apply to receiving waters with certain beneficial uses specified for them. The CTR implementation plan does not apply to storm water discharges; instead, those discharges are regulated through municipal storm water permits and state storm water permits.

Discharges of pollutants into waters of the United States are not allowed, except in accordance with the permitting program of the Clean Water Act, the NPDES. Authority to implement and administer the NPDES program in California largely has been delegated by EPA to the state and regional water quality control boards. NPDES permits have been issued that apply to storm water discharges from large municipal storm sewer systems, specific industrial activities, and large construction activities. The County of Orange holds an NPDES permit governing its storm sewer systems. Also, the State of California has issued an NPDES permit relating to construction sites. The Proposed Project is within the jurisdiction of the RWQCB-SA. In May 2011 the RWQCB-SA approved the NPDES requirements under Order #R8-2009-030 and NPDES Permit #CA5618030. The County, as well as the City, and subsequently the Proposed Project, will be required to comply with the current waste discharge requirements.

Narrative and numeric water quality objective criteria are contained in the Basin Plan issued by RWQCB-SA. The Basin Plan establishes designated uses and water quality objectives for surface waters in the basin. The Municipal Separate Storm Sewer System Permit (R8-2009-0030 and CAS618030) (MS4 Permit for Santa Ana Region) establishes waste discharge requirements for Orange County, the Orange County Flood Control District and the incorporated cities of Orange County (including the City). The MS4 Permit relies primarily on the 2003 Orange County Drainage Area Management Plan (DAMP), which sets forth Best Management Practices (BMPs) and other water quality control measures to establish effluent limits for storm water discharges to the municipal storm drain system. The DAMP was written to meet permitting requirements by the RWQCB-SA and is administered by the County. The DAMP is the principal policy and guidance document of the countywide NPDES storm water program, and is designed to achieve compliance with Basin Plan standards through BMPs. BMPs are procedures designed to minimize the release of pollutants. In December 2012, the County released the "Orange County Stormwater Program Construction Runoff Guidance Manual," which updates County BMPs.[19]

NPDES permits require effluent limits necessary to meet water quality standards for pollutants that may cause or contribute to an exceedance of a state water quality standard[20]. NPDES permits may establish enforceable effluent limitations on discharges, require monitoring of discharges, designate reporting requirements, or

---

17 *Code of Federal Regulations*, Title40 §131.36

18 *Code of Federal Regulations*, Title 40 §131.38

19 Orange County Stormwater Program Construction Runoff Guidance Manuel, December 2012 https://media.ocgov.com/gov/pw/watersheds/documents/bmp/constructionactivities.asp (accessed July 2013)

20 *Code of Federal Regulations*, Title 40, §122.44

require the permittee to implement BMPs. BMPs may be used in addition to numeric effluent limitations, or, in some cases, in lieu of numeric effluent limitations. When application of numeric effluent limitations is technically infeasible, such as in permits governing storm water discharges, effluent limitations are expressed as BMPs.

Where, despite the issuance of NPDES permits containing effluent limitations, water quality standards are not being achieved and the beneficial uses are not being met, the Clean Water Act requires identifying and listing that water body as "impaired" under Section 303(d). Once a water body has been deemed "impaired," a Total Maximum Daily Load (TMDL) must be developed for that water body. A TMDL is an estimate for the total load of pollutants, from point (discharges to air or water at a single location), non-point, and natural sources that a water body may receive without exceeding applicable water quality standard. Once established, the TMDL is allocated among current and future dischargers into the water body. Santa Ana River Reach 2 is listed as Unknown Toxicity and Indicator Bacteria (2010, 303d, List and Pollutants of Concern) related to the Proposed Project. A Watershed Infiltration and Hydromodification Management Plan (WIHMP) has not been issued for the Santa Ana River as of the date of this writing. However, for North Orange County, Susceptibility Analysis Santa Ana River from the Orange County Watershed Master Plan, there are susceptible channels downstream of the site and, therefore, there is a Hydrologic Condition of Concern (HCOC). An HCOC is identified when changes in the existing condition may cause an increase in sediments due to an increase in velocity or the amount of water entering the channel. The existing discharge point is an unstable earthen channel that is identified as the channel in the City's open space adjacent to San Antonio Road. Therefore, the Proposed Project will be designed to reduce sediment for the identified HCOC.

The County of Orange approved in concept the Conceptual Water Quality Management Plan (CWQMP) in May 2013. Prior to issuance of any grading permit, a Final Water Quality Management Plan (WQMP) for the Proposed Project will be prepared to comply with the Orange County Municipal Separate Storm Sewer System (MS4) permit and the County of Orange DAMP. The DAMP requires preparation of a project-specific Final WQMP in connection with new development projects and addresses post-construction, long-term water quality issues. The DAMP contains New Development BMPs as well as other applicable programs, such as fertilizer management and efficient irrigation programs.

In 2009, the SWRCB adopted order No., 2009-0009-DWQ, NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, NPDES No. CAS000002 Construction General Permit (CG Permit). The CG Permit requires that construction sites with one acre or greater of soil disturbance apply for coverage for discharges under the CG Permit, developing a Storm Water Pollution Prevention Plan (SWPPP), implementing BMPs to address construction site pollutants, and complying with the monitoring requirements of the CG Permit. The objectives of the SWPPP are to identify the sources of sediments and other pollutants from the construction site that affect the quality of storm water discharges, and to describe the practices to reduce sediments and other pollutants in storm water discharges generated from the construction site.

2. Master Plan of Drainage Facilities

a. Orange County Master Plan of Drainage

The Orange County Esperanza Master Plan of Drainage, dated April 4, 1973, identifies drainage facilities for the Proposed Project Site Area. The Esperanza Channel is the regional drainage facility planned to improve flood control and conveyance from the southern slopes of the Puente Hills to the Sana Ana River.

The County prepared a Hydrology Report for the Esperanza Channel in 1977 providing proposed pipe design sizing for these facilities. As a result, the Orange County Flood District constructed Facility E06 as shown in Exhibit 5-83 – Orange County Flood Control District, Existing Facilities (page 5-345 above). Orange County drainage facilities E06-existing, P07, P08, P04, and S01 are identified within the Project Site Area.

County public storm drain lines facilities that are to be owned and maintained by Orange County Public Works shall be designed to convey the 100-year storm event.

Project private storm drain lines shall be designed based on the Orange County Local Drainage Manual criteria as listed below.

Protection Levels:

- Storm drains with tributary area less than 640 acres are to be designed for a minimum of 10-year storm event frequency below top of curb using a combination of street and storm drain flow.
- In sump conditions, catch basins and the connecting storm drains should be designed to a 25-year storm event frequency.
- Habitable structures shall have 100-year storm event flood protection.
- Minimum acceptable freeboard for catch basins from gutter flow line and detention basins from top of slope is 2.0 feet.

b. Yorba Linda Master Plan of Drainage

The City of Yorba Linda Master Plan of Drainage, dated February 2000, is based on the Orange County Esperanza Hills Master Plan and includes a hydrologic analysis for the 10-year storm event for the Proposed Project Area to identify conceptual drainage improvements from anticipated development. The City's criteria for a storm drain, in order to be considered as a master planned facility, are for the storm drain facility to provide protection to prevent flood damage to properties and require a minimum of a 39-inch diameter reinforced concrete pipe.

The Master Plan of Drainage is based on the Yorba Linda General Plan (Yorba Linda GP) ultimate land use of open space with a small portion of the site as residential at a density of 0.5 to 18 dwelling units per acre. The calculated 10-year storm event proposed flow at Aspen Way was determined to be 1,813 cfs,

with an area of 956 acres. This results in a ratio of 1.9:1 between the peak flow rate and the drainage area for the 10-year storm event. This study also includes capital improvement project master plan drainage facilities, M-1 (P07 of county study) and M-2 (P08 of county study) that are located on the Project Site. The alignment of these facilities, overlaid onto the Proposed Site Plan for Option 1, with pipe sized for the 10-year storm event, is shown on Exhibit 5-86 – Master Plan Proposed Facilities.

The master plan provides an estimated cost analysis and concludes that the development fee for these proposed facilities is $14,000 per acre. It is anticipated that storm drainage fees for the Proposed Project and reimbursements will be determined during final engineering.

5.8.3 Thresholds of Significance

For the purposes of this DEIR, the thresholds of significance for evaluating project impacts are based upon suggested criteria from the CEQA Environmental Checklist (Appendix G of the CEQA Guidelines) and policies of the County of Orange. The project would result in a significant impact if it would:

a) Violate any water quality standards or waste discharge requirements.
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on-site or off-site.
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in a substantial increase in the rate or amount of surface runoff in manner which would result in flooding on-site or off-site.
e) Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff.
f) Otherwise substantially degrade water quality.
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.

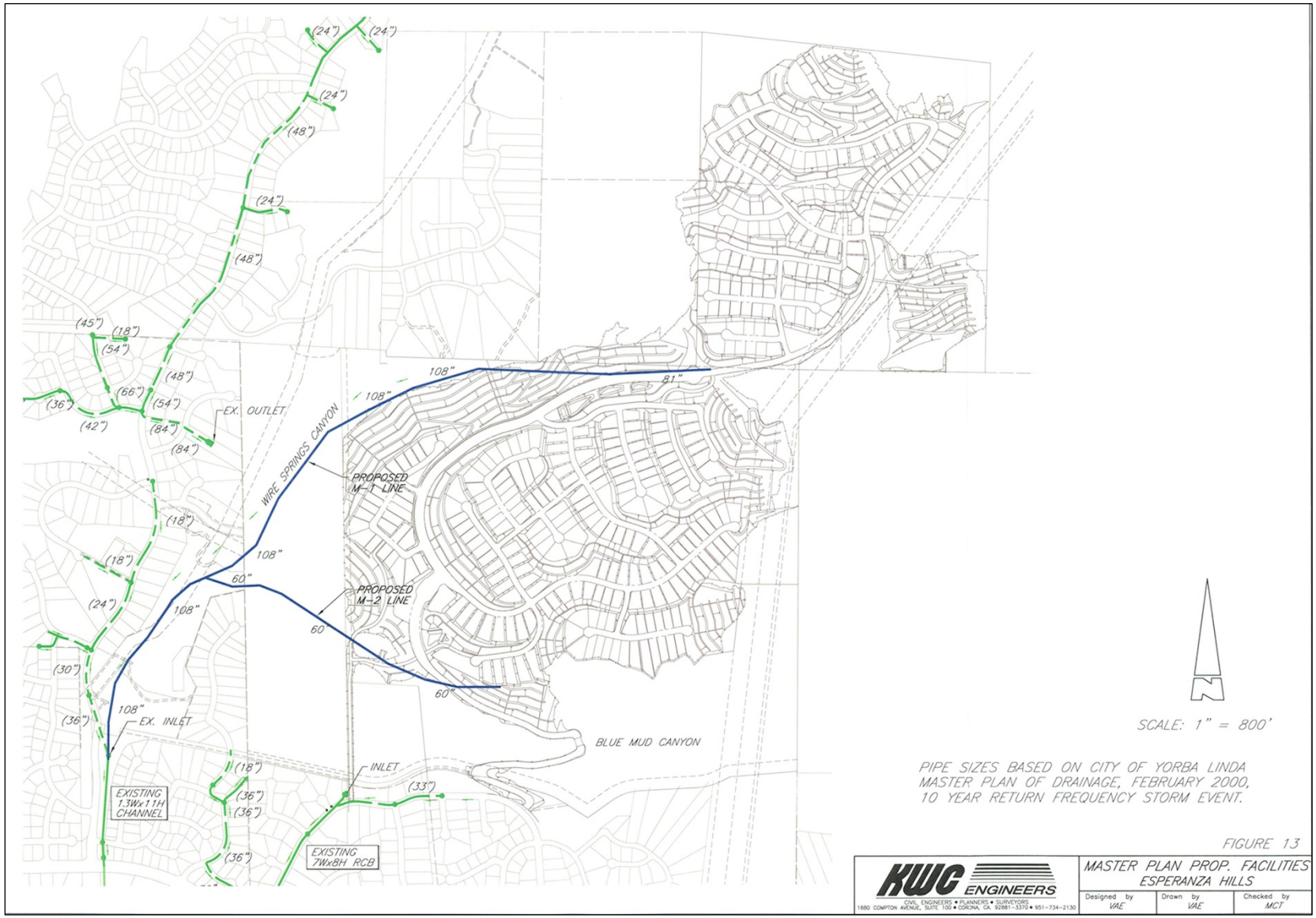


Exhibit 5-86– Master Plan Proposed Facilities

h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows.

i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam, or inundation by seiche, tsunami or mudflow.

5.8.4 Project Impacts Prior to Mitigation

The Proposed Project has been designed with two entry street options:

- Option 1, Stonehaven Drive – 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. Option 1 is designed for 334 residential lots, including 2 estate lots.
- Option 2, Aspen Way – Option 2 would provide a primary connection going west from the site to Aspen Way, which then connects to San Antonio Road. Option 2 is designed for 340 residential lots, including 2 estate lots.

The Proposed Project will also include a gate house, private streets, driveways, and two underground water reservoirs. These items could potentially increase the imperviousness of the Project Area and, combined with the storm drain system, could alter the hydrologic response to storm events. The impermeable surface associated with each option is as follows:

- Option 1 – The total site area is 468.9 acres. In the post-project condition the Proposed Project will add approximately 77.2 acres (17%) of impervious area, which is made up of 46.6 acres of private streets and 30.6 acres of rooftops and driveways. The graded area is 328.9 acres and the impermeable surface will be approximately 23% of the graded area with 140.0 acres open space.
- Option 2 – The total site area is 468.9 acres. In the post-project condition the Proposed Project will add approximately 73.0 acres on-site and 2.6 offsite for a total of 75.6 acres (16%) of impervious area. The offsite impervious area is the entry extension from Aspen Way. The 73.0 acres onsite of impervious area is made up of 41.8 acres of private streets and 31.2 acres of rooftops and driveways. The graded area is 317.6 acres and the impermeable surface will be approximately 21% of the graded area with 151.3 acres open space.

The Project does not propose storage facilities, parking lots, or any commercial facilities. All landscape maintenance equipment, chemicals, supplies, and materials will be brought on-site as needed for a specific day of work. The Project does not propose any community facilities such as laundry, car wash areas, swimming pools, clubhouse, or restrooms.

Approximately 15 to 16 million cubic yards of remedial grading is associated with the Proposed Project for the development of residential, open space, and park pads along with supporting roadway grades. The Proposed Project grading and development will result in fill placement in Canyon B and Canyon C, thus substantially altering the existing drainage pattern on the site that, unless Project Design Features are incorporated into the Proposed Project, would result in substantial erosion or siltation (earth matter carried by moving or running water) on-site or off-site.

The Proposed Project has the potential to increase runoff volume, decrease infiltration, change time concentration, increase downstream erosion, and adversely impact downstream structures, which would be considered a significant impact if not mitigated by the design features. Storm water runoff can be divided into two categories:

1. *Dry weather urban runoff* occurs when there is no precipitation-general runoff. Typical sources include landscape irrigation runoff, driveway and sidewalk washing, noncommercial vehicle washing, groundwater seepage, fire flow, potable water line operations and maintenance discharges, and permitted or illegal non-storm water discharges.
2. *Wet weather urban runoff* refers collectively to non-point source (water and air pollution from diffuse sources) discharges that result from precipitation events, including storm water runoff. Storm water discharges are generated by runoff from land and impervious areas such as paved streets and building rooftops during rainfall events, which often contain pollutants in quantities that could adversely affect water quality. Most urban storm water discharges are considered non-point sources and are regulated by a National Pollution Discharge Elimination System (NPDES) Municipal General Permit or Construction General Permit.

Urbanization and the increase in population density from the Proposed Project will increase the potential for storm water runoff to be contaminated by human activities associated with the change in land use. Potential pollutants of concern include motor vehicle operations, oil and grease residue, fertilizers; chemicals associated with gardening, landscaping, household cleaners, and solvents, and increased coliform levels associated with household pets. These pollutants are more efficiently mobilized and transported by impervious surfaces on the site and the storm drain system. Pollutants such as pesticides may also be mobilized into the storm drain system during dry weather (excess irrigation and fertilizer/pesticides). Potential storm water pollutants that could result from implementation of the Proposed Project include suspended solids/sediments, nutrients, heavy metals (due to streets), pathogens, pesticides, oil and grease, toxic organic compounds (due to streets), and trash and debris.

The evaluation of potential impact is based on the following for a two-year frequency storm event because an HCOC exists for the Proposed Project:

- Increases in runoff volume;
- Decreases in infiltration;
- Changes in time of concentration;
- Potential for increases in post-development downstream erosion; and
- Potential for adverse downstream impact on physical structure.

The following is an analysis of the impacts on hydrology and water quality for Option 1 and Option 2. Each option has a unique hydrology footprint and design as well as water quality design features. This analysis will present information on both options when they differ.

1. Hydrological Modeling Results

a. Option 1 Facilities Description

Storm water flows will enter the Project Site at upper elevations from off-site canyons and will be directed to four proposed basins, including two debris basins (#1 and #2) and two detention/debris facilities (#3 and #4), which are designed to detain the volume of storm water runoff for a minimum of 48 hours to allow particles and associated pollutants to settle. The street catch basins on-site, which are maintained by the homeowners' association (HOA), connect to the on-site storm drain system. The publicly maintained proposed on-site storm drain system will leave the Project Site in two locations into existing natural canyons at the property line. The four debris basins, Outlet Structure #1 and Outlet Structure #2 are shown on Exhibit 5-87 – Proposed Storm Drain Facilities, Option 1).

At each outlet structure, an energy dissipater and an erosion protection rip-rap pad designed per Orange County Public Works guidelines will reduce the discharge velocity to slower than the existing condition to lessen the potential for downstream erosion of the proposed Cielo Vista project and the City's open space. With the construction of the outlet structure the Proposed Project will not erode the downstream canyon.

To determine the hydrology characteristics of the Proposed Project for modeling purposes, the land use type of two dwelling units per acre was selected for the developed areas, and undeveloped (dense cover) was selected for the open space/landscaped areas. This results in an analysis that is consistent with the overall project density of 0.73 dwelling units per acre. The soils map from the hydrology manual was overlaid on the proposed condition hydrology maps and soil type areas were calculated for each sub-area.

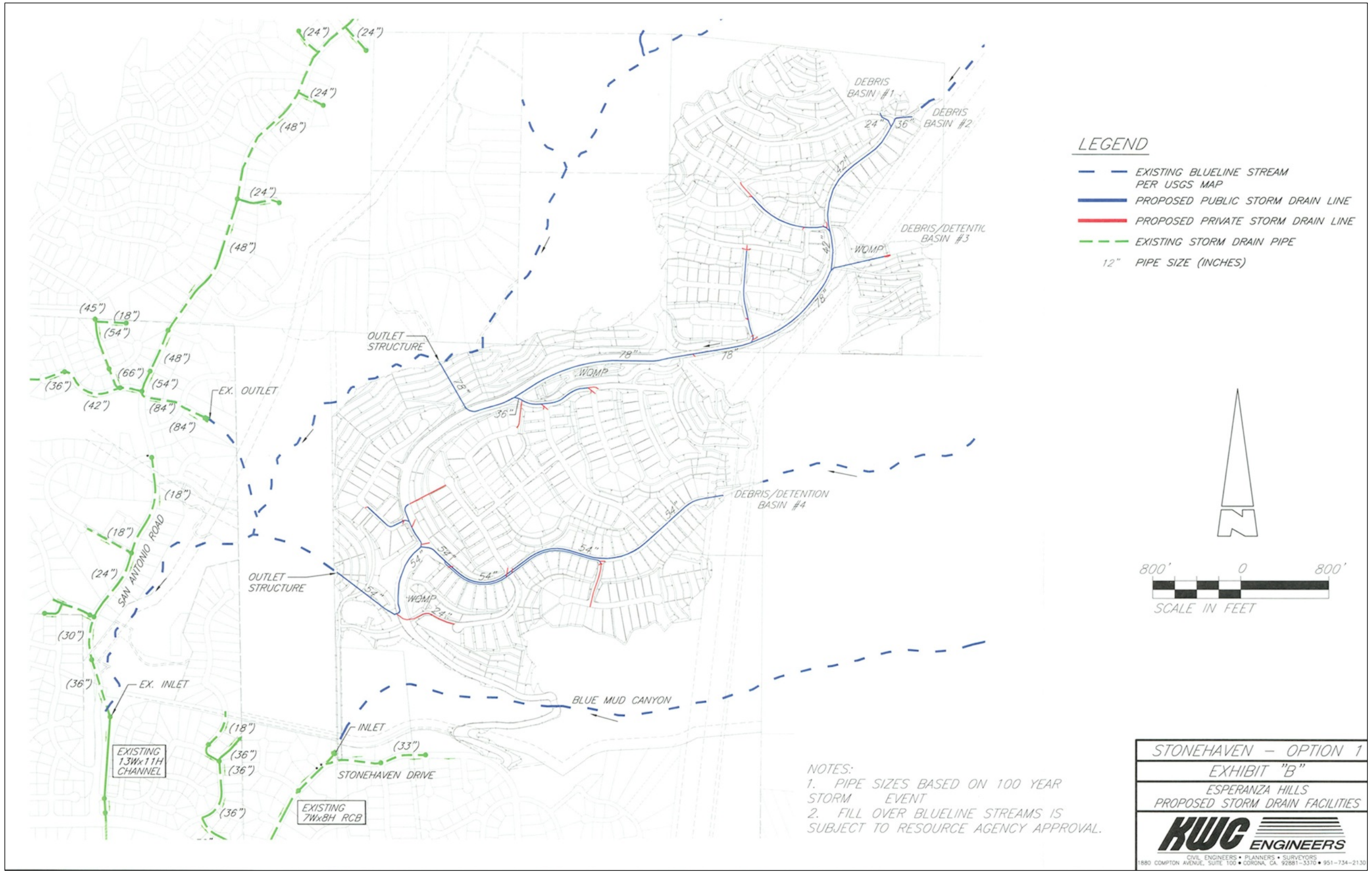


Exhibit 5-87 – Proposed Storm Drain Facilities, Option 1

The drainage area of the Option 1 development plan comprises 889.6 acres and generates 2,112 cfs in the 100-year storm event, 1,598 cfs in the 25-year storm event and 1,283 in the 10-year storm event, which is conveyed through the site and outlets at the property line. This corresponds generally to a 1.4:1 ratio between the peak flow rate and the drainage area for the 10-year storm event which is less than the master planned ratio of 1.9:1. Therefore, there will be less storm water runoff than predicted in the Yorba Linda Master Plan of Drainage. In fact, the master plan predicted more development in this tributary area than is currently proposed. Therefore, the discharge from the Proposed Project Site in Option 1 is less than what was predicted in the Master Plans.

The storm water design for Option 1 has two detention/debris basins, #3 and #4, that are designed to intercept the off-site storm water flow to reduce volume and velocity as it enters into the Proposed Project. The detention basins shall include a restricted outlet riser designed to Orange County Public Works standards. Table 5-8-1 below identifies the basin area, depth, and volume of storm water provided by each detention basin.

Table 5-8-1 Detention Basin Summary, Option 1

Tributary Area	Basin #	Area of Basin	Depth of Basin	Volume Provided
A	3	19,000 square feet	6 feet	2.6 acre-feet
B	4	21,000 square feet	6 feet	2.9 acre-feet

Table 5-8-2 below provides a summary of the Detention Basin Analysis for each outlet structure associated with Proposed Project Option 1. The table provides the tributary area, the drainage area discharge (Q), volume associated with the storm event frequency, and the velocity of the discharge.

Table 5-8-2 Summary of Outlet Structures #1 and #2 – Option 1

	Existing Condition	Proposed Condition without Mitigation	Difference (Proposed-Existing)	Proposed Condition with Mitigation
Structure #1				
Area (acres)	676.4	677.2	0.8	677.2
Q 25 cubic feet per second	1041.7	1167.7	126.0	1041.7
Q 100 cubic feet per second	1393.6	1551.2	157.6	1393.6
Vol. 25 (acre-feet)	165.2	135.9	-29.2	135.9
Vol. 100 (acre-feet)	288.9	252/2	-36/7	252.2
Vel. 25 (feet per second)	12.7	12/4	-0.3	5 *
Vel. 100 (feet per second)	13.7	13.3	-0.4	5 *
Structure #2				
Area (ac.)	206.4	212.5	6.1	212.5
Q 25 (cfs)	332.2	431.0	98.8	332.2
Q 100 (cfs)	444.5	561.6	117.1	444.5
Vol. 25 (acre-feet)	52.3	45.2	-7.1	45.2
Vol. 100 (acre-feet)	91.2	80.8	-10.3	80.8
Vel. 25 (feet per second)	10.2	69.5	59.3	5 *
Vel. 100 (feet per second)	11.0	73.8	62.8	5 *

*Energy Dissipater and erosion protection rip rap shall be designed in Final Engineering to lessen the velocity in proposed condition with mitigation.

The table shows that with the detention/debris basins (#3 and #4), as designed, the discharge velocity will be reduced to slower than the existing condition through incorporation of an energy dissipater and an erosion protection rip-rap pad located prior to the storm water flow exiting from the outlet structure. The area associated with Outlet Structure #2 is increased by 6.1 acres, because with implementation of the Proposed Project, 6.1 acres that currently drain into Blue Mud Canyon will be graded to drain through the development.

An analysis of the 10-year, 24-hour storm event was also conducted. The difference in peak flow for the worst case scenario is the 10-year 24-hour event at 174 cfs between the proposed and existing conditions. Comparing the proposed and existing condition hydrograph results in a detention volume of 5.5 acre-feet to mitigate the peak flow, as reflected in Table 5-8-1 above. As shown in Table 5-8-1, Detention/Debris Basin #3 with a volume capacity of 2.6 acre-feet and Detention/Debris Basin #4 with a volume capacity of 2.9 acre-feet are designed to provide a capacity of 5.5 acre-feet.

Option 1 facilities include four WQMP basins that incorporate Low Impact Development (LID) techniques to treat pollutants and HCOC that safely bypass the large storm events with a storm drain pipe. Refer to Section 5.8.4.8, Low Impact Development Features (page 5-376) for a description of WQMP basins.

b. Option 2 - Facilities Description

The storm water flows will enter the Project Site at upper elevations from off-site canyons and will be directed to four proposed debris basins. Basin #3 will serve as a debris/detention basin. Privately maintained street catch basins on-site will connect to the publicly maintained on-site storm drain system. The Option 2 storm drain system proposes to exit the Project Site in a pipe or reinforced concrete box culvert under the extension of Aspen Way at the flow line of the existing canyon, as shown on Exhibit 5-88 – Proposed Storm Drain Facilities, Option 2. The outlet structure will include an energy dissipater and erosion protection rip-rap pad designed per Orange County Public Works guidelines to reduce the discharge velocity to slower than the existing condition to lessen the potential for erosion of the downstream open space property in the City. With the construction of the outlet structure the Proposed Project will not erode the downstream canyon.

The proposed drainage area at the local point of discharge from the Project Site comprises 610.1 acres and generates 1,445 cfs in the 100-year storm event, 1,090 cfs in the 25-year storm event, and 857 cfs in the 10-year storm event which is conveyed through the site and exits from the culvert under Aspen Way. This corresponds generally to a 1.41 ratio between the peak flow rate and the drainage area for the 10-year storm event which is below the master planned ratio. In fact, the master plan predicted more development in this tributary area than is currently proposed. Therefore, the proposed discharge from the Project Site is in conformance with the Master Plans.

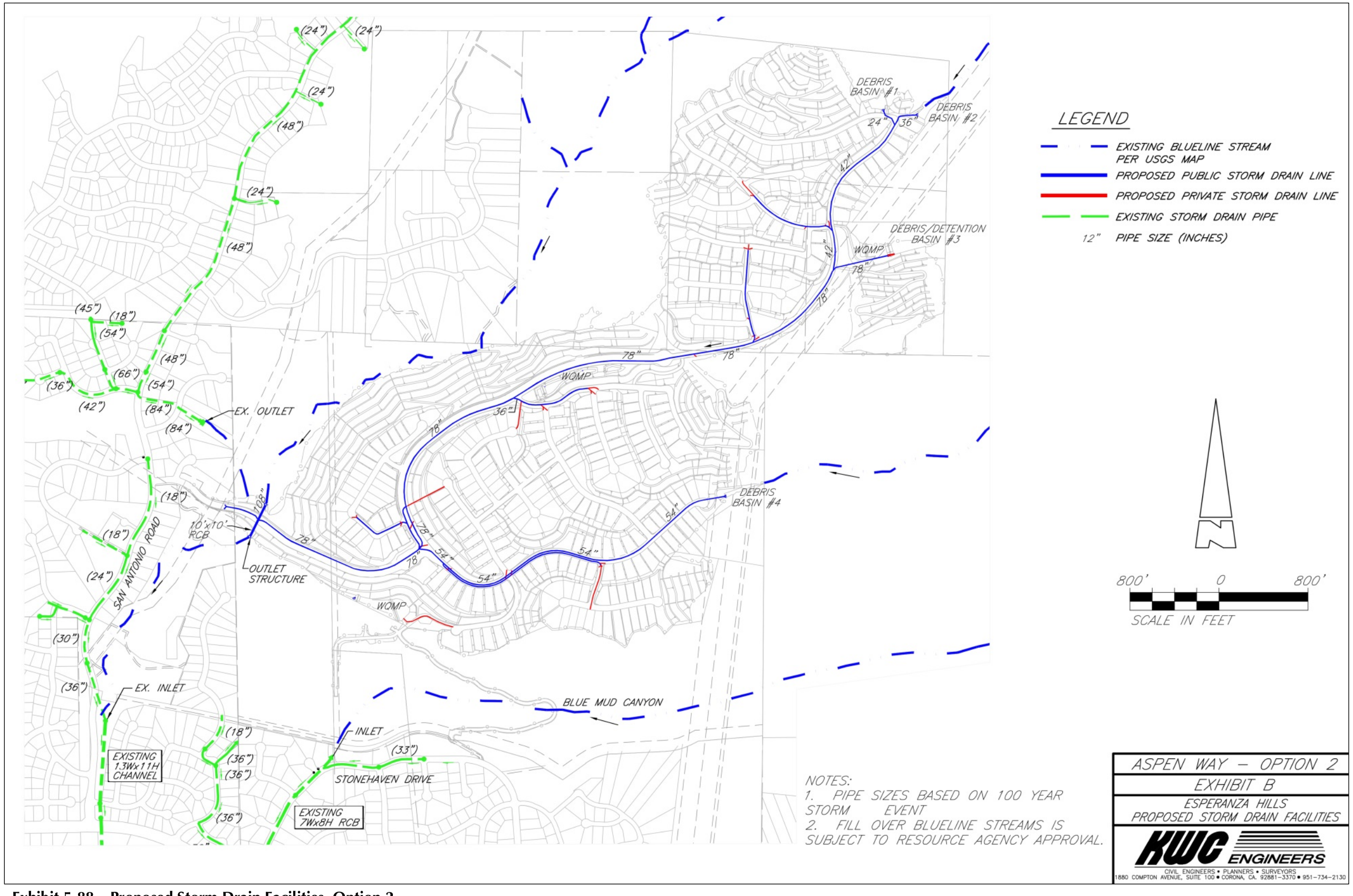


Exhibit 5-88 – Proposed Storm Drain Facilities, Option 2

Detention Basin #3 shall be designed to reduce volume and velocity of storm water runoff from higher off-site areas as it enters the Proposed Project Site. The detention basin will include a restricted outlet riser designed to Orange County Public Works standards.

Table 5-8-3 identifies the basin area, depth, and volume of storm water provided by the detention basin detention volume of 5.1 acre-feet to mitigate the peak flow.

Table 5-8-3 Detention Basin Summary, Option 2

Tributary Area	Basin #	Area of Basin	Depth of Basin	Volume Provided
A	3	28,000 square feet	8 feet	5.1 acre-feet

Table 5-8-4 provides a summary of the Detention Basin Analysis for the outlet structure associated with Proposed Project Option 2. The table provides the tributary area, the drainage area discharge (Q), volume associated with the storm event frequency, and the velocity of the discharge.

Table 5-8-4 Detention Basin Analysis, Option 2

	Existing Condition	Proposed Condition without Mitigation	Difference (Proposed-Existing)	Proposed Condition with Mitigation
Area (acres)	610.1	610.1	0	610.1
Q 25 (cubic feet per second)	991.1	1,148.3	157.2	991.1
Q 100 (cubic feet per second)	1,352.3	1,269.3	-83.0	1,269.3
Vol. 25 (acre-feet.)	113.7	122.3	8.6	113.7
Vol. 100 (acre-feet)	221.9	226.3	4.4	221.9
Vel. 25 (feet per second)	11.7	54.5	42.8	5 *
Vel. 100 (feet per second)	12.6	59.3	46.7	5 *

*Energy dissipater and erosion protection rip rap pad shall be designed in Final Engineering to lessen velocity in proposed condition with mitigation.

The table shows that with Detention/Debris Basin #3 the storm water discharge characteristics are the same or less when compared to the existing condition. The storm water velocity has been reduced with the incorporation of an energy dissipater and an erosion protection rip rap pad that is located prior to the storm water flow exit from the outlet structure.

The differences in volume in acre-feet between 25-year 24-hour storms and 100-year 24-hour storms are minor with the proposed condition a little more than the existing condition. However, the difference in flow increases by 157.2 cfs in the 25-year 24-hour storm. Therefore, a detention basin is required.

Comparing the proposed and existing condition hydrograph results in a detention volume of 5.1 acre-feet to mitigate the peak flow. As indicated in Table 5-8-3 above, Basin #3 has been designed to provide a detention capacity of 5.1 acre-feet.

2. On-Site Storm Drain System

The on-site storm drain system for Option 1 and Option 2 shall be owned and maintained by Orange County Public Works. If annexation of the Proposed Project Area into the City of Yorba Linda occurs, the ownership of the on-site storm drain systems would transfer to the City. Preliminary on-site drainage facilities for the Proposed Project were calculated by the rational method hydrology program and are presented in Table 5-8-5, Summary of Drainage Facilities, Option 1 and Table 5-8-6, Summary of Drainage Facilities, Option 2. The estimated sizes of these facilities and their approximate locations are intended for conceptual purposes only and will be refined in the design review and final engineering process. Pipe sizes from the debris basins are based on the 100-year storm event. Pipes were designed as reinforced concrete pipe in an open channel flow condition. Hydraulic calculations will be performed in the final engineering phase of the Proposed Project once an access option has been selected for the project.

Table 5-8-5 provides a description of proposed drainage facilities and the maintenance responsibilities for Option 1.

Table 5-8-5 Summary of Drainage Facilities, Option 1

Type of Storm Drain Facility	Street Name	Approximate Length of Facility	Approximate Size of Facility	Maintenance Responsibility
Debris Basins (3)	-	-	3± acres total	HOA
Detention / Debris Basin #3	-	-	10.33 acre park	HOA
Water Quality Basins (4)	-	-	3± acres total	HOA
SD Pipe	Outlet Structure #1 to Debris Basin #3	4710’	78’	OCPW*
SD Pipe	“S” Street	720’	24” – 36”	OCPW*
SD Pipe	“X” Street	770’	24” – 36”	OCPW*
SD Pipe	“W” Street	1540’	42”‘	OCPW*
SD Pipe	“EE” Street	810’	18” – 30”	OCPW*
SD Pipe	“W” Street to Debris Basin #1	170’	24”	OCPW*
SD Pipe	“W” Street to Debris Basin #2	240’	36”	OCPW*
SD Pipe	Outlet Structure #2 to Esperanza Hills Pkwy.	1360’	54”	OCPW*
SD Pipe	Esperanza Hills	440’	30” – 36”	OCPW*
SD Pipe	“B” & “C” Streets	460’	18” – 24”	OCPW*
SD Pipe	“G” & “K” Streets	3130’	54”	OCPW*
SD Pipe	“G” Street	1600’	24” – 36”	OCPW*
SD Pipe	All other laterals and catch basins	-	18”	OCPW*
SD Pipe	All pipes to & from WQ basins	-	18”	OCPW*

* Pending approval from Orange County Public Works

Table 5-8-6 provides a description of proposed drainage facilities and the maintenance responsibilities for Option 2.

Table 5-8-6 Summary of Drainage Facilities, Option 2

Type of Storm Drain Facility	Street Name	Approximate Length of Facility	Approximate Size of Facility	Maintenance Responsibility
Debris Basins (3)	-	-	3± acres total	HOA
Detention/Debris Basin #3	-	-	10.33 acre park	HOA
Water Quality Basins (4)	-	-	3± acres total	HOA
Box Culvert	Aspen Way	300'	20' X 10'	OCPW*
SD Pipe	Aspen Way	355'	18" + 2 CBs	OCPW*
SD Pipe	Aspen Way	1600'	78"	OCPW*
SD Pipe	"G" & "K" Streets	3130'	54"	OCPW*
SD Pipe	"G" Street	1590'	30"'	OCPW*
SD Pipe	"B" & "C" Streets	540'	18" – 24"	OCPW*
SD Pipe	Esperanza Hills Parkway	450'	18" – 30"	OCPW*
SD Pipe	Esperanza Hills Parkway to Debris Basin #3	5690'	78"	OCPW*
SD Pipe	"S" Street to	710'	18" - 36"	OCPW*
SD Pipe	"X" Street	840'	24" - 36"	OCPW*
SD Pipe	"W" Street	1520'	42"	OCPW*
SD Pipe	"W" Street to Debris Basin #2	240'	30" – 36"	OCPW*
SD Pipe	"W" Street to Debris Basin #1	170'	24"	OCPW*
SD Pipe	All other laterals and catch basins	-	18"	OCPW*

* Pending approval from Orange County Public Works

Catch basins and storm drain laterals were placed at locations to keep the 25-year storm event flow below the top of curb and the 100-year storm event flow below the right-of-way. Catch basins are also placed in locations so that a single 21-foot-long (the largest size) catch basin can collect a majority of the projected street flow without bypassing to the next downstream catch basin. Preliminary sizing calculations are included in the Drainage Reports (Appendix K). Catch basins will be sized in the final engineering phase of the project once an access option has been selected for the project. The Proposed Project has been designed appropriately to meet the required design criteria.

3. Street Capacity

Preliminary on-site street capacity for Option 1 and Option 2 were calculated using the computer program FlowMaster by Bentley. The street sections as shown on the TTM that range from 44 to 90 feet were analyzed with variable street grades (1% to 10%). Flow to the top of curb was determined for the 25-year storm event street capacity and flow to the right of way was determined for the 100-year storm event, for the full street and the half street. The storm drain mainline pipes are sized for the 100-year storm event; therefore, the street will only contain local flows until catch basins intercept the 100-year storm event flow. The street capacity analysis with the rational method flows determined that the street sections are sufficient to meet the street capacity criteria established by Orange County Public Works. The street capacity is

also capable of conveying the flow in the unlikely situation that the proposed underground water reservoirs were to rupture. The Proposed Project street capacity has been designed to contain the predicted storm event design criteria.

4. Hydrological Conditions – Post-Development

The Proposed Project has been designed per the Orange County Public Works standards for local storm drain systems. Peak flows were calculated per the 1986 Orange County Hydrology Manual, Modified Rational Method and runoff volumes were calculated using the Unit Hydrograph Method. The CivilD 2005 computer software was used to generate the models and aerial topography was used to create the hydrology maps. Debris basins were sized using the ACOE Los Angeles District Method.

The conceptual drainage and water quality design features for the Proposed Project include the following. Any differences between Option 1 and Option 2 are identified.

- Debris Basins – Off-site storm water from the upper eastern canyons will flow into four debris basins which will be maintained by the HOA. Local private storms drain laterals will connect into the public mainline system.
- WQMP basins will include a Sediment Forebay, a level spreader dirt berm, sand and gravel layers, perforated underdrains, and an outlet structure. The outlet structure, a concrete box of CMP riser with a grate at the top, will allow the two-year volume to be treated and will provide for overtopping relief of the basin.
- Detention Basins – Basins #3 and #4 in Option 1 and Basin #3 in Option 2 will serve as detention basins for the site, sized large enough to detain the increase in peak flow from 10-year, 25-year, and 100-year storm events associated with the development. The detention basin will include a restricted outlet riser designed per Orange County Public Works standards.
- Bypass manholes will divert the two-year flow to private pipes discharging into private WQMP basins to treat the urban runoff for water quality requirements prior to connecting back to the on-site public storm drain system, while higher flows will continue down the storm drain pipe.
- Storm Drain Mainline Pipes – Public storm drain pipes within private streets designed per Orange County Public Works guidelines, will convey the 100-year storm event flow southwesterly within the project. The storm drain mainline pipes are proposed to be maintained by Orange County Public Works.
- Private Storm Drain Lateral Pipes – Local private storm drain laterals will connect curb opening catch basins to the public mainline. The private storm drain laterals, including pipes from the WQMP basins and catch basins will be maintained by the HOA.

- Storm flows and treated two-year flows will discharge out the storm drain system via energy dissipaters into existing channels.
- Outlet Structure –At the outlet of the public storm drain system an energy dissipater and erosion protection rip-rap pad designed per Orange County Public Works and other agency standard guidelines will reduce the discharge velocity to slower than the existing condition to reduce the potential for erosion of the downstream properties of the proposed Cielo Vista project and the City of Yorba Linda Open Space. With the construction of the outlet structure(s), the Proposed Project will not erode the downstream canyon.

Storm water discharge from the storm drain will flow through the existing downstream natural canyon prior to flowing into the existing Orange County Flood Control facility E06, a 13′ wide by 11′ high reinforced concrete box located southwest of the Project Site adjacent to San Antonio Road.

5. Summary of Drainage System Designs

The difference in the two options concerning drainage system design is summarized below.

- Option 1 proposes to outlet the public storm drain mainline at two locations into existing natural canyons prior to the property boundary. At the outlet of the public storm drain systems, an energy dissipater and an erosion protection rip-rap pad designed per Orange County Public Works and other agency standard guidelines will reduce the discharge velocity to slower than the existing. Option 1 has two detention basins of 19,000 square feet with a capacity of 2.6 acre-feet and 21,000 square feet with a capacity of 2.9 acre-feet, as described in Table 5-8-1 on page 5-363).
- Option 2 proposes a storm drain mainline to one outlet into an existing natural canyon at the downstream end of the proposed culvert at the extension of Aspen Way. At the outlet of the public storm drain system, an energy dissipater and an erosion protection rip-rap pad designed per Orange County Public Works and other agencies' standard guidelines will reduce the discharge velocity to slower than the existing. Option 2 has one detention basin of 28,000 square feet with a capacity of 5.1 acre-feet.

6. Short-Term Construction Impacts to Water Quality

Approximately 15 to 16 million cubic yards of remedial grading associated with the Proposed Project for the development of residential, open space, and park pads along with supporting roadway grades will occur during the construction phase of the Proposed Project. The removal of native vegetation will be associated with grading, and the potential exposure of large areas of barren soil will result in the increase in erosion and sedimentation impacts on down-gradient streams, thereby increasing the deposition of sediment runoffs into drainage channels and ending up in storm drain

systems. Erosion impacts are most serious along freshly graded slopes during the rainy season.

Grading may expose drilling muds from abandoned oil wells that may include contaminants. Mitigation measures to address soil contaminants from oil well operations are included in Section 5.7, Hazards and Hazardous Materials (beginning on page 5-275) and are included herein. It is anticipated that the grading will be balanced on-site; therefore, no import of soil is anticipated during grading operations. The potential for increased erosion and sedimentation will occur as a result of substantial amounts of cut, fill, and grading activities as the direct result of the proposed development. Construction of residential homes, the gate house, and utilities will also have short-term construction impacts on water quality. Table 5-8-7 below provides a list of potential short-term construction impacts by potential pollutant category.

Table 5-8-7 Potential Pollutants from Construction Activities

Activity	Potential Pollutant Category		
	Sediment/ Erosion	Non-Sediment	Non-Storm Water
Demolition of existing structures	X	X	
Earthwork (e.g., grading; trenching; and excavation, import, export and stockpiling of soil)	X		
Construction of erosion control measures (e.g., desilting basins, storm drain system, sand bag dikes)	X	X	
Underground Utility Installation	X	X	
Concrete waste management (including rock crushing and concrete or pavement recycling)	X	X	
Street sweeping and cleaning	X	X	X
Vehicle and construction equipment storage, cleaning, maintenance, fueling and stored fuel management		X	X
Dewatering			X
Management of contaminated soils	X	X	
Solid and hazardous waste management (including disposal)		X	
Material delivery and storage	X	X	
Portable sanitary and septic waste management		X	

Table 5-8-8 analyzes construction material and equipment that may have a potential to contribute to the discharge of pollutants to storm water or non-storm water discharges. General classes of materials, where applicable, are meant to include the specific.

Table 5-8-8 Potential Construction Material and Equipment Summary

Material/Equipment	Potential Pollutant Category		
	Sediment/ Erosion	Non-Sediment	Non-Storm Water
Concrete and concrete slurry		X	
Curing compounds		X	
Petroleum products		X	
Natural earthen materials (including: sand, sandblast grit, gravel and topsoil)	X	X	
Packaging materials		X	
Paints and solvents		X	
Plaster and other products		X	
Construction debris		X	
Cleaning solutions and detergents		X	
Air conditioning condensate		X	X
Acids		X	
Antifreeze		X	
Adhesives		X	
Portable toilet waste		X	
Waste water from dewatering operations		X	X
Equipment parts and fluids (inducing hydraulic fluid and batteries)		X	
Domestic wastes, food containers and cigarettes		X	
Demolition equipment	X	X	
Earth moving equipment (including: bulldozers, scrapers and compactors)	X	X	
Water Trucks	X	X	X
Concrete trucks	X	X	
Street cleaning trucks (including sweepers)	X	X	X
Delivery and material trucks	X	X	
Cranes	X	X	
Personal vehicles	X	X	

7. Construction Best Management Practices

Prior to the start of grading activities, an SWPPP must be prepared and submitted to the County that addresses two major objectives: 1) to help identify the sources of sediment and other pollutants that affect the quality of storm water discharges; and 2) to describe and ensure the implementation of Best Management Practices (BMPs), such as scheduling of construction activities, maintenance procedures, education/training, and other management practices that reduce or eliminate pollutants in storm water discharges and authorized non-storm water discharges.

BMPs collectively refer to a variety of pollution prevention controls and design techniques implemented throughout the Project Site at various times of the project. BMPs are specifically aimed at controlling pollution in storm water runoff during the construction phase of the project. The major construction BMP categories are Erosion

Control, Sediment Control, Wind Erosion Control, Tracking Control, Non-Storm Water Management, and Waste Management and Materials Pollution Controls. Table 5-8-9 below discusses the titles and basic description of BMPs that might be used on the Project Site to control erosion, sediment, tracking, wind erosion during construction activities.

Table 5-8-9 Sediment and Erosion Control BMPs

Best Management Practice*	General Description
EC 1: Scheduling	Sequencing the project to reduce the amount and duration of soil exposed.
EC 2: Preservation of Existing Vegetation	Controlling erosion through preserving existing trees, shrubs, and/or grasses.
EC 3: Hydraulic Mulch	Stabilizing soil with sprayed on mulch.
EC 4: Hydro seeding	Stabilizing soils with sprayed on seeding and fertilizer.
EC 5: Soil Binders	Chemical stabilizing materials to prevent soil erosion and dust.
EC 6: Straw Mulch	Detaining sediment-laden water and preventing runoff with straw mulch barriers.
EC 7: Geotextiles and Mats	Stabilizing soils with erosion matting of natural and synthetic materials.
EC 8: Wood Mulching	Stabilizing soils and erosion with wood mulching materials in area that vegetation is not appropriate.
EC 9: Earth Dike and Drainage Swales	Managing runoff, desilting, or channeling water with earthen berms.
EC 10: Velocity Dissipation Devices	Reducing runoff velocity and trapping sediment to prevent scour of the soil caused by concentrated, high velocity flows.
EC 11: Slope Drain	Draining slopes and channeling water with pipe drops, down drains or V-ditches.
EC 15: Slope Roughening/Terracing	Reducing runoff velocity and trapping sediment by creating microclimates and increasing infiltration and sedimentation.
EC 16: Non Vegetation Stabilization	Non-vegetative stabilization methods are used for temporary or permanent stabilization of areas prone to erosion and should be used only where vegetative options are not feasible.
SE 1: Silt Fence	Detaining sediment-laden water with, primarily, fabric fencing or fencing combined with sandbags.
SE 2: Sediment Basin	Retaining and detaining sediment laden water.
SE 3: Sediment Trap	Providing sedimentation with excavated bermed areas.
SE 4: Check Dams	Reducing the velocity of water with berms and sandbag dikes.
SE 5: Fiber Rolls	Intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff.
SE 6: Gravel Bag Berms	Intercepts and slows sheet flow runoff, causing temporary ponding
SE 7: Street Sweeping and Vacuuming	Reduces dust and sediments from entering receiving waters.
SE 8: Sand Bag Barriers	Detaining sediment-laden water and preventing hazardous material runoff with sandbag barriers.
SE 9: Straw Bale Barriers	Detaining sediment-laden water with straw bales.
SE 10: Storm Drain Inlet Protection	Stabilizing drain outlets with rock and other velocity and erosion reducing devices.
SE 13: Compost Stock Berms	Three-dimensional biodegradable filtering structures to intercept runoff where sheet flow occurs
SE 14: Biofilter Bags	Detaining flow and allowing a slow rate of discharge through the wood media
TC 1: Stabilizing Entrance and Exit	Stabilizing points of ingress and egress and points where paved and unpaved roads meet.
TC 2: Stabilizing Construction Roadways	Stabilizing vehicle routes through watering, berms or paving.
TC 3: Entrance Outlet Tire Wash	Stabilizing construction access points to remove sediment from tires and under carriages and to prevent sediment from being transported onto public roadways.
WE 1: Wind Erosion Control	Controlling fugitive dust through, primarily, watering exposed areas.

EC = erosion control, SE = sediment control, TC = tracking control, WE = wind erosion control

Table 5-8-10 discusses the titles and basic descriptions of the BMPs that might be used on the Project Site to control non-storm water pollutants and waste management and materials pollution controls (typically, BMPs that deal with contractor activities and practices during construction activities.)

Table 5-8-10 Non-Storm Water and Waste Management BMPs during Construction

Best Management Practice*	General Description
NS 1: Water Conservation Practices	Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants off-site. These practices can reduce or eliminate non-storm water discharges.
NS 2: Dewatering Operations	Regulates disposal of non-storm water
NS 3: Paving Operations	Requires runoff prevention, proper disposal of wastes and employee training
NS 4: Temporary Stream Crossing	A temporary stream crossing is a temporary culvert, ford, or bridge placed across a waterway to eliminate erosion and downstream sedimentation caused by vehicles.
NS 5: Clear Water Diversion	Clear water diversion consists of a system of structures and measures that intercept clear surface water runoff upstream of a project, transport it around the work area, and discharge it downstream with minimal water quality degradation from either the project construction operations or the construction of the diversion.
NS 6: Illicit Connection/Discharge	Procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents.
NS 8: Vehicle and Equipment Cleaning	Requiring off-site cleaning
NS 9: Vehicle and Equipment Fueling	Requires off-site fueling, when possible. Requires on-site fueling in designated or secured areas, discouraging on-site fuel storage, implementing spill controls and requiring employee training.
NS 10: Vehicle and Equipment Maintenance	Compelling off-site maintenance, if possible, on-site maintenance in designated or secured areas, cover for materials stored outside, inspection for leaks and spills, immediate containment of leaks and spills and employee training.
NS 12: Concrete Curing	Discharges of storm water and non-storm water exposed to concrete during curing may have a high pH and may contain chemicals, metals, and fines. Requires procedures and employee training.
NS 13: Concrete Finishing	Storm water and non-storm water exposed to concrete finishing by-products may have a high pH and may contain chemicals, metals, and fines. Proper procedures and implementation of appropriate BMPs can minimize the impact that concrete-finishing methods may have on storm water and non-storm water discharges.
WM 1: Material Delivery	Requiring minimization of materials stored on-site, storage of materials in stabilized or secured areas, storage of certain materials in secondary containment, and employee training.
WM 2: Material Use	Compelling use of alternative products, minimizing of hazardous material use and employee training.
WM 3: Stockpile Management	Stockpile management procedures and practices are designed to reduce or eliminate air and storm water pollution from stockpiles of soil, soil amendments, sand, paving materials such as Portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called “cold mix” asphalt), and pressure treated wood.
WM 4: Spill Prevention Control	Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.
WM 5: Solid Waste Management	Requiring designated waste collection areas, and when possible, the regular and proper disposal of materials and employee training.
WM 6: Hazardous Waste Management	Compelling the minimization of hazardous material use, proper disposal of hazardous materials and employee training.
WM 7: Contaminated Soil Management	Requiring the detection, treatment, and/or disposal of contaminated soils.
WM 8: Concrete Waste management	Requiring off-site washout areas, when possible, designated and secured on-site washout areas and employee training.

Best Management Practice*	General Description
WM 9: Sanitary/Septic Waste Management	Requiring the provision of convenient and well-maintained facilities, placement of those facilities away from paved areas or in secured areas, and provision of regular service and disposal.
WM 10: Liquid Waste Management	Liquid waste management includes procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

NS = non-storm water, WM = waste management

8. Low Impact Development Features

The Proposed Project has been designed to incorporate Low Impact Development (LID) techniques by designing the site grading to respect the existing drainage boundaries for each canyon, to provide for WQMP basins to treat pollutants and HCOC, and to safely bypass the large storm events with a storm drain pipe. The Simple Method Runoff Coefficient for Volume-Based BMP Sizing was used to calculate the design storm capture volume for each of the five drainage management areas (DMA) within the development area of the Proposed Project. Table 5-8-11 summarizes the characteristics of each DMA for each option.

Table 5-8-11 Drainage Management Area Characteristics

	Basin	Area (acres)	Impervious Ratio	Design Capture Volume (acre-feet)
Option 1	1	60.3	0.24	1.49
	2	45.0	0.23	1.08
	3	55.7	0.29	1.53
	4	107.1	0.28	2.90
	5	6.6	0.56	0.50
Option 2	1	60.3	0.24	1.49
	2	45.0	0.23	1.08
	3	55.7	0.29	1.53
	4	118.0	0.26	3.05
	5	6.6	0.56	0.31

Due to the steepness of the site grading, with most proposed streets above 5% grade, BMPs that require flatter grades could not be used. In consideration of the landslide potential of the steep existing and proposed slopes on-site, the earthwork required to grade the site, the shallow bedrock on-site, and the site primarily consisting of Type D soils, infiltration BMPs are not feasible for this project. Therefore, Dry Extended Detention Basins were chosen as the primary BMP for treatment of the hydrology conditions of concern (HCOC).

Dry extension detention basins are designed to detain the volume of storm water runoff from a water quality design storm for a minimum of 48 hours to allow particles and associated pollutants to settle. Additional pollutant removal is provided by maximizing the opportunity for the volume to infiltrate, evaporate, and surface wet. Unlike wet ponds, these facilities do not have a large permanent pool. Storm water enters the basin through a forebay where any trash, debris, and sediment accumulate for easy removal. The Proposed Project includes formation of an HOA that will be

responsible for compliance with the CWQMP as identified in Table 5-8-5 (page 5-368) and Table 5-8-6 (page 5-369). Flows from the forebay enter the basin, which will be vegetated with native shrubs, plants, and small trees to create an ecological garden for local residents to enjoy. Low flows or incidental dry weather flows will be conveyed to the basin bottom to be treated and absorbed through an engineered soil mulch layer designed to filter and absorb pollutants so they do not enter the gravel and the sub-drain layer that connects to the storm drain system. Any additional flows will be detained in the basin for an extended period by incorporation of an outlet structure that is more restrictive to extend the drawdown times, which results in further settlement of particles.

Exhibit 5-89– Esperanza Hills CWQMP Best Management Practices – Option 1, Stonehaven Drive and Exhibit 5-90– Esperanza Hills CWQMP Best Management Practices Exhibit – Option 2, Aspen Way provide the graphic area of each DMA and the locations of proposed water quality detention basins. The drainage design includes the following features:

- Existing upstream canyons will drain into four proposed debris basins that serve as the upstream end of the on-site storm drain system. One of these basins will be designed as the detention basin to mitigate the 10-, 25-, and 100-year storm events.
- Street catch basins on-site connect to an on-site public storm drain system.
- Bypass manholes will divert the two-year flow to private pipes discharging into private WQMP basins to treat the urban runoff for water quality requirements prior to connecting back to the on-site public storm drain system while higher flows will continue down the storm drain pipe
- WQMP basins will include a sediment forebay, a level spreader dirt berm, sand and gravel layers, perforated under-drains, and an outlet structure. The outlet structure, a concrete box or a CMP riser with a grate at the top, will allow the two-year volume to be treated and will provide for overtopping relief of the basin.
- Storm flows and treated two-year flows will discharge out of the storm drain system via energy dissipaters into existing channels.

The proposed WQMP basins are designed to capture the storm water volume as represented by the design capture volume (DCV). Table 5-8-12 below demonstrates that 75% of the DCV can be met by the WQMP basins and 25% of the DCV can be met in the sediment forebay for each option.

Table 5-8-12 Design Capture Volume

	Basin	Basin Area (square feet)	Basin Depth (feet)	Basin Volume (acre-feet)	75% DCV (acre-feet)
Option 1	1	22,000	2.5	1.26	1.11
	2	8,700	5	1.00	0.81
	3	14,300	4	1.31	1.15
	4	12,400	6*	2.18	2.18
Option 2	1	22,000	2.5	1.26	1.11
	2	8,700	5	1.00	0.81
	3	14,300	4	1.31	1.15
	4	33,400	4	3.07	2.29
	Basin	**Forebay Area (square feet)**	**Forebay Depth (feet)**	**Forebay Volume (acre-feet)**	**25% DCV (acre-feet)**
Option 1	1	7,000	2.5	0.40	0.37
	2	6,000	2.5	0.34	0.27
	3	6,000	3.0	0.41	0.38
	4	5,900	6.0	0.73	0.73
Option 2	1	7,000	2.5	0.40	0.37
	2	6,000	2.5	0.34	0.27
	3	6,000	3.0	0.41	0.38
	4	20,400	2.5	1.17	0.76

*A 3.5-foot-thick gravel subgrade included to obtain the required DCV

9. Hydromodification Control BMPs

The Proposed Project was analyzed for HCOC impacts of increased volume, time of concentration, infiltration, and erosion between the existing and proposed conditions. The Proposed Project has been designed to collect the two-year storm within four basins, as described above. Each basin was analyzed specifically for impacts to HCOC. The total volume of runoff for the 2-year, 24-hour storm event increased from the existing to the proposed condition by 6.21 acre-feet. The time of concentration decreased from the existing condition to the proposed condition an average of seven minutes without mitigation. The infiltration potential for the Proposed Project increased from the existing condition because of the flat residential pads with landscaping, landscaped parkways along streets, and four basins allowing runoff time for infiltration. The erosion impact decreased as compared to the existing condition in steep slopes prone to erosion and landslides, and the proposed condition includes stabilized grading, landscaping, streets, and flat residential pads associated with the Project design.

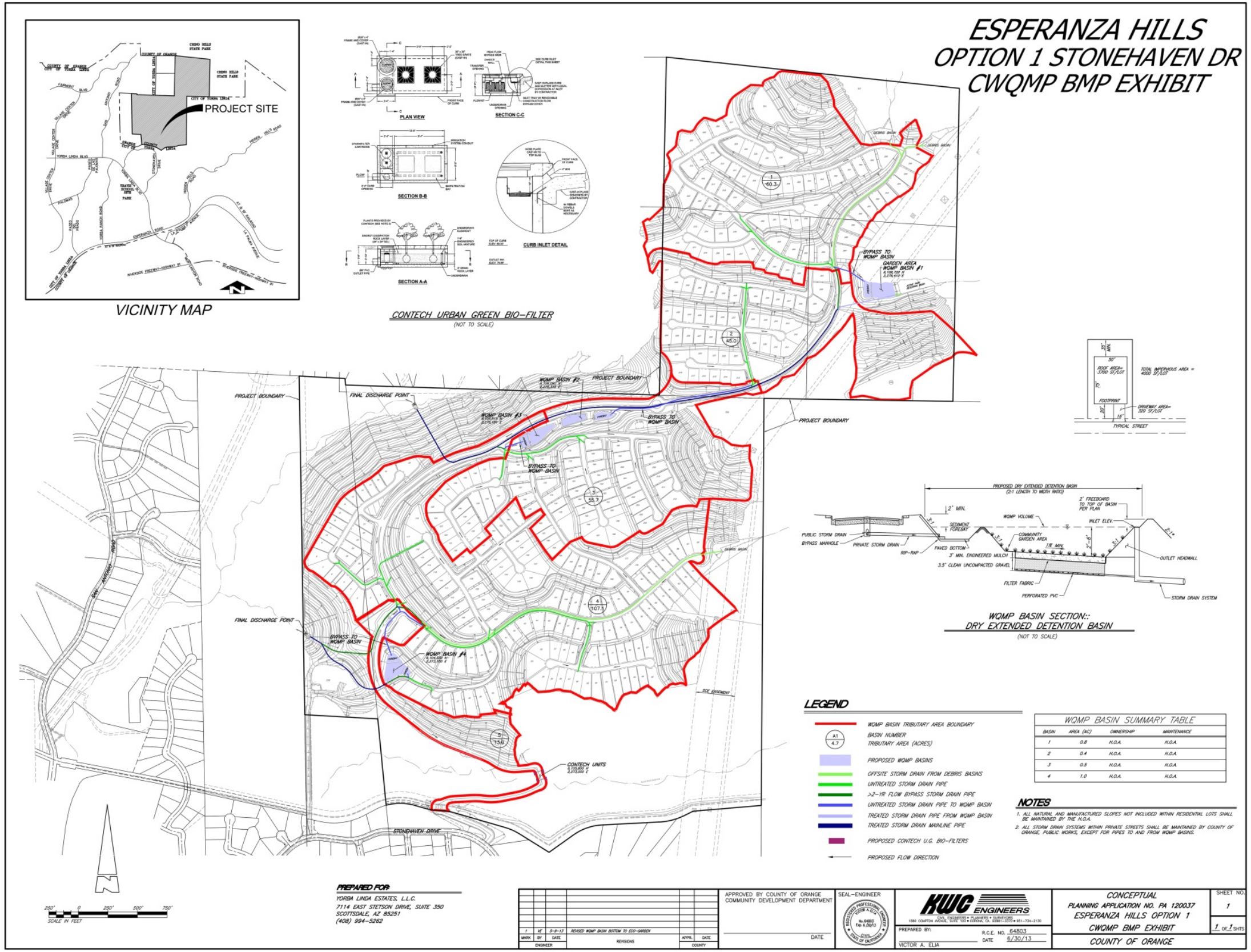


Exhibit 5-89 – Esperanza Hills CWQMP Best Management Practices – Option 1, Stonehaven Drive

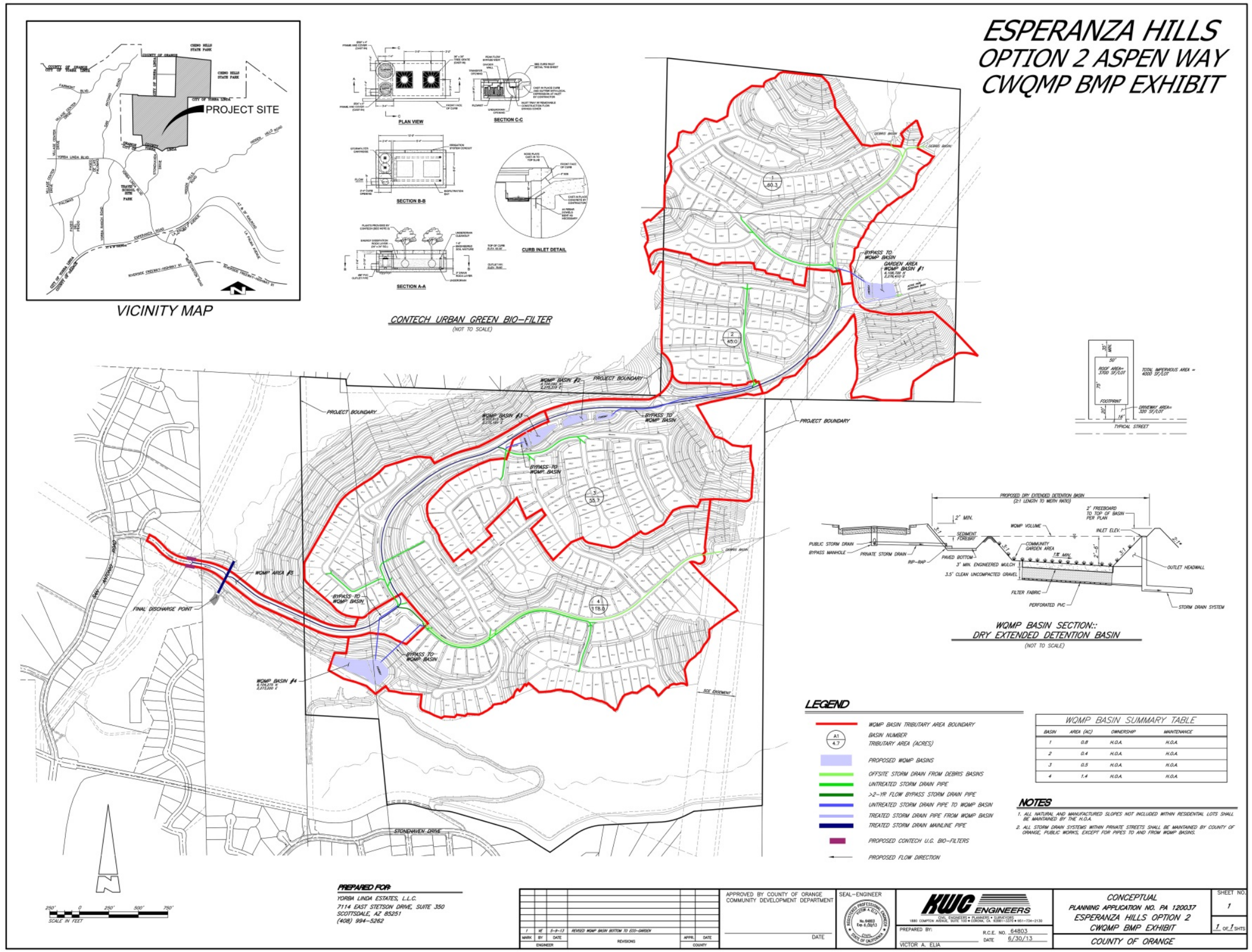


Exhibit 5-90 – Esperanza Hills CWQMP Best Management Practices Exhibit – Option 2, Aspen Way

As shown in Exhibit 5-91 – Conceptual WQMP Bio-Retention Basin #2, dry extended detention basins are designed to detain the volume of storm water runoff for a minimum of 48 hours to allow particles and associated pollutants to settle. Additional pollutant removal is provided by maximizing the opportunity for the volume to infiltrate, evaporate, and surface wet. Unlike wet ponds, these facilities do not have a large permanent pool. Storm water enters the basin through a forebay where any trash, debris, and sediment accumulate for easy removal. Flows from the forebay enter into the basin, which will be vegetated with native shrubs, plants, and small trees. As shown on Exhibit 5-92 – Section Dry Extended Detention Basin, low flows or incidental dry weather flows will be conveyed to the basin bottom to be treated and absorbed through an engineered soil mulch layer designed to filter and absorb pollutants so they do not enter the gravel and sub-drain layer that connects to the storm drain system. Any additional flows will be held in the basin for an extended period by incorporating an outlet structure that is sized to detain the peak flow to match the existing condition via a restricted outlet, which results in further settlement of particles.

10. Bio-Treatment BMP Features

Small portions of each development option cannot be treated with WQMP basins; therefore, a bio-treatment BMP is proposed.

- Under Option 1, a 13-acre tributary area that drains into Blue Mud Canyon on the south side of the Project Site consisting of the entry road and landscaped slopes does not have sufficient space for a WQMP basin; therefore, a proprietary bio-treatment BMP is proposed for this location as shown on Exhibit 5-89 – Esperanza Hills CWQMP Best Management Practices – Option 1, Stonehaven Drive (page 5-379 above) for Area 5.
- Under Option 2, Aspen Way access, the low point for the drainage areas is found in Area 5, which includes the public entry street located within Cielo Vista's property. Therefore, a BMP that fits within the street has been included in the project design to treat the street runoff prior to discharge into the natural channel downstream from the Project Site as shown on Exhibit 5-90 – Esperanza Hills CWQMP Best Management Practices Exhibit – Option 2, Aspen Way (page 5-381 above).

The proposed bio-treatment BMP for Option 1 and Option 2 is the Contech Urban-Green BioFilter, a precast concrete box with a tree and engineered mulch, to be located at the low point of the street along the curb and gutter prior to the bridge crossing in Option 1 and within the street below the curb and gutter in Option 2. The Contech Urban-Green BioFilter incorporates four levels of treatment: infiltration where the site conditions allow, bio filtration through engineered mulch, pollutant absorption from the planted tree, and media filtration to expand the capacity. For fact sheet and details, refer to "Conceptual Water Quality Management Plan" found in Appendix K of this DEIR.

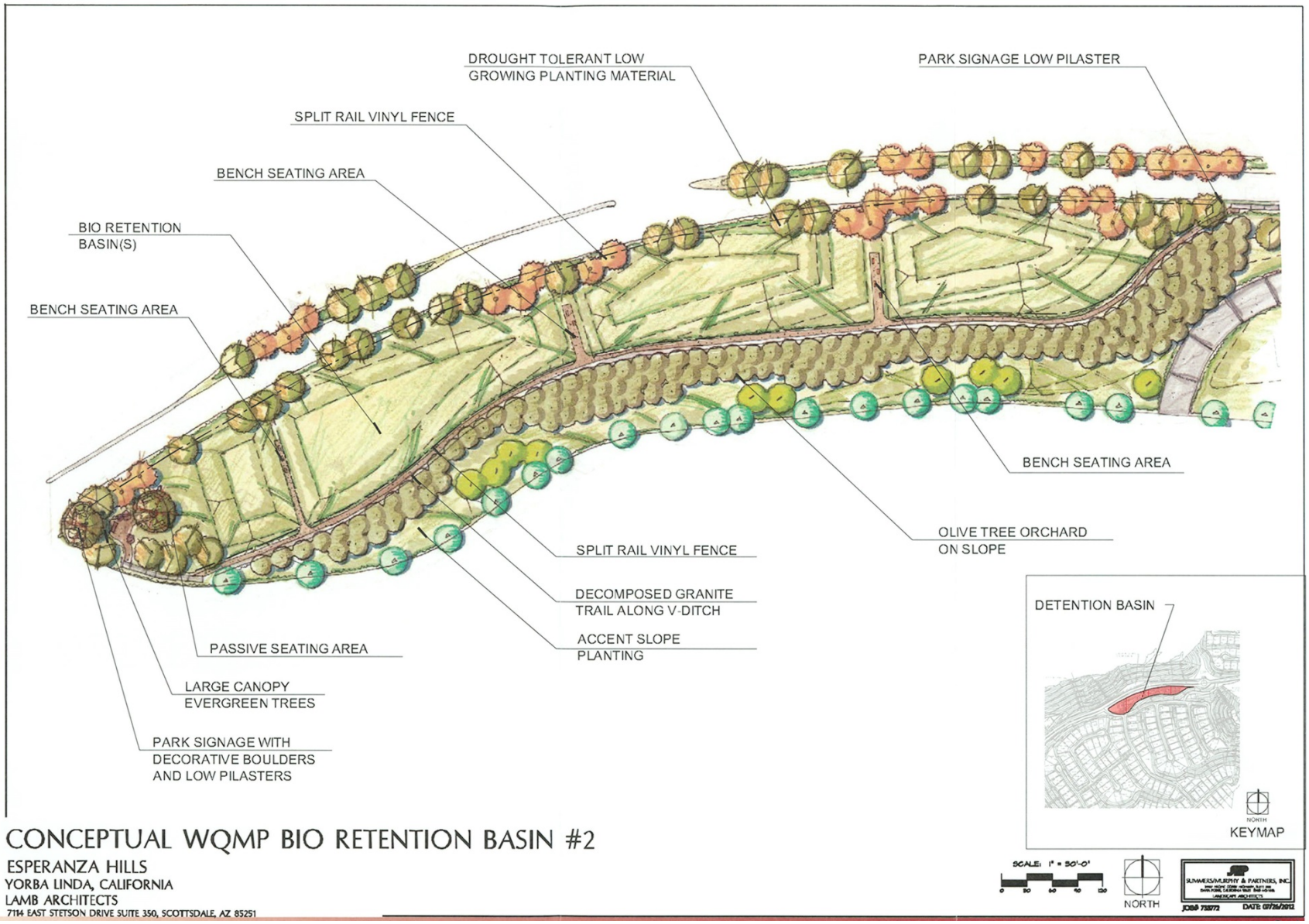


Exhibit 5-91 – Conceptual WQMP Bio-Retention Basin #2

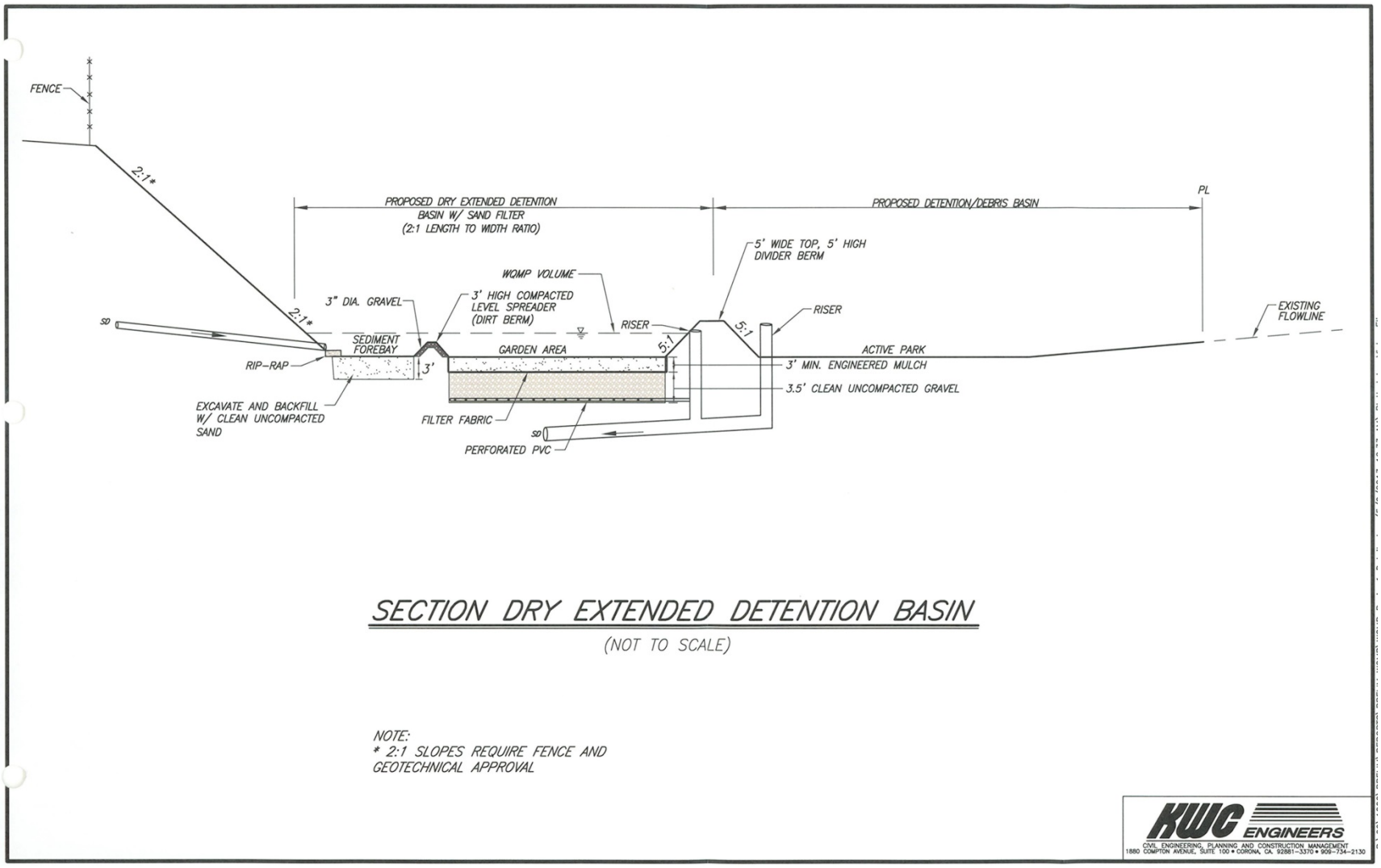


Exhibit 5-92 – Section Dry Extended Detention Basin

11. Source Control BMPs

Source control BMPs reduce the potential for storm water runoff and pollutants from coming into contact with one another. Source Control BMPs are defined as any administrative action, design of a structural facility, usage of alternative materials, and operation, maintenance, inspection, and compliance of an area that aims to eliminate or reduce storm water pollution. Table 5-8-13 and Table 5-8-14 below list applicable Structural and Non-Structural Source Control BMPs for the Proposed Project:

Table 5-8-13 Structural Source Control Best Management Practices for Esperanza Hills Specific Plan

Identifier	Structural Source Control Best Management Practice
S1	Provide storm drain system stenciling and signage
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control
S5	Protect slopes and channels and provide energy dissipation
S12	Hillside landscaping

Table 5-8-14 Non-Structural Source Control Best Management Practices for Esperanza Hills Specific Plan

Identifier	Non-Structural Source Control Best Management Practice
N1	Education for property owners, tenants and occupants
N2	Activity restrictions
N3	Common area landscape management
N4	BMP maintenance
N11	Common area litter control
N15	Street sweeping private streets and parking lot

A complete description of each applicable Structural and Non-Structural Source Control BMP is provided in the CWQMPs that are included in Appendix K of this DEIR. Final structural and non-structural source control BMPs that will be incorporated into the Proposed Project will be determined with the Final WQMP and incorporated into the Proposed Project's CC&Rs.

12. Project WQMP Basins and BMPs Maintenance

The Proposed Project includes the formation of an HOA that will be responsible for the maintenance of privately (i.e., HOA) maintained streets, parks, natural hillsides, fuel modification zones (FMZs), and landscaped slopes. The HOA will be responsible for compliance with the Final WQMP and the associated Operation and Maintenance Plan that will include maintenance of the WQMP basins and bio-treatment BMP (Contech Urban-Green Filter). Annual inspection prior to the rainy season will be required by the HOA.

13. Flooding/Inundation

As depicted on Exhibit 5-93 – FIRM – Flood Insurance Rate Map, Orange County, the Project Site is designated as "Zone X." Zone X flood areas have been determined to be outside the 500-year flood plain; therefore, the Project Site is not located within any flood zone. As a result, implementation of the Proposed Project will not be subjected to flooding in the event of a 100-year storm event.

There are two underground water reservoir storage tanks proposed with this project consisting of .70 MG located at 1,200 AMSL and will be constructed in Planning Area 1 and .40 MG located at elevation 1,390 AMSL and will be constructed in Planning Area 2. Since the tanks are located underground, inundation from tank rupture is not likely. However, the project designed street capacity could handle water from the underground tank reservoir without flooding. There is no impact from site inundation associated with the underground water reservoir.

5.8.5 Project Design Features

PDF 29 The project has been designed to treat development flows (runoff) with a dry extended detention water quality basin, while implementing the following low impact development techniques:

- Conservation of natural areas, including existing trees, other vegetation and soils
- Keeping streets at minimum standard widths
- Minimizing the impervious footprint of the project
- Minimizing disturbances to natural drainages

PDF 30 The project will be designed to include the following best management practices to promote infiltration and slow down surface flows:

- Impervious area dispersion
- Native drought-tolerant landscaping/efficient irrigation

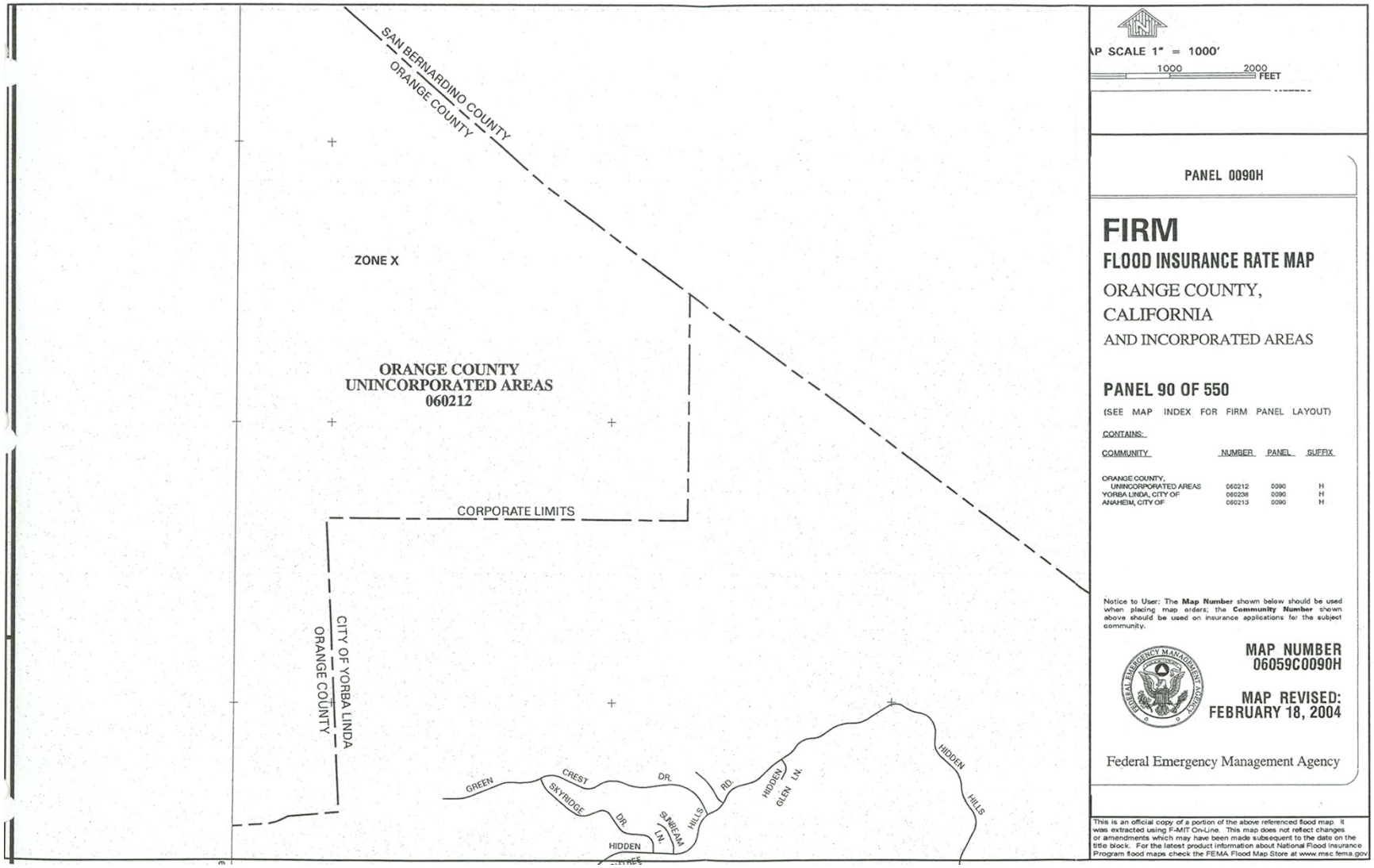


Exhibit 5-93 – FIRM – Flood Insurance Rate Map, Orange County

5.8.6 Conditions of Approval

COA-1 Prior to the issuance of grading permit, the Project Applicant shall submit the following drainage studies for approval by the County Manager, Permit Services:

1. A final drainage study of the project incorporating the Preliminary Drainage Report for Esperanza Hills Property drainage features pursuant to the approved development option; and

2. Detailed drainage studies indicating how the project grading, in conjunction with the drainage conveyance systems including applicable swales, channels, street flows, catch basins, storm drains, and flood water retarding, will allow building pads to be safe from inundation from rainfall runoff which may be expected from all storms up to and including the theoretical 100-year flood.

COA-2 Prior to the issuance of any certificates of use and occupancy, the Project Applicant shall not grant any new easements over any property subject to a requirement of dedication or irrevocable offer to the Orange County Flood Control District, unless such easements are expressly made subordinate to the easements to be offered for dedication to the County. Prior to granting any of said easements, the subdivider shall furnish a copy of the proposed easement to the County Manager, Permit Services for review and approval.

COA-3 Prior to the recordation of a subdivision map (except for financing and conveyance purposes only), the Project Applicant shall participate in the applicable Master Plan of Drainage in a manner meeting the approval of the Manager, Permit Services, including payment of fees and the construction, or provide evidence of financial security (such as bonding), of the necessary facilities. The applicant shall enter into an agreement with the County of Orange concerning payment and reimbursement of Master Plan Drainage Fees to the City as a condition of any future annexation for drainage facilities transferred from OCPW to the City.

COA-4 Prior to the issuance of any grading or building permits, the Project Applicant shall demonstrate compliance under California's General Permit for Storm Water Discharges Associated with Construction Activity by providing a copy of the Notice of Intent submitted to the State Water Resources Control Board and a copy of the subsequent notification of the issuance of a Waste Discharge Identification Number; or other proof of filing in a manner meeting the satisfaction of the Manager, Permit Services. Projects subject to this requirement shall prepare and implement a SWPPP. A copy of the current SWPPP shall be kept at the Project Site and be available for County review on request.

COA-5 Prior to the issuance of any grading or building permit, the Project Applicant shall submit an Erosion and Sediment Control Plan (ESCP) in a manner meeting approval of the Manager, Permit Services, to demonstrate compliance with the County's NPDES Implementation Program and state water quality regulations for grading and construction activities. The ESCP shall identify how all construction materials, wastes, grading or demolition debris, and stockpiles of soil, aggregates, soil amendments, etc.

shall be properly covered, stored, and secured to prevent transport into local drainages by wind, rain, or tracking. The ESCP shall also describe how the applicant will ensure that all BMPs will be maintained during construction of any future public right-of-ways. A copy of the current ESCP shall be kept at the Project Site and be available for County review on request.

COA-6 Prior to the issuance of any grading or building permits, the Project Applicant shall submit for review and approval by the Manager, Permit Services, a final WQMP specifically identifying BMPs that will be used on-site to control predictable pollutant runoff. The Project Applicant shall utilize the DAMP, the Model WQMP, and Technical Guidance Manual for reference, and the County's WQMP template for submittal. This final WQMP shall update the project's CWQMP based on the final design and include the following:

- Detailed site and project description
- Potential storm water pollutants
- Post-development drainage characteristics
- Low impact development (LID) BMP selection and analysis
- Structural and non-structural source control BMPs
- Site design and drainage plan (CWQMP BMP Exhibit)
- GIS coordinates for all LID and treatment control BMPs
- Operation and Maintenance (O&M) Plan that: (1) describes the long-term operation and maintenance requirements for BMPs identified in the BMP Exhibit; (2) identifies the entity that will be responsible for long-term operation and maintenance of the referenced BMPs; and (3) describes the mechanism for funding the long-term operation and maintenance of the referenced BMPs

The BMP map exhibit from the approved final WQMP shall be included as a sheet in all plan sets submitted for plan check and all BMPs shall be depicted on these plans. Grading and building plans must be consistent with the approved BMP map exhibit.

COA-7 Prior to the recordation of any subdivision map, the Project Applicant shall prepare Covenants, Conditions & Restrictions (CC&Rs) for review and acceptance by the Manager of Permit Services for the HOA, including a section for surface water quality protection and the following prohibited activity restrictions:

- Blowing, sweeping, or hosing of debris (e.g., leaf litter, grass clippings, litter) into storm drain inlets or other conveyances
- On-site fueling
- Dumping of any toxic substance or liquid waste on the pavement, on the ground, or toward a storm drain
- Use of pesticides if rain is expected
- Mixing or preparation of pesticides for application near storm drain inlets
- Allowing wash water to enter storm drain

The CC&Rs shall require the HOA to maintain the debris basins, detention/debris basin #3 and water quality basins on an annual basis in order to maintain flood protection associated with the design of the Project's drainage system.

COA-8 Prior to the issuance of a certificate of use and occupancy, the Project Applicant shall demonstrate compliance with the County's NPDES Implementation Program in a manner meeting the satisfaction of the Manager, OC Inspection:

- Demonstrate that all structural best management practices (BMPs) described in the BMP exhibit from the project's approved WQMP have been implemented, constructed and installed in conformance with approved plans and specifications;
- Demonstrate that the Project Applicant has complied with all non-structural BMPs described in the project's WQMP;
- Submit for review and approval, an Operations and Maintenance Plan for all structural BMPs (the plan shall become an attachment to the WQMP);
- Demonstrate that copies of the project's approved WQMP (with attached Operations and Maintenance Plan) are available for each of the initial occupants;
- Agree to pay for a Special Investigation from the County for a date 12 months after the issuance of a Certificate of Use and Occupancy for the project to verify compliance with the approved WQMP and Operations and Maintenance Plan;
- Demonstrate that the Project Applicant has recorded one of the following:

  a) The CC&Rs (that must include the approved Water Quality Management Plan and Operations and Maintenance Plan) for the project's HOA;
  b) A water quality implementation agreement that has the approved Water Quality Management Plan and Operations and Maintenance Plan attached; or
  c) The approved final Water Quality Management Plan and Operations and Maintenance Plan

COA-9 Prior to the issuance of grading permit, the Project Applicant shall record a grant of easement for on-site public storm water pipes to the Orange County Flood Control District.

5.8.7 Mitigation Measures

No mitigation measures are required

5.8.8 Level of Significance after Mitigation

As designed with incorporation of the LID, hydromodification control, bio-treatment, and source control BMPs, the Proposed Project does not violate any water quality standard or waste discharge requirement. Implementation of the Proposed Project will result in the same total volume of runoff as in the existing condition, a decrease in time of concentration, an increase in infiltration potential, and a decrease in erosion as compared to the existing condition. The Proposed Project would be in compliance with the Regional Water Quality Control Board – Santa Ana Region, and would

incorporate requirements and standards of the 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. Therefore, the project impact on water quality standards and discharge requirements is less than significant.

The Proposed Project does not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table. This is further addressed in Section 5.15, Utilities and Service Systems (beginning on page 5-625) under the Water Supply analysis. The groundwater below the Project Site is deep. The site is located outside the North Orange County Mapped Depth to First Groundwater Map. The existing soils are associated with low water absorption and the groundwater on the Project Site is very deep based on regional maps. The on-site WQMP Basins will alleviate any potential pollutants due to development prior to discharging off-site. Detention and WQMP Basins will allow for groundwater replenishment to the extent feasible to lessen the increase in permeable area. The Proposed Project will have the same volume of storm water runoff after development as the existing condition; therefore, the impact to groundwater supplies and groundwater recharge is less than significant.

Approximately 15 to 16 million cubic yards of remedial grading will occur associated with the Proposed Project for the development of residential, open space, and park pads along with supporting roadway grades. The Proposed Project grading and development will result in fill placement in Canyon A and Canyon B, thus substantially altering the existing drainage pattern on the site, which could result in substantial erosion or siltation on-site or off-site unless design features and conditions of approval are incorporated into the Proposed Project. The Proposed Project has included design features such as dry detention basins, rip rap pads, flow restrictors, and BMPs to reduce erosion or siltation from storm water runoff. Conditions of Approval COA-4, COA-5, COA-6, COA-7, and COA-8 have been incorporated into the Project to lessen erosion and siltation impact on-site and off-site. The Project with these design features and conditions of approval does not result in substantial erosion or siltation on-site or off-site associated with the development of the Project. Therefore, the impact to existing drainage pattern is less than significant.

The Proposed Project grading and development will result in fill placement in Canyon B and Canyon C, thus substantially altering the existing drainage pattern on the site, which could substantially increase the rate or amount of surface runoff in a manner that would result in flooding on-site or off-site unless design features are incorporated into the Proposed Project. The overall on-site surface runoff velocities, volume, and peak flow rates are in conformance with the planned capacity in the Orange County Esperanza Channel Master Plan of Drainage. In fact, the master plan predicted more development in this tributary area than is currently proposed. The Proposed Project consists of a storm drainage system designed to accommodate and

moderate long-term surface runoff drainage impacts. The project design include preserving and enhancing natural drainage courses where applicable, installing debris basins, using energy dissipating devices, designing development areas that result in surface drainage to be directed to street frontage, and designing drainage systems that will not result in downstream flooding or damage. Therefore, the Proposed Project impact on an increase in the rate or amount of surface runoff in a manner which would result in flooding on-site or off-site is less than significant.

The Proposed Project does not create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff. Peak storm flows caused by the Proposed Project will not exceed the design capacity of on-site and downstream conveyance channels. The Proposed Project on-site surface runoff velocities, volume, and peak flow rates are consistent with the Orange County Esperanza Channel Master Plan of Drainage. The project includes Water Quality Basins and debris basins and includes guidelines for BMPs to reduce and diminish erosion impacts and pollutants associated with residential development. Mitigation measures have been incorporated into the Proposed Project that would ensure that the runoff water shall not exceed the capacity of existing or planned storm water drainage systems or provide an additional source of runoff pollutants. Therefore, the project impact to existing and planned storm water drainage system and runoff pollutants is less than significant.

The construction grading permit requires that the Project Applicant and subsequent owners develop and implement a SWPPP based on applicable BMPs. The construction grading permit specifies that BMPs must satisfy the best available technology (BAT) and best conventional technology (BCT) standards. With compliance with the County's NPDES Implementation Program, the state water quality regulations for grading and construction activities, along with the implementation of the SWPPP for the Proposed Project, potential construction-related water quality impacts would be reduced to less than significant levels.

The Proposed Project will not otherwise degrade water quality. The Proposed Project design includes low impact development techniques and best management practices and Conditions of Approval that reduce the Project's impact on water quality to less than significant levels.

The Proposed Project has been designed to eliminate any exposure of people or structures to significant risk of loss, injury, or death involving flooding. The Proposed Project has been designed to eliminate any exposure of people or structures to the significant risk of loss or injury. In the unlikely event that the two underground tanks ruptured, the street capacity is designed to convey water without resulting in any flooding. The debris/detention basins are designed and sized to capture mudflow associated with off-site drainage. Therefore, the project impact is less than significant.

5.8.9 Cumulative Impacts

Future development within the Project Area (including areas surrounding the Project Site, Cielo Vista, Bridal Hills LLC parcel, and the Yorba Linda Land LLC parcel) could potentially increase impervious surfaces and increase the potential for flooding in the area. Cumulative development in the Project Area could result in alterations to the drainage pattern and flow rates in the project vicinity. Impacts will be mitigated on a project-by-project basis by construction of project specific drainage improvements consistent with the Orange County Esperanza Master Plan of Drainage and the Orange County Local Drainage Manual. Storm drain improvements for the Proposed Project and other projects in the area will be designed to provide projected levels required by the Orange County Hydrology Manual and the County NPDES county-wide permit. The County requires all new development to design and implement Low Impact Development that mimics the pre-development existing flows, volumes, and water quality prior to discharge from the individual Project Site. The Proposed Project will not generate an increase in runoff from the Project Site and will generate less than predicted in this tributary. Project discharge to downstream storm drain facilities will provide equal or greater water quality compared with of existing conditions. With implementation of regional drainage plans, combined with future project-specific improvements upon drainage and flood control, the Proposed Project, when considered with other potential projects, will not result in significant cumulative impacts.

5.8.10 Unavoidable Adverse Impacts

Implementation of the recommended project design features and conditions of approval specified above will reduce the potentially significant impacts relating to hydrology and water quality to a less than significant level. The Proposed Project drainage system, as designed, will not generate an increase in storm water runoff or derogate water quality beyond the existing condition. Three stages are associated with water quality impacts and the development of the Proposed Project: existing conditions, construction, and post-construction. Each stage has specific characteristics of storm water runoff in terms of quality and drainage patterns. Changes to storm water characteristics due to development include remediation of any contaminated soil, increased runoff due to increased impervious area, site stabilization due to development, reduced erosion potential, storm water quality improvement over existing conditions due to inclusion of Low Impact Development design, and inclusion of structural and non-structural best management practices. The Proposed Project will not result in unavoidable adverse impacts to hydrology or water quality.