

**DRAFT**  
**JURISDICTIONAL DELINEATION**  
**OF AREAS SUBJECT TO THE JURISDICTION OF**  
**THE CALIFORNIA DEPARTMENT OF FISH AND GAME**

**PURSUANT TO**  
**SECTION 1600 OF THE FISH AND GAME CODE**

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## INTRODUCTION

Federal, state and local agencies, in cooperation with local landowners are currently engaged in a comprehensive land use and natural resource planning process for the San Juan Creek and western San Mateo Creek watersheds within southern Orange County. This comprehensive planning process includes preparation of a Special Area Management Plan/Master Streambed Alteration Agreement (SAMP/MSAA). In support of the SAMP/MSAA, the U.S. Army Corps of Engineers conducted a landscape level delineation, to identify areas of potential Corps and CDFG jurisdiction along with the mapping of areas of potential wetlands and riparian habitat within the SAMP/MSAA study area.<sup>1</sup>

In addition to the planning level delineation, Regulatory Specialists from Glenn Lukos Associates (GLA) conducted a project level jurisdictional delineation between October 29, 2002 and November 5, 2003 to identify and quantify the extent of areas subject to the jurisdiction of the (1) U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act and (2) the California Department of Fish and Game pursuant to Section 1600 of the Fish and Game Code. Appendix A includes a list of specific field dates. A total of nine planning areas were evaluated with the maximum potential limits of each planning area subject to the project-level delineation. In addition, all major roadway alignments not included within the nine planning areas were also examined.

## METHODOLOGY

Prior to beginning the field delineation a 200-scale color aerial photograph, a 200-scale topographic base map of the property, and the USGS topographic maps Cañada Gobernadora (dated 1968, photo revised in 1988), San Clemente (dated 1968 and photo revised in 1975) and San Juan Capistrano (dated 1968 and photo revised in 1981) were examined to determine the locations of potential areas of Corps/CDFG jurisdiction. Prior to completing the jurisdictional delineation, GLA was provided a copy of a planning level delineation prepared by the Corps in September of 2000. All areas identified as potentially jurisdictional in the planning level delineation were evaluated for Corps and CDFG jurisdiction. All suspected jurisdictional areas were field checked for the presence of definable channels and/or wetland vegetation, soils and hydrology. Suspected wetland habitats on the site were evaluated using the methodology set forth in the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual<sup>2</sup> (Wetland Manual). While in the field the jurisdictional area was recorded onto a 200-scale color aerial photograph using visible landmarks. Other data were recorded onto wetland data sheets.

Beginning on March 11, 2003, Regulatory Specialists from GLA; a representative of Rancho Mission Viejo; representatives of the Corps including Mr. Russell Kaiser, Ms. Corice Farrar, and

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<sup>1</sup> Lichvar, R., G. Gustina, D. MacDonald, and M. Ericsson. 2000. Planning Level Delineation and Geospatial Characterization of Riparian Ecosystems of San Diego Creek Watershed, Orange County California. Prepared for the U.S. Army Corps of Engineers, Engineering and Research Development Center (ERDC) Cold Regions Research and Engineering Laboratory (CRREL), Hanover N.H. September 2000.

<sup>2</sup> Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, U.S. Army Engineer Waterways Experimental Station, Vicksburg, Mississippi.

Mr. Rob Lawrence; and representatives of CDFG including Mr. Don Chadwick, Mr. Bradley Henderson, and Ms. Donna Cobb conducted a field verification of the project level delineation. Prior to beginning the field-level verification, the Corps representative Mr. Kaiser noted that the Corps would generally assert jurisdiction over drainages that conduct flows during 10-year storm events or less, and that drainages that do not conduct flows during 10-year events are not considered as waters of the United States. Following the initial site visits in early March, the area experienced a rainfall event on March 15, 2003 that averaged over five inches over most of the study area, corresponding very closely with a 10-year event. The 10-year storm event resulted in clear discharge in many of the drainages evaluated, including presence of litter and debris (e.g., oak leaves or other plant materials), sediment deposits, and destruction of terrestrial vegetation (through scouring or buried by sediments). However, many of the features failed to exhibit any signs of discharge. The 10-year storm event recorded on March 15, in at least some instances allowed for determination of (1) presence of a streambed that exhibits flowing water, and where present (2) the lateral extent of the streambed and/or associated aquatic resources.

The field verification was completed on October 27, 2003 with the exception of specific areas to be addressed during a field review scheduled for xx, 2003 with senior staff from the CDFG. Appendix A includes a list of specific field dates. During the field verification, all areas identified in the Lichevar (2000) planning level delineation as well as by GLA in the project level delineation were examined. The results of the field verification are incorporated into this document. The jurisdictional status of a few aquatic features remain unresolved and these areas are fully described in this report including discussions as to why certain specific features are not subject to CDFG jurisdiction. In all instances, the reason for excluding areas from CDFG jurisdiction is because the features are components of ongoing mining operations. Two of the areas are mining pits subject to reclamation plans that will be filled and graded during reclamation. The other feature is an artificial tailings pond that is artificially filled with wash water and tailings-laden water directly associated with mining operations. With cessation of the mining operations, this feature will quickly dry out and would not exhibit characteristics of a lake which currently are associated with this feature due to addition of well water. Those features or areas for which CDFG and Rancho Mission Viejo (RMV) concur relative to the jurisdictional status are referred to a “Resolved Areas” in this document. Features or areas for which CDFG and RMV have not reached concurrence relative to their jurisdictional status are referred to as “Unresolved Areas”.

## **SUMMARY OF RESULTS**

A total of nine potential development areas or “bubbles” were evaluated plus areas subject to potential impacts associated with major arterials that connect the potential development bubbles. Total CDFG jurisdiction identified within the potential development areas and the potential arterial right-of-ways, which are Resolved Areas, is 398.14 acres of which 368.40 acres consist of vegetated riparian habitat. Table 1 summarizes the jurisdictional totals by planning area. An additional 91.70 acres have been evaluated in the field, including 55.88 acres of vegetated riparian habitat, for which RMV and CDFG have not reached concurrence relative to their jurisdictional status. Table 2 summarizes the unresolved totals by planning area. As noted above, these Unresolved Areas are discussed in detail in this report; whereas, Resolved Areas are summarized only and included in tabular form by drainage according to planning area. **It is the**

opinion of GLA that all of the Unresolved Areas are features that will not meet the definition of a streambed or lake under the Fish and Game Code at the time of project implementation.

**TABLE 1: Study Area Jurisdictional Totals for Resolved Features**

<b>Planning Area</b>	<b>Riparian Vegetation<sup>1</sup></b>	<b>Unvegetated Streambed<sup>2</sup></b>	<b>Total CDFG<sup>3</sup></b>
Ortega Gateway	3.07	0.71	3.78
Chiquita	41.66	0.55	42.21
Gobernadora	49.46	4.87	54.33
East Ortega	44.49	3.48	47.97
Trampas	26.06	4.29	30.35
Cristianitos Meadows	9.54	0.32	9.86
Cristianitos Canyon	15.87	5.81	21.68
TRW	23.13	4.26	27.39
O'Neill Ranch	31.69	4.47	36.16
Road Gaps	123.43	0.98	124.41
<b>Totals<sup>4</sup></b>	<b>368.40</b>	<b>29.74</b>	<b>398.14</b>

<sup>1</sup> Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>2</sup> Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>3</sup> Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

<sup>4</sup> These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

**TABLE 2: Study Area Non-jurisdictional Totals (Unresolved Features<sup>1</sup>)**

<b>Planning Area</b>	<b>Riparian Vegetation (acres)</b>	<b>Unvegetated Streambed (acres)</b>	<b>Total Acreage</b>
Ortega Gateway	0.00	0.00	0.00
Chiquita	0.00	0.00	0.00
Gobernadora	0.00	0.00	0.00
East Ortega	0.00	0.00	0.00
Trampas	55.74	34.77	90.51
Cristianitos Meadows	0.00	0.00	0.00
Cristianitos Canyon	0.14	1.05	1.19
TRW	0.00	0.00	0.00
O'Neill Ranch	0.00	0.00	0.00
Road Gaps	0.00	0.00	0.00
<b>Totals</b>	<b>55.88</b>	<b>35.82</b>	<b>91.70</b>

<sup>1</sup>These features consist of proposed non-jurisdictional features that have been field verified but for which CDFG has not yet made a determination regarding regulatory status.

**PLANNING AREA 1 (ORTEGA GATEWAY)**

Planning Area 1 is located near the western edge of the study area immediately west of Antonio Parkway and includes areas on both sides of Ortega Highway. Much of the area encompassed by the Ortega Gateway area has been previously developed or under long-term agriculture. RMV and CDFG have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas. CDFG jurisdiction in Planning Area 1 totals approximately 3.78 acres of which 3.07 acres consist of vegetated riparian habitat.

**TABLE 3: Ortega Gateway Jurisdictional Totals (Resolved Areas)**

Feature Name	Riparian Vegetation <sup>1</sup>	Unvegetated Streambed <sup>2</sup>	Total CDFG <sup>3</sup>
San Juan Creek	0.75	0.00	0.75
1-1	0.12	0.00	0.12
1-2	0.00	0.03	0.03
1-3	0.09	0.02	0.11
1-4	0.00	0.08	0.08
1-5	0.00	0.02	0.02
1-6	0.04	0.20	0.24
1-7	0.21	0.00	0.21
1-8	0.00	0.03	0.03
1-9	0.10	0.08	0.18
1-10	0.00	0.01	0.01
1-11	0.03	0.01	0.04
1-12	1.73	0.23	1.96
<b>Totals<sup>4</sup></b>	<b>3.07</b>	<b>0.71</b>	<b>3.78</b>

<sup>1</sup> Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>2</sup> Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>3</sup> Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

<sup>4</sup> These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

**TABLE 4: Ortega Gateway Non-jurisdictional Totals (Resolved Areas<sup>1</sup>)**

Feature Name	Vegetated (acres)	Unvegetated (acres)	Total Acreage
Isolated nursery pond	0.00	0.12	0.12
Nursery Ponds	0.00	0.03	0.03
<b>Totals</b>	<b>0.00</b>	<b>0.15</b>	<b>0.15</b>

<sup>1</sup> These features have been field verified and CDFG concurs they are not subject to regulation pursuant to Section 1603 of the Fish and Game Code.

**PLANNING AREA 2 (CHIQUITA CANYON)**

Planning Area 2 is located at the northwestern corner of the study area immediately west of Antonio Parkway and north of San Juan Creek. The planning area consists of a main canyon (Chiquita Canyon), which generally traverses the western one-third to one-quarter of the study area. The extreme western portion of the study area includes east-facing slopes that drain toward Chiquita Creek, a prominent aquatic feature/drainage that occupies the bottom of this broad canyon. Chiquita Creek supports a mosaic of wetland types including areas of southern arroyo willow riparian forest, alkali marsh, freshwater marsh, and alkali meadow. The area east of Chiquita Creek consists of a series of northeast-to-southwest trending side canyons alternating with gentle hills. Many of the side canyons are broad features that exhibit low gradients and have been subject to decades of farming, consisting mostly of winter barley or orchards (lemons and avocados). RMV and CDFG have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas.

CDFG jurisdiction in Planning Area 2 totals approximately 42.21 acres of which 41.66 acres consist of vegetated riparian habitat. A number of the side canyons do not contain drainages that exhibit a bed or bank.

**TABLE 5: Chiquita Jurisdictional Totals (Resolved Areas)**

Feature Name	Riparian Vegetation <sup>1</sup>	Unvegetated Streambed <sup>2</sup>	Total CDFG <sup>3</sup>
Chiquita	29.88	0.00	29.88
2-1	0.39	0.04	0.43
2-2	0.24	0.01	0.25
2-3	0.24	0.00	0.24
2-4	0.48	0.02	0.50
2-5	1.70	0.00	1.70
2-6	0.83	0.02	0.85
2-7	0.00	0.02	0.02
2-8	2.53	0.00	2.53
2-9	0.00	0.02	0.02
2-10	0.00	0.06	0.06
2-11	0.09	0.11	0.20
2-12	0.01	0.00	0.01
2-13	5.27	0.25	5.52
2-14	0.00	0.003	0.003
<b>Totals<sup>4</sup></b>	<b>41.66</b>	<b>0.55</b>	<b>42.21</b>

<sup>1</sup> Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>2</sup> Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>3</sup> Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

<sup>4</sup> These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

**TABLE 6: Chiquita Non-jurisdictional Feature Totals (Resolved Areas<sup>1</sup>)**

Feature Name	Vegetated(acres )	Unvegetated (acres)	Total Acreage
Wetland A	0.11	0.00	0.11
Wetland B	0.40	0.00	0.40
Excavated Depression	0.15	0.00	0.15
<b>Totals</b>	<b>0.66</b>	<b>0.00</b>	<b>0.66</b>

<sup>1</sup> These features have been field verified and CDFG concurs that they are not subject to regulation pursuant to Section 1603 of the Fish and Game Code

**PLANNING AREA 3 (GOBERNADORA)**

Planning Area 3 is located near the northern edge of the study area east of Casper’s Regional Park and north of San Juan Creek. The planning area generally exhibits steeper topography than Planning Area 2. A ridgeline, that trends from southwest to the northeast divides the planning area into two drainage areas with the northwest half of the planning area draining to Gobernadora Creek and the southeast half of the planning area draining to San Juan Creek. Gobernadora Creek originates in the Cleveland National Forest to the north, traversing Coto de Caza before entering the planning area at the extreme northwest corner of the planning area before exiting the planning area about 3,000 feet from the northern boundary of the planning area. Gobernadora Creek runs parallel to and outside of the planning area after exiting the planning area, ultimately discharging into San Juan Creek beyond the southwest corner of the planning area. RMV and CDFG have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas.

CDFG jurisdiction in Planning Area 3 totals approximately 54.33 acres of which 49.46 acres consist of vegetated riparian habitat. A number of side canyons to the east of Gobernadora Creek do not contain drainages exhibiting a bed or bank and therefore are not subject to CDFG jurisdiction.

**TABLE 7: Gobernadora Jurisdictional Feature Totals (Resolved)**

Feature Name	Riparian Vegetation <sup>1</sup>	Unvegetated Streambed <sup>2</sup>	Total CDFG <sup>3</sup>
Gobernadora	9.40	0.00	9.40
3-1	0.23	0.00	0.23
3-2	0.04	0.02	0.06
3-3	0.29	0.24	0.53
3-4	1.07	0.05	1.12
3-5	5.49	0.53	6.02

Feature Name	Riparian Vegetation <sup>1</sup>	Unvegetated Streambed <sup>2</sup>	Total CDFG <sup>3</sup>
3-6	4.82	0.12	4.94
3-7	0.26	0.33	0.59
3-8	0.00	0.13	0.13
3-9	0.00	0.10	0.10
3-10	1.85	0.47	2.32
3-11	0.00	0.01	0.01
3-12	7.27	1.38	8.65
3-13	12.98	1.48	14.46
3-14	0.48	0.00	0.48
3-15	0.21	0.00	0.21
3-16	4.28	0.00	4.28
3-17	0.00	0.01	0.01
Sulfer Canyon	0.79	0.00	0.79
<b>Totals<sup>4</sup></b>	<b>49.46</b>	<b>4.87</b>	<b>54.33</b>

<sup>1</sup> Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>2</sup> Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>3</sup> Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

<sup>4</sup> These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

**TABLE 8: Gobernadora Non-jurisdictional Feature Totals (Resolved Areas<sup>1</sup>)**

Feature Name	Vegetated(acres )	Unvegetated (acres)	Total Acreage
Isolated Willow Seep	0.26	0.00	0.26
3-5 Seep	0.06	0.00	0.06
Mining Pits	4.36	0.00	4.36
<b>Total</b>	<b>4.68</b>	<b>0.00</b>	<b>4.68</b>

<sup>1</sup> These features have been field verified and CDFG concurs they are not subject to regulation pursuant to Section 1603 of the Fish and Game Code.

## **PLANNING AREA 4 (EAST ORTEGA)**

Planning Area 4 is located near the northern edge of the study area immediately south of Ortega Highway and includes Verdugo Canyon. RMV and CDFG have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas. CDFG jurisdiction in Planning Area 4 totals approximately 47.97 acres of which 44.49 acres consist of vegetated riparian habitat.



**TABLE 9: East Ortega Jurisdictional Feature Totals (Resolved Areas)**

Feature Name	Riparian Vegetation <sup>1</sup>	Unvegetated Streambed <sup>2</sup>	Total CDFG <sup>3</sup>
San Juan Creek	0.55	0.00	0.55
Verdugo	19.39	0.00	19.39
4-1	0.02	0.09	0.11
4-2	0.00	0.13	0.13
4-3	1.05	0.16	1.21
4-4	0.00	0.04	0.04
4-5	0.18	0.18	0.36
4-6	0.00	0.05	0.05
4-7	0.36	0.20	0.56
4-8	0.00	0.03	0.03
4-9	0.00	0.04	0.04
4-10	0.00	0.02	0.02
4-11	6.36	0.49	6.85
4-12	6.56	0.48	7.04
4-13	1.34	0.31	1.65
4-14	0.41	0.04	0.45
4-15	0.16	0.10	0.26
4-16	1.52	0.10	1.62
4-17	5.24	0.31	5.55
4-17 Pond	0.59	0.00	0.59
4-18	0.02	0.12	0.14
4-19	0.74	0.59	1.33
<b>Totals<sup>4</sup></b>	<b>44.49</b>	<b>3.48</b>	<b>47.97</b>

<sup>1</sup> Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>2</sup> Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>3</sup> Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

<sup>4</sup> These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

**TABLE 10: East Ortega Non-jurisdictional Feature Totals (Resolved Areas<sup>1</sup>)**

Feature Name	Vegetated (acres)	Unvegetated (acres)	Total Acreage
Nursery Ditch <sup>2</sup>	0.03	0.00	0.03
<b>Total</b>	<b>0.03</b>	<b>0.00</b>	<b>0.03</b>

<sup>1</sup> This feature has been field verified and CDFG concurs it is not subject to regulation pursuant to Section 1603 of the Fish and Game Code

**PLANNING AREA 5 (TRAMPAS)**

Planning Area 5 is located in the San Juan Creek watershed and is located immediately south of Ortega Highway. Much of the planning area is currently occupied by a sand mining and processing operation, that has operated in the southern half of the planning area since the 1960s. Sand mining and processing has required significant modifications to the landscape in the central portion of the planning area including creation of a dam on Trampas Canyon Creek and excavation of a large mining pit (Cell A) and additional areas of influence (Exhibit 5).

Based upon verification visits with CDFG, RMV and CDFG have agreed on the jurisdictional status of all areas or features within the planning area (Resolved Areas) with the following exceptions associated with the mining operation: 1) Tailings Deposition/Water Recycling Area, 2) Ridgetop Reservoir, 3) Thickener, 4) Disilting Pond and associated Ditches, 5) Temporary Storage Pond 6) Cell A Mining Pit. Outside of limits of the sand-mining area, portions of Drainage 5-7A also remain unresolved. Those features that are components of the mining operation are described below under “Sand Mining Operation”. Resolved Areas are clearly distinguished from Unresolved Areas within the descriptions associated with the sand mining area. Finally, a description of the non-jurisdiction reach of Drainage 5-7A is also provided.

CDFG jurisdiction associated with Planning Area 5 totals 30.35 acres of which 26.06 acres consist of vegetated riparian habitat. A summary of features subject to CDFG verification for which RMV and the CDFG concur relative to their jurisdictional status is provided in Tables 11 and 12. Table 11 is a summary of areas subject to CDFG jurisdiction and Table 12 is a summary of areas not subject to CDFG jurisdiction due regulatory considerations (e.g., isolated wetlands or riparian habitat not associated with a lake or streambed).

**TABLE 11: Trampas Jurisdictional Feature Totals (Resolved Areas)**

Feature Name	Riparian Vegetation <sup>1</sup>	Unvegetated Streambed <sup>2</sup>	Total CDFG <sup>3</sup>
5-1A	2.76	0.21	2.97
5-1B	6.25	1.96	8.21
5-2	1.94	0.00	1.94
5-3	0.00	0.03	0.03
5-4	0.09	0.17	0.26
5-5	1.27	0.01	1.28
5-6	0.10	0.13	0.23
Slope Wetland B	0.17	0.00	0.17
5-7	7.12	1.28	8.40
5-7A	3.64	0.08	3.72
5-7B	2.72	0.42	3.14
<b>Totals<sup>4</sup></b>	<b>26.06</b>	<b>4.29</b>	<b>30.35</b>

<sup>1</sup> Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>2</sup> Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>3</sup> Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

<sup>4</sup> These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

**TABLE 12: Trampas Non-jurisdictional Feature Totals (Resolved Areas<sup>1</sup>)**

<b>Feature Name</b>	<b>Riparian Vegetation (acres)</b>	<b>Unvegetated Streambed (acres)</b>	<b>Total Acreage</b>
Saltgrass Swale	0.002	0.00	0.002
Seasonal Pond	0.13	0.00	0.13
Slope Wetland A	0.04	0.00	0.04
Settling Pond A	0.26	0.00	0.26
Settling Pond B	1.30	0.00	1.30
Settling Pond C	1.33	0.00	1.33
Settling Pond D	2.37	0.00	2.37
Juncus Patch	0.05	0.00	0.05
<b>Total</b>	<b>5.48</b>	<b>0.00</b>	<b>5.48</b>

<sup>1</sup> These features have been field verified and CDFG concurs they are not subject to regulation pursuant to Section 1603 of the Fish and Game Code

## **Sand Mining Facilities**

As noted above, a substantial portion of the Trampas Planning Area has been affected by sand mining activities since the 1960s. The sand mining operation requires use of water during various steps in the process including 1) washing of the mined materials to separate silts and clays from the sand, and 2) use of water to transport silt and clay tailings to tailings storage area areas (i.e., Tailings Pond) via pumps. In order to conserve water through recycling as well as to maintain maximum flexibility in the system, an elaborate system of ponds, pipes, and ditches have been constructed that are used in the washing and recycling processes. These various components of the sand washing operation are described below and are also depicted and appropriately designated on Exhibits 5a and 5b. The features further described below include:

- Trampas Dam and associated “Tailings Deposition/ Water Recycling Area”;
- Dam-Face “V”-Ditches
- Dam-Face Leach Field and Associated Drainage Features;
- Thickener;
- Desilting Pond and Associated Recycling Ditches and Pipes;
- Ridgetop Reservoir;
- Temporary Storage Pond;
- Cell A;

## **Trampas Dam and Associated Tailings Deposition and Water Recycling Area (Unresolved Area)**

Trampas Dam was constructed in 1975 following preparation of and certification of an Environmental Impact Report (EIR) prepared pursuant to the California Environmental Quality Act. The dam was constructed in a manner that isolated Trampas Creek and its ephemeral tributaries that supported approximately 12 acres of southern coast live oak riparian forest.

Because substantial water is lost to evaporation during various steps in the washing process as well as from the Tailings Deposition/Water Recycling Area, it is necessary to pump well water into the pond to maintain water levels. If water is not regularly added to the process, the Tailings Pond Area will dry up. At its current elevation, the Tailings Deposition and Water Recycling Area covers approximately 70 acres and includes approximately 30 acres of open water with the remaining 40 acres consisting of exposed tailings which support various densities of southern cattail (*Typha domingensis*, OBL), and California bulrush (*Scirpus californicus*, OBL).

The Tailings Deposition/Water Recycling Area serves two primary functions in the processing of sand: 1) it receives all of the tailings separated from the sand during the washing process and 2) it serves as a re-circulating water source for the washing process. During the washing process, water is moved through a variety of the facilities noted above with the movement patterns of the water varying according to a number of factors directly related to the needs of the mining operation. As stated above, the goal to conserve the maximum amount of water during the washing process has resulted in the creation of a series of storage areas and conduits that allow water to be recycled at various points in the process.

All of the features associated with the sand mining operations and discussed below were created to support the mining operations and will not exist in their current state after the plant closes. The descriptions that follow address both resolved and unresolved components in the sand mining and processing operation as they exist today as well as a discussion of the aquatic characters they would be expected to retain after mining operations cease. These descriptions are intended to clearly demonstrate that none of the features associated with the mining operation would be regulated as a stream or lake under Section 1600. Although the term “lakes” is not defined in the Fish and Game Code or in CDFG regulations, the CDFG’s Legal Advisor has referred to the definition in Black’s Law Dictionary, 5<sup>th</sup> edition:

A considerable body of standing water in a depression of land or expanded part of a closed basin serving to drain surrounding country; or a body of water of considerable size surrounded by land; a widened portion of a river or a lagoon. [Citation] Also a: Body of water, more or less, stagnant, in which the water is supplied from drainage. [Citation].<sup>3</sup>

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<sup>3</sup> Ivester, Dave. December 9, 2003. Memorandum regarding CDFG jurisdiction.

### **Dam Face and Associated “V”-Ditches (Resolved Area)**

Construction of the dam included installation of a series of V-Ditches that capture precipitation falling on the 11.5-acre dam face. There is no hydrologic connection between the Tailings Pond/Recycle Area behind the dam and the water collected on the face of the dam. The primary function of the V-Ditches on the Dam is to prevent damage to the dam through rilling and erosion. These V-Ditches have been designed to discharge all flows to an underground inlet near the face of the dam where a 24-inch pipe was installed to collect the runoff, ultimately directing it to the “Desilting Pond” via pipes and an above-ground artificial drainage ditch (NJD Feature C). By design, all water that originates on the face of the dam is directed into the recycling system for use in the mining process. The concrete v-ditches constructed on the dam face do not meet the definition of a stream set forth in the Fish and Game Code and would not be subject to regulation pursuant to Section 1600.

It should be noted that during a field visit, conducted on October 3, 2003 with representatives of Oglebay Norton, the operators of the sand mine and processing facility, GLA observed the inlet of the 24-pipe, which had been temporarily buried, and had just been uncovered. The pipe was full of sediments and was in need of maintenance. Because the pipe had become clogged, water was not discharging to NJD Feature C (which carries the water via a second pipe to the Desilting Pond before it is pumped to the “Thickener” (see below). As a result of the pipe being blocked and the resulting accumulation of water, a small area, covering approximately 50 by 100 feet has been colonized by opportunistic cattails. Maintenance of the V-Ditches and the pipe system, including the unclogging of the 24-inch pipe that connects the base of the dam to the Desilting Pond via NJD Mining Feature C, will eliminate the source of water to the opportunistic cattails at the base of the dam face.

### **Dam Face Leachfield and Associated Pipes (Resolved Area)**

Construction of the dam also included installation of interior drains to protect the dam from seepage. Water is collected in drains, which are in turn are connected to an underground rock and gravel collection field. Much of the water is collected in a four-inch clay pipe and is carried underground to the “Temporary Storage Pond”. As noted above, the leachfield is also designed to drain to the v-ditch and then into the 24-inch pipe.. By design, all of the subdrain water from the base of the dam is intended for the Temporary Storage Pond or the Desilting Pond, and ultimately to the Thickener.

### **Thickener (Unresolved Area)**

The Thickener is a constructed circular basin that receives tailings-laden water from the washing operations and also receives fresh water that enters the washing system at this point (well water can be pumped into the system at a number of locations as needed). The thickener is mechanically “stirred” in order to maintain the tailings in suspension so that they can be pumped as a slurry to the Tailings Deposition/Water Recycling Area. The outer rim of the thickener includes a two-foot-wide concrete ditch that directs overflow water (the thickener only rarely overflows) to a metal pipe, which carries the overflow to the Temporary Storage Pond from where the water can be pumped back to the thickener or to the Desilting Pond. The Thickener

does not meet the definition of a lake set forth in the Fish and Game Code and would not be subject to regulation pursuant to Section 1600 since it was constructed in upland and is not sustained by drainage from the surrounding land; but is rather supported completely from artificial irrigation.

### **Ridgetop Reservoir (Unresolved Area)**

The Ridgetop Reservoir is located immediately adjacent to and substantially above in terms of elevation, the Tailings Pond. This feature receives water that is pumped from the Desilting Pond as well as directly from well water. This feature was constructed entirely on upland and because of its topographic position does not receive and runoff from the surrounding watershed. While it supports limited areas of hydrophytic vegetation, the only source of water for this feature (other than direct rainfall) is entirely from pumped water. The Ridgetop Reservoir does not meet the definition of a lake set forth in the Fish and Game Code and would not be subject to regulation pursuant to Section 1600 since it was constructed in upland and is not sustained by drainage from the surrounding land; but is rather supported completely from artificial irrigation.

### **Temporary Storage Pond (Unresolved Area)**

The Temporary Storage Pond, which covers approximately 0.65 acre, is an artificial basin, constructed on upland and by design, was not constructed as an impoundment of jurisdictional waters. Rather, the Temporary Storage Pond was constructed to receive overflow from the Thickener as well as the minimal discharge from the four-inch clay pipe, generated by the drain at the base of the dam.

Accumulation of sediments generated by the sand mining and processing operation has resulted in a minor diversion of a nearby drainage such that a side channel has developed that flows into the basin during large storm events. The basin has no outlet or spillway and is, by design fully isolated from jurisdictional waters. The bottom of the basin supports California bulrush, mulefat scrub and a few individual arroyo willows.

This feature was excavated and bermed in uplands and has no connection to downstream jurisdictional streams. A side channel that migrated from the mainstem of Drainage 5-7 currently discharges to this feature; however, the feature was not designed with this connection and the feature remains isolated. The Temporary Storage Pond does not meet the definition of a lake set forth in the Fish and Game Code and would not be subject to regulation pursuant to Section 1600 since it was constructed in upland and is sustained by artificial irrigation..

### **Desilting Pond and Associated Ditches and Pipes (Unresolved Area)**

A Desilting Pond is located immediately west of the Thickener. The Desilting Pond receives tailings-laden wash water that is drained from washed sands located in the washing facilities immediately east of the washing facilities [See exhibit 5b]. From the wet sand piles, water drains through one of two artificial drainage ditches (NJD Feature A and/or NJD Feature B). NJD Feature A is connected directly to the Desilting Pond by means of a pipe. NJD Feature B is connected directly to the Desilting Pond by means of a pipe which discharges into NJD Feature

C and a third pipe that connects NJD Feature C with the Desilting Pond. The Desilting Pond does not meet the definition of a lake set forth in the Fish and Game Code and would not be subject to regulation pursuant to Section 1600. The collection ditches that drain water from the washed sand to the Desilting Pond do not meet the definition of a stream set forth in the Fish and Game Code and would not be subject to regulation pursuant to Section 1600 since it was constructed in upland and is not sustained by drainage from the surrounding land; but is rather completely supported by artificial irrigation.

**Cell A (Unresolved Area)**

Cell A is located approximately 1,000 feet north of the Trampas Dam. Cell A, which covers approximately 11.56 acres of open water and exposed tailings which support various densities of southern cattail (*Typha domingensis*, OBL), and bulrush (*Scirpus californicus*, OBL). Cell A is an area of dry land that has been under excavation since the 1960’s and currently consists of a mining pit that is fully isolated with no potential outlets due to the elevation. Cell A is a potential reservoir for deposition of tailings and recycling of wash water. Cell A is subject to active mining and any portions remaining at the termination of mining operations would be reclaimed pursuant to the reclamation plan developed for the site. As a result, Cell A will not meet the definition of a lake set forth in the Fish and Game Code at the time of project implementation and therefore is not subject to regulation pursuant to Section 1600.

**Abandoned Settling Ponds (Resolved Area)**

A series of five abandoned settling basins constructed in upland occupy a bench below the ridgeline that runs along the western boundary of the planning area. The abandoned basins are isolated and are not connected to jurisdictional waters. None of the basins support a predominance of hydrophytic vegetation and, due to the lack of water subsidies from the mining operation, are reverting to upland habitat.

**Table 13: Trampas Non-jurisdictional Feature Totals (Unresolved Areas<sup>1</sup>)**

Feature Name	Vegetated (acres)	Unvegetated (acres)	Total Acreage
Cell A Mining Pit	11.56	0.00	11.56
Desilting Pond	0.00	0.12	0.12
NJD Erosional Feature	0.00	0.04	0.04
NJD Mining Feature A	0.17	0.00	0.17
NJD Mining Feature B	0.00	0.11	0.11
NJD Mining Feature C	0.00	0.13	0.13
Ridgetop Reservoir	1.86	3.24	5.10
Thickener	0.18	1.34	1.52
ONIS Tailings Pond	41.32	29.79	71.11
Temporary Storage Pond	0.65	0.00	0.65
<b>Total</b>	<b>55.74</b>	<b>34.77</b>	<b>90.51</b>

<sup>1</sup> These features have been field verified but are still under consideration by CDFG relative to regulation pursuant to Section 1603 of the Fish and Game Code

## **JURISDICTIONAL STATUS OF TAILINGS DEPOSITION/WATER RECYCLING AREA**

As noted above, the Tailings Deposition/Water Recycling Area was created by construction of a dam on Trampas Creek. Construction of the dam created a large basin that was intended for use a storage area for tailings that are a by-product of the sand mining operation. In addition, the basin created by the dam is also used as a facility for recycling the water used in washing/processing operations. Essentially all of the water that enters the facility is well water that is pumped into the basin. The water level in the facility is carefully monitored and maintained at a volume sufficient for operational purposes .. As described in the water budget summary below and more fully detailed in the attached water budget, in the post mining condition all water subsidies would cease and the facility will dry out in a manner of months. In the post mining condition, the facility is expected to support a minimal amount of wetland vegetation in small isolated patches, and would not meet the definition of a lake set forth in the Fish and Game Code and would not be subject to regulation pursuant to Section 1600.

## **WATER BUDGET FOR TAILINGS POND**

In the post-mining condition, the Tailings Pond will dry out if not subsidized with well water. For purposes of understanding the ambient conditions, GLA and Wildermuth Environmental prepared a water budget for the Tailings Pond/Recycle Area that considers the conditions expected behind the dam in the absence of any water subsidies from mining. Based on rainfall data using the last 75 years, the area occupied by the tailings area would support approximately five to six acres of emergent marsh habitat once all artificial water subsidies are eliminated. The marsh habitat would occur in small isolated patches and would not meet the definition of a lake. Some of the wetland areas would likely form at the edge of the stored tailings, where ephemeral drainages would discharge to the facility. At least a portion of the wetland vegetation that would occur in these isolated areas would be associated with a “stream” and may be subject to regulation by CDFG under Section 1600.

### **Overall Approach**

In order to accurately determine the extent of hydrophytic vegetation and/or open water in the post-mining condition, the following factors were considered/evaluated.

- Post-mining dry-out of the tailings;
- Hydrologic input from watershed runoff;
- Hydrologic input from precipitation;
- Water consumption by hydrophytic vegetation (amounts); and
- Water consumption by hydrophytic vegetation (seasonality)



## **Post-Mining Dryout of Tailings**

Currently, water depths for areas occupied by cattails, which accounts for approximately 55 acres of the Tailings Pond, average less than two feet. Cattails and bulrush will use up to ten feet of water per year when it is available and require a minimum of about four feet of water seasonally to survive and persist on a site. Cattails and bulrush exhibit winter dormancy with most of the water consumption occurring during the period from May to November. Cattails and bulrush are both shallow-rooted species with the entire root zone located in the upper two feet (three feet maximum). Without water subsidies from the mining operation, essentially all of the water within the root zone of the cattails and bulrush would be depleted by the end of one growing season.<sup>4</sup>

While the Tailings Pond is drying out during the first year without water subsidies, the exposed substrate will quickly be colonized by propagules from non-native grasses and forbs that are found throughout the watershed of the Tailings Pond including wild oats (*Avena fatua*, UPL), slender oats (*Avena barbata*, UPL), riggut (*Bromus diandrus*, UPL), soft chess (*Bromus hordeaceus*, UPL), red brome (*Bromus madritensis rubens*, UPL), rattail fescue (*Vulpia myuros*, UPL), Italian ryegrass (*Lolium multiflorum*, UPL), black mustard (*Brassica nigra*, UPL), field mustard (*Brassica rapa*, UPL), wild radish (*Raphanus sativus*, UPL), tocalote (*Centaurea melitensis*, UPL) and three species of filaree (*Erodium* spp., UPL). These species, as a group, germinate during winter and early spring, consuming most available soil moisture by late spring or early summer, meaning that they are most active during the winter dormancy of the cattails and bulrush, substantially limiting soil moisture that might be available to any surviving wetland plants. Direct evaporation and evapotranspiration will consume most direct precipitation falling on the tailings such that water would be available in very limited amounts to wetland plant species.

## **Input from Watershed Runoff**

The hydrological model set forth in Appendix C determined that approximately 43.5 acre-feet of water would reach the tailings during an average rainfall year.<sup>5</sup> Essentially all of the hydrological input from watershed runoff would occur during the rainy season, which is between October 15 and April 15. This runoff would reach the outer edges of the Tailings Pond, at points where the ephemeral drainages intersect the Tailings. Tailings at these locations would be shallowest and much of the water would be stored in the upper few feet, meaning that it would be available to whatever plants are growing at the discharge point. As noted above, substantial amounts of this water would be consumed by opportunistic spring annuals, which germinate as early as November or December (coincident with the first one to two inches of rainfall) and

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<sup>4</sup> This includes surface water up to three feet and subsurface water at depths to three feet.

<sup>5</sup> Wildermuth Environmental has, on a preliminary basis, conducted more detailed modeling of the Tailings Pond, that reduces the estimated watershed runoff (as set forth using the TR-55 methodology) from approximately 43.5 acre feet to between 25 and 30 acre feet. The more conservative number of 43.5 acre feet is incorporated into this analysis because the Wildermuth report has not yet been completed; however, upon its completion, it is expected to reduce the watershed runoff totals.

reach their peak growth during February and March (some species such as Italian Rygrass germinate a little later and reach peak growth in March and April). The 43.5 acre feet of runoff would generally be sufficient to support up to seven acres of cattails, bulrush and other native and non-native hydrophytes. However, direct evaporation coupled with water consumption by spring annuals, which would germinate and reach maximum growth during the winter dormancy period exhibited by the cattails and bulrush, would reduce to amount of wetland vegetation to between five and six acres.

### **Input from Direct Precipitation**

During average rainfall years, approximately 75 acre-feet would fall on the area occupied by the mine tailings. Essentially all of the hydrological input from direct precipitation would occur during the rainy season, which is between October 15 and April 15, which as noted above coincides with the winter dormancy period of native hydrophytes and the germination and maximum growth period of non-native spring annual grasses and forbs. It is expected that direct evaporation and evapotranspiration by the spring annuals would utilize essentially all of the water reaching the tailings.

### **Summary/Conclusions**

In the post-mining condition, the available surface and subsurface water in the Tailings Pond would be consumed by the existing hydrophytic vegetation, which exhibits high water consumption rates, beginning in late spring and continuing until late fall. Natural hydrologic input from storm runoff and direct precipitation would coincide with the germination and maximum growth period of the (mostly) non-native annual grasses and forbs expected to rapidly colonize the drying tailings. Available water for native hydrophytes would be between 30 and 35 acre feet which would be sufficient to allow persistence of between five and six acres of hydrophytic vegetation. At least a portion of this vegetation would occur at the points where existing ephemeral drainages discharge into the stored tailings, resulting in some wetland or riparian vegetation at these discharge points that would be associated with the ephemeral drainages. Based on total hydrologic inputs to the tailings, the total area could not exceed five to six acres with the actual area potentially subject to Section 1600 jurisdiction clearly less than the maximum of five to six acres predicted by the water budget.

### **PLANNING AREA 6 (CRISTIANITOS MEADOWS)**

Planning Area 6 is located near the southeastern edge of the study area immediately north of the O'Neill Land Conservancy. RMV and CDFG have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas. CDFG jurisdiction in Planning Area 6 totals approximately 9.86 acres of which 9.54 acres consist of vegetated riparian habitat.

**TABLE 14: Cristianitos Meadows Jurisdictional Feature Totals (Resolved Areas)**

<b>Feature Name</b>	<b>Riparian Vegetation<sup>1</sup></b>	<b>Unvegetated Streambed<sup>2</sup></b>	<b>Total CDFG<sup>3</sup></b>
Cristianitos Stock Pond	1.00	0.00	1.00
6-1	0.00	0.01	0.01
6-2	2.20	0.02	2.22
6-3	0.22	0.18	0.40
6-4	6.12	0.11	6.23
<b>Totals<sup>4</sup></b>	<b>9.54</b>	<b>0.32</b>	<b>9.86</b>

<sup>1</sup> Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>2</sup> Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>3</sup> Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

<sup>4</sup> These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

**TABLE 15: Cristianitos Meadows Non-jurisdictional Feature Totals (Resolved Areas<sup>1</sup>)**

<b>Feature Name</b>	<b>Vegetated (acres)</b>	<b>Unvegetated (acres)</b>	<b>Total Acreage</b>
Vernal Marsh	0.17	0.00	0.17
<b>Total</b>	<b>0.17</b>	<b>0.00</b>	<b>0.17</b>

<sup>1</sup> This feature has been field verified and CDFG concurs that it is not subject to regulation pursuant to Section 1603 of the Fish and Game Code

## **PLANNING AREA 7 (CRISTIANITOS CANYON)**

Planning Area 7 is located near the southern portion of the study area and immediately east of the O'Neill Land Conservancy. For this report, the planning area is divided into two distinct areas: the eastern half which is characterized by fairly steep topography with deep canyons that drain toward Gabino Creek that runs generally parallel to and beyond the limits of the southern planning area boundary. The western half of the planning area exhibits more gentle topography and drains to the upper reach of Cristianitos Creek. Gabino Creek and the upper reach of Cristianitos Creek join just southwest of the planning area boundary.

The southern portion of the planning area exhibits a number of clay mines that have been under operation since the 1930s. Mining is currently not in operation; however the lease holders continue maintenance operations and all but one of the mining operations are subject to reclamation pursuant to plans submitted to and administered by the County of Orange.<sup>6</sup> As recently as September of 2002, representatives of Riverside Cement met with officials of the

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<sup>6</sup> No jurisdictional waters are associated with clay mine that is not subject to County of Orange reclamation requirements.

County of Orange onsite to review reclamation plans and discuss plant palettes to be used upon implementation of the reclamation programs.<sup>7</sup>

**Resolved Areas**

CDFG jurisdiction in Planning Area 7 totals approximately 21.68 acres of which 15.87 acres consist of vegetated riparian habitat.

**TABLE 16: Cristianitos Canyon Jurisdictional Feature Totals (Resolved Areas)**

Feature Name	Riparian Vegetation <sup>1</sup>	Unvegetated Streambed <sup>2</sup>	Total CDFG <sup>3</sup>
7-1	0.22	0.44	0.66
7-2	0.17	0.57	0.74
7-3	0.00	0.13	0.13
7-4	0.00	0.29	0.29
7-5	0.00	0.09	0.09
7-6	1.18	0.13	1.31
7-7	7.29	1.17	8.46
7-8	0.00	0.08	0.08
7-9	0.02	0.08	0.10
7-10	0.00	0.15	0.15
7-11	0.07	0.04	0.11
7-12	2.11	0.25	2.36
7-13	3.78	2.18	5.96
7-14	0.16	0.00	0.16
7-15	0.22	0.02	0.24
7-16	0.60	0.02	0.62
7-17	0.05	0.02	0.07
7-18	0.00	0.01	0.01
7-19	0.00	0.14	0.14
<b>Totals<sup>4</sup></b>	<b>15.87</b>	<b>5.81</b>	<b>21.68</b>

<sup>1</sup> Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>2</sup> Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>3</sup> Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

<sup>4</sup> These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

<sup>7</sup> Bomkamp, Tony. Personal observation as attendee at two meetings to address reclamation of the sites.

**TABLE 17: Cristianitos Canyon Non-jurisdictional Feature Totals (Resolved Areas<sup>1</sup>)**

Feature Name	Vegetated (acres)	Unvegetated (acres)	Total Acreage
Cattail pond	0.01	0.00	0.01
7-11 Isolated seasonal pond <sup>1</sup>	0.04	0.00	0.04
7-12 Isolated Stock Pond <sup>1</sup>	0.03	0.00	0.03
Isolated Willow Patch <sup>2</sup>	0.15	0.00	0.15
<b>Totals</b>	<b>0.28</b>	<b>0.00</b>	<b>0.23</b>

<sup>1</sup> These features have been field verified and CDFG concurs that they are not subject to regulation pursuant to Section 1603 of the Fish and Game Code

### Unresolved Areas

**Feature 7-13 Stock Pond** – is an unvegetated stock pond that results from precipitation ponding at the base of a very small watershed that was impounded as a result of mining activities. The pond has no jurisdictional streambeds discharging into it.

**Feature 7-19 Mining Pit**– is a clay mining pit, already in the early stages of construction in a 1938 aerial photograph that is located near the southwest corner of the planning area. This pit was excavated near the top of a prominent ridgeline and exhibits vertical slopes on all but the western edge. Although water levels vary seasonally, this pit exhibits ponded water year-round due to groundwater seepage. As discussed above, although mining is currently not being conducted in this pit, it continues to be subject to ongoing maintenance by the lease holder and is subject to reclamation pursuant to County of Orange requirements and is not considered to be abandoned. This feature is expected to be filled and will not exist at the time of project implementation.

Two branches of an erosional feature/ephemeral drainage, that originate in upper portions of the mined area drain to the mining pit approximately 400 feet below their confluence. The area occupied by the ephemeral drainage channels is highly disturbed and the channels are mostly unvegetated with a few individuals of mulefat in the lower reach of the drainage below the confluence of the two branches.

**TABLE 18: Cristianitos Canyon Non-jurisdictional Feature Totals (Unresolved Areas<sup>1</sup>)**

Feature Name	Riparian Vegetation (acres)	Unvegetated Streambed (acres)	Total Acreage
7-13 Stock Pond	0.00	0.28	0.28
7-19 Mining Pit	0.14	0.77	0.91
<b>Total</b>	<b>0.14</b>	<b>1.05</b>	<b>1.19</b>

<sup>1</sup> These features have been field verified but are still under consideration by CDFG relative to regulation pursuant to Section 1603 of the Fish and Game Code

**PLANNING AREA 8 (TRW)**

Planning Area 8 is located near the southern edge of the study area east of Avenida Pico and north of Talega Creek. RMV and CDFG have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables and examined in the field and all features in this planning area are considered Resolved Areas. The middle reaches of Features 8-1, 8-4 and 8-8, as well as the middle reach of the southern Blind Canyon tributary and the upper reach of northern Blind Canyon tributary have not yet been subject to field verification. CDFG jurisdiction in Planning Area 8 totals approximately 27.39 acres of which 23.13 acres consist of vegetated riparian habitat.

**TABLE 19: TRW Jurisdictional Feature Totals (Resolved)**

Feature Name	Riparian Vegetation <sup>1</sup>	Unvegetated Streambed <sup>2</sup>	Total CDFG <sup>3</sup>
Blind Canyon	18.90	0.96	19.86
8-1	0.33	0.17	0.50
8-2	0.00	0.01	0.01
8-3	0.00	0.03	0.03
8-4	0.57	0.05	0.62
8-5	0.00	0.10	0.10
8-6	0.07	0.03	0.10
8-7	0.06	0.19	0.25
8-8	0.00	0.09	0.09
8-9	0.18	0.14	0.32
8-10	0.00	0.05	0.05
8-11	0.09	0.05	0.14
8-12	0.06	0.08	0.14
8-13	0.00	0.07	0.07
8-14	0.00	0.05	0.05
8-15	0.83	0.06	0.89
8-16	0.20	0.02	0.21
8-17	0.01	0.05	0.07
8-18	0.00	0.01	0.01
8-19	0.00	0.01	0.01
8-20	0.10	0.06	0.16
8-21	0.00	0.02	0.02
8-22	0.06	0.48	0.54
8-23	0.02	0.33	0.35
8-24	1.65	0.27	1.92
8-25	0.00	0.14	0.14
8-26	0.00	0.16	0.16
8-27	0.00	0.10	0.10

Feature Name	Riparian Vegetation <sup>1</sup>	Unvegetated Streambed <sup>2</sup>	Total CDFG <sup>3</sup>
8-28	0.00	0.13	0.13
8-29	0.00	0.16	0.16
8-30	0.00	0.00	0.00
8-31	0.00	0.14	0.14
8-32	0.00	0.02	0.02
8-33	0.00	0.02	0.02
8-34	0.00	0.01	0.01
<b>Totals<sup>4</sup></b>	<b>23.13</b>	<b>4.26</b>	<b>27.39</b>

<sup>1</sup> Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>2</sup> Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>3</sup> Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

<sup>4</sup> These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

**TABLE 20: TRW Non-jurisdictional Feature Totals (Resolved Areas<sup>1</sup>)**

Feature Name	Vegetated (acres)	Unvegetated (acres)	Total Acreage
Isolated Seasonal Pond	0.58	0.00	0.58
<b>Total</b>	<b>0.58</b>	<b>0.00</b>	<b>0.58</b>

<sup>1</sup> This feature has been field verified and CDFG concurs it is not subject to regulation pursuant to Section 1603 of the Fish and Game Code

## **PLANNING AREA 9 (O'NEILL RANCH)**

Planning Area 9 is located near the eastern edge of the study area within portions of Gabino Canyon. RMV and CDFG have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas. CDFG jurisdiction in Planning Area 9 totals approximately 36.16 acres of which 31.69 acres consist of vegetated riparian habitat.

**TABLE 21: O'Neill Ranch Jurisdictional Feature Totals (Resolved Areas)**

Feature Name	Riparian Vegetation <sup>1</sup>	Unvegetated Streambed <sup>2</sup>	Total CDFG <sup>3</sup>
Gabino	18.89	0.05	18.94
9-1	0.60	0.61	1.21
9-2	3.55	0.32	3.87
9-3	0.69	0.10	0.79
9-4	1.64	0.33	1.97
9-5	0.38	0.02	0.40
9-6	0.13	0.17	0.30

9-7	0.00	0.003	0.003
9-8	0.00	0.01	0.01
9-9	0.00	0.01	0.01
9-10	0.00	0.04	0.04
9-11	0.29	0.15	0.44
9-12	0.00	0.03	0.03
9-13	0.10	0.11	0.21
9-14	2.55	0.12	2.67
9-15	0.05	0.22	0.27
Gabino/Jerome Lake Wetland	1.87	0.00	1.87
Jerome Lake	0.95	2.18	3.13
<b>Totals<sup>4</sup></b>	<b>31.69</b>	<b>4.47</b>	<b>36.16</b>

<sup>1</sup> Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>2</sup> Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>3</sup> Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

<sup>4</sup> These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

## **ROAD GAPS**

Road Gaps are located throughout the study area. RMV and CDFG have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas. CDFG jurisdiction in the road gaps totals approximately 124.41 acres of which 123.43 acres consist of vegetated riparian habitat.

**TABLE 22: Road Gap Jurisdictional Feature Totals (Resolved)**

Feature Name	Riparian Vegetation <sup>1</sup>	Unvegetated Streambed <sup>2</sup>	Total CDFG <sup>3</sup>
Blind Canyon	0.84	0.00	0.84
Chiquita	1.72	0.00	1.72
Chiquita Wetland	12.60	0.00	12.60
Cristianitos Creek	9.79	0.00	9.79
Gabino Creek	5.50	0.00	5.50
Gobernadora	3.03	0.00	3.03
Road Gap-1	0.64	0.06	0.70
Road Gap-10/1-7	0.29	0.00	0.29
Road Gap-11/2-11	0.30	0.00	0.30
Road Gap 12/2-12	0.32	0.00	0.32
Road Gap-13/2-14	0.35	0.00	0.35
Road Gap-14/2-13	0.62	0.00	0.62
Road Gap-15/3-16	2.49	0.00	2.49
Road Gap-16/3-13	0.45	0.00	0.45
Road Gap-17/5-1	0.00	0.40	0.40



Feature Name	Riparian Vegetation <sup>1</sup>	Unvegetated Streambed <sup>2</sup>	Total CDFG <sup>3</sup>
Road Gap-18	0.00	0.01	0.01
Road Gap 19/5-7A	0.23	0.01	0.24
Road Gap 2	0.00	0.02	0.02
Road Gap-20/8-21	0.00	0.06	0.06
Road Gap 21	0.00	0.01	0.01
Road Gap-22	1.25	0.00	1.25
Road Gap-3	0.00	0.01	0.01
Road Gap-4	0.00	0.02	0.02
Road Gap-5/2-1	2.85	0.08	2.93
Road Gap-6/2-4	0.00	0.07	0.07
Road Gap-7/2-5	0.00	0.05	0.05
Road Gap-8	1.44	0.04	1.48
Road Gap-9	0.00	0.14	0.14
San Juan Creek A	6.12	0.00	6.12
San Juan Creek B	16.56	0.00	16.56
San Juan Creek C	17.77	0.00	17.77
San Juan Creek D	22.57	0.00	22.57
San Juan Creek E	10.28	0.00	10.28
Sulfer Canyon Creek	5.42	0.00	5.42
<b>Totals<sup>4</sup></b>	<b>123.43</b>	<b>0.98</b>	<b>124.41</b>

<sup>1</sup> Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>2</sup> Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

<sup>3</sup> Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

<sup>4</sup> These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

**TABLE 23: Road Gap Non-jurisdictional Feature Totals (Resolved Areas<sup>1</sup>)**

Feature Name	Vegetated(acres)	Unvegetated (acres)	Total Acreage
Sulfer Slope Wetland	0.16	0.00	0.16
<b>Totals</b>	<b>0.16</b>	<b>0.00</b>	<b>0.16</b>

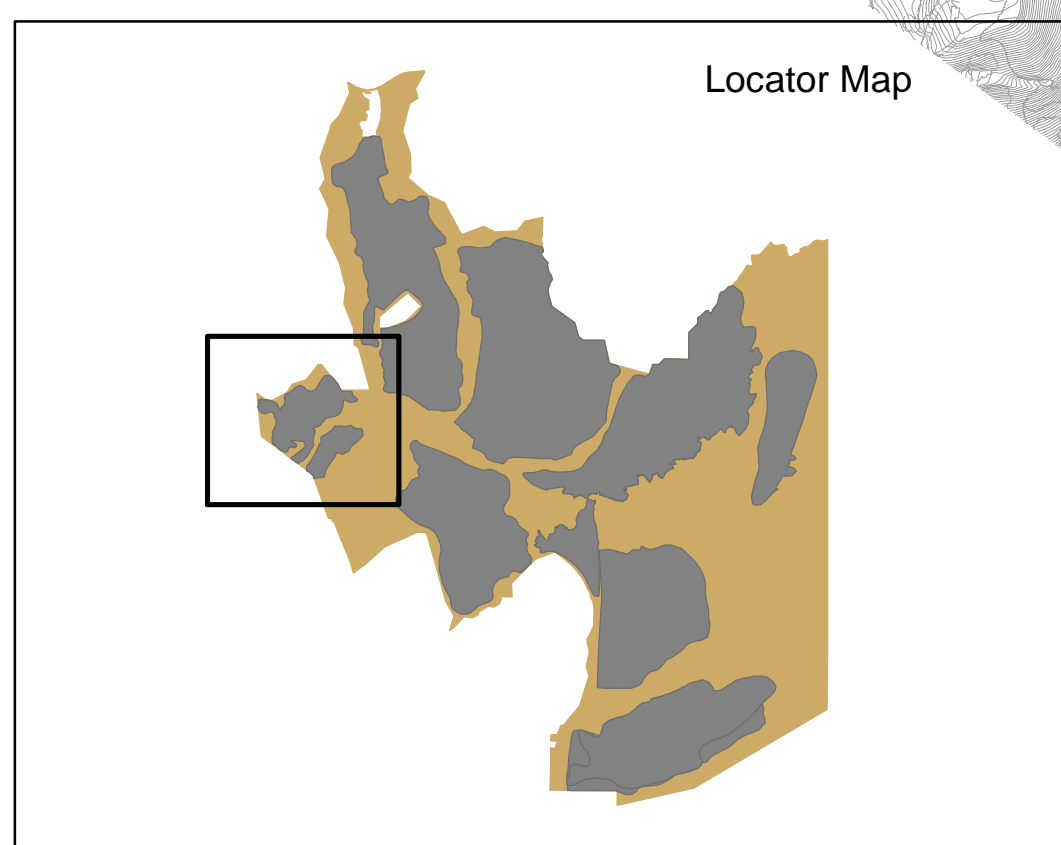
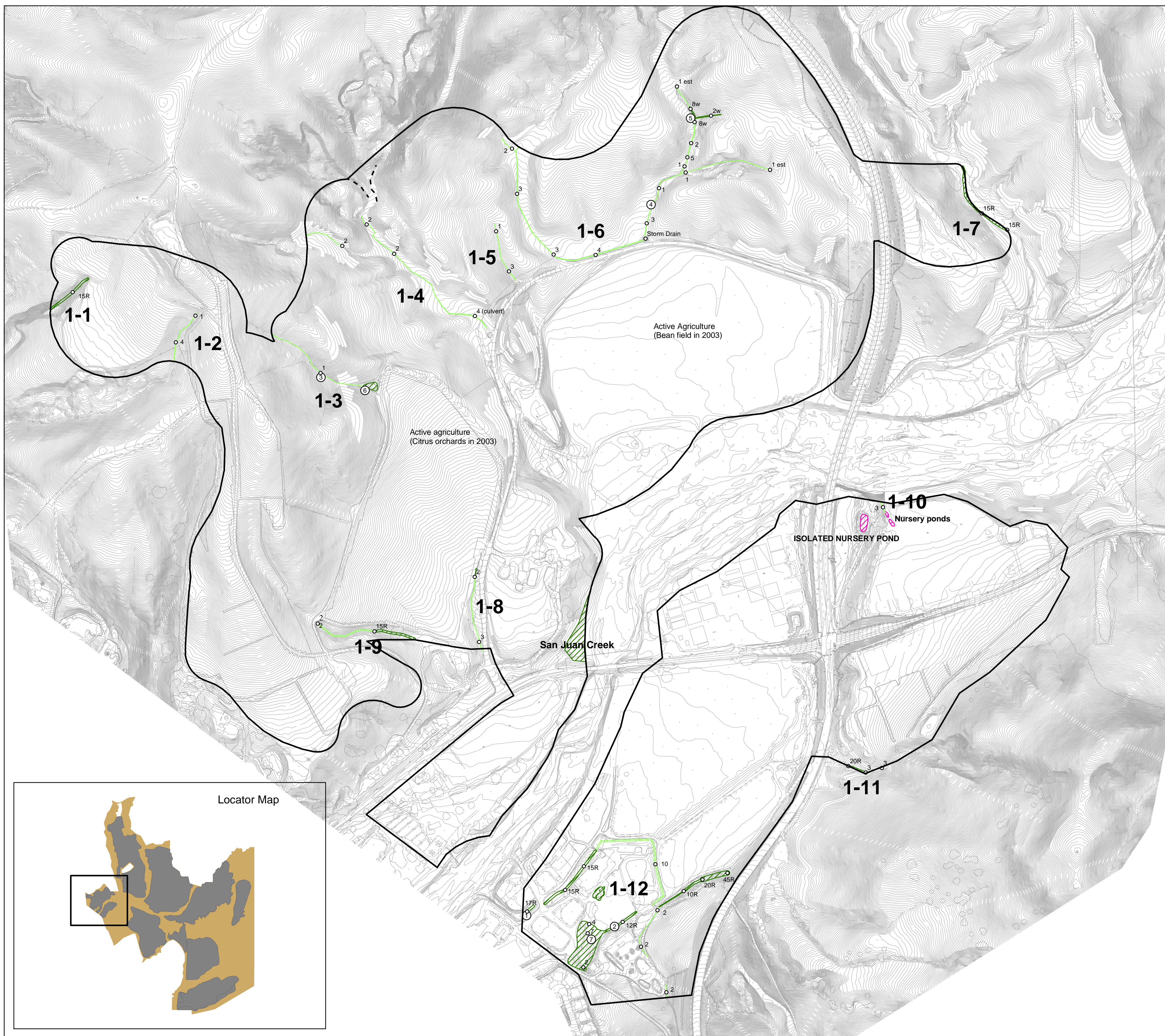
<sup>1</sup> This feature has been field verified and CDFG concurs that it is not subject to regulation pursuant to Section 1603 of the Fish and Game Code

s:0239GENERAL/0239-15/0239-15b.GLAjd.CDFG.032304.doc



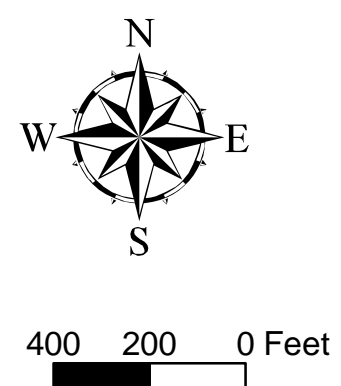
**APPENDIX A**  
**Delineation and Verification Site Visit Dates**

<b>Type</b>	<b>Month and Year</b>	<b>Individual Dates</b>
Delineation	October 2002	29, 30, 31
Delineation	November 2003	1, 4, 7, 11, 12, 14, 21, 25, 26
Delineation	December 2002	6, 16
Delineation	January 2003	15
Delineation	February 2003	19, 21, 24, 27
Delineation	March 2003	3, 5, 6, 8, 21, 24, 26
Delineation	April 2003	1, 8, 16, 22, 23, 24, 25, 28
Delineation	May 2003	1, 2, 13, 22, 23
Delineation	June 2003	2, 5, 9, 11, 12, 13, 26, 27
Delineation	July 2003	9, 10, 11, 14
Delineation	October 2003	6, 7, 17
Delineation	November 2003	5
Verification	March 2003	11, 14, 19
Verification	April 2003	1, 11, 29, 30
Verification	May 2003	21, 23
Verification	June 2003	18, 25
Verification	July 2003	2, 3, 8, 9, 14, 22, 23, 30, 31
Verification	August 2003	6, 15
Verification	October 2003	27



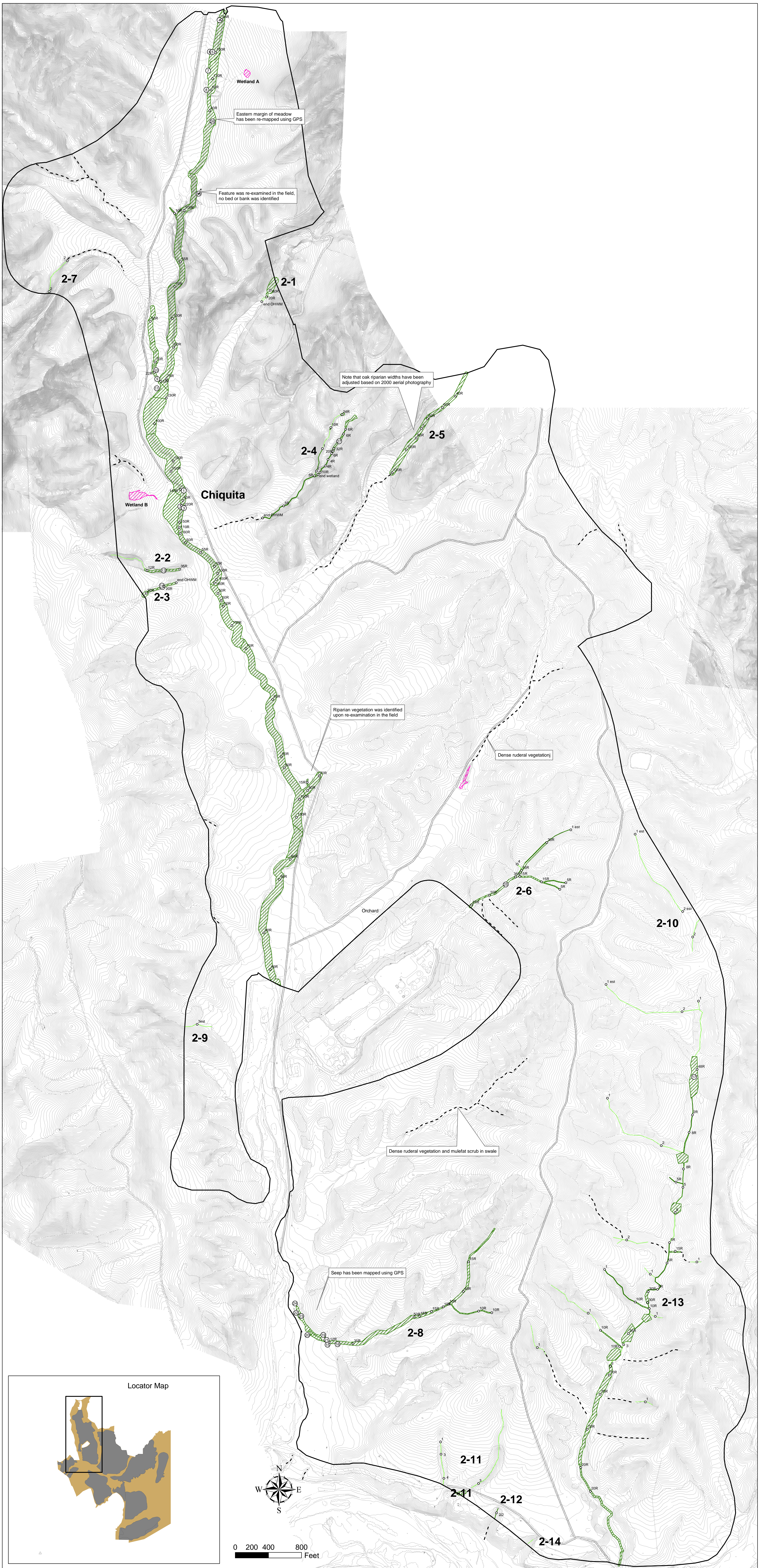
**RANCHO MISSION VIEJO  
ORTEGA GATEWAY**  
Jurisdictional Delineation Map (CDFG)

GLENN LUKOS ASSOCIATES  
FINAL DRAFT  
Supersedes versions dated July 2003



**Legend**

- Study Area
- Streambed ("R" represents riparian vegetation)
- Soil Pit Location
- No OHWM
- Riparian Vegetation
- Jurisdictional Streambed
- Non-jurisdictional Feature



**RANCHO MISSION VIEJO  
CHIQUITA**

Jurisdictional Delineation Map (CDFG)

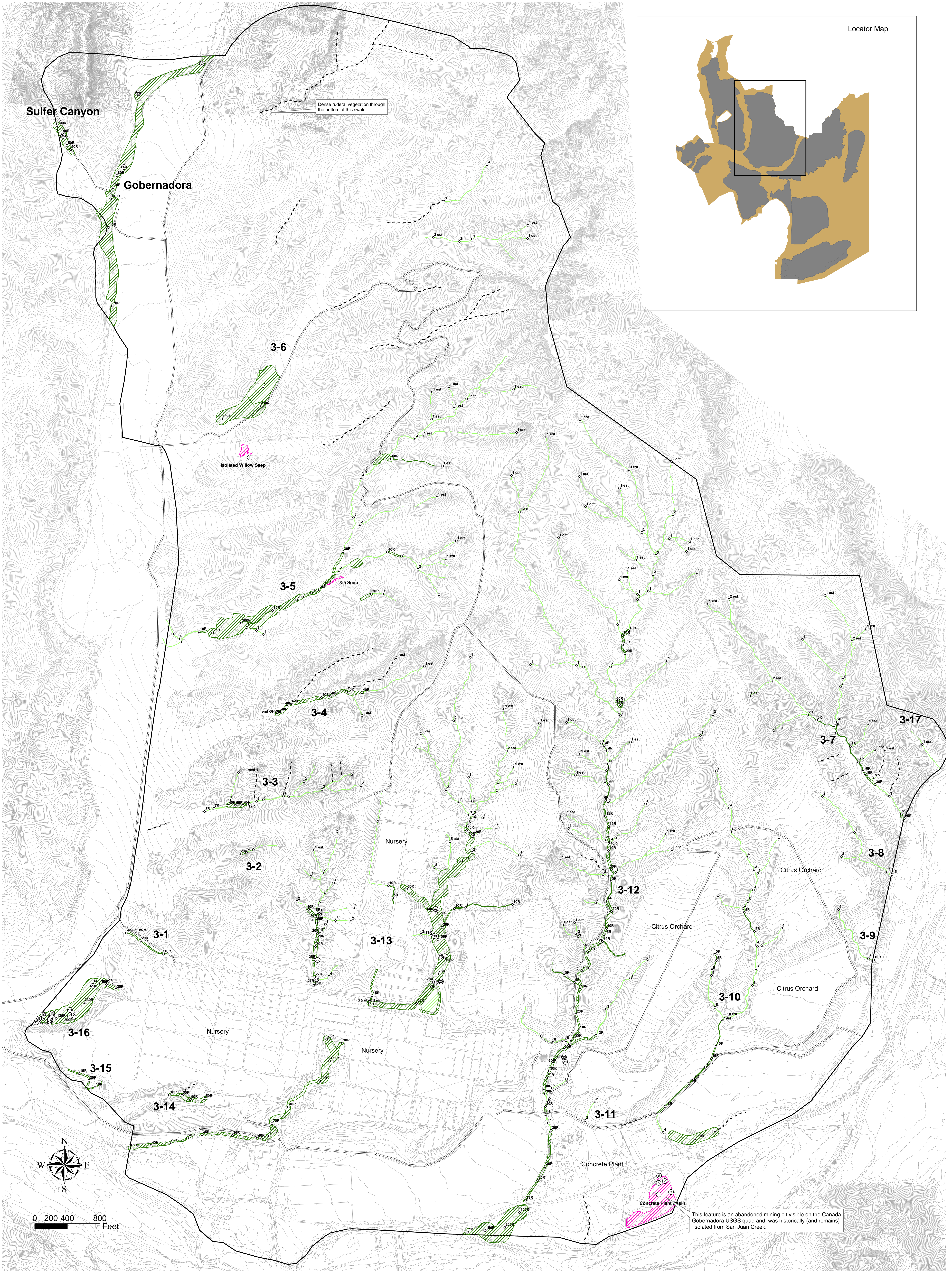
GLENN LUKOS ASSOCIATES



FINAL DRAFT  
Supersedes version dated July 2003

**Legend**

- Study Area Boundary
- No OHWM
- Existing Ranch Road
- Streambed Width ("R" represents Riparian vegetation)
- Soil Pit Location
- Riparian Vegetation
- Jurisdictional Streambed
- Non-jurisdictional Feature



**RANCHO MISSION VIEJO  
GOBERNADORA**

Jurisdictional Delineation Map (CDFG)

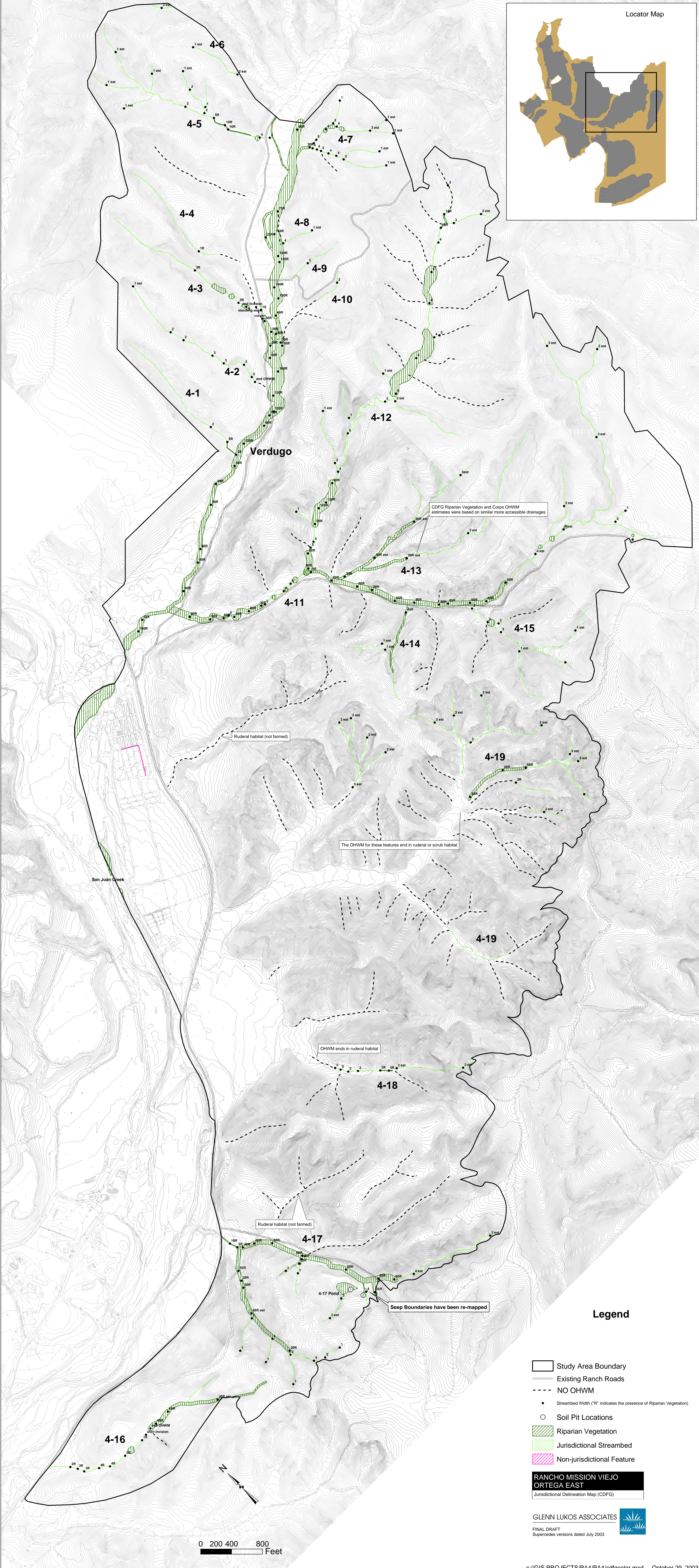
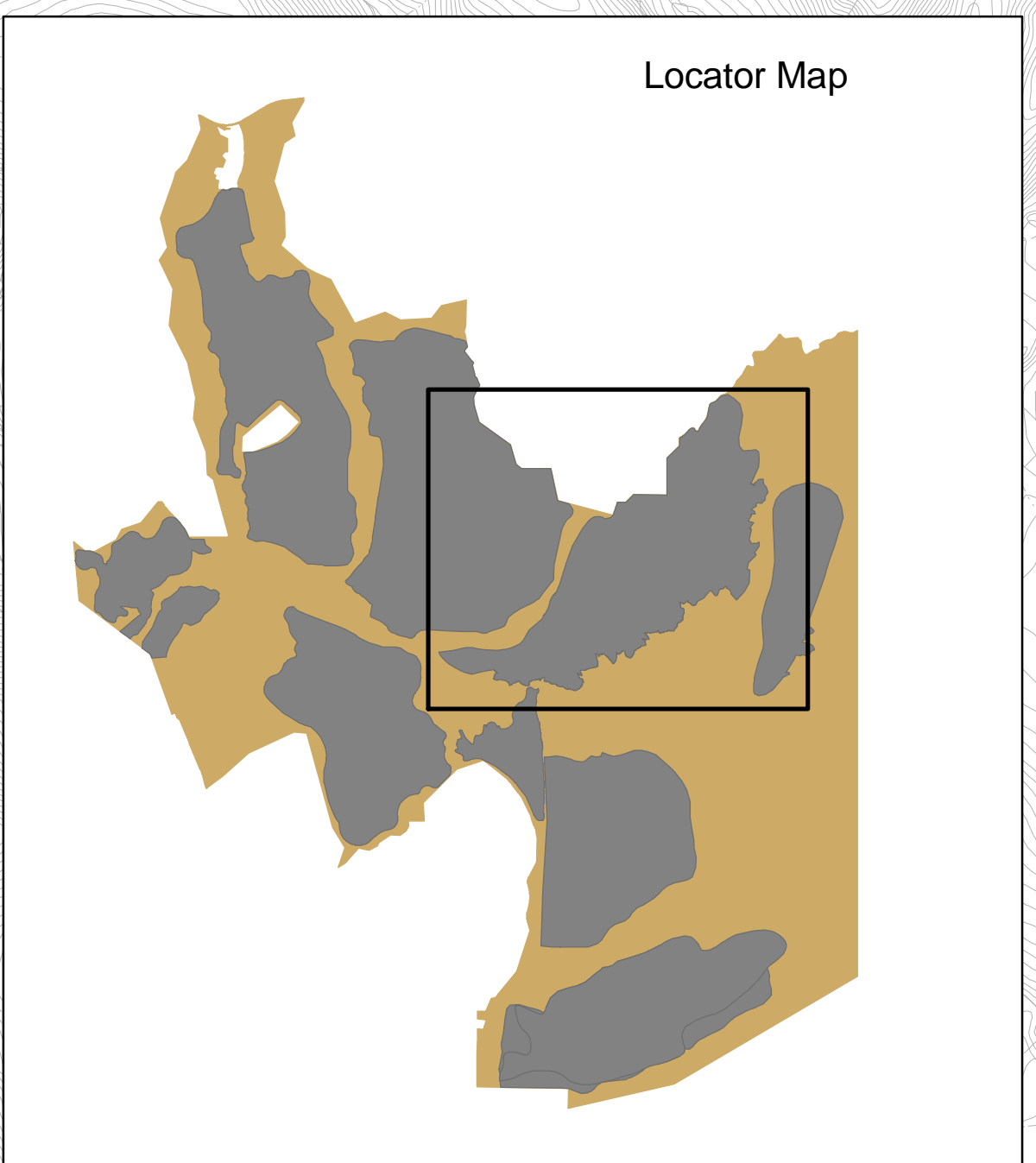
GLENN LUKOS ASSOCIATES



FINAL DRAFT  
Superseded versions dated July 2003

**Legend**

- Study Area Boundary
- Existing Ranch Roads
- Streambed Width ("R" indicates the presence of Riparian Vegetation)
- Soil Pit Location
- No OHWM
- Non-jurisdictional Feature
- Riparian Vegetation
- Jurisdictional Streambed



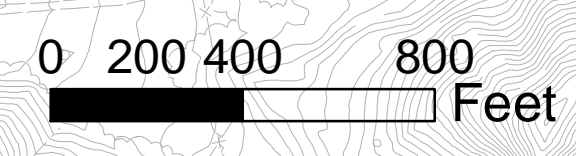
**Legend**

- Study Area Boundary
- Existing Ranch Roads
- NO OHWM
- Streambed Width ("R" indicates the presence of Riparian Vegetation)
- Soil Pit Locations
- Riparian Vegetation
- Jurisdictional Streambed
- Non-jurisdictional Feature

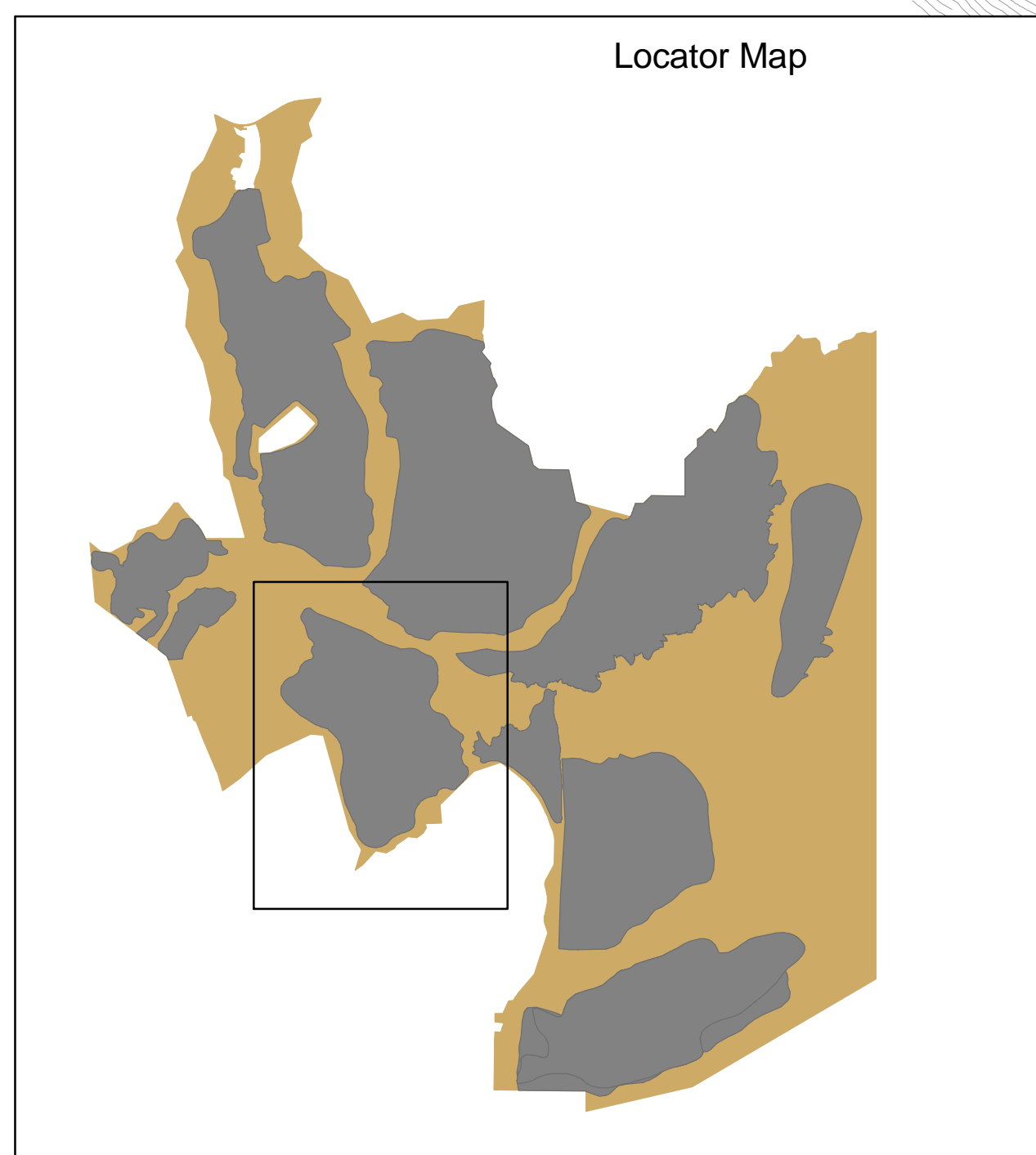
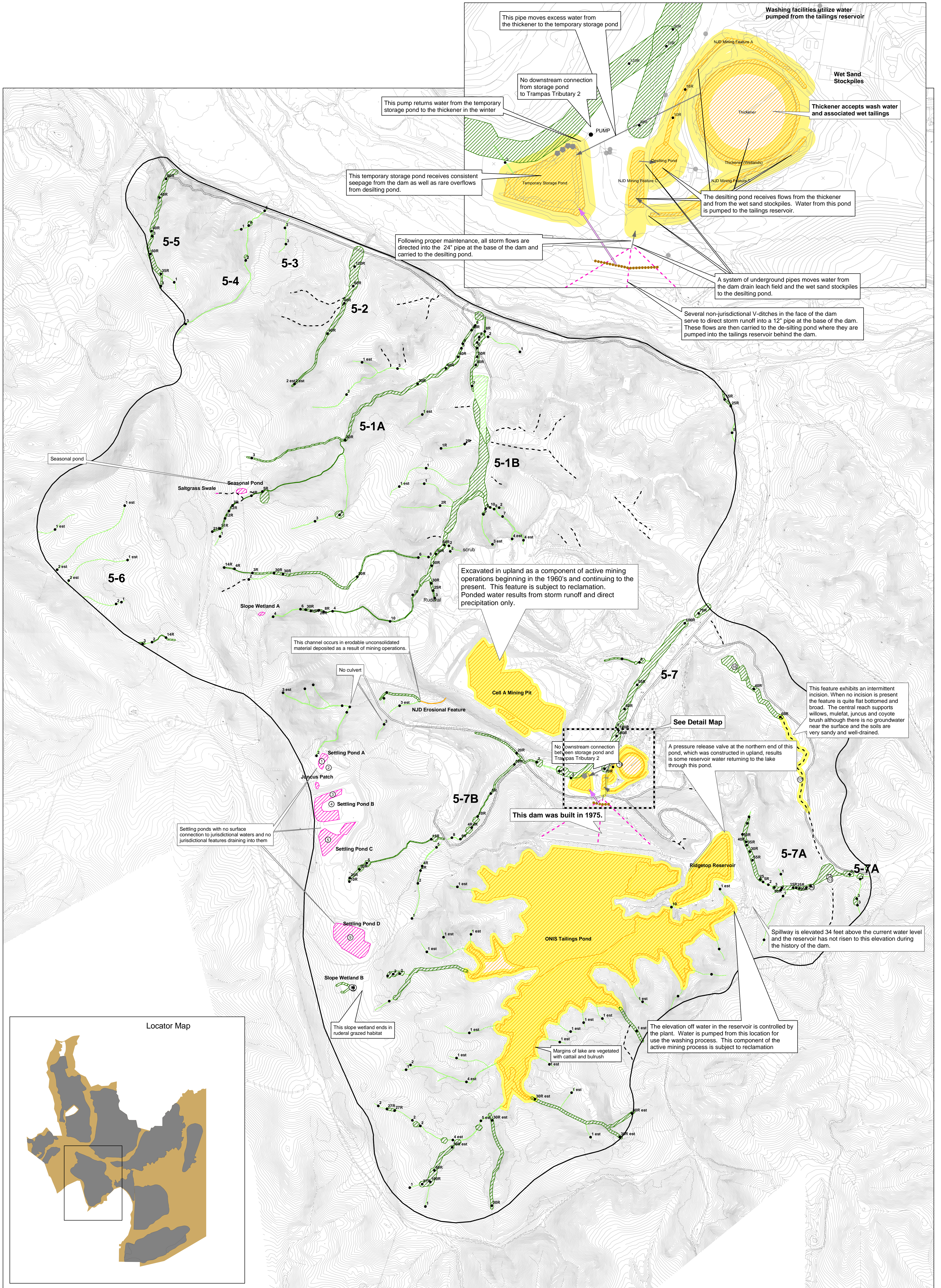
**RANCHO MISSION VIEJO  
ORTEGA EAST**  
Jurisdictional Delineation Map (CDFG)

GLENN LUKOS ASSOCIATES

FINAL DRAFT  
Supersedes versions dated July 2003

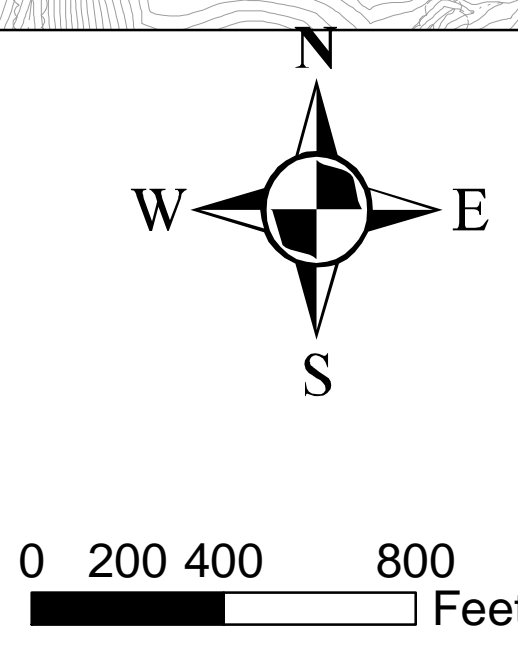


OGLEBAY NORTON SAND WASHING FACILITIES 100-SCALE DETAIL MAP



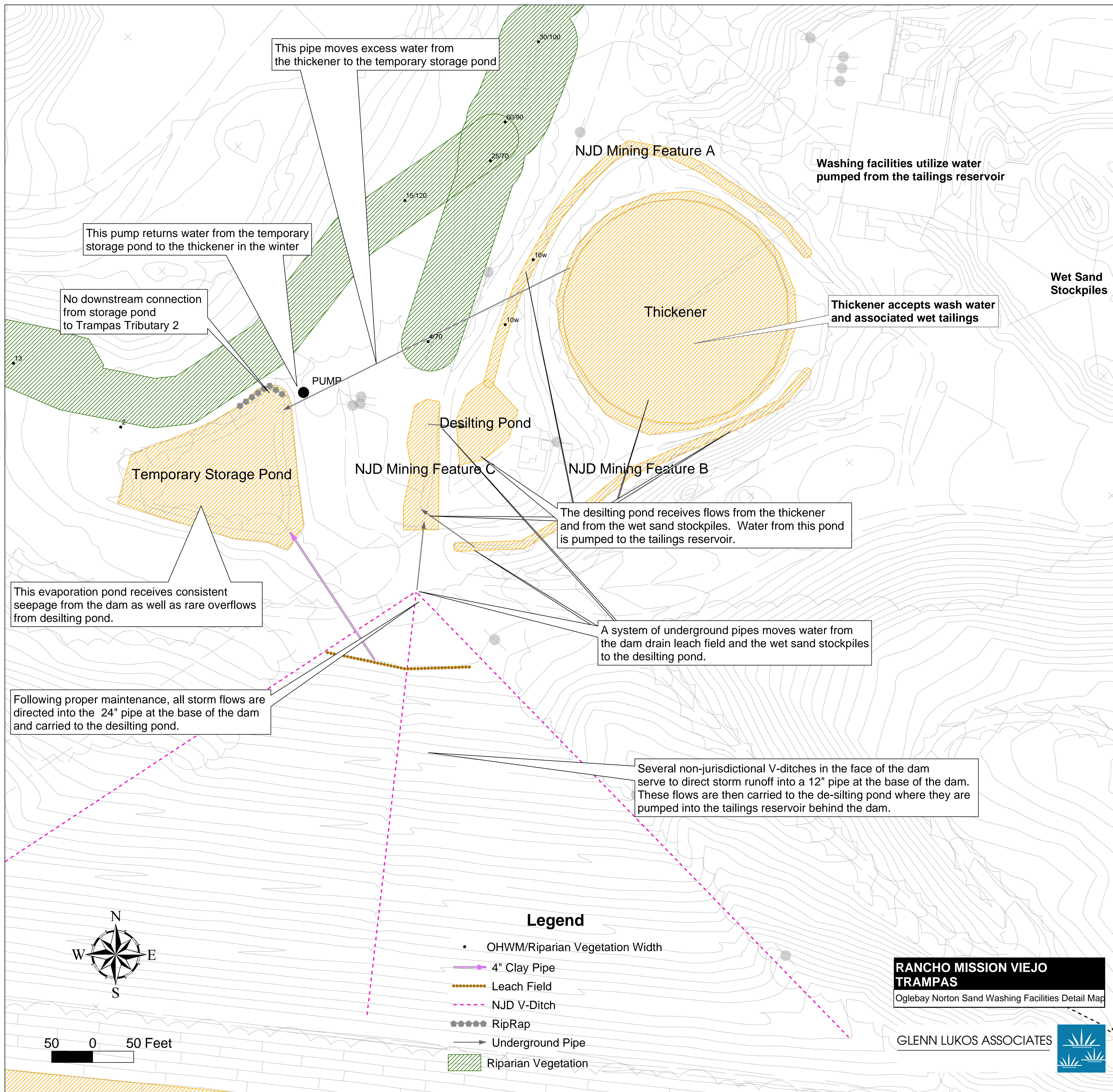
**RANCHO MISSION VIEJO TRAMPAS**  
Jurisdictional Delineation Map (CDFG)

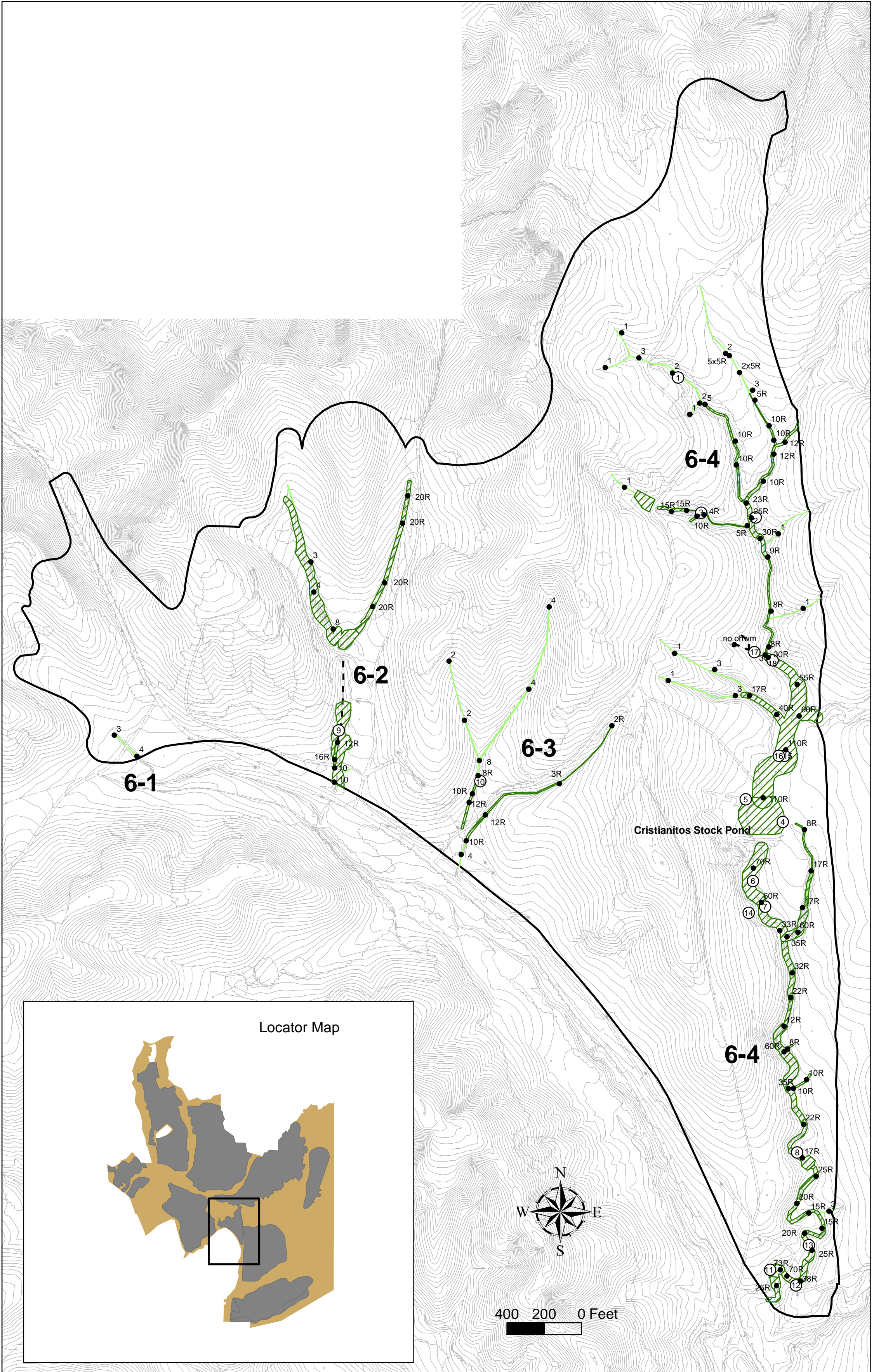
GLENN LUKOS ASSOCIATES  
FINAL DRAFT  
Supersedes versions dated July 2003



Legend	
--- No OHWM	4" Clay Pipe
▨ Riparian Vegetation	●●●● Leach Field
▨ Jurisdictional Streambed	- - - - NJD V-Ditch
▨ Non-jurisdictional Feature	●●●● RipRap
▨ Proposed Non-jurisdictional Feature	→ Underground Pipe
○ Soil Pit Location	■ Discussion Items
□ Study Area Boundary	
— Existing Ranch or Mining Roads	
• Streambed Width ("R" indicates the presence of riparian vegetation)	

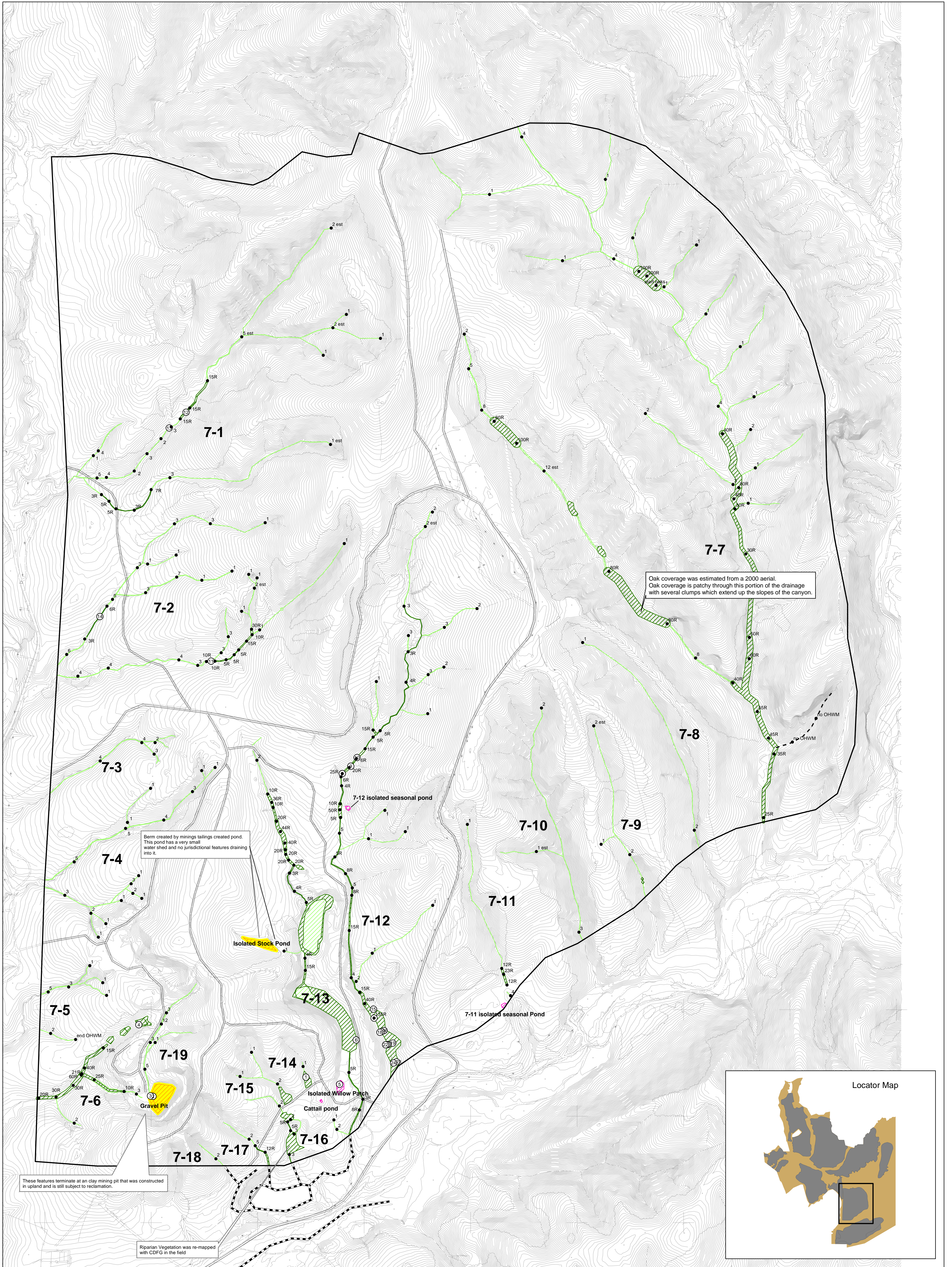






**Legend**

- Streambed Width ("R" indicates the presence of riparian vegetation)
- Soil Pit Location
- No OHWM
- ▨ Riparian Vegetation
- ▨ Jurisdictional Streambed

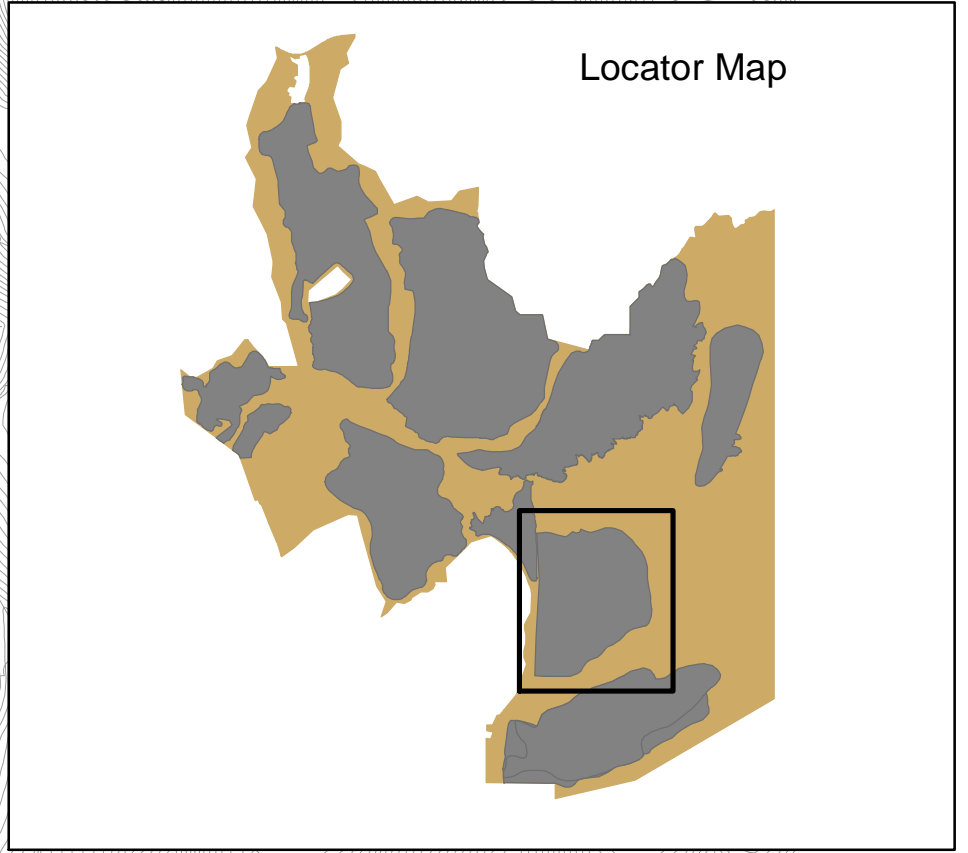


Oak coverage was estimated from a 2000 aerial. Oak coverage is patchy through this portion of the drainage with several clumps which extend up the slopes of the canyon.


Berm created by minings tailings created pond. This pond has a very small water shed and no jurisdictional features draining into it.

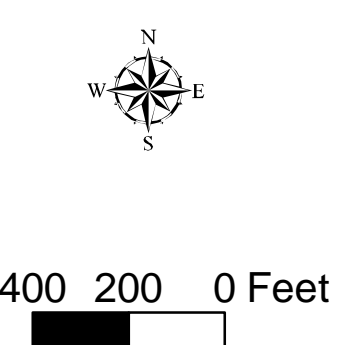
These features terminate at a clay mining pit that was constructed in upland and is still subject to reclamation.

Riparian Vegetation was re-mapped with CDFG in the field

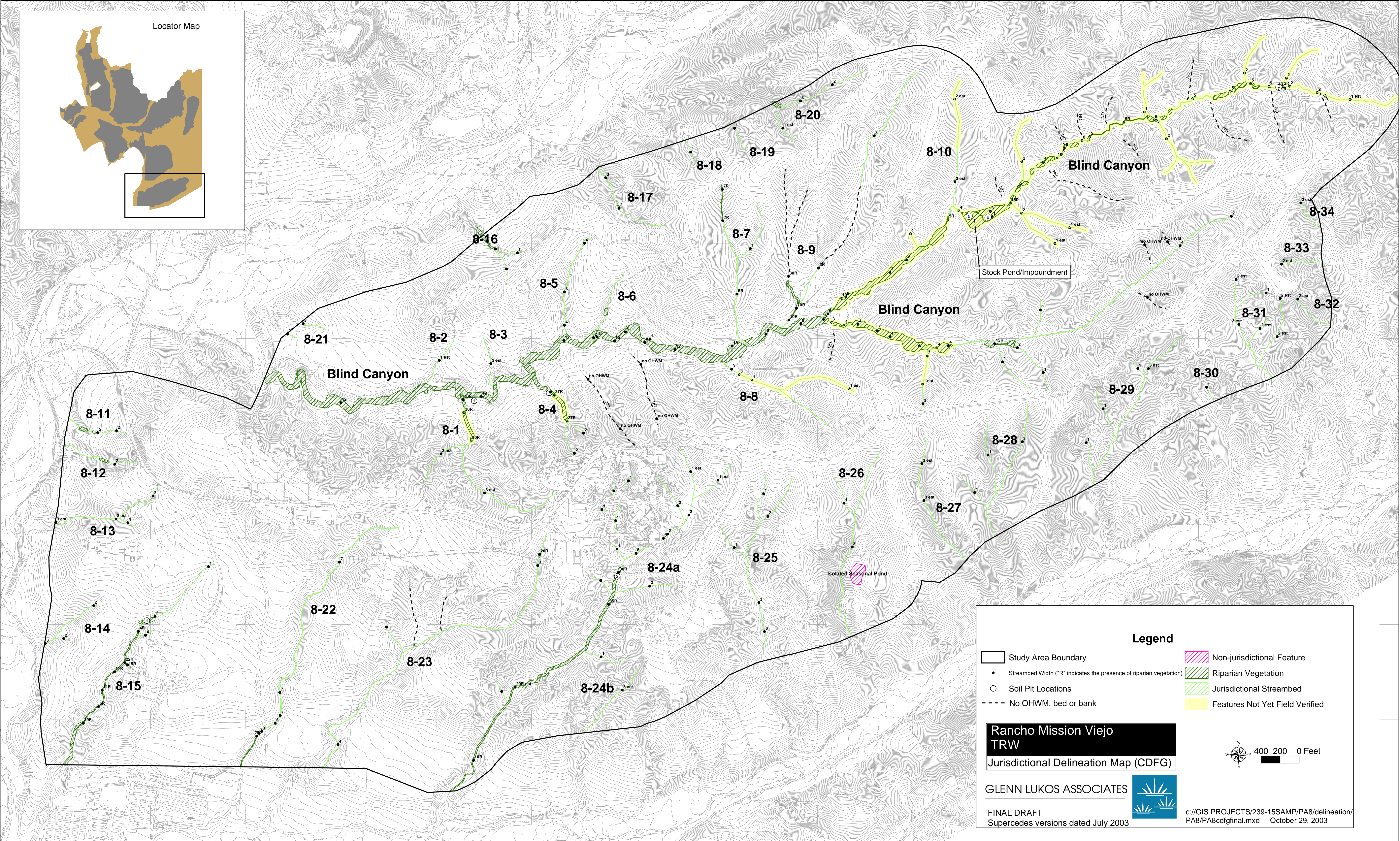
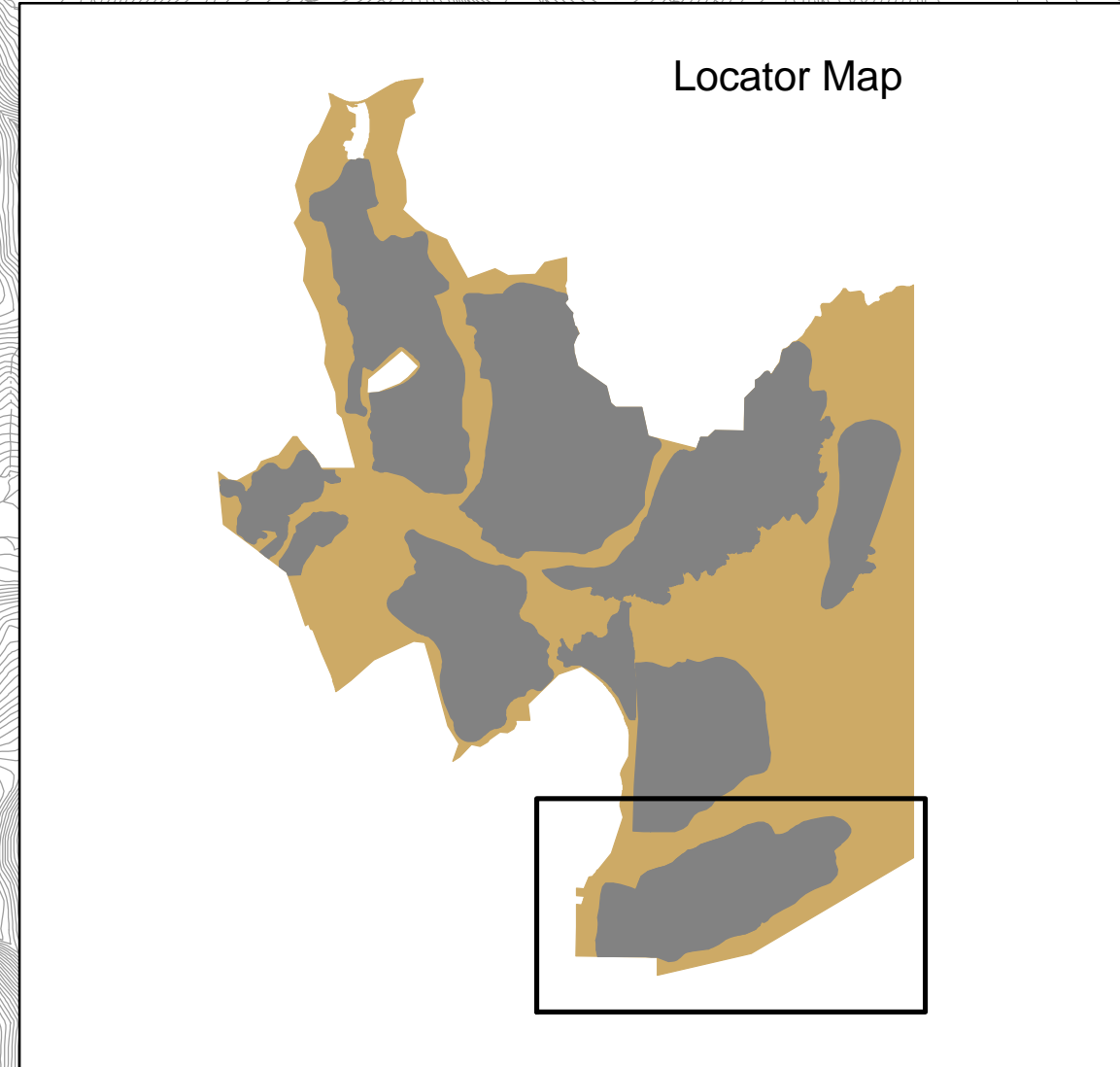


**RANCHO MISSION VIEJO  
CRISTIANITOS CANYON**  
Jurisdictional Delineation Map (CDFG)

GLENN LUKOS ASSOCIATES   
FINAL DRAFT  
Supersedes versions dates July 2003



Legend	
	Study Area Boundary
	Existing or Abandoned Roads
	Streambed Width ("R" indicates the presence of riparian vegetation)
	Soil Pit Location
	No OHWM, bed or bank
	Riparian Vegetation
	Jurisdictional Streambed
	Non-jurisdictional Feature
	Proposed Non-jurisdictional Feature
	Discussion Items
	Off-Site Features



**Legend**

- Study Area Boundary
- Streambed Width ("R" indicates the presence of riparian vegetation)
- Soil Pit Locations
- No OHWM, bed or bank
- Non-jurisdictional Feature
- Riparian Vegetation
- Jurisdictional Streambed
- Features Not Yet Field Verified

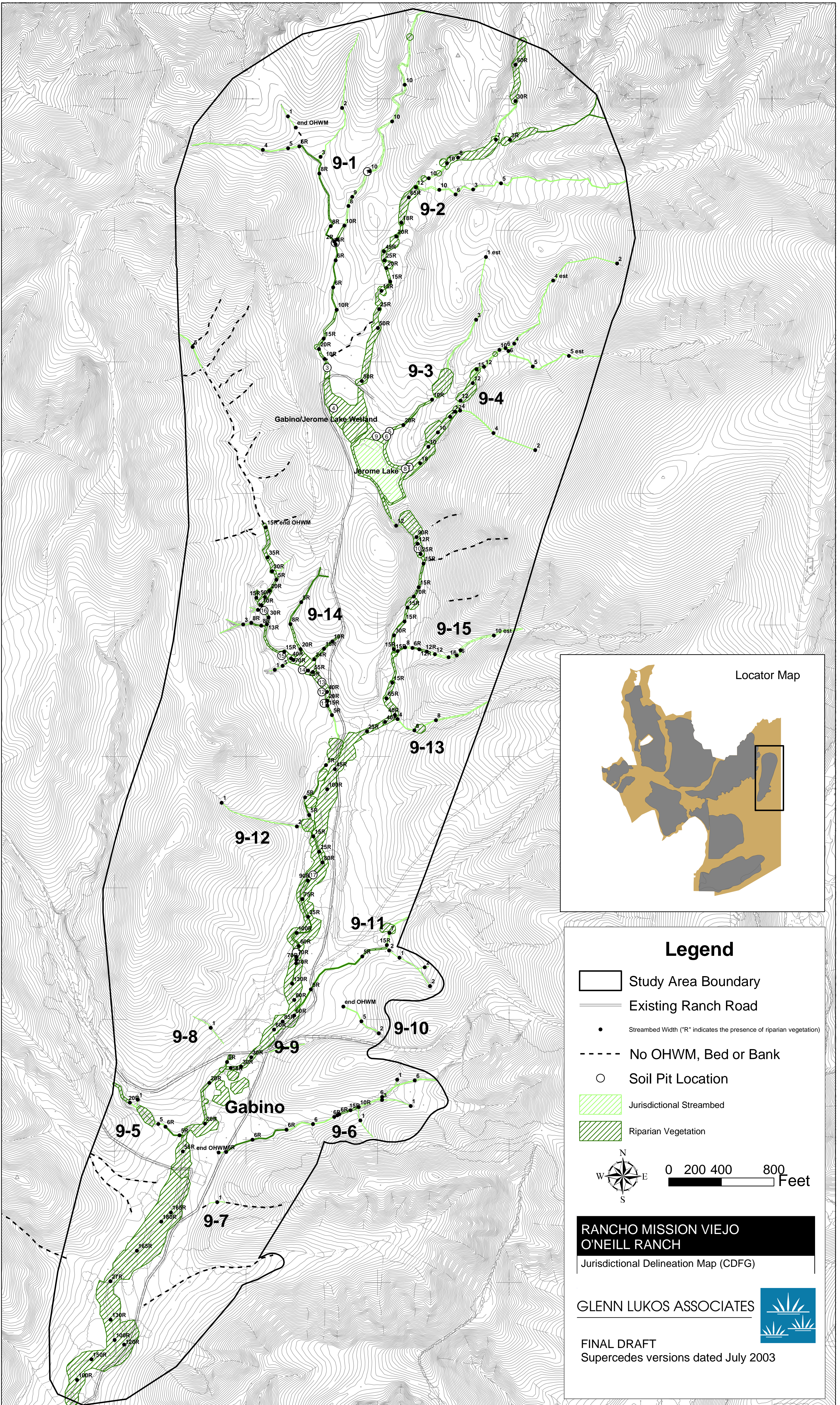
**Rancho Mission Viejo  
TRW  
Jurisdictional Delineation Map (CDFG)**

GLENN LUKOS ASSOCIATES

FINAL DRAFT  
Supersedes versions dated July 2003

400 200 0 Feet

c://GIS PROJECTS/239-15SAMP/PA8/delineation/PA8/PA8cdfgfinal.mxd October 29, 2003





# RANCHO MISSION VIEJO ROAD GAP ANALYSIS

Jurisdictional Delineation Key Map

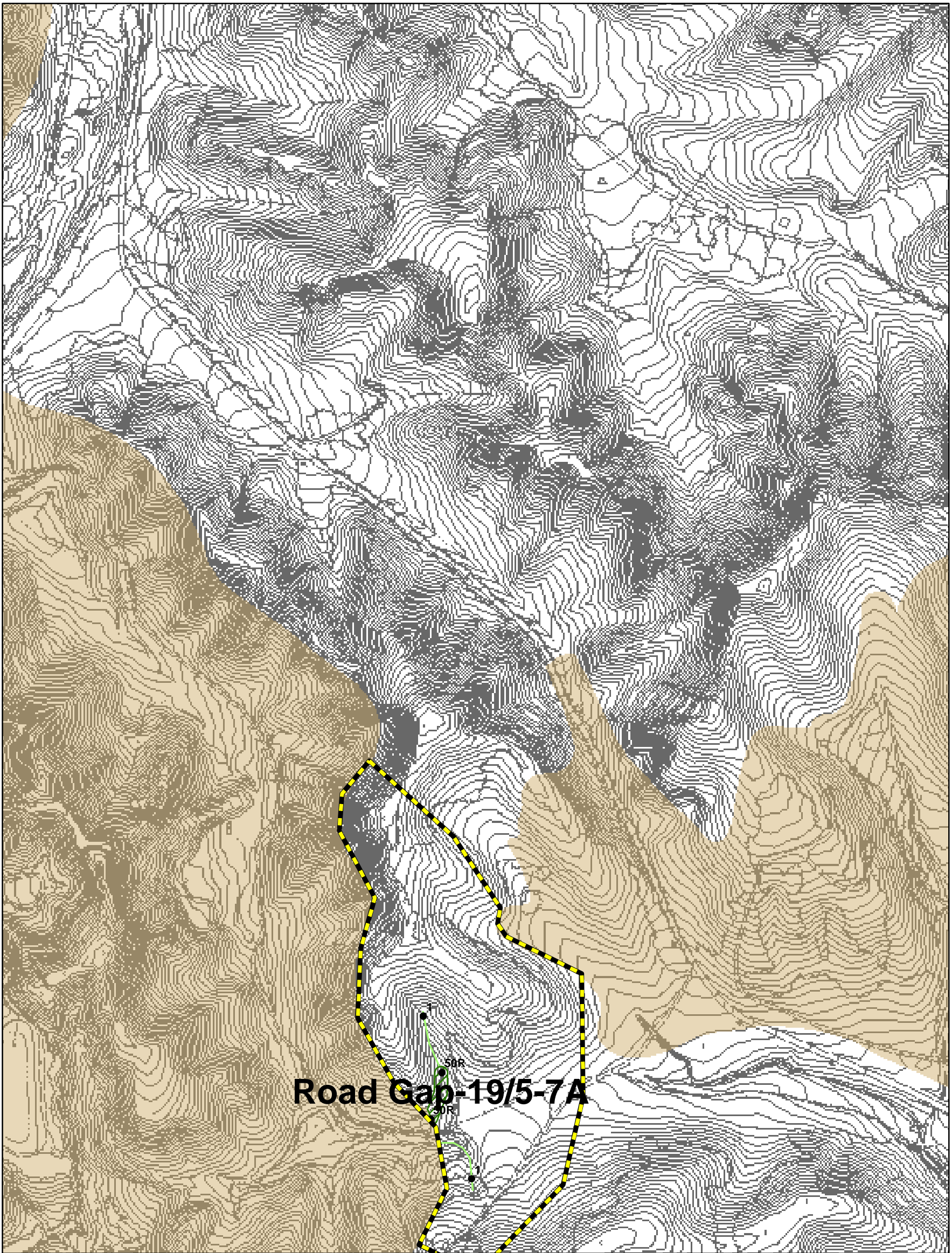
GLENN LUKOS ASSOCIATES



## Legend

-  Conceptual Road Alignments
-  Study Area Boundaries
-  Property Boundary

This gap analysis was based on the conceptual road alignments above, which have not yet been subject to final engineering.



# RANCHO MISSION VIEJO ROAD GAP ANALYSIS









Jurisdictional Delineation Map (CDFG) Sheet 10

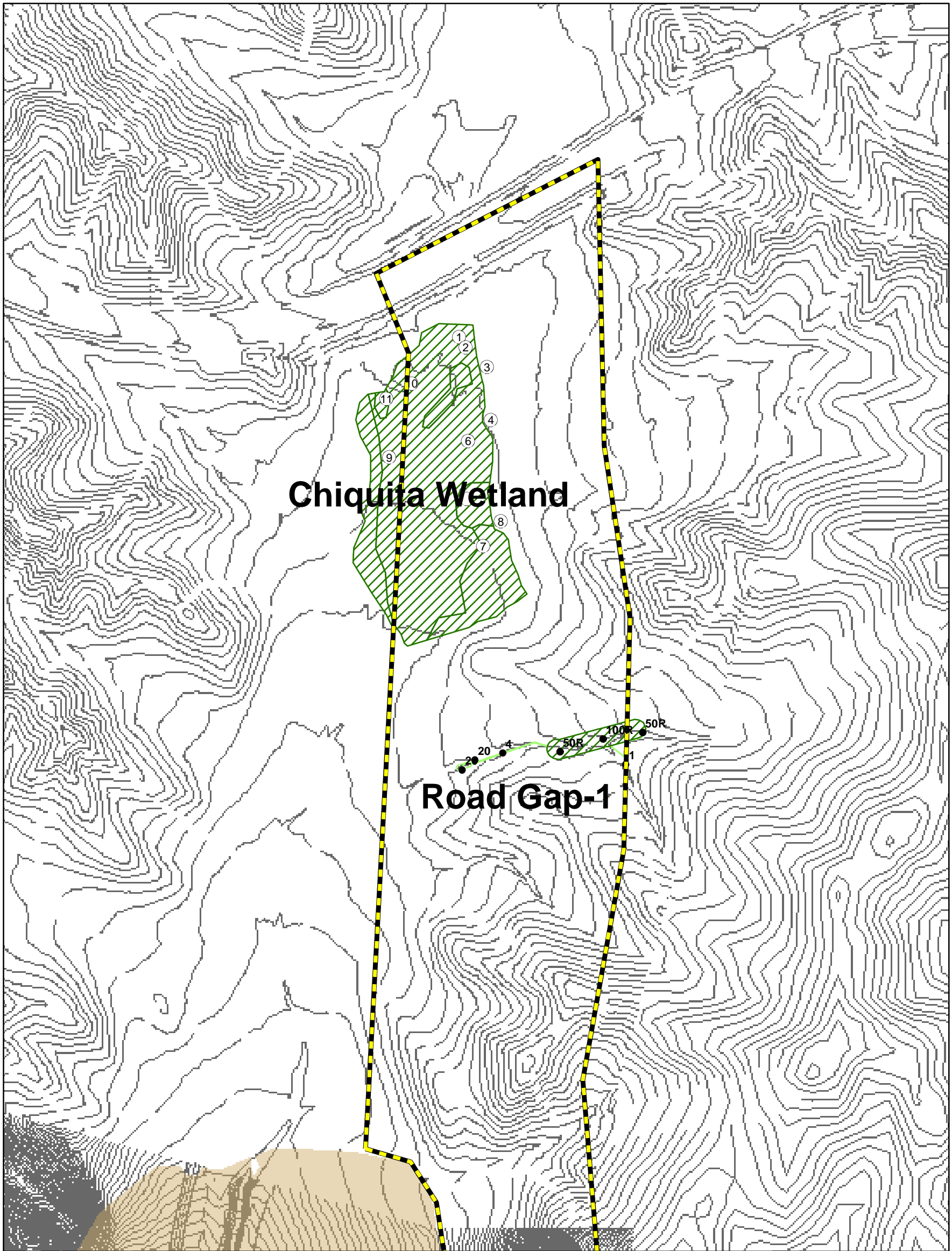
GLENN LUKOS ASSOCIATES



400 0 Feet



-  Study Area Boundaries
-  Soil Pit Location
-  Streambed Width ("R" indicates the presence of Riparian Vegetation)
-  No OHWM, bed or bank
-  Riparian Vegetation
-  Non-jurisdictional Feature
-  Jurisdictional Streambed
-  Planning Area (see Study Area Maps)



# RANCHO MISSION VIEJO ROAD GAP ANALYSIS

Jurisdictional Delineation Map (CDFG) Sheet 1

GLENN LUKOS ASSOCIATES

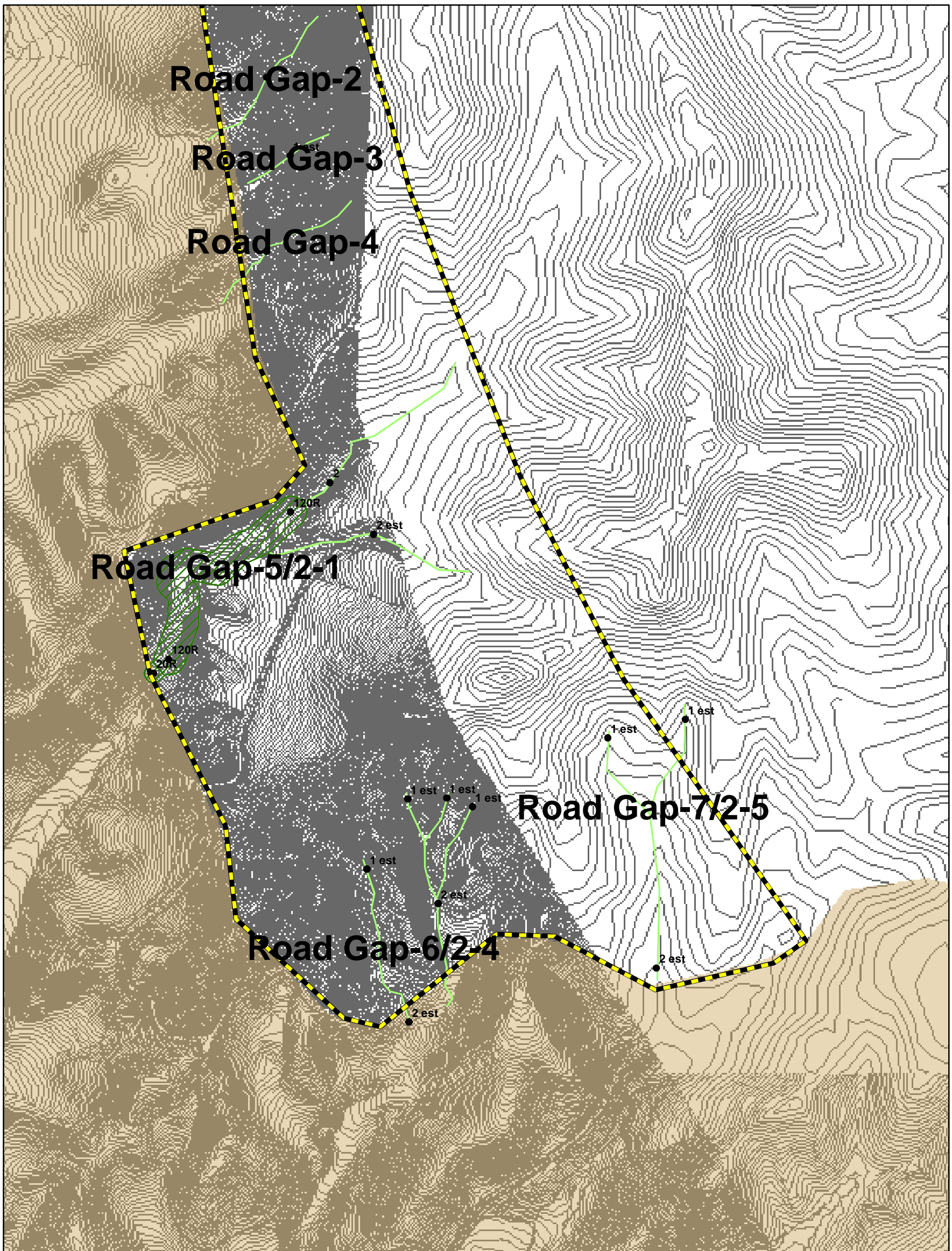


400 0 Feet



- Study Area Boundaries
- Soil Pit Location
- Streambed Width ("R" indicates the presence of Riparian Vegetation)
- No OHWM, bed or bank
- Riparian Vegetation
- Non-jurisdictional Feature
- Jurisdictional Streambed
- Planning Area (see Study Area Maps)





**RANCHO MISSION VIEJO  
ROAD GAP ANALYSIS**









Jurisdictional Delineation Map (CDFG) Sheet 2

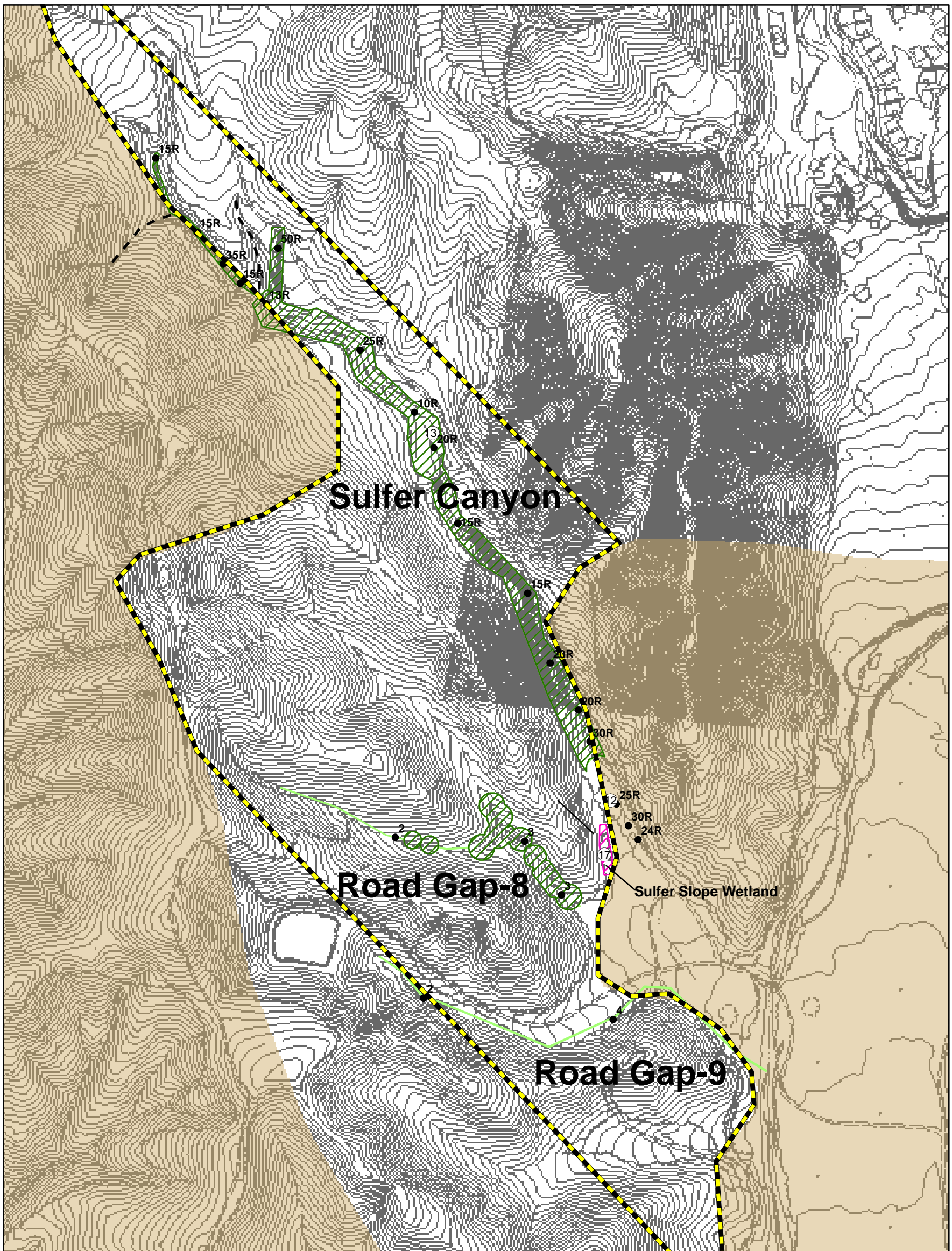
GLENN LUKOS ASSOCIATES



400 0 Feet



-  Study Area Boundaries
-  Soil Pit Location
-  Streambed Width ("R" indicates the presence of Riparian Vegetation)
-  No OHWM, bed or bank
-  Riparian Vegetation
-  Non-jurisdictional Feature
-  Jurisdictional Streambed
-  Planning Area (see Study Area Maps)











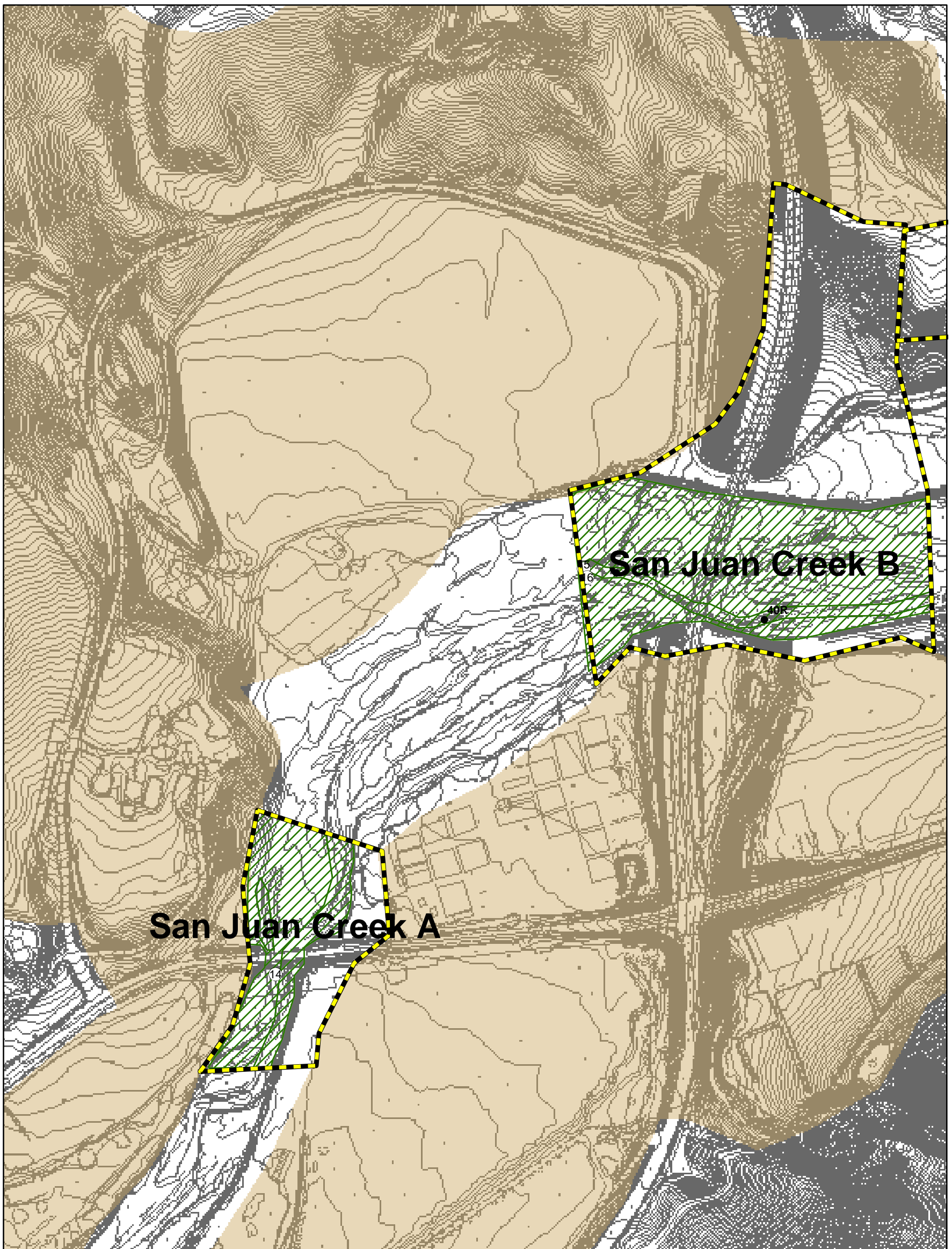
**RANCHO MISSION VIEJO  
ROAD GAP ANALYSIS**

Jurisdictional Delineation Map (CDFG) Sheet 3

GLENN LUKOS ASSOCIATES



-  Study Area Boundaries
-  Soil Pit Location
-  Streambed Width ("R" indicates the presence of Riparian Vegetation)
-  No OHWM, bed or bank
-  Riparian Vegetation
-  Non-jurisdictional Feature
-  Jurisdictional Streambed
-  Planning Area (see Study Area Maps)





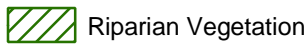
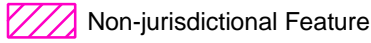
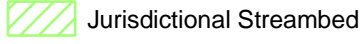
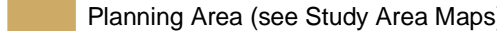


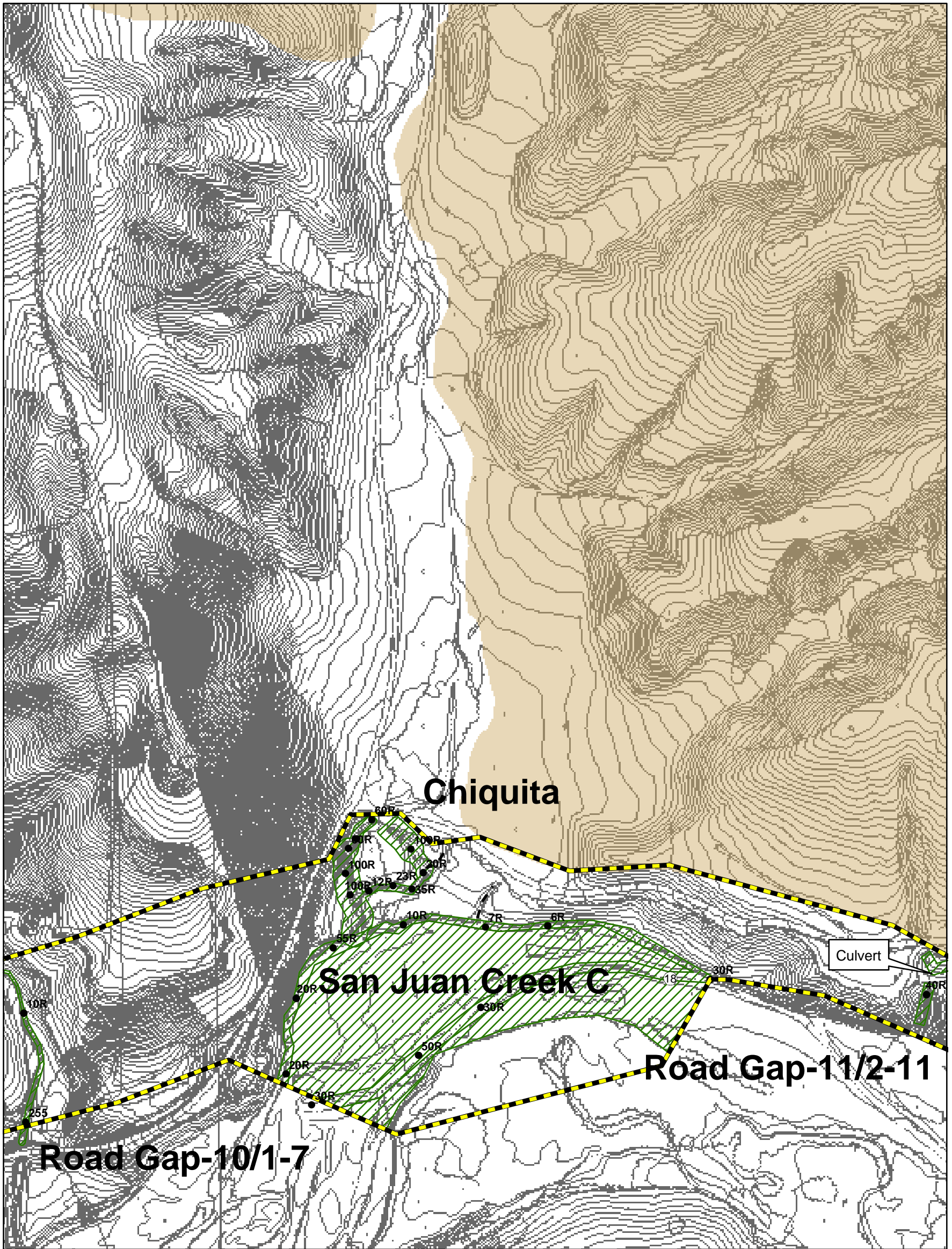
**RANCHO MISSION VIEJO  
ROAD GAP ANALYSIS**

Jurisdictional Delineation Map (CDFG) Sheet 4

GLENN LUKOS ASSOCIATES



-  Study Area Boundaries
-  Soil Pit Location
-  Streambed Width ("R" indicates the presence of Riparian Vegetation)
-  No OHWM, bed or bank
-  Riparian Vegetation
-  Non-jurisdictional Feature
-  Jurisdictional Streambed
-  Planning Area (see Study Area Maps)











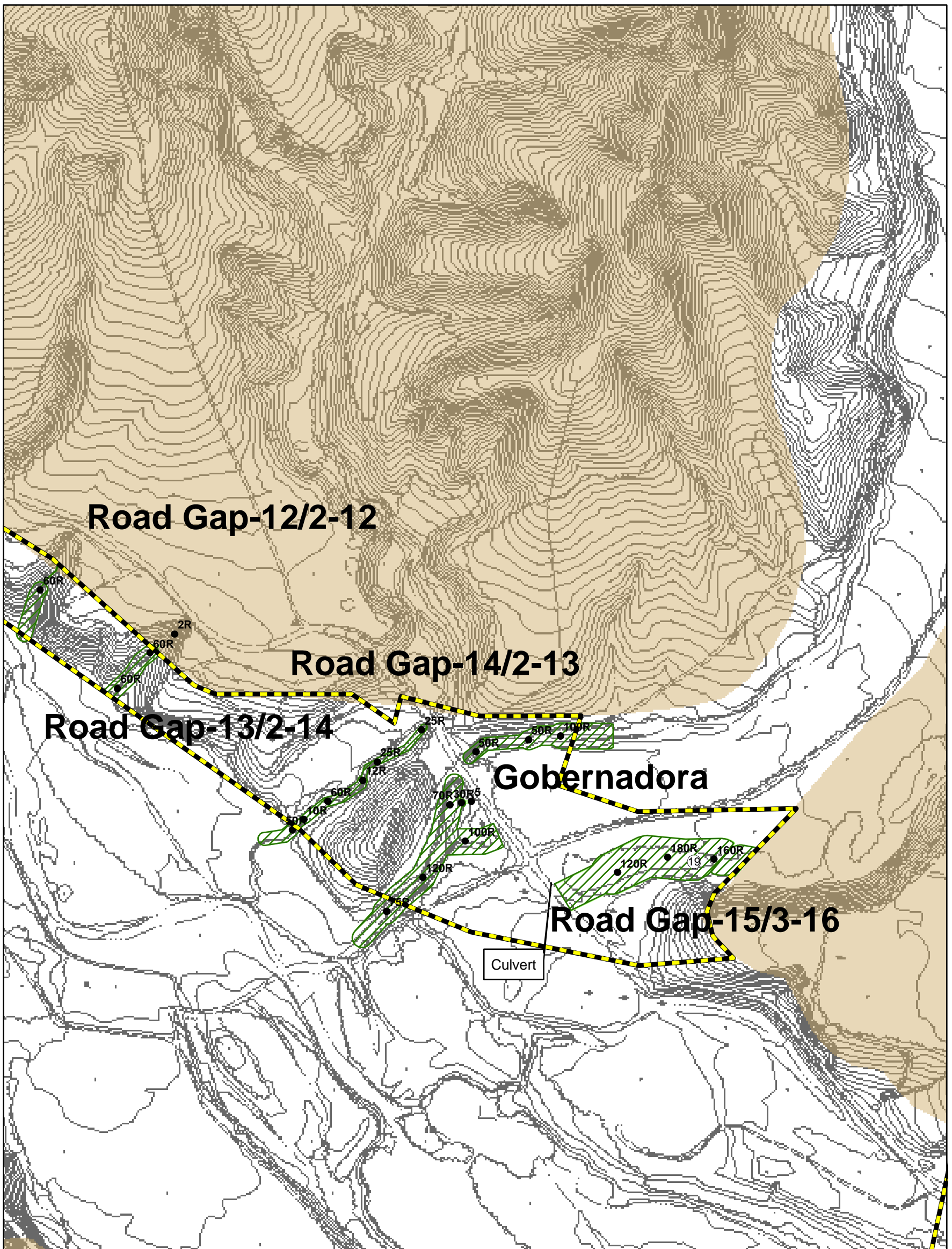
**RANCHO MISSION VIEJO  
ROAD GAP ANALYSIS**

Jurisdictional Delineation Map (CDFG) Sheet 5

GLENN LUKOS ASSOCIATES



-  Study Area Boundaries
-  Soil Pit Location
-  Streambed Width ("R" indicates the presence of Riparian Vegetation)
-  No OHWM, bed or bank
-  Riparian Vegetation
-  Non-jurisdictional Feature
-  Jurisdictional Streambed
-  Planning Area (see Study Area Maps)











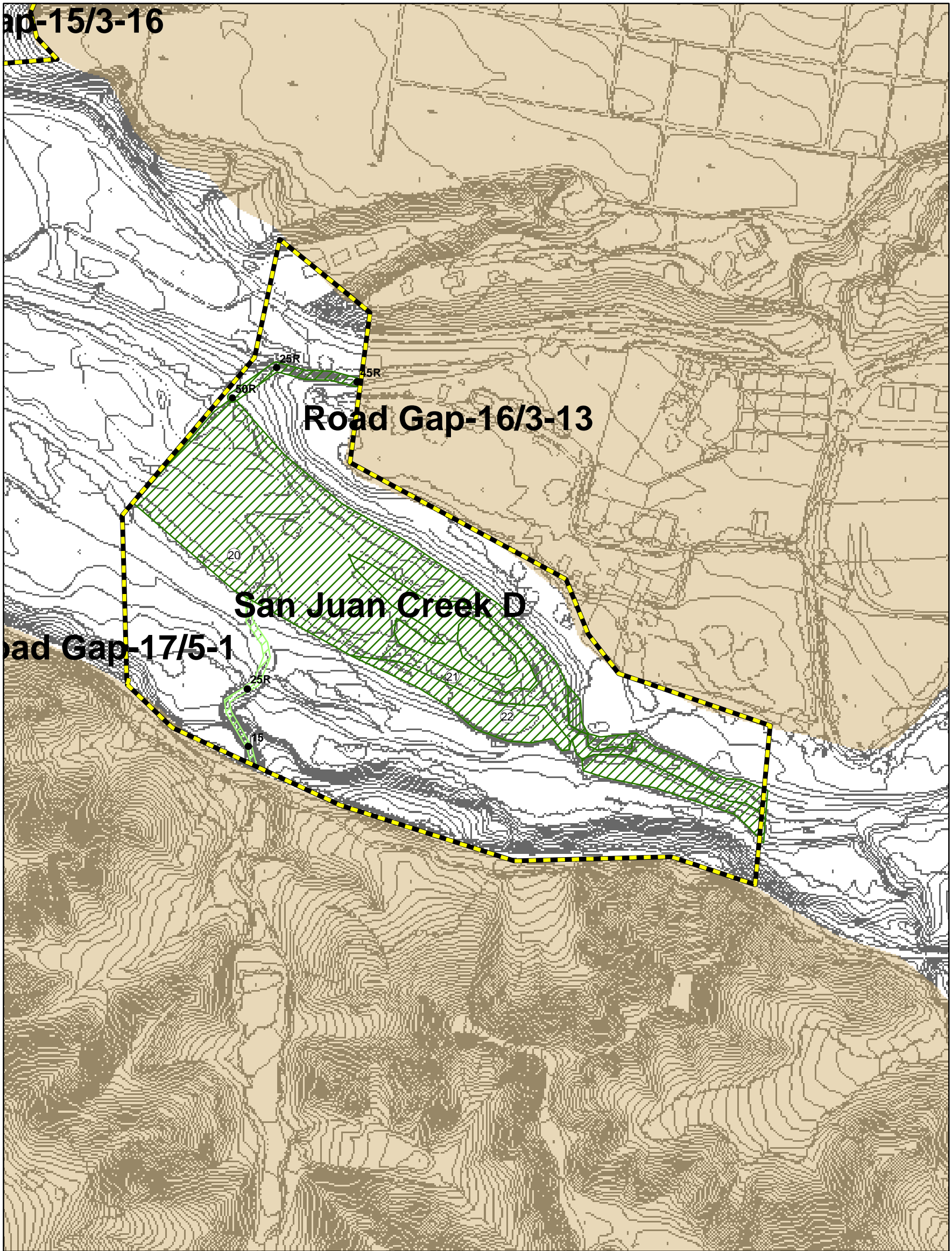
# RANCHO MISSION VIEJO ROAD GAP ANALYSIS

Jurisdictional Delineation Map (CDFG) Sheet 6

GLENN LUKOS ASSOCIATES



-  Study Area Boundaries
-  Soil Pit Location
-  Streambed Width ("R" indicates the presence of Riparian Vegetation)
-  No OHWM, bed or bank
-  Riparian Vegetation
-  Non-jurisdictional Feature
-  Jurisdictional Streambed
-  Planning Area (see Study Area Maps)






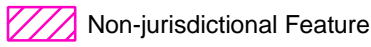
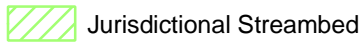
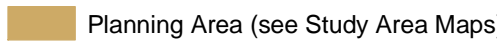


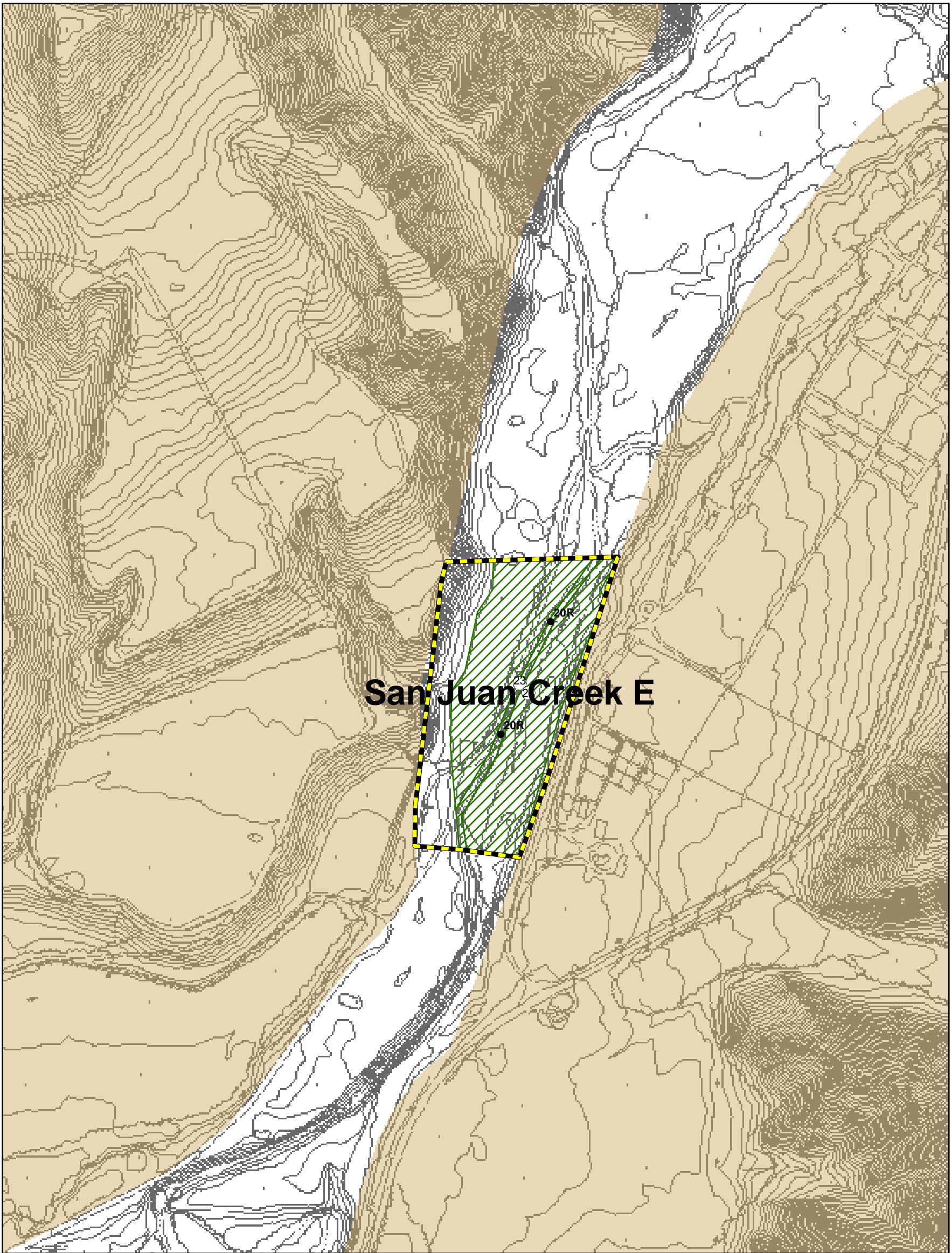
**RANCHO MISSION VIEJO  
ROAD GAP ANALYSIS**

Jurisdictional Delineation Map (CDFG) Sheet 7

GLENN LUKOS ASSOCIATES



-  Study Area Boundaries
-  Soil Pit Location
-  Streambed Width ("R" indicates the presence of Riparian Vegetation)
-  No OHWM, bed or bank
-  Riparian Vegetation
-  Non-jurisdictional Feature
-  Jurisdictional Streambed
-  Planning Area (see Study Area Maps)








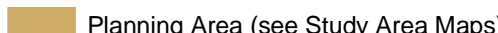


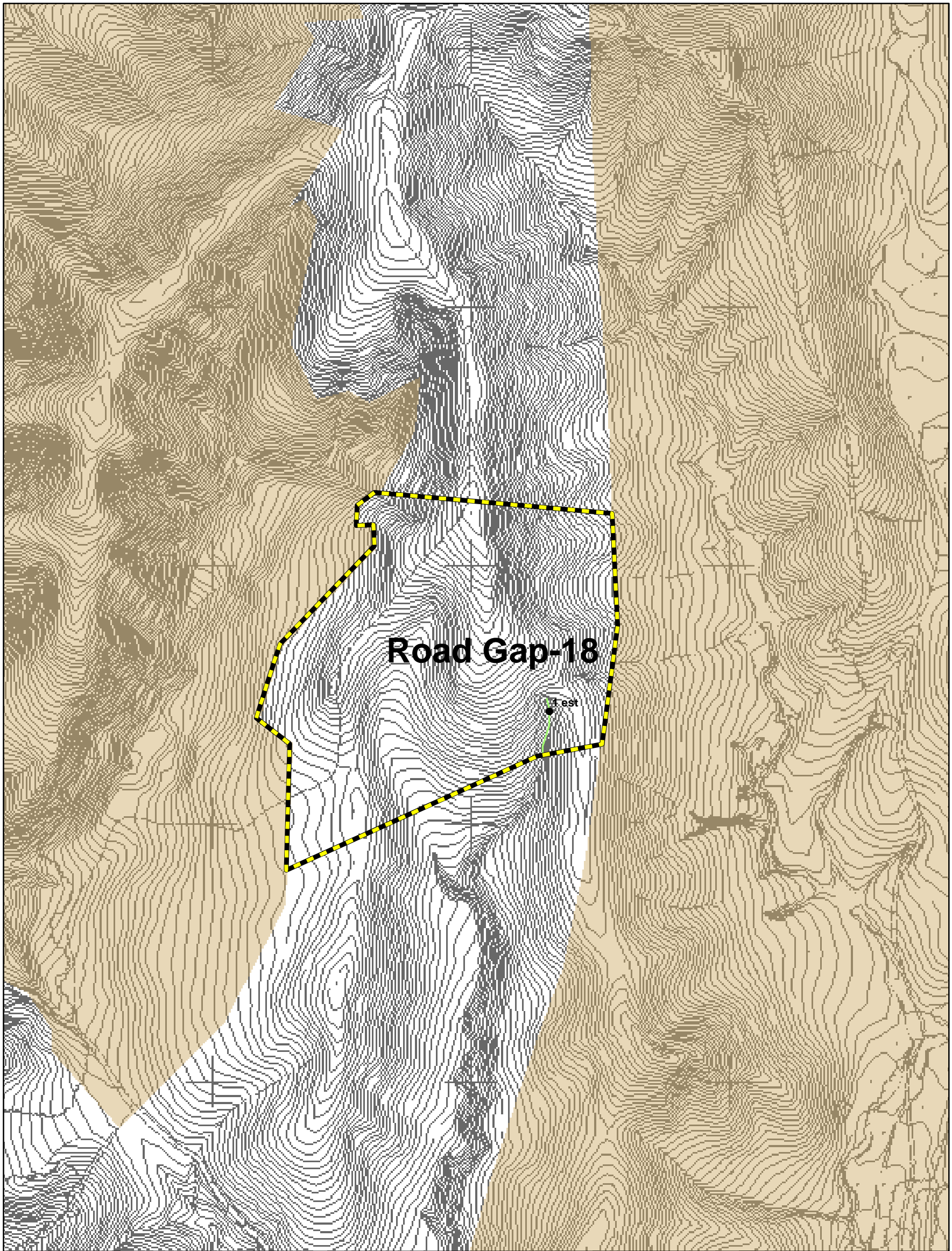
**RANCHO MISSION VIEJO  
ROAD GAP ANALYSIS**

Jurisdictional Delineation Map (CDFG) Sheet 8

GLENN LUKOS ASSOCIATES



-  Study Area Boundaries
-  Soil Pit Location
-  Streambed Width ("R" indicates the presence of Riparian Vegetation)
-  No OHWM, bed or bank
-  Riparian Vegetation
-  Non-jurisdictional Feature
-  Jurisdictional Streambed
-  Planning Area (see Study Area Maps)



# RANCHO MISSION VIEJO ROAD GAP ANALYSIS









Jurisdictional Delineation Map (CDFG) Sheet 9

GLENN LUKOS ASSOCIATES

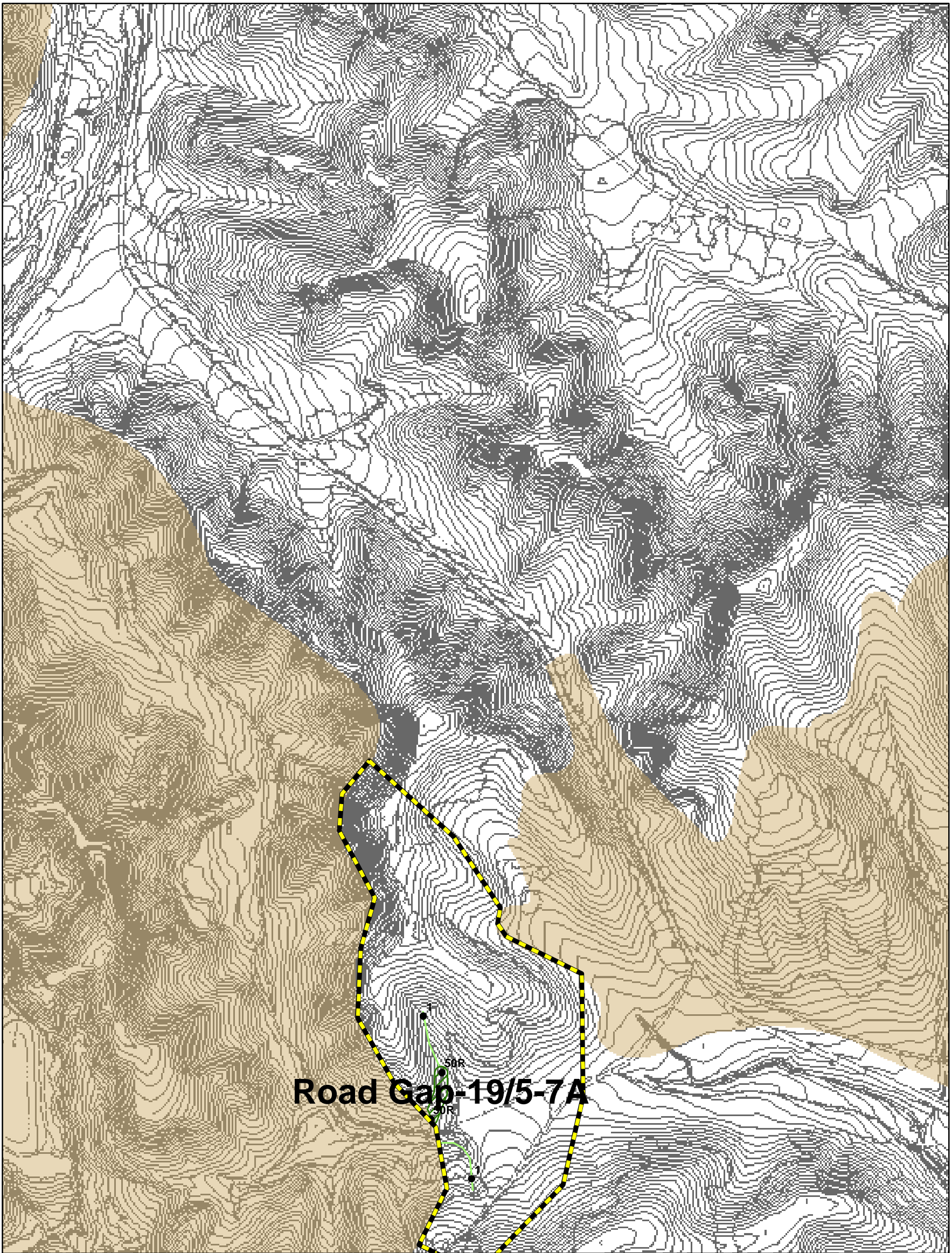


400 0 Feet



-  Study Area Boundaries
-  Soil Pit Location
-  Streambed Width ("R" indicates the presence of Riparian Vegetation)
-  No OHWM, bed or bank
-  Riparian Vegetation
-  Non-jurisdictional Feature
-  Jurisdictional Streambed
-  Planning Area (see Study Area Maps)





# RANCHO MISSION VIEJO ROAD GAP ANALYSIS









Jurisdictional Delineation Map (CDFG) Sheet 10

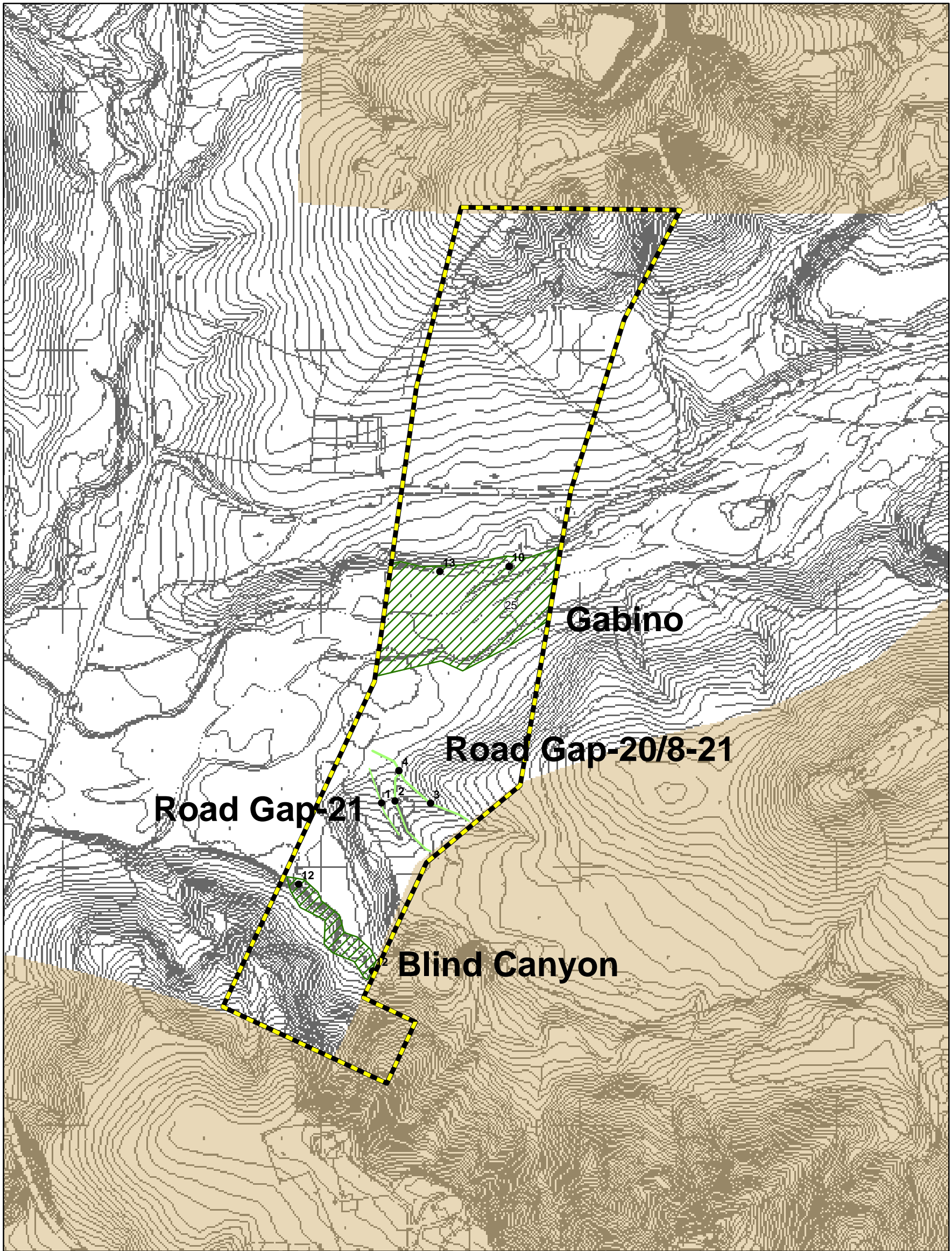
GLENN LUKOS ASSOCIATES



400 0 Feet



-  Study Area Boundaries
-  Soil Pit Location
-  Streambed Width ("R" indicates the presence of Riparian Vegetation)
-  No OHWM, bed or bank
-  Riparian Vegetation
-  Non-jurisdictional Feature
-  Jurisdictional Streambed
-  Planning Area (see Study Area Maps)



# RANCHO MISSION VIEJO ROAD GAP ANALYSIS






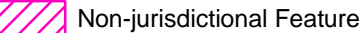

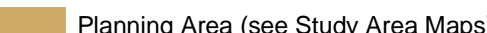
Jurisdictional Delineation Map (CDFG) Sheet 11

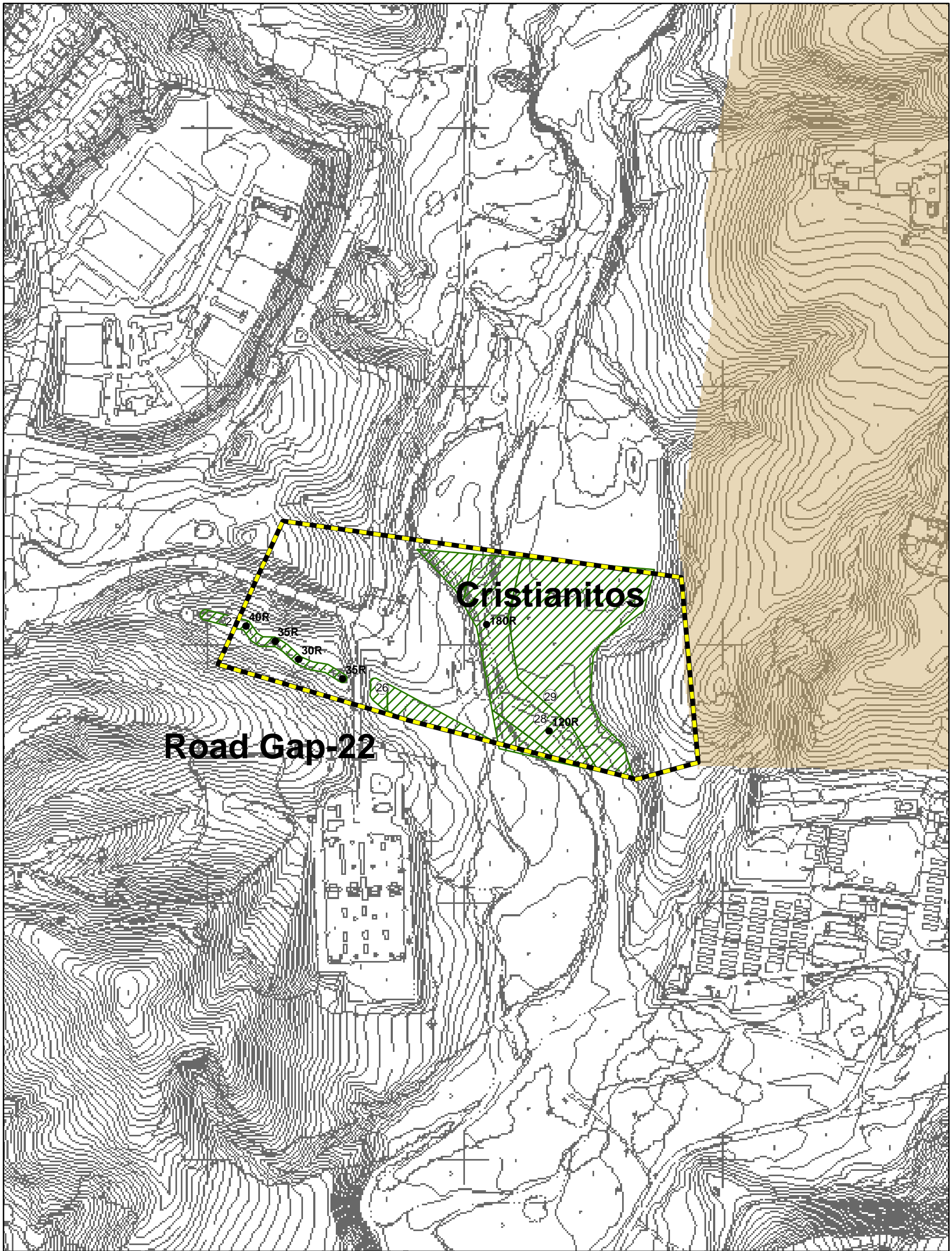
GLENN LUKOS ASSOCIATES



400 0 Feet



-  Study Area Boundaries
-  Soil Pit Location
-  Streambed Width ("R" indicates the presence of Riparian Vegetation)
-  No OHWM, bed or bank
-  Riparian Vegetation
-  Non-jurisdictional Feature
-  Jurisdictional Streambed
-  Planning Area (see Study Area Maps)






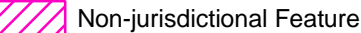

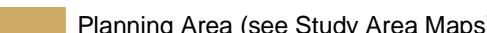


**RANCHO MISSION VIEJO  
ROAD GAP ANALYSIS**

Jurisdictional Delineation Map (CDFG) Sheet 12

GLENN LUKOS ASSOCIATES



-  Study Area Boundaries
-  Soil Pit Location
-  Streambed Width ("R" indicates the presence of Riparian Vegetation)
-  No OHWM, bed or bank
-  Riparian Vegetation
-  Non-jurisdictional Feature
-  Jurisdictional Streambed
-  Planning Area (see Study Area Maps)

APPENDIX A

WETLAND DATA SHEETS ARE AVAILABLE FROM:

GLENN LUKOS ASSOCIATES  
29 ORCHARD  
LAKE FOREST, CA 92630  
(949) 837-0404

November 14, 2003

Laura Coley Eisenberg  
Rancho Mission Viejo  
P.O. Box 9  
San Juan Capistrano, CA 92693

SUBJECT: Graphical Peak Discharge Report, Trampas Dam Watershed, Rancho Mission Viejo, Orange County, California.

Dear Ms. Coley Eisenberg:

Glenn Lukos Associates (GLA) is currently assisting Rancho Mission Viejo (RMV) in preparing a jurisdictional delineation in support of the Special Area Management Plan/Master Streambed Alteration Agreement (SAMP/MSAA) that RMV is preparing in consultation with the U.S. Army Corps of Engineers (Corps) and California Department of Fish and Game (CDFG). The jurisdictional delineation covers all areas identified by the SAMP/MSAA alternatives as potentially developable. A development bubble (Planning Area 5) has been identified in the Trampas sub-basin. Currently Oglebay Norton Industrial Sands (ONIS) is located in this sub-basin, and conducts a sand mining operation on a portion of the sub-basin. Trampas Dam was constructed in 1975, prior to the July 1, 1977 phase-in-date for Section 404 permits for ephemeral tributaries, to support mining operations within this sub-basin. Water used in the sand processing operation, along with the tailings generated by the processing operation, are stored behind the dam. Since construction of the dam isolated all of the area above the dam from downstream jurisdictional waters prior to regulation under the Clean Water Act, the dam does not represent an impoundment of waters of the United States. It is therefore the position of RMV and GLA that the Tailings Pond/Recycle Area behind Trampas Canyon Dam is not subject to Corps jurisdiction as it is isolated pursuant to the recent Supreme Court decision in *Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers et al* (SWANCC).

To date, the Corps has not concurred with this position and, during a review of the Tailings Pond/Recycle Area suggested that most effective way to evaluate the post-mining condition would be to “turn off the water”. The analysis summarized in this letter report was performed to respond to the Corps request and models the amount of U.S. Army Corps of Engineers (Corps) and California Department of Fish and Game (CDFG) jurisdiction for the Tailings Pond/Recycle Area in the post mining condition when all artificial water subsidies associated with current mining practices are withdrawn (It is not possible to literally “turn off the water” as the mining operator has a lease with RMV and is expected to continue mining until 2013).

Rather than turning off the water supply, a regulatory specialist/hydrologist GLA conducted an analysis of the amount of water that could potentially accumulate in the "Tailings Pond/Water Recycling Area" under natural hydrological conditions (i.e., with no artificial irrigation provided by the mining operation). As noted, in 1975, the Trampas Dam was constructed in such a manner that it isolated Trampas Canyon Creek and its ephemeral tributaries. It is important to note that prior to construction of the dam, GLA has determined (based on a Corps-verified delineation of upstream and downstream drainages) that the amount of ephemeral drainage channels isolated behind the dam was between 0.8 and 1.2 acres with no wetlands. In the post-mining condition, sufficient hydrology would exist, at the site under natural conditions (i.e., no irrigation subsidies) to support between 5 and 6 acres of hydrophytic vegetation, which would be isolated and not subject to Corps jurisdiction.

The watershed of the Trampas Canyon Dam (Dam) is located in Orange County [Exhibit 1] and covers approximately 362.6 acres of which 71.1 acres is open water or mine tailings [Exhibit 2].

## **I. METHODOLOGY**

The most widely used rainfall-runoff model for routine design purposes in the United States is the SCS method, which was developed by the U.S. Soil Conservation Service (now the U.S. Natural Resources Conservation Service, NRCS). Technical Release 55 (TR-55) presents simplified procedures for estimating runoff and peak discharges in small watersheds. To save time, the procedures in TR-55 are simplified by assumptions, approximations and generalizations about certain parameters, which can provide results that are less refined than more detailed methods.<sup>1</sup> Runoff is determined primarily by the amount of precipitation and by infiltration characteristics related to soil type, soil moisture, antecedent rainfall, cover type, impervious surfaces and surface retention. Travel time is determined using slope, length of flow path, depth of flow, and roughness of flow surfaces. Peak discharges are based on the relationship of these parameters and on the total drainage area of the watershed, the effect of any natural or man-made storage, and the distribution of rainfall during a given storm event. A peak discharge was calculated for the watershed surrounding the Trampas Canyon Dam. The amount of water that would be impounded by the Tailings Pond and Recycle Area was calculated using the Rational Method, which will be discussed below.

---

<sup>1</sup> Wildermuth Environmental has, on a preliminary basis, conducted more detailed modeling of the Tailings Pond, that reduces the estimated watershed runoff (as set forth using the TR-55 methodology) from approximately 43.5 acre feet to between 25 and 30 acre feet. The more conservative number of 43.5 acre feet is incorporated into this analysis because the Wildermuth report has not yet been completed; however, upon its completion, it is expected to reduce the watershed runoff totals.

In order to determine the amount of wetland habitat that could be sustained in the post-mining condition, it was also necessary to calculate the amount of water that is required by native hydrophytes such as southern cattail (*Typha domingensis*) and California bulrush (*Scirpus californicus*). Water use data for vegetation was obtained from *Bulletin No. 50: Use of Water by Native Vegetation*.<sup>2</sup>, Bulletin No. 50, State of California, Department of Public

**A. Estimating Runoff**

The Soil Conservation Service uses the Runoff Curve Number (CN) method to estimate runoff from storm rainfall. SCS runoff equation is:

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S}$$

where Q = runoff (in)  
P = rainfall (in)  
S = potential maximum retention after runoff begins (in) and  
I<sub>a</sub> = initial abstraction

**Initial Abstraction (I<sub>a</sub>)**

Initial abstraction is all losses before runoff begins. It includes water retained in surface depressions, water intercepted by vegetation, evaporation, and infiltration. I<sub>a</sub> is highly variable and is correlated with soil and cover parameters. I<sub>a</sub> is approximated in this method by the following empirical equation:

$$I_a = 0.2S$$

Substituting 0.2S for I<sub>a</sub> in the runoff equation gives:

$$Q = \frac{(P - 0.2S)^2}{(P - 0.2S) + S}$$

S is related to the soil and cover conditions of the watershed through CN by:

---

<sup>2</sup> State of California, Department of public Works, Division of Water Resources. 1942. *Bulletin No. 50: Use of Water by Native Vegetation*, 160pp.

$$S = \frac{1000}{CN} - 10$$

Determination of CN depends on the soil and cover conditions of the watershed. Hydrologic soil group (HSG), cover type, treatment, hydrologic condition and antecedent runoff coefficient (ARC) are the five parameters analyzed to represent the soil and cover conditions.

### Hydrologic Soil Groups (HSG)

Infiltration rates of soils vary widely and are affected by subsurface permeability as well as surface intake rates. Soils are classified into four HSG's (A, B, C, and D) according to their minimum infiltration rate, which is obtained for bare soil after prolonged wetting [Exhibit 3]. Soils in Group A have the lowest runoff potential and the highest infiltration rates, while Group D soils exhibit opposite characteristics.

The Soil Conservation Service (SCS) soil survey of the Orange County and Western Riverside Counties (1978) identified the soils in the area of interest. Table 1 lists each of the soil types located in the general vicinity of the study area along with their HSG classification and their watershed composition percentage.

Table 1. Soil Types and HSG Classifications for Watershed

<i>Soil Type</i>	<i>HSG Classification</i>	<i>Composition of Watershed</i>
Bosanko Clay (128)	Group D	25%
Cieneba Sandy Loam (142)	Group C	60%
Soper Gravelly Loam (202)	Group C	15%

### Cover Type

Cover types address vegetation, bare soil and impervious surfaces of the study area. Field reconnaissance and aerial photographs were the methods used to determine the cover types. Arid and semiarid rangelands runoff curve numbers were used for this method [Exhibit 4].

### Treatment

Treatment is a cover type modifier that is used to describe the management of cultivated agricultural lands. This is not applicable to the study area.



**Hydrologic Condition**

Hydrologic Condition indicates the effects of cover type on infiltration and runoff and is generally estimated from density of plant and residue cover on sample areas. Good hydrologic condition indicates that soil usually has a low runoff potential for that specific hydrologic soil group and cover type. Table 2 lists the cover type and hydrologic condition for each of the soils identified for the site.

Table 2. Cover Types and Hydrologic Conditions for Watershed

<i>Soil Type</i>	<i>Cover Type</i>	<i>Hydrologic Condition</i>
Bosanko Clay (128)	Oak-Aspen	Good
Cieneba Sandy Loam (142)	Oak-Aspen	Good
Soper Gravelly Loam (202)	Oak-Aspen	Good

**Antecedent Runoff Condition (ARC)**

The index of runoff potential before a storm event is the antecedent runoff condition. CN for the average ARC at a site is the median value as taken from sample rainfall and runoff data. Average runoff condition was assumed for this calculation.

**Results**

Table 3. Results from Runoff Calculations

<i>Parameter</i>	<i>Result</i>
Curve Number (CN)	43
Maximum Potential Retention After Runoff Begins (S)	13.26 in
Runoff (Q)	0.0024 in

Calculations for the runoff curve number and runoff for can be found on Worksheet 2 in Appendix A. The 2-year, 24-hour precipitation event was obtained from the NOAA Atlas 2.

**Estimating Time of Concentration and Time of Travel**

Travel time ( $T_t$ ) is the time it takes water to travel from one location to another in a watershed.  $T_t$  is a component of time concentration ( $T_c$ ), which is the time for runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed.  $T_c$  is computed by summing up all the travel times for consecutive components of the drainage conveyance system.

Time of travel and time of concentration is affected by surface roughness, channel shape, flow patterns, and slopes. Water moves through a watershed as sheet flow, shallow concentrated flow, open channel flow, or some combination of these. Sheet flow is flow over plane surfaces until it becomes shallow concentrated flow and then open channel flow. A detailed description of these types of flow along with the figure to determine average velocity for shallow concentrated flow is in Exhibit 5.

Table 4. Results from Time of Concentration and Travel Calculations

<i>Flow Type</i>	<i>Segment ID</i>	<i>T<sub>t</sub></i>
Sheet Flow	AB	0.21 hr
Shallow Concentrated Flow	BC	0.02 hr
Channel Flow	CD	0.02 hr
	<b>T<sub>c</sub></b>	<b>0.25 hr</b>

Calculations for the time of travel and time of concentration can be found on Worksheet 3 in Appendix A.

**B. Graphical Peak Discharge Method**

The graphical peak discharge method computes peak discharge from rural and urban areas. A detailed description of this method is in Exhibit 6, while the calculations can be found on Worksheet 4 in Appendix A.

**Results**

The peak discharge for the Trampas Dam watershed was determined to be 0.06 cubic feet per second (ft<sup>3</sup>/s) or 43.5 af/yr.

**C. Rational Method**

To calculate the amount of water that will accumulate in the area behind the Dam through direct precipitation, a modified version of the Rational Method was applied.

$$Q = CIA$$

- where: Q = peak discharge (ft<sup>3</sup>/s)  
 C = runoff coefficient (dimensionless)  
 I = average available rainfall (ft/yr)  
 A = area (acres)

Average available rainfall (I) was calculated by subtracting the average monthly evaporation rates from the average monthly rainfall rates to determine the amount of rainfall that would remain in the Tailings Pond/Recycling Area (see Appendix B). Sulphur Creek Dam data was used because it is the closest recording station to Trampas Canyon Dam.

The peak discharge into the 71.1-acre area behind the dam, calculated from an average available rainfall of 3.58 inches with a runoff coefficient of 1.0 is 21.2 af/yr.

## **II. CONCLUSIONS/DISCUSSION**

Under natural conditions, the area behind Trampas Dam will receive approximately 64.7 acre-feet of water in an average rainfall year including 43.5 acre-feet from the surrounding watershed and an additional 21.2 acres of “available” water from direct precipitation.

### **A. Overall Approach**

In order to accurately determine the extent of hydrophytic vegetation in the post-mining condition, the following factors were considered/evaluated.

- Post-mining dry-out of the tailings;
- Hydrologic input from watershed runoff (provided in detail above);
- Hydrologic input from precipitation (provided in detail above);
- Water consumption by hydrophytic vegetation (amounts); and
- Water consumption by hydrophytic vegetation (seasonality)

### **B. Post-Mining Dryout of Tailings**

Currently, water depths for areas occupied by cattails, which accounts for approximately 55 acres of the Tailings Pond, average less than two feet. Cattails and bulrush will use up to eight feet of water per year when it is available and require a minimum of about five feet of water seasonally to survive and persist on a site.<sup>3</sup> Cattails and bulrush exhibit winter dormancy with most of the water consumption occurring during the period from May to November. Cattails and bulrush are both shallow-rooted species with nearly all of root zone located in the upper two feet.

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<sup>3</sup> California bulrush grown in tanks will use up to 184 inches (15.3 feet) of water per year. In the field, under optimal hydrological conditions the actual water use is substantially less, varying between five and eight feet

Without water subsidies from the mining operation, essentially all of the water within the root zone of the cattails and bulrush would be depleted by the end of one growing season.<sup>4</sup>

While the Tailings Pond is drying out during the first year without water subsidies, the exposed substrate will quickly be colonized by propagules from non-native grasses and forbs that are found throughout the watershed of the Tailings Pond including wild oats (*Avena farua*, UPL), slender oats (*Avena barbata*, UPL), ripgut (*Bromus diandrus*, UPL), soft chess (*Bromus hordeaceus*, UPL), red brome (*Bromus madritensis rubens*, UPL), rattail fescue (*Vulpia myuros*, UPL), Italian ryegrass (*Lolium multiflorum*, UPL), black mustard (*Brassica nigra*, UPL), field mustard (*Brassica rapa*, UPL), wild radish (*Raphanus sativus*, UPL), tocalote (*Centaurea melitensis*, UPL) and three species of filaree (*Erodium* spp., UPL). These species, as a group, germinate during winter and early spring, consuming most available soil moisture by late spring or early summer, meaning that they are most active during the winter dormancy of the cattails and bulrush, substantially limiting soil moisture that might be available to any surviving wetland plants. Direct evaporation and evapotranspiration will consume most direct precipitation falling on the tailings such that water would be available in very limited amounts to wetland plant species.<sup>5</sup>

### **C. Input from Watershed Runoff**

The hydrological model determined that a maximum of 43.5 acre-feet of water would reach the tailings during an average rainfall year.<sup>6</sup> Essentially all of the hydrological input from watershed runoff would occur during the rainy season, which is between October 15 and April 15. This runoff would reach the outer edges of the Tailings Pond, at points where the ephemeral drainages intersect the Tailings. Tailings at these locations would be shallowest and much of the water would be stored in the upper few feet, meaning that it would be available to whatever plants are growing at the discharge point. As noted above, substantial amounts of this water would be consumed by opportunistic spring annuals, which germinate as early as November or December (coincident with the first one to two inches of rainfall) and reach their peak growth during February and March (some species such as Italian Ryegrass geminate a little later and reach peak growth in March and April). The approximately 43.5 acre feet of runoff would generally be

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<sup>4</sup> This includes surface water up to three feet and subsurface water at depths to three feet. Evaporation and transpiration combined could account for up to 12 feet of water loss in the first year if sufficient water supplies were available.

<sup>5</sup> According to Water Bulletin 50, native grasses and weeds will use between 10.0 and 15.5 inches of water per year and in most years will use all available soil moisture except in above-average rainfall years when limited amounts of water penetrate to below the root zone before the water is transpired.

<sup>6</sup> As noted in footnote 1 above, a more detailed analysis is expected to reduce the total to between 25 and 30 acre feet.

sufficient to support up to 7.0 acres of cattails, bulrush and other native and non-native hydrophytes. However, direct evaporation coupled with water consumption by spring annuals, which would germinate and reach maximum growth during the winter dormancy period exhibited by the cattails and bulrush, would reduce to amount of wetland vegetation to between 5.0 and 6.0 acres.<sup>7</sup>

**D. D. Input from Direct Precipitation**

During average rainfall years, approximately 75 acre-feet would fall on the area occupied by the mine tailings. Essentially all of the hydrological input from direct precipitation would occur during the rainy season, which is between October 15 and April 15, which as noted above coincides with the winter dormancy period of native hydrophytes and the germination and maximum growth period of non-native spring annual grasses and forbs. Evaporation rates exceed rainfall rates in all months except for February and March, leaving about 21 acre feet of available water. Up to 15 inches of water could be used by the weedy annual vegetation with the rest lost to evaporation leaving essentially no additional water to support wetland vegetation.

**E. E. Summary/Conclusions**

In the post-mining condition, the available surface and subsurface water in the Tailings Pond would be consumed by the existing hydrophytic vegetation, which exhibits high water consumption rates, beginning in late spring and continuing until late fall. Natural hydrologic input from storm runoff and direct precipitation would coincide with the germination and maximum growth period of the (mostly) non-native annual grasses and forbs expected to rapidly colonize the drying tailings. Available water for native hydrophytes would be a maximum of 30 and 35 acre feet which would be sufficient to allow persistence of between 5.0 and 6.0 acres of hydrophytic vegetation.

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<sup>7</sup> A reduction in the runoff from 43.5 to 25 to 30 acre feet would result in a reduction of potential wetland habitat to between approximately three and four acres.

Laura Coley Eisenberg  
Rancho Mission Viejo  
November 14, 2003  
Page 10

If you have any questions about this letter report, please contact either Tony Bomkamp or Cherylee Sevilla at (949) 837-0404.

Sincerely,

GLENN LUKOS ASSOCIATES, INC.

Tony Bomkamp  
Senior Biologist

s:0239-15TrampasDam2.rpt

Adapted from USGS Santa Ana Quadrangle

NORTH ↑

SCALE IN MILES



# TRAMPAS CANYON DAM

Regional Map

GLENN LUKOS ASSOCIATES

EXHIBIT 1



Adapted from Rancho Mission Viejo  
Interactive Aerial Photograph GIS Index



**Trampas Dam  
Watershed Boundary**

NORTH  
0  
1000  
2000  
3000  
FEET

**TRAMPAS CANYON DAM**  
Watershed Boundary

GLENN LUKOS ASSOCIATES

EXHIBIT 2





# Hydrologic Soil Groups

Soils are classified into hydrologic soil groups (HSG's) to indicate the minimum rate of infiltration obtained for bare soil after prolonged wetting. The HSG's, which are A, B, C, and D, are one element used in determining runoff curve numbers (see chapter 2). For the convenience of TR-55 users, exhibit A-1 lists the HSG classification of United States soils.

The infiltration rate is the rate at which water enters the soil at the soil surface. It is controlled by surface conditions. HSG also indicates the transmission rate—the rate at which the water moves within the soil. This rate is controlled by the soil profile. Approximate numerical ranges for transmission rates shown in the HSG definitions were first published by Musgrave (USDA 1955). The four groups are defined by SCS soil scientists as follows:

**Group A**soils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sand or gravel and have a high rate of water transmission (greater than 0.30 in/hr).

**Group B**soils have moderate infiltration rates when thoroughly wetted and consist chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission (0.15-0.30 in/hr).

**Group C**soils have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine texture. These soils have a low rate of water transmission (0.05-0.15 in/hr).

**Group D**soils have high runoff potential. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very low rate of water transmission (0-0.05 in/hr).

In exhibit A-1, some of the listed soils have an added modifier; for example, "Abrazo, gravelly." This refers to a gravelly phase of the Abrazo series that is found in SCS soil map legends.

## Disturbed soil profiles

As a result of urbanization, the soil profile may be considerably altered and the listed group classification may no longer apply. In these circumstances, use the following to determine HSG according to the texture of the new surface soil, provided that significant compaction has not occurred (Brakensiek and Rawls 1983).

HSG	Soil textures
A	Sand, loamy sand, or sandy loam
B	Silt loam or loam
C	Sandy clay loam
D	Clay loam, silty clay loam, sandy clay, silty clay, or clay

## Drainage and group D soils

Some soils in the list are in group D because of a high water table that creates a drainage problem. Once these soils are effectively drained, they are placed in a different group. For example, Ackerman soil is classified as A/D. This indicates that the drained Ackerman soil is in group A and the undrained soil is in group D.

**Table 2-2d** Runoff curve numbers for arid and semiarid rangelands <sup>1</sup>

Cover description	Hydrologic condition <sup>2</sup>	Curve numbers for hydrologic soil group			
		A <sup>3</sup>	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

- 1 Average runoff condition, and  $I_a = 0.2S$ . For range in humid regions, use table 2-2c.
- 2 Poor: <30% ground cover (litter, grass, and brush overstory).  
Fair: 30 to 70% ground cover.  
Good: > 70% ground cover.
- 3 Curve numbers for group A have been developed only for desert shrub.

## Sheet flow

Sheet flow is flow over plane surfaces. It usually occurs in the headwater of streams. With sheet flow, the friction value (Manning's  $n$ ) is an effective roughness coefficient that includes the effect of raindrop impact; drag over the plane surface; obstacles such as litter, crop ridges, and rocks; and erosion and transportation of sediment. These  $n$  values are for very shallow flow depths of about 0.1 foot or so. Table 3-1 gives Manning's  $n$  values for sheet flow for various surface conditions.

**Table 3-1** Roughness coefficients (Manning's  $n$ ) for sheet flow

Surface description	$n$ <sup>1/</sup>
Smooth surfaces (concrete, asphalt, gravel, or bare soil) .....	0.011
Fallow (no residue) .....	0.05
Cultivated soils:	
Residue cover $\leq 20\%$ .....	0.06
Residue cover $> 20\%$ .....	0.17
Grass:	
Short grass prairie .....	0.15
Dense grasses <sup>2/</sup> .....	0.24
Bermudagrass .....	0.41
Range (natural) .....	0.13
Woods: <sup>3/</sup>	
Light underbrush .....	0.40
Dense underbrush .....	0.80

<sup>1</sup> The  $n$  values are a composite of information compiled by Engman (1986).

<sup>2</sup> Includes species such as weeping lovegrass, bluegrass, buffalo grass, blue grama grass, and native grass mixtures.

<sup>3</sup> When selecting  $n$ , consider cover to a height of about 0.1 ft. This is the only part of the plant cover that will obstruct sheet flow.

For sheet flow of less than 300 feet, use Manning's kinematic solution (Overtop and Meadows 1976) to compute  $T_t$ :

$$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} s^{0.4}} \quad [\text{eq. 3-3}]$$

where:

- $T_t$  = travel time (hr),
- $n$  = Manning's roughness coefficient (table 3-1)
- $L$  = flow length (ft)
- $P_2$  = 2-year, 24-hour rainfall (in)
- $s$  = slope of hydraulic grade line (land slope, ft/ft)

This simplified form of the Manning's kinematic solution is based on the following: (1) shallow steady uniform flow, (2) constant intensity of rainfall excess (that part of a rain available for runoff), (3) rainfall duration of 24 hours, and (4) minor effect of infiltration on travel time. Rainfall depth can be obtained from appendix B.

## Shallow concentrated flow

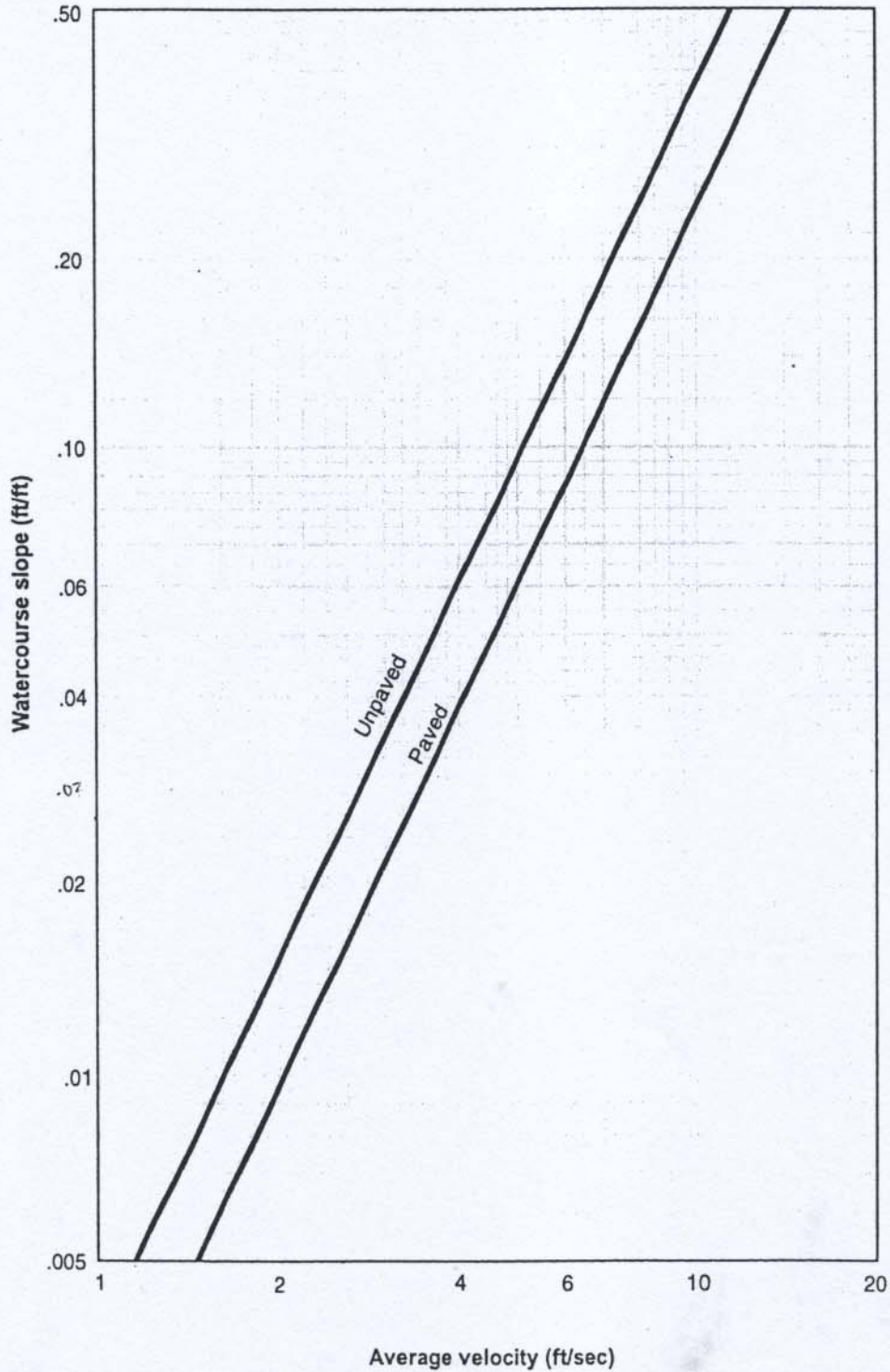
After a maximum of 300 feet, sheet flow usually becomes shallow concentrated flow. The average velocity for this flow can be determined from figure 3-1, in which average velocity is a function of watercourse slope and type of channel. For slopes less than 0.005 ft/ft, use equations given in appendix F for figure 3-1. Tillage can affect the direction of shallow concentrated flow. Flow may not always be directly down the watershed slope if tillage runs across the slope.

After determining average velocity in figure 3-1, use equation 3-1 to estimate travel time for the shallow concentrated flow segment.

## Open channels

Open channels are assumed to begin where surveyed cross section information has been obtained, where channels are visible on aerial photographs, or where blue lines (indicating streams) appear on United States Geological Survey (USGS) quadrangle sheets. Manning's equation or water surface profile information can be used to estimate average flow velocity. Average flow velocity is usually determined for bank-full elevation.

**Figure 3-1** Average velocities for estimating travel time for shallow concentrated flow



This chapter presents the Graphical Peak Discharge method for computing peak discharge from rural and urban areas. The Graphical method was developed from hydrograph analyses using TR-20, "Computer Program for Project Formulation—Hydrology" (SCS 1983). The peak discharge equation used is:

$$q_p = q_u A_m Q F_p \quad [\text{eq. 4-1}]$$

where:

- $q_p$  = peak discharge (cfs)
- $q_u$  = unit peak discharge (csm/in)
- $A_m$  = drainage area (mi<sup>2</sup>)
- $Q$  = runoff (in)
- $F_p$  = pond and swamp adjustment factor

The input requirements for the Graphical method are as follows: (1)  $T_c$  (hr), (2) drainage area (mi<sup>2</sup>), (3) appropriate rainfall distribution (I, IA, II, or III), (4) 24-hour rainfall (in), and (5) CN. If pond and swamp areas are spread throughout the watershed and are not considered in the  $T_c$  computation, an adjustment for pond and swamp areas is also needed.

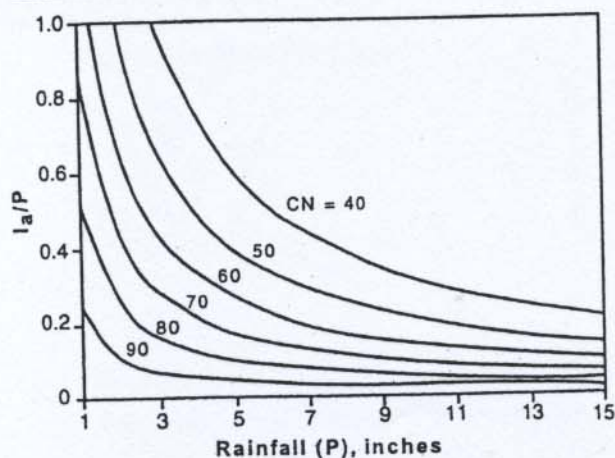
### Peak discharge computation

For a selected rainfall frequency, the 24-hour rainfall (P) is obtained from appendix B or more detailed local precipitation maps. CN and total runoff (Q) for the watershed are computed according to the methods outlined in chapter 2. The CN is used to determine the initial abstraction ( $I_a$ ) from table 4-1.  $I_a/P$  is then computed.

If the computed  $I_a/P$  ratio is outside the range in exhibit 4 (4-I, 4-IA, 4-II, and 4-III) for the rainfall distribution of interest, then the limiting value should be used. If the ratio falls between the limiting values, use linear interpolation. Figure 4-1 illustrates the sensitivity of  $I_a/P$  to CN and P.

Peak discharge per square mile per inch of runoff ( $q_u$ ) is obtained from exhibit 4-I, 4-IA, 4-II, or 4-III by using  $T_c$  (chapter 3), rainfall distribution type, and  $I_a/P$  ratio. The pond and swamp adjustment factor is obtained from table 4-2 (rounded to the nearest table value). Use worksheet 4 in appendix D to aid in computing the peak discharge using the Graphical method.

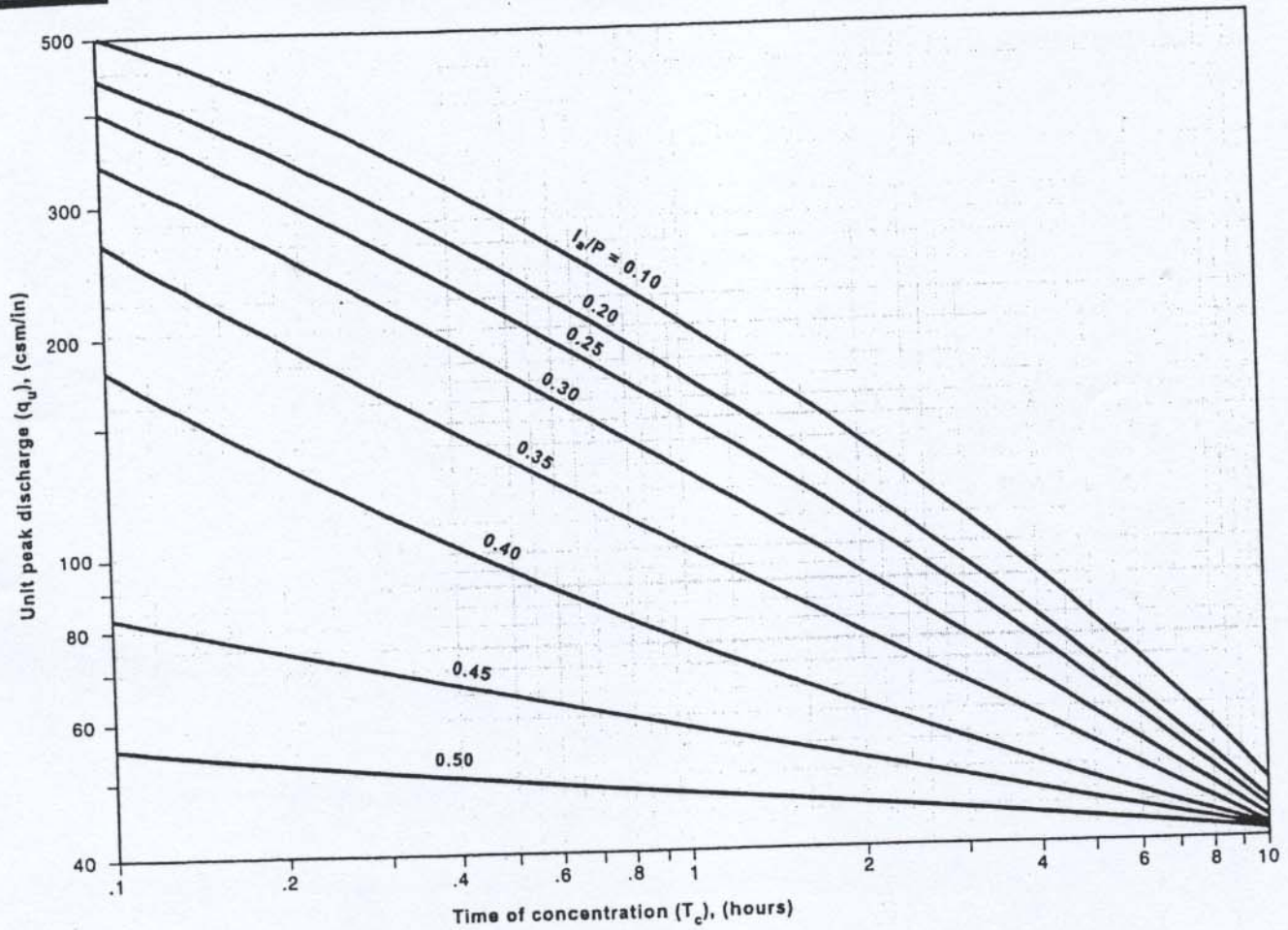
**Figure 4-1** Variation of  $I_a/P$  for P and CN



**Table 4-1**  $I_a$  values for runoff curve numbers

Curve number	$I_a$ (in)	Curve number	$I_a$ (in)
40	3.000	70	0.857
41	2.878	71	0.817
42	2.762	72	0.778
43	2.651	73	0.740
44	2.545	74	0.703
45	2.444	75	0.667
46	2.348	76	0.632
47	2.255	77	0.597
48	2.167	78	0.564
49	2.082	79	0.532
50	2.000	80	0.500
51	1.922	81	0.469
52	1.846	82	0.439
53	1.774	83	0.410
54	1.704	84	0.381
55	1.636	85	0.353
56	1.571	86	0.326
57	1.509	87	0.299
58	1.448	88	0.273
59	1.390	89	0.247
60	1.333	90	0.222
61	1.279	91	0.198
62	1.226	92	0.174
63	1.175	93	0.151
64	1.125	94	0.128
65	1.077	95	0.105
66	1.030	96	0.083
67	0.985	97	0.062
68	0.941	98	0.041
69	0.899		

Exhibit 4-I Unit peak discharge ( $q_u$ ) for NRCS (SCS) type I rainfall distribution



# Worksheet 2: Runoff curve number and runoff

Project <b>Trampas Canyon</b>	By	Date
Location <b>Rancho Mission Viejo</b>	Checked	Date

Check one:  Present  Developed

## 1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description <small>(cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)</small>	CN <sup>1/</sup>			Area <input type="checkbox"/> acres <input type="checkbox"/> mi <sup>2</sup> <input checked="" type="checkbox"/> %	Product of CN x area
		Table 2-2	Figure 2-3	Figure 2-4		
cieneba, C	oak-aspen, good	41			60	2460
Saper, C	oak-aspen, good	41			15	615
Bosanko, D	oak-aspen, good	48			25	1200
					24	4275

<sup>1/</sup> Use only one CN source per line

Totals ➔ **100 4275**

CN (weighted) =  $\frac{\text{total product}}{\text{total area}} = \frac{4275}{100} = 42.75$ ;

Use CN ➔ **43**

## 2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr	2		
Rainfall, P (24-hour) ..... in	2.48		
Runoff, Q ..... in	0.0024		

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

# Worksheet 3: Time of Concentration (T<sub>C</sub>) or travel time (T<sub>t</sub>)

Project <b>Trampas Canyon</b>	By	Date
Location <b>Rancho Mission Viejo</b>	Checked	Date

Check one:  Present  Developed

Check one:  T<sub>C</sub>  T<sub>t</sub> through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

## Sheet flow (Applicable to T<sub>C</sub> only)

	Segment ID		
1. Surface description (table 3-1) .....	AB		
2. Manning's roughness coefficient, n (table 3-1) .....	Dense grass		
3. Flow length, L (total L † 300 ft) ..... ft	0.24		
4. Two-year 24-hour rainfall, P <sub>2</sub> ..... in	300		
5. Land slope, s ..... ft/ft	2.48		
	0.33		
6. $T_t = \frac{0.007 (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ Compute T <sub>t</sub> ..... hr	0.21	+	<b>0.21</b>

## Shallow concentrated flow

	Segment ID		
7. Surface description (paved or unpaved) .....	BC		
8. Flow length, L .....ft	unpaved		
9. Watercourse slope, s ..... ft/ft	200		
10. Average velocity, V (figure 3-1) ..... ft/s	0.028		
	2.8		
11. $T_t = \frac{L}{3600 V}$ Compute T <sub>t</sub> ..... hr	0.020	+	<b>0.02</b>

## Channel flow

	Segment ID		
12. Cross sectional flow area, a ..... ft <sup>2</sup>	CD		
13. Wetted perimeter, p <sub>w</sub> ..... ft	8		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft	8		
	1		
15. Channel slope, s ..... ft/ft	0.18		
16. Manning's roughness coefficient, n .....	0.025		
17. $V = \frac{1.49 r^{2/3} s^{1/2}}{n}$ Compute V ..... ft/s	25.03		
18. Flow length, L ..... ft	1880		
19. $T_t = \frac{L}{3600 V}$ Compute T <sub>t</sub> ..... hr	0.021	+	<b>0.02</b>
20. Watershed or subarea T <sub>C</sub> or T <sub>t</sub> (add T <sub>t</sub> in steps 6, 11, and 19) ..... Hr			<b>0.25</b>



# Worksheet 4: Graphical Peak Discharge method

Project <u>Trampas Canyon Dam</u>	By	Date
Location <u>Rancho Mission Viejo</u>	Checked	Date

Check one:  Present    Developed

**1. Data**

Drainage area .....  $A_m = \underline{0.45}$  mi<sup>2</sup> (acres/640)

Runoff curve number .....  $CN = \underline{43}$  (From worksheet 2)

Time of concentration .....  $T_c = \underline{0.25}$  hr (From worksheet 3)

Rainfall distribution ..... = I (I, IA, II III)

Pond and swamp areas spread throughout watershed ..... = 0 percent of  $A_m$  ( 0 acres or mi<sup>2</sup> covered)

	Storm #1	Storm #2	Storm #3
2. Frequency ..... yr	2		
3. Rainfall, P (24-hour) ..... in	2.48		
4. Initial abstraction, $I_a$ ..... in (Use CN with table 4-1)	2.651		
5. Compute $I_a/P$ .....	1.07		
6. Unit peak discharge, $q_u$ ..... csm/in (Use $T_c$ and $I_a/P$ with exhibit 4- <u>1</u> )	55		
7. Runoff, Q ..... in (From worksheet 2) Figure 2-6	0.0024		
8. Pond and swamp adjustment factor, $F_p$ ..... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1.0		
9. Peak discharge, $q_p$ ..... ft <sup>3</sup> /s	0.06		

(Where  $q_p = q_u A_m Q F_p$ )

$(ft^3/s \times 1.984 \times 365)$   
 $\downarrow$   
 $43.45 \text{ af/yr} + 21.21 \text{ af/yr} =$   
 $64.66 \text{ af/yr}$

Sulphur Creek Dam Rainfall and Evaporation Data (1977-2002)

	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
Average Rainfall (in)	0.02	0.13	0.34	0.44	1.25	1.83	3.41	3.72	2.73	0.92	0.22	0.08
Average Evaporation (in)*	5.26	4.87	4.01	3.06	2.27	1.81	1.76	1.81	2.76	3.55	4.22	4.53
Difference (in)	-5.24	-4.74	-3.67	-2.62	-1.02	<b>0.01</b>	<b>1.66</b>	<b>1.90</b>	-0.03	-2.63	-3.99	-4.45

Average Available Rainfall (in) **3.58**

Source: County of Orange Public Facilities and Resources Department, 2002

\*These evaporation numbers reflect the Class A land pan coefficient number of 0.70