Appendix A

Biological Resources

Appendix A.1

Addendum to the Biological Technical Report

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Subject: Addendum to the Biological Technical Report for the Bouquet Canyon Project (Tentative Tract No. 82126)

Dear Mr. Knapp:

This letter report is intended to serve as an Addendum to the Biological Technical Report (BTR) for the Bouquet Canyon Project (project) that HELIX Environmental Planning, Inc. (HELIX) prepared in October 2019 (Attachment A, *Bouquet Canyon Biological Technical Report*). The Bouquet Canyon Project Final Environmental Impact Report (Final EIR) was prepared by Michael Baker International, Inc. and certified by the City of Santa Clarita (California Environmental Quality Act [CEQA] lead agency) on November 10, 2020. Following certification of the Final EIR, some revisions were made to the project design (revised project) and the project study area (revised study area), resulting in minor changes to the original study area evaluated under the attached 2019 BTR for the project.

The purpose of this addendum is to demonstrate that the revised project remains consistent with the findings documented in the "Biological Resources" section of the Final EIR. This letter report describes and existing biological resources within the revised project areas; provides an updated analysis of potential project effects associated with the revised study area; and demonstrates that no new significant impacts to biological resources would result from the implementation of the revised project.

STUDY AREA LOCATION

The revised project is located within an approximately 89.73-acre revised study area (the original study area described in the 2019 BTR is 93.47 acres) in the Saugus Community in the northern portion of the City of Santa Clarita. The study area includes approximately 56.91 acres of on-site areas within the project boundary and approximately 32.82 acres of off-site areas outside of the project boundary, where project disturbance may be required. The study area is generally located 5.5 miles to the northeast of Interstate 5 and 3.8 miles to the northwest of California State Route 14 (Figure 1, *Regional Location*). The study area is within Section 6 of Township 4 North, Range 15 West of the Mint Canyon U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 2, *USGS Topography*).

Specifically, the study area is located directly south of the intersection of David Way and Bouquet Canyon Road (Figure 3, *Aerial Photograph*).

REVISED PROJECT AREAS

As described in the BTR, the proposed project is a residential development that would consist of a gated community comprising several neighborhoods and common area amenities. The proposed project also includes the construction of a flood control channel adjacent, and parallel to, the proposed Bouquet Canyon Creek low-flow channel and the new proposed alignment of Bouquet Canyon Road along the southerly boundary of the project site. The approximately 7.50 acres of revised project areas summarized below are included within the approximately 89.73-acre revised study area for the project as described below and depicted on Figure 4, *Revised Project Areas*.

Revised Project Areas (7.50 Acres)

1. Off-Site Flood Control Channel Outlet - Additional temporary impacts to the concrete banks of the off-site concrete flood control channel required for the revisions related to the alignment of the outlet.

2. Copper Hill Road Improvements – Additional grading/paving for Copper Hill Road.

3. Davenport Trailhead – Addition of the Davenport parcel (APN 2812-008-008) for the construction of a city-required trailhead.

4. Bouquet Canyon Road Improvements North – Additional off-site repaving and improvements to existing Bouquet Canyon Road near the northeast corner of the project.

5. Flood Control Channel Inlet & Diversion Structure – Construction of a slightly larger concrete flow diversion structure intended to convey low flows into the low-flow channel and divert high flows into the proposed concrete-lined flood control channel.

6. Sewer Line - Installation of a sewer line in the northeast portion of the site.

7. Slope Grading – Additional slope grading for the new alignment of Bouquet Canyon Road along the southerly border of the study area.

8. Bouquet Canyon Road Improvements South – Minor additional off-site road repaving and improvements to Bouquet Canyon Road located in the southwesterly portion of the project site.

9. Residential Addition – Addition of the “donut hole” parcel (APN 2812-008-002) in the easterly portion of the project site. Note that this area was evaluated for impacts to biological resources in the 2019 BTR yet was not evaluated as part of the project in the Final EIR. Additional residential uses have been proposed in the donut hole area since the Final EIR was certified. As such, the donut hole parcel has been included in this addendum.

10. Residential Reduction - Removal of Planning Area 1a, which was previously proposed to be constructed within the southern portion of the study area per the project BTR and Final EIR.

This planning area presented in the Final EIR for the project will not be constructed as part of the revised project.

UPDATED GENERAL BIOLOGICAL SURVEY AND JURISDICTIONAL DELINEATION

On December 10 and December 21, 2021, HELIX biologist and ISA-certified arborist Daniel Torres performed a general biological survey, jurisdictional assessment, burrowing habitat assessment, and oak tree assessment over Revised Project Areas 1-8 described above. Mr. Torres performed an initial oak tree survey within Project Area 3 on February 26, 2021. Carlsberg and Associates performed a follow-up oak tree health assessment on Project Area 3 (Davenport Trailhead) on August 12, 2021. Area 9 (the donut hole parcel) was previously assessed as part of the 2019 BTR although that area had not been included as part of the project in the Final EIR for the original project. An oak tree assessment was performed in Area 9 on August 16, 2021. Area 10 is a reduction in the project footprint, and is, therefore, not included in the December 2021 field assessments. The oak tree survey report addendum including addenda covering all surveys mentioned above is included as Attachment B, *Oak Tree Survey Report Addendum*.

SUMMARY OF EXISTING CONDITIONS

The revised approximately 85.86-acre study area is located in the foothills of the Sierra Pelona Mountains, and portions were historically used as a school, ranch, and hog farm from the early 1900s through the 1970s (Historic Aerials 1948). The topography in the southern and western portions of the revised study area is predominantly steep hillsides, while the northern portion is primarily flat. The steep hills throughout the southern and western portions of the site are predominated by Riversidean upland sage scrub, while the flatter portions of the study area are dominated by non-native grassland due to historic disturbance from ranching activities (Figure 5, *Vegetation and Land Uses*). Bouquet Canyon Creek flows from east to west in the northern portion of the revised study area and supports U.S. Army Corps of Engineers (USACE)/Regional Water Quality Control Board (RWQCB) waters of the U.S. and California Department of Fish and Wildlife (CDFW) jurisdictional streambed and associated vegetation (Figure 6, *Jurisdictional Features*). Elevations associated with the revised study area range from approximately 1,365 feet above mean sea level (AMSL) near the western boundary of the study area to approximately 1,600 feet above AMSL near the southeastern corner. Eight soil types are mapped on the revised study area, including Castaic-Balcom silty clay loams (CmF2), Hanford sandy loam (HcC), Metz loam sandy (MfA), Mocho loam (MpA), Ojai loam (3f), Saugus loam (ScF2), Sorrento loam (SsA), and Yolo loam (YoC; NRCS 2017).

Immediate surrounding land uses include existing residential development to the north and west, a mixture of undeveloped land and residential development to the south, and a juvenile camp (Los Angeles County Camp Joseph Scott) to the east. The revised study area is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest.

REVISED PROJECT EFFECTS TO BIOLOGICAL RESOURCES

The following provides a summary of revised project effects to biological resources:

Vegetation Communities

The revised project falls within, and adjacent to, the original study area and consists of approximately 80.83 acres of permanent impacts and 0.53 acre of temporary impacts to vegetation and land uses. Additional impacts to vegetation and land uses occur on the edges of the prior study area and would mostly affect existing disturbed/developed areas and non-native vegetation (See Areas 2, 3, 4, 7, 8, and 9 on Figure 4). The removal of Planning Area 1a (Revised Project Area 10 on Figure 4) alone results in the reduction of 6.95 acres of impacts to vegetation and land uses as compared to the previous study area evaluated in the project BTR.

Jurisdictional Waters

In summary, the project has reduced permanent impacts to California Department of Fish and Wildlife (CDFW) jurisdictional streambeds and U.S. Army Corps of Engineers (USACE) waters of the U.S. evaluated in the Final EIR. However, due to State-level procedural changes implemented in May 2020 during the processing of the Los Angeles Regional Water Quality Control Board (RWQCB) Section 401 Water Quality Certification for the project issued the Los Angeles RWQCB on March 8, 2021 (File No. 20-089), the limits of RWQCB waters of the State were expanded on the site based on hydrologic modeling of the 25-year flood event within Bouquet Canyon Creek, rather than being based on jurisdictional field indicators associated with the ordinary high water mark (OHWM), as had been the long-standing method. Consequently, the extent of permanent impacts to RWQCB jurisdictional waters of the U.S. have increased compared to the Final EIR. It should be noted that areas of expanded jurisdiction by the Los Angeles RWQCB are located within the limits of areas previously evaluated in the project BTR and the Final EIR as supporting CDFW jurisdictional resources. Given that project impacts to expanded RWQCB jurisdictional areas (and compensatory mitigation for RWQCB impacts) were evaluated as waters of the State regulated by CDFW in the Final EIR for the project, impacts to expanded RWQCB waters regulated under the project Section 401 Water Quality Certification are considered less than significant.

Although jurisdictional resources were identified within areas added to the project (See Revised Project Areas #5 and #6 on Figure 4), no additional impacts to jurisdictional streambeds will occur within the Revised Project Areas depicted on Figure 4. The sewer line proposed within Area 6 will be installed with directional drilling and will not result in additional impacts to jurisdictional streambeds regulated by the CDFW, USACE, or RWQCB. Therefore, no new significant impacts to biological resources will result from the implementation of the revised project plan when compared to the findings of the Final EIR for the project. A more detailed discussion of revised project effects on biological resources is provided below.

Sensitive Species

Rare Plants

Rare plant surveys were conducted within the prior study area in 2018 and 2019. A total of 496 slender mariposa lilies (*Calochortus clavatus* var. *gracilis*) were observed throughout the north-facing slopes in the eastern and southern portions of the original study area. Of those 496 individuals, 462 individual lilies were determined to be permanently impacted by the original project as part of the project BTR and the Final EIR. The new impact areas associated with New Bouquet Canyon Road improvement slope grading revisions (Area 7 on Figure 4) in the southern portion of the revised study area are located within the vicinity of these individuals. Area 7 was surveyed as part of the 2018 and 2019 rare plant surveys. However, with the removal of Area 10 from the revised study area and the minor slope revisions proposed within Revised Project Area 7 (slope grading), impacts to slender mariposa lilies will be reduced by nine (9) individuals, reducing the total impacts to this species from 462 individual lilies within the original project study area, to 453 individual lilies within the revised study area. Area 3 supports a suitable vegetation community (non-native vegetation/Riversidean upland sage scrub) for slender mariposa lily; however, the vegetation is located on a steep and highly disturbed south-facing slope, which is not suitable geomorphology for this species. Revised Project Areas 5 and 6 were not surveyed during the rare plant surveys; however, these areas support riverwash and non-native vegetation, which are not suitable habitat for the rare plant species analyzed in the BTR. The additional areas do not support habitat for slender mariposa lilies or other rare plants described in the BTR (Figure 7, *Impacts to Vegetation and Land Uses*). Therefore, the implementation of the revised project would not result in increased impacts to rare plant species.

Based on HELIX's assessment, the revised project results in a minor reduction of impacts to rare plants and therefore remains consistent with the findings described in the BTR and Final EIR. Compliance with Mitigation Measure [MM] 3.3-1 of the original project EIR provides appropriate mitigation for impacts to rare plants for the revised project.

Sensitive Wildlife Species

The revised project plan proposes additional permanent impacts to vegetation communities within mapped non-native grassland/Riversidean upland sage scrub, non-native vegetation/Riversidean upland sage scrub, riverwash, non-native vegetation, mulefat scrub, riverwash, developed areas, and ornamental vegetation (Figure 7). These vegetation communities and land uses do not provide suitable habitat for sensitive wildlife species previously identified in the BTR to have a potential to occur on the previous study area. The Revised Project Areas were included as part of the 2018 burrowing owl (*Athene cunicularia*), and the 2018 coastal California gnatcatcher (*Polioptila californica californica*) focused surveys. These species were not detected during the surveys. No suitable habitat for burrowing owl was detected during the 2021 general biological survey performed in the Revised Project Areas. Therefore, the implementation of the revised project plan would not result in additional direct impacts to sensitive animal species.

As described in the BTR, potential significant indirect impacts were identified for burrowing owl. Mitigation Measure 3.3-2 in the Final EIR includes measures to avoid and/or minimize potential indirect impacts to this sensitive animal species, which the revised project would also comply with. No additional measures to avoid or minimize significant impacts to sensitive wildlife species are warranted and the revised project is consistent with the findings described in the BTR and Final EIR.

Sensitive Vegetation Communities

California Department of Fish and Wildlife Sensitive Vegetation Communities/Habitats

The revised project would result in 80.83 acres of permanent impacts and 0.53 acre of temporary impacts to vegetation and land uses (Figure 7; Table 1, *Revised Permanent Impacts to Vegetation and Land Uses*). The revised project plan proposes the reduction of permanent impacts to 5.62 acres of vegetation and land uses, including the reduction of permanent impacts to: 0.24 acres of chamise chaparral/non-native grassland, 0.02 acres of giant reed stand, 1.37 acres of non-native grassland, 0.08 acre of non-native grassland/Riversidean upland sage scrub, 0.16 acre of non-native vegetation, 0.53 acre of Riversidean upland sage scrub, 1.17 acres of Riversidean upland sage scrub/non-native grassland, 0.05 acre of southern north slope chaparral, and 0.01 acre of southern willow scrub/giant reed stand). The Revised Project includes new permanent impacts to developed areas (1.3 acres), disturbed areas (0.42 acre), mulefat scrub (0.09 acre), ornamental vegetation (0.30 acre), and riverwash (0.02 acre). The revised project area also includes new temporary impacts to 0.53 acre (0.08 acre of disturbed areas, 0.02 acre of non-native grassland, 0.18 acre of non-native vegetation, 0.24 acre of ornamental vegetation, and 0.01 acre of riverwash). None of these communities are considered sensitive by CDFW.

With the removal of Planning Area 1a, the revised study area no longer includes the following vegetation and land uses: disturbed-Riversidean upland sage scrub, scrub oak chaparral, and scrub oak chaparral/non-native grassland. The revised study area includes two vegetation communities (non-native vegetation/upland Riversidean sage scrub and Tucker oak chaparral) not described in the BTR. These vegetation communities were recorded within Revised Project Area 3 (Davenport Parcel) and are described below. Neither vegetation community is considered sensitive by CDFW.

Based on the above analysis, impacts to CDFW Sensitive Vegetation Communities from the revised project remain consistent with the findings described in the BTR and Final EIR. Therefore, impacts to CDFW Sensitive Vegetation Communities remain less than significant consistent with the Final EIR.

Non-native Vegetation/Riversidean Upland Sage Scrub

This plant community is dominated by non-native vegetation with a subdominant component of Riversidean upland sage scrub. Non-native vegetation community is typically associated with land that has been heavily influenced by human activities, including areas adjacent to roads, manufactured slopes, and abandoned lots. Non-native vegetation areas are dominated by ornamental and non-native species that take advantage of previously cleared or abandoned landscaping or land showing signs of past or present animal usage that removes any capability of providing viable habitat. Riversidean sage scrub is the most xeric expression of coastal sage scrub south of Point Conception, California. This community occupies xeric sites, such as steep slopes, severely drained soils, or clays that slowly release stored soil moisture. This community is dominated by subshrubs, with leaves that are deciduous during drought, an adaptation that allows the habitat to withstand the prolonged drought period in the summer and fall. Sage scrub species have relatively shallow root systems and open canopies that allow for the occurrence of a substantial herbaceous (annual plant) component. Typical stands are fairly open and dominated by species such as California sagebrush, brittlebush (*Encelia farinosa*), and California buckwheat.

Non-native vegetation/Riversidean upland sage scrub was mapped in one area totaling 0.67 acre within the southern portion of Revised Project Area 3 (Davenport parcel). This vegetation community was dominated by shortpod mustard (*Hirschfeldia incana*). Component species of Riversidean upland sage scrub were observed in scattered amounts. These species included California sagebrush (*Artemisia californica*), purple sage (*Salvia leucophylla*), fourwing saltbush (*Atriplex canescens*), and California buckwheat (*Eriogonum fasciculatum*). The revised project plan includes impacts to 0.53 acre of this vegetation community.

Tucker Oak Chaparral

Tucker oak chaparral is dominated by an open to a continuous canopy of Tucker oak (*Quercus john-tuckeri*). This vegetation community is found on upper slopes and ridges, from approximately 980 to 4,920 feet in elevation. Other shrubs present may include chamise (*Adenostoma fasciculatum*), bigberry manzanita (*Arctostaphylos glauca*), California buckwheat, California juniper (*Juniperus californica*), and interior live oak (*Quercus wislizeni*).

One small area of Tucker oak chaparral totaling 0.24 acre was mapped in the northern portion of Revised Project Area 3 (Davenport Parcel). This vegetation community was dominated by Tucker oak with an understory of red brome (Bromus madritensis) and leaf litter. Other shrub species observed included California juniper, hollyleaf cherry (*Prunus ilicifolia*), purple sage, and chaparral yucca (*Hesperoyucca whipplei*). There were also two large interior live oaks within this vegetation community. The revised project plan does not propose impacts to Tucker oak chaparral.

Table 1
REVISED PERMANENT IMPACTS TO VEGETATION COMMUNITIES AND LAND USES

Habitat Type (Holland/Oberbauer)	Revised Study Area Existing (acres)	Prior Permanent Impacts (acres)	Revised Study Area Permanent Impacts (acres)	Revised Study Area Temporary Impacts (acres)
Big Sagebrush Scrub	1.91	1.91	1.91	0.00
Chamise Chaparral/Non-native Grassland	2.99	2.77	2.53	0.00
Developed	6.61	4.70	6.00	0.08
Disturbed	5.30	3.83	4.25	0.00
Disturbed-Riversidean Upland Sage Scrub	0.58	0.54	-	-
Elderberry Savanna[1]	0.56	0.56	0.56	0.00
Giant Reed Stand	7.06	7.08	7.06	0.00
Mule Fat Scrub	0.42	0.27	0.36	0.00
Non-native Grassland	21.77	21.75	20.38	0.02
Non-native Grassland/Riversidean Upland Sage Scrub	7.49	7.41	7.33	0.00
Non-native Vegetation	8.08	7.16	7.00	0.18
Non-native Vegetation/Elderberry Savanna	0.97	0.97	0.97	0.00
Non-native Vegetation/Riversidean Upland Sage Scrub[2]	0.67	-	0.53	0.00
Ornamental	2.95	2.13	2.43	0.24
Riversidean Upland Sage Scrub	7.01	6.90	6.37	0.00
Riversidean Upland Sage Scrub/Non-native Grassland	13.01	12.96	11.79	0.00
River Wash	0.42	0.36	0.38	0.01
Scrub Oak Chaparral	-	0.26	-	-
Scrub Oak Chaparral/Non-native Grassland	0.67	2.01	-	-
Southern North Slope Chaparral	0.34	0.34	0.29	0.00
Southern Willow Scrub/Giant Reed Stand[1]	0.70	0.70	0.69	0.00
Tucker Oak Chaparral[2]	0.24	-	0.00	0.00
	89.75	**84.61**	**80.83**	**0.53**

1 Sensitive habitats pursuant to the California Department of Fish and Wildlife (CDFW) Natural Communities List (2018b).
2 Indicates a plant community added during the 2021 survey.

California Department of Fish and Wildlife Riparian Habitat and Streambed

The revised project plan includes a reduction of permanent impacts to CDFW jurisdictional areas within Bouquet Canyon Creek associated with Revised Project Areas 1, 5, and 6 compared to the Final EIR for the project. Permanent impacts to CDFW jurisdictional streambeds from the revised project were decreased from 9.33 acres to 8.36 acres, and temporary impacts increased by 1.27 acres (Table 2, *Revised Impacts to California Department of Fish and Wildlife Jurisdiction*; Figure 8, *Impacts to Jurisdictional Features*). The decrease in permanent impacts and the corresponding decrease in temporary impacts to CDFW jurisdiction is due primarily to the recharacterization of the on-site low flow channel invert as a temporary impact. No new CDFW jurisdictional areas will be impacted by the revised project. The Final EIR for the project assumed all permanent impacts to CDFW jurisdiction within the low-flow channel, in order to avoid using the channel as compensatory mitigation for impacts to CDFW jurisdictional waters.

Table 2
REVISED IMPACTS TO CDFW JURISDICTION

Drainage	Permanent Impacts (acres)	Temporary Impacts (acres)
Bouquet Canyon Creek	8.32	1.74
Drainage A	0.01	0.00
Drainage B	0.01	0.00
Drainage C	0.01	0.00
Drainage D	0.01	0.00
TOTAL	**8.36**	1.74

The revised project is consistent with the findings described in the BTR and Final EIR and does not result in any new significant impacts to CDFW jurisdictional areas. Therefore, impacts to CDFW jurisdictional waters from the revised project are considered less than significant pursuant to CEQA.

U.S. Army Corps of Engineers Jurisdictional Waters of the U.S.

The revised project plan includes a total reduction of 0.01 acre of permanent impacts to USACE jurisdictional waters of the U.S. compared to the original project. Permanent impacts to USACE jurisdiction associated with the revised project have decreased from 0.19 acre to 0.18 acre (Table 3, *Revised Impacts to USACE Jurisdiction*; Figure 8).

Table 3
REVISED IMPACTS TO USACE JURISDICTION

Drainage	Permanent Impacts (acres)	Temporary Impacts (acres)
Bouquet Canyon Creek	0.18	0.46

The revised project results in a reduction of impacts to USACE jurisdictional areas compared to the BTR and Final EIR for the project. Therefore, impacts to USACE jurisdictional waters from the revised project are considered less than significant pursuant to CEQA.

The Final EIR for the project estimated the same limits of jurisdiction for both the USACE and the RWQCB within the study area. Use of the OHWM was the standard for determining the limits of RWQCB waters of the State prior to the procedural changes to the Section 401 Water Quality Certification program implemented by the State Water Resources Control Board in May 2020. As such, the Los Angeles RWQCB expanded their jurisdiction on the site compared to areas previously delineated by HELIX in the project BTR, resulting in an increase from 0.19 acre to 1.32 acres of permanent impacts to RWQCB jurisdictional waters of the State compared to the BTR and Final EIR for the project (Table 4*, Revised Impacts to RWQCB Jurisdiction*; Figure 8). This larger extent of RWQCB jurisdiction is documented in the project Section 401 Water Quality Certification (File No. 20-089) issued on March 8, 2021, for the project). Consequently, the extent of permanent impacts to RWQCB jurisdictional waters of the U.S. have increased compared to the Final EIR. It should be noted that areas of expanded jurisdiction by the Los Angeles RWQCB are located within the limits of areas previously evaluated in the project BTR and Final EIR as supporting CDFW jurisdictional resources. Given that project impacts to, and mitigation for, expanded RWQCB jurisdictional areas were already evaluated as waters of the State regulated by CDFW in the Final EIR for the project. Therefore, the increase in RWQCB jurisdiction as regulated under the project Section 401 Water Quality Certification is considered less than significant.

Table 4
REVISED IMPACTS TO RWQCB JURISDICTION

Drainage	Permanent Impacts (acres)	Temporary Impacts (acres)
Bouquet Canyon Creek	1.32	1.39

The revised project does not result in any new significant impacts to RWQCB jurisdictional areas compared to the BTR and Final EIR for the project. Therefore, impacts to RWQCB jurisdictional waters from the revised project are considered less than significant pursuant to CEQA.

Wildlife Movement and Migratory Species

Wildlife Movement

Impacts associated with the Revised Project Areas are proposed within mapped developed areas, non-native vegetation, non-native grassland/Riversidean upland sage scrub, and riverwash. With the removal of Planning Area 1a from the project plan, the total revised permanent impacts to vegetation were reduced from 3.78 acres (Figure 7). As discussed in the BTR, the study area provides suitable habitat for some local wildlife movement but is not considered a regional wildlife movement corridor. Although the implementation of the project may result in some temporary disturbance to local wildlife movement from construction noise, the project would have a less than significant impact to wildlife movement, and no mitigation measures are recommended.

The revised project includes a reduction of impacts to vegetation and land uses. No additional impacts to wildlife movement are proposed; therefore, the revised project is consistent with the (1) vegetation and land use impact and (2) wildlife movement findings described in the BTR and Final EIR.

Migratory Species

The revised project plan proposes permanent impacts to 80.83 acres and temporary impacts to 0.53 acre of vegetation communities and land uses. Some impacted areas may support vegetation suitable for nesting birds (Figure 7). In addition, adjacent areas may support suitable habitat for nesting birds. Construction activities could disturb or destroy active migratory bird nests, including eggs and young. The Final EIR includes Mitigation Measure 3.3-5 to avoid potential impacts to nesting bird species, which the revised project would also comply with these measures. No additional measures to avoid or minimize significant impacts to nesting birds are warranted.

The revised project plan includes a reduction of permanent impacts by 3.78 acres. Additionally, the revised project plan includes compliance with the MM 3.3-5 of the Final EIR. The findings described in the BTR and Final EIR are consistent with the revised project.

Local Policies and Ordinances

The oak tree survey described in the BTR detected 64 City-protected oak trees (*Quercus* sp.) within the survey area. The project originally proposed to remove 26 oak trees, including four scrub oaks, two blue oaks, and 20 Tucker oaks. In addition, one Tucker oak would have been subjected to major encroachment, and two Tucker oaks would have been subjected to minor encroachment. The remaining 35 oak trees would have been completely avoided by the original proposed project. Impacts to oak trees within the revised study area have been evaluated by HELIX, resulting in a significant decrease in impacts to oak trees as further described below.

An oak tree survey was performed by Carlsberg and Associates within Revised Project Area 3 (Davenport Trailhead). This survey detected 20 City-protected oak trees, including 17 Tucker oak, one blue oak, two interior live oak on the Davenport Trailhead property. All the trees within Revised Project Area 3 will be avoided. No oak trees were detected during the December 2021 oak tree survey performed within Revised Project Areas 1, 2, and 4-10. The revised project includes a reduction of tree removals, from 26 removals proposed as part of the original project, to 12 removals proposed as part of the revised project. The revised impacts to oak trees are detailed in Table 5, below. The project oak tree survey report, including addenda addressing Revised Project Areas and including a revised tree appraisal, is included as Attachment B.

Table 5
REVISED IMPACTS TO OAK TREES

Species Name	Common Name	Number of Trees			
		Removed	Major Encroachment	Minor Encroachment	Avoided
Quercus agrifolia	coast live oak	1	0	0	2
Quercus berberidifolia	scrub oak	0	1	1	4
Quercus douglasii	blue oak	1	0	0	2
Quercus john-tuckeri	Tucker oak	10	0	0	60
Quercus lobata	valley oak	0	0	0	1
Quercus wislizeni	interior live oak	0	0	0	2
	TOTAL	**12**	**1**	**1**	**69**

The revised project would not conflict with the City's Oak Tree Preservation ordinance. Furthermore, the revised project includes a reduction of impacts to oaks compared to oak impacts proposed in the Final EIR. As described in BIO-6 of the BTR, an oak tree removal permit will be obtained from the City prior to construction. Impacts to oak trees by the revised project therefore remain less than significant with the mitigation proposed in the Final EIR.

Adopted Habitat Conservation Plans

The Revised Project Areas are not located within any adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. As such, the implementation of the project would not conflict with any adopted habitat conservation plans.

The findings related to adopted Habitat Conservation Plan described in the BTR and Final EIR are therefore consistent with the revised project.

MITIGATION MEASURES

Permanent impacts analyzed in this addendum are consistent with impacts evaluated under the BTR and Final EIR, and no additional significant impacts were identified. Implementation of the revised project would not trigger any additional avoidance/minimization measures. The revised project will still be required to comply with the avoidance/minimization measures 3.3-1 through 3.3-5 listed in Section Four of the Final EIR, which are provided below.

3.3-1 Mitigation for project impacts to the slender mariposa-lily (*Calochortus clavatus* var. *gracilis*) shall include one or more of the following, implemented in consultation with the City and CDFW prior to construction:

- Prior to construction, a mitigation plan shall be developed that describes methods to mitigate for impacts to slender mariposa lily at a 1:1 ratio. The mitigation plan shall include a description of the mitigation site, bulb collection and planting methods, maintenance and monitoring requirements, and performance standards to measure the success of the mitigation. Slender mariposa lily bulbs shall be collected at the end of the growing season and prior to ground disturbance, or bulbs shall be obtained from a native plant nursery if available. The bulbs shall be planted within an appropriate on-site or off-site mitigation area, which will be conserved as open space in perpetuity.

- Payment into a mitigation bank and/or in-lieu fee program that has mitigation available for slender mariposa lily at a 1:1 ratio; and/or

- Preservation of land that contains slender mariposa lily at a 1:1 ratio.

3.3-2 In compliance with the CDFW *Staff Report on Burrowing Owl Mitigation* (2012), a take avoidance survey shall be conducted on the study area within 14 days prior to ground disturbance to determine the presence of BUOW. If the take avoidance survey is negative and BUOW is confirmed absent, then ground-disturbing activities shall be allowed to commence, and no further mitigation would be required.

If BUOW are observed during the take avoidance survey, active burrows shall be avoided by the project in accordance with the CDFW's Staff Report (2012). The CDFW shall be immediately informed of any BUOW observations. A Burrowing Owl Protection and Relocation Plan (plan) shall be prepared by a qualified biologist, which must be sent for approval by CDFW prior to initiating ground disturbance. The plan shall detail avoidance measures that shall be implemented during construction and passive or active relocation methodology. Relocation shall only occur outside of the nesting season (September 1 through January 31).

3.3-3 Prior to the City's issuance of a grading permit, the Project Applicant shall demonstrate that a Streambed Alteration Agreement has been issued by CDFW. Temporary impacts to CDFW jurisdiction shall be returned to pre-project topographic contours once the project has been completed. Permanent impacts to CDFW jurisdiction for southern willow scrub/giant reed stand (0.70 acre) shall be mitigated through on-site or off-site enhancement, restoration, and/or creation of CDFW jurisdictional streambed at a ratio of no less than 1:1. Given that the remaining portion of Bouquet Canyon Creek is dominated by invasive giant reed stands, which is of extremely low biological function and value, and contributes to downstream infestation of giant reed, the remaining permanent impacts to CDFW jurisdiction (8.63 acres) shall be mitigated through on-site or off-site enhancement, restoration, and/or creation of CDFW jurisdictional streambed at a ratio of no less than 0.5:1. Best Management Practices (BMPs) to minimize and avoid impacts to CDFW jurisdiction during and after construction will be addressed as part of the Streambed Alteration Agreement. Minimization and avoidance measures may include, but are not limited to, the following:

- Construction-related equipment will be stored in developed areas, outside of drainages. No equipment maintenance will be done within or adjacent to the drainage.
- Mud, silt, spoil sites, raw cement, asphalt, or other pollutants from construction activities will not be placed within or adjacent to the drainage.
- Open trenches or other excavated areas will be properly secured at the end of the day to avoid entrapment of animals, or an escape ramp will be provided.
- To avoid attracting predators during construction, the project will be kept clean of debris to the extent possible. All food-related trash items will be enclosed in sealed containers and regularly removed from the site.
- Construction personnel will strictly limit their activities, vehicles, equipment, and construction material to the proposed project footprint, staging areas, and designated routes of travel.
- Exclusion fencing will be installed to demarcate the limits of disturbance. The exclusion fencing should be maintained until the completion of construction activities.
- To the extent feasible, construction will be conducted outside of the nesting bird season (see MM 3.3-5 below).

3.3-4 **USACE and RWQCB Jurisdiction**: Prior to the City's issuance of a grading permit, the Project Applicant shall demonstrate that the appropriate regulatory permits have been issued by USACE and RWQCB. Temporary impacts to waters of the U.S. shall be returned to pre-project topographic contours once the project has been completed. Compensatory mitigation for permanent impacts to waters of the U.S. shall be required as part of subsequent permitting requirements. Permanent impacts to WUS shall be mitigated through on-site or off-site enhancement, restoration, and/or creation of jurisdictional streambed at a ratio of no less than 1:1. BMPs to minimize and avoid impacts to waters of the U.S. during and after construction will be addressed as part of the USACE and RWQCB permitting process. Minimization and avoidance measures may include, but are not limited to, the following:

- Construction-related equipment will be stored in developed areas, outside of the drainage. No equipment maintenance will be done within or adjacent to the drainage.

- Source control and treatment control BMPs will be implemented to minimize the potential contaminants that are generated during and after construction. Water quality BMPs will be implemented throughout the project to capture and treat potential contaminants.

- Substances harmful to aquatic life will not be discharged into the drainage. All hazardous substances will be properly handled and stored.

- A Storm Water Pollution Prevention Plan will be prepared to prevent sediment from entering the drainage during construction.

- To avoid attracting predators during construction, the project will be kept clean of debris to the extent possible. All food-related trash items will be enclosed in sealed containers and regularly removed from the site.

- Construction personnel will strictly limit their activities, vehicles, equipment, and construction material to the proposed project footprint, staging areas, and designated routes of travel.

- Exclusion fencing will be installed to demarcate the limits of disturbance. The exclusion fencing should be maintained until the completion of construction activities.

3.3-5 Construction activities (i.e., earthwork, clearing, and grubbing) shall occur outside of the general bird nesting season for migratory birds, which is February 15 through August 31 for songbirds and January 15 to August 31 for raptors.

If construction activities (i.e., earthwork, clearing, and grubbing) must occur during the general bird nesting season for migratory birds and raptors, a qualified biologist shall perform a pre-construction survey of potential nesting habitat to confirm the absence of active nests belonging to migratory birds and raptors afforded protection under the MBTA and CFG Code. The pre-construction survey shall be performed no more than seven days prior to the commencement of construction activities. The results of the pre-construction survey shall be documented by the qualified biologist. If construction is inactive for more than seven days, an additional survey shall be conducted.

If the qualified biologist determines that no active migratory bird or raptor nests occur, the activities shall be allowed to proceed without any further requirements. If the qualified biologist determines that an active migratory bird or raptor nest is present, no impacts within 300 feet (500 feet for raptors) of the active nest shall occur until the young have fledged the nest and the nest is confirmed to no longer be active, or as determined by the qualified biologist. The biological monitor may modify the buffer or propose other recommendations in order to minimize disturbance to nesting birds.

CONCLUSIONS

The analysis provided above is intended to serve as an addendum to the BTR to document revisions to the proposed project comprised of ten revised areas. The revised project areas total 7.50 acres located adjacent to the project site (see Figure 4).

The revised project would result in a total of 80.83 acres of permanent impacts and 0.53 acre of temporary impacts to the same vegetation/land uses analyzed in the project BTR and Final EIR. The revised project includes a reduction of impacts to USACE and CDFW jurisdiction, slender mariposa lilies, and oak trees The project would still be required to comply with mitigation measures disclosed in the Final EIR to avoid potential indirect impacts to sensitive wildlife species (burrowing owl), CDFW, and USACE/RWQCB jurisdiction, oak trees, slender mariposa lilies, and nesting birds. Therefore, no new significant impacts to biological resources would result from implementation of the revised project, and the revised project remains consistent with the findings of the Final EIR.

If you have any questions regarding the information presented in this letter report, please contact Daniel Torres (DanielT@helixepi.com) or Ezekiel Cooley (EzekielC@helixepi.com).

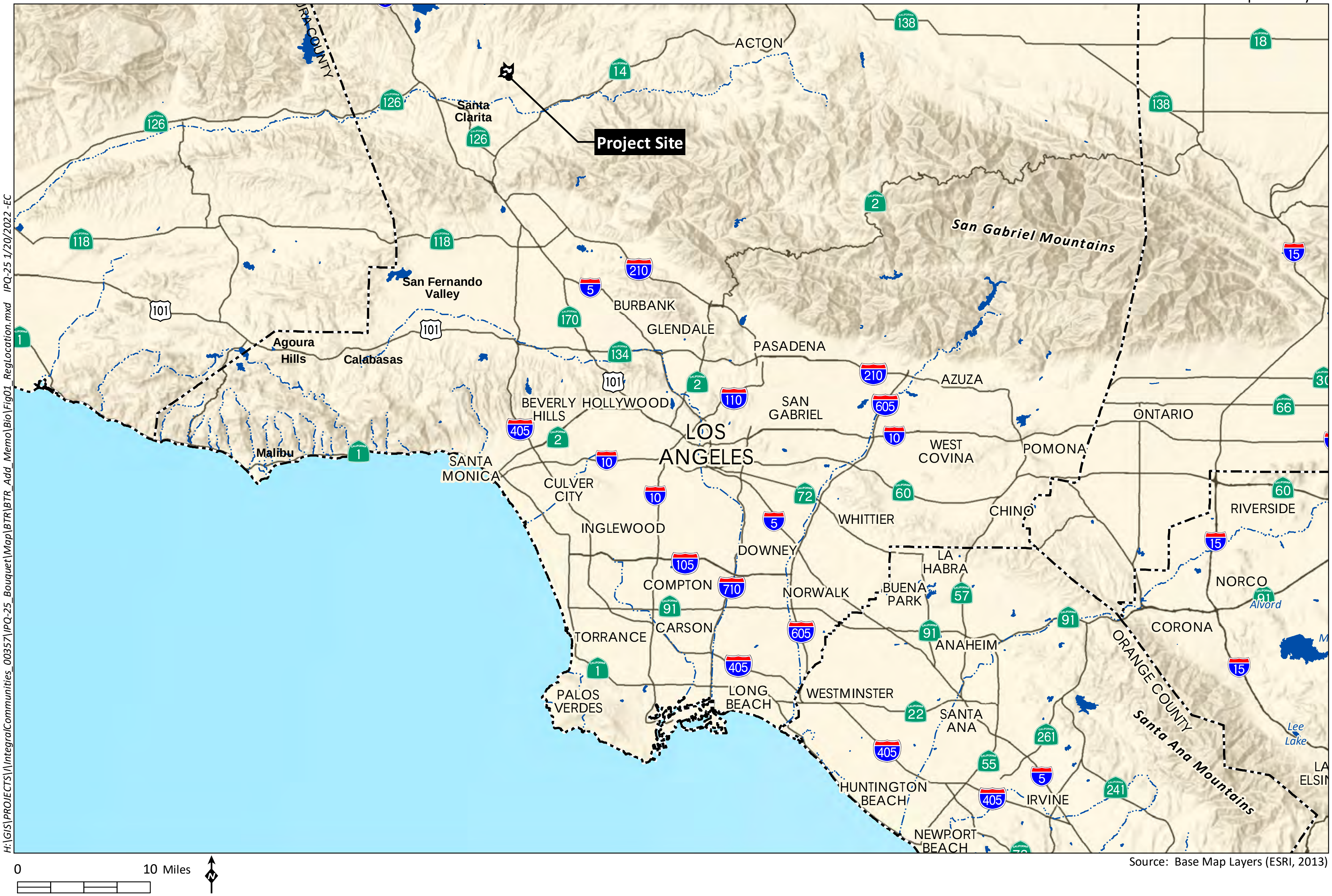
Sincerely,

Daniel Torres
Biologist

Ezekiel Cooley
Senior Biology Project Manager

Attachments:

Figure 1: Regional Location
Figure 2: USGS Topography
Figure 3: Aerial Vicinity
Figure 4: Revised Project Areas
Figure 5: Vegetation and Land Uses
Figure 6: Jurisdictional Features
Figure 7: Impacts to Vegetation and Land Uses
Figure 8: Impacts to Jurisdictional Features
Attachment A: Biological Technical Report
Attachment B: Oak Tree Survey Report Addendum



Source: Base Map Layers (ESRI, 2013)

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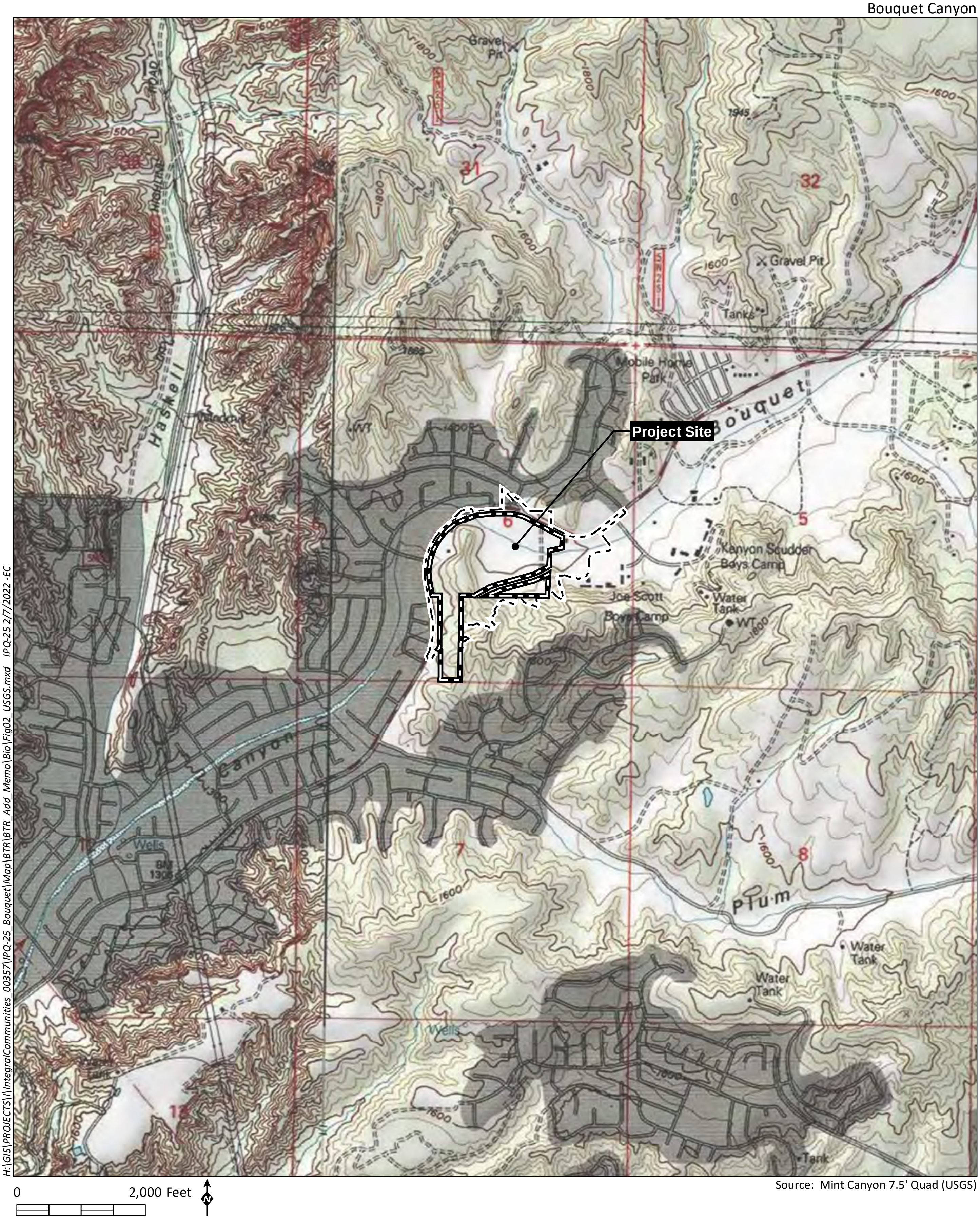
HELIX Environmental Planning

Regional Location

Figure 1



Source: Mint Canyon 7.5' Quad (USGS)

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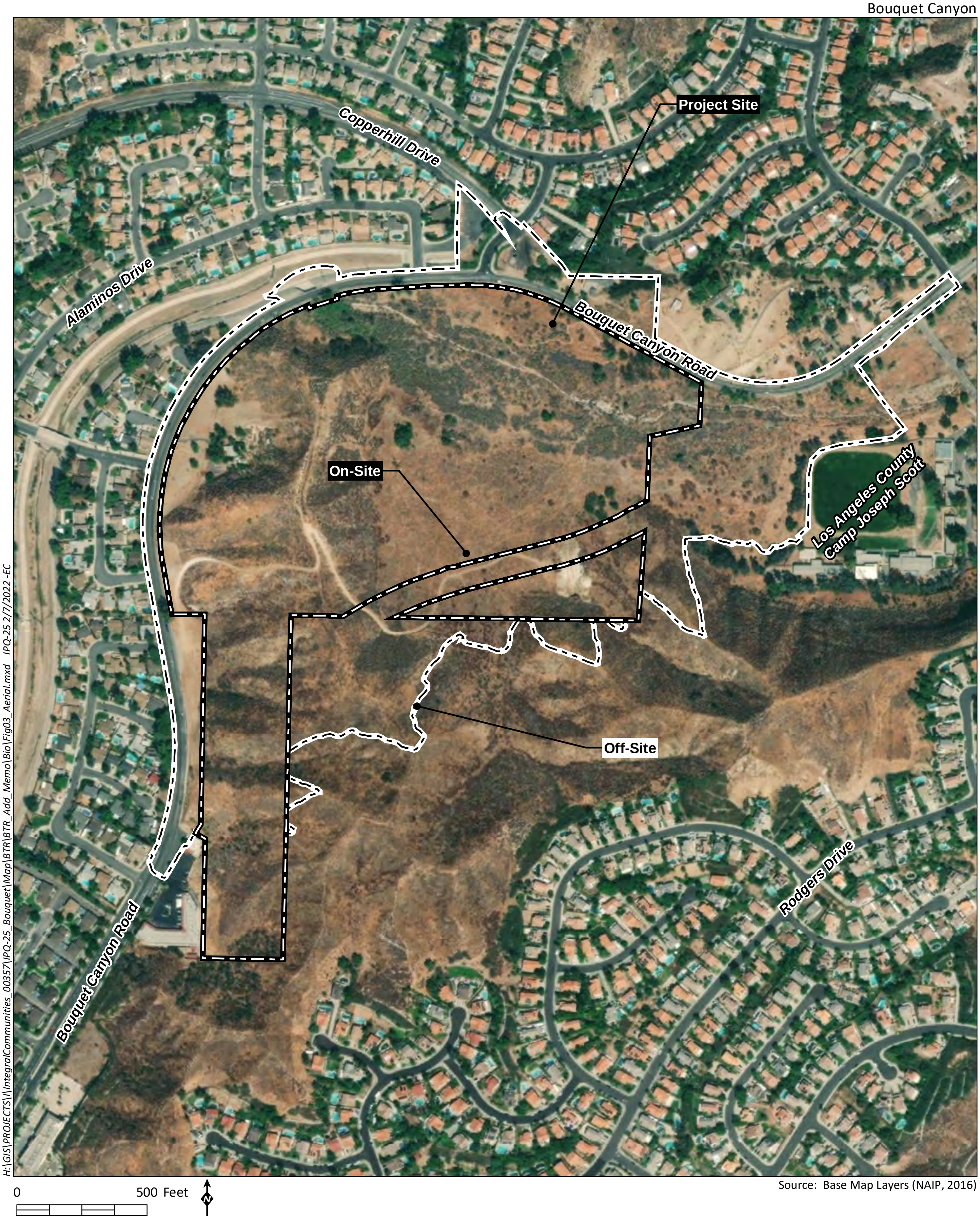
USGS Topography

Figure 2



Source: Base Map Layers (NAIP, 2016)

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Aerial Photograph

Figure 3

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Source: Site Plan (9-29-21)

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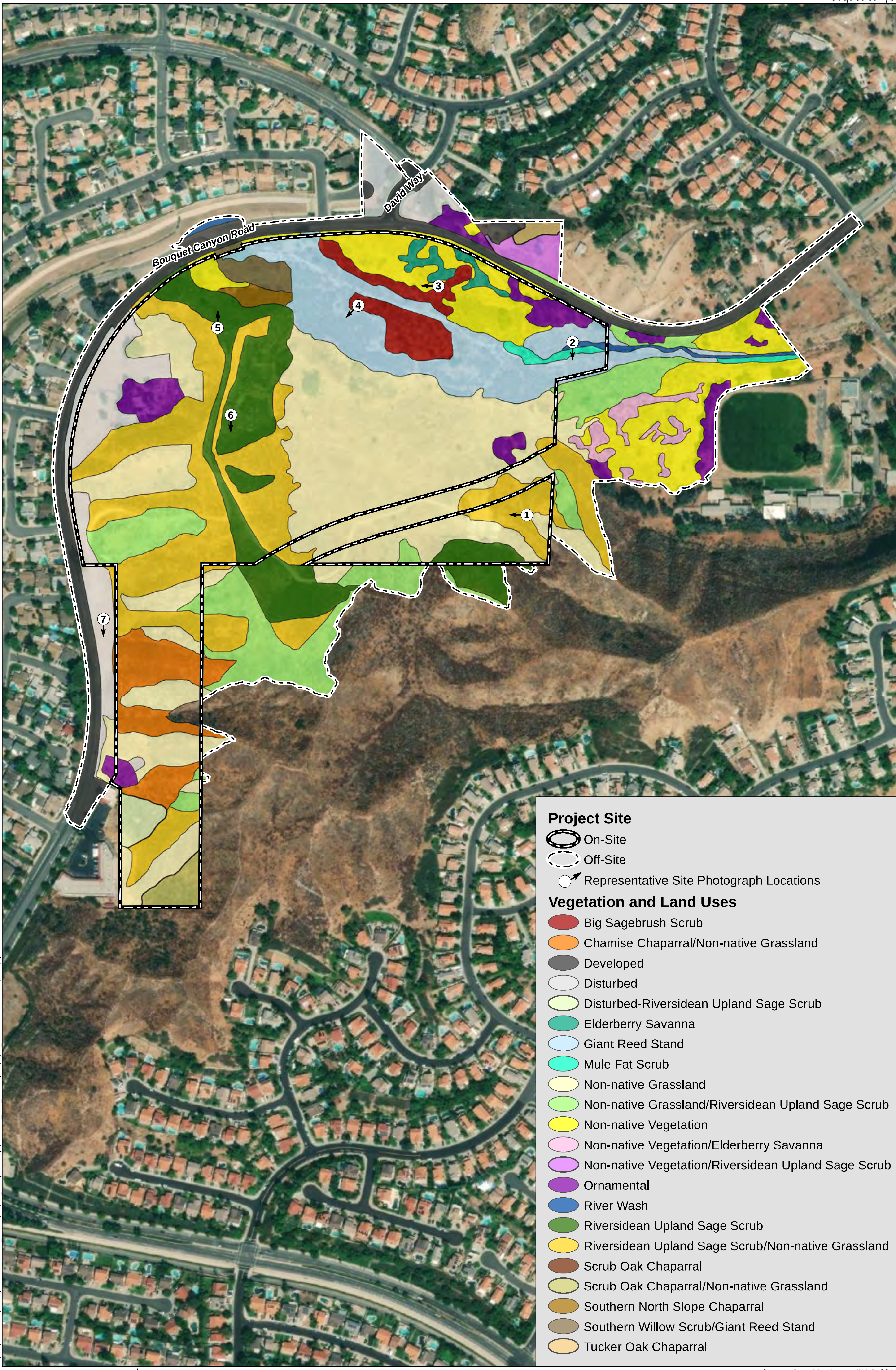
Revised Project Areas

Figure 4



Source: Base Map Layers (NAIP, 2016)

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Vegetation and Land Uses

Figure 5

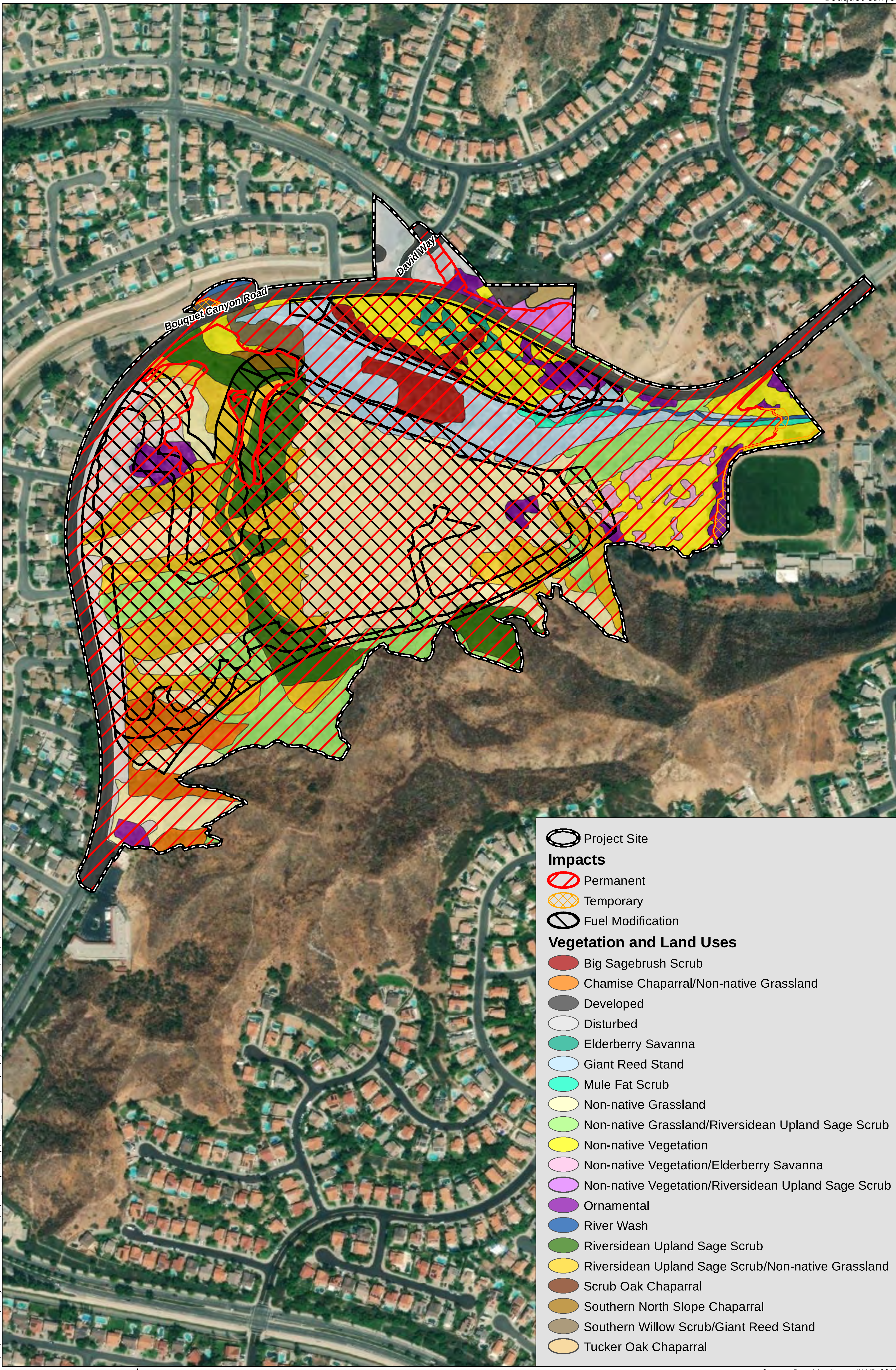
Bouquet Canyon

Source: Base Map Layers (NAIP, 2016; NearMap, 2017)

HELIX Environmental Planning

Jurisdictional Features

Figure 6



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Source: Base Map Layers (NAIP, 2016)

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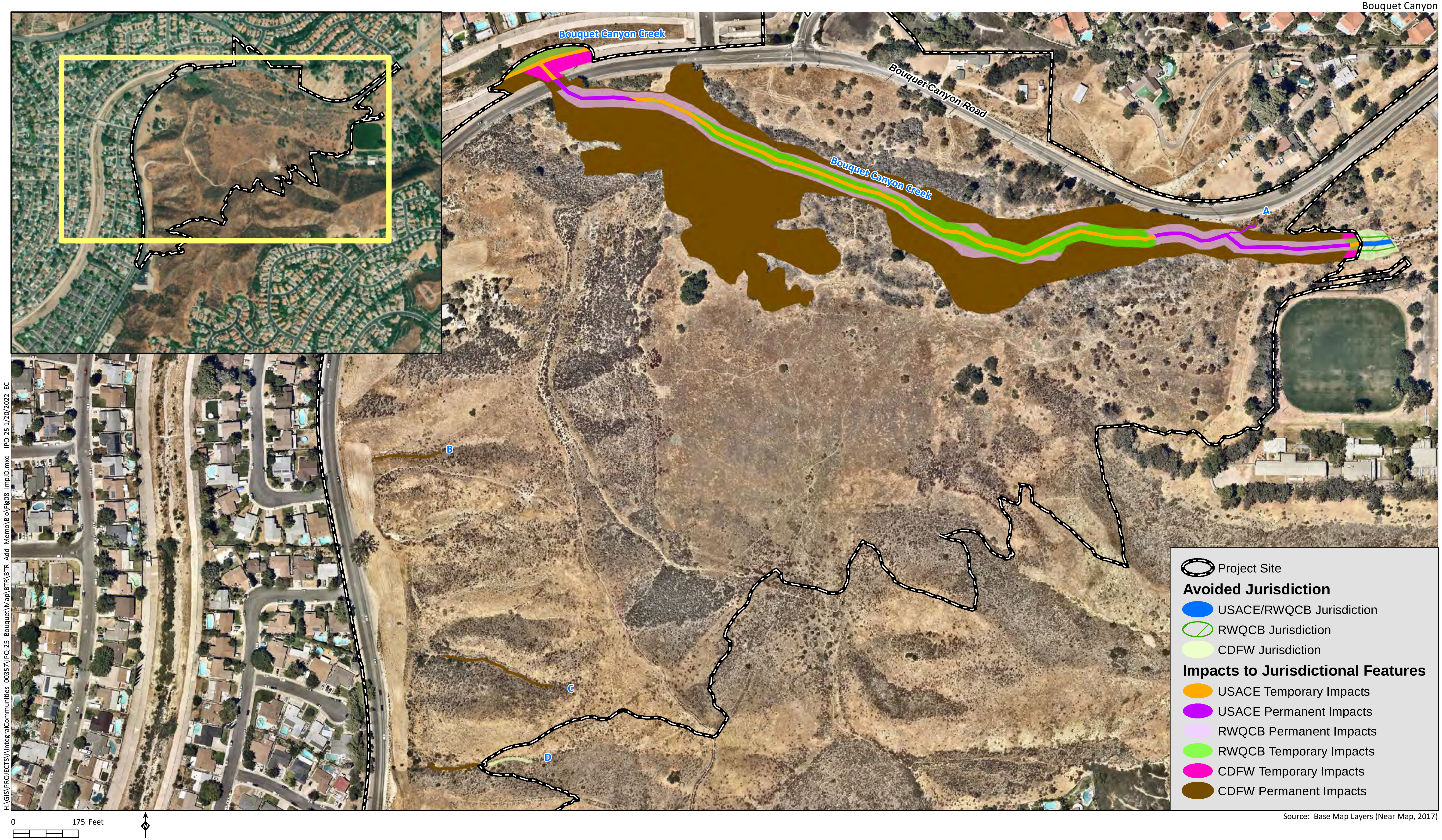
Impacts to Vegetation and Land Uses

Figure 7



Source: Base Map Layers (Near Map, 2017)

HELIX Environmental Planning

Impact to Jurisdictional Features

Figure 8

Attachment A

Biological Technical Report

Bouquet Canyon Project (Tentative Tract No. 82126)

Biological Technical Report

October 17, 2019 | IPQ-25

Prepared for:

Integral Communities
888 San Clemente Drive, Suite 100
Newport Beach, CA 92660

Prepared by:

HELIX Environmental Planning, Inc.
16485 Laguna Canyon Road, Suite 150
Irvine, CA 92618

Bouquet Canyon Project (Tentative Tract No. 82126)

Biological Technical Report

Prepared for:

Integral Communities
888 San Clemente Drive, Suite 100
Newport Beach, CA 92660

Prepared by:

HELIX Environmental Planning, Inc.
16485 Laguna Canyon Road, Suite 150
Irvine, CA 92618

October 17, 2019 | IPQ-25

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ACRONYMS AND ABBREVIATIONS

AMSL	Above Mean Sea Level
BMPs	Best Management Practices
BUOW	Burrowing Owl
CAGN	Coastal California Gnatcatcher
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFG	California Fish and Game
City	City of Santa Clarita
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
County	County of Los Angeles
CRPR	California Rare Plant Rank
CWA	Clean Water Act
EPA	Environmental Protection Agency
FESA	Federal Endangered Species Act
G	Global
GPS	Global Positioning System
HELIX	HELIX Environmental Planning, Inc.
ISA	International Society of Arboriculture
MBTA	Migratory Bird Treaty Act
MCV	A Manual of California Vegetation
NPPA	Native Plant Protection Act
NRCS	Natural Resources Conservation Service
OHWM	Ordinary High Water Mark
Project	Bouquet Canyon
RPW	Relatively Permanent Water Body
RWQCB	Regional Water Quality Control Board
S	State
SFP	State Fully Protected
SMEA	San Marino Environmental Associates

SSC	Species of Special Concern
TNW	Traditional Navigable Waters
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UTS	Unarmored Threespine Stickleback
WUS	Waters of the U.S.

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EXECUTIVE SUMMARY

HELIX Environmental Planning, Inc. (HELIX) completed this biological technical report for the Bouquet Canyon Project (project), which is proposed by Integral Communities in the City of Santa Clarita (City), Los Angeles County, California. Integral Communities is proposing a residential development and road improvements to Bouquet Canyon Road on an approximately 94-acre study area. The study area is generally located 5.5 miles to the northeast of Interstate 5 and 3.8 miles to the northwest of California State Route 14.

The study area is located in the foothills of the Sierra Pelona Mountains. The topography in the southern and western portions of the study area is predominantly steep hillsides, while the northern portion is primarily flat. Bouquet Canyon Creek flows from east to west in the northern portion of the study area. The steep hills throughout the southern and western portions of the site are predominated by Riversidean upland sage scrub while the flatter portions of the study area are dominated by non-native grassland. HELIX conducted a general biological survey (including vegetation mapping and a general habitat assessment) and a jurisdictional assessment in 2017. Focused surveys for rare plant species, burrowing owl (*Athene cunicularia*; BUOW), and coastal California gnatcatcher (*Polioptila californica californica*; CAGN) surveys and an oak tree survey were conducted in 2018.

A total of 20 vegetation communities were mapped on the study area. Native communities totaled 29.19 acres, which included big sagebrush scrub, chamise chaparral/non-native grassland, elderberry savanna, Riversidean upland sage scrub, Riversidean upland sage scrub/non-native grassland, scrub oak chaparral, scrub oak chaparral/non-native grassland, southern north slope chaparral, and southern willow scrub/giant reed stand. Elderberry savanna and southern riparian scrub/giant reed stand are considered sensitive communities pursuant to the California Department of Fish and Wildlife (CDFW). A total of 496 slender mariposa lilies (*Calochortus clavatus* var. *gracilis*) were observed throughout the north-facing slopes in the eastern and southern portions of the study area during the rare plant surveys. Eight sensitive animal species were determined to have a potential occur on the study area, including three species with a low potential (California glossy snake [*Arizona elegans occidentalis*], Townsend's big-eared bat [*Corynorhinus townsendii*; foraging only], and southern grasshopper mouse [*Onychomys torridus ramona*]), one species with a moderate potential (California legless lizard [*Anniella* sp.]), four species with a high potential (coastal whiptail [*Aspidoscelis tigris stejnegeri*], coast horned lizard [*Phrynosoma blainvillii*], loggerhead shrike [*Lanius ludovicianus*], and San Diego black-tailed jackrabbit [*Lepus californicus bennettii*]). Two sensitive animal species are presumed absent due to negative focused surveys (BUOW and CAGN). Bouquet Canyon Creek is an ephemeral stream that runs east to west through the northern portion of the study area and is dominated by the invasive grass species giant reed (*Arundo donax*). The study are supports a total of 0.65 acre of U.S. Army Corps of Engineers (USACE)/Regional Water Quality Control Board (RWQCB) waters of the U.S. (WUS) and 9.80 acres of CDFW jurisdictional streambed and associated vegetation. A total of 64 oak trees meet the City's definition of a protected tree, including two coast live oaks (*Quercus agrifolia*), six scrub oaks (*Quercus berberidifolia*), two blue oaks (*Quercus douglasii*), and 54 Tucker oaks (*Quercus john-tuckeri*). The study area is not considered a regional wildlife corridor.

Potential significant impacts were identified for rare plants, BUOW (if present during the take avoidance survey), jurisdictional resources, nesting bird species, and City-protected oak trees. Permanent impacts are proposed to approximately 462 slender mariposa lilies and 28.68 acres of native-dominated vegetation. The project would permanently impact 0.19 acre and temporarily impact 0.46 acre of non-wetland USACE/RWQCB WUS. The project would also permanently impact 9.33 acres and temporarily impact 0.47 acre of CDFW jurisdictional streambed and associated vegetation (mostly invasive giant reed). Following construction, the majority of the central channel within CDFW jurisdiction will be returned to pre-project topographic contours. The project would permanently remove 26 City-protected oak trees. The proposed project would not impact wildlife corridors or conflict with regional conservation plans.

Measures related to the following topics are proposed herein to fully mitigate potential impacts of the project: rare plants, BUOW, jurisdictional resources, nesting birds, and City-protected oak trees. Successful implementation of these measures would mitigate potential impacts to below a level of significance.

1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

This report provides the City of Santa Clarita (City; California Environmental Quality Act [CEQA] lead agency), resource agencies, and the public with current biological data to satisfy review of the proposed Bouquet Canyon Project (Tentative Tract No. 82126; project) located in the City of Santa Clarita, Los Angeles County, California. The purpose of this report is to document the existing biological conditions on and in the immediate vicinity of the project and provide an analysis of potential impacts to sensitive biological resources with respect to local, state, and federal policy. This report provides the biological resources technical documentation necessary for project review under CEQA by the lead agency.

1.2 PROJECT LOCATION

The proposed project is located within an approximately 93.47-acre study area in the Saugus Community in the northern portion of the City. The study area is generally located 5.5 miles to the northeast of Interstate 5 and 3.8 miles to the northwest of California State Route 14 (Figure 1, *Regional Location*). The study area is within Section 6 of Township 4 North, Range 15 West of the Mint Canyon U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 2, *USGS Topography*). Specifically, the study area is located directly south of the intersection of David Way and Bouquet Canyon Road (Figure 3, *Aerial Photograph*).

1.3 PROJECT DESCRIPTION

The proposed project is a residential development that would consist of a gated community comprising several neighborhoods and common area amenities (Figure 4, *Proposed Project*). The development would consist of private residences and would include a combination of detached single-family lots, auto court detached bungalow units, attached row townhomes, and attached motor court condominiums. The project would also require some slope stabilization in addition to implementing fuel modification zones in accordance with the County of Los Angeles (County) Fire Department regulations (County of Los Angeles 2017). A flood control channel would be constructed to south of existing Bouquet Canyon Creek. Downstream flows within Bouquet Canyon Creek would feed into the flood control channel, which would ultimately tie into the existing concrete-lined portion of Bouquet Canyon Creek to the northwest of the proposed project.

The project would construct a new alignment of Bouquet Canyon Road, which would improve a heavily-traveled route that connects to Copper Hill Drive and the northern portion of the City. The new road alignment would be constructed approximately 1,500 feet north of Plum Canyon Road on the south end to a connection point at the existing Bouquet Canyon Road approximately 700 feet south of Shadow Valley Lane. Construction of the new Bouquet Canyon alignment would implement a portion of the City's General Plan Circulation Element (City of Santa Clarita [City] 2011). The new alignment would include widened lane and shoulder areas, a full-width bridge over Bouquet Canyon Creek, pedestrian walkways, and a multi-use trail accessible to both existing neighborhoods and the proposed development.

2.0 METHODS

Project evaluation included a review of project plans; a literature review of biological resources occurring on the study area and surrounding vicinity; a general biological survey, including vegetation mapping and a general habitat assessment; focused surveys for rare plant species, burrowing owl (*Athene cunicularia*; BUOW), and coastal California gnatcatcher (*Polioptila californica californica*; CAGN); an oak tree (*Quercus* spp.) survey; and a jurisdictional assessment. The methods used to evaluate the biological resources present on the study area are discussed in this section.

2.1 NOMENCLATURE

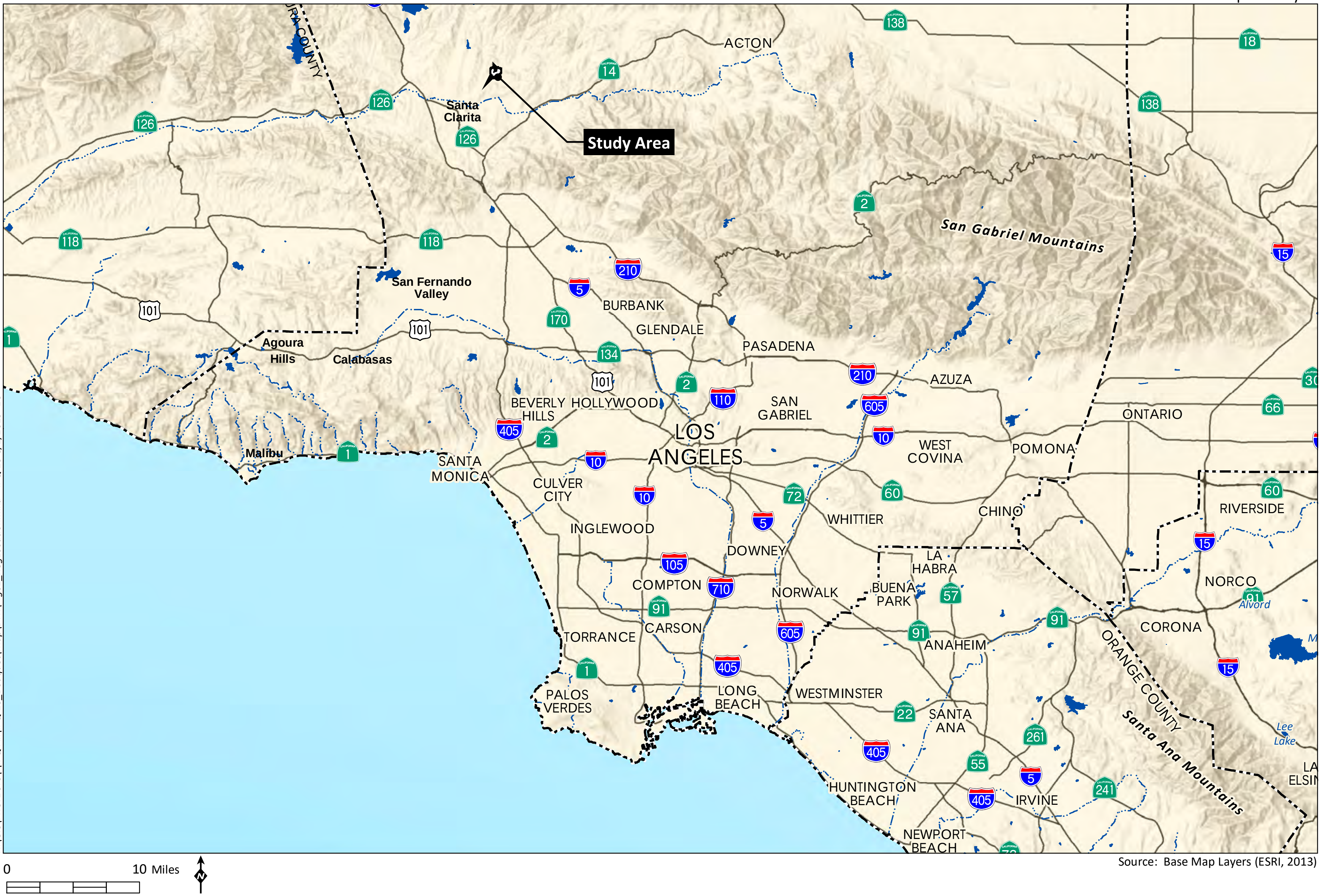
Nomenclature for this report follows Baldwin et al. (2012) for plants. Plant communities were classified in accordance with Holland (1986) and Oberbauer (1996), with additional vegetation community information taken from Manual of California Vegetation, Second Edition (MCV; Sawyer et al. 2009). Animal nomenclature follows Emmel and Emmel (1973) for butterflies, Center for North American Herpetology (Taggart 2016) for reptiles and amphibians, American Ornithologists' Union (2018) for birds, and Baker et al. (2003) for mammals. Rare plant and sensitive animal statuses are from the Inventory of Rare and Endangered Plants of California (California Native Plant Society [CNPS] 2017, 2018) and the California Natural Diversity Database (CNDDB; California Department of Fish and Wildlife [CDFW] 2017, 2018a). Rare plant species' habitats and flowering periods are from the Jepson Manual (Baldwin et al. 2012), the Inventory of Rare and Endangered Plants of California (CNPS 2018), and California Natural Diversity Database (CDFW 2018a). Soil classifications were obtained from the Web Soil Survey (Natural Resources Conservation Service [NRCS] 2017).

2.2 LITERATURE REVIEW

Prior to conducting the site visit, HELIX Environmental Planning, Inc. (HELIX) reviewed regional planning documents, Google Earth aerials (2017), Web Soil Survey (NRCS 2017), and sensitive species database records, including the Inventory of Rare and Endangered Plants of California (CNPS 2017, 2018), CNDDB (CDFW 2017, 2018a), and critical habitat maps for endangered and threatened species (U.S. Fish and Wildlife Service [USFWS] 2017a). A nine-quadrangle database search was conducted on CNDDB and CNPS, which included the following quadrangles: Agua Dulce, Green Valley, Mint Canyon, Newhall, Oat Mountain, San Fernando, Sleepy Valley, Sunland, and Warm Springs Mountain.

2.3 FIELD SURVEYS

Field surveys were conducted to document the existing condition of the study area and surrounding lands. A general biological survey and habitat assessment were conducted on the study area to map existing vegetation communities and to determine habitat suitability for sensitive plant and animal species. A list of plant and animal species observed and/or detected during the field surveys are provided as Appendix A, *Plant Species Observed* and Appendix B, *Animal Species Observed and/or Detected*. Noted animal species were identified by direct observation, vocalizations, or the observance of scat, tracks, or other signs. However, the list of animal species identified is not necessarily a comprehensive account of all species that use the study area as species that are nocturnal, secretive, or seasonally restricted may not have been observed. Focused surveys for rare plant species, oak trees, BUOW, and CAGN were conducted. A jurisdictional assessment was also conducted to determine the



Source: Base Map Layers (ESRI, 2013)

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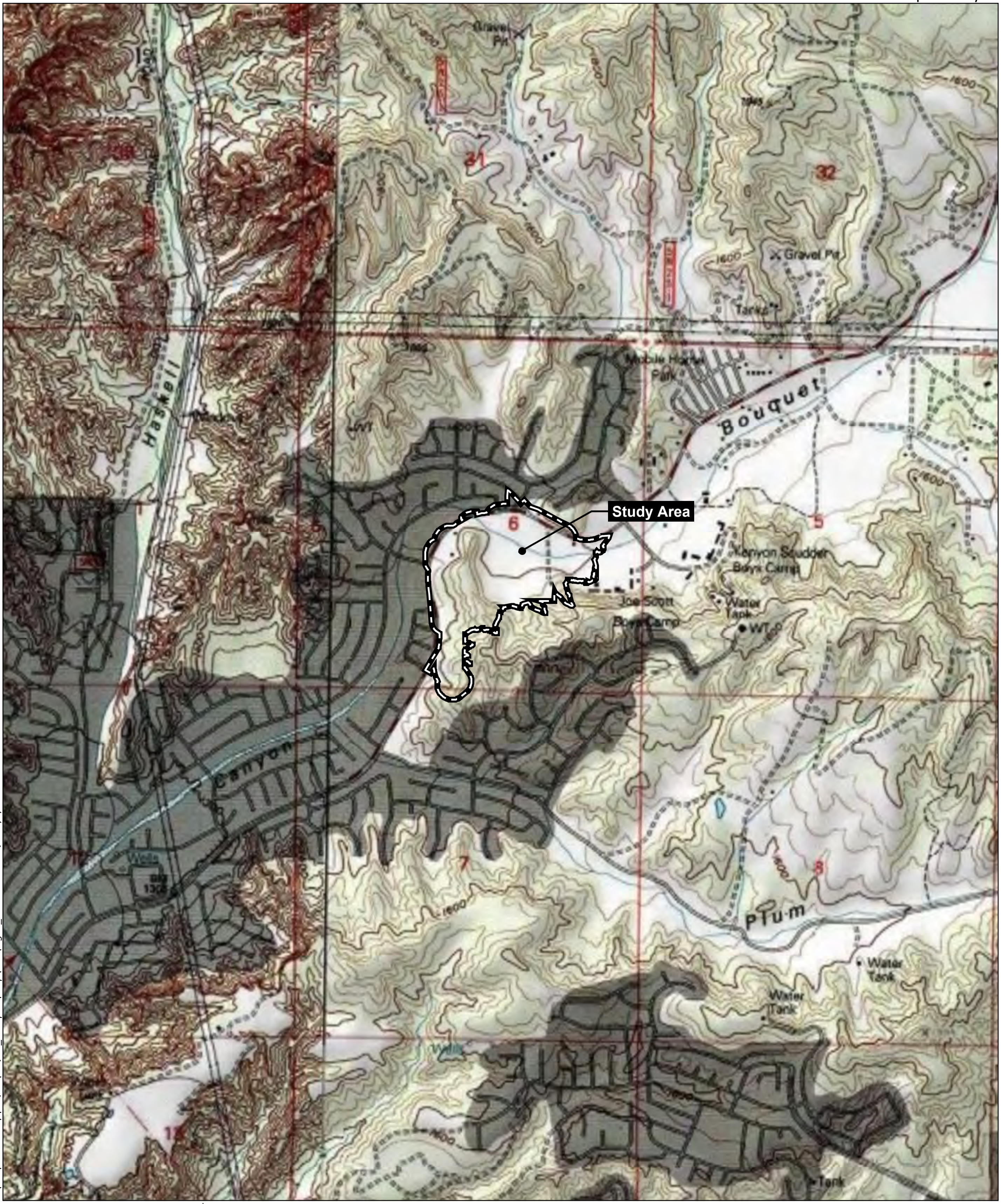
Regional Location

Figure 1



Source: Mint Canyon 7.5' Quad (USGS)

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USGS Topography

Figure 2

Source: Base Map Layers (NAIP, 2016)

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Aerial Photograph

Figure 3

Source:Urban Arena, 2019

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HELIX
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Proposed Project

Figure 4

existing jurisdictional limits regulated by the U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), and CDFW.

2.3.1 General Biological Survey

HELIX Biologist and Regulatory Specialist Ezekiel Cooley and Biologist Lauren Singleton conducted a general biological survey of the study area on June 13, 2017. Vegetation communities were classified and mapped in accordance with Holland (1986) and Oberbauer (1996). Vegetation was mapped on a 125-foot (1 inch = 125 feet) aerial photograph of the site. Vegetation communities were mapped by HELIX to one-hundredth of an acre (0.01 acre). The entire site was surveyed on foot with the aid of binoculars. Representative photographs of the site were taken, with select photographs included in this report as Appendix C, *Representative Site Photographs*. Plant and animal species observed or otherwise detected were recorded in field notebooks. Animal identifications were made in the field by direct, visual observation or indirectly by detection of calls, burrows, tracks, or scat. Plant identifications were made in the field or in the lab through comparison with voucher specimens or photographs.

2.3.2 Rare Plant Species Surveys

Rare plants investigated include those that are listed as threatened or endangered by USFWS or CDFW and those afforded a California Rare Plant Rank (CRPR) of 1 through 3 by CNPS.

Mr. Cooley, Ms. Singleton, and HELIX Biologist Daniel Torres conducted spring rare plant surveys on May 15, 2018 and May 9, 2019, and a summer rare plant survey on August 8, 2018. The surveys were conducted in accordance with published agency guidelines (CDFW 2009, 2000; USFWS 2000) and during the appropriate flowering period to maximize the detection of those rare plant species with the potential occur on the study area. Survey methods incorporated a combination of meandering transects and focused searches in areas with the greatest potential to support rare plant species with the potential to occur on the study area. If observed, individual rare plants were mapped using a handheld Global Positioning System (GPS) unit. HELIX also recorded any rare plant species incidentally encountered during other field surveys.

2.3.3 Burrowing Owl

A habitat assessment was conducted on the study area by Ms. Singleton and Mr. Torres on March 27, 2018, to identify areas with potential BUOW habitat and eliminate those that did not contain habitat suitable to support the species. A focused burrow survey was conducted concurrently with the habitat assessment. All suitable burrows (i.e., greater than approximately four inches [11 cm] in height and width and greater than approximately 59 inches [50 cm] in depth) and burrow surrogates were recorded using a handheld GPS unit. The assessment was conducted on the study area and included an approximately 500-foot (150-m) buffer zone around the periphery of the study area. The study area was determined to support suitable BUOW habitat and burrows; therefore, a focused survey was conducted as described below.

A focused survey for BUOW was conducted between April 13 and June 26, 2018, by Mr. Cooley. The survey consisted of four breeding season (February 1 through August 31) surveys that were performed in accordance with the current CDFW survey guidelines (California Department of Fish and Game [CDFG] 2012). The surveys were spaced at least three weeks apart, with at least one survey conducted between February 15 and April 15 and one survey conducted between June 15 and July 15. Biologists visually searching for BUOW sign and individuals with the aid of binoculars by slowly walking meandering transects spaced no more than 65 feet (20 meters) apart through areas of potential habitat. Fence posts, rocks, and other possible perching locations as well as mammal burrows (especially those of California ground squirrel [*Otospermophilus beecheyi*]) potentially suitable for use by BUOW were inspected. Burrows were searched for sign of recent BUOW occupation, including pellets with regurgitated fur, bones, and insect parts; white wash (excrement); tracks; and feathers. If observed, BUOW sign and/or individuals were recorded with a handheld GPS unit. The findings for the BUOW survey are included as Appendix D, *Burrowing Owl Focused Survey Report*.

2.3.4 Coastal California Gnatcatcher

A focused survey for CAGN was conducted between March 15 and June 30 by HELIX Biologist Tara Baxter (TE 87004B-0) in accordance with the current USFWS protocols (USFWS 1997). The survey consisted of six breeding season (February 15 through August 30) surveys conducted at least one week apart between March 15 and June 30. The CAGN survey area encompassed suitable habitat and a 100-foot buffer area. The CAGN survey area totaled approximately 33 acres of potential CAGN habitat within the survey area, which comprised big sagebrush scrub, Riversidean upland sage scrub, Riversidean upland sage scrub/non-native grassland, and adjacent habitat.

The surveys were conducted by walking within and along the perimeter of suitable CAGN habitat. The survey route was arranged to ensure complete survey coverage of habitat with potential for occupancy by CAGN. Surveys were conducted with binoculars to aid in bird detection. Recorded CAGN vocalizations were played sparingly and only if other means of detection had failed. If a CAGN was detected before playing recorded vocalizations, the recordings were not played. Once CAGNs were initially detected in an area, use of playback was discontinued. The CAGN survey findings are documented in a separate letter report included as Appendix E, *Coastal California Gnatcatcher Focused Survey Report*.

2.3.5 Jurisdictional Assessment

Prior to beginning fieldwork, aerial photographs (1 inch = 75 feet), topographic maps (1 inch = 75 feet), USGS quadrangle maps, and National Wetlands Inventory maps (USFWS 2017b) were reviewed to assist in determining the location of potential jurisdictional waters on the study area. Mr. Cooley and HELIX Principal Regulatory Specialist Amir Morales conducted the jurisdictional assessment field work on July 6, 2017. The assessment was conducted to identify and jurisdictional waters potentially subject to USACE jurisdiction pursuant to Section 404 of the Clean Water Act (CWA), RWQCB jurisdiction pursuant to Section 401 of the CWA, and streambed habitats potentially subject to CDFW jurisdiction pursuant to Sections 1600 *et seq.* of the California Fish and Game (CFG) Code. Data collection was targeted in areas that were deemed to have the potential to support jurisdictional resources, such as the presence of an ordinary high water mark (OHWM), the presence of a bed/bank and streambed associated vegetation and/or other surface indications of streambed hydrology. Representative photographs were taken of the drainage features and are included as Appendix F, *Representative Drainage Photographs*. The findings of the jurisdictional assessment are included as Appendix G, *Jurisdictional Delineation Report*).

2.3.5.1 U.S. Army Corps of Engineers and Regional Water Quality Control Board Jurisdiction

The USACE waters of the U.S. (WUS) were determined using current USACE guidelines (Environmental Laboratory 1987, USACE 2008a). Areas were determined to be WUS if there was evidence of regular surface flow (e.g., bed and bank). Jurisdictional limits for these areas were measured according to the presence of a discernible OHWM, which is defined in 33 Code of Federal Regulations Section 329.11 as "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank; shelving; changes in the character of the soil; destruction of terrestrial vegetation; the presence of litter or debris; or other appropriate means that consider the characteristics of the surrounding areas." The USACE has issued further guidance on the OHWM (Riley 2005; USACE 2008b), which also was considered in this jurisdictional assessment.

The jurisdictional delineation was conducted in accordance with court decisions (i.e., Rapanos v. United States, Carabell v. United States, and Solid Waste Agency of Northern Cook County v. USACE), as outlined and applied by the USACE (USACE 2007; Grumbles and Woodley 2007); the USACE and U.S. Environmental Protection Agency (EPA; 2007), and the 2015 Clean Water Rule (USACE 2015). These publications explain that the EPA and USACE will assert jurisdiction over traditional navigable waters (TNW) and tributaries to TNWs that are a relatively permanent water body (RPW), which has year-round or continuous seasonal flow. For water bodies that are not RPWs, a significant nexus evaluation is used to determine if the non-RPW is jurisdictional. As an alternative to the significant nexus evaluation process, a preliminary jurisdictional delineation may be submitted to the USACE. The preliminary jurisdictional delineation treats all waters and wetlands on a site as if they are jurisdictional WUS (USACE 2008a). A significant nexus evaluation or preliminary jurisdictional delineation are typically only required for projects that propose impacts to potentially jurisdictional features and, therefore, require a Section 404 permit from the USACE.

The RWQCB asserts regulatory jurisdiction over activities affecting wetland and non-wetland waters of the State pursuant to Section 401 of the CWA and the State Porter-Cologne Water Quality Control Act. Potential RWQCB jurisdiction found within the study area follows the boundaries of potential USACE jurisdiction for WUS. There are no areas supporting isolated waters of the State subject to exclusive RWQCB jurisdiction pursuant to the State Porter-Cologne Water Quality Control Act.

2.3.5.2 California Department of Fish and Wildlife Jurisdiction

The CDFW jurisdictional boundaries were determined based on the presence of riparian vegetation or regular surface flow, if present. Streambeds within CDFW jurisdiction were delineated based on the definition of streambed as "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supporting fish or other aquatic life. This includes watercourses with surface or subsurface flow that supports riparian vegetation" (Title 14, Section 1.72). This definition for CDFW jurisdictional habitat allows for a wide variety of habitat types to be jurisdictional, including some that do not include wetland species (e.g., oak woodland and alluvial fan sage scrub). Jurisdictional limits for CDFW streambeds were defined by the top of bank. Vegetated CDFW habitats were mapped at the limits of streambed-associated vegetation, if present.

2.3.6 Oak Tree Survey

An oak tree survey was conducted by Mr. Cooley and Mr. Torres (International Society of Arboriculture [ISA] WE-12249) on December 19 and 20, 2018 to identify oak trees that are protected under the City's Oak Tree Preservation ordinance (Title 17, Chapter 51, Section 40; City of Santa Clarita [City] 1990). Under these guidelines, all oak trees in the genus *Quercus* at least six inches in circumference measured at 4.5 feet above the natural grade are protected by the City. Heritage oak trees are given special consideration and may be fully protected or subject to requirements stricter than those of a standard protected oak tree. A heritage oak tree is defined as any oak tree measuring 108 inches in circumference measured at 4.5 feet above the tree's natural grade. In the case of trees with multiple trunks, two or more trunks must measure 72 inches each or greater in circumference when measured at 4.5 feet above the tree's natural grade.

All oak trees within the survey area that satisfied the previously mentioned criteria were identified to species. An aluminum tag with a unique number was affixed to the north side of each tree at approximately three feet above natural grade, with the exception of those trees located outside of the study area where the Applicant does not own the property. The location of each individual tree and the canopy extent were recorded with a GPS with sub-meter accuracy. Physical and horticultural evaluations were performed for each tree according to the City's Oak Tree Preservation and Protection Guidelines (City 1990). The rating system is outlined below in Table 1, *Oak Tree Rating System*. The findings of the oak tree survey are included as Appendix H, *Oak Tree Survey Report*.

Table 1
OAK TREE RATING SYSTEM

Rating	Description
A – Outstanding	A healthy and vigorous tree characteristic of its species and reasonably free of any visible signs of stress, disease, or pest infestation.
B – Above Average	A healthy and vigorous tree with minor visible signs of stress, disease, or pest infestation.
C – Average	Although healthy in overall appearance there is an abnormal amount of stress or disease and/or pest infestation.
D – Below Average/Poor	This tree is characterized by exhibiting a greater degree of stress, disease, and/or pest infestation than normal and appears to be in a state of rapid decline. The degree of decline may vary greatly in signs of dieback, disease, and pest infestation and appears to be in an advanced state of decline.
F – Dead	This tree exhibits no signs of life whatsoever.

Source: City of Santa Clarita (1990)

3.0 RESULTS

3.1 ENVIRONMENTAL SETTING

The study area is located in the foothills of the Sierra Pelona Mountains and portions were historically used as school, ranch, and hog farm from the early 1900s through the 1970s (Historic Aerials 1948). The topography in the southern and western portions of the study area is predominantly steep hillsides, while the northern portion is primarily flat. The steep hills throughout the southern and western portions of the site are predominated by Riversidean upland sage scrub while the flatter portions of the study area are dominated by non-native grassland due to historic disturbance from ranching activities. Bouquet Canyon Creek flows from east to west in the northern portion of the study area. Elevations on the study area range from approximately 1,365 feet above mean sea level (AMSL) near the western boundary of the study area to approximately 1,600 feet above AMSL near the southeastern corner. Seven soil types are mapped on the study area, including Hanford sandy loam (HcC), Metz loam sandy (MfA), Mocho loam (MpA), Ojai loam (OgF), Saugus loam (ScF2), Sorrento loam (SsA), and Yolo loam (YoC; NRCS 2017).

Immediate surrounding land uses include existing residential development to the north and west, a mixture of undeveloped land and residential development to the south, and a juvenile camp (Los Angeles County Camp Joseph Scott) to the east. The study area is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest.

3.2 VEGETATION COMMUNITIES

A total of 20 vegetation communities were mapped on the study area (Table 2, *Vegetation Communities*, Figure 5, *Vegetation*). The Holland/Oberbauer Element Codes and CDFW CaCodes are provided in parentheses next to each MCV community name in Table 2. Sensitive habitats pursuant to CDFW's Natural Communities List (2018b) are also identified in Table 2. A brief description of each vegetation community and land uses mapped on the study area is provided below.

Table 2
VEGETATION COMMUNITIES

Habitat Type (Holland/Oberbauer)	Habitat Type (Manual of California Vegetation)	Acres
Big Sagebrush Scrub (H[1] 35210)	Big Sagebrush (35.110.02)	1.91
Chamise Chaparral (H 37200)/Non-native Grassland (H 42200)	Chamise Chaparral (37.101.16)/Red Brome Grasslands (42.024.02)	2.98
Developed (O[2] 12000)	Developed (N/A)	9.37
Disturbed (O 11300)	Disturbed (N/A)	5.32
Disturbed-Riversidean Upland Sage Scrub	Disturbed-California Buckwheat Scrub	0.62
Elderberry Savanna (H 63430)	Blue Elderberry Stands (63.410.00)[3]	0.56
Giant Reed Stand (O 65100)	Giant Reed Breaks (42.080.01)	7.08
Mule Fat Scrub (H 63310)	Mule Fat Thickets (63.510.01)	0.27
Non-native Grassland (H 42200)	Red Brome Grasslands (42.024.02)	22.06
Non-native Grassland (H 42200)/ Riversidean Upland Sage Scrub (H 32710)	Red Brome Grasslands (42.024.02)/California Sagebrush Scrub (32.010.01)	7.75
Non-native Vegetation (O 42210)	Upland Mustards (42.011.05)	8.06
Non-native Vegetation (O 42210)/ Elderberry Savanna (H 63430)	Red Brome Grasslands (42.024.02)/Blue Elderberry Stands (63.410.00)	0.97
Ornamental (N/A)	Ornamental (N/A)	2.69
Riversidean Upland Sage Scrub (H 32710)	California Sagebrush Scrub (32.010.01)	7.06
Riversidean Upland Sage Scrub (H 32710)/Non-native Grassland (H 42200)	California Sagebrush Scrub (32.010.01)/Non-native Grassland	13.10
River Wash (O 64140)	River Wash (N/A)	0.36
Scrub Oak Chaparral (H 37900)	Scrub Oak Chaparral (37.407.02)	0.26

Table 2 (cont.)
VEGETATION COMMUNITIES

Habitat Type (Holland/Oberbauer)	Habitat Type (Manual of California Vegetation)	Acres
Scrub Oak Chaparral (H 37900)/Non-native Grassland (H 42200)	Scrub Oak Chaparral (37.407.02)/Red Brome Grasslands (42.024.02)	2.01
Southern North Slope Chaparral (H 37E20)	Tucker Oak Chaparral (37.418.04)	0.34
Southern Willow Scrub (H 63320)/Giant Reed Stand (O 65100)	Red Willow Thickets (61.205.01)[3]	0.70
	TOTAL	**93.47**

1 Holland Element Code
2 Oberbauer Element Code
3 Sensitive habitats pursuant to the California Department of Fish and Wildlife (CDFW) Natural Communities List (2018b).

3.2.1 Big Sagebrush Scrub

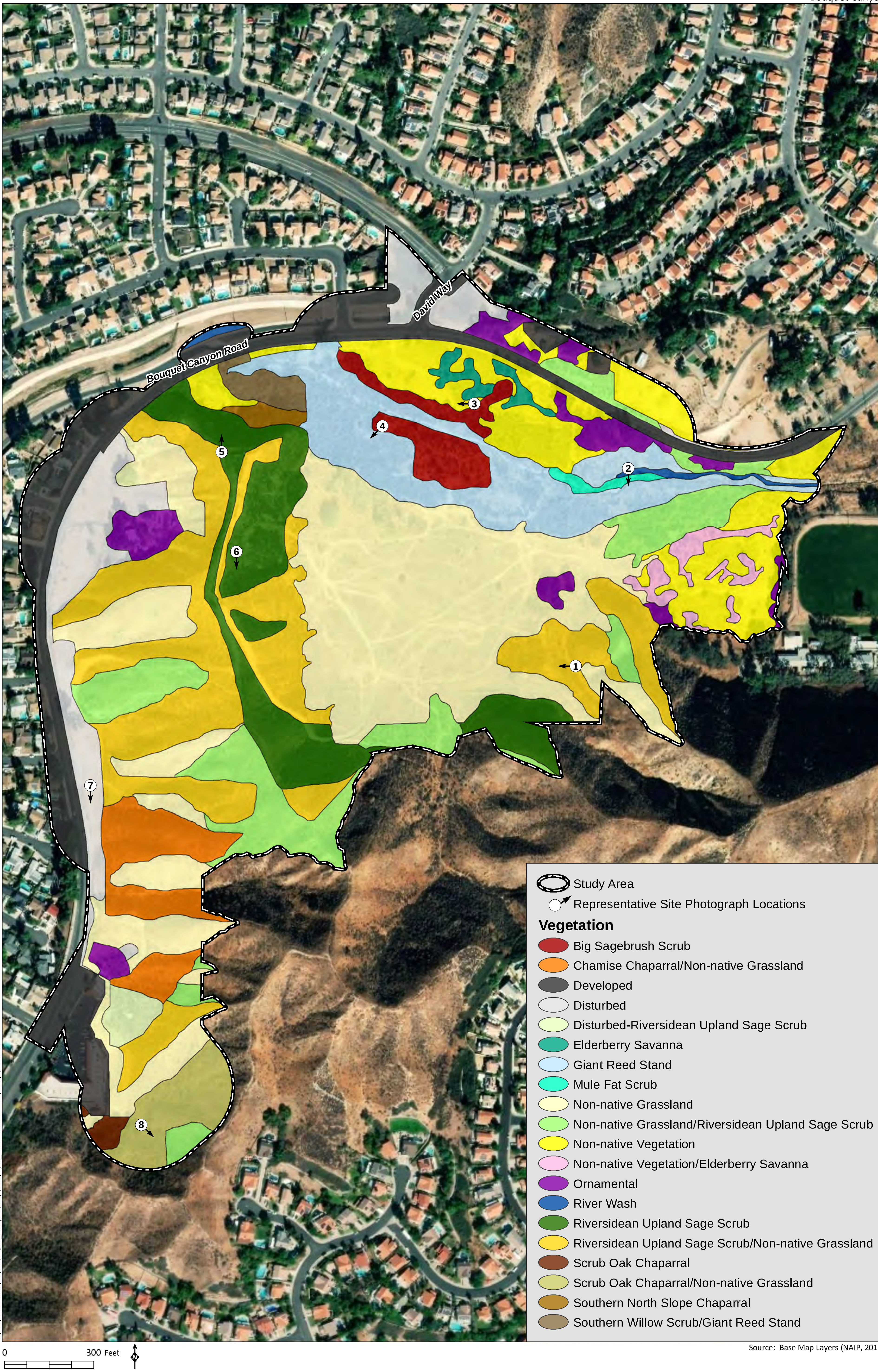
Big sagebrush scrub comprises mostly soft-woody shrubs usually with bare ground underneath and between the shrubs. This vegetation community occurs on a wide variety of soils and terrain, from rocky, well-drained slopes to fine-textured valley soils with high water tables. Big sagebrush scrub usually occurs between 4,000 feet and 9,000 feet in scattered localities within and along the margins of the Mojave and Sonoran deserts, on desert mountain ranges. Great Basin sagebrush (*Artemisia tridentata*) is the dominant plant species.

Big sagebrush scrub totaled 1.91 acres and was observed adjacent to portions of Bouquet Canyon Creek. This plant community was dominated by big sagebrush with scattered non-native species in the understory, including giant reed (*Arundo donax*), Mediterranean grass (*Schismus barbatus*), and short-pod mustard (*Hirschfeldia incana*).

3.2.2 Chamise Chaparral/Non-native Grassland

Chamise chaparral is the most widely distributed chaparral shrub and is dominated by the species chamise (*Adenostoma fasciculatum*). This vegetation community is found from Baja to northern California in pure or mixed stands. Chamise chaparral's ubiquitous distribution may be the result of chamise being the only chaparral species that regenerates from fire from both an underground root crown and the production of seeds. This community can be found on variable landforms, but soils are usually fairly shallow over bedrock. Chamise chaparral often dominates at low elevations and on xeric south facing slopes with 60 to 90 percent canopy cover. Along its lower elevation limit, chamise chaparral intergrades with coastal sage scrub. Mission manzanita (*Xylococcus bicolor*) and black sage (*Salvia mellifera*) are minor plant species associated within this vegetation community.

Chamise chaparral/non-native grassland was observed on some of the steep north-facing slopes in the southwestern portion of the study area, totaling 2.98 acres. Chamise was the dominant shrub observed in this community. The shrubs were fairly well-spaced with understory comprising many non-native grassland species (see Section 3.2.10 below). A few other native shrubs were observed in this community, including California buckwheat (*Eriogonum fasciculatum*), chaparral mallow (*Malacothamnus fasciculatus*), and Tucker oak (*Quercus john-tuckeri*).



Source: Base Map Layers (NAIP, 2016)

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HELIX Environmental Planning

Vegetation

Figure 5

3.2.3 Developed

Developed land is where permanent structures and/or pavement have been placed, which prevents the growth of vegetation, or where landscaping is clearly tended and maintained.

Developed areas were observed near the northern and western study area boundaries, totaling 9.37 acres. The developed areas consisted of the existing Bouquet Canyon Road right-of-way.

3.2.4 Disturbed

Disturbed habitat includes land cleared of vegetation (e.g., dirt roads) or actively maintained or heavily disturbed areas that are mostly unvegetated but may support scattered non-native plant species, such as ornamentals or ruderal exotic species that take advantage of disturbance. Disturbed habitat is similar to the non-native vegetation community described below (see Section 3.2.11), although disturbed areas generally support little to no vegetative cover.

Disturbed habitat was observed adjacent to Bouquet Canyon Road along the northern and western study area boundary, totaling 5.32 acre. The disturbed habitat mainly consisted of fuel modification areas for existing adjacent residential homes and were mostly void of vegetation.

3.2.5 Disturbed/Riversidean Upland Sage Scrub

This community is dominated by disturbed habitat described in Section 3.2.4 above and is intermixed with species associated with Riversidean upland sage scrub described in Section 3.2.14 below.

Disturbed/Riversidean upland sage scrub was observed in the southern portion of the study area, totaling 0.62 acre. This community consisted of widely-spaced California buckwheat shrubs. The interstitial spaces between the shrubs were mostly unvegetated due to fuel modification that was implemented for the adjacent shopping center.

3.2.6 Elderberry Savanna

Elderberry savanna is dominated by widely-spaced blue elderberry (*Sambucus nigra* ssp. *caerulea*) with a grassy understory. This plant community is associated with stream terraces and bottomlands, which may be intermittently flooded.

One small patch of elderberry savanna was observed adjacent to the northern study area boundary, totaling 0.56 acre. This plant community was dominated by blue elderberry trees in the overstory and California buckwheat and short-pod mustard (*Hirschfeldia incana*) in the understory.

3.2.7 Giant Reed Stand

Giant reed stand occurs within sandy or gravelly soils that are deposited near stream channels during flood events and are densely vegetated by giant reed. These dense stands generally exclude most other plant life. This community typically associated with riparian areas along low-gradient streams and in ditches.

The giant reed stands on the study area were densely vegetated by giant reed, and the community totaled 7.08 acres on the study area. Native species, such as thick-leaved yerba santa (*Eriodictyon* *crassifolium*), fourwing saltbush (*Atriplex canescens*), and caterpillar phacelia (*Phacelia cicutaria*), were observed within the openings of this plant community. One Fremont cottonwood (*Populus fremontii* ssp. *fremontii*) was also observed in this community. Non-native species observed within these openings included prickly lettuce (*Lactuca serriola*), red brome (*Bromus madritensis* ssp. *rubens*), short-pod mustard, and tree tobacco (*Nicotiana glauca*).

3.2.8 Mule Fat Scrub

Mule fat scrub is a shrubby riparian scrub community dominated by mule fat (*Baccharis salicifolia*) interspersed with small willows. This early seral community is dominated by frequent flooding, the absence of which would lead to a cottonwood or sycamore dominated woodland or forest. In some environments, limited hydrology may favor the persistence of mule fat.

The study area supports one patch of mule fat scrub along Bouquet Canyon Creek in the northeastern corner of the study area, which totaled 0.27 acre. In addition to mule fat, other species observed included California sagebrush (*Artemisia californica*) with and understory of non-native species such as Jersey cudweed (*Pseudognaphalium luteo-album*), red brome (*Bromus madritensis* ssp. *rubens*), common ripgut grass (*Bromus diandrus*), and short-podded mustard.

3.2.9 Non-native Grassland

Non-native grassland is a dense to sparse cover of annual grasses, often associated with numerous species of showy-flowered native annual forbs. Characteristic species include oats (*Avena* spp.), brome grasses (*Bromus* spp.), and mustards (*Brassica* spp., *Hirschfeldia incana*). Most of the annual introduced species within the non-native grassland originated from the Mediterranean region, an area with a long history of agriculture and a climate similar to California. Intensive grazing and agricultural practices combined with severe droughts in California contributed to the successful invasion and establishment of these species and the replacement of native grasslands with annual-dominated non-native grasslands (Jackson 1985).

Non-native grassland is the predominant plant community observed on the study area, totaling 22.06 acres. This community was observed in the flatter portions of the study area, including the valleys in the center and western parts of the study area. This plant community consisted most of red brome. Other non-native grass species included common ripgut grass, Mediterranean grass, and oats. A few annual native species were also observed within these areas, including common sandaster (*Corethrogyne filaginifolia*), fascicled tarplant (*Deinandra fasciculata*), and Menzies' fiddleneck (*Amsinckia menziesii*) and.

3.2.10 Non-native Grassland/Riversidean Upland Sage Scrub

This community is dominated by non-native grassland described in Section 3.2.9 above and is intermixed with some species associated with Riversidean upland sage scrub described in Section 3.2.14 below.

Non-native grassland/Riversidean upland sage scrub was observed on some of the south- and southwest-facing slopes in the southern portion of the study area, totaling 7.75 acres. This community was dominated by non-native grasses with widely-spaced California buckwheat shrubs.

3.2.11 Non-native Vegetation

Non-native vegetation community is typically associated with land that has been heavily influenced by human activities, including areas adjacent to roads, manufactured slopes, and abandoned lots. Non-native vegetation areas are dominated by ornamental and non-native species that take advantage of previously cleared or abandoned landscaping or land showing signs of past or present animal usage that removes any capability of providing viable habitat.

Non-native vegetation was observed in several patches within the study area, totaling 8.06 acres. These areas were dominated by short-podded mustard with other scattered non-native species such as annual yellow sweetclover (*Melilotus indicus*), foxtail barely (*Hordeum murinum*), red brome, and redstem filaree (*Erodium cicutarium*).

3.2.12 Non-native Vegetation/Elderberry Savanna

This community is dominated by non-native herbaceous species described in Section 3.2.11 above and is intermixed with some species associated with elderberry savanna described in Section 3.2.6 above.

Non-native vegetation/elderberry savanna was observed as scattered patches in the eastern portion of the study area, totaling 0.97 acre. This community was dominated by mustard with widely-spaced blue elderberry shrubs.

3.2.13 Ornamental

Ornamental vegetation is characterized as stands of naturalized trees and shrubs, many of which are also used in landscaping.

Ornamental vegetation was observed in small patches throughout the study area, totaling 2.69 acres. Most of the ornamental vegetation was associated with existing development adjacent to the study area, such as Bouquet Canyon Road, residences, and commercial businesses. Ornamental species observed included black locust (*Robinia pseudoacacia*), chinaberry (*Melia azedarach*), blue gum (*Eucalyptus globulus*), Italian cypress (*Cupressus sempervirens*), river red gum (*Eucalyptus camaldulensis*), silver dollar gum (*Eucalyptus polyanthemos*), and tree of heaven (*Ailanthus altissima*).

3.2.14 Riversidean Upland Sage Scrub

Riversidean sage scrub is the most xeric expression of coastal sage scrub south of Point Conception, California. This community occupies xeric sites, such as steep slopes, severely drained soils, or clays that slowly release stored soil moisture. This community is dominated by subshrubs with leaves that are deciduous during drought, an adaptation that allows the habitat to withstand the prolonged drought period in the summer and fall. Sage scrub species have relatively shallow root systems and open canopies that allow for the occurrence of a substantial herbaceous (annual plant) component. Typical stands are fairly open and dominated by species such as California sagebrush, brittlebush (*Encelia farinosa*), and California buckwheat.

Several patches of Riversidean upland sage scrub were observed on the east- and north-facing hillsides in the western portion of the study area, totaling 7.06 acres. In addition to California sagebrush and California buckwheat, other native shrubs included black sage, basket-brush (*Rhus aromatica*), purple sage (*Salvia leucophylla*), chaparral mallow, and Our Lord's candle (*Hesperoyucca whipplei*). Native annuals included common goldenstar (*Bloomeria crocea*), elegant clarkia (*Clarkia unguiculata*), gilia (*Gilia angelensis*), and Menzies' fiddleneck.

3.2.15 Riversidean Upland Sage Scrub/Non-native Grassland

This community is dominated by species associated with the Riversidean upland sage scrub community described above in Section 3.2.7 above with a significant component of species associated with non-native grassland described in Section 3.2.9 above.

Riversidean upland sage scrub/non-native grassland was observed on the north-facing hillsides in the western portion of the study area, totaling 13.10 acres. This community mostly consisted of California sagebrush and California buckwheat shrubs, but contributed less cover than those observed in the Riversidean upland sage scrub community. The understory was made up mostly of non-native brome grasses, such as red brome and common ripgut grass.

3.2.16 River Wash

River wash is mostly unvegetated streambed that typically consists of coarse-textured substrate, which ranges from sand to gravel. The coarse-textured substrate is transported and deposited by stream flows.

River wash was observed in the upstream portion of Bouquet Canyon, totaling 0.36 acre. The river wash consisted of mostly unvegetated sandy streambed. Some thick-leaved yerba santa and non-native grasses were scattered throughout this area.

3.2.17 Scrub Oak Chaparral

Scrub oak chaparral is a dense, evergreen chaparral with shrubs up to 20 feet tall and is dominated by scrub oak (*Quercus berberidifolia*) with considerable mountain mahogany (*Cercocarpus betuloides*). Scrub oak chaparral occurs in somewhat more mesic areas than other chaparrals, such as north facing slopes, and recovers more rapidly from fires than other chaparrals due to resprouting capabilities of scrub oak (Holland 1986). This vegetation community often occurs at slightly higher elevations (to 5,000 feet) and substantial leaf litter accumulates.

Two small areas of scrub oak chaparral were observed on a steep north-facing slope in the southwestern corner of the study area, totaling 0.26 acre. Scrub oak was the dominant shrub species while the understory consisted of non-native brome grasses.

3.2.18 Scrub Oak Chaparral/Non-native Grassland

This community is dominated by species associated with the scrub oak chaparral community described above in Section 3.2.17 above with a significant component of species associated with non-native grassland described in Section 3.2.9 above.

Scrub oak chaparral/non-native grassland was observed on the north-facing hillsides in the western portion of the study area, totaling 13.10 acres. This community mostly consisted of scrub oak, but contributed less cover than those observed in the scrub oak chaparral. The understory was made up mostly of non-native brome species, such as red brome and common ripgut grass. The study area supports one patch of scrub oak chaparral/non-native grassland totaling 2.01 acres adjacent to the southern corner of the study area.

3.2.19 Southern North Slope Chaparral

Southern north slope chaparral is generally a mixed chaparral community on more mesic, shady slopes with well-drained soil. Codominant species or minor components of this plant community may include chamise, manzanita (*Arcostaphylos* spp.), California lilac (*Ceanothus* spp.), and basket-bush.

One patch of southern north slope chaparral was observed on the upper portion of a north-facing slope near the northwestern corner of the study area, totaling 0.34 acre. Tucker oak was the dominant shrub in this plant community. Other species observed included basket-bush, California bee plant (*Scrophularia californica),* and chamise. The understory of this plant community comprised non-native grasses.

3.2.20 Southern Willow Scrub/Giant Reed Stand

Southern willow scrub consists of dense, broad-leaved, winter-deciduous stands of trees dominated by shrubby willows (*Salix* spp.) in association with mule fat and with scattered emergent Fremont cottonwood and western sycamores (*Platanus racemosa*). This vegetation community occurs on loose, sandy or fine gravelly alluvium deposited near stream channels during flood flows. Frequent flooding maintains this early seral community, preventing succession to a riparian woodland or forest (Holland 1986). In the absence of periodic flooding, this early seral type would be succeeded by southern cottonwood or western sycamore riparian forest.

The study area supports one patch of southern riparian scrub/giant reed stand located along in the downstream (western) portion of Bouquet Canyon Creek, totaling 0.70 acre. Red willow (*Salix laevigata*) dominated the canopy in this community with a strong presence of giant reed in the understory. The canopy also included a few dying Fremont cottonwoods and scattered patches of mule fat were observed in the shrub layer.

3.3 PLANTS

HELIX identified a total of 151 plant species within the study area during surveys to date, of which 53 (35 percent) are non-native species (Appendix A).

3.4 ANIMALS

A total of 45 animal species were identified on the study area during biological surveys, including one reptile species, 40 bird species, and four mammal species (Appendix B).

3.5 SENSITIVE BIOLOGICAL RESOURCES

3.5.1 Rare Plant Species

Rare plant species are uncommon or limited in that they: (1) are only found in the Santa Clarita region; (2) are a local representative of a species or association of species not otherwise found in the region; or (3) are severely depleted within their ranges or within the region. Rare plant species include those species listed by CNPS with a CRPR of 1, 2, or 3 or federally and state listed endangered and threatened species. Species with CRPR of 4 may be considered rare if a population is locally uncommon, at the periphery of the species' range, sustained heavy losses, shows unusual morphology, or occurs on unusual substrates (CNPS 2019). Focused surveys concentrated on the identification of CRPR 1, 2, and 3 species.

A total of eight rare plant species were recorded within the Mint Canyon quadrangle database search conducted on CNDDB (CDFW 2018a) and CNPS (2018). These species are included in Appendix I, *Rare Plant Species Potential to Occur.* Of the eight rare plant species recorded within the vicinity of the study area, four species were considered to have no potential to occur on the study area based on elevation range and/or lack of suitable habitat on the study area. The remaining four species were considered to have a potential to occur on the study area, primarily based on the presence of chaparral and coastal scrub habitats (see Appendix I). These species include Nevin's barberry (*Berberis nevinii*), slender mariposa lily (*Calochortus clavatus* var. *gracilis*), slender-horned spineflower (*Dodecahema leptoceras*), and Piute Mountains navarretia (*Navarretia setiloba*).

Spring rare plant surveys were conducted on May 15, 2018 and May 9, 2019, and a summer rare plant survey was conducted on August 8, 2018. Nevin's barberry, slender-horned spineflower, and Piute Mountains navarretia were not observed during the rare plant surveys and are therefore presumed absent from the study area. A total of 496 slender mariposa lilies were observed throughout the north-facing slopes in the eastern and southern portions of the study area during the spring rare plant survey (Figure 6, *Rare Plant Locations*).

3.5.2 Sensitive Animal Species

Sensitive animal species include federally and state listed endangered and threatened species, candidate species for listing by USFWS or CDFW, and/or are species of special concern (SSC) pursuant to CDFW.

A total of 15 sensitive animal species were recorded within the Mint Canyon database search conducted on CNDDB (CDFW 2018a). These species are included in Appendix J, *Sensitive Animal Species Potential to Occur.* An evaluation of each sensitive animal species' potential to occur on the study area is also provided in Appendix J and discussed in further detail below.

No Potential to Occur

Of the 15 sensitive animal species recorded within the vicinity of the study area, five species (Quino checkerspot butterfly [*Euphydryas editha quino*], two-striped gartersnake [*Thamnophis hammondii*], unarmored threespine stickleback [*Gasterosteus aculeatus williamsoni*], vernal pool fairy shrimp [*Branchinecta lynchi*], and western spadefoot [*Spea hammondii*]) were considered to have no potential to occur on the study area due to lack of suitable habitat and/or the study area is located outside of the species' known geographical range. Due to historical documentation of unarmored threespine stickleback (UTS) in Bouquet Canyon Creek, this species is discussed in further detail below.

Unarmored Threespine Stickleback

Currently, there are three recognized subspecies of threespine stickleback (*Gasterosteus aculeatus*), which are differentiated by the number of plates on the sides of their bodies. The subspecies include: (1) fully plated threespine stickleback (*Gasterosteus aculeatus aculeatus*), which have up to 36 plates; (2) low-plated threespine stickleback (*Gasterosteus aculeatus microcephalus*), which have 3 to 7 plates; and (3) UTS, which lack plates (Richmond et al. 2015). The UTS adults prefer slow-moving streams with a constant flow of water, but will occupy faster moving water if algal mats or other forms of protection

Source: Aerial (NAIP, 2016)

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Rare Plant Locations

Figure 6

are available (USFWS 2009). The UTS require sheltered pools at least 15 inches in depth with dense aquatic vegetation for breeding.

The UTS has been historically documented in Bouquet Canyon Creek. Although there is no written record, low-plated threespine stickleback were believed to have been introduced from the Fillmore State Fish Hatchery on the lower Santa Clara River into Bouquet Canyon Creek during rainbow trout (*Oncorhynchus mykiss*) stocking in the 1970s. This resulted in intergrades between the low-plated threespine stickleback and the UTS (San Marino Environmental Associates [SMEA] 2008; Richmond et al. 2015). San Marino Environmental Associates (SMEA) conducted multiple surveys for stickleback in Bouquet Canyon Creek. They identified an intergrade zone just upstream of the U.S. Forest Service Texas Canyon Station near the end of Bouquet Canyon. SMEA also conducted a number of surveys downstream of this intergrade zone where Bouquet Canyon Creek crosses Vasquez Canyon Road, which is approximately 1.70 miles upstream of the study area. SMEA collected 27 UTS in 1998 and only 3 UTS in 2001. In 2005, three sticklebacks were captured and plates were counted on two of the individuals. One of the individuals was unarmored while the other individual had one plate. This reach of Bouquet Canyon Creek was also surveyed in 2000, but was entirely dry. SMEA notes that this stretch of UTS habitat has clearly become more ephemeral since the 1998 survey, which is reflected in the drop in stickleback individuals collected between 1998 and 2005. SMEA concluded that the population located near Vasquez Canyon Road has likely been extirpated and only the intergrade zone remains upstream at the U.S. Forest Service Texas Canyon Station.

Richmond et al. (2015) also conducted a genetic study of sticklebacks in Bouquet Canyon Creek. They determined that the genotype and phenotype of sticklebacks in Bouquet Canyon Creek resemble a low-plated threespine stickleback population as opposed to the unarmored populations they observed in adjacent streams (e.g., San Francisquito Canyon, Santa Ana River near Valencia, and Soledad Canyon). They also discovered that although sticklebacks sampled near the juncture of Bouquet Canyon Creek and Texas Canyon Creek were the most similar to the unarmored populations, plates have steadily increased since at least the 1980s. This is the near the same location SMEA (2008) identified an intergrade zone between UTS and the low-plated threespine stickleback.

Although UTS have historically been documented upstream of the study area, findings by SMEA (2008) and Richmond et al. (2015) indicate that many stickleback in Bouquet Canyon Creek have a low plate count due to introduction of partially armored stickleback upstream. Richmond et al. (2015) indicates that downstream movement of stickleback through Bouquet Canyon Creek into the Santa Clara River is not likely due to channel alteration at the base of Bouquet Canyon (i.e., approximately 3.2 miles upstream of the study area). Upstream movement of stickleback from the Santa Clara River to Bouquet Canyon Creek and into the study area is restricted as a result of the channelization of Bouquet Canyon Creek just downstream of the study area. Existing drop structures would prohibit stickleback movement upstream into the study area.

The reach of Bouquet Canyon Creek that occurs within the study area does not support suitable live-in habitat for stickleback. Bouquet Canyon Creek within the study area is characterized as an ephemeral drainage comprising somewhat excessively drained sandy loam soil of the Metz series. Due to its ephemeral nature, the drainage only supports flowing water for a brief period following rainfall. The drainage does not support dense vegetation or algal mats. No ponding or surface water was documented during any of the site visits conducted between 2017 and 2019. Since this portion of Bouquet Canyon Creek only supports water for a short period following rainfall, the study area does not support suitable live-in habitat for UTS.

Potential to Occur

Of the 15 sensitive animal species recorded within the vicinity of the study area, eight species were considered to have potential occur. Three species were determined to have a low potential to occur on the study area based on the presence of low quality habitat, limited acreage of habitat, and lack of recent observations within the immediate vicinity of the study area, including California glossy snake (*Arizona elegans occidentalis*), Townsend's big-eared bat (*Corynorhinus townsendii*; foraging only), and southern grasshopper mouse (*Onychomys torridus ramona*). California glossy snake and southern grasshopper mouse are SSC. Townsend's big-eared bat is an SSC and state candidate threatened species; no suitable roosting habitat is present for this species, although this species may use the site as foraging habitat.

One species (California legless lizard [*Anniella* sp.]) was determined to have a moderate potential to occur on the study area based on the presence of low-quality habitat and recent observations within the immediate vicinity.

Four species were determined to have a high potential to occur on the study area based on the presence of suitable habitat and recent observations within the immediate vicinity of the study area, including coastal whiptail (*Aspidoscelis tigris stejnegeri*), coast horned lizard (*Phrynosoma blainvillii*), loggerhead shrike (*Lanius ludovicianus*), and San Diego black-tailed jackrabbit (*Lepus californicus bennettii*). All four species are SSC and were recorded within the last 15 years less than five miles from the study area.

Presumed Absent

Focused surveys were conducted for two sensitive bird species with the potential to occur on the study area, including BUOW and CAGN. Focused surveys for both species were negative. Survey results are discussed further below.

Burrowing Owl

The BUOW is an SSC. A focused survey for BUOW was conducted between March and June 2018. No BUOWs were observed during the surveys; therefore, this species is presumed absent from the study area. The detailed report findings for the BUOW surveys are included as Appendix D.

Coastal California Gnatcatcher

The CAGN is a federally threatened species and a SSC. A focused survey for CAGN was conducted between March and May 2018. No CAGN were observed during the surveys; therefore, this species is presumed absent from the study area. The detailed report findings for the CAGN surveys are included as Appendix E.

3.5.3 Sensitive Vegetation Communities/Habitats

Sensitive vegetation communities/habitats are considered either rare within the region or sensitive by CDFW (2018b). Communities are given a Global (G) and State (S) ranking on a scale of 1 to 5. Communities afforded a rank of 5 are most common while communities with a rank of 1 are considered highly periled. The CDFW considers sensitive communities as those with a rank between S1 and S3.

The study area supports two sensitive plant communities. Elderberry savanna and southern willow scrub/giant reed stand are considered sensitive habitats pursuant to CDFW. Approximately 0.56 acre of elderberry savanna and 0.70 acre of southern riparian scrub/giant reed stand were mapped on the study area (Figure 5). Both communities are small, isolated habitat patches with a non-native understory.

3.5.4 Jurisdictional Waters and Wetlands

One major drainage feature, Bouquet Canyon Creek, occurs within the study area. The drainage features are described in detail below. The study area supports approximately 0.65 acre of USACE/RWQCB jurisdictional WUS and 9.80 acres of CDFW jurisdictional streambed and riparian vegetation (Figure 7, *Jurisdictional Features*).

3.5.4.1 Bouquet Canyon Creek

Bouquet Canyon Creek, which is mapped by USGS as a blueline stream, is an ephemeral drainage that runs from east to west near the northern study area boundary. The headwaters of the Bouquet Canyon drainage feature originate approximately 10 miles to the northeast of the study area in the Sierra Pelona Mountains, and non-storm related flows through the wash are often controlled via regulated releases from Bouquet Reservoir. The Bouquet Canyon streambed enters the study area at the northeastern boundary and exits at the northwestern boundary. The drainage continues under Bouquet Canyon Road at the northwestern corner of the study area boundary where the drainage has been channelized. The Bouquet Canyon drainage is a tributary to the Santa Clara River, which ultimately drains into the Pacific Ocean approximately 35 miles to the southwest of the study area. The on-site floodplain of Bouquet Canyon Creek is infested with invasive giant reed. Historical imagery and evidence of grinded material observed on the study area suggest that giant reed removal has previously occurred on the study area. Bouquet Canyon Creek supports somewhat excessively drained sandy loam of the Metz soil series. Aside from Bouquet Canyon Creek, no other surface water features were observed and the study area is predominantly upland habitat. The jurisdictional delineation report is included as Appendix G, *Jurisdictional Delineation Report*.[1]

Within the study area, Bouquet Canyon Creek supports approximately 0.65 acre of USACE/RWQCB non-wetland WUS ephemeral streams. In addition, Bouquet Canyon Creek supports approximately 9.80 acres of CDFW jurisdictional streambed and riparian vegetation.

3.5.5 Oak Tree Survey

A total of 64 oak trees meet the City's definition of a protected tree (Figure 8, *Oak Tree Locations*). Of the 64 trees, two were coast live oaks (*Quercus agrifolia*), six were scrub oaks, two were blue oaks (*Quercus douglasii*), 53 were Tucker oaks, and one was a valley oak (*Quercus lobata*). Six trees (9 percent) were assigned an A rating, 22 trees (34 percent) were assigned a B rating, 25 trees (40 percent) were assigned a C rating, and 11 trees (17 percent) were assigned a D rating. No dead trees or heritage oak trees were observed during the survey. The detailed report findings are included as Appendix H.

[1] The study area evaluated in the Jurisdictional Delineation Report increased slightly following report completion. The jurisdictional resources were extended based on previous delineation results and confirmed in the field during subsequent site visits.

3.5.6 Habitat and Wildlife Corridor Evaluation

Wildlife corridors connect otherwise isolated pieces of habitat and allow movement or dispersal of plants and animals. Corridors can be local or regional in scale; their functions may vary temporally and spatially based on conditions and species presence. Local wildlife corridors allow access to resources such as food, water, and shelter within the framework of their daily routine. Animals use these corridors, which are often hillsides or tributary drainages, to move between different habitats. Regional corridors provide these functions over a larger scale and link two or more large habitat areas, allowing the dispersal of organisms and the consequent mixing of genes between populations.

Regionally, the study area is situated in the foothills of the Sierra Pelona Mountains and supports the lower portion of Bouquet Canyon Creek just upstream of where the creek becomes channelized. The study area is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest, although existing development separates the study area from these open space areas. The study area is mostly surrounded by development with the exception of the eastern portion of the study area, which connects to undeveloped land located to the east. Bouquet Canyon Creek supports limited native habitat for wildlife, including small patches of mule fat and red willows. The majority of Bouquet Canyon Creek on the study area is vegetated with giant reed, which provides limited resources for wildlife. The remainder of the study area supports a number of native upland habitats that provide live-in resources for wildlife, such as big sagebrush scrub, elderberry savanna, Riversidean upland sage scrub, scrub oak chaparral, and southern north slope chaparral. The dominant habitat on the study area is non-native grassland, which also provides low-value foraging habitat for some bird species.

As previously described, corridors can be local or regional in scale. The study area is not considered a regional corridor since it does not directly connect two or more large blocks of habitat that would otherwise be fragmented or isolated from one another. The areas immediately adjacent to the study area are highly urbanized and support limited cover for wildlife moving through the area. Wildlife may access the study area via undeveloped land to the east. Access to the study area from the east is quite constrained, but could occur along Bouquet Canyon Creek or along the ridgeline to the south of the Camp Joseph Scott facility. Development of the project would not impede wildlife access to other undeveloped land in the region since the study area is located at the edge of existing development. Although wildlife likely use Bouquet Canyon Creek for local movement through the area, the lower portion of Bouquet Canyon would not be considered a regional corridor for wildlife since the creek becomes channelized and unvegetated just downstream of the study area. The study area is essentially a “dead end” for wildlife moving through the area since it does not directly connect two or more large blocks of habitat and the northern, southern, and western portions of the study area are confined by existing development. The study area is not within any wildlife corridors or linkages identified by the South Coast Missing Linkages Project (South Coast Wildlands 2008). The nearest wildlife movement corridor to the study area identified by the South Coast Missing Linkages Project is the San Gabriel – Castaic Connection located approximately 4.3 miles to the northeast of the study area.

While the study area is not considered a regional wildlife movement corridor, the study area does support habitat suitable for local wildlife movement. Common mammals that are adapted to human disturbance (e.g., raccoon [*Procyon lotor*], skunk [*Mephitis* sp.], cottontail rabbits [*Sylvilagus* spp.], and coyote [*Canis latrans*]) may use the study area for local movement within the area. Birds species may fly over surrounding development to nest and/or forage within study area. Mountain lions (*Puma concolor*) are known to occur within the vicinity of the study area and one bobcat (*Lynx rufus*) was observed on

Source: Base Map Layers (NAIP, 2016; NearMap, 2017)

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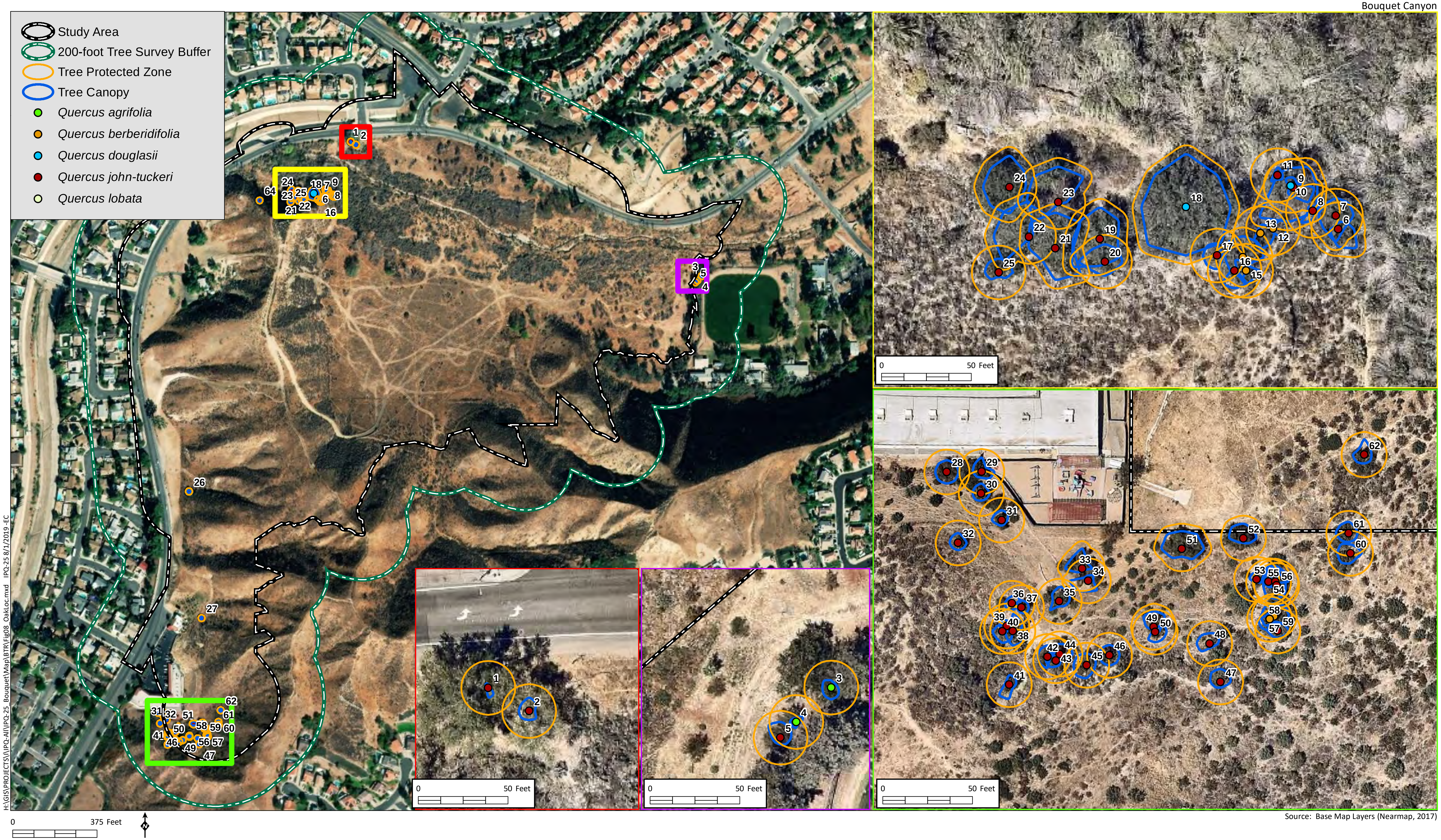
Jurisdictional Features

Figure 7



Source: Base Map Layers (Nearmap, 2017)

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Oak Tree Locations

Figure 8

the study area during field surveys. These larger mammals require large expanses of undeveloped land for their territories, such as land to the east. Although the study area is not large enough to solely support live-in habitat for these larger mammals, the study area could be on the edge of their territories and they may occasionally wander onto the study area. As discussed above, the study area supports opportunities for local wildlife movement but does not function as a wildlife corridor since it does not directly connect to two or more blocks of large habitat.

4.0 REGIONAL AND REGULATORY CONTEXT

Biological resources located within the study area are subject to regulatory review by federal, state, and local agencies. Biological resources-related laws and regulations that apply to the project include the Federal Endangered Species Act (FESA), Migratory Bird Treaty Act (MBTA), CWA, California Endangered Species Act (CESA), and CFG Code.

4.1 FEDERAL REGULATIONS

4.1.1 Federal Endangered Species Act

Administered by the USFWS, the FESA provides the legal framework for the listing and protection of species (and their habitats) identified as being endangered or threatened with extinction. Actions that jeopardize endangered or threatened species and the habitats upon which they rely are considered a "take" under the FESA. Section 9(a) of the FESA defines take as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." "Harm" and "harass" are further defined in federal regulations and case law to include actions that adversely impair or disrupt a listed species' behavioral patterns.

Sections 4(d), 7, and 10(a) of the FESA regulate actions that could jeopardize endangered or threatened species. Section 7 describes a process of federal interagency consultation for use when federal actions may adversely affect listed species. A biological assessment is required for any major construction activity if it may affect listed species. In this case, take can be authorized via a letter of biological opinion issued by the USFWS for non-marine related listed species issues. A Section 7 consultation is required when there is a nexus between federally listed species' use of the site and impacts to USACE jurisdictional areas. Section 10(a) allows issuance of permits for "incidental" take of endangered or threatened species. The term "incidental" applies if the taking of a listed species is incidental to and not the purpose of an otherwise lawful activity.

4.1.2 Federal Clean Water Act

Federal wetland regulation (non-marine issues) is guided by the Rivers and Harbors Act of 1899 and the CWA. The Rivers and Harbors Act deals primarily with discharges into navigable waters, while the purpose of the CWA is to restore and maintain the chemical, physical, and biological integrity of all WUS. Permitting for projects filling WUS, including wetlands and vernal pools, is overseen by USACE under Section 404 of the CWA. Projects may be permitted on an individual basis or may be covered under one of several approved Nationwide Permits. Individual Permits are assessed individually based on the type of action, amount of fill, etc. Individual Permits typically require substantial time (often longer than six months) to review and approve, while Nationwide Permits are pre-approved if a project meets the appropriate conditions. A CWA Section 401 Water Quality Certification, which is administered by the State Water Resources Control Board, must be issued prior to any 404 Permit.

4.1.3 Migratory Bird Treaty Act

All migratory bird species that are native to the United States or its territories are protected under the federal MBTA, as amended under the Migratory Bird Treaty Reform Act of 2004 (FR Doc. 05-5127). The MBTA is generally protective of migratory birds but does not actually stipulate the type of protection required. In common practice, the MBTA is used to place restrictions on disturbance of active bird nests during the nesting season, which is generally defined as February 15 to August 31 for songbirds. In addition, the USFWS commonly places restrictions on disturbances allowed near active raptor nests, which the nesting season is generally defined as January 15 to August 31.

4.1.4 Critical Habitat

As described by the FESA, critical habitat is the geographic area occupied by a threatened or endangered species essential to species conservation that may require special management considerations or protection. Critical habitat also may include specific areas not occupied by the species but that have been determined to be essential for species conservation.

Critical habitat does not occur on the study area. The nearest critical habitat to the study area is spreading navarretia (*Navarretia fossalis*) critical habitat, which is approximately 2.25 miles to the east (USFWS 2017a).

4.2 STATE REGULATIONS

4.2.1 California Environmental Quality Act

Primary environmental legislation in California is found in CEQA and its implementing guidelines (State CEQA Guidelines), which require that projects with potential adverse effects (i.e., impacts) on the environment undergo environmental review. Adverse environmental impacts are typically mitigated as a result of the environmental review process in accordance with existing laws and regulations.

4.2.2 California Endangered Species Act

The CESA is similar to the FESA in that it contains a process for listing of species and regulating potential impacts to listed species. Section 2081 of the CESA authorizes the CDFW to enter into a memorandum of agreement for take of listed species for scientific, educational, or management purposes. The golden eagle (*Aquila chrysaetos*) and white-tailed kite (*Elanus leucurus*) are considered State Fully Protected (SFP) species. A SFP species may not be taken or possessed at any time, and no state licenses or permits may be issued for their take except for collecting the species necessary for scientific research and relocation of the bird species for the protection of livestock (Fish and Game Code Sections 3511, 4700, 5050, and 5515).

The Native Plant Protection Act (NPPA) enacted a process by which plants are listed as rare or endangered. The NPPA regulates the collection, transport, and commerce of plants that are listed. The CESA followed the NPPA and covers both plants and animals that are determined to be endangered or threatened with extinction. Plants listed as rare under NPPA were designated threatened under the CESA.

4.2.3 California Fish and Game Code

4.2.3.1 Protection of Raptor Species

Raptors (birds of prey) and owls and their active nests are protected by CFG Code Section 3503.5, which states that it is unlawful to take, possess, or destroy any birds of prey or to take, possess, or destroy the nest or eggs of any such bird unless authorized by the CDFW.

4.2.3.2 Streambed Alteration Agreement

The CFG Code (Section 1600 et seq.) requires an agreement with the CDFW for projects affecting riparian and wetland habitats through the issuance of a Streambed Alteration Agreement.

4.3 LOCAL REGULATIONS

4.3.1 Oak Tree Protection

The City has implemented regulatory measures to protect and preserve oak trees that occur within the City's jurisdiction. The City's Oak Tree Preservation ordinance states, "No person shall cut, prune, remove, relocate, endanger, damage, or encroach into the protected zone of any oak tree on any public or private property within the City" (City 2013). The protected zone of the oak tree includes the area within five feet of the dripline (canopy extent), but no less than 15 feet from the trunk. Encroachment is defined as intrusion into the protected zone of an oak tree, which includes but is not limited to, intrusion by trenching, paving, pruning, dumping, parking of commercial vehicles. Major encroachment is defined by the City as "an area between the outer edge of the trunk and fifty percent of the diameter of the protected zone" and minor encroachment is defined as an area between the outermost edge of the protected zone and fifty percent of the diameter of the protected zone" (2013).

To remove any oak tree or to subject its protected zone to major encroachment, an Oak Tree Permit must be obtained. Trees subject to the permit include all oak trees in the genus *Quercus* that exceed six inches in circumference when measured at 4.5 feet above the tree's natural grade. Heritage oak trees are given special consideration and may be fully protected or subject to requirements stricter than those of a standard protected oak tree. A heritage oak tree is defined as any oak tree measuring 108 inches in circumference measured at 4.5 feet above the tree's natural grade. In the case of trees with multiple trunks, two or more trunks must measure 72 inches each or greater in circumference when measured at 4.5 feet above the tree's natural grade.

To obtain an Oak Tree Permit, an application must be submitted to the City Manager or designated representative ("Director") and a filing fee as established by the City Council must be paid. The conditions of the Oak Tree Permit will require native oak trees at a minimum of 24-inch box size to be planted for each protected oak tree removed and for each tree whose protected zone will be subject to major encroachment. Minor encroachment does not require mitigation, but a number of protection measures are required during construction as outlined in Section VII. Standards for Performance of Permitted Work of the Oak Tree Preservation Guidelines (City 1990). The number of replacement trees required is dependent upon the circumference of the tree to be impacted, which are described in

Subsection B of the Oak Tree Preservation Ordinance. For those trees with multiple stems, the average circumference was used to determine the number of replacement trees.

4.3.2 Fuel Modification Zones

The County Fire Department requires fuel modification zones to create a defensible space in the event a wildlife breaks out (County of Los Angeles N.D.). There are three difference zones, which are outlined below:

1. **Zone A (Setback Zone)** – This zone extends 20 feet beyond the edge of any structures. The only allowed vegetation within this zone is green lawns, ground cover not exceeding six inches in height, and well-spaced shrubs. The landscape must be irrigated to promote healthy vegetation and fire resistance.

2. **Zone B (Irrigated Zone)** – This zone extends from the outermost edge of Zone A to 100 feet from structures. Green lawn, ground cover not exceeding six inches in height, and well-spaced shrubs and trees are allowed in this zone. The landscape must be irrigated to promote healthy vegetation and fire resistance.

3. **Zone C (Native Brush Thinning Zone)** – This zone extends from the outermost edge of Zone B to 200 feet from the structures. Well-spaced native vegetation and ornamental shrubs and trees are allowed. Vegetation must be thinned and species that constitute a fire risk are not allowed (e.g., chamise, sages [*Salvia* spp.], California sagebrush, and California buckwheat). This zone does not require irrigation.

5.0 PROJECT EFFECTS

This section describes potential direct and indirect impacts associated with the proposed project. Direct impacts immediately alter the affected biological resources such that those resources are eliminated temporarily or permanently. Indirect impacts consist of secondary effects of a project, including noise, decreased water quality (e.g., through sedimentation, urban contaminants, or fuel release), fugitive dust, colonization of non-native plant species, animal behavioral changes, and night lighting. The magnitude of an indirect impact can be the same as a direct impact; however, the effect usually takes a longer time to become apparent.

The significance of impacts to biological resources present or those with potential to occur was determined based upon the sensitivity of the resource and the extent of the anticipated impacts. For certain highly sensitive resources (e.g., a federally listed species), any impact would be significant. Conversely, other resources that are of low sensitivity (e.g., species with a large, locally stable population in the region but declining elsewhere) could sustain some impact with a less than significant effect.

5.1 SENSITIVE SPECIES

5.1.1 Rare Plant Species

Less than Significant Impacts with Mitigation Incorporated

A total of four of the eight rare plant species recorded within the Mint Canyon quadrangle were not considered to have a potential to occur based on geographic range, elevation range, and/or lack of suitable habitat (see Appendix I). The remaining four species were considered to have a potential to occur on the study area primarily based on the presence of chaparral and coastal scrub habitats. Rare plant surveys were conducted in May and August 2018 and May 2019.

Nevin's barberry, Piute Mountains navarretia, and slender-horned spineflower were not observed on the study area during any of the rare plant surveys. Therefore, these species are presumed absent from the study area. Project grading and fuel modification associated with the residential development would impact approximately 142 slender mariposa lilies (Figure 9, *Impacts to Rare Plants*). Construction of the new alignment of Bouquet Canyon Road would impact approximately 320 slender mariposa lilies. The remaining 34 individuals would be avoided by the project.

Slender mariposa lily is a CRPR 1B.2 species, which are species considered rare throughout their range and have declined significant over the last century. This species is not federally or state listed as endangered or threatened. Project impacts to this species would be significant and mitigation would be required to reduce impacts to less than significant. Required mitigation for potential impacts to slender mariposa lily is described in mitigation measure BIO-1 in Section 6.0 below.

5.1.2 Sensitive Animal Species

Less than Significant Impacts with Mitigation Incorporated

Of the 15 sensitive animal species recorded within the vicinity of the study area, five species (Quino checkerspot butterfly, two-striped gartersnake, UTS , vernal pool fairy shrimp, and western spadefoot) were considered to have no potential to occur on the study area due to lack of suitable habitat and/or the study area is located outside of the species' known geographical range (Appendix J). Although UTS was determined to have no potential to occur on the study area (see discussion in Section 3.5.2 above), populations of UTS do occur downstream in portions of the Santa Margarita River. The project would not indirectly affect downstream water quality or surface water flows. The project would prevent sedimentation and potential impacts to water quality downstream during construction and post-construction by preparing and implementing a project-specific Stormwater Pollution Prevention Plan (SWPPP) and Water Quality Management Plan (WQMP), respectively. Potential impacts to water quality due to pollutants from residential uses will be addressed through the use of infiltration basins where feasible and biofiltration basins where infiltration is not feasible due to low percolation rates in the underlying soil. The SWPPP and WQMP will also be provided to the resource agencies (USACE, RWQCB, and CDFW) during the regulatory permitting process. Most of the flow within the Bouquet Creek is from upstream waters. Per the project engineer, the water surface flows within the project reach will only contribute an additional 100 cubic feet per second, which represents approximately 0.5 percent of the overall flow within this reach of Bouquet Canyon Creek. Potential increases to surface flow rates due to project construction of impervious surfaces (e.g., roads, roofs, sidewalks, etc.) would be offset by the construction of desilting basins upstream of the realigned Bouquet Canyon Road. Since the project would not indirectly affect downstream water quality or surface water flows, the project would not indirectly impact any UTS downstream of the study area.

As discussed above, the project would not impact Quino checkerspot butterfly, two-striped gartersnake, UTS , vernal pool fairy shrimp, or western spadefoot. Of the remaining 10 species, three species have a low potential to occur, one species has a moderate potential to occur, four species have a high potential to occur, and two species are presumed absent from the study area. These species are discussed in further detail below.

Low Potential Species

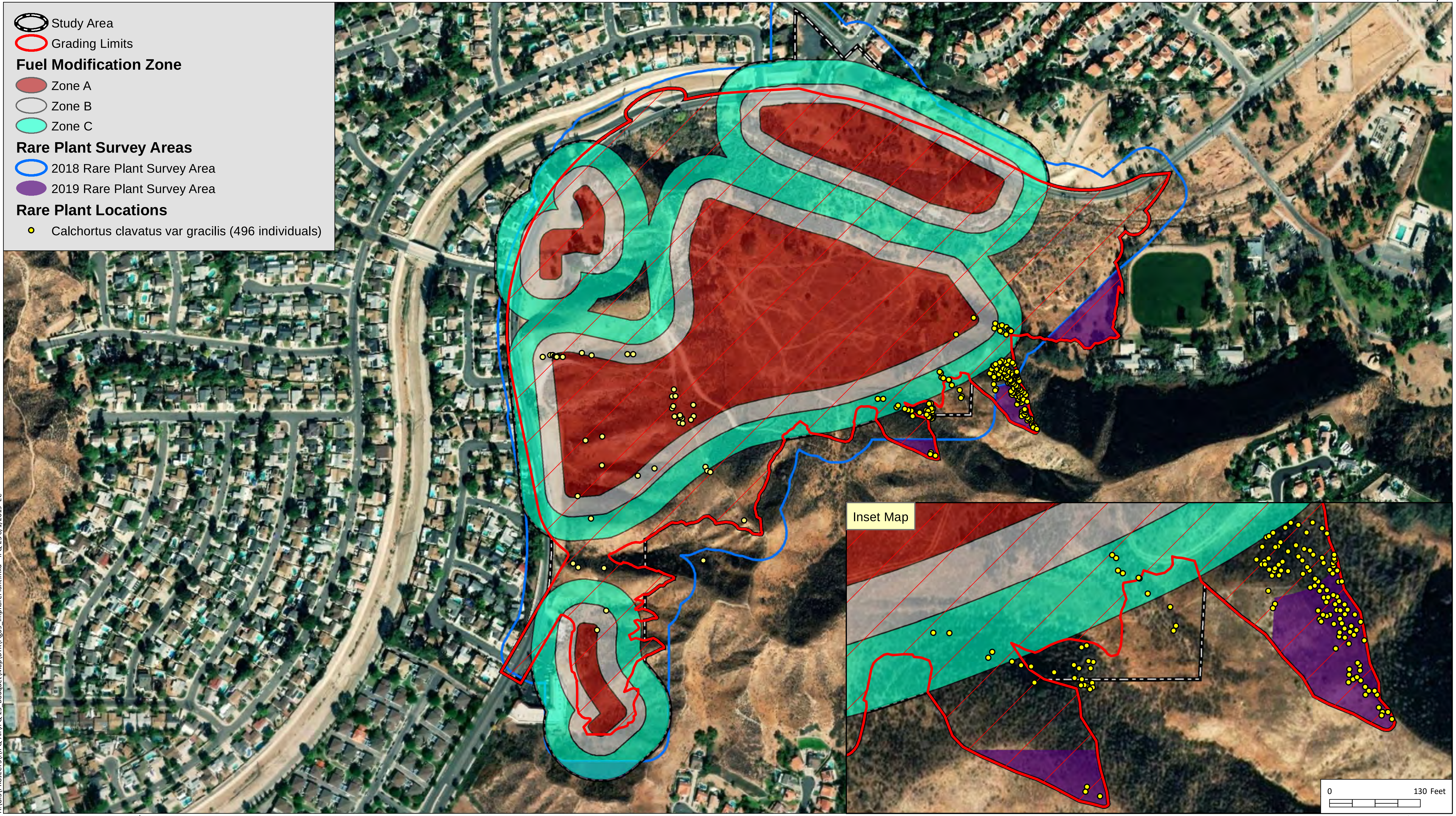
Three species were determined to have a low potential to occur on the study area based on the presence of low quality habitat, limited acreage of habitat, and lack of recent observations within the immediate vicinity. These species include California glossy snake, Townsend's big-eared bat, and southern grasshopper mouse. California glossy snake and southern grasshopper mouse are SSC. Although suitable habitat is present on the study area, these species have not been recorded within the vicinity of the study area (five- to 10-mile radius) in over 50 years, indicating that regionally significant populations of these species are not present. Therefore, the study area is not expected to support large populations of California glossy snake or southern grasshopper mouse and a loss of a few individuals, if present, would not be expected to reduce regional population numbers. Townsend's big-eared bat is a State Candidate Threatened species and an SSC. There is no suitable roosting habitat on the study area. This species could use the study area for foraging habitat since it uses a variety habitats, although it is a low potential since this species prefers mesic habitats. Impacts to these species would be less than significant and no mitigation measures are considered required.

Moderate Potential Species

California legless lizard, which is an SSC, was determined to have a moderate potential to occur on the study area based on the presence of low quality habitat on the study area and recent observations within the immediate vicinity. Although the study area supports suitable sandy wash habitat within Bouquet Canyon Creek, the habitat is considered low quality since the banks are infested with giant reed, leaving little open areas for the lizard to burrow and no leaf litter for protection. Since the study area supports low quality habitat, the study area is not expected to support large populations of this species and a loss of a few individuals, if present, would not be expected to reduce regional population numbers. Impacts to these species would be less than significant and no mitigation measures are considered required.

High Potential Species

Four species were determined to have a high potential to occur on the study area based on the presence of suitable habitat and recent observations within the immediate vicinity. These species include coastal whiptail, coast horned lizard, loggerhead shrike, and San Diego black-tailed jackrabbit, which are all SSC. None of these species were observed during any of the field surveys conducted on the study area. Coastal whiptail, coast horned lizard, loggerhead shrike, and San Diego black-tailed jackrabbit are highly mobile and the majority are expected to disperse to undeveloped land to the east of the proposed project. These species are not afforded a state or federal listing. Displacement or loss of a few individuals, if present, would not be expected to reduce regional population numbers. Impacts to these



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0 375 Feet

Source: Aerial (NAIP, 2016)

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Impacts to Rare Plants

Figure 9

species would be less than significant and no mitigation measures are proposed. Loggerhead shrike eggs and young are protected under MBTA, which is discussed in Section 5.4.2 below.

Presumed Absent Species

Focused surveys for BUOW (SSC) and CAGN (federally threatened and SSC) were conducted in 2018. Survey results were negative, and these species are presumed absent from the study area. Therefore, no direct or indirect impacts are anticipated to these species.

Since the study area supports suitable BUOW habitat, a take avoidance survey is required prior to ground disturbance in accordance with CDFW's *Staff Report on Burrowing Owl Mitigation* (CDFG 2012). An avoidance and minimization measure is included as BIO-2 in Section 6.0 below, which requires a take avoidance survey and avoidance of active nests and/or relocation of BUOW (if BUOWs are observed).

5.2 SENSITIVE VEGETATION COMMUNITIES

5.2.1 California Department of Fish and Wildlife Sensitive Vegetation Communities/Habitats

Less than Significant Impacts with Mitigation Incorporated

The study area supports native-dominated habitat totaling 29.19 acres, including big sagebrush scrub (1.91 acres), chamise chaparral/non-native grassland (2.98 acres), elderberry savanna (0.56 acre), mule fat scrub (0.27 acre), Riversidean upland sage scrub (7.06 acres), Riversidean upland sage scrub/non-native grassland (13.10 acres), scrub oak chaparral (0.26 acre), scrub oak chaparral/non-native grassland (2.01 acres), southern north slope chaparral (0.34 acre), and southern willow scrub/giant reed stand (0.70 acre). The remainder of the study area (64.28 acres) supports habitat dominated by non-native species and sparsely vegetated developed, disturbed, and river wash.

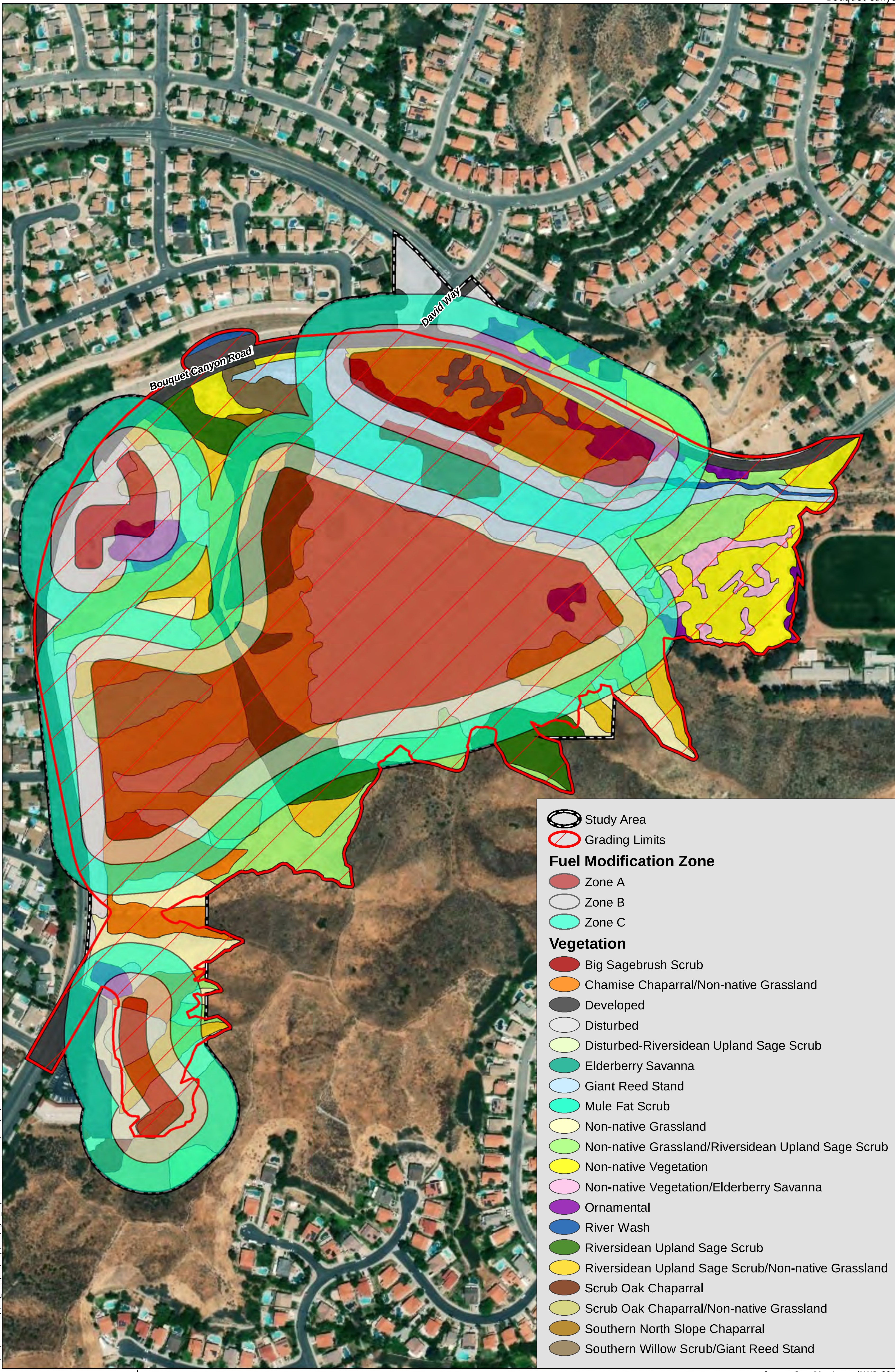
Permanent impacts to vegetation total 84.61 acres, which are proposed for project development and to implement County-required fuel modification (Figure 10, *Impacts to Vegetation*). Permanent impacts are proposed to 28.68 acres of native-dominated habitat and 55.93 acres of habitat dominated by non-native species, developed, disturbed, and river wash (Table 3, *Impacts to Vegetation Communities*). Although some native vegetation will be avoided in Zones B and C, such as protected oak trees, all fuel modification impacts were assessed as permanent impacts.

Table 3
IMPACTS TO VEGETATION COMMUNITIES

Habitat Type (Holland/Oberbauer)	Existing (acres)	Permanent Impacts (acres)
Big Sagebrush Scrub	1.91	1.91
Chamise Chaparral/Non-native Grassland	2.98	2.77
Developed	9.37	4.70
Disturbed	5.32	3.83
Disturbed-Riversidean Upland Sage Scrub	0.62	0.54
Elderberry Savanna[1]	0.56	0.56
Giant Reed Stand	7.08	7.08
Mule Fat Scrub	0.27	0.27
Non-native Grassland	22.06	21.75
Non-native Grassland/Riversidean Upland Sage Scrub	7.75	7.41
Non-native Vegetation	8.06	7.16
Non-native Vegetation/Elderberry Savanna	0.97	0.97
Ornamental	2.69	2.13
Riversidean Upland Sage Scrub	7.06	6.90
Riversidean Upland Sage Scrub/Non-native Grassland	13.10	12.96
River Wash	0.36	0.36
Scrub Oak Chaparral	0.26	0.26
Scrub Oak Chaparral/Non-native Grassland	2.01	2.01
Southern North Slope Chaparral	0.34	0.34
Southern Willow Scrub/Giant Reed Stand[1]	0.70	0.70
	93.47	**84.61**

[1] Sensitive habitats pursuant to the California Department of Fish and Wildlife (CDFW) Natural Communities List (2018b).

Two of the vegetation communities described above are considered sensitive pursuant to CDFW (2018b): elderberry savanna (0.56 acre) and southern willow scrub/giant reed stand (0.70 acre; Table 3; Figure 10). Both communities will be permanently impacted. The sensitive natural community designation is generally reserved for high-quality habitats, such as those that lack invasive species, do not show signs of human-caused disturbance, and show signs of reproduction (i.e., sprouts and seedlings present). Mitigation for impacts to elderberry savanna is not proposed since the habitat is considered low quality. The elderberry savanna is small and isolated from other native habitat, with the exception of a small patch of big sagebrush scrub. The understory is dominated by non-native short-pod mustard, which is likely due to historic disturbance from ranching activities, fuel modification over the years, and its proximity to Bouquet Canyon Road. No sprouts or seedlings were noted during field surveys. Based on the low-quality characteristics of the elderberry scrub, impacts to these species would be less than significant and no mitigation is proposed. The southern willow scrub/giant reed stand on the project appears to be associated with relict floodplain conditions that no longer exist on the site. However, for the purpose of this biological technical report, this habitat is presumed to be regulated as CDFW jurisdiction. Although southern willow scrub/giant reed stand is considered low-quality habitat due to the prevalence of giant reed, the project will provide mitigation for permanent impacts to 0.70 acre through compensatory mitigation for impacts to CDFW jurisdiction as outlined in BIO-3 included in Section 6.0 below.



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Source: Base Map Layers (NAIP, 2016)

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Environmental Planning

Impacts to Vegetation

Figure 10

5.2.2 California Department of Fish and Wildlife Riparian Habitat and Streambed

Less than Significant Impacts with Mitigation Incorporated

Bouquet Canyon Creek flows through the northern portion of the study area, which is considered a jurisdictional streambed pursuant to Section 1602 of the CFG Code as regulated by CDFW. The project would result in permanent impacts to 9.33 acres and temporary impacts to 0.47 acre of CDFW jurisdictional streambed and associated vegetation (Table 4, *Impacts to California Department of Fish and Wildlife Jurisdiction*; Figure 11, *Impacts to Jurisdictional Features*). The streambed is characterized as an ephemeral floodplain with a central channel that conveys the majority of flows through the site. Permanent impacts are necessary to construct the development, complete slope grading, implement County-required fuel modification, and construct a new flood control channel to the south of Bouquet Canyon Creek. The majority of the central channel within CDFW jurisdiction will be returned to pre-project topographic contours following completion of construction. Most of the permanent impacts to streambed-associated vegetation would be to giant reed, which is rated highly invasive by the California Invasive Plant Council (2006, 2007). Only small areas of native-dominated habitat would be permanently impacted, including southern willow scrub/giant reed stand and mule fat scrub. The remaining permanent impacts would be to mostly invasive giant reed stands and unvegetated river wash. The project would remove approximately 7.08 acres of giant reed stand, eliminating it as possible seed source to downstream habitats. Temporary impacts include those proposed to existing concrete within Bouquet Canyon Creek at the downstream (west) end and disturbance for bridge installation at the upstream (east) end.

Table 4
IMPACTS TO CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE JURISDICTION

Drainage	Existing (acres)	Permanent Impacts (acres)	Temporary Impacts (acres)
Bouquet Canyon Creek	9.80	9.33	0.47

Impacts to CDFW jurisdiction will require a Section 1602 Stream Alteration Agreement from the CDFW, as described in BIO-3 included in Section 6.0 below. Compensatory streambed mitigation for permanent impacts to CDFW jurisdiction will be required as part of subsequent Section 1602 permitting requirements.

5.3 U.S. ARMY CORPS OF ENGINEERS/REGIONAL WATER QUALITY CONTROL BOARD JURISDICTION

Less than Significant Impacts with Mitigation Incorporated

Bouquet Canyon Creek is considered a jurisdictional streambed pursuant to Sections 404/401 of the CWA as regulated by USACE and RWQCB, respectively. The project would result in permanent impacts to 0.19 acre and temporary impacts to 0.46 acre of non-wetland WUS (Table 5, *Impacts to U.S. Army Corps of Engineers/Regional Water Quality Control Board Jurisdiction*; Figure 11). Permanent impacts are proposed within Bouquet Canyon Creek at the downstream (west) end for improvements to the outlet for the proposed flood control channel and construction of a park as well as at the upstream (east) end to install a culvert associated within the new Bouquet Canyon Road alignment. The remainder of the Bouquet Canyon Creek central channel will be temporarily impacted to construct a new flood control channel to the south of Bouquet Canyon Creek. Temporary impact areas within Bouquet Canyon Creek will be returned to pre-project topographic contours following completion of construction.

Table 5
IMPACTS TO U.S. ARMY CORPS OF ENGINEERS/
REGIONAL WATER QUALITY CONTROL BOARD JURISDICTION

Drainage	Existing (acres)	Permanent Impacts (acres)	Temporary Impacts (acres)
Bouquet Canyon Creek	0.65	0.19	0.46

Impacts to USACE/RWQCB jurisdiction will require a Section 404 permit from USACE and a Section 401 permit from RWQCB, as described in BIO-4 included in Section 6.0 below. Compensatory streambed mitigation for permanent impacts to USACE/RWQCB jurisdiction will be required as part of subsequent Section 404/401 permitting requirements.

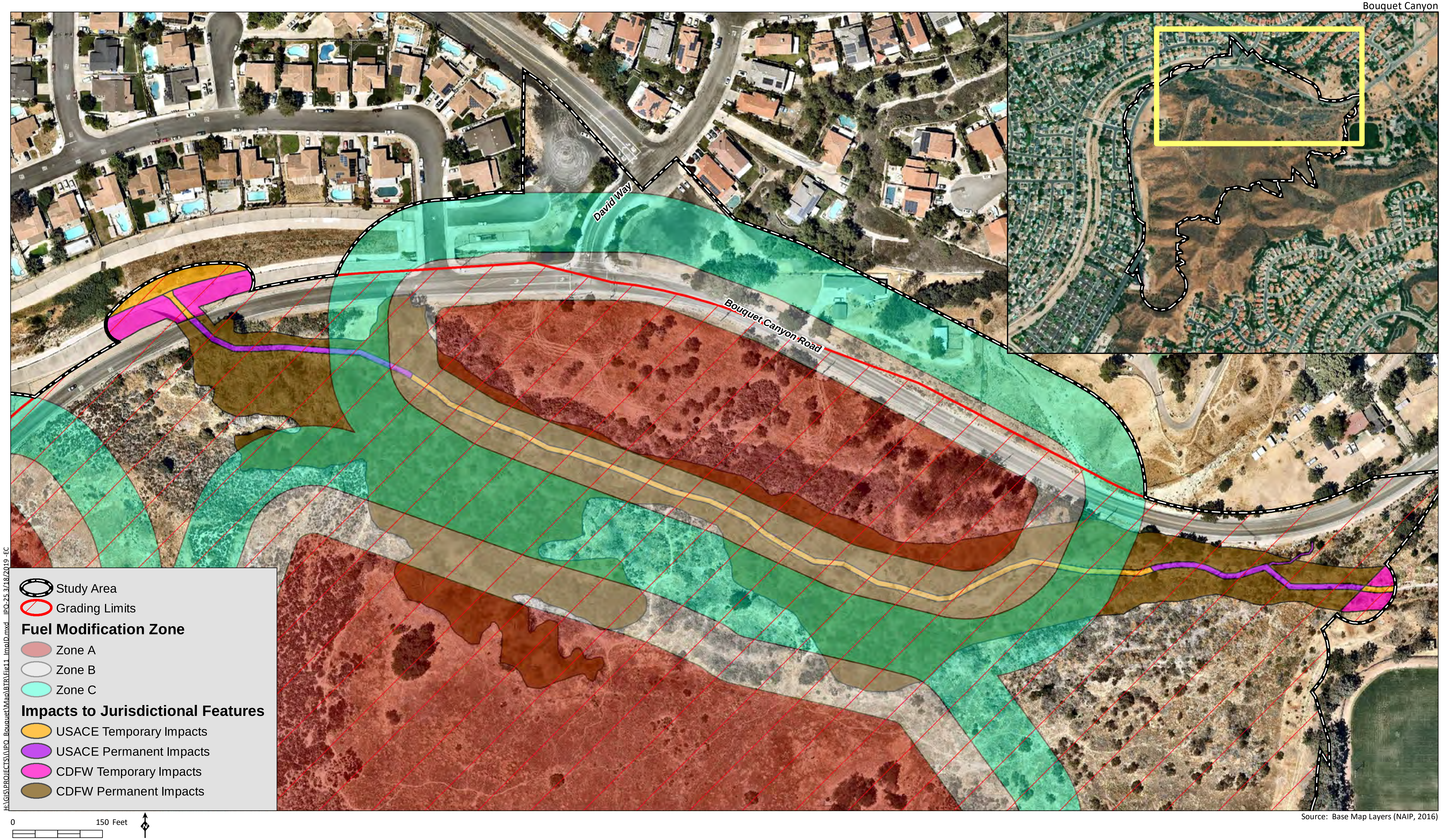
5.4 WILDLIFE MOVEMENT AND MIGRATORY SPECIES

5.4.1 Wildlife Movement

Less than Significant

The study area is not part of a regional corridor and does not serve as a nursery site. The study area is not identified as being part of a local or regional corridor or linkage by the South Coast Missing Linkages (South Coast Wildlands 2008). The study area currently has no direct connectivity to two or more large blocks of habitat and is constrained by existing development. The study area does support native upland vegetation and small patches of native riparian vegetation, which provide habitat for local wildlife movement and migratory birds passing through the study area. Some reptiles, small mammals, and occasionally larger mammals may access the study area from undeveloped land to the east via Bouquet Canyon Creek or the ridgeline to the south of the Camp Joseph Scott facility. Birds may fly over existing development to access the study area for foraging and/or nesting. Therefore, the study area provides habitat for local wildlife movement, but does not serve as a regional wildlife corridor.

The study area is confined by existing development to the north, south, and west. Wildlife movement through Bouquet Canyon Creek downstream of the study area is limited since the stream becomes channelized to the north of Bouquet Canyon Road, just downstream (west) of the study area. Although vegetation will be removed from Bouquet Canyon Creek due to fuel modification requirements, the majority of the stream will be recontoured to pre-project topographic contours following construction. Although implementation of the project may result in some temporary disturbance to local wildlife movement from construction noise, the project would have a less than significant impact to wildlife movement and no mitigation measures would be required.



HELIX Environmental Planning

Impact to Jurisdictional Features

Figure 11

5.4.2 Migratory Species

Less than Significant Impacts with Mitigation Incorporated

The study area has the potential to support songbird and raptor nests due to the presence of shrubs, ground cover, and trees on the study area. Project activities could disturb or destroy active migratory bird nests including eggs and young. Disturbance to or destruction of migratory bird eggs, young, or adults is in violation of the MBTA and is considered a potentially significant impact. The nesting season is generally defined as February 15 through August 31 for songbirds and January 15 to August 31 for raptors. An avoidance and minimization measure is provided as BIO-5 in Section 6.0 below, which would ensure the project is in compliance with MBTA regulations.

5.5 LOCAL POLICIES AND ORDINANCES

Less than Significant with Mitigation Incorporated

The project would remove 26 oak trees, including four scrub oaks, two blue oaks, and 20 Tucker oaks (Table 6, *Impacts to Oak Trees*; Figure 12, *Impacts to Oak Trees*). In addition, one Tucker oak would be subjected to major encroachment and two Tucker oaks would be subjected to minor encroachment. The remaining 35 oak trees would be completely avoided by the project.

Table 6
IMPACTS TO OAK TREES

Species Name	Common Name	Number of Trees			
		Removed	Major Encroachment	Minor Encroachment	Avoided
Quercus agrifolia	coast live oak	0	0	0	2
Quercus berberidifolia	scrub oak	4	0	0	2
Quercus douglasii	blue oak	2	0	0	0
Quercus john-tuckeri	Tucker oak	20	1	2	30
Quercus lobata	valley oak	0	0	0	1
	TOTAL	**26**	**1**	**2**	**35**

Impacts to City-protected oak trees will require an Oak Tree Permit prior to project construction to mitigate for proposed impacts. The conditions of the Oak Tree Permit will require native oak trees at a minimum of 24-inch box size to be planted for each protected oak tree removed and for each tree whose protected zone will be subject to major encroachment. The number of replacement trees required is dependent upon the circumference of the tree to be impacted. These guidelines are described in Subsection B of the Oak Tree Preservation Ordinance, reproduced in Table 7, *Number of Replacement Trees*. Replacement trees must be placed on the same property. If there is no appropriate location on site, the replacement trees may be donated to the City or the monetary value of the required replacement trees may be paid to the City at the discretion of the Director.

Table 7
NUMBER OF REPLACEMENT TREES

Circumference of Tree Destroyed (4 feet above ground level)	Number of Replacement Trees Required for Each Tree Destroyed
Under 12 inches	2
12 to 18 inches	3
18 to 24 inches	4
24 to 30 inches	5
30 to 36 inches	6
Over 36 inches	1 additional replacement tree per incremental increase of 6 inches

Source: City of Santa Clarita (2013)

For the purpose of this assessment, oak trees located within the grading footprint and/or Fuel Modification Zone A were considered impacted while oak trees located within Zones B or C were considered avoided. Based on the impacts to oak trees as quantified by the impact assessment, 27 oak trees will be removed or subjected to major encroachment and would require replacement trees (Table 8, *Oak Tree Mitigation*). In order to receive an Oak Tree Removal Permit for these impacts, it is anticipated the City will require 91 replacement trees to be planted or the equivalent monetary value of the replacement trees to be paid, as described in mitigation measure BIO-6 included in Section 6.0 below. Replacement trees must be approved by the City and consist of the following tree species: coast live oak, valley oak, canyon live oak (*Quercus chrysolepis*), or interior live oak (*Quercus wislizenii*).

Table 8
OAK TREE MITIGATION

Species Name	Common Name	Number of Trees	
		Removed/Major Encroachment	Replacement Trees Required
Quercus berberidifolia	scrub oak	4	9
Quercus douglasii	blue oak	2	19
Quercus john-tuckeri	Tucker oak	21	63
	TOTAL	**27**	**91**

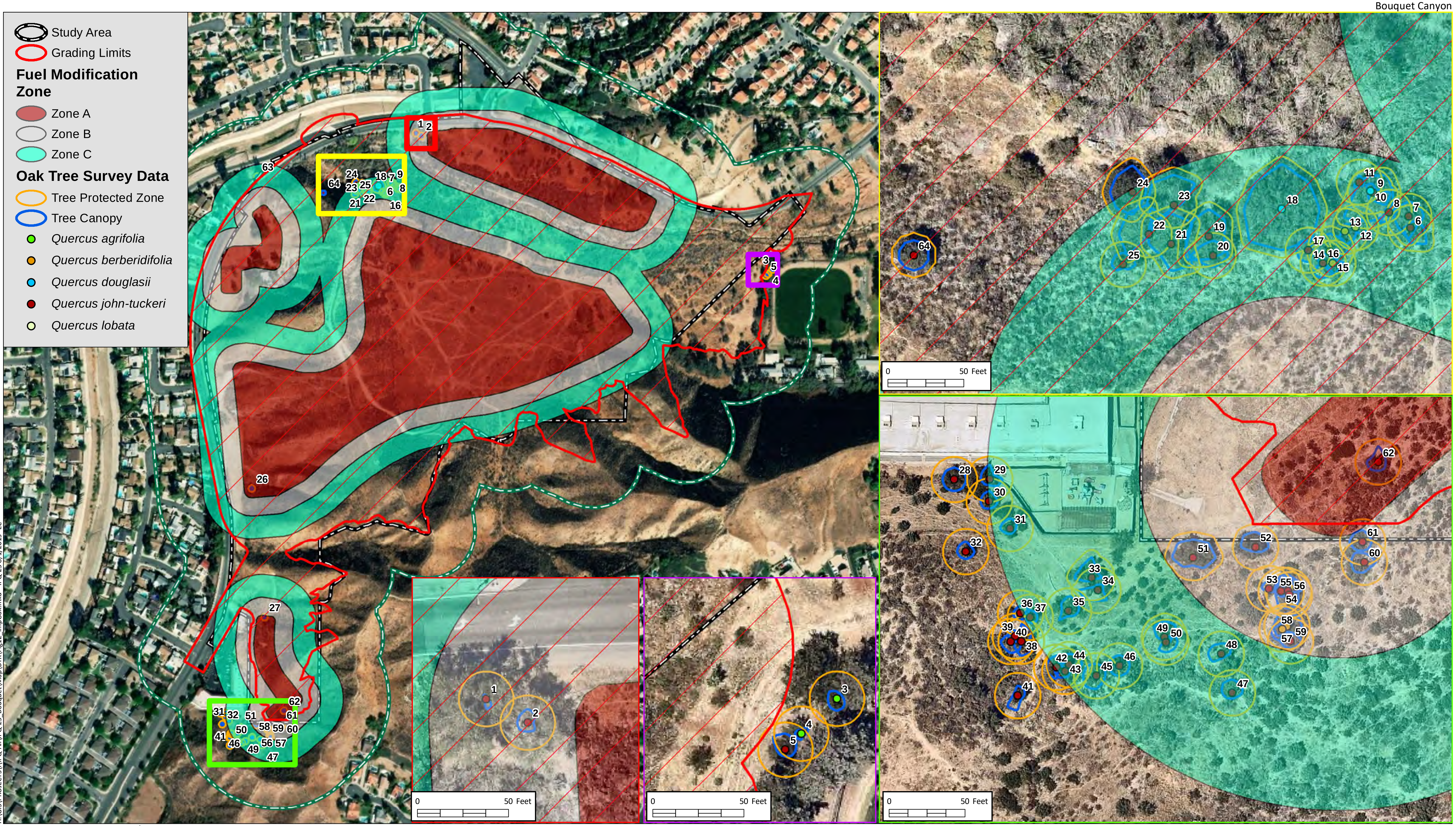
Thirty-seven oak trees will be completely avoided or subject to minor encroachment and would not require replacement trees. During construction, avoided trees and trees subject to encroachment will require protection measures, including but not limited to those outlined within Section VII. Standards for Performance of Permitted Work of the Oak Tree Preservation Guidelines (City 1990).

5.6 ADOPTED HABITAT CONSERVATION PLANS

No Impacts

The study area is not located within any adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. As such, implementation of the project would not conflict with any adopted habitat conservation plans.

Bouquet Canyon



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Source: Base Map Layers (Nearmap, 2017)

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Impacts to Oak Trees

Figure 12

6.0 MITIGATION MEASURES

The following provides recommended measures intended to minimize or avoid impacts to biological resources:

BIO-1 Mitigation for project impacts to slender mariposa lily shall include one or more of the following:

- Prior to construction, a mitigation plan shall be developed that describes methods to mitigate for impacts to slender mariposa lily at a 1:1 ratio. The mitigation plan shall include a description of the mitigation site, bulb collection and planting methods, maintenance and monitoring requirements, and performance standards to measure the success of the mitigation. Slender mariposa lily bulbs shall be collected at the end of the growing season and prior to ground disturbance, or bulbs shall be obtained from a native plant nursery if available. The bulbs shall be planted within an appropriate on-site or off-site mitigation area, which will be conserved as open space in perpetuity.

- Payment into a mitigation bank and/or in-lieu fee program that has mitigation available for slender mariposa lily at a 1:1 ratio; and/or

- Preservation of land that contains slender mariposa lily at a 1:1 ratio.

Mitigation for significant impacts to slender mariposa lily shall be implemented in consultation with the City and CDFW prior to construction.

BIO-2 **Burrowing Owl**: In compliance with the CDFW *Staff Report on Burrowing Owl Mitigation* (2012), a take avoidance survey shall be conducted on the study area within 14 days prior to ground disturbance to determine presence of BUOW. If the take avoidance survey is negative and BUOW is confirmed absent, then ground-disturbing activities shall be allowed to commence, and no further mitigation would be required.

If BUOW are observed during the take avoidance survey, active burrows shall be avoided by the project in accordance with the CDFW's Staff Report (2012). The CDFW shall be immediately informed of any BUOW observations. A Burrowing Owl Protection and Relocation Plan (plan) shall be prepared by a qualified biologist, which must be sent for approval by CDFW prior to initiating ground disturbance. The plan shall detail avoidance measures that shall be implemented during construction and passive or active relocation methodology. Relocation shall only occur outside of the nesting season (September 1 through January 31).

BIO-3 **Southern Willow Scrub/Giant Reed Stand and CDFW Jurisdiction**: Prior to the City's issuance of a grading permit, the Project Applicant shall demonstrate that a Streambed Alteration Agreement has been issued by CDFW. Temporary impacts to CDFW jurisdiction shall be returned to pre-project topographic contours once the project has been completed. Permanent impacts to CDFW jurisdiction for southern willow scrub/giant reed stand (0.70 acre) shall be mitigated through on-site or off-site enhancement, restoration, and/or creation of CDFW jurisdictional streambed at ratio of no less than 1:1. Given that the remaining portion of Bouquet Canyon Creek is dominated by invasive giant reed stands, which is of extremely low biological function and value and contributes to downstream infestation of giant reed, the remaining permanent impacts to CDFW jurisdiction (8.63 acres) shall be mitigated through on-site or off-site enhancement, restoration, and/or creation of CDFW jurisdictional streambed at a ratio of no less than 0.5:1. Best Management Practices (BMPs) to minimize and avoid impacts to CDFW jurisdiction during and after construction will be addressed as part in the Streambed Alteration Agreement. Minimization and avoidance measures may include, but are not limited to, the following:

- Construction-related equipment will be stored in developed areas, outside of drainages. No equipment maintenance will be done within or adjacent to the drainage.
- Mud, silt, spoil sites, raw cement, asphalt, or other pollutants from construction activities will not be placed within or adjacent to the drainage.
- Open trenches or other excavated areas will be properly secured at the end of the day to avoid entrapment of animals, or an escape ramp will be provided.
- To avoid attracting predators during construction, the project will be kept clean of debris to the extent possible. All food-related trash items will be enclosed in sealed containers and regularly removed from site.
- Construction personnel will strictly limit their activities, vehicles, equipment and construction material to the proposed project footprint, staging areas, and designated routes of travel.
- Exclusion fencing will be installed to demarcate the limits of disturbance. The exclusion fencing should be maintained until the completion of construction activities.
- To the extent feasible, construction will be conducted outside of the nesting bird season (see MM BIO-5 below).

BIO-4 **USACE and RWQCB Jurisdiction**: Prior to the City's issuance of a grading permit, the Project Applicant shall demonstrate that the appropriate regulatory permits have been issued by USACE and RWQCB. Temporary impacts to WUS shall be returned to pre-project topographic contours once the project has been completed. Compensatory mitigation for permanent impacts to WUS shall be required as part of subsequent permitting requirements. Permanent impacts to WUS shall be mitigated through on-site or off-site enhancement, restoration, and/or creation of jurisdictional streambed at a ratio of no less than 1:1. BMPs to minimize and avoid impacts to WUS during and after construction will be addressed as part of the USACE and RWQCB permitting process. Minimization and avoidance measures may include, but are not limited to, the following:

- Construction-related equipment will be stored in developed areas, outside of the drainage. No equipment maintenance will be done within or adjacent to the drainage.

- Source control and treatment control BMPs will be implemented to minimize the potential contaminants that are generated during and after construction. Water quality BMPs will be implemented throughout the project to capture and treat potential contaminants.

- Substances harmful to aquatic life will not be discharged into the drainage. All hazardous substances will be properly handled and stored.

- A Storm Water Pollution Prevention Plan will be prepared to prevent sediment from entering the drainage during construction.

- To avoid attracting predators during construction, the project will be kept clean of debris to the extent possible. All food-related trash items will be enclosed in sealed containers and regularly removed from site.

- Construction personnel will strictly limit their activities, vehicles, equipment and construction material to the proposed project footprint, staging areas, and designated routes of travel.

- Exclusion fencing will be installed to demarcate the limits of disturbance. The exclusion fencing should be maintained until the completion of construction activities.

BIO-5 **Nesting Birds:** Construction activities (i.e., earthwork, clearing, and grubbing) shall occur outside of the general bird nesting season for migratory birds, which is February 15 through August 31 for songbirds and January 15 to August 31 for raptors.

If construction activities (i.e., earthwork, clearing, and grubbing) must occur during the general bird nesting season for migratory birds and raptors, a qualified biologist shall perform a pre-construction survey of potential nesting habitat to confirm the absence of active nests belonging to migratory birds and raptors afforded protection under the MBTA and CFG Code. The pre-construction survey shall be performed no more than seven days prior to the commencement of construction activities. The results of the pre-construction survey shall be documented by the qualified biologist. If construction is inactive for more than seven days, an additional survey shall be conducted.

If the qualified biologist determines that no active migratory bird or raptor nests occur, the activities shall be allowed to proceed without any further requirements. If the qualified biologist determines that an active migratory bird or raptor nest is present, no impacts within 300 feet (500 feet for raptors) of the active nest shall occur until the young have fledged the nest and the nest is confirmed to no longer be active, or as determined by the qualified biologist. The biological monitor may modify the buffer or propose other recommendations in order to minimize disturbance to nesting birds.

BIO-6 **Protected Oak Trees:** Prior to construction, the Applicant shall obtain an Oak Tree Permit in accordance with the City's Oak Tree Preservation ordinance (City 2013) to impact protected oak trees. The following measures shall be required:

- **Impacted Trees:** All tree removals shall be conducted in the presence of a qualified arborist approved by the City. The Applicant shall replace impacted City-protected oak trees proposed for removal by planting replacement trees on-site, donating trees to the City, or to pay the City an equivalent monetary value of the replacement trees. Replacement ratios shall be determined based requirements described in Subsection B of the Oak Tree Preservation Ordinance (City 2013). Unless otherwise approved by the City, replacement trees shall be at a minimum of 24-inch box size and consist of the following tree species: coast live oak, valley oak, canyon live oak, or interior live oak. All replacement trees shall be approved by the City.

- **Encroached Trees:** The Applicant shall notify the City and qualified arborist 48 hours prior to beginning work within the protected zone of an oak tree. All work conducted within the protected zone shall be monitored by a qualified arborist and verified by the City. Work shall be done with hand tools only. Once work within the protected zones is complete, the qualified arborist shall submit a certification letter to the City within 10 working days demonstrating the work was conducted in accordance with project's permit. Other protection measures may be required by the City.

- **Encroached/Avoided Trees:** A minimum five-foot chain link fence in concrete footings with posts installed every eight feet and two feet deep shall be installed at the outermost edge of the protected zone of each oak or oak grove. Trees on steep slopes that will not be impacted by vegetation removal or graded may be exempt from fencing requirement. Fencing shall be inspected and approved by the City prior to construction initiation. Signs shall be placed on the fence in four locations around each tree or every 50 feet around oak groves. Signs shall be a minimum of two feet by two with the following language: "Warning: This fence is for the protection of this tree and shall not be removed or relocated without written authorization for the City of Santa Clarity Community Development Department." The fence shall remain in place for the duration of construction and shall not be removed until receiving written authorization from the City. Planting within the protected zone is discouraged. If planting within the protected zone, only drought tolerant species shall be permitted and no spray-type irrigation shall be used. A maintenance and care program shall be implemented to ensure continued health and care of oak trees on the proposed development. Other protection measures may be required by the City.

7.0 CERTIFICATION/QUALIFICATION

The following individuals contributed to the fieldwork and/or preparation of this report:

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Appendix A

Plant Species Observed

Appendix A
Plant Species Observed

Family	Scientific Name	Common Name
GYMNOSPERMS		
Cupressaceae	*Cupressus sempervirens**	Italian cypress
ANGIOSPERMS – EUDICOTS		
Adoxaceae	*Sambucus nigra* ssp. *caerulea*	blue elderberry
Aizoaceae	*Carpobrotus edulis**	hottentot-fig
Anacardiaceae	*Malosma laurina*	laurel sumac
	Rhus aromatica	basket-brush
	Rhus ovata	sugar bush
	*Schinus molle**	Peruvian pepper tree
	Toxicodendron diversilobum	poison oak
Apocynaceae	*Nerium oleander**	oleander
Asteraceae	*Acourtia microcephala*	sacapellote
	Ambrosia acanthicarpa	annual bur-sage
	Artemisia californica	California sagebrush
	Artemisia douglasiana	mugwort
	Artemisia tridentata	Great Basin sagebrush
	Baccharis pilularis	coyote brush
	Baccharis salicifolia	mule fat
	*Centaurea benedicta**	blessed thistle
	*Centaurea melitensis**	tocalote
	Corethrogyne filaginifolia	common sand aster
	Deinandra fasciculata	fascicled tarplant
	Encelia farinosa	brittlebush
	Ericameria pinifolia	pine goldenbush
	Erigeron canadensis	horseweed
	Eriophyllum confertiflorum	golden-yarrow
	Gutierrezia californica	California matchweed
	Hazardia squarrosa	saw-toothed goldenbush
	Helianthus annuus	western sunflower
	Heterotheca grandiflora	telegraph weed
	Isocoma menziesii	goldenbush
	Iva axillaris	povertyweed
	*Lactuca serriola**	wild lettuce
	Lepidospartum squamatum	scale-broom
	Malacothrix saxatilis	cliff aster
	Osteospermum sp.*	African daisy
	Pseudognaphalium californicum	California everlasting
	*Pseudognaphalium luteoalbum**	everlasting cudweed
	*Silybum marianum**	milk thistle
	*Sonchus asper**	prickly sow thistle
	Stephanomeria virgata	virgate wreath-plant
	*Taraxacum officinale**	dandelion
	Uropappus lindleyi	silver puffs
Boraginaceae	*Amsinckia intermedia*	rancher's fiddleneck
	Emmenanthe penduliflora	whispering bells
	Eucrypta chrysanthemifolia	common eucrypta
	Eriodictyon crassifolium	felt-leaf yerba santa
	Heliotropium curassavicum var. *occulatum*	salt heliotrope
	Phacelia brachyloba	short lobed phacelia

Appendix A (cont.)
Plant Species Observed

Family	Scientific Name	Common Name
ANGIOSPERMS – EUDICOTS (cont.)		
Boraginaceae (contin.)	*Phacelia cicutaria*	caterpillar phacelia
	Phacelia distans	wild heliotrope
Brassicaceae	*Hirschfeldia incana**	short-pod mustard
	*Sisymbrium irio**	London rocket
	Sisymbrium orientale *	hare's ear cabbage
Cactaceae	*Opuntia basilaris*	beavertail cactus
Chenopodiaceae	*Atriplex canescens*	fourwing saltbush
	*Atriplex semibaccata**	Australian saltbush
	Chenopodium californicum	California pigweed
	*Chenopodium murale**	nettle-leaf goosefoot
	*Salsola tragus**	Russian thistle
Convolvulaceae	*Calystegia peirsonii*[1]	Peirson's morning-glory
	Cuscuta sp.	dodder
Crassulaceae	*Dudleya lanceolata*	coastal dudleya
Cucurbitaceae	*Cucurbita foetidissima*	calabazilla
	Marah macrocarpa	wild cucumber
Euphorbiaceae	*Euphorbia albomarginata*	rattlesnake weed
	Croton setigerus	dove weed
	*Euphorbia serpens**	matted sandmat
	Stillingia linearifolia	linear leaf stillingia
Fabaceae	*Acmispon glaber*	deerweed
	Astragalus pomonensis	Pomona locoweed
	Lupinus bicolor	miniature lupine
	Lupinus succulentus	arroyo lupine
	*Melilotus indicus**	Indian sweet clover
	*Robinia pseudoacacia**	black locust
Fagaceae	*Quercus berberidifolia*	scrub oak
	Quercus douglasii	blue oak
	Quercus john-tuckeri	Tucker oak
	Quercus lobata	valley oak
Geraniaceae	*Erodium cicutarium**	redstem filaree
Lamiaceae	*Marrubium vulgare**	horehound
	Salvia apiana	white sage
	Salvia columbariae	chia
	Salvia leucophylla	purple sage
	Salvia mellifera	black sage
	Trichostema lanatum	woolly blue-curls
Malvaceae	*Malacothamnus fasciculatus*	chaparral mallow
	*Malva parviflora**	cheeseweed
	Malvella leprosa	alkali-mallow
Meliaceae	*Melia azaderach**	chinaberry
Mytaceae	*Eucalyptus camaldulensis**	river red gum
	*Eucalyptus globulus**	blue gum
	*Eucalyptus polyanthemos**	silver dollar gum
Nyctaginaceae	*Mirabilis laevis ssp. crassifolia*	wishbone bush
Onagraceae	*Clarkia purpurea*	purple clarkia
	Clarkia unguiculata	elegant clarkia
	Eulobus californicus	California primrose

Appendix A (cont.)
Plant Species Observed

Family	Scientific Name	Common Name
ANGIOSPERMS – EUDICOTS (cont.)		
Orobanchaceae	*Castilleja exserta*	purple owl's clover
Papaveraceae	*Eschscholzia californica*	California poppy
Plantaginaceae	*Penstemon centranthifolius*	scarlet bugler
Polemoniaceae	*Allophyllum divaricatum*	purple fasle gilia
	Eriastrum densifolium	giant eriastrum
	Gilia angelensis	gilia
Polygonaceae	*Chorizanthe staticoides*	Turkish rugging
	Eriogonum fasciculatum	buckwheat
	*Polygonum aviculare**	common knotweed
	*Rumex crispus**	curly dock
Portulacaceae	*Portulaca oleracea**	common purslane
Ranunculaceae	*Delphinium parryi*	San Bernardino larkspur
Rhamnaceae	*Rhamnus crocea*	spiny redberry
Rosaceae	*Adenostoma fasciculatum*	chamise
	Heteromeles arbutifolia	toyon
	Prunus ilicifolia	holly-leafed cherry
Rubiaceae	*Galium angustifolium*	narrow-leaved bedstraw
Salicaceae	*Populus fremontii* ssp. *fremontii*	Fremont cottonwood
	Salix gooddingii	Goodding's black willow
	Salix laevigata	red willow
Santalaceae	*Phoradendron* sp.	mistletoe
Sapindaceae	*Koelreuteria paniculata**	goldenrain tree
Scrophulariaceae	*Scrophularia californica*	California figwort
	*Verbascum virgatum**	wand mullein
Simaroubaceae	*Ailanthus altissima**	tree-of-heaven
Solanaceae	*Datura wrightii*	jimson weed
	*Nicotiana glauca**	tree tobacco
	Nicotiana quadrivalvis	Indian tobacco
	Solanum xanti	purple nightshade
Tamaricaceae	*Tamarix ramosissima**	saltcedar
Ulmaceae	*Ulmus pumila**	Siberian elm
Urticaceae	*Urtica dioica*	stinging nettle
Verbenaceae	*Verbena lasiostachys*	verbena
Vitaceae	*Vitis vinifera**	cultivated grape
Zygophyllaceae	*Tribulus terrestris**	puncture vine
ANGIOSPERMS – MONOCOTS		
Agavaceae	*Hesperoyucca whipplei*	Our Lord's candle
Arecaceae	*Washingtonia robusta**	Mexican fan palm
Liliaceae	*Calochortus clavatus* var. *clavatus*[2]	club-haired mariposa lily
	Calochortus clavatus var. *gracilis*[3]	slender mariposa lily
	Calochortus splendens	lilac mariposa lily
	Calochortus venustus	butterfly mariposa lily

Appendix A (cont.)
Plant Species Observed

Family	Scientific Name	Common Name
ANGIOSPERMS – MONOCOTS (cont.)		
Poaceae	*Arundo donax**	giant reed
	*Avena barbata**	slender oat
	*Avena fatua**	wild oats
	*Bromus diandrus**	common ripgut grass
	*Bromus hordeaceus**	soft brome
	Bromus madritensis ssp. *rubens* *	red brome
	*Bromus tectorum**	cheatgrass
	*Cynodon dactylon**	Bermuda grass
	Distichlis spicata	saltgrass
	Elymus condensatus	giant wild rye
	*Festuca myuros**	fescue
	*Hordeum murinum**	hare barley
	*Polypogon monspeliensis**	annual beardgrass
	*Schismus barbatus**	Mediterranean grass
Themidaceae	*Bloomeria crocea*	common goldenstar
	Dichelostemma capitatum	blue dicks

* Non-native species
[1] California Rare Plant Rank (CRPR) 4.2
[2] CRPR 4.3
[3] CRPR 1B.2

Appendix B

Animal Species Observed or Detected

Appendix B
Animal Species Observed or Detected

Order	Family	Scientific Name	Common Name
Insects			
Lepidoptera	Pieridae	*Anthocharis sara sara*	Sara orangetip
	Riodinidae	*Apodemia mormo virgulti*	Behr's metalmark
Reptiles			
Squamata	Phrynosomatidae	*Sceloporus occidentalis*	western fence lizard
Birds			
Accipitriformes	Accipitridae	*Accipiter cooperii*	Cooper's hawk
		Buteo jamaicensis	red-tailed hawk
	Cathartidae	*Cathartes aura*	turkey vulture
Apodiformes	Apodidae	*Aeronautes saxatalis*	white-throated swift
	Trochilidae	*Calypte anna*	Anna's hummingbird
		Calypte costae	Costa's hummingbird
		Selasphorus sp.	hummingbird sp.
Charadriiformes	Charadriidae	*Charadrius vociferus*	killdeer
Columbiformes	Columbidae	*Columba livia*	rock pigeon
		Streptopelia decaocto	Eurasian collared-dove
		Zenaida macroura	mourning dove
Cuculiformes	Cuculidae	*Geococcyx californianus*	greater roadrunner
Falconiformes	Falconidae	*Falco sparverius*	American kestrel
Galliformes	Odontophoridae	*Callipepla californica*	California quail
Passeriformes	Aegithalidae	*Psaltriparus minimus*	bushtit
	Alaudidae	*Eremophila alpestris*	horned lark
	Cardinalidae	*Passerina caerulea*	blue grosbeak
		Pheucticus melanocephalus	black-headed grosbeak
		Piranga ludoviciana	western tanager
	Corvidae	*Aphelocoma californica*	California scrub-jay
		Corvus brachyrhynchos	American crow
		Corvus corax	common raven
	Emberizidae	*Aimophila ruficeps*	rufous-crowned sparrow
		Chondestes grammacus	lark sparrow
		Melospiza melodia	song sparrow
		Pipilo crissalis	California towhee
		Pipilo maculatus	spotted towhee
		Zonotrichia leucophrys	white-crowned sparrow
	Fringillidae	*Haemorhous mexicanus*	house finch
		Spinus psaltria	lesser goldfinch
		Spinus tristis	American goldfinch
	Hirundinidae	*Hirundo rustica*	barn swallow
		Petrochelidon pyrrhonota	cliff swallow
		Stelgidopteryx serripennis	northern rough-winged swallow
	Icteridae	*Agelaius phoeniceus*	red-winged blackbird
		Icterus cucullatus	hooded oriole
		Molothrus ater	brown-headed cowbird
		Sturnella neglecta	western meadowlark
	Mimidae	*Mimus polyglottos*	northern mockingbird
		Toxostoma redivivum	California thrasher
	Paradoxornithidae	*Chamaea fasciata*	wrentit
	Paridae	*Baeolophus inornatus*	oak titmouse

Appendix B (cont.)
Animal Species Observed or Detected

Order	Family	Scientific Name	Common Name
Birds (cont.)			
Passeriformes (cont.)	Parulidae	*Cardellina pusilla*	Wilson’s warbler
		Geothlypis trichas	common yellowthroat
		Oreothlypis celata	orange-crowned warbler
		Setophaga coronate	yellow-rumped warbler
	Passerellidae	*Aimophila ruficeps*	rufous-crowned sparrow
		Melospiza melodia	song sparrow
		Melozone crissalis	California towhee
		Pipilo maculatus	spotted towhee
		Zonotrichia leucophrys	white-crowned sparrow
	Polioptilidae	*Polioptila caerulea*	blue-gray gnatcatcher
	Ptilogonatidae	*Phainopepla nitens*	Phainopepla
	Sturnidae	*Sturnus vulgaris*	European starling
	Troglodytidae	*Thryomanes bewickii*	Bewick's wren
	Turdidae	*Sialia mexicana*	western bluebird
		Turdus migratorius	American robin
	Tyrannidae	*Contopus sordidulus*	western wood-pewee
		Empidonax difficilis	pacific-slope flycatcher
		Myiarchus cinerascens	ash-throated flycatcher
		Sayornis nigricans	black phoebe
		Sayornis saya	Say's phoebe
		Tyrannus verticalis	western kingbird
		Tyrannus vociferans	Cassin's kingbird
Piciformes	Picidae	*Colaptes auratus*	northern flicker
		Melanerpes formicivorus	acorn woodpecker
		Picoides nuttallii	Nuttall's woodpecker
		Picoides pubescens	Downy woodpecker
Mammals			
Carnivora	Canidae	*Canis latrans*	coyote
	Felidae	*Lynx rufus*	bobcat
	Procyonidae	*Procyon lotor*	raccoon
Lagomorpha	Leporidae	*Sylvilagus audubonii*	desert cottontail
Rodentia	Sciuridae	*Otospermophilus beecheyi*	California ground squirrel

Appendix C

Representative Site Photographs

Photograph 1: Overview of the study area, facing west. Note the flatter portions of the study area support mostly non-native grass species due to historical ranching activities and the steeper hillsides support native Riversidean upland sage scrub.

Photograph 2: View of the mule fat scrub community, facing south.

Photograph 3: View of the non-native vegetation community (left) and elderberry savanna community (right), facing west.

Photograph 4: View of the big sagebrush scrub community (foreground) and giant reed stand community (background), facing southwest.

Note: See Figure 5 for photograph locations.

Source: HELIX 2017

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Representative Site Photographs

Photograph 5: View of the non-native vegetation community (left) and the southwestern willow scrub/giant reed stand community (right), facing north.

Photograph 6: View of non-native grassland community (left) and Riversidean upland sage scrub community (right), facing south. The non-native grassland/Riversidean upland sage scrub can be seen on the hillsides in the background.

Photograph 7: View of the Riversidean upland sage scrub/non-native grassland community (left) and disturbed habitat (right), facing south.

Photograph 8: View of the scrub oak chaparral community, facing southeast.

Note: See Figure 5 for photograph locations.

Source: HELIX 2017

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Representative Site Photographs

Appendix D

Burrowing Owl Focused Survey Report

HELIX Environmental Planning, Inc.
16485 Laguna Canyon Road
Suite 150
Irvine, CA 92618
949.234.8792 **tel.**
619.462.0552 **fax**
www.**helixepi**.com

September 7, 2018 IPQ-25

Mr. Scott Covington
Integral Communities
888 San Clemente Drive, Suite 100
Newport Beach, CA 92660

Subject: 2018 Burrowing Owl (*Athene cunicularia*) Survey Report for the Bouquet Canyon Road Project

Dear Mr. Covington:

This letter report presents the results of the 2018 focused burrowing owl (*Athene cunicularia*; BUOW) survey conducted by HELIX Environmental Planning, Inc. (HELIX) for the Bouquet Canyon Road Project (project) located in the City of Santa Clarita, Los Angeles County, California. The survey was conducted in accordance with the California Department of Fish and Wildlife (CDFW; previously California Department of Fish and Game [CDFG]) Staff Report on Burrowing Owl Mitigation (CDFG 2012). This letter report describes the methods used to perform the survey and the survey results.

PROJECT SITE LOCATION

The 78.10-acre project site is generally located 6.9 miles to the east of Interstate 5 and 3.8 miles to the northwest of California State Route 14 in the City of Santa Clarita (Figure 1, *Regional Location*). The project site is within Section 6 of Township 4 North, Range 15 West of the Mint Canyon, California U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 2, *Vicinity Map*). Specifically, the project site is located directly south of the intersection of David Way and Bouquet Canyon Road (Figure 3, *Aerial Photograph*).

PROJECT SITE DESCRIPTION

The project site is located in the foothills of the Sierra Pelona Mountains. The topography in the southern and western portions of the project site is predominantly steep hillsides, while the northern portion is primarily flat. Elevations on the project site range from approximately 1,365 feet above mean sea level (AMSL) near the northwest corner of the project to approximately 1,520 feet above AMSL near the southeastern corner. The steep hills throughout the southern and western portions of the site are predominated by Riversidean upland sage scrub while the flatter portions of the project site are dominated by non-native grassland. Seven soil types are mapped on the project site, including Hanford sandy loam (HcC), Metz loam sandy (MfA), Mocho loam (MpA), Ojai loam (OgF), Saugus loam (ScF2), Sorrento loam (SsA), and Yolo loam (YoC).

Immediate surrounding land uses include existing residential development to the north and west, a mixture of undeveloped land and residential development to the south, and undeveloped land and juvenile detention schools to the east (Figure 3). The project site is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest.

Representative photographs of the project site are shown on Attachment A, *Site Photographs*.

METHODS

The focused BUOW survey was conducted according to the CDFW BUOW survey guidelines (CDFG 2012), which includes Part I Habitat Assessment and Focused Burrow Survey and Part II Focused BUOW Surveys. The CDFW BUOW survey guidelines are described in further detail below.

Part I: Habitat Assessment and Focused Burrow Survey

Prior to conducting the habitat assessment, HELIX consulted the California Natural Diversity Database (CNDDB) to determine the nearest BUOW occurrence(s). A habitat assessment was conducted by HELIX biologists Lauren Singleton and Daniel Torres on March 27, 2018, to determine whether the project site supports suitable BUOW habitat. A focused burrow survey was conducted concurrently with the habitat assessment. All suitable burrows (i.e., greater than 11 centimeters [cm] in height and width and greater than 150 cm in depth) and burrow surrogates were recorded using a handheld Global Positioning System (GPS) unit (Figure 4, *Suitable Burrow and Transect Locations*). The habitat assessment and focused burrow survey were conducted prior to commencement of the BUOW focused surveys. The assessment was conducted on the project site and within a 150-meter (approximately 500-foot) buffer zone around the periphery of the project site (survey area). The survey area was slowly walked and assessed for suitable BUOW habitat, including:

- disturbed low-growing vegetation within grassland and shrublands (less than 30 percent canopy cover);
- gently rolling or level terrain;
- areas with abundant small mammal burrows, especially California ground squirrel (*Otospermophilus beecheyi*) burrows;
- fence posts, rocks, or other low perching locations; and
- man-made structures, such as earthen berms, debris piles, and cement culverts.

All potential burrows were checked for signs of recent owl occupation. Signs of occupation include:

- pellets/casting (regurgitate fur, bones, and/or insect parts);
- white wash (excrement); and/or
- feathers.

Part II: Locating Burrowing Owls

Since suitable habitat and burrows were observed within the survey area, focused BUOW surveys were conducted to determine whether the survey area supports BUOW. The focused surveys consisted of four breeding season surveys that were performed by HELIX biologist Ezekiel Cooley between April 13 and June 26, 2018. The surveys were spaced at least three weeks apart, with at least one survey conducted between February 15 and April 15 and three surveys conducted between April 15 and July 15 (Table 1, *Survey Information*)

The biologist walked transects spaced no greater than 20 meters apart (approximately 65 feet) to allow for 100 percent visual coverage of all suitable habitat within the survey area (Figure 4). The biologist walked slowly and methodically, closely checking suitable habitat within the survey area for BUOW diagnostic sign (e.g., molted feathers, pellets/castings, or whitewash at or near a burrow entrance) and individual BUOW. If observed, BUOW sign and BUOW observations were recorded with a GPS unit. Inaccessible areas of the survey area were visually assessed using binoculars.

Table 1
SURVEY INFORMATION

Site Visit	Survey Date	Biologist	Start/Stop Time	Start/Stop Weather Conditions	Survey Results
HA[1]	03/27/18	Lauren Singleton Daniel Torres	0800-1300	54°F, wind 6-7 mph, 0% clouds 66°F, wind 6-7 mph, 0% clouds	Suitable habitat and burrows present.
1	04/13/18	Ezekiel Cooley	0630-1000	48°F, wind 2-3 mph, 100% clouds 63°F, wind 2-4 mph, 5% clouds	No BUOW detected.
2	05/11/18	Ezekiel Cooley	0625-1000	58°F, wind 2-3 mph, 100% clouds 61°F, wind 1-2 mph, 100% clouds	No BUOW detected.
3	06/08/18	Ezekiel Cooley	0600-1000	56°F, wind 2-3 mph, 0% clouds 73°F, wind 1-2 mph, 0% clouds	No BUOW detected.
4	06/26/18	Ezekiel Cooley	0630-0950	61°F, wind 0-1 mph, 0% clouds 70°F, wind 0-1 mph, 5% clouds	No BUOW detected.

[1] Part I Habitat Assessment and focused burrowing survey.

RESULTS

No BUOW have been previously recorded on the project site. The nearest BUOW observation record in CNDDB was observed in 2005, approximately three miles to the southeast of the survey area (California Department of Fish and Wildlife 2018).

Suitable BUOW habitat was observed within the survey area, including low-growing vegetation within disturbed areas and non-native grasslands (Attachment A). Several burrows that could potentially be used by BUOW were observed within the survey area and suitable foraging habitat was observed within and adjacent to the survey area. No BUOW or sign of BUOW occupation were observed within the survey area during the four focused surveys. Therefore, BUOW do not currently occupy the survey area. Observed burrow locations and transects walked are show on Figure 4.

CONCLUSION

No BUOW were observed or detected within the survey area during the focused surveys. Burrows with potential to support BUOW were noted on the project site, but no sign of BUOW occupation was observed. A take avoidance (pre-construction) survey is required to be conducted within 14 days prior to ground disturbance in accordance with CDFW Staff Report on Burrowing Owl Mitigation (2012). If ground-disturbing activities are delayed more than 14 days after the pre-construction survey has been completed, the project site must be resurveyed.

If you have any questions regarding the information presented in this letter report, please contact Ezekiel Cooley (EzekielC@helixepi.com) at (949) 234-8770.

Sincerely,

Ezekiel Cooley
Biologist

Enclosures:

Figure 1: Regional Location
Figure 2: Vicinity Map
Figure 3: Aerial Photograph
Figure 4: Suitable Burrow and Transect Locations
Attachment A: Site Photographs

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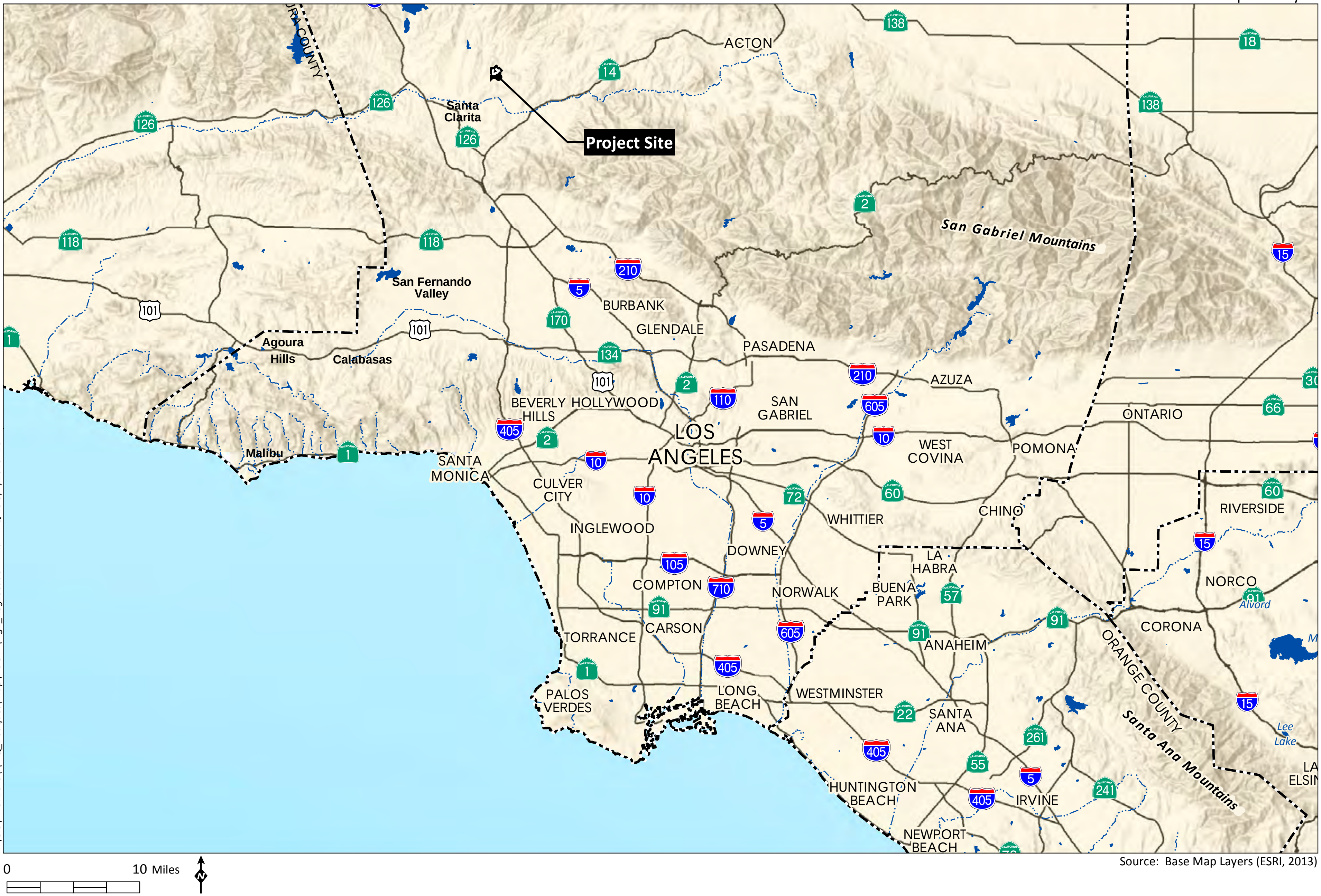

Source: Base Map Layers (ESRI, 2013)

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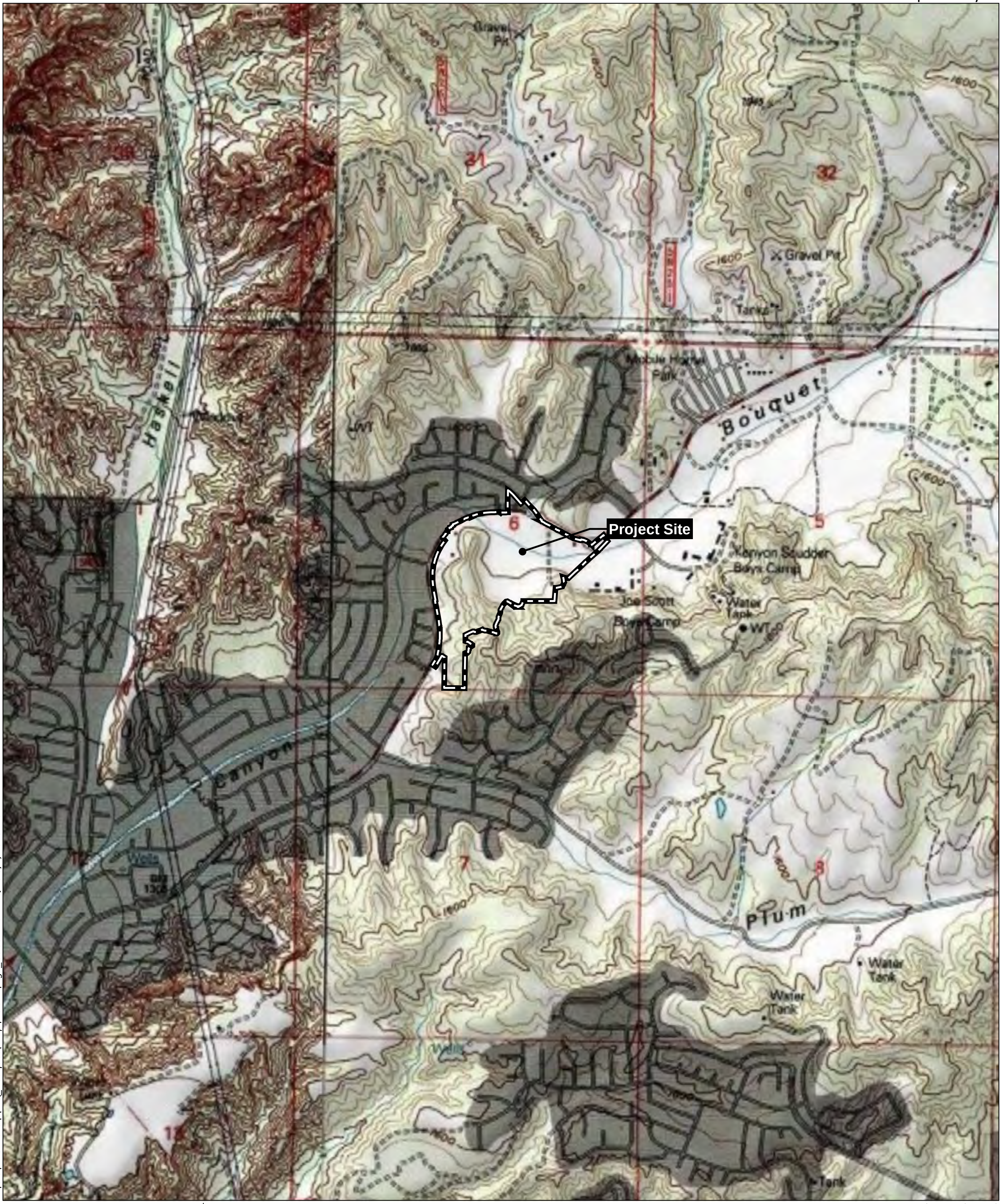
HELIX Environmental Planning

Regional Location

Figure 1



Source: Mint Canyon 7.5' Quad (USGS)

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HELIX
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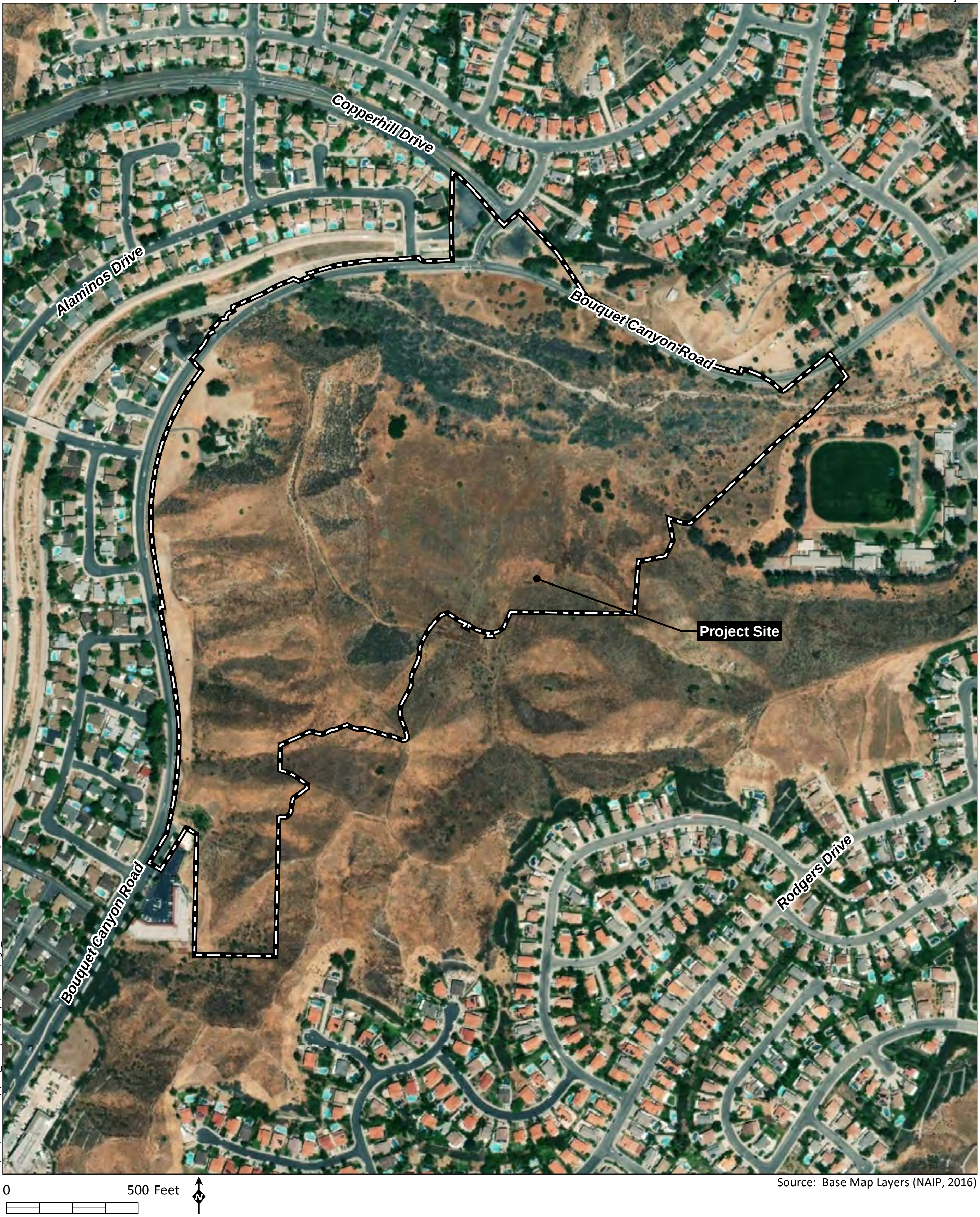
Vicinity Map

Figure 2



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Source: Base Map Layers (NAIP, 2016)

HELIX
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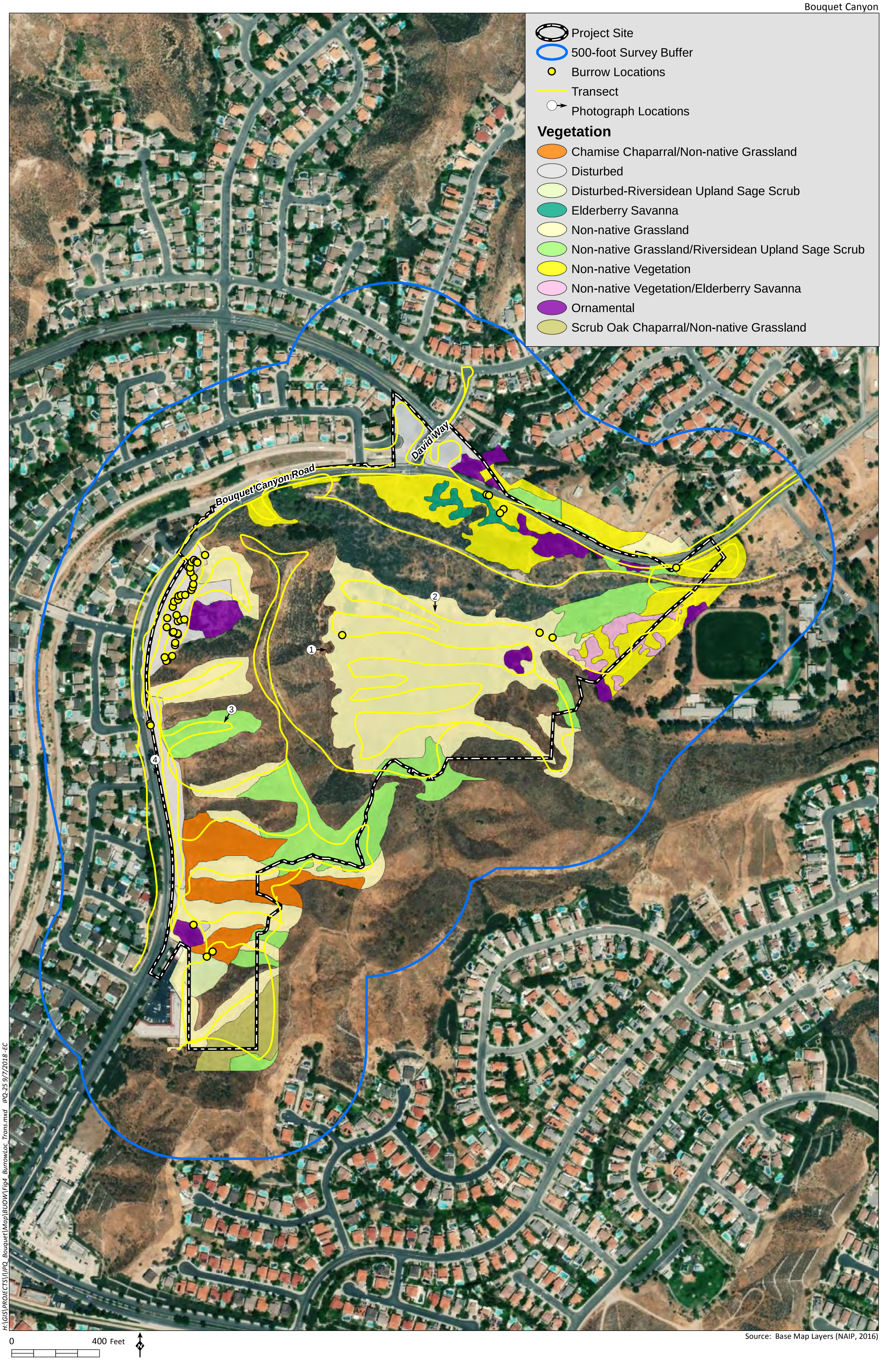
Aerial Photograph

Figure 3



HELIX
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Suitable Burrow and Transect Locations

Figure 4

Photograph 1: View of the non-native grassland located in the center of the study area, facing east.

Photograph 2: View of the non-native grassland located in the center of the study area, facing south.

Photograph 3: View of disturbed-riversidean upland sage scrub in foreground, chamise chaparral/non-native grassland, non-native grassland, and disturbed area in the background, facing southwest.

Photograph 4: View of disturbed areas located adjacent to Bouquet Canyon Road, facing south.

Note: See Figure 4 for photograph locations.

Source: HELIX 2018

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Environmental Planning

Site Photographs

Attachment A

Appendix E

Coastal California Gnatcatcher Focused Survey Report

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942
619.462.1515 tel
619.462.0552 fax
www.helixepi.com

June 22, 2018 IPQ-25

Mr. Chris Kofron
US Fish & Wildlife Service
2493 Portola Road, Suite B
Ventura, California 93003

Subject: 2018 Coastal California Gnatcatcher (*Polioptila californica californica*) Survey Report for the Bouquet Canyon Project

Dear Mr. Kofron:

This letter presents the results of a US Fish and Wildlife Service (USFWS) protocol presence/absence survey of the federally listed threatened coastal California gnatcatcher (*Polioptila californica californica*; CAGN) conducted by HELIX Environmental Planning, Inc. (HELIX) for the Bouquet Canyon Project (project). The project site is comprised of four parcels with Assessor Parcel Numbers (APNs) 2812-008-03, -013, -022, and -031 located in the City of Santa Clarita, Los Angeles County, California. The project site also includes the northwest corner of the parcel with APN 2812-038-022, which may be considered for slope stabilization associated with the proposed development, and a road easement that extends through the southern portion of the parcel with APN 2812-008-022. In addition, a 100-foot buffer around the project site was evaluated. This report describes the methods used to perform the survey and the results, which is being submitted to the USFWS as a condition of HELIX's Threatened and Endangered Species Permit TE-778195-13.

PROJECT LOCATION

The approximately 78-acre project site and 24-acre buffer is generally located 6.9 miles to the east of Interstate 5 and 3.8 miles to the northwest of California State Route 14 in the City of Santa Clarita (Figure 1). Specifically, the project site is located directly south of the intersection of David Way and Bouquet Canyon Road (Figure 2). The project site is within Section 6 of Township 4 North, Range 15 West of the Mint Canyon, California US Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 3).

Immediate surrounding land uses include existing residential development to the north and west, a mixture of undeveloped land and residential development to the south, and undeveloped land and juvenile detention schools to the east. The project site is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest.

METHODS

The survey consisted of six visits that were performed by HELIX biologist Tara Baxter (TE 87004B-0) in accordance with the current (1997) USFWS protocol. Approximately 32.83 acres of potential CAGN habitat occurs within the survey area, which consists of big sagebrush scrub, Riversidean upland sage scrub, disturbed-Riversidean upland sage scrub, Riversidean upland sage scrub/non-native grassland, and non-native grassland/Riversidean upland sage scrub mapped within the project site and 100-foot buffer (Figure 4). Table 1 details the survey dates, times, and conditions.

The surveys were conducted by walking within and along the perimeter of suitable CAGN habitat within the project site. Suitable habitat in areas adjacent to the project site were surveyed from the project site boundary. The survey route was arranged to ensure complete survey coverage of habitat with potential for occupancy by CAGN. Surveys were conducted with binoculars to aid in bird detection. Recorded CAGN vocalizations were played sparingly and only if other means of detection had failed. If a CAGN was detected before playing recorded vocalizations, the recordings were not played. Once CAGNs were initially detected in an area, use of playback was discontinued. The approximate survey route followed is depicted on Figure 4.

Table 1
GNATCATCHER SURVEY INFORMATION

Site Visit	Survey Date	Biologist(s)	Start/Stop Time	Approx. Acres Surveyed/ Acres per Hour	Start/Stop Weather Conditions	Survey Results
1	03/24/18	Tara Baxter	0715/1045	32.83 ac/ 9.38 ac/hr	46°F, wind 2-4 mph, 20% cloud cover 64°F, wind 3-5 mph, 40% cloud cover	No CAGN detected
2	04/07/18	Tara Baxter	0630/0930	32.83 ac/ 9.38 ac/hr	56°F, wind 0-2 mph, 15% cloud cover 70°F, wind 1-3 mph, 20% cloud cover	No CAGN detected
3	04/14/18	Tara Baxter	0830/1130	32.83 ac/ 9.38 /hr	67°F, wind 0-2mph, 0% cloud cover 77°F, wind 0-2 mph, 0% cloud cover	No CAGN detected
4	04/21/18	Tara Baxter	0700/1000	32.83 ac/ 9.38 ac/hr	50°F, wind 0-2mph, 0% cloud cover 68°F, wind 1-3 mph, 0% cloud cover	No CAGN detected
5	05/05/18	Tara Baxter	0600/0900	32.83 ac/ 9.38 ac/hr	57°F, wind 0-2 mph, 5% cloud cover 74°F, wind 1-3 mph, 10% cloud cover	No CAGN detected
6	05/12/18	Tara Baxter	0645/0945	32.83 ac/ 9.38 ac/hr	59°F, wind 1-4 mph, 95% cloud cover 63°F, wind 1-4 mph, 100% cloud cover	No CAGN detected

COASTAL CALIFORNIA GNATCATCHER HABITAT

Big Sagebrush Scrub

Big sagebrush scrub comprises mostly soft-woody shrubs up to two meters tall, and usually has bare ground underneath and between the shrubs. This vegetation community is dominated by big sagebrush (*Artemisia tridentata*) and occurs on a wide variety of soils and terrain, from rocky, well-drained slopes to fine-textured valley soils with high water tables. Other species observed in this community included mostly non-native species, such as giant reed (*Arundo donax*), short-pod mustard (*Hirschfeldia incana*), and tree tobacco (*Nicotiana glauca*).

Riversidean Upland Sage Scrub

Riversidean upland sage scrub (including disturbed-Riversidean sage scrub, Riversidean sage scrub/non-native grassland, and non-native grassland/Riversidean sage scrub) occupies xeric sites such as steep slopes, severely drained soils, or clays that slowly release stored soil moisture. This vegetation community is dominated by California sagebrush (*Artemisia californica*) and California buckwheat (*Eriogonum fasciculatum*). Other species observed in this community included basket-brush (*Rhus aromatica*), purple sage (*Salvia leucophylla*), and rancher's fiddleneck (*Amsinckia intermedia*).

Disturbed-Riversidean sage scrub has been subjected to human disturbance and has a lower percent cover of Riversidean sage scrub species and a higher percent cover of bare ground. Riversidean sage scrub/non-native grassland is dominated by California sagebrush and California buckwheat with several non-native grass species interspersed between shrubs, including red brome (*Bromus madritensis* ssp. *rubens*), ripgut (*Bromus diandrus*), and soft chess (*Bromus hordeaceus*). Non-native grassland/Riversidean sage scrub is dominated by non-native grass species with interspersed California sagebrush and California buckwheat shrubs.

RESULTS

No coastal California gnatcatchers were detected during the survey (Figure 4). CAGN is assumed to be absent from the survey area.

CERTIFICATION

I certify that the information in this survey report and enclosed exhibit fully and accurately represent our work.

Sincerely,

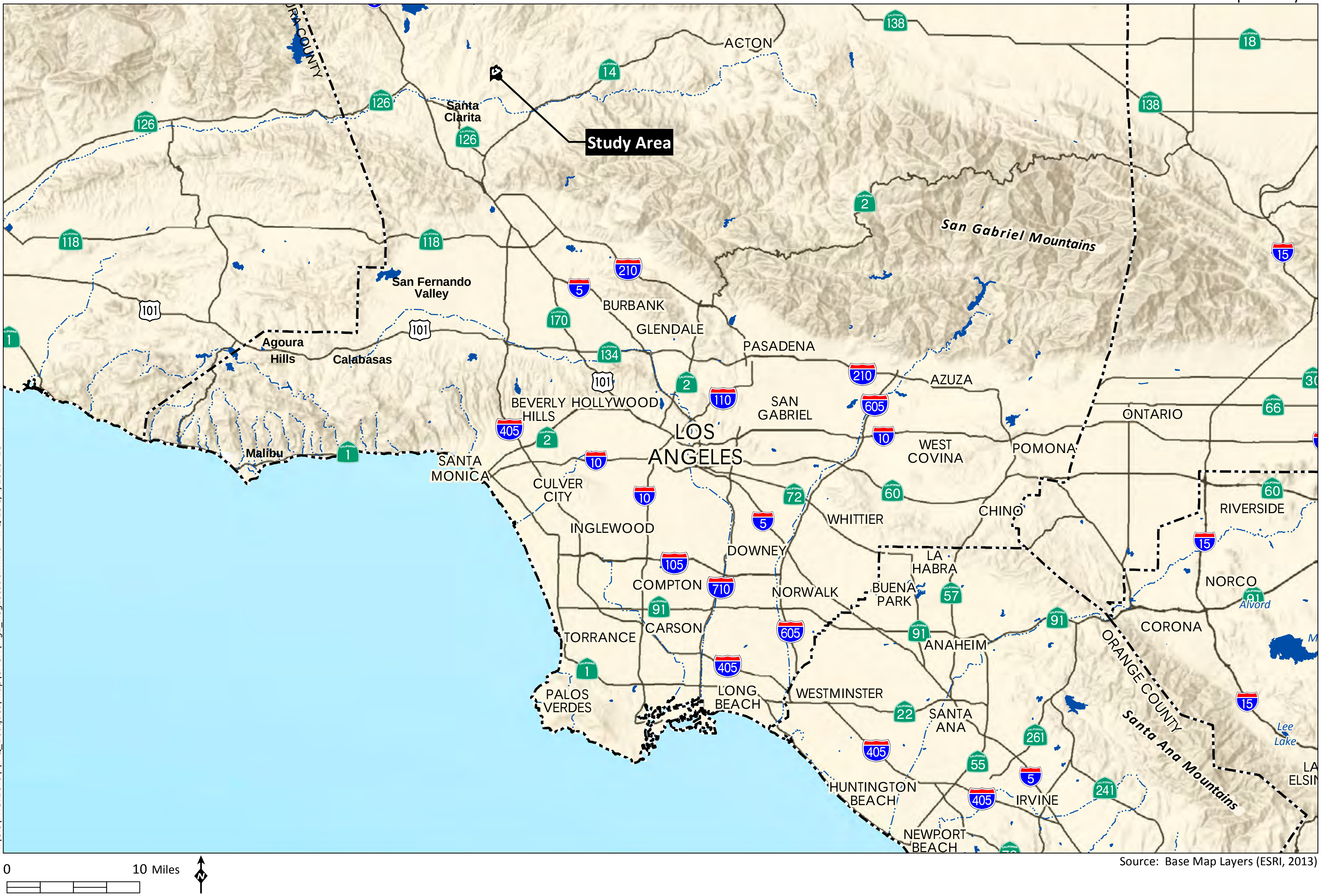
TARA

Tara Baxter

Enclosures:
Figure 1 Regional Location
Figure 2 Project Vicinity (Aerial Photograph)
Figure 3 Project Vicinity (USGS Topography)
Figure 4 2018 Coastal California Gnatcatcher Survey Results

REFERENCES

US Fish and Wildlife Service (USFWS). 1997. Coastal California Gnatcatcher (*Polioptila californica californica*) Presence/Absence Survey Protocol. 5pp.



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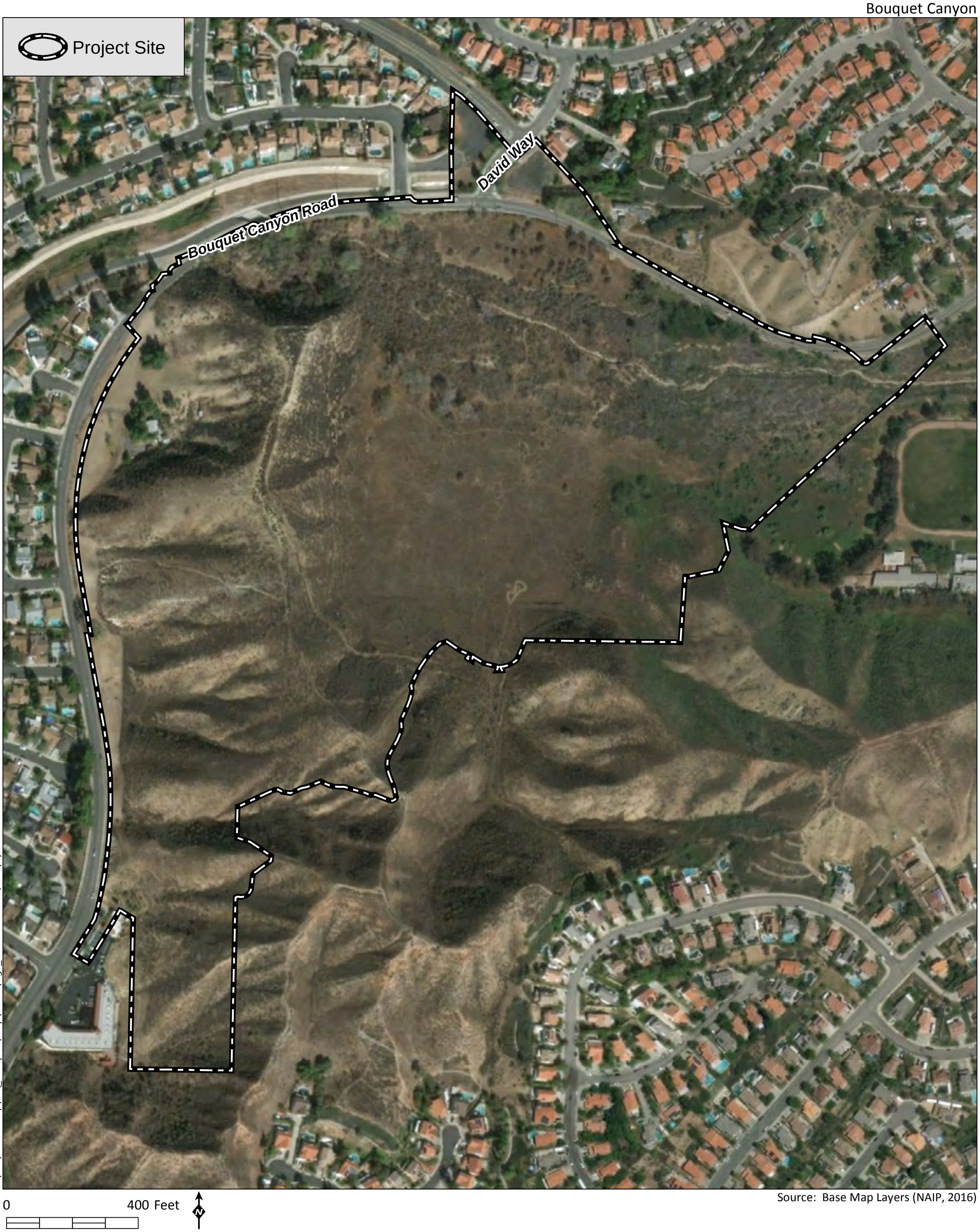
Source: Base Map Layers (ESRI, 2013)

HELIX Environmental Planning

Regional Location

Figure 1



Source: Base Map Layers (NAIP, 2016)

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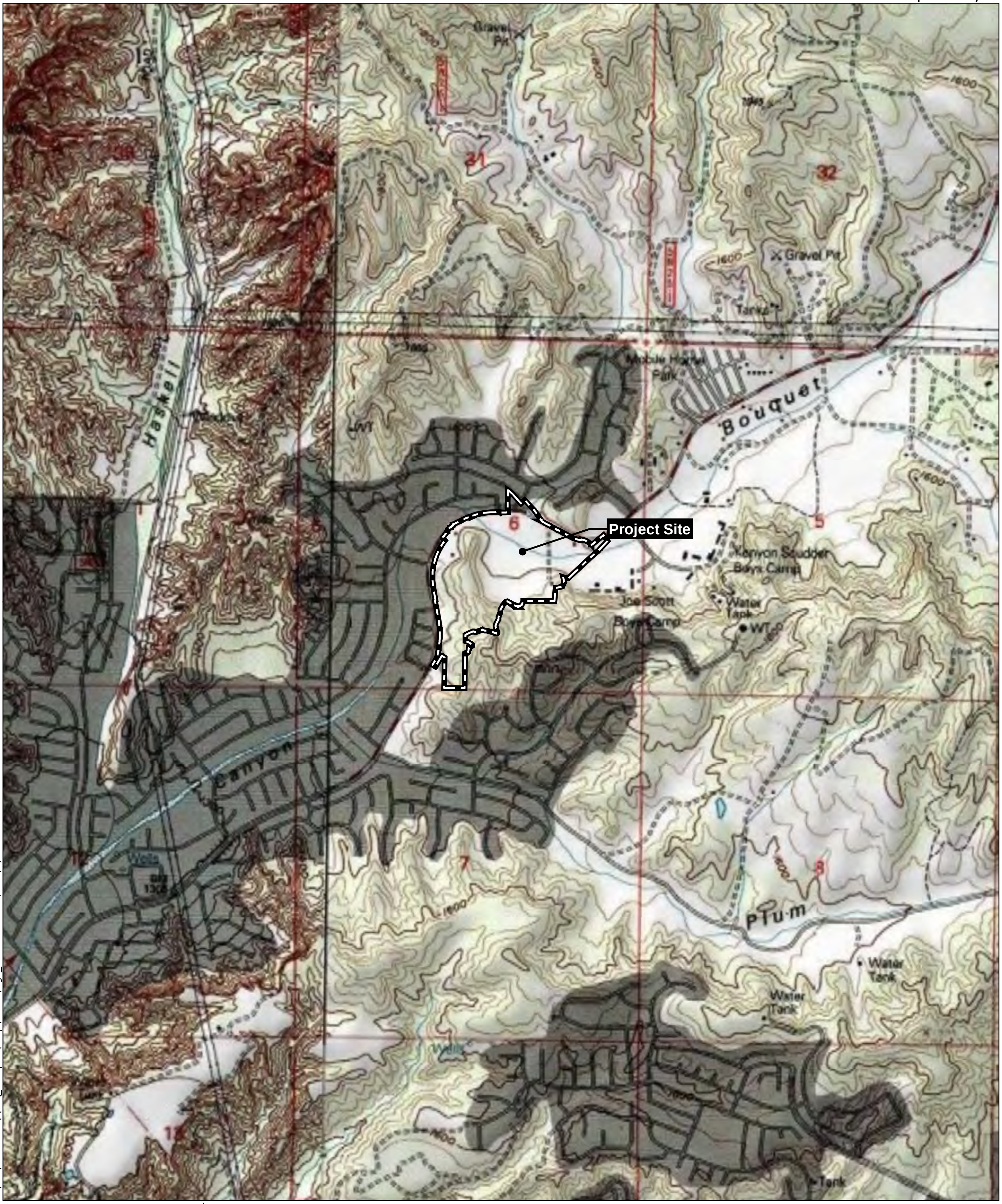
Project Vicinity (Aerial Photograph**)**

Figure 2



Source: Mint Canyon 7.5' Quad (USGS)

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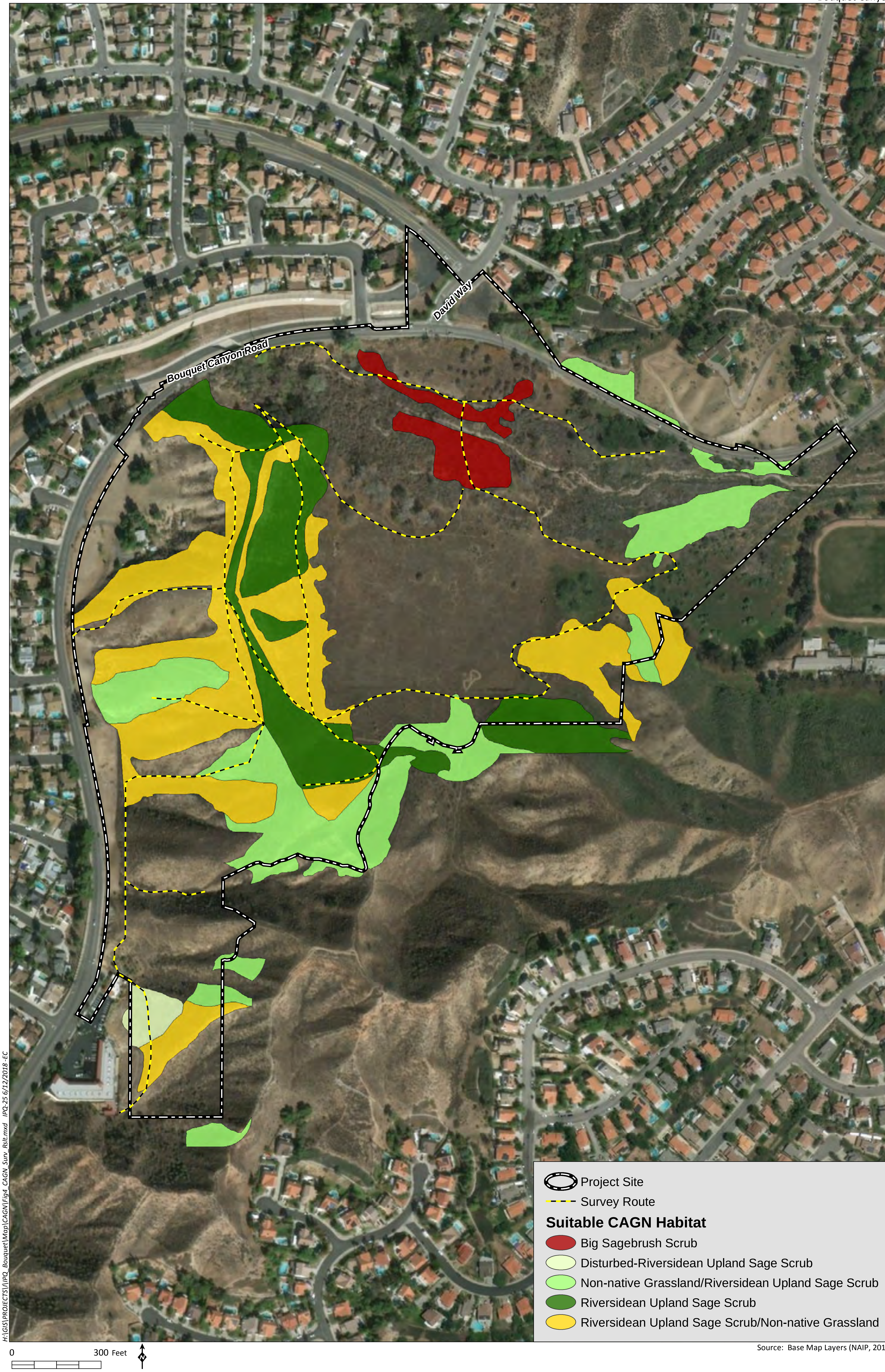
Project Vicinity (USGS Topography)

Figure 3



Source: Base Map Layers (NAIP, 2016)

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HELIX Environmental Planning

2018 Coastal California Gnatcatcher Survey Results

Figure 4

Appendix F

Representative Drainage Photographs

Photograph 1: View of the eastern portion of Bouquet Canyon Creek, facing downstream. The unvegetated river wash can be seen in the foreground and the mule fat scrub community can be seen in the distance.

Photograph 2: View of the central portion of Bouquet Canyon Creek within the study area, facing upstream. The unvegetated river wash can be seen in the foreground and the giant reed stand vegetation community can be seen along the banks.

Photograph 3: View of the western portion of Bouquet Canyon Creek within the study area, facing upstream. The giant reed stand vegetation community can be seen along the banks.

Photograph 4: View of the western most portion of Bouquet Canyon Creek within the study area, facing upstream. The giant reed stand vegetation community can be seen along the banks.

Note: See Figure 7 for photograph locations.

Source: HELIX 2017

HELIX Environmental Planning

Representative Drainage Photographs

Appendix F

Appendix G

Jurisdictional Delineation Report

Bouquet Canyon Project

Jurisdictional Delineation Report

September 20. 2017 | IPQ-25

Ezekiel Cooley
Project Manager

Prepared for:

Integral Communities
888 San Clemente Drive, Suite 100
Newport Beach, CA 92660

Prepared by:

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

Bouquet Canyon Project

Jurisdictional Delineation Report

Prepared for:

Integral Communities
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Prepared by:

HELIX Environmental Planning, Inc.
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Irvine, CA 92618

September 20, 2017 | IPQ-25

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ACRONYMS AND ABBREVIATIONS

AMSL	Above mean sea level
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
EPA	Environmental Protection Agency
HELIX	HELIX Environmental Planning, Inc.
IP	Individual Permit
MCV	A Manual of California Vegetation
NWP	Nationwide Permit
OHWM	Ordinary high water mark
Project	Bouquet Canyon Residential Development Project
RPW	Relatively Permanent Waterbody
RWQCB	California Regional Water Quality Control Board
SAA	Stream Alteration Agreement
TNW	Traditional Navigable Waters
U.S.	United States
U.S.C.	United States Code
USGS	U.S. Geological Survey
USACE	U.S. Army Corps of Engineers
WUS	Waters of the U.S.

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1.0 INTRODUCTION

This report presents the results of a jurisdictional delineation for the proposed Bouquet Canyon Residential Development (Project), which is proposed on an approximately 56.77-acre undeveloped property located in the City of Santa Clarita, Los Angeles County, California (study area). The Project proposes a residential development, along with associated infrastructure improvements.

This delineation was conducted to identify and map existing areas within the study area that are Waters of the U.S. (WUS) under U.S. Army Corps of Engineers (USACE) jurisdiction pursuant to Section 404 of the Clean Water Act ([CWA] 33 United States Code [U.S.C.] 1344); and wetland and streambed habitats under California Department of Fish and Wildlife (CDFW) jurisdiction pursuant to Section 1600 of the California Fish and Game Code. This information is necessary to evaluate effects on jurisdictional areas and determine permit requirements for the proposed Project. This report presents HELIX Environmental Planning, Inc.'s (HELIX's) best efforts to quantify the amount of WUS and state jurisdictional habitats in the study area using the current regulations, written policies, and guidance from the agencies. The results presented here are subject to confirmation by the USACE and CDFW.

1.1 STUDY AREA LOCATION

The 56.77-acre study area is generally located 6.9 miles to the east of Interstate 5 and 3.8 miles to the northwest of California State Route 14 in the City of Santa Clarita (Figure 1, *Regional Location*). Specifically, the study area is located directly south of the intersection of David Way and Bouquet Canyon Road. The study area is within Section 6 of Township 4 North, Range 15 West of the Mint Canyon, California U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 2, *Vicinity Map*).

Immediate surrounding land uses include existing residential development to the north and west, a mixture of undeveloped land and residential development to the south, and undeveloped land and juvenile detention schools to the east (Figure 3, *Aerial Photograph*). The study area is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest.

2.0 METHODS

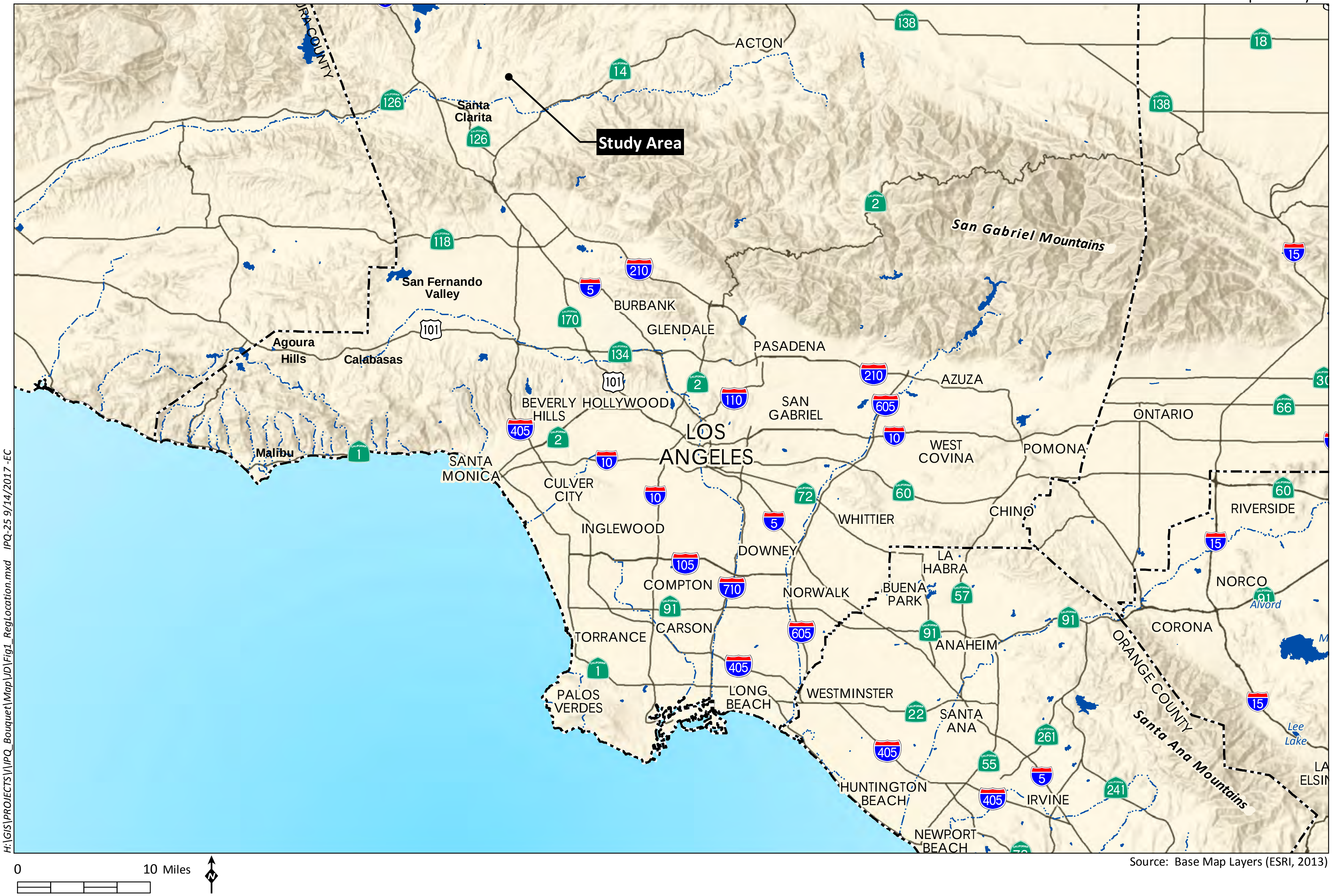
Prior to beginning fieldwork, aerial photographs (1”=75’ scale), topographic maps (1”=125’ scale), USGS quadrangle maps, and National Wetlands Inventory maps (U.S. Fish and Wildlife Service 2017) were reviewed to assist in determining the location of potential jurisdictional waters and wetlands in the study area. HELIX regulatory specialists Amir Morales and Ezekiel Cooley conducted the jurisdictional delineation field work on July 6, 2017. Data were collected in areas that were judged likely to support potential jurisdictional resources. Mapping of drainage features was performed in the field based on ordinary high water mark (OHWM) and other surface indications, as defined below.

2.1 U.S. ARMY CORPS OF ENGINEERS AND REGIONAL WATER QUALITY CONTROL BOARD JURISDICTION

Areas were determined to be potential USACE WUS wetland if the three criteria (vegetation, soils, and hydrology) established for wetland delineations, as described within the Wetlands Delineation Manual (Environmental Laboratory 1987) and Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (U.S. Army Corps of Engineers [USACE] 2008a) were met. Plants were identified according to Baldwin et al. (2012), and Calflora (2017) was used to augment common names. Wetland affiliations of plant species follow the National Wetland Plant List (Lichvar et al. 2016). Soils information was taken from the Natural Resource Conservation Services’ Web Soil Survey (2017). Areas were determined to be potential non-wetland WUS if there was evidence of regular surface flow (e.g., bed and bank) but either the vegetation or soils criterion was not met. Jurisdictional limits for these areas were measured according to the presence of a discernible OHWM, which is defined in 33 Code of Federal Regulations (CFR) Section 329.11 as “that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank; shelving; changes in the character of the soil; destruction of terrestrial vegetation; the presence of litter or debris; or other appropriate means that consider the characteristics of the surrounding areas.” The USACE has issued further guidance on the OHWM (Riley 2005; USACE 2008b), which also was used for this delineation.

The results presented here are also discussed in light of court decisions (i.e., Rapanos v. United States, Carabell v. United States, and Solid Waste Agency of Northern Cook County [SWANCC] v. USACE), as outlined and applied by the USACE (USACE 2007; Grumbles and Woodley 2007), USACE and Environmental Protection Agency (EPA; 2007), and EPA and USACE (2007). These publications explain that the EPA and USACE will assert jurisdiction over traditional navigable waters (TNW) and tributaries to TNW that are relatively permanent water bodies (RPWs), which have year-round or continuous seasonal flow. For water bodies that are not RPWs, a significant nexus evaluation must be conducted to determine whether the non-RPW is jurisdictional. An overview of USACE wetlands and jurisdictional WUS definitions is presented in Appendix A, *Federal Jurisdictional Information*.

The California Regional Water Quality Control Board (RWQCB) asserts regulatory jurisdiction over activities affecting wetland and non-wetland Waters of the State pursuant to Section 401 of the CWA and the State Porter-Cologne Water Quality Control Act. Potential RWQCB jurisdiction found within the study area follows the boundaries of potential USACE jurisdiction for WUS. There are no areas supporting isolated Waters of the State subject to exclusive RWQCB jurisdiction pursuant to the State Porter Cologne Water Quality Control Act.



Source: Base Map Layers (ESRI, 2013)

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HELIX Environmental Planning

Regional Location

Figure 1

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Source: Mint Canyon 7.5' Quad (USGS)

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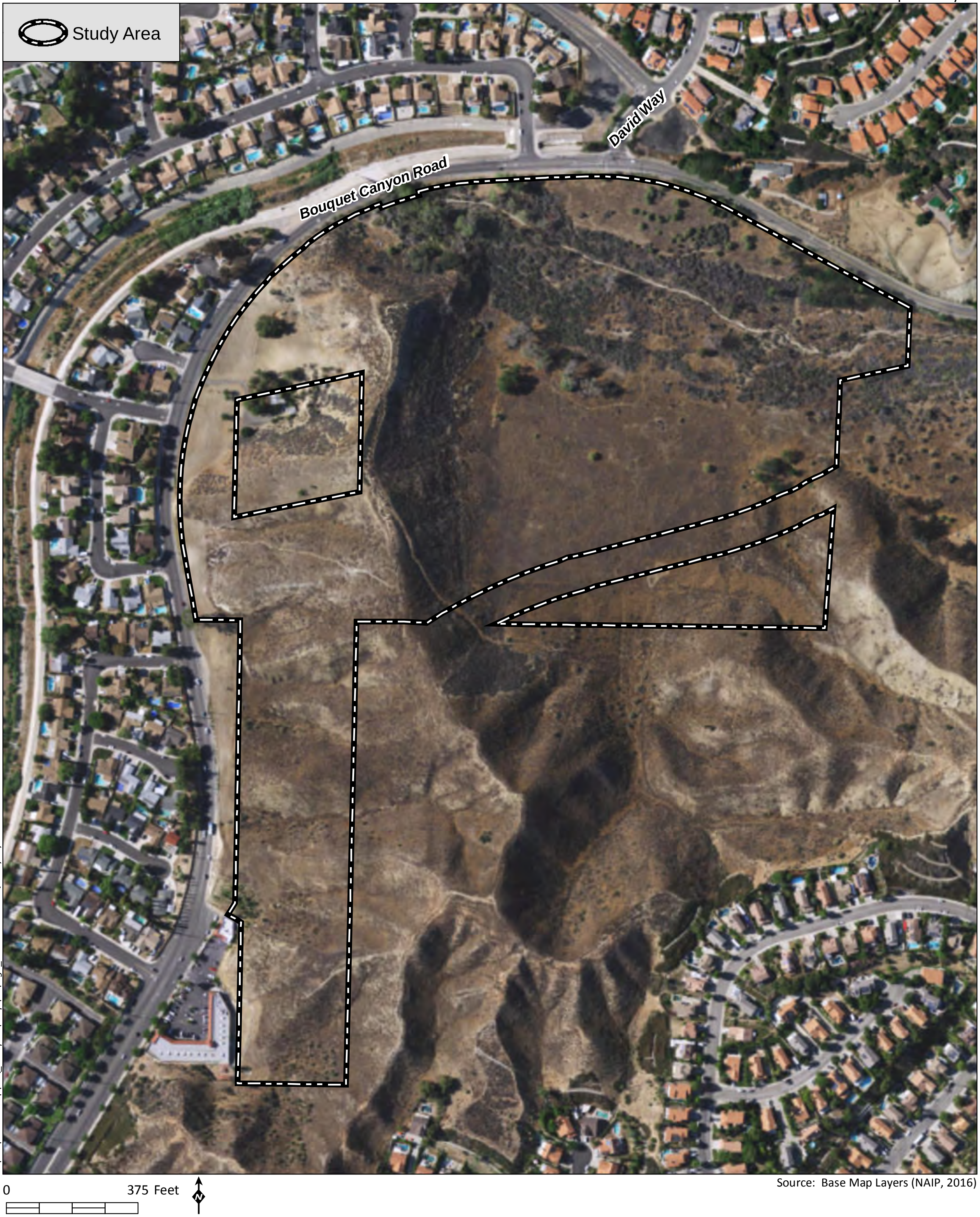
HELIX Environmental Planning

Vicinity Map

Figure 2



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Source: Base Map Layers (NAIP, 2016)

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Aerial Photograph

Figure 3

2.2 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE JURISDICTION

The CDFW jurisdictional boundaries were determined based on the presence of riparian vegetation or regular surface flow. Streambeds within CDFW jurisdiction were delineated based on the definition of streambed as "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supporting fish or other aquatic life. This includes watercourses having a surface or subsurface flow that supports riparian vegetation" (Title 14, Section 1.72). This definition for CDFW jurisdictional habitat allows for a wide variety of habitat types to be jurisdictional, including some that do not include wetland species (e.g., oak woodland and alluvial fan sage scrub). Streambed widths were measured to the nearest foot at various locations along the channel. The CDFW guidance on dryland watersheds (Vyverberg 2010) was also used to understand fluvial actions and map jurisdictional areas in the study area. Definitions of CDFW jurisdictional areas are presented in Appendix B, *State Jurisdictional Information*.

3.0 RESULTS

3.1 STUDY AREA DESCRIPTION

The study area is located in the foothills of the Sierra Pelona Mountains. The topography in the southern and western portions of the study area is predominantly steep hillsides, while the northern portion is primarily flat. Elevations on the study area range from approximately 1,365 feet above mean sea level (AMSL) near the northwest corner of the study area to approximately 1,520 feet above AMSL near the southeastern corner. The steep hills throughout the southern and western portions of the site are predominated by Riversidean upland sage scrub while the flatter portions of the study area are dominated by non-native grassland.

Seven soil types are mapped on the study area, including Hanford sandy loam (HcC), Metz loam sandy (MfA), Mocho loam (MpA), Ojai loam (OgF), Saugus loam (ScF2), Sorrento loam (SsA), and Yolo loam (YoC; Figure 4, *Soils*).

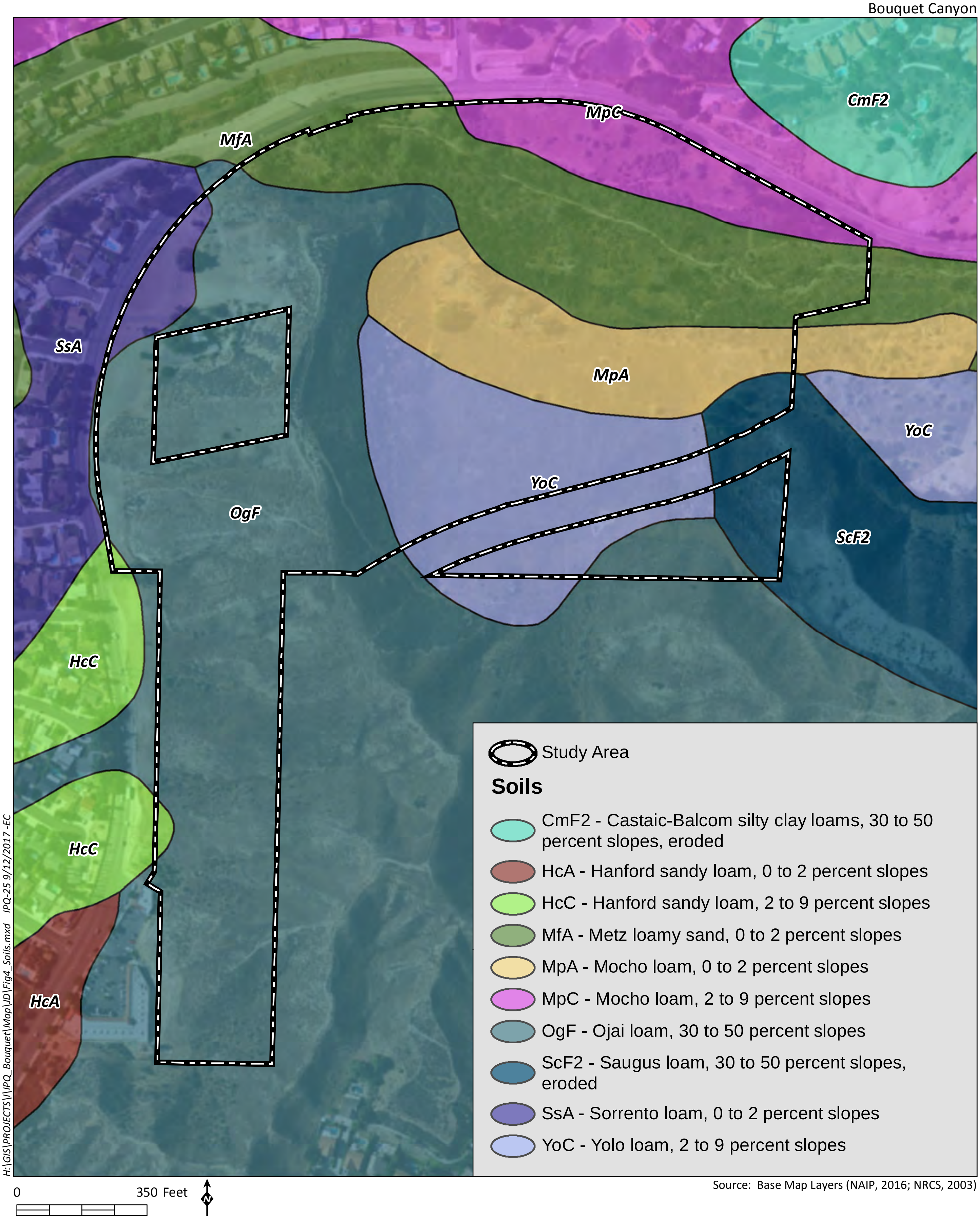
3.2 DRAINAGE FEATURE DESCRIPTION

Bouquet Canyon Creek, which is a blueline stream mapped by USGS, is an ephemeral drainage that runs from east to west near the northern study area boundary. The headwaters of the Bouquet Canyon drainage feature originate approximately 10 miles to the northeast of the study area in the Sierra Pelona Mountains, and non-storm related flows through the wash are often controlled via regulated releases from Bouquet Reservoir. The Bouquet Canyon streambed enters the study area at the northeastern boundary and exits at the northwestern boundary. The drainage continues under Bouquet Canyon Road at the northwestern corner of the study area boundary where the drainage has been channelized. The Bouquet Canyon drainage is a tributary to the Santa Clara River, which ultimately drains into the Pacific Ocean approximately 35 miles to the southwest of the study area. The on-site floodplain of the Bouquet Canyon drainage is infested with invasive giant reed (*Arundo donax*). Historical imagery and evidence of grinded material observed on the study area suggest giant reed removal has occurred on the study area. Bouquet Canyon supports somewhat excessively drained sandy loam of the Metz soil series. Aside from Bouquet Canyon, no other surface water feature was observed and the study area is predominantly made up of upland habitat.

Representative photographs were taken of the drainage and are included as Appendix C, *Representative Drainage Photographs*.

3.3 VEGETATION COMMUNITIES

The study area supports 18 vegetation communities, which are shown on Figure 5, *Vegetation* and listed in Table 1, *Vegetation Communities*. Plant communities are classified in accordance with Holland (1986) and Oberbauer (1996). Community names consistent with A Manual of California Vegetation, Second Edition (MCV; Sawyer et al. 2009) are also provided. Sensitive habitats pursuant to CDFW's Natural Communities List (California Department of Fish and Wildlife 2010) are also identified in Table 1.



Source: Base Map Layers (NAIP, 2016; NRCS, 2003)

HELIX
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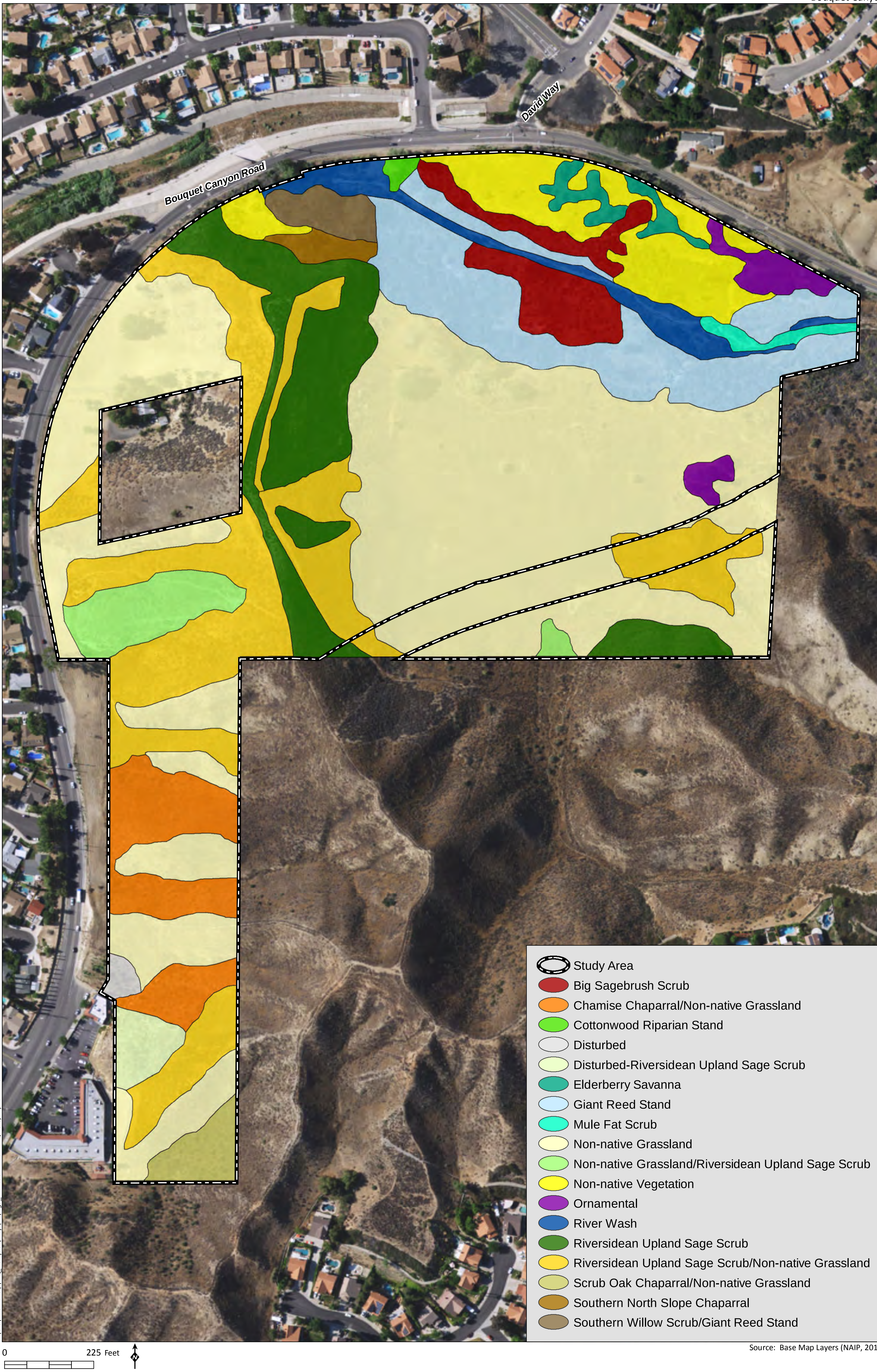
Soils

Figure 4



Source: Base Map Layers (NAIP, 2016)

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HELIX Environmental Planning

Vegetation

Figure 5

Table 1
VEGETATION COMMUNITIES

Habitat Type (Holland/Oberbauer)	Habitat Type (MCV)	Acres
Big Sagebrush Scrub	Big Sagebrush	1.91
Chamise Chaparral/Non-native Grassland	Chamise Chaparral/Non-native Grassland	2.70
Cottonwood Riparian Stand	Fremont Cottonwood Forest	0.13
Elderberry Savannah	Blue Elderberry Stands[1]	0.56
Mule Fat Scrub	Mule Fat Thickets	0.29
Riversidean Upland Sage Scrub	California Sagebrush Scrub	4.87
Riversidean Upland Sage Scrub/Non-native Grassland	California Sagebrush Scrub/Non-native Grassland	8.86
Scrub Oak Chaparral/Non-native Grassland	Scrub Oak Chaparral/Non-native Grassland	0.67
Southern North Slope Chaparral	Tucker Oak Chaparral	0.34
Southern Willow Scrub/Giant Reed Stand	Red Willow Thickets[1]/Giant Reed Breaks	0.61
Disturbed	Disturbed	0.18
Disturbed-Riversidean Upland Sage Scrub	Disturbed-California Buckwheat Scrub	0.58
Giant Reed Stand	Giant Reed Breaks	5.12
Non-native Grassland	Non-native Grassland	23.02
Non-native Grassland/Riversidean Upland Sage Scrub	Non-native Grassland/California Sagebrush Scrub	1.49
Non-native Vegetation	Upland Mustards	3.30
Ornamental	Ornamental	0.78
River Wash	River Wash	1.36
	TOTAL	**56.77**

Source: HELIX (2017)
[1] These communities are considered sensitive habitats pursuant to CDFW's Natural Communities List.

3.3.1 Description of Jurisdictional Habitats

Potential jurisdictional habitats observed on the study area include big sagebrush scrub, cottonwood riparian stand, giant reed stand, mule fat scrub, river wash, and southern willow scrub/giant reed stand.

3.3.1.1 Big Sagebrush Scrub

Big sagebrush scrub is dominated by big sagebrush (*Artemisia tridentata*). Big sagebrush scrub is typically associated with plains, alluvial fans, lower slopes, and dry washes in well-drained sandy and loamy soils. Associated species observed within this community include shadscale (*Atriplex canescens*), giant reed, Mediterranean grass (*Schismus barbatus*). Big sagebrush scrub/non-native grassland was observed along the eastern boundary of the study area.

3.3.1.2 Cottonwood Riparian Stand

Cottonwood riparian stand consists of tall, open, broad-leaved, winter-deciduous cottonwood (*Populus fremontii* ssp. *fremontii*), with non-native herbaceous species and giant reed comprising the understory. Most of the understory of this community is heavily disturbed due to the community's proximity to Bouquet Canyon Road and the roads associated weed abatement activities. A small cottonwood riparian stand was observed in the northeastern portion of the study area.

3.3.1.3 Giant Reed Stand

Giant reed stand is completely dominated by dense stands of giant reed. Giant reed stand is associated with low-gradient streams, ditches, and coastal marshes. Giant reed is an invasive species that outcompetes native riparian species. Other scattered species observed in this community included native big sagebrush and red willow (*Salix laevigata*) and non-native foxtail chess (*Bromus madritensis* ssp. *rubens*) and short podded mustard (*Hirschfeldia incana*). Giant reed stand extends the length of the drainage atop the banks on both sides.

3.3.1.4 Mule Fat Scrub

Mule fat scrub is a shrubby riparian scrub community dominated by mule fat (*Baccharis salicifolia*) and interspersed with small willows (*Salix* spp.). This vegetation community occurs along stream channels with a fairly coarse substrate and moderate depth to the water table. Mule fat scrub is present in the downstream most portion of the drainage near the eastern boundary of the study area.

3.3.1.5 River Wash

River wash is predominately unvegetated; however, some sparse upland species and giant reed do persist in the wash. River wash is present in the most upstream portion of the drainage near the northern boundary of the study area.

3.3.1.6 Southern Willow Scrub/Giant Reed Stand

Southern willow scrub/giant reed stand consists of dense, broad-leaved, winter-deciduous stands of trees dominated by shrubby willows in association with mule fat, and also contains scattered stands of giant reed. This vegetation community occurs on loose, sandy or fine gravelly alluvium deposited near stream channels during flood flows (Holland 1986). Southern willow scrub/giant reed stand is present in the most upstream portion of the drainage near the northern boundary of the study area.

3.3.1.7 Riversidean Upland Sage Scrub

Riversidian sage scrub is the most xeric expression of coastal sage scrub south of Point Conception, California. Typical stands are fairly open and dominated by California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum* ssp. *fasciculatum*), and foxtail chess, each attaining at least 20 percent cover. Riversidian sage scrub is typically found on xeric sites such as steep slopes, severely drained soils, or clays that release stored soil moisture only slowly. Intergrades at slightly higher elevations with several southern Californian chaparrals. Characteristic species of Riversidean upland sage scrub in the study area include California buckwheat, California sagebrush, and black sage (*Salvia melifera*), with a sparse understory of non-native grasses.

3.3.1.8 Southern North Slope Chaparral

Southern north slope chaparral is a dense, evergreen chaparral up to 20 feet tall, dominated by scrub oak (*Quercus berberidifolia*). Southern north slope chaparral occurs in somewhat more mesic areas than many other chaparrals, such as north facing slopes, and recovers more rapidly from fires than other chaparrals due to resprouting capabilities of scrub oak (Holland 1986; Keeley and Keeley 1988).

Characteristic species of southern north slope chaparral in the study area include scrub oak, with an understory of non-native grasses.

3.3.1.9 Non-native Vegetation

Non-native vegetation includes land containing a preponderance of non-native plant species such as ornamentals or ruderal exotic species that take advantage of disturbance (previously cleared or abandoned landscaping), or land showing signs of past or present animal usage. Characteristic species of non-native vegetation in the study area include short podded mustard, foxtail chess, and Mediterranean grass.

3.3.1.10 Non-native Grassland

Non-native grassland is a dense to sparse cover of annual grasses, sometimes associated with native annual forbs. Most of the species that occur in non-native grassland originated from the Mediterranean region, an area with a long history of agriculture and a climate similar to California. Characteristic species of non-native grassland in the study area include oats (*Avena* sp.), bromes (*Bromus* spp.), and mustards (*Brassica* spp.).

3.4 JURISDICTIONAL SUMMARY

3.4.1 Federal Jurisdiction

Areas under USACE jurisdiction within the study area consist of a total of 0.35 acre of non-wetland WUS ephemeral streams (Figure 6, *USACE Waters of the U.S.*; Table 2, *Jurisdictional Habitats Occurring on the Study Area*).

3.4.2 State Jurisdiction

Areas under CDFW jurisdiction within the study area total 8.14 acres, including 0.57 acre of big sagebrush scrub, 0.11 acre of cottonwood riparian stand, 4.09 acres of giant reed stand, 0.29 acre of mule fat scrub, 0.68 acre of non-native grassland, 0.35 acre of non-native vegetation, 0.01 acre of Riverisdean upland sage scrub, 1.20 acre of river wash, 0.26 acre of southern north slope chaparral, and 0.58 acre of southern willow scrub/giant reed stand (Figure 7, *CDFW Waters of the State*; Table 2).

Table 2
JURISDICTIONAL HABITATS OCCURRING ON THE STUDY AREA

Habitat	CDFW (Acres)[1]	USACE/RWQCB (Acres)[1]
Big Sagebrush Scrub	0.57	<0.01
Cottonwood Riparian Stand	0.11	<0.01
Giant Reed Stand	4.09	0.00
Mule Fat Scrub	0.29	0.07
Non-native Grassland	0.68	0.00
Non-native Vegetation	0.35	0.00
Riversidean Upland Sage Scrub	0.01	0.00
River Wash	1.20	0.27
Southern North Slope Chaparral	0.26	0.00
Southern Willow Scrub/Giant Reed Stand	0.58	0.00
TOTAL	**8.14**	**0.35**

Source: HELIX (2017)
[1] Acres are rounded to the nearest hundredth.

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HELIX
Environmental Planning

USACE Waters of the U.S.

Figure 6

Source: Base Map Layers (NAIP, 2016)

HELIX Environmental Planning

CDFW Waters of the State

Figure 7

4.0 CONCLUSION

4.1 FEDERAL PERMITTING

Federal jurisdictional areas occurring within the study area total 0.35 acre. Impacts to WUS are regulated by the USACE under Section 404 of the CWA (33 U.S.C. 401 et seq.; 33 U.S.C. 1344; U.S.C. 1413; and U.S. Department of Defense, Department of the Army, USACE 33 CFR Part 323). A federal CWA Section 404 Permit would be required for the proposed Project. A CWA Section 401 Water Quality Certification administered by the RWQCB must be issued prior to any 404 Permit.

Projects may be permitted on an individual basis or may be covered under one of several approved Nationwide Permits (NWPs), which is based on the type of action, amount of fill, and size and length of impact. Individual Permits (IPs) typically require substantial time (often longer than 12 months) to review and approve, while NWPs are pre-approved if a project meets appropriate conditions.

4.1.1 404 Permit

A CWA Section 404 Permit is required by the USACE for impacts to WUS. The type of 404 Permit required from the USACE would depend primarily on the quantity of jurisdictional areas to be impacted. If the Project affects less than 0.5 acre of jurisdictional areas, it may qualify for a NWP 29 for residential developments under current regulations. The NWP's are pre-issued permits for certain activities resulting in no more than minimal adverse effects to USACE jurisdictional streambeds. If implementation of the Project on the study area would impact less than 0.5 acre of jurisdictional areas but exceed the 300-foot threshold for linear streambed impacts under NWP 29, an IP could be required if USACE does not grant a waiver of the 300-foot limit for the Project. Based on the preliminary site plan, our sense is that a NWP may be obtainable if unavoidable impacts to USACE waters are required. An IP application generally takes significantly longer to process than a NWP and requires preparation of a biological assessment, a detailed Section 404(b)(1) on- and off-site alternatives analysis, an environmental assessment, and issuance of a public notice.

4.1.2 401 Certification

A 401 Water Quality Certification (Certification) is required by the RWQCB for impacts to Waters of the State. The 401 Certification is tied to the 404 Permit, and the 404 Permit cannot be issued until the 401 Certification is issued. The 401 Certification cannot be issued until the adopted or certified California Environmental Quality Act (CEQA) document is completed by the lead CEQA agency. In HELIX's experience, RWQCB is one of the most challenging regulatory agencies to obtain a regulatory permit from, as the 401 Certification evaluates impacts to jurisdictional WUS and Waters of the State, and also ensures that adequate pre- and post-construction water quality measures are implemented by a proposed project. Early planning and coordination between the design engineer and regulatory consultant is highly recommended to minimize impacts to RWQCB jurisdiction, ensure adequate water quality measures, and determine potential mitigation obligations.

4.2 STATE PERMITTING

The CDFW jurisdictional areas occurring within the study area total 8.14 acres, including 0.57 acre of big sagebrush scrub, 0.11 acre of cottonwood riparian stand, 4.09 acres of giant reed stand, 0.29 acre of mule fat scrub, 0.68 acre of non-native grassland, 0.35 acre of non-native vegetation, 0.01 acre of Riverisdean upland sage scrub, 1.20 acre of river wash, 0.26 acre of southern north slope chaparral, and 0.58 acre of southern willow scrub/giant reed stand. The CDFW regulates alterations or impacts to streambeds or lakes under California Fish and Game Code 1602 and requires a Streambed Alteration Agreement (SAA) for projects that will divert or obstruct the natural flow of water; change the bed, channel, or bank of any stream; or use any material from a streambed. The SAA is a contract between the applicant and CDFW that includes reasonable measures necessary to protect the resource (California Association of Resource Conservation Districts 2002). Any impacts to CDFW habitat would be regulated under California Fish and Game Code 1602 (Appendix B) and require an SAA.

4.2.1 1602 Agreement

Notification of Lake or Streambed Alteration is required to CDFW for impacts to jurisdictional streambed and riparian habitat. For projects with minor minimal streambed impacts, CDFW may waive their right to issue a formal SAA and issue an Operation of Law authorization, which requires compliance with the terms proposed as part of the SAA notification. For projects in which CDFW takes action and requires a SAA, the SAA cannot be issued until the certified CEQA document or determination is completed by the lead CEQA agency.

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Appendix A

Federal Jurisdictional Information

WETLANDS AND "WATERS OF THE U.S." DEFINITIONS

WETLANDS

The U.S. Army Corps of Engineers (USACE; 33 CFR 328.3) and the Environmental Protection Agency (EPA; 40 CFR 230.3) jointly define wetlands as "[t]hose areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (Environmental Laboratory 1987).

WATERS OF THE U.S.

The official definition of "Waters of the U.S." and their limits of jurisdiction (as they may apply) are defined by the USACE' Regulatory Program Regulations (33 CFR 328.3, paragraphs [a] 1-3 and [e], and Section 328.4, paragraphs [c] 1 and 2) as follows:

1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

2. All interstate waters including interstate wetlands;

3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters,

    i. which are or could be used by interstate or foreign travelers for recreation or other purposes; or

    ii. from which fish or shellfish are or could be taken and sold in interstate commerce; or

    iii. which are used or could be used for industrial purpose by industries in interstate commerce;

4. All impoundments of waters otherwise defined as waters of the United States under the definition;

5. Tributaries of waters;

6. The territorial seas;

7. Wetlands adjacent to waters (other than waters that are themselves wetlands)…

NON-TIDAL WATERS OF THE U.S.

The limits of jurisdiction in non-tidal waters: In the absence of adjacent wetlands, the jurisdiction extends to the OHWM, or when adjacent wetlands are present, the jurisdiction extends to the limit of the adjacent wetlands.

The term OHWM refers to that line on the shore established by the fluctuation of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation (scouring), the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Waters of the U.S. must exhibit an OHWM or other evidence of surface flow created by hydrologic physical changes. These physical changes include (Riley 2005):

- Natural line impressed on the bank
- Shelving
- Changes in the character of soil
- Destruction of terrestrial vegetation
- Presence of litter and debris
- Wracking
- Vegetation matted down, bent, or absent
- Sediment sorting
- Leaf litter disturbed or washed away
- Scour
- Deposition
- Multiple observed flow events
- Bed and banks
- Water staining
- Change in plant community

Further guidance on identifying the OHWM in the Arid Southwest (Lichvar and McColley 2008). This publication provided geomorphic and vegetation OHWM indicators specific to the Arid Southwest.

Jurisdictional areas also must be connected to Waters of the U.S. (Guzy and Anderson 2001; U.S. Supreme Court 2001).

As a consequence of the U.S. Supreme Court decision in Rapanos v. United States, a memorandum was developed regarding Clean Water Act jurisdiction (Grumbles and Woodley 2007). The memorandum states that the EPA and the USACE will assert jurisdiction over traditional navigable waters (TNW), wetlands adjacent to TNW, tributaries to TNWs that are a relatively permanent water body (RPW), and wetlands adjacent to TNW. An RPW has year-round flow or a continuous seasonal flow (i.e., typically for three months or longer). Jurisdiction over other waters (i.e., non TNW and RPW) will be based on a fact-specific analysis to determine if they have a significant nexus to a TNW.

Pursuant to the USACE Instructional Guidebook (USACE and EPA 2007), the significant nexus evaluation will cover the subject reach of the stream (upstream and downstream) as well as its adjacent wetlands (Illustrations 2 through 6, USACE and EPA 2007). The evaluation will include the flow characteristics, annual precipitation, ability to provide habitat for aquatic species, ability to retain floodwaters and filter pollutants, and proximity of the subject reach to a TNW, drainage area, and the watershed.

WETLAND CRITERIA

Wetland boundaries are determined using three mandatory criteria (hydrophytic vegetation, wetland hydrology, and hydric soil) established for wetland delineations and described within the Wetlands Delineation Manual (Environmental Laboratory 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (USACE 2008). Following is a brief discussion of the three criteria and how they are evaluated.

Vegetation

"Hydrophytic vegetation is defined herein as the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present" (Environmental Laboratory 1987).

The wetland indicator status (obligate upland, facultative upland, facultative, facultative wetland, obligate wetland, or no indicator status) of the dominant plant species of all vegetative layers is determined. Species considered to be hydrophytic include the classifications of facultative, facultative wetland, and obligate wetland as defined in the current list of wetland plants of the Arid Southwest (Lichvar, et al. 2016; Table A-1). The percent of dominant wetland plant species is calculated. The hydrophytic vegetation criterion is considered to be met if it meets the "Dominance Test," "Prevalence Index," or the vegetation has morphological adaptations for prolonged inundation.

Table A-1
DEFINITIONS OF PLANT INDICATOR CATEGORIES

Indicator Categories	Abbreviation	Qualitative Description
Obligate	OBL	Almost always occur in wetlands
Facultative Wetland	FACW	Usually occur in wetlands but may occur in non-wetlands
Facultative	FAC	Occur in wetlands and non-wetlands
Facultative Upland	FACU	Usually occur in non-wetlands but may occur in wetlands
Upland	UPL	Almost never occur in wetlands

Hydrology

"The term 'wetland hydrology' encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season. Areas with evident characteristics of wetland hydrology are those where the presence of water has an overriding influence on characteristics of vegetation and soils due to anaerobic reducing conditions, respectively" (Environmental Laboratory 1987).

Hydrologic characteristics must indicate that the ground is saturated to within 12 inches of the surface for at least five percent of the growing season during a normal rainfall year (approximately 18 days for most of low-lying southern California). Hydrology criteria are evaluated based on the characteristics listed below (USACE 2008). Where positive indicators of wetland hydrology are present, the limit of the OHWM (or the limit of adjacent wetlands) is noted and mapped. Evidence of wetland hydrology is met by the presence of a single primary indicator or two secondary indicators.

Primary

- surface water (A1)
- high water table (A2)
- saturation (A3)
- water marks (B1; non-riverine)
- sediment deposits (B2; non-riverine)
- drift deposits (B3; non-riverine
- surface soil cracks (B6)
- inundation visible on aerial imagery (B7)
- water-stained leaves (B9)
- salt crust (B11)
- biotic crust (B12)
- aquatic invertebrates (B13)
- hydrogen sulfide odor (C1)
- oxidized rhizospheres along living roots (C3)
- presence of reduced iron (C4)
- recent iron reduction in tilled soils (C6)
- thin muck surface (C7)

Secondary

- watermarks (B1; riverine)
- sediment deposits (B2; riverine)
- drift deposits (B3; riverine)
- drainage patterns (B10)
- dry-season water table (C2)
- crayfish burrows (C8)
- saturation visible on aerial imagery (C9)
- shallow aquitard (D3)
- FAC-neutral test (D5)

In the absence of all other hydrologic indicators and in the absence of significant modifications of an area's hydrologic function, positive hydric soil characteristics are assumed to indicate positive wetland hydrology. This assumption applies unless the site visit was done during the wet season of a normal or wetter-than-normal year. Under those circumstances, wetland hydrology would not be present.

Soils

The USACE and EPA, in their administration of Section 404 of the Clean Water Act, rely on the National Technical Committee for Hydric Soils (NTCHS) for a definition of hydric soils. According to the NTCHS, "A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part." (Federal Register 1994)

Soils must exhibit physical and/or chemical characteristics indicative of permanent or periodic saturation. Soil matrix and mottle colors are identified at each sampling plot using a Munsell soil color chart (Kollmorgen 1994). Generally, an 18-inch or deeper pit is excavated with a shovel at each sampling plot unless refusal occurs above 18 inches.

Soils in each area are closely examined for hydric soil indicators, including the characteristics listed below. Hydric soil indicators are presented in three groups. Indicators for "All Soils" (A) are used in any soil regardless of texture, indicators for "Sandy Soils" (S) area used in soil layers with USDA textures of loamy fine sand or coarser, and indicators for "Loamy and Clayey Soils" (F) are used with soil layers of loamy very fine sand and finer (USACE 2008 and Vasilias et al. 2017).

- histosols (A1)
- histic epipedons (A2)
- black histic (A3)
- hydrogen sulfide (A4)
- stratified layers (A5)
- 1 cm muck (A9)
- depleted below dark surface (A11)
- thick dark surface (A12)
- sandy mucky mineral (S1)
- sandy gleyed matrix (S4)
- sandy redox (S5)
- stripped matrix (S6)
- loamy mucky mineral (F1)
- loamy gleyed matrix (F2)
- depleted matrix (F3)
- redox dark surface (F6)
- depleted dark surface (F7)
- redox depressions (F8)
- vernal pools (F9)
- 2 cm muck (A10)
- reduced vertic (F18)
- red parent material (TF2)

Hydric soils may be assumed to be present in plant communities that have complete dominance of obligate or facultative wetland species. In some cases, there is only inundation during the growing season and determination must be made by direct observation during that season, recorded hydrologic data, testimony of reliable persons, and/or indication on aerial photographs.

NON-WETLAND WATERS OF THE U.S.

The non-wetland Waters of the U.S. designation is met when an area has periodic surface flows but lacks sufficient indicators to meet the hydrophytic vegetation and/or hydric soils criteria. For purposes of delineation and jurisdictional designation, the non-wetland Waters of the U.S. boundary in non-tidal areas is the OHWM as described in the Section 404 regulations (33 CFR Part 328).

U.S. Geological Survey Mapping

The U.S. Geological Survey (USGS) quad maps are one of the resources used to aid in the identification and mapping of jurisdictional areas. Their primary uses include understanding the subregional landscape position of a site, major topographical features, and a project's position in the watershed.

In our experience, the designation of watercourse as a blue-line stream (intermittent or perennial) on USGS maps has been unreliable and typically overstates the hydrology of most streams. This has also been the experience of others, including the late Dr. Luna Leopold. Dr. Leopold was a hydrologist with USGS from 1952 to 1972, professor in the Department of Geology and Geophysics and Department of Landscape Architecture, University of California, Berkeley from 1972 to 1986, and Professor Emeritus from 1987 until his death in 2006. In regard to USGS maps, Dr. Leopold wrote, "I tried to devise a way of defining hydrologic criteria for the channels shown on topographic maps and developed some promising procedures. None were acceptable to the topographers, however. I learned that the blue lines on a map are drawn by non-professional, low-salaried personnel. In actual fact, they are drawn to fit a rather personalized aesthetic" (Leopold 1994).

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Appendix B

State Jurisdictional Information

CALIFORNIA FISH AND WILDLIFE REGULATIONS

The California Department of Fish and Wildlife (CDFW) regulates alterations or impacts to streambeds or lakes (wetlands) under Fish and Game Code Sections 1600 through 1616 for any private, state, or local government or public utility-initiated projects. The Fish and Game Code Section 1602 requires any entity to notify the CDFW before beginning any activity that will do one or more of the following: (1) substantially obstruct or divert the natural flow of a river, stream, or lake; (2) substantially change or use any material from the bed, channel, or bank of a river, stream, or lake; or (3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into a river, stream, or lake. Fish and Game Code Section 1602 applies to all perennial, intermittent, and ephemeral rivers and streams as well as lakes in the state.

In order to notify the CDFW, a person, state, or local governmental agency or public utility must submit a complete notification package and fee to the CDFW regional office that serves the county where the activity will take place (CDFW 2016). A fee schedule is included in the notification package materials. Under the Permit Streamlining Act (Government Code Sections 65920 et seq.), the CDFW has 30 days to determine whether the package is complete. If the requestor is not notified within 30 days, the application is automatically deemed to be complete.

Once the notification package is deemed to be complete, the CDFW will determine whether the applicant will need a Lake or Streambed Alteration Agreement (SAA) for the activity, which will be required if the activity could substantially adversely affect an existing fish and wildlife resource. If an SAA is required, the CDFW will conduct an on-site inspection, if necessary, and submit a draft SAA that will include measures to protect fish and wildlife resources while conducting the project. If the applicant is applying for a regular SAA (less than five years), the CDFW will submit a draft SAA within 60 calendar days after notification is deemed complete. The 60-day time period does not apply to notifications for long-term SAAs (greater than five years).

After the applicant receives the SAA, the applicant has 30 calendar days to notify the CDFW whether the measures in the draft SAA are acceptable. If the applicant agrees with the measures included in the draft SAA, the applicant will need to sign the SAA and submit it to the CDFW. If the applicant disagrees with any measures in the draft SAA, the applicant must notify the CDFW in writing and specify the measures that are not acceptable. Upon written request, the CDFW will meet with the applicant within 14 calendar days of receiving the request to resolve the disagreement. If the applicant fails to respond in writing within 90 calendar days of receiving the draft SAA, the CDFW may withdraw that SAA. The time periods described above may be extended at any time by mutual agreement.

After the CDFW receives the signed draft SAA, the CDFW will make it final by signing the SAA; however, the CDFW will not sign the SAA until it both receives the notification fee and ensures that the SAA complies with the California Environmental Quality Act (Public Resources Code Section 21000 et seq.). After the applicant receives the final agreement, the applicant may begin the project, provided that the applicant has obtained any other necessary federal, state, and/or local authorizations.

WATER RESOURCE CONTROL BOARD REGULATIONS

SECTION 401 WATER QUALITY CERTIFICATION

Whenever a project requires a federal Clean Water Act (CWA) Section 404 permit or a Rivers and Harbors Act Section 10 permit, it must first obtain a CWA Section 401 Water Quality Certification. The Regional Water Quality Control Board (RWQCB) administers the 401 Certification program. Federal CWA Section 401 requires that every applicant for a Section 404 permit must request a Water Quality Certification that the proposed activity will not violate state and federal water quality standards.

PORTER-COLOGNE WATER QUALITY CONTROL ACT

The State Water Resource Control Board (SWRCB) and the RWQCB regulate the discharge of waste to waters of the State via the 1969 Porter-Cologne Water Quality Control Act (Porter-Cologne) as described in the California Water Code (SWRCB 2017). The California Water Code is the State's version of the federal CWA. Waste, according to the California Water Code, includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal. State waters that are not federal waters may be regulated under Porter-Cologne. A Report of Waste Discharge must be filed with the RWQCB for projects that result in discharge of waste into waters of the State. The RWQCB will issue Waste Discharge Requirements (WDRs) or a waiver. The WDRs are the Porter-Cologne version of a CWA 401 Water Quality Certification.

REFERENCES

California Department of Fish and Wildlife (CDFW). 2016. Notification of Lake or Streambed Alteration, Notification Instructions and Process. Available from: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=3773&inline

State Water Resources Control Board. 2017. Laws and Regulations. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency. Available from: http://www.waterboards.ca.gov/laws_regulations/

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Appendix C

Representative Drainage Photographs

Photograph 1: View of the eastern portion of Bouquet Canyon Creek, facing downstream. The unvegetated river wash can be seen in the foreground and the mule fat scrub community can be seen in the distance.

Photograph 2: View of the central portion of Bouquet Canyon Creek within the project site, facing upstream. The unvegetated river wash can be seen in the foreground and the giant reed stand vegetation community can be seen along the banks.

Photograph 3: View of the western portion of Bouquet Canyon Creek within the project site, facing upstream. The giant reed stand vegetation community can be seen along the banks.

Photograph 4: View of the western most portion of Bouquet Canyon Creek within the project site, facing upstream. The giant reed stand vegetation community can be seen along the banks.

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Source: HELIX 2017

HELIX
Environmental Planning

Representative Drainage Photographs

Appendix H

Oak Tree Survey Report

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16485 Laguna Canyon Road, Suite 150
Irvine, CA 91942
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March 21, 2019 IPQ-25

Mr. Scott Covington
Integral Communities
888 San Clemente Drive
Newport Beach, CA 92660

Subject: Oak Tree Survey Report for the Bouquet Canyon Road Project

Dear Mr. Covington:

HELIX Environmental Planning, Inc. (HELIX) prepared this report to document the results of an oak tree survey conducted for the proposed Bouquet Canyon Road Project (project) located the City of Santa Clarita (City), Los Angeles County, California. The purpose of this report is to provide an inventory of all species of oak tree (*Quercus* spp.) within 200-feet of the project footprint with at least one trunk over 6 inches in circumference at a point 4.5 feet above natural grade and to determine the presence of Heritage Trees as defined under the City's Oak Tree Preservation Ordinance (17.51.040; ordinance). This report was also prepared to provide supporting information for obtaining an Oak Tree Permit if sought in the future.

STUDY AREA LOCATION

The approximately 94-acre study area is generally located 6.9 miles to the east of Interstate 5 and 3.8 miles to the northwest of California State Route 14 in the City of Santa Clarita (Figure 1, *Regional Location*). Specifically, the study area is located directly south of the intersection of David Way and Bouquet Canyon Road. The study area is within Section 6 of Township 4 North, Range 15 West of the Mint Canyon, USGS 7.5-minute topographic quadrangle (Figure 2, *USGS Topography*).

Immediate surrounding land uses include existing residential developments to the north and west, a mixture of undeveloped land and residential development to the south, and undeveloped land and juvenile detention schools to the east (Figure 3, *Aerial Photograph*). The study area is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest.

REGULATORY FRAMEWORK

The City's Oak Tree Preservation ordinance states, "No person shall cut, prune, remove, relocate, endanger, damage, or encroach into the protected zone of any oak tree on any public or private property within the City" (City of Santa Clarita [City] 2013). The protected zone of the oak tree includes

the area within five feet of the dripline (canopy extent), but no less than 15 feet from the trunk. To remove any oak tree or to subject its protected zone to major encroachment, an Oak Tree Permit must be obtained. Trees subject to the permit include all trees of the oak species (*Quercus* sp.) exceeding 6 inches in circumference when measured at a point 4.5 feet above the tree's natural grade. Encroachment is defined as intrusion into the protected zone of an oak tree, which includes but is not limited to, intrusion by trenching, paving, pruning, dumping, parking of commercial vehicles. Major encroachment is defined by the City's ordinance as "an area between the outer edge of the trunk and fifty percent of the diameter of the protected zone" and minor encroachment is defined as an area between the outermost edge of the protected zone and fifty percent of the diameter of the protected zone" (City 2013).

To obtain an Oak Tree Permit, an application must be submitted to the City Manager or designated representative ("Director") and a filing fee as established by the City Council must be paid. The conditions of the Oak Tree Permit will require native oak trees at a minimum of 24-inch box size to be planted for protected trees that are removed or subjected to major encroachment. The number of replacement trees required is dependent upon the circumference of the tree to be impacted. These guidelines are described in Subsection B of the Oak Tree Preservation Ordinance (City 2013), and reproduced below in Table 1, *Number of Replacement Trees*.

Table 1
NUMBER OF REPLACEMENT TREES

Circumference of Tree Destroyed (4 feet above ground level)	Number of Replacement Trees Required for Each Tree Destroyed
Under 12 inches	2
12 to 18 inches	3
18 to 24 inches	4
24 to 30 inches	5
30 to 36 inches	6
Over 36 inches	1 additional replacement tree per incremental increase of 6 inches

Source: City of Santa Clarita (2013)

Replacement trees must be placed on the same property. If there is no appropriate location on-site, the replacement trees may be donated to the City or the monetary value of the required replacement trees may be paid to the City at the discretion of the Director.

Heritage Oak Trees are given special consideration and may be fully protected or subject to requirements stricter than those of a standard protected oak tree. A Heritage Oak Tree is defined as any oak tree measuring 108 inches in circumference when measured 4.5 feet above the tree's natural grade. In the case of trees with multiple trunks, two or more trunks each must measure 72 inches or greater in circumference when measured 4.5 feet above the tree's natural grade.

METHODS

HELIX International Society of Arboriculture (ISA) Certified Arborist Daniel Torres (WE-12249) and HELIX Biologist/Regulatory Specialist Ezekiel Cooley completed an oak tree survey on the study area and within a 200-foot buffer of the study area (survey area) on December 19 and 20, 2018. The purpose of the survey was to document the presence of: (1) oak trees with at least one trunk over 6 inches in circumference at a point 4.5 feet above natural grade and (2) Heritage Oak Trees.

All oak trees within the survey area that satisfied the previously mentioned criteria were identified to species. The circumference at a point 4.5 feet above natural grade was measured. For trees with co-dominant stems at 4.5 feet above natural grade, the circumference of each stem was measured at this height. The average circumference of all the stems was calculated in order to determine the number of replacement trees required if the tree was to be removed or subject to major encroachment, as outlined in Table 1 above. Next, the height of each tree was estimated and an aluminum tag with a unique number was affixed to the north side of the tree at approximately three feet above natural grade. Trees located outside of the study area but located within the buffer area were not tagged since Integral Communities does not own this property. Finally, the location of each individual tree and the canopy extent were recorded with a global positioning system device with sub-meter accuracy. The collected data are not considered survey-grade accuracy and should not be used for construction purposes.

Physical and horticultural evaluations were performed for each protected tree according to the City's Oak Tree Preservation and Protection Guidelines (City 1990). The physical evaluation included the assessment of structure, terrain, and general appearance. The horticultural evaluation included the detection of any disease or pathogens and an assessment of the tree's overall vigor. The physical and horticultural evaluations were used to rate each tree on a scale ranging from A to F as outlined in the City's Preservation and Protection Guidelines. The rating system is reproduced below in Table 2, *Oak Tree Rating System*.

Table 2
OAK TREE RATING SYSTEM

Rating	Description
A – Outstanding	A healthy ad vigorous tree characteristic of its species and reasonably free of any visible signs of stress, disease or pest infestation.
B – Above Average	A healthy and vigorous tree with minor visible signs of stress, disease or pest infestation.
C – Average	Although healthy in overall appearance there is an abnormal amount of stress or disease and/or pest infestation.
D – Below Average/Poor	This tree is characterized by exhibiting a greater degree of stress, disease and/or pest infestation than normal and appears to be in a state of rapid decline. The degree of decline may vary greatly in signs of dieback, disease and pest infestation and appears to be in an advanced state of decline.

F – Dead	This tree exhibits no signs of life whatsoever.

Source: City of Santa Clarita (1990)

Following the oak tree survey, an impact assessment was conducted using the most recent project grading plans. The impact assessment was used to determine the number of oak trees that would be required to be removed or whose protected zone would be subject to major encroachment to complete project activities.

RESULTS

A total of 64 oak trees subject to an Oak Tree Permit were located within the survey area (Figure 4, *Oak Tree Locations*). Of these trees, 2 were coast live oak (*Quercus agrifolia*), 6 were scrub oak (*Quercus berberidifolia*), 2 were blue oak (*Quercus douglasii*), 53 were Tucker oak (*Quercus john-tuckeri*), and one was a valley oak (*Quercus lobata*). Six trees (approximately 9 percent) were assigned a rating of A – Outstanding, 22 trees (approximately 34 percent) were B – Above Average, 25 trees (approximately 40 percent) were C – Average, and 11 trees (approximately 17 percent) were D – Below Average. No dead trees were observed during the survey. Overall, there was very little disease noted on the oak trees within the survey area. The majority of trees (37 trees, approximately 58 percent) showed evidence of stress-related growth such as epicormic sprouting and suckers. No Heritage Oak Trees were found during the survey. The locations of all oak tree surveyed are shown in Figure 4. The data collected during the survey is included as Attachment A, *Oak Tree Survey Data*. Representative site and tree photographs are included as Attachment B, *Representative Photographs*.

IMPACT ASSESSMENT

All oak trees within the project footprint will be removed. In addition, the project will be required to implement fuel medication. The County Fire Department requires fuel modification zones to create a defensible space in the event a wildlife breaks out (County of Los Angeles N.D.). There are three different zones, which are outlined below:

Zone A (Setback Zone) – This zone extends 20 feet beyond the edge of any structures. The only allowed vegetation within this zone is green lawns, ground cover not exceeding six inches in height, and well-spaced shrubs. The landscape must be irrigated to promote healthy vegetation and fire resistance.

Zone B (Irrigated Zone) – This zone extends from the outermost edge of Zone A to 100 feet from structures. Green lawn, ground cover not exceeding six inches in height, and well-spaced shrubs and trees are allowed in this zone. The landscape must be irrigated to promote healthy vegetation and fire resistance.

Zone C (Native Brush Thinning Zone) – This zone extends from the outermost edge of Zone B to 200 feet from the structures. Well-spaced native vegetation and ornamental shrubs and trees are allowed. Vegetation must be thinned and species that constitute a fire risk are not allowed (e.g., chamise [*Adenostoma fasciculatum*], sages [*Salvia* spp.], California sagebrush, and California buckwheat). This zone does not require irrigation.

For the purpose of this assessment, oak trees located within Fuel Modification Zone A were considered impacted while oak trees located within Zones B and C were considered avoided.

Based on analyzing each surveyed oak's location in respect to the project grading plans and fuel modification zones, the project would require the removal of 26 oak trees, including 4 scrub oaks (*Quercus berberidifolia*), 2 blue oaks (*Quercus douglasii*), and 20 Tucker oaks (*Quercus john-tuckeri*). In addition, one Tucker oak would be subjected to major encroachment and two Tucker oaks would be subjected to minor encroachment. The remaining 35 oak trees would be completely avoided by the project (Table 3, *Impacts to Oak Trees*). A map with the location and protected zone of the oak trees assessed during this survey is included as Figure 5, *Impacts to Oak Trees*.

Table 3
IMPACTS TO OAK TREES

Species Name	Common Name	Number of Trees			
		Removed	Major Encroachment	Minor Encroachment	Avoided
Quercus agrifolia	coast live oak	0	0	0	2
Quercus berberidifolia	scrub oak	4	0	0	2
Quercus douglasii	blue oak	2	0	0	0
Quercus john-tuckeri	Tucker oak	20	1	2	30
Quercus lobata	valley oak	0	0	0	1
	TOTAL	**26**	**1**	**2**	**35**

MITIGATION

Based on the impacts to oak trees as quantified by the impact assessment, 27 oak trees will be removed or subjected to major encroachment. In order to receive an Oak Tree Removal Permit for these impacts, it is anticipated that the City will require 91 replacement trees to be planted or the equivalent monetary value of the replacement trees to be paid (Table 4, *Oak Tree Mitigation*). Trees that will be completely avoided or subject to minor encroachment will not require replacement trees.

Table 4
OAK TREE MITIGATION

Species Name	Common Name	Number of Trees	
		Removed/Major Encroachment	Replacement Trees Required
Quercus berberidifolia	scrub oak	4	9
Quercus douglasii	blue oak	2	19
Quercus john-tuckeri	Tucker oak	21	63
	TOTAL	**27**	**91**

CONCLUSION

Sixty-four (64) oak trees on the survey area were considered City-protected trees. Construction of the project will require 27 of these trees to be removed or to be subjected to major encroachment. It is anticipated that the City will require mitigation for these impacts through the purchase of 91 replacement trees or payment to the City of their equivalent monetary value. Thirty-seven (37) of these trees will be completely avoided or subjected to minor encroachment during project activities and will not require replacement trees.

During construction, trees subject to minor or major encroachment will require protection measures, including but not limited to those outlined within Section VII. Standards for Performance of Permitted Work of the Oak Tree Preservation Guidelines. Other general guidelines to protect trees during for project construction are included as Attachment C, *Tree Protection Recommendations*.

Should you have any questions or require additional information, please do not hesitate to contact me at (949) 234-1515 or DanielT@helixepi.com.

Sincerely,

Daniel Torres
ISA Certified Arborist (WE-12249A)

Enclosures:

Figure 1: Regional Location
Figure 2: USGS Topography
Figure 3: Aerial Vicinity
Figure 4: Oak Tree Locations
Figure 5: Impacts to Oak Trees

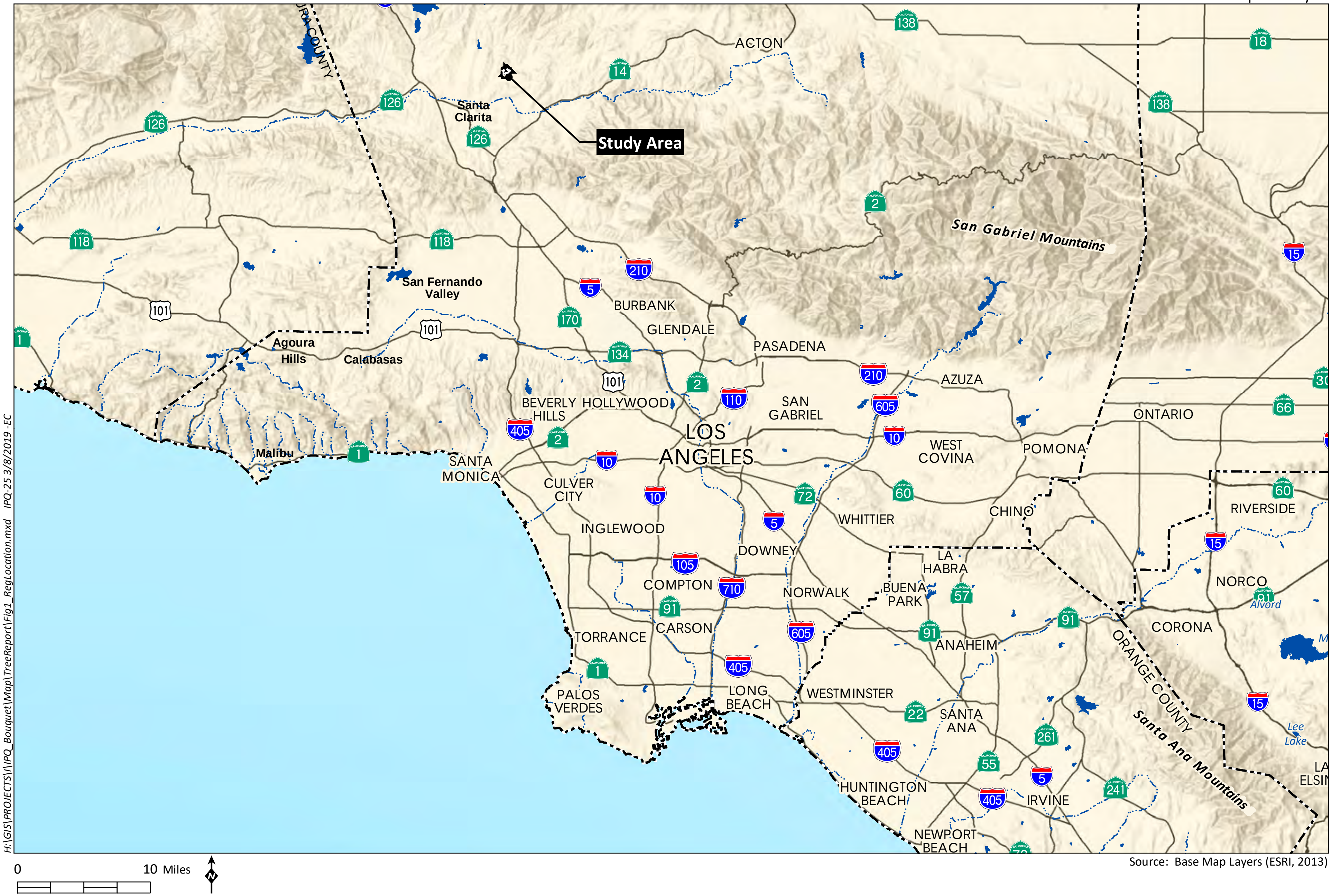
Attachment A: Oak Tree Survey Data
Attachment B: Representative Photos
Attachment C: Tree Protection Recommendations

REFERENCES

Los Angeles Fire Department, County of. N.D. Fuel modification plan notes. Available from: https://www.fire.lacounty.gov/wp-content/uploads/2017/03/Fuel-ModificationPlanNotes.pdf. Accessed March 14, 2019.

Santa Clarita, City of. 1990. Oak Tree Preservation and Protection Guidelines. Adopted September 1990. Available from: https://www.santa-clarita.com/home/showdocument?id=10121. Accessed November 19, 2018.

Santa Clarita, City of. 2013. Oak Tree Preservation. Ordinance No. 17.51.040. Santa Clarita Municipal Code. Adopted December 1987, revised in 2013. Available from: https://www.codepublishing.com/CA/SantaClarita. Accessed November 19, 2018.



Source: Base Map Layers (ESRI, 2013)

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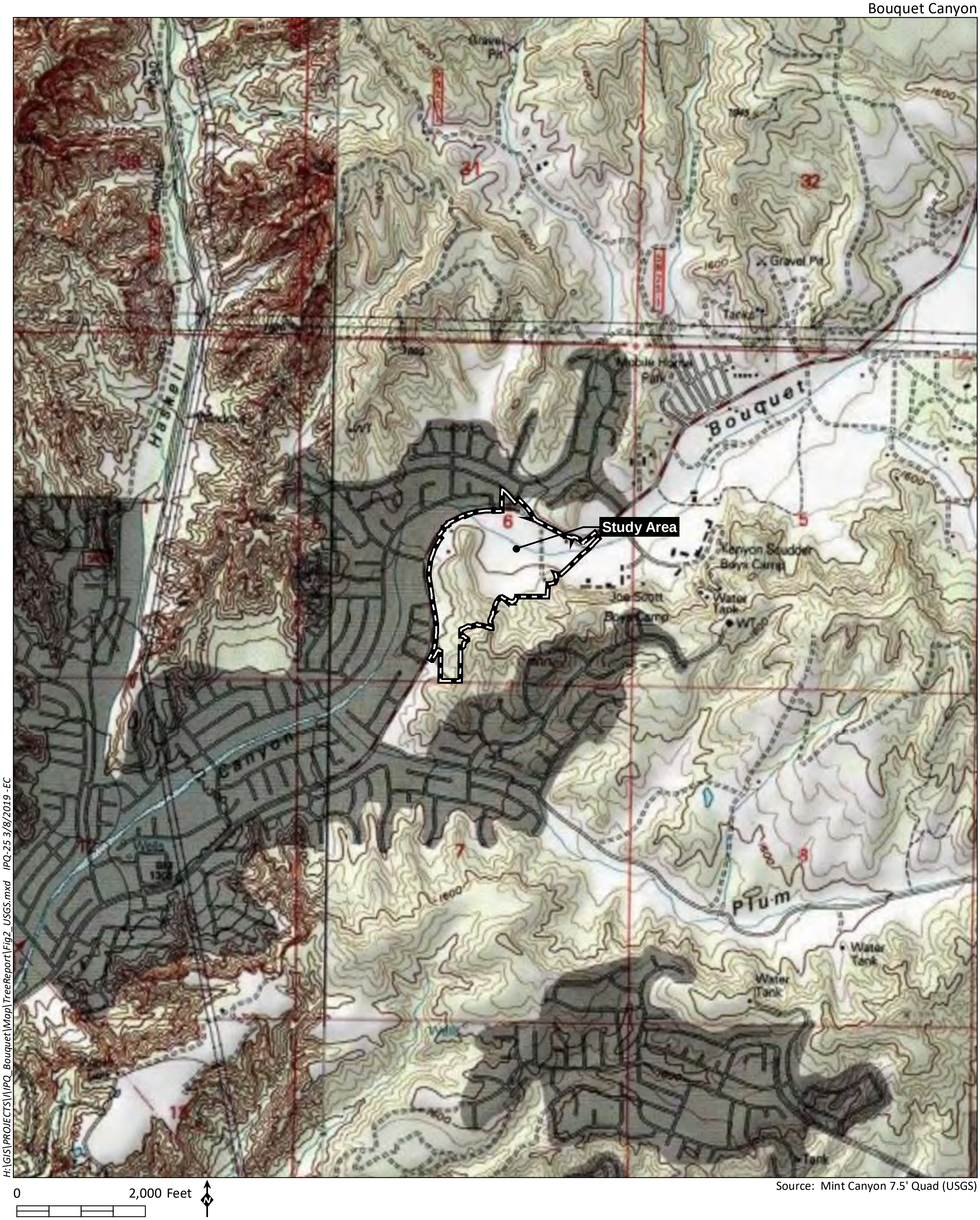
HELIX Environmental Planning

Regional Location

Figure 1



Source: Mint Canyon 7.5' Quad (USGS)

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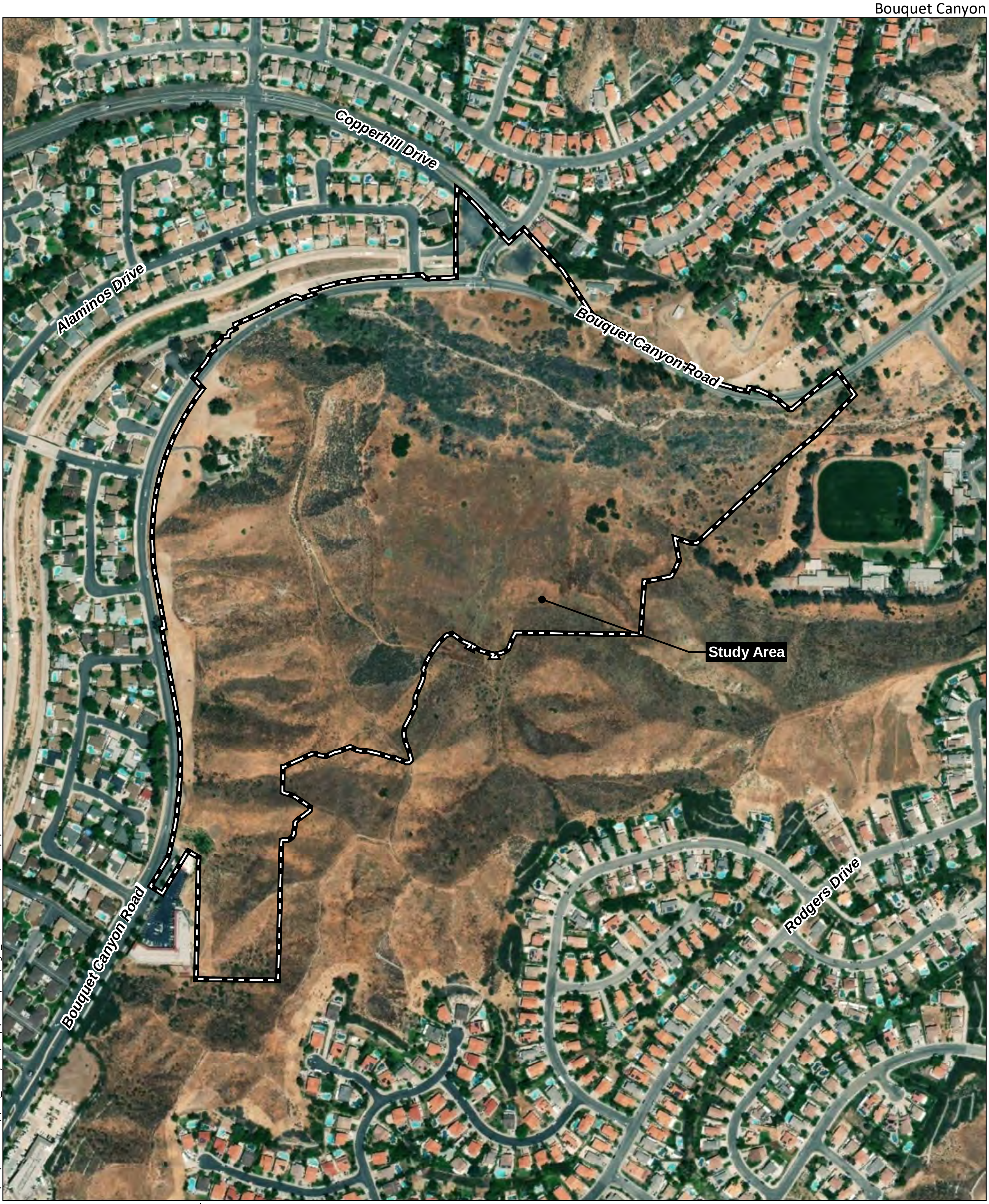
Environmental Planning

USGS Topography

Figure 2



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Source: Base Map Layers (NAIP, 2016)

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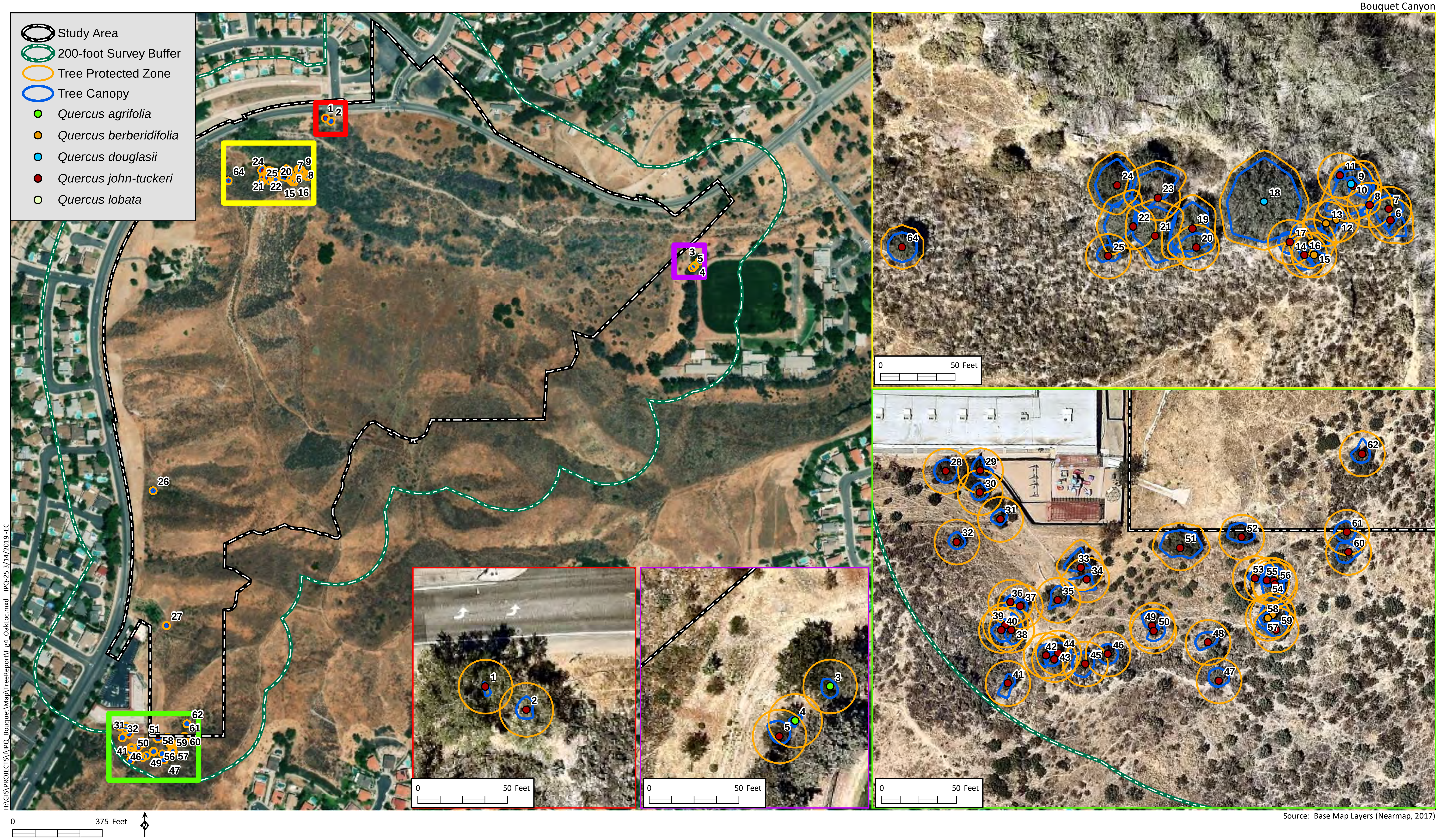
Environmental Planning

Aerial Photograph

Figure 3



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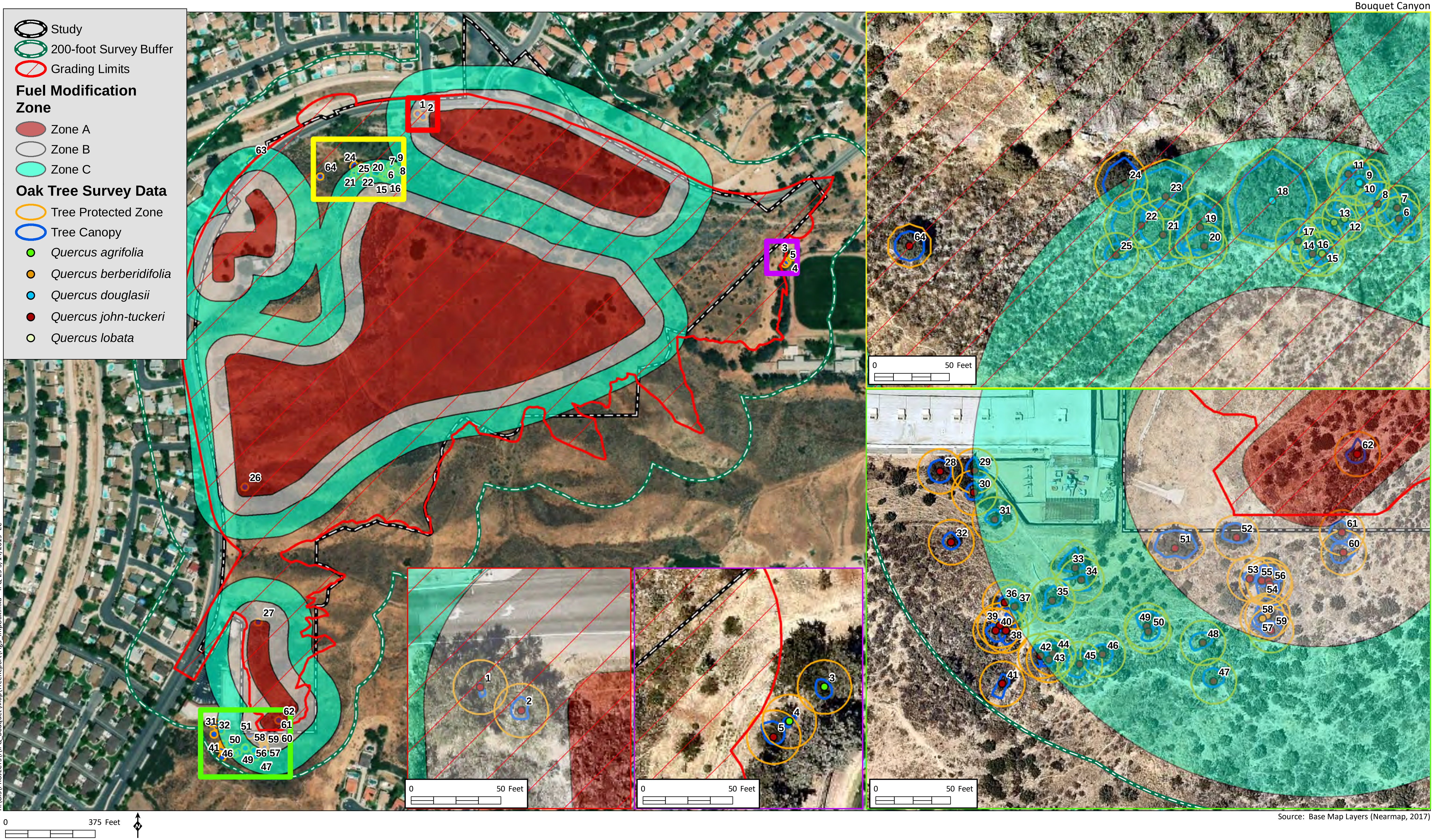
Oak Tree Locations

Figure 4

Bouquet Canyon



Source: Base Map Layers (Nearmap, 2017)

HELIX Environmental Planning

Impacts to Oak Trees

Figure 5

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
1	Tucker oak *Quercus john-tuckeri*	6	10	3	1	1	5	6	1	1	3	Deep v-crotch at 7", canopy is N-S oriented, does not extend E-W.	Appears vigorous, some small galls present, some old, healed trunk injuries.	B		Removal
2	Tucker oak *Quercus john-tuckeri*	7.5	9	8	6	3	6	5	6	6	6	Trunk leaning northeast, canopy overall well-distributed.	Galls, insect damage.	B		Removal
3	coast live oak *Quercus agrifolia*	12.75	16	4	3	4	6	7	6	5	6	Tree leaning south.	Has stress-related suckers, sapsucker holes.	B	No tag; off-site.	Avoided
4	coast live oak *Quercus agrifolia*	10, 9, 7	9	2	6	3	1	4	3	4	3	Tree has been topped.	All epicormic growth, tree in severe decline.	D	No tag; off-site.	Avoided
5	Tucker oak *Quercus john-tuckeri*	11.75, 12, 8.5	15	9	8	6	5	4	4	5	10	Tree leaning north, away from adjacent eucalyptus.	Some galls present, bark damage present (chainsaw cut)-healing.	B	No tag; off-site.	Minor Encroach-ment
6	Tucker oak *Quercus john-tuckeri*	9, 13, 13	16	4	6	9	15	10	5	5	2	Large failure at v-crotch with decay (old main stem), exposed roots.	Declining, significant amount of epicormic sprouting.	D		Removal
7	Tucker oak *Quercus john-tuckeri*	18, 19, 24	22	10	10	10	8	15	10	10	9	Exposed roots, wide angle crotch at base.	Declining, epicormic sprouting, canopy dieback.	D		Removal

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
8	Tucker oak *Quercus john-tuckeri*	9.75, 6	5	2	8	2	2	5	10	2	4	Severe lean to south, on steep slope.	Tree is being shaded, very sparse canopy, canopy dieback.	D	Stump shoots from old dead tree.	Removal
9	Tucker oak *Quercus john-tuckeri*	20	15	6	3	12	12	5	5	2	7	Exposed roots, on steep slope.	Large split with internal decay in trunk, internal decay throughout.	D		Removal
10	blue oak *Quercus douglasii*	85, 36	45	10	15	15	20	20	25	10	10	Main trunk split long ago, large trunk leaning north, southern-most trunk with severe lean south, on steep slope.	Lots of mistletoe, canopy very sparse.	D		Removal
11	Tucker oak *Quercus john-tuckeri*	9	16	5	3	3	4	2	6	2	2	On steep slope.	Most of canopy is dead, mistletoe present, epicormic sprouting.	D	Tree is almost completely dead.	Removal
12	scrub oak *Quercus berberidifolia*	10	15	2	8	8	8	2	2	2	2	Trunk leaning to north, multi-stem, one stem is dead, on steep slope.	Epicormic growth, very sparse canopy.	D		Removal

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
13	scrub oak *Quercus berberidifolia*	12, 9.5, 10, 10	15	5	6	8	8	9	5	2	2	One dead stem, on steep slope.	Epicormic sprouting, severe decline, some galls present.	D		Removal
14	scrub oak *Quercus berberidifolia*	22.5. 22, 17, 10, 7.5	20	12	12	12	5	12	10	10	12	Some stems have internal decay, on steep slope.	Epicormic sprouting, mistletoe present, tree in decline.	D		Removal
15	scrub oak *Quercus berberidifolia*	7.5. 7.5, 8, 5.5	14	5	3	8	6	8	5	5	9	Good balance, on steep slope.	Some mistletoe present, significant amount of epicormic sprouting, some canopy dieback.	C		Removal
16	Tucker oak *Quercus john-tuckeri*	9.5	10	1	1	1	10	10	10	2	1	Most of canopy is in the south, shaded in the north, on steep slope.	Some dieback present, significant amount of epicormic sprouting.	C		Removal
17	Tucker oak *Quercus john-tuckeri*	5.5, 6.5, 7, 9	12	7	3	3	4	8	8	8	8	Some included bark at v-crotch about 5" above ground, tree on steep slope.	Small amounts of dieback and epicormic sprouting present.	B		Removal

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
18	blue oak *Quercus douglasii*	40.5, 24, 47, 52.5, 48	35	30	25	25	28	27	30	25	25	Large multi-stem tree with big split and decay, all stems leaning towards the south, tree on steep slope.	Tree is experiencing some dieback, epicormic sprouting, sap sucker and borer holes present.	C	Tree tagged 61 in old survey, probably burned.	Removal
19	Tucker oak *Quercus john-tuckeri*	22, 16.5, 17, 13, 10, 11	30	18	15	10	15	15	22	15	15	Included bark in all crotches, tree on a steep slope.	Appears vigorous, some cankers, canopy is somewhat sparse.	B		Removal
20	Tucker oak *Quercus john-tuckeri*	17.5, 17, 14, 14	15	10	10	10	7	8	8	15	10	Tree on steep slope, nexus of stems is 1’ above ground.	Some canopy dieback present.	B		Removal
21	Tucker oak *Quercus john-tuckeri*	21, 25, 20.5, 9	20	20	20	10	20	18	10	15	20	Multiple trunks all leaning in different directions, tree on a steep slope.	Most of canopy is epicormic sprouting, borer and sapsucker holes are present.	C		Removal
22	Tucker oak *Quercus john-tuckeri*	15, 19, 18.5, 19, 20	25	20	3	2	1	1	20	20	20	Tree is on a steep slope, included bark present.	Tree appears healthy but is being shaded, canopy is somewhat sparse, significant dieback is present.	C		Removal

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
23	Tucker oak *Quercus john-tuckeri*	44.5	35	20	20	5	1	1	10	18	20	Strong lean to the north.	Significant amount of dieback in the lower canopy.	B		Removal
24	Tucker oak *Quercus john-tuckeri*	18, 12.5, 42, 22.5	30	18	12	9	9	15	15	15	15	V-crotch with included bark at 7”, 1.5’, and 2’ above ground.	Some galls are present.	B	Tree tagged 60 in old survey.	Removal
25	Tucker oak *Quercus john-tuckeri*	9, 9, 10, 6	9	8	8	8	5	2	6	8	8	Tree is on a steep slope.	Some epicormic sprouting is present, fairly even canopy.	B		Removal
26	Tucker oak *Quercus john-tuckeri*	6.5	10	8	8	8	8	8	8	8	8	Even canopy spread, tree growing in the open.	Some galls are present, canopy is dense and healthy.	A	Shrub form, more than 25 stems, all 1-3 inches in circum-ference.	Removal
27	Tucker oak *Quercus john-tuckeri*	6	9	6	4	4	4	6	6	4	5	Structurally good, open, even canopy.	Significant amount of epicormic growth, most leaves are affected by aphids.	D	Some mechanical damage on the east side of the trunk.	Removal
28	Tucker oak *Quercus john-tuckeri*	6.5	8	8	8	8	8	8	8	8	8	Tree is on a steep slope.	Some galls are present.	B	No tag; off-site.	Avoided
29	Tucker oak *Quercus john-tuckeri*	10, 6, 6.5, 5.5, 11	9	10	4	9	7	4	5	6	7		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided
30	Tucker oak *Quercus john-tuckeri*	9, 11	12	7	5	6	5	5	6	6	6		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
31	Tucker oak *Quercus john-tuckeri*	6.5, 8, 6.5	8	7	6	4	3	4	4	7	6		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided
32	Tucker oak *Quercus john-tuckeri*	6	9	7	5	6	5	5	5	6	6		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided
33	Tucker oak *Quercus john-tuckeri*	12, 9.5, 14.5	13	14	5	7	1	1	4	12	10	Strong lean downhill.	Tree is vigorous, some minor boring insect damage, significant amount of stress-related sprouting at base.	C	No tag; off-site.	Avoided
34	Tucker oak *Quercus john-tuckeri*	14.5, 11	14	4	5	3	9	7	10	13	3	Good structure.	Tree appears vigorous, lots of stress-related sprouting at base, epicormic sprouting present.	C	No tag; off-site.	Avoided
35	Tucker oak *Quercus john-tuckeri*	8, 13, 16, 9.5	15	10	10	7	5	3	9	4	7	Internal decay present in one main trunk.	Significant amount of stress-related sprouting at base.	C	No tag; off-site.	Avoided
36	Tucker oak *Quercus john-tuckeri*	6	12	5	6	6	4	5	5	5	4		Significant amount of epicormic sprouting, some galls present.	C	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
37	Tucker oak *Quercus john-tuckeri*	8	12	5	5	5	5	4	3	3	5		Significant amount of epicormic sprouting, some galls present.	C	No tag; off-site.	Avoided
38	Tucker oak *Quercus john-tuckeri*	9.5, 10, 8.5	12	12	10	5	10	10	6	5	2	Lean is causing bark to split.	Some internal decay and stress-related sprouting at the base is present.	C	No tag; off-site.	Avoided
39	Tucker oak *Quercus john-tuckeri*	7	10	4	3	3	3	4	4	5	5		Stress-related sprouting at the base and epicormic sprouting is present.	C	No tag; off-site.	Avoided
40	Tucker oak *Quercus john-tuckeri*	6, 5	12	5	4	7	8	8	6	7	5		Some galls are present, tree is in good health overall.	B	No tag; off-site.	Avoided
41	Tucker oak *Quercus john-tuckeri*	8, 6	15	7	6	5	3	10	10	3	3	Bark has a healing fissure down the middle of the trunk.	Some epicormic sprouting is present.	B	No tag; off-site.	Avoided
42	Tucker oak *Quercus john-tuckeri*	6.5, 6	12	8	8	2	2	8	7	7	7	Several branches are rubbing against each other.	Some galls are present.	B	No tag; off-site.	Avoided
43	Tucker oak *Quercus john-tuckeri*	6, 4	12	5	5	3	4	4	6	7	7		Some epicormic sprouting is present.	B	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
44	Tucker oak *Quercus john-tuckeri*	6, 6	12	7	8	9	5	3	3	7	7		Some canopy dieback is present.	C	No tag; off-site.	Avoided
45	Tucker oak *Quercus john-tuckeri*	7, 6, 6, 6, 5	13	8	8	6	6	9	10	9	9	Tree is in shrub form, several widely-spaced branches.	Some epicormic sprouting and galls are present.	B	No tag; off-site.	Avoided
46	Tucker oak *Quercus john-tuckeri*	6, 6, 6, 6, 8, 8.5	9	7	7	7	7	7	7	7	7	Tree is in shrub form, several widely-spaced branches.	Some epicormic sprouting is present, tree exhibiting vigorous growth.	B	No tag; off-site.	Avoided
47	Tucker oak *Quercus john-tuckeri*	6.5, 4	9	9	8	7	4	4	5	7	9	Tree is leaning downslope causing fissures in some stems.	Main stem has a large fissure with internal decay.	C	No tag; off-site.	Avoided
48	Tucker oak *Quercus john-tuckeri*	6, 5, 5	9	7	9	6	3	3	8	9	8	Some healing cracks are present at the base of main stems.	Some galls are present, some canopy dieback.	B	No tag; off-site.	Avoided
49	Tucker oak *Quercus john-tuckeri*	10, 6.5, 9.5	13	11	11	5	5	5	2	5	10	Good structure.	Some dieback and significant amounts of epicormic sprouting are present.	C	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
50	Tucker oak *Quercus john-tuckeri*	9, 7, 6, 6	13	2	8	8	7	7	7	2	2	Good structure.	Significant amount of epicormic sprouting is present.	C	No tag; off-site.	Avoided
51	Tucker oak *Quercus john-tuckeri*	15, 16, 16, 17	18	12	14	15	10	5	9	14	14	V-crotches are 1' above ground, some chainsaw wounds are present.	Significant amount of epicormic sprouting is present.	C	No tag; off-site.	Avoided
52	Tucker oak *Quercus john-tuckeri*	16.5, 10, 9.5, 17, 6, 9, 8.5	17	10	9	9	5	3	4	10	11	Many stems, but good structure.	Significant amount of epicormic sprouting and some canopy dieback are present.	C		Minor Encroach-ment
53	Tucker oak *Quercus john-tuckeri*	13	19	5	8	6	3	2	2	5	5	V-crotch at 6" and 4' above ground, tree has a slight lean.	Most of canopy is epicormic sprouting.	C	No tag; off-site.	Avoided
54	Tucker oak *Quercus john-tuckeri*	10, 8, 10	17	11	11	5	5	3	3	5	5		Most of canopy is epicormic sprouting, significant canopy dieback is present.	C	No tag; off-site.	Avoided
55	Tucker oak *Quercus john-tuckeri*	12	17	11	9	9	1	1	6	8	9	Tree is leaning northeast.	Borer holes and internal decay are present.	C	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
56	Tucker oak *Quercus john-tuckeri*	12, 11, 7, 7, 8, 10.5	15	8	8	6	8	9	10	9	7		Borer holes, some epicormic sprouting, internal decay, and canopy dieback are present.	C	No tag; off-site.	Avoided
57	scrub oak *Quercus berberidifolia*	9.5, 9.5, 7, 10, 8, 6.5, 6	12	9	10	10	7	5	9	9	9	Tree is in shrub form, mostly shaded by surrounding trees.	Some galls and epicormic sprouting are present.	B	No tag; off-site.	Avoided
58	scrub oak *Quercus berberidifolia*	7, 6	11	5	1	3	8	8	8	8	3	Tree is in shrub form.	Canopy is dying back, significant amount of epicormic sprouting is present.	C	No tag; off-site.	Avoided
59	Tucker oak *Quercus john-tuckeri*	8, 8, 8, 8, 8, 12.5	11	6	6	8	5	5	5	7	7	Tree is in shrub form.	A healing fissure and internal decay are present in one of the main stems.	C	No tag; off-site.	Avoided
60	Tucker oak *Quercus john-tuckeri*	6, 6, 6, 9, 4	8	6	6	8	5	7	9	9	9	Stems are all widely-spaced, spread out, tree is in shrubby form.	Some canopy dieback is present.	B	No tag; off-site, there is a packrat midden in the middle of the trunks.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
61	Tucker oak *Quercus john-tuckeri*	6, 6, 4, 5, 8, 6, 4, 4	9	8	6	6	6	6	7	9	8	Tree is in shrub form, stems are spread out.	Some canopy dieback, epicormic sprouting, and galls are present.	B		Major Encroach-ment
62	Tucker oak *Quercus john-tuckeri*	9, 7.5, 5.5, 6.5, 5.5, 8.5, 8, 6.5, 4, 5, 6	9	11	6	5	6	6	7	8	5		Cankers, galls, epicormic sprouting, and canopy dieback are present.	C		Removal
63	valley oak *Quercus lobata*	12, 22	20	5	7	7	7	7	7	7	7	V-crotch at 1.5’ and 5’ with included bark, tree is growing straight.	Vigorous growth, healthy specimen, no obvious signs of disease.	A	Circumfer-ence and canopy were estimated-tree is on private property.	Avoided
64	Tucker oak *Quercus john-tuckeri*	17, 32.5	19	10	10	10	10	10	8	8	10	Included bark, exposed roots, tree is growing on a steep slope.	Vigorous growth, some canopy dieback is present.	B		Removal

Photo 1: Tree 10 (blue oak, *Quercus douglasii*) adjacent to the northwestern corner of the study area.

Photo 2: Tucker oak (*Quercus john-tuckeri*) scrub adjacent to the southwestern corner of the study area.

Photo 3: Tree 51 (Tucker oak, *Quercus john-tuckeri*) assigned an oak tree rating of C for displaying significant amounts of epicormic growth.

Photo 4: Tree 62 (Tucker oak, *Quercus john-tuckeri*) assigned an oak tree rating of C for displaying canopy dieback and significant amounts of epicormic growth.

General Construction Site Recommendations

- A minimum 4-foot tall, brightly colored, synthetic fence should be installed around the outermost edge of the protected zone of trees that are designated for retention on-site. Encroachment into the fenced areas should be restricted to the minimum amount feasible and fencing should remain in place until all construction activities have ceased
- The fenced area should be kept clear of building materials, waste, and excess soil.
- No digging, trenching, compaction, or other soil disturbance should be allowed in the fenced area.
- The storage of construction equipment or hazardous materials such as gasoline, oil, or other toxic chemicals should not be allowed in or adjacent to the fenced area.
- Storage areas for equipment, soil, and construction materials as well as burn sites (if permitted), cement washout pits, and construction work zones should be kept away from protected trees and outside the fenced in area.
- Cable, chain, rope or signage should not be attached to retained trees.
- Designated roads and parking areas should be established. All construction personnel should be restricted to driving and parking in designated areas. Discharge of exhaust from construction vehicles and equipment should not be allowed near the protected zone of trees.
- Grade changes should be avoided near fenced areas to the maximum extent possible.

Recommendations for Construction Activities in the Vicinity of Retained Trees

- All necessary clearance pruning should be conducted by a Certified Tree Worker or Certified Arborist.
- Trenching within the dripline of retained trees should be avoided to the maximum extent practicable and kept a minimum distance of 10 times the diameter of the tree away from its trunk. If necessary, this trenching should be conducted using hand excavation or compressed air to reduce impacts to tree roots. Machine trenching should not be allowed within the dripline of retained trees. If pipes must be installed closer to the tree than a distance of 10 times the diameter of the tree away from its trunk, they should be bored beneath the tree a minimum of 3 feet below the ground surface to reduce impacts to roots.
- Excavation should also be minimized within the dripline of retained trees. Construction within the dripline of retained trees should be conducted in a manner that minimizes excavation and provides for the best preservation of roots as determined by the Project Arborist.
- If tree roots are severed outside of the fenced area, they should be severed cleanly and kept moist. All exposed roots outside of fenced areas should be covered with protective material during construction such as mulch or plywood sheets to reduce soil

compaction. Protective material should be removed upon completion of construction activities.

- Trenching and excavation should be avoided during hot, dry, weather and trees shall be watered before, during, and after trenching and excavation within the dripline of retained trees to offset water loss due to cut roots.
- Grading within the driplines of retained trees should be avoided wherever feasible.
- To prevent soil compaction, several inches of wood chips should be spread in the root zone area and covered with steel plates.

Recommendations for Protection of Trees Post-Construction

- Post-construction inspections of the trees should be conducted by a Certified Arborist or Certified Tree Worker to determine if retained trees are stressed (e.g., water stress, nutrient stress) or damaged (e.g., broken branches, trunk damage). Appropriate corrective actions should be implemented as necessary. Such corrective actions may include application of root stimulant to encourage new root growth in trees that have a significant portion of their roots lost due to cutting or soil compaction.
- Aeration of soil by vertical mulching or similar technique should be implemented around retained trees to offset the impacts of soil compaction that has already occurred due to construction activities and other site uses.
- Long term maintenance should also be conducted by a Certified Arborist or tree care specialist to assist the trees with recovering from construction related stress and may include watering, fertilization, pruning, and/or pest/disease control.

Appendix I

Rare Plant Species Potential to Occur

Appendix I
Rare Plant Species Potential to Occur[1]

Species Name	Common Name	Status[2]	Habitat, Ecology, and Life History	Potential to Occur[3]
Berberis nevinii	Nevin's barberry	FE/SE CRPR 1B.1	Shrub. Occurs on steep, north-facing slopes or washes within chaparral, cismontane woodland, coastal scrub, and riparian scrub. Elevation range 70-825 m. Flowering period Mar-May.	**Presumed absent.** The study area supports suitable habitat for this species. The nearest observation of this species was recorded in 1987 within the Santa Clara river, approximately 4.25 miles to the southwest of the study area. This species was not observed during the rare plant surveys.
Calochortus clavatus var. *gracilis*	slender mariposa-lily	CRPR 1B.2	Medium perennial herb. Occurs in shaded foothills and canyons within chaparral, coastal scrub, and valley grassland. Elevation range below 1000 m. Flowering period May-Jun.	**Observed.** A total of 496 individuals were observed on the study area during the rare plant surveys.
Calochortus palmeri var. *palmeri*	Palmer's mariposa-lily	CRPR 1B.2	Medium perennial herb. Occurs in mesic and vernally moist areas within chaparral, lower montane coniferous forest, and meadows. Also occurs within seeps. Elevation range 1200-2200 m. Flowering period May-Jul.	**None.** The study area does not support mesic or vernally moist areas. There are no records of this species in the Santa Clarita area; Los Angeles County records are confined to the San Gabriel Mountains. This study area is below the elevation range for this species.

Appendix I (cont.)
Rare Plant Species Potential to Occur[1]

Species Name	Common Name	Status[2]	Habitat, Ecology, and Life History	Potential to Occur[3]
Dodecahema leptoceras	slender-horned spineflower	FE/SE CRPR 1B.1	Small annual herb. Occurs in sandy or gravelly places within chaparral, cismontane woodland, and coastal scrub associated with alluvial fans. Elevation range 200-700 m. Flowering period May-Jun.	**Presumed absent.** The study area supports suitable habitat for this species. The nearest observation of this species was recorded in 1979, approximately 3.75 miles to the east of the study area within a non-specific area of Mint Canyon. This species was not observed during the rare plant surveys.
Navarretia fossalis	spreading navarretia	FT CRPR 1B.1	Small annual herb. Occurs in vernal pools, vernal swales, or roadside depressions. Population size is strongly correlated with rainfall. Depth of pool appears to be a significant factor as this species is rarely found in shallow pools. Elevation range 30-1300 m. Flowering period Apr-Jun.	**None.** The study area does not support vernally moist areas.
Navarretia setiloba	Piute Mountains navarretia	CRPR 1B.1	Small annual herb. Occurs on depressions in clay or gravelly loam within valley grassland, foothill woodland, and pinyon-juniper woodland. Elevation range 500-2100 m. Flowering period Apr-Jul.	**Presumed absent.** The study area contains suitable habitat for the species. The nearest observation of this species was recorded in 2001, approximately 2.25 miles the to the east of the study area within Plum Canyon. This species was not observed during the rare plant surveys.
Opuntia basilaris var. *brachyclada*	short-joint beavertail	CRPR 1B.2	Medium succulent. Occurs on sandy or coarse granitic soil within chaparral, Joshua tree woodland, and oak/pine woodland. Elevation range 1200-1800 m. Flowering period Apr-Jun.	**None.** The study area is below the elevation range for this species.

Rare Plant Species Potential to Occur[1]

Species Name	Common Name	Status[2]	Habitat, Ecology, and Life History	Potential to Occur[3]
Orcuttia californica	California Orcutt grass	FE/SE CRPR 1B.1	Small annual herb. Occurs in or near vernal pools. This species tends to grow in wetter portions of the vernal pool basin but does not show much growth until the basins become somewhat desiccated. Elevation range 0-700 m. Flowering period Apr-Aug.	**None.** The study area does support vernal pools.

Source: HELIX (2018)

[1] Sensitive species reported within the Mint Canyon quadrangle on CNDDB and CNPS databases.

[2] Listing is as follows: F = Federal; S = State of California; E = Endangered; T = Threatened.
CRPR = California Rare Plant Rank: 1A – presumed extinct; 1B – rare, threatened, or endangered in California and elsewhere; 2A – rare, threatened, or endangered in California and elsewhere; 2B – rare, threatened, or endangered in California but more common elsewhere; 3 – more information on distribution, endangerment, ecology, and/or taxonomic validity is needed. Extension codes: .1 – seriously endangered; .2 – moderately endangered; . 3 – not very endangered.

[3] Potential to Occur is assessed as follows: **None**: Habitat suitable for species survival does not occur on the study area, the study area is not within geographic range of the species, and/or the study area is not within the elevation range of the species; **Low**: Suitable habitat is present on the study area but of low quality and/or small extent. The species has not been recorded recently on or near the study area. Although the species was not observed during surveys for the current project, the species cannot be excluded with certainty; **Moderate**: Suitable habitat is present on the study area and the species was recorded recently near the study area; however, the habitat is of moderate quality and/or small extent. Although the species was not observed during surveys for the current project, the species cannot be excluded with certainty; **High**: Suitable habitat of sufficient extent is present on the study area and the species has been recorded recently on or near the study area, but was not observed during surveys for the current project. However, focused/protocol surveys are not required or have not been completed; **Presumed Present**: The species was observed during focused surveys for the current project and is assumed to occupy the study area; **Presumed Absent**: Suitable habitat is present on the study area but focused surveys for the species were negative.

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Appendix J

Sensitive Animal Species Potential to Occur

Appendix J
Sensitive Animal Species Potential to Occur[1]

Species Name	Common Name	Status[2]	Habitat, Ecology, and Life History	Potential to Occur[3]
Invertebrates				
Branchinecta lynchi	vernal pool fairy shrimp	FT	Most commonly found in swale, earth slump, or basal-flow depression pools in unplowed grasslands. Requires cool-water pools.	**None.** The study area does not support vernal pools or other depressional pool habitat.
Euphydryas editha quino	Quino checkerspot butterfly	FE	Primary larval host plants in San Diego are dwarf plantain (*Plantago erecta*) at lower elevations, woolly plantain (*P. patagonica*) and white snapdragon (*Antirrhinum coulterianum*) at higher elevations. Owl's clover (*Castilleja exserta*) is considered a secondary host plant if primary host plants have senesced. Potential habitat includes vegetation communities with areas of low-growing and sparse vegetation. These habitats include open stands of sage scrub and chaparral, adjacent open meadows, old foot trails and dirt roads.	**None.** The study area is located outside of this species' current range. A historical record of this species was documented on CNDDB in 1920, approximately 2.25 miles to the east of the study area within non-specific area in Mint Canyon. The study area does not support this species' primary larval host plant, although a few scattered owl's clover individuals were observed.
Fish				
Gasterosteus aculeatus williamsoni	unarmored threespine stickleback	FE/SE	Occurs in weedy ponds, backwaters, and among emergent vegetation in small, south coast-flowing streams.	**None.** The study area does not support suitable perennial water for this species.
Amphibians				
Spea hammondii	western spadefoot	SSC	Occurs in open coastal sage scrub, chaparral, and grassland, along sandy or gravelly washes, floodplains, alluvial fans, or playas; require temporary pools for breeding and friable soils for burrowing; generally excluded from areas with bullfrogs (*Rana catesbiana*) or crayfish (*Procambarus* spp.)	**None.** The study area does not support suitable temporary pools required for breeding.

Appendix J (cont.)
Sensitive Animal Species Potential to Occur[1]

Species Name	Common Name	Status[2]	Habitat, Ecology, and Life History	Potential to Occur[3]
Reptiles				
Anniella sp.	California legless lizard	SSC	Occurs in a variety of habitats, such as coastal dunes, sandy washes, and alluvial fans within chaparral, pine-oak woodlands, stream terraces with cottonwoods, sycamores or oaks. Prefers areas with leaf litter under trees and bushes with generally moist and loose soil.	**Moderate.** The study area supports suitable habitat for this species, particularly within and adjacent to Bouquet Canyon Creek. However, the site is relatively free of leaf litter due to presence of giant reed (*Arundo donax*) along the banks of Bouquet Canyon Creek. The nearest CNDDB occurrence was recorded in 2010, approximately 1.5 miles to the northwest of the study area along Pettinger Canyon Road.
Arizona elegans occidentalis	California glossy snake	SSC	Most common in desert habitats but also occur in chaparral, sagebrush, valley-foothill hardwood, pine-juniper, and annual grass. Prefers open sandy areas with scattered brush, but also found in rocky areas.	**Low.** The study area supports suitable chaparral habitat, although there has not been a CNDDB occurrence record in the area in over 50 years.
Aspidoscelis tigris stejnegeri	coastal whiptail	SSC	Open coastal sage scrub, chaparral, and woodlands. Frequently found along the edges of dirt roads traversing its habitats. Important habitat components include open, sunny areas, shrub cover with accumulated leaf litter, and an abundance of insects, spiders, or scorpions.	**High.** The study area supports suitable sage scrub, chaparral, and woodland habitat for this species. The nearest CNDDB occurrence was recorded in 2008, approximately 1.25 miles to the east of the study area along Hayfork Road.

Species Name	Common Name	Status[2]	Habitat, Ecology, and Life History	Potential to Occur[3]
Reptiles (cont.)				
Phrynosoma blainvillii	coast horned lizard	SSC	Coastal sage scrub and open areas in chaparral, oak (Quercus sp.) woodlands, and coniferous forests with sufficient basking sites, adequate scrub cover, and areas of loose soil; require native ants, especially harvester ants (*Pogonomyrmex* spp.), and are generally excluded from areas invaded by Argentine ants (*Linepithema humile*).	**High.** The study area supports suitable sage scrub, chaparral, and oak woodland habitats. The nearest CNDDB occurrence was recorded in 2005, approximately 4.5 miles to the southwest of the study area within the Santa Clara River.
Thamnophis hammondii	two-striped gartersnake	SSC	Occurs along perennial and intermittent streams bordered by dense riparian vegetation, but occasionally associated with vernal pools or stock ponds.	**None.** The study area does not support perennial or intermittent streams or other aquatic habitats.
Birds				
Athene cunicularia	burrowing owl	SSC	Typical habitat is grasslands, open scrublands, agricultural fields, and other areas where there are ground squirrel burrows or other areas in which to burrow.	**Presumed Absent.** Although the study area supports suitable habitat and burrows, no burrowing owls were observed during the focused survey.

Appendix J (cont.)
Sensitive Animal Species Potential to Occur[1]

Species Name	Common Name	Status[2]	Habitat, Ecology, and Life History	Potential to Occur[3]
Birds (cont.)				
Lanius ludovicianus	loggerhead shrike	SSC	Nests in dense, often thorny shrubs or trees. Will nest within brush piles or tumbleweeds when trees or shrubs are not present. Feeds on a wide variety of animals, including arthropods, amphibians, reptiles, small mammals, and small songbirds within open habitats such as grasslands, agricultural fields, pastures, shrublands, and ruderal areas with adequate perching locations.	**High.** Some portions of the study area support dense shrubs and trees suitable for nesting . The majority of the site supports suitable foraging habitat. The nearest CNDDB occurrence was recorded in 2005, approximately 1.25 miles to the northeast of the study area.
Polioptila californica californica	coastal California gnatcatcher	FT/SSC	Occurs in coastal sage scrub and very open chaparral.	**Presumed Absent.** The study area supports coastal scrub and chaparral habitat. This species was not observed during focused surveys.
Mammals				
Corynorhinus townsendii	Townsend's big-eared bat	SCT/SSC	Occurs in a wide variety of habitats, although more common in mesic habitats. Usually roosts in caves, abandoned mines, and occasionally buildings. Forages for small moths along the edge of vegetation, such as riparian and woodland habitats.	**Low.** The study area does not contain suitable roosting habitat but may be used by foraging individuals.
Lepus californicus bennettii	San Diego black-tailed jackrabbit	SSC	Occurs primarily in open habitats including coastal sage scrub, chaparral, grasslands, croplands, and open, disturbed areas if there is at least some shrub cover present.	**High.** The study area contains suitable habitat for this species. The nearest CNDDB occurrence was recorded in 2015, approximately 5.5 miles to the southeast of the study area.

Appendix J (cont.)
Sensitive Animal Species Potential to Occur[1]

Species Name	Common Name	Status[2]	Habitat, Ecology, and Life History	Potential to Occur[3]
Mammals (cont.)				
Onychomys torridus ramona	southern grasshopper mouse	SSC	Sandy valley floors within desert scrub habitat with low to moderate shrub cover and friable soils, but also found in coastal scrub and chaparral habitats.	**Low.** The study area contains suitable habitat for this species. However, the nearest CNDDB occurrence was recorded in 1930, approximately 7 miles to the northeast of the study area within the Angeles National Forest.

[1] Sensitive species reported within the Mint Canyon quadrangle on CNDDB.

[2] Listing is as follows: F = Federal; S = State of California; E = Endangered; T = Threatened; CE = Candidate Endangered; CT = Candidate Threated; FP = Fully Protected; SSC = State Species of Special Concern.

[3] Potential to Occur is assessed as follows. **None**: Species is so limited to a particular habitat that it cannot disperse across unsuitable habitat (*e.g.* aquatic organisms), and habitat suitable for its survival does not occur on the study area; **Not Expected**: Species moves freely and might disperse through or across the study area, but suitable habitat for residence or breeding does not occur on the study area (includes species recorded during surveys but only as transients); **Low**: Suitable habitat is present on the study area but of low quality and/or small extent. The species has not been recorded recently on or near the study area. Although the species was not observed during surveys for the current project, the species cannot be excluded with certainty; **Moderate**: Suitable habitat is present on the study area and the species was recorded recently near the study area; however, the habitat is of moderate quality and/or small extent. Although the species was not observed during surveys for the current project, the species cannot be excluded with certainty; **High**: Suitable habitat of sufficient extent for residence or breeding is present on the study area and the species has been recorded recently on or near the study area, but was not observed during surveys for the current project. However, focused/protocol surveys are not required or have not been completed; **Presumed Present**: The species was observed during biological surveys for the current project and is assumed to occupy the study area; **Presumed Absent**: Suitable habitat is present on the study area but focused/protocol surveys for the species were negative.

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Attachment B

Oak Tree Survey Report Addendum

HELIX Environmental Planning, Inc.
16485 Laguna Canyon Road
Suite 150
Irvine, CA 92618
949.234.8770 **tel**
619.462.0552 **fax**
www.**helixepi**.com

February 16, 2022

Evan Knapp
Integral Communities
888 San Clemente Drive, Suite 100
Newport Beach, CA 92660

Subject: Addendum to the Oak Tree Report for the Bouquet Canyon Project (Tentative Tract No. 82126)

Dear Mr. Knapp:

HELIX Environmental Planning, Inc. (HELIX) completed an oak tree survey report in August 2021 for the proposed Bouquet Canyon Road Project (Project) located in the City of Santa Clarita (City), Los Angeles County, California. This letter report is an addendum to the oak tree survey report to provide updates to the findings of that report based on revised project plans. The revised study area total 89.73 acres (56.91 acres on-site and 32.82 acres off-site). The revised project is shown on Figure 1, *Regional Location*, Figure 2, *USGS Topography*, and Figure 3, *Aerial Photograph*.

REVISED PROJECT AREAS

The Revised Project Areas and changes made to the project since the BTR are summarized below and depicted on Figure 4, *Revised Project Areas*.:

1. Off-Site Flood Control Outlet- Additional temporary impacts to the concrete banks of the off-site concrete flood control channel required for the revisions related to the alignment of the outlet.

2. Copper Hill Road Improvements – Additional grading/paving for Copper Hill Road.

3. Davenport Trailhead – The addition of the Davenport parcel (APN 2812-008-008) for the construction of a city-required trailhead.

4. Bouquet Canyon Road Improvements North – Additional off-site repaving and improvements to existing Bouquet Canyon Road near the northeast corner of the project.

5. Flood Control Channel Inlet & Diversion Structure – Construction of a slightly larger concrete flow diversion structure intended to convey low flows into the low-flow channel and divert high flows into the proposed concrete-lined flood control channel.

6. Sewer Line - Installation of a sewer line in the northeast portion of the site.

7. Slope Grading – Additional slope grading for the new alignment of Bouquet Canyon Road along the southerly border of the study area.

8. Bouquet Canyon Road Improvements South – Minor additional off-site road repaving and improvements to Bouquet Canyon Road located in the southwesterly portion of the project site.

9. Residential Addition – Addition of the "donut hole" parcel (APN 2812-008-002) in the easterly portion of the project site. Note that this area was evaluated for impacts to biological resources in the 2019 BTR yet was not evaluated as part of the project in the EIR. Additional residential uses have been proposed in the donut hole area since the EIR was certified. As such, the donut hole parcel has been included in this addendum.

10. Residential Reduction - Removal of Planning Area 1a, which was previously proposed to be constructed within the southern portion of the study area per the project BTR and EIR. This planning area presented in the Final EIR for the project will not be constructed as part of the revised project.

UPDATED OAK TREE SURVEY

On February 26, 2021, HELIX biologist and ISA-certified arborist Daniel Torres performed a preliminary oak tree survey on Revised Project Area 3 (Davenport Trailhead). On October 19, 2021, Mr. Torres performed an oak tree survey in Revised Project Area 9 (see *Attachment A*, Oak Tree Survey Report). On August 12, 2021, Carlsberg and Associates performed a follow-up oak tree survey on the Davenport Parcel. The Carlsberg report is included as Attachment B, *Davenport Oak Tree Survey Report*. On December 10, 2021, Mr. Torres performed an oak tree survey on Additional Project Areas 1, 2, 4-8, and 10. Of the Revised Project Areas, City-protected oak trees were detected on the Revised Project Area 3 only.

UPDATED RESULTS

A total of 20 new trees subject to an Oak Tree Permit were identified on Revised Project Area 3 (Attachment B). The total number of trees within the revised study area is 84. Of the 20 new trees, one was a blue oak (*Quercus douglasii*), two were interior live oak (*Quercus wislizeni* var. *wislizeni*), and 17 were Tucker oak (*Quercus john-tuckeri*). The locations of all oak trees are depicted on Figure 5, *Oak Tree Locations*).

REVISED PROJECT EFFECTS

The revised project includes avoidance for all oaks within Revised Project Area 3. Tree 27 (Tucker oak) located in the southwestern portion of the study area was avoided in the original project plan. This tree will be subject to minor encroachment in the revised project plan. The updated oak tree impacts table is included as Attachment C, *Updated Oak Tree Survey Data.* According to the City's Oak Tree Preservation Ordinance, no mitigation is warranted for minor encroachments. With the removal of Planning Area 1a, 69 oaks are now being avoided. A summary of the revised impacts to oak trees is provided in Table 1, *Revised Impacts to Oak Trees*. A map within the location, canopy, and protected zone of the oak trees assessed during this survey is included as Figure 6, *Impacts to Oak Trees*.

Table 1
REVISED IMPACTS TO OAK TREES

Species Name	Common Name	Removed	Major Encroachment	Minor Encroachment	Avoided
Quercus agrifolia	coast live oak	1	0	0	0
Quercus berberidifolia	scrub oak	0	1	1	4
Quercus douglasii	blue oak	1	0	0	2
Quercus john-tuckeri	Tucker oak	10	0	1	60
Quercus lobata	valley oak	0	0	0	1
Quercus wislizeni var. wislizeni	interior live oak	0	0	0	2
	TOTAL	**12**	**1**	**1**	**69**

OAK TREE APPRAISED VALUES

Since the oak trees within Revised Project Area 3 will be avoided, no oak tree appraisal is warranted for these trees. Additionally, no appraisal is warranted for minor encroachment to Tree 27. Therefore, the total appraised value of the oak trees ($80,300) remains the same as presented in the Oak Tree Survey Report (Attachment A). The oak tree appraisals are detailed in Attachment C of Oak Tree Survey Report and summarized in Table 2, *Summary of Tree Appraisals*, below.

To mitigate for the full value of the appraised oak trees, an Oak Tree Mitigation Plan will be prepared detailing the installation of $39,600 worth of oak trees. Additionally, blue oak #10 will be transplanted. If the blue oak tree does not survive after a 5-year monitoring period, the full appraised value of the tree ($40,700) will be paid to the City.

Table 2
SUMMARY OF TREE APPRAISALS

Tree Number	Species	DBH*	Appraised Value
1	Tucker oak	1.9	$2,300
2	Tucker oak	2.4	$2,500
3	coast live oak	4.1	$3,100
4	Tucker oak	4.8*	$3,700
5	Tucker oak	6.0*	$5,200
6	Tucker oak	6.5*	$3,700
7	Tucker oak	11.3*	$7,000
8	Tucker oak	3.6*	$2,100
9	Tucker oak	6.4	$3,100
10	blue oak	29.4*	$40,700
11	Tucker oak	2.9	$2,200
12	scrub oak	3.2	$2,300
26	Tucker oak	2.1	$2,400
TOTAL APPRAISED VALUE			**$80,300**

Source: HELIX (2021)
*Indicates a tree with multiple trunks at DBH where the aggregate diameter was calculated

CONCLUSIONS

The analysis provided above is intended to serve as an addendum to the Oak Tree Survey Report to document revisions to the original proposed project, including nine Revised Project Areas and the removal of Planning Area 1a. The revised study area includes 84 City-protected oak trees. All 20 new oak trees detected within Revised Project Area 3 will be completely avoided. The revised project plan includes minor encroachment to Tree 27. No appraisal or mitigation is warranted for minor encroachment according to the City's Oak Tree Preservation Ordinance. The total appraised value required to mitigate for impacted oak trees is $80,300. This will occur through the planting of $39,600 worth of mitigation oak trees on site and the transplantation of blue oak #10. If the blue oak does not survive the 5-year monitoring period following transplantation, the appraised value of the blue oak ($40,700) will be paid to the City.

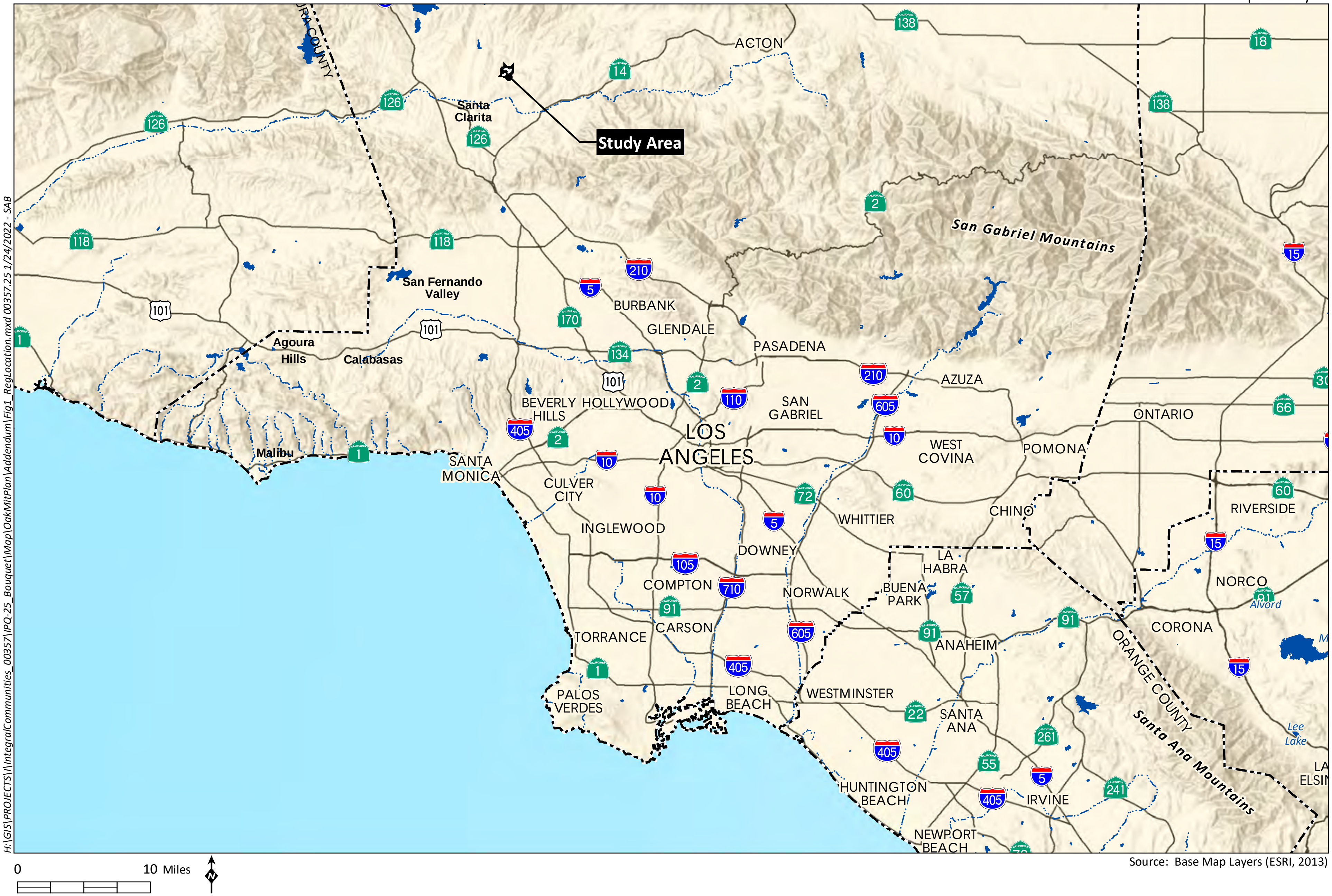
If you have any questions regarding the information presented in this letter report, please contact me at (619) 462-1515 or DanielT@helixepi.com.

Sincerely,

Daniel Torres
Biologist
ISA-Certified Arborist (WE-12249)

Attachments:

Figure 1: Regional Location
Figure 2: USGS Topography
Figure 3: Aerial Vicinity
Figure 4: Revised Project Areas
Figure 5: Oak Tree Locations
Figure 6: Impacts to Oak Trees
Attachment A: Oak Tree Survey Report
Attachment B: Davenport Oak Tree Survey Report
Attachment C: Updated Oak Tree Survey Data



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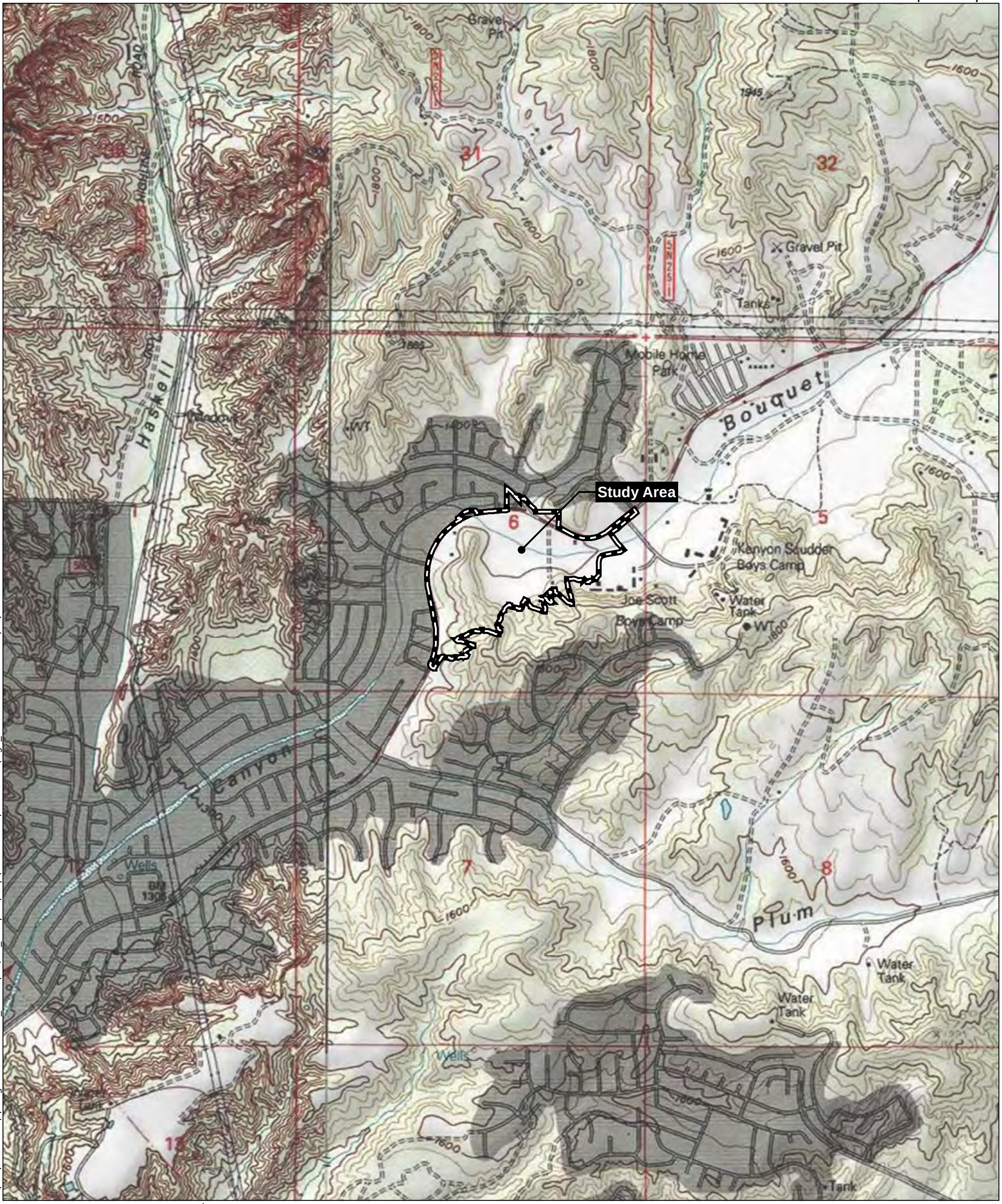
Source: Base Map Layers (ESRI, 2013)

HELIX Environmental Planning

Regional Location

Figure 1



0 2,000 Feet

Source: Mint Canyon 7.5' Quad (USGS)

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Vicinity Map

Figure 2

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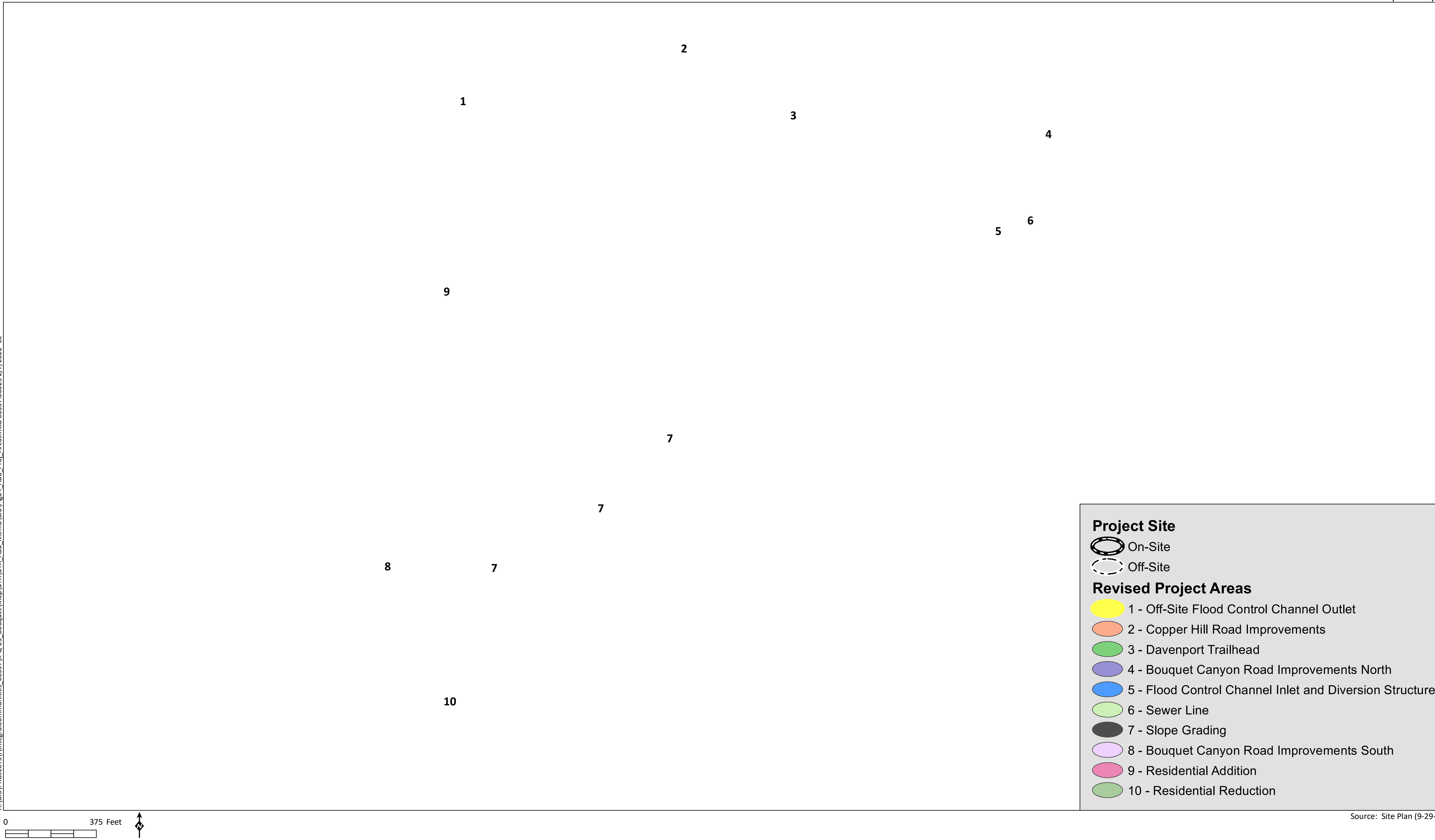
Source: Aerial (NearMap, 2021)

HELIX Environmental Planning

Aerial Photograph

Figure 3

Bouquet Canyon



Source: Site Plan (9-29-21)

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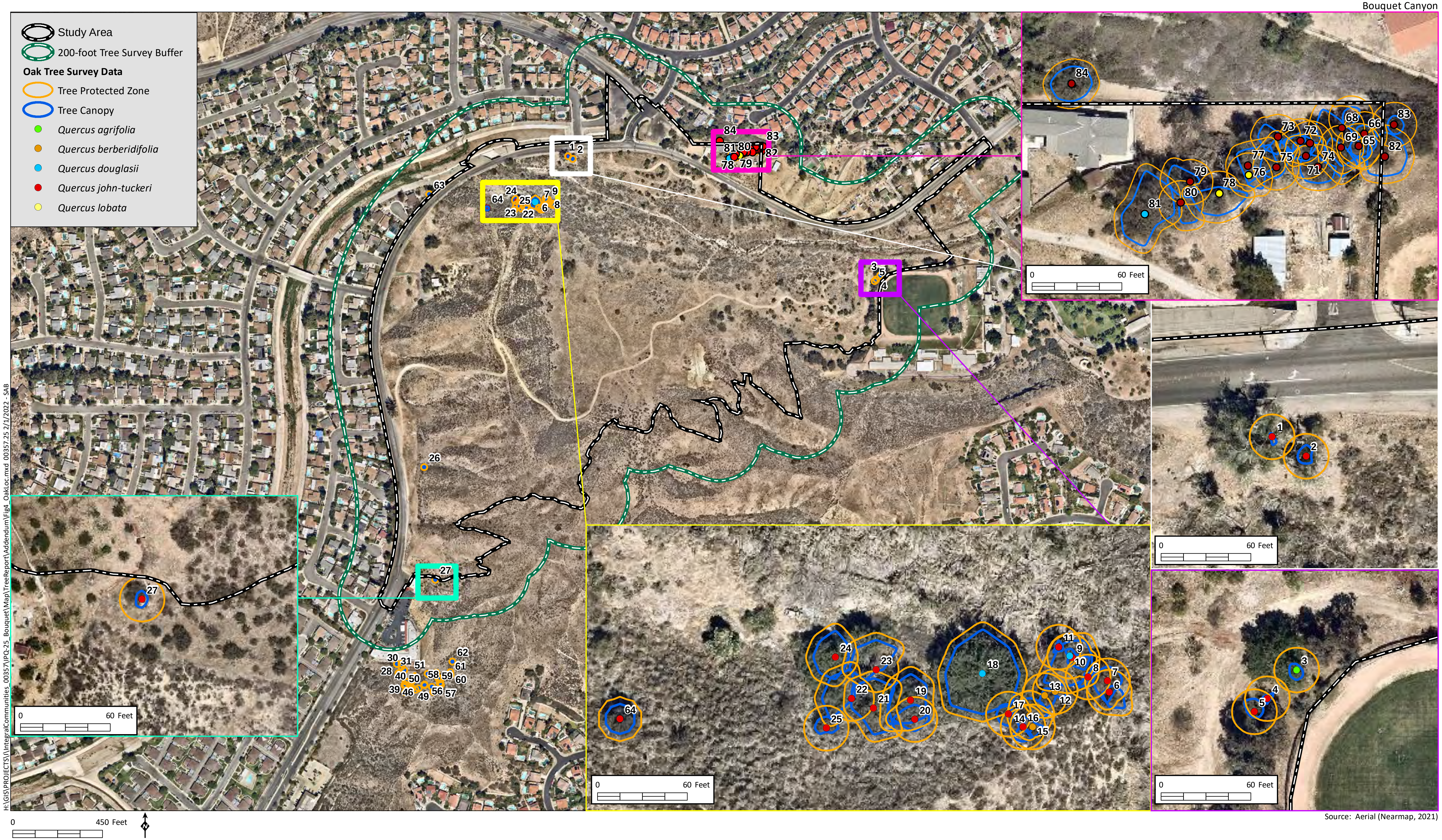
Additional Project Areas

Figure 4

Bouquet Canyon



Source: Aerial (Nearmap, 2021)

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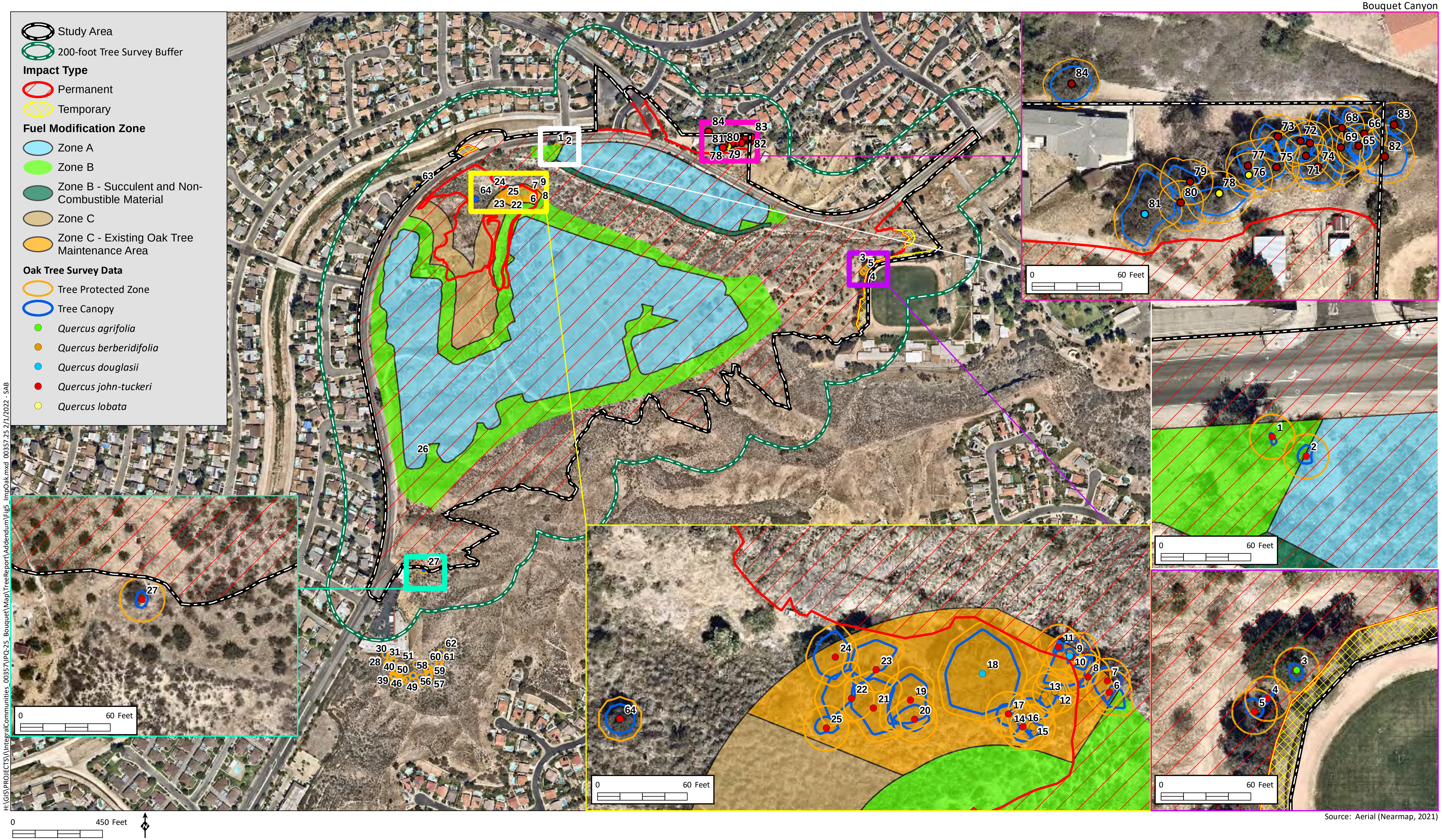
Environmental Planning

Oak Tree Locations

Figure 5



Source: Aerial (Nearmap, 2021)

HELIX Environmental Planning

Impacts to Oak Trees

Figure 6

Attachment A

Oak Tree Survey Report

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August 16, 2021 IPQ-25

Mr. Peter Vanek
Integral Communities
888 San Clemente Drive
Newport Beach, CA 92660

Subject: Oak Tree Survey Report for the Bouquet Canyon Road Project

Dear Mr. Covington:

HELIX Environmental Planning, Inc. (HELIX) prepared this report to document the results of an oak tree survey conducted for the proposed Bouquet Canyon Road Project (project) located the City of Santa Clarita (City), Los Angeles County, California. The purpose of this report is to provide an inventory of all species of oak tree (*Quercus* spp.) within 200-feet of the project footprint with at least one trunk over 6 inches in circumference at a point 4.5 feet above natural grade and to determine the presence of Heritage Trees as defined under the City's Oak Tree Preservation Ordinance (17.51.040; ordinance). This report was also prepared to provide supporting information for obtaining an Oak Tree Permit if sought in the future.

STUDY AREA LOCATION

The approximately 94-acre study area is generally located 6.9 miles to the east of Interstate 5 and 3.8 miles to the northwest of California State Route 14 in the City of Santa Clarita (Figure 1, *Regional Location*). Specifically, the study area is located directly south of the intersection of David Way and Bouquet Canyon Road. The study area is within Section 6 of Township 4 North, Range 15 West of the Mint Canyon, USGS 7.5-minute topographic quadrangle (Figure 2, *USGS Topography*).

Immediate surrounding land uses include existing residential developments to the north and west, a mixture of undeveloped land and residential development to the south, and undeveloped land and juvenile detention schools to the east (Figure 3, *Aerial Photograph*). The study area is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest.

REGULATORY FRAMEWORK

The City's Oak Tree Preservation ordinance states, "No person shall cut, prune, remove, relocate, endanger, damage, or encroach into the protected zone of any oak tree on any public or private property within the City" (City of Santa Clarita [City] 2013). The protected zone of the oak tree includes

the area within five feet of the dripline (canopy extent), but no less than 15 feet from the trunk. To remove any oak tree or to subject its protected zone to major encroachment, an Oak Tree Permit must be obtained. Trees subject to the permit include all trees of the oak species (*Quercus* sp.) exceeding 6 inches in circumference when measured at a point 4.5 feet above the tree's natural grade. Encroachment is defined as intrusion into the protected zone of an oak tree, which includes but is not limited to, intrusion by trenching, paving, pruning, dumping, parking of commercial vehicles. Major encroachment is defined by the City's ordinance as "an area between the outer edge of the trunk and fifty percent of the diameter of the protected zone" and minor encroachment is defined as an area between the outermost edge of the protected zone and fifty percent of the diameter of the protected zone" (City 2013).

To obtain an Oak Tree Permit, an application must be submitted to the City Manager or designated representative ("Director") and a filing fee as established by the City Council must be paid. The conditions of the Oak Tree Permit may include replacement or relocation of trees, or payment of a fee based on the ISA's "Guide for Plant Appraisal."

Heritage Oak Trees are given special consideration and may be fully protected or subject to requirements stricter than those of a standard protected oak tree. A Heritage Oak Tree is defined as any oak tree measuring 108 inches in circumference when measured 4.5 feet above the tree's natural grade. In the case of trees with multiple trunks, two or more trunks each must measure 72 inches or greater in circumference when measured 4.5 feet above the tree's natural grade.

METHODS

HELIX International Society of Arboriculture (ISA) Certified Arborist Daniel Torres (WE-12249) and HELIX Biologist/Regulatory Specialist Ezekiel Cooley completed an oak tree survey on the study area and within a 200-foot buffer of the study area (survey area) on December 19 and 20, 2018. The purpose of the survey was to document the presence of: (1) oak trees with at least one trunk over 6 inches in circumference at a point 4.5 feet above natural grade and (2) Heritage Oak Trees.

All oak trees within the survey area that satisfied the previously mentioned criteria were identified to species. The circumference at a point 4.5 feet above natural grade was measured. For trees with co-dominant stems at 4.5 feet above natural grade, the circumference of each stem was measured at this height. Next, the height of each tree was estimated and an aluminum tag with a unique number was affixed to the north side of the tree at approximately three feet above natural grade. Trees located outside of the study area but located within the buffer area were not tagged since Integral Communities does not own this property. Additionally, trees located on the detention school property to the east were not surveyed since permission to access this property was not provided. Finally, the location of each individual tree and the canopy extent were recorded with a global positioning system device with sub-meter accuracy. The collected data are not considered survey-grade accuracy and should not be used for construction purposes.

Physical and horticultural evaluations were performed for each protected tree according to the City's Oak Tree Preservation and Protection Guidelines (City 1990). The physical evaluation included the assessment of structure, terrain, and general appearance. The horticultural evaluation included the detection of any disease or pathogens and an assessment of the tree's overall vigor. The physical and horticultural evaluations were used to rate each tree on a scale ranging from A to F as outlined in the

City's Preservation and Protection Guidelines. The rating system is reproduced below in Table 2, *Oak Tree Rating System*.

Table 2
OAK TREE RATING SYSTEM

Rating	Description
A – Outstanding	A healthy and vigorous tree characteristic of its species and reasonably free of any visible signs of stress, disease or pest infestation.
B – Above Average	A healthy and vigorous tree with minor visible signs of stress, disease or pest infestation.
C – Average	Although healthy in overall appearance there is an abnormal amount of stress or disease and/or pest infestation.
D – Below Average/Poor	This tree is characterized by exhibiting a greater degree of stress, disease and/or pest infestation than normal and appears to be in a state of rapid decline. The degree of decline may vary greatly in signs of dieback, disease and pest infestation and appears to be in an advanced state of decline.
F – Dead	This tree exhibits no signs of life whatsoever.

Source: City of Santa Clarita (1990)

Following the oak tree survey, an impact assessment was conducted using the most recent project grading plans. The impact assessment was used to determine the number of oak trees that would be required to be removed or whose protected zone would be subject to major encroachment to complete project activities.

RESULTS

A total of 64 oak trees subject to an Oak Tree Permit were located within the survey area (Figure 4, *Oak Tree Locations*). Of these trees, one was coast live oak (*Quercus agrifolia*), six were scrub oak (*Quercus berberidifolia*), two were blue oak (*Quercus douglasii*), 54 were Tucker oak (*Quercus john-tuckeri*), and one was a valley oak (*Quercus lobata*). Six trees (approximately 9 percent) were assigned a rating of A – Outstanding, 22 trees (approximately 34 percent) were B – Above Average, 25 trees (approximately 40 percent) were C – Average, and 11 trees (approximately 17 percent) were D – Below Average. No dead trees were observed during the survey. Overall, there was very little disease noted on the oak trees within the survey area. The majority of trees (37 trees, approximately 58 percent) showed evidence of stress-related growth such as epicormic sprouting and suckers. No Heritage Oak Trees were found during the survey. The locations of all oak tree surveyed are shown in Figure 4. The data collected during the survey is included as Attachment A, *Oak Tree Survey Data*. Representative site and tree photographs are included as Attachment B, *Representative Photographs*.

IMPACT ASSESSMENT

All oak trees within the project footprint will be removed. In addition, the project will be required to implement fuel modification. The County Fire Department requires fuel modification zones to create a defensible space in the event a wildlife breaks out (County of Los Angeles N.D.). There are five different zones, which are outlined below:

> **Zone A (Setback Zone)** – This zone extends 30 feet beyond the edge of any structures. The only allowed vegetation within this zone is green lawns, ground cover not exceeding six inches in height, and well-spaced shrubs. The landscape must be irrigated to promote healthy vegetation and fire resistance.
>
> **Zone B (Irrigated Zone)** – This zone extends from the outermost edge of Zone A to 100 feet from structures. Green lawn, ground cover not exceeding six inches in height, and well-spaced shrubs and trees are allowed in this zone. The landscape must be irrigated to promote healthy vegetation and fire resistance.
>
> **Zone B (Succulent and Non-Combustible Material**) – This zone is in included within Zone B and will be comprised of a minimum of 50% succulent plant material and non-combustible material (including rock, decomposed granite [DG], or concrete), comprising a minimum 25% succulents and 25% non-combustible material.
>
> **Zone C (Native Brush Thinning Zone)** – This zone extends from the outermost edge of Zone B to 200 feet from the structures. Well-spaced native vegetation and ornamental shrubs and trees are allowed. Vegetation must be thinned and species that constitute a fire risk are not allowed (e.g., chamise [*Adenostoma fasciculatum*], sages [*Salvia* spp.], California sagebrush, and California buckwheat). This zone does not require irrigation.
>
> **Zone C (Existing Oak Tree Maintenance Area)** – This zone is included within Zone C and shall comply with the following requirements: (1) any plant material and tree litter under the oak canopies shall be cleared twice yearly, once by May 15th and August 15th of each calendar year; (2) in lieu of plant material where topography allows, DG may be placed, but is not required to be placed, within the drip line area of the oak trees beginning approximately 3-feet from the trunk of the tree with an approximately thickness of 2-inches, DG shall not be compacted, rather shall be loosely placed; and (3) use of soil sterilizers shall be prohibited under and around existing oak trees, use of pre-emergent weed killer shall be prohibited within 100 feet of any individual oak tree or within a natural drainage that seasonally irrigates oak trees.

According to County Fire Department guidelines, all vegetation within Zone A must be irrigated, and the only vegetation allowed is green lawns, ground cover not exceeding six inches in height, and well-spaced shrubs. It was determined that requirements of Zone A are incompatible with the retainment of native oak trees. For the purpose of this assessment, oak trees located within Fuel Modification Zone A were considered removed, while oak trees located within Zones B and C were considered retained. In order to retain oaks within Zones A, authorization from the County Fire Department would be required. No tree pruning will be performed in any of the zones. The fuel modification zone plans were prepared by FireSafe Planning Solutions and were submitted to the County Fire Department on July 20, 2021.

Based on analyzing each surveyed oak's location in respect to the project grading plans and fuel modification zones, the project would require the removal of 12 oak trees, including one coast live oak (*Quercus agrifolia*, Tree 3), one blue oak (*Quercus douglasii*, Tree 10), and 10 Tucker oaks (*Quercus john-tuckeri*, Trees 1,2, 4-9, 11, and 26). Finally, one scrub oak (Tree 12) would be subjected to major encroachment.

One scrub oak (Tree 13) would be subjected to minor encroachment. Additionally, a retaining wall will be built outside of the protected zone of one blue oak (Tree 18), therefore this tree will be avoided. A total of 50 oak trees would be completely avoided by the project (Table 3, *Impacts to Oak Trees*). A map with the location, canopy, and protected zone of the oak trees assessed during this survey is included as Figure 5, *Impacts to Oak Trees*.

Table 3
IMPACTS TO OAK TREES

Species Name	Common Name	Removed	Major Encroachment	Minor Encroachment	Avoided
Quercus agrifolia	coast live oak	1	0	0	0
Quercus berberidifolia	scrub oak	0	1	1	4
Quercus douglasii	blue oak	1	0	0	1
Quercus john-tuckeri	Tucker oak	10	0	0	44
Quercus lobata	valley oak	0	0	0	1
	TOTAL	**12**	**1**	**1**	**50**

MITIGATION

Based on the impacts to oak trees as quantified by the impact assessment, 12 oak trees will be removed, and one will be subjected to major encroachment. In order to receive an Oak Tree Removal Permit for these impacts, the City may determine whether the project proponent shall replace or relocate, pay a fee, or donate boxed trees to the City of an equivalent value to all oak trees removed or subject to major encroachment. In order to determine the value of impacted trees, the appraised value of each tree subject to impacts was calculated using the 10^{th} Edition of the Guide for Plant Appraisal (CTLA 2019). The total appraised value of trees subject to removal or major encroachment is $80,300 (Attachment C). Trees that will be completely avoided or subject to minor encroachment will not require mitigation.

CONCLUSION

Sixty-four (64) oak trees on the survey area were considered City-protected trees. Construction of the project will require 12 of these trees to be removed and one to be subjected to major encroachment. It is anticipated that the City will require mitigation for the value of these trees, which totals $80,300. Fifty

(50) of these trees will be completely avoided or subjected to minor encroachment during project activities and therefore will not require mitigation.

During construction, trees subject to minor or major encroachment will require protection measures, including but not limited to those outlined within Section VII. Standards for Performance of Permitted Work of the Oak Tree Preservation Guidelines. Other general guidelines to protect trees during for project construction are included as Attachment D, *Tree Protection Recommendations*.

Should you have any questions or require additional information, please do not hesitate to contact me at (949) 234-1515 or DanielT@helixepi.com.

Sincerely,

Daniel Torres
ISA Certified Arborist (WE-12249A)

Enclosures:

Figure 1: Regional Location
Figure 2: USGS Topography
Figure 3: Aerial Vicinity
Figure 4: Oak Tree Locations
Figure 5: Impacts to Oak Trees

Attachment A: Oak Tree Survey Data
Attachment B: Representative Photos
Attachment C Oak Tree Appraisal Addendum
Attachment D: Tree Protection Recommendations

REFERENCES

Council of Tree and Landscape Appraisers (CTLA). 2019. *Guide for Plant Appraisal, 10th Edition.*

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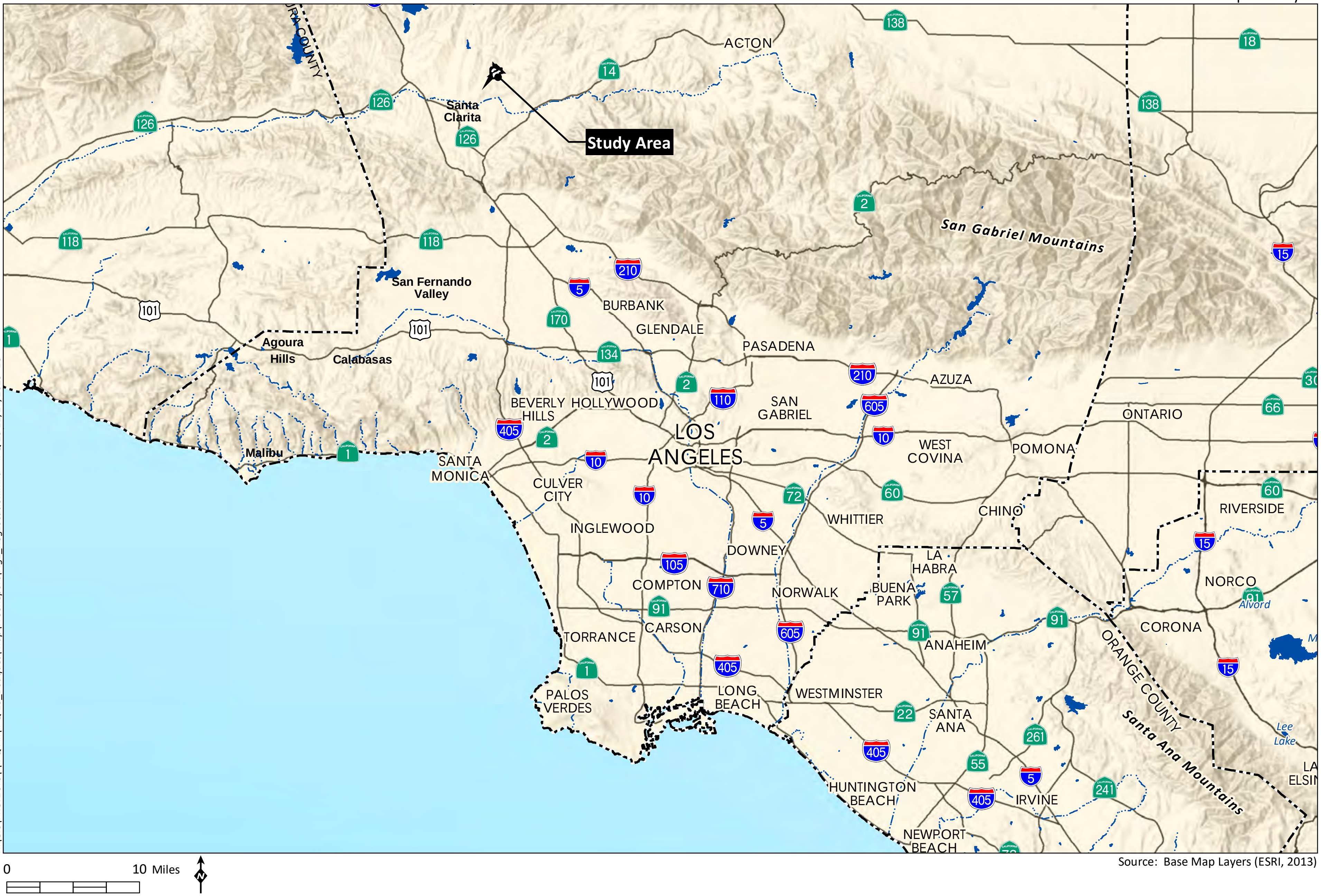

Source: Base Map Layers (ESRI, 2013)

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HELIX Environmental Planning

Regional Location

Figure 1

Source: Mint Canyon 7.5' Quad (USGS)

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HELIX Environmental Planning

Vicinity Map

Figure 2

Source: Base Map Layers (NAIP, 2016)

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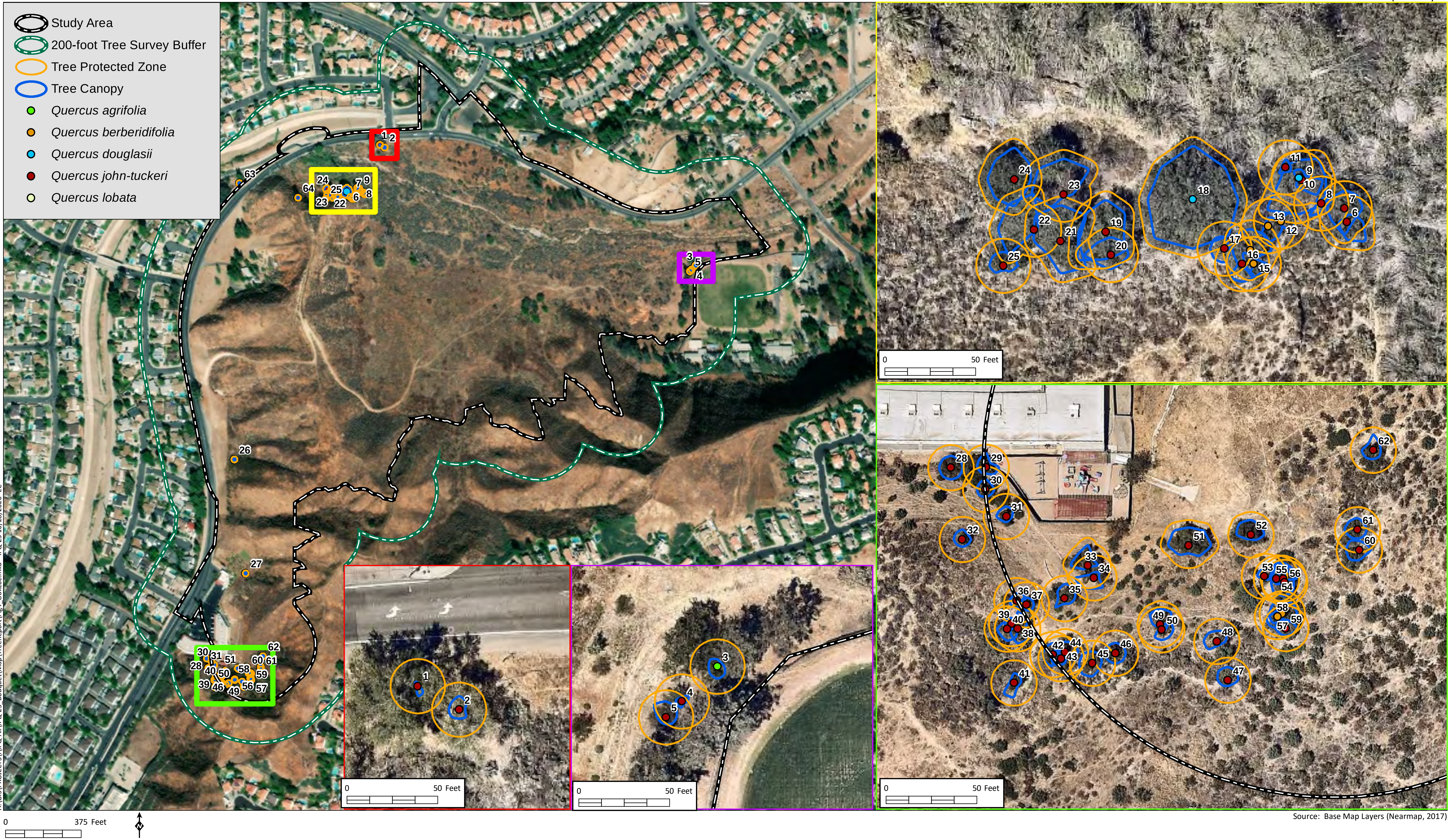
HELIX
Environmental Planning

Aerial Photograph

Figure 3

Bouquet Canyon



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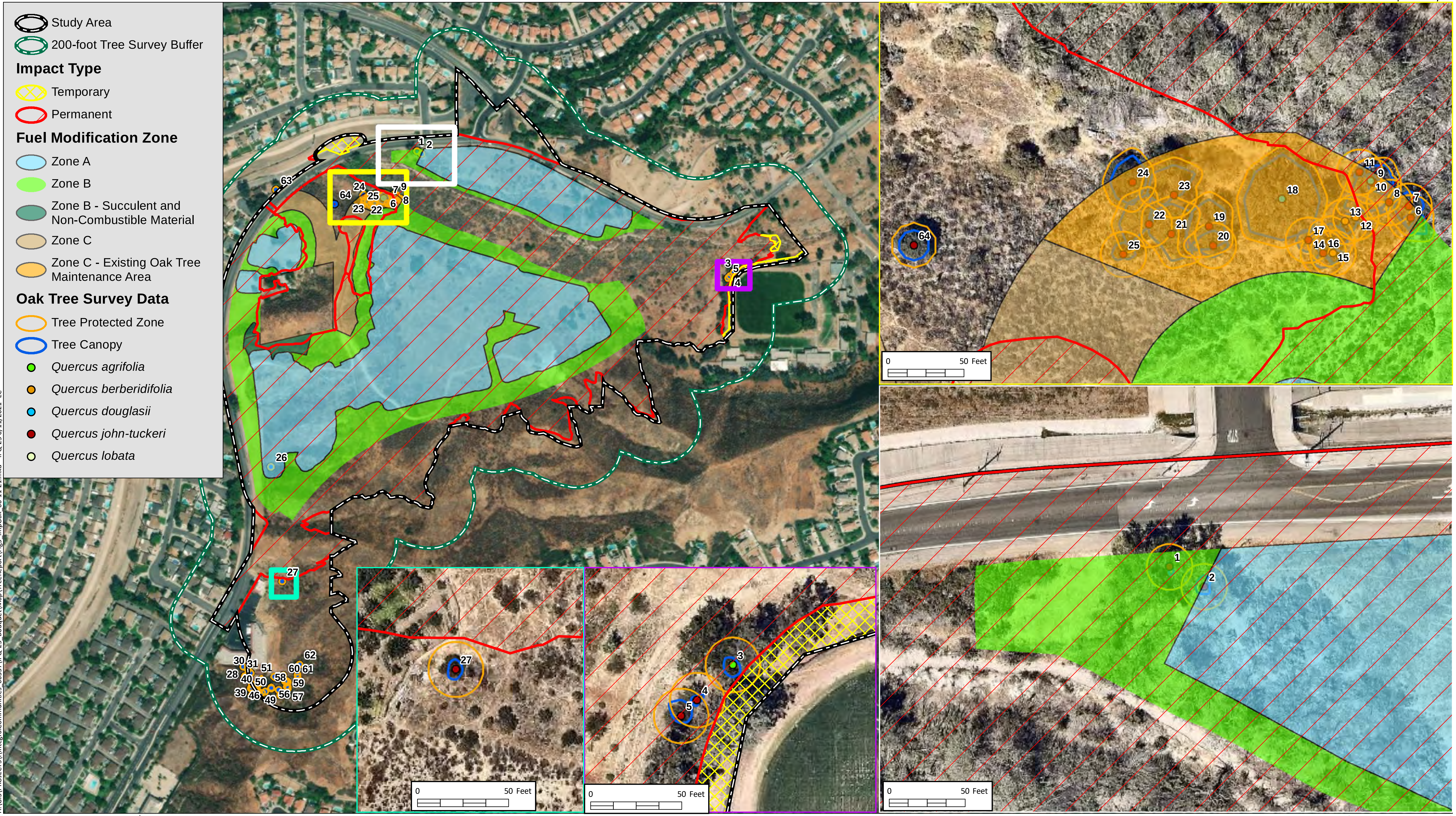
Source: Base Map Layers (Nearmap, 2017)

HELIX Environmental Planning

Oak Tree Locations

Figure 4



H:\GIS\PROJECTS\IntegralCommunities_0035\IPQ-25_Bouquet\Map\TreeReport\Fig5_ImpOak_06-11-21.mxd IPQ-25 6/11/2021 - EC

0 450 Feet

Source: Base Map Layers (NAIP, 2016; Nearmap, 2017)

HELIX Environmental Planning

Impacts to Oak Trees

Figure 5

Attachment A

Oak Tree Survey Data

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
1	Tucker oak *Quercus john-tuckeri*	6	10	3	1	1	5	6	1	1	3	Deep v-crotch at 7", canopy is N-S oriented, does not extend E-W.	Appears vigorous, some small galls present, some old, healed trunk injuries.	B		Removal
2	Tucker oak *Quercus john-tuckeri*	7.5	9	8	6	3	6	5	6	6	6	Trunk leaning northeast, canopy overall well-distributed.	Galls, insect damage.	B		Removal
3	coast live oak *Quercus agrifolia*	12.75	16	4	3	4	6	7	6	5	6	Tree leaning south.	Has stress-related suckers, sapsucker holes.	B	No tag; off-site.	Removal
4	Tucker oak *Quercus john-tuckeri*	10, 9, 7	9	2	6	3	1	4	3	4	3	Tree has been topped.	All epicormic growth, tree in severe decline.	D	No tag; off-site.	Removal
5	Tucker oak *Quercus john-tuckeri*	11.75, 12, 8.5	15	9	8	6	5	4	4	5	10	Tree leaning north, away from adjacent eucalyptus.	Some galls present, bark damage present (chainsaw cut)-healing.	B	No tag; off-site.	Removal
6	Tucker oak *Quercus john-tuckeri*	9, 13, 13	16	4	6	9	15	10	5	5	2	Large failure at v-crotch with decay (old main stem), exposed roots.	Declining, significant amount of epicormic sprouting.	D		Removal
7	Tucker oak *Quercus john-tuckeri*	18, 19, 24	22	10	10	10	8	15	10	10	9	Exposed roots, wide angle crotch at base.	Declining, epicormic sprouting, canopy dieback.	D		Removal

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
8	Tucker oak *Quercus john-tuckeri*	9.75, 6	5	2	8	2	2	5	10	2	4	Severe lean to south, on steep slope.	Tree is being shaded, very sparse canopy, canopy dieback.	D	Stump shoots from old dead tree.	Removal
9	Tucker oak *Quercus john-tuckeri*	20	15	6	3	12	12	5	5	2	7	Exposed roots, on steep slope.	Large split with internal decay in trunk, internal decay throughout.	D		Removal
10	blue oak *Quercus douglasii*	85, 36	45	10	15	15	20	20	25	10	10	Main trunk split long ago, large trunk leaning north, southern-most trunk with severe lean south, on steep slope.	Lots of mistletoe, canopy very sparse.	D		Removal
11	Tucker oak *Quercus john-tuckeri*	9	16	5	3	3	4	2	6	2	2	On steep slope.	Most of canopy is dead, mistletoe present, epicormic sprouting.	D	Tree is almost completely dead.	Removal
12	scrub oak *Quercus berberidifolia*	10	15	2	8	8	8	2	2	2	2	Trunk leaning to north, multi-stem, one stem is dead, on steep slope.	Epicormic growth, very sparse canopy.	D		Major Encroachment

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
13	scrub oak *Quercus berberidifolia*	12, 9.5, 10, 10	15	5	6	8	8	9	5	2	2	One dead stem, on steep slope.	Epicormic sprouting, severe decline, some galls present.	D		Minor Encroachment
14	scrub oak *Quercus berberidifolia*	22.5. 22, 17, 10, 7.5	20	12	12	12	5	12	10	10	12	Some stems have internal decay, on steep slope.	Epicormic sprouting, mistletoe present, tree in decline.	D		Avoided
15	scrub oak *Quercus berberidifolia*	7.5. 7.5, 8, 5.5	14	5	3	8	6	8	5	5	9	Good balance, on steep slope.	Some mistletoe present, significant amount of epicormic sprouting, some canopy dieback.	C		Avoided
16	Tucker oak *Quercus john-tuckeri*	9.5	10	1	1	1	10	10	10	2	1	Most of canopy is in the south, shaded in the north, on steep slope.	Some dieback present, significant amount of epicormic sprouting.	C		Avoided
17	Tucker oak *Quercus john-tuckeri*	5.5, 6.5, 7, 9	12	7	3	3	4	8	8	8	8	Some included bark at v-crotch about 5” above ground, tree on steep slope.	Small amounts of dieback and epicormic sprouting present.	B		Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
18	blue oak *Quercus douglasii*	40.5, 24, 47, 52.5, 48	35	30	25	25	28	27	30	25	25	Large multi-stem tree with big split and decay, all stems leaning towards the south, tree on steep slope.	Tree is experiencing some dieback, epicormic sprouting, sap sucker and borer holes present.	C	Tree tagged 61 in old survey, probably burned.	Avoided
19	Tucker oak *Quercus john-tuckeri*	22, 16.5, 17, 13, 10, 11	30	18	15	10	15	15	22	15	15	Included bark in all crotches, tree on a steep slope.	Appears vigorous, some cankers, canopy is somewhat sparse.	B		Avoided
20	Tucker oak *Quercus john-tuckeri*	17.5, 17, 14, 14	15	10	10	10	7	8	8	15	10	Tree on steep slope, nexus of stems is 1' above ground.	Some canopy dieback present.	B		Avoided
21	Tucker oak *Quercus john-tuckeri*	21, 25, 20.5, 9	20	20	20	10	20	18	10	15	20	Multiple trunks all leaning in different directions, tree on a steep slope.	Most of canopy is epicormic sprouting, borer and sapsucker holes are present.	C		Avoided
22	Tucker oak *Quercus john-tuckeri*	15, 19, 18.5, 19, 20	25	20	3	2	1	1	20	20	20	Tree is on a steep slope, included bark present.	Tree appears healthy but is being shaded, canopy is somewhat sparse, significant dieback is present.	C		Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
23	Tucker oak *Quercus john-tuckeri*	44.5	35	20	20	5	1	1	10	18	20	Strong lean to the north.	Significant amount of dieback in the lower canopy.	B		Avoided
24	Tucker oak *Quercus john-tuckeri*	18, 12.5, 42, 22.5	30	18	12	9	9	15	15	15	15	V-crotch with included bark at 7”, 1.5’, and 2’ above ground.	Some galls are present.	B	Tree tagged 60 in old survey.	Avoided
25	Tucker oak *Quercus john-tuckeri*	9, 9, 10, 6	9	8	8	8	5	2	6	8	8	Tree is on a steep slope.	Some epicormic sprouting is present, fairly even canopy.	B		Avoided
26	Tucker oak *Quercus john-tuckeri*	6.5	10	8	8	8	8	8	8	8	8	Even canopy spread, tree growing in the open.	Some galls are present, canopy is dense and healthy.	A	Shrub form, more than 25 stems, all 1-3 inches in circum-ference.	Removal
27	Tucker oak *Quercus john-tuckeri*	6	9	6	4	4	4	6	6	4	5	Structurally good, open, even canopy.	Significant amount of epicormic growth, most leaves are affected by aphids.	D	Some mechanical damage on the east side of the trunk.	Avoided
28	Tucker oak *Quercus john-tuckeri*	6.5	8	8	8	8	8	8	8	8	8	Tree is on a steep slope.	Some galls are present.	B	No tag; off-site.	Avoided
29	Tucker oak *Quercus john-tuckeri*	10, 6, 6.5, 5.5, 11	9	10	4	9	7	4	5	6	7		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided
30	Tucker oak *Quercus john-tuckeri*	9, 11	12	7	5	6	5	5	6	6	6		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
31	Tucker oak *Quercus john-tuckeri*	6.5, 8, 6.5	8	7	6	4	3	4	4	7	6		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided
32	Tucker oak *Quercus john-tuckeri*	6	9	7	5	6	5	5	5	6	6		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided
33	Tucker oak *Quercus john-tuckeri*	12, 9.5, 14.5	13	14	5	7	1	1	4	12	10	Strong lean downhill.	Tree is vigorous, some minor boring insect damage, significant amount of stress-related sprouting at base.	C	No tag; off-site.	Avoided
34	Tucker oak *Quercus john-tuckeri*	14.5, 11	14	4	5	3	9	7	10	13	3	Good structure.	Tree appears vigorous, lots of stress-related sprouting at base, epicormic sprouting present.	C	No tag; off-site.	Avoided
35	Tucker oak *Quercus john-tuckeri*	8, 13, 16, 9.5	15	10	10	7	5	3	9	4	7	Internal decay present in one main trunk.	Significant amount of stress-related sprouting at base.	C	No tag; off-site.	Avoided
36	Tucker oak *Quercus john-tuckeri*	6	12	5	6	6	4	5	5	5	4		Significant amount of epicormic sprouting, some galls present.	C	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
37	Tucker oak *Quercus john-tuckeri*	8	12	5	5	5	5	4	3	3	5		Significant amount of epicormic sprouting, some galls present.	C	No tag; off-site.	Avoided
38	Tucker oak *Quercus john-tuckeri*	9.5, 10, 8.5	12	12	10	5	10	10	6	5	2	Lean is causing bark to split.	Some internal decay and stress-related sprouting at the base is present.	C	No tag; off-site.	Avoided
39	Tucker oak *Quercus john-tuckeri*	7	10	4	3	3	3	4	4	5	5		Stress-related sprouting at the base and epicormic sprouting is present.	C	No tag; off-site.	Avoided
40	Tucker oak *Quercus john-tuckeri*	6, 5	12	5	4	7	8	8	6	7	5		Some galls are present, tree is in good health overall.	B	No tag; off-site.	Avoided
41	Tucker oak *Quercus john-tuckeri*	8, 6	15	7	6	5	3	10	10	3	3	Bark has a healing fissure down the middle of the trunk.	Some epicormic sprouting is present.	B	No tag; off-site.	Avoided
42	Tucker oak *Quercus john-tuckeri*	6.5, 6	12	8	8	2	2	8	7	7	7	Several branches are rubbing against each other.	Some galls are present.	B	No tag; off-site.	Avoided
43	Tucker oak *Quercus john-tuckeri*	6, 4	12	5	5	3	4	4	6	7	7		Some epicormic sprouting is present.	B	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
44	Tucker oak *Quercus john-tuckeri*	6, 6	12	7	8	9	5	3	3	7	7		Some canopy dieback is present.	C	No tag; off-site.	Avoided
45	Tucker oak *Quercus john-tuckeri*	7, 6, 6, 6, 5	13	8	8	6	6	9	10	9	9	Tree is in shrub form, several widely-spaced branches.	Some epicormic sprouting and galls are present.	B	No tag; off-site.	Avoided
46	Tucker oak *Quercus john-tuckeri*	6, 6, 6, 6, 8, 8.5	9	7	7	7	7	7	7	7	7	Tree is in shrub form, several widely-spaced branches.	Some epicormic sprouting is present, tree exhibiting vigorous growth.	B	No tag; off-site.	Avoided
47	Tucker oak *Quercus john-tuckeri*	6.5, 4	9	9	8	7	4	4	5	7	9	Tree is leaning downslope causing fissures in some stems.	Main stem has a large fissure with internal decay.	C	No tag; off-site.	Avoided
48	Tucker oak *Quercus john-tuckeri*	6, 5, 5	9	7	9	6	3	3	8	9	8	Some healing cracks are present at the base of main stems.	Some galls are present, some canopy dieback.	B	No tag; off-site.	Avoided
49	Tucker oak *Quercus john-tuckeri*	10, 6.5, 9.5	13	11	11	5	5	5	2	5	10	Good structure.	Some dieback and significant amounts of epicormic sprouting are present.	C	No tag; off-site.	Avoided
50	Tucker oak *Quercus john-tuckeri*	9, 7, 6, 6	13	2	8	8	7	7	7	2	2	Good structure.	Significant amount of epicormic sprouting is present.	C	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
51	Tucker oak *Quercus john-tuckeri*	15, 16, 16, 17	18	12	14	15	10	5	9	14	14	V-crotches are 1’ above ground, some chainsaw wounds are present.	Significant amount of epicormic sprouting is present.	C	No tag; off-site.	Avoided
52	Tucker oak *Quercus john-tuckeri*	16.5, 10, 9.5, 17, 6, 9, 8.5	17	10	9	9	5	3	4	10	11	Many stems, but good structure.	Significant amount of epicormic sprouting and some canopy dieback are present.	C		Avoided
53	Tucker oak *Quercus john-tuckeri*	13	19	5	8	6	3	2	2	5	5	V-crotch at 6” and 4’ above ground, tree has a slight lean.	Most of canopy is epicormic sprouting.	C	No tag; off-site.	Avoided
54	Tucker oak *Quercus john-tuckeri*	10, 8, 10	17	11	11	5	5	3	3	5	5		Most of canopy is epicormic sprouting, significant canopy dieback is present.	C	No tag; off-site.	Avoided
55	Tucker oak *Quercus john-tuckeri*	12	17	11	9	9	1	1	6	8	9	Tree is leaning northeast.	Borer holes and internal decay are present.	C	No tag; off-site.	Avoided
56	Tucker oak *Quercus john-tuckeri*	12, 11, 7, 7, 8, 10.5	15	8	8	6	8	9	10	9	7		Borer holes, some epicormic sprouting, internal decay, and canopy dieback are present.	C	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
57	scrub oak *Quercus berberidifolia*	9.5, 9.5, 7, 10, 8, 6.5, 6	12	9	10	10	7	5	9	9	9	Tree is in shrub form, mostly shaded by surrounding trees.	Some galls and epicormic sprouting are present.	B	No tag; off-site.	Avoided
58	scrub oak *Quercus berberidifolia*	7, 6	11	5	1	3	8	8	8	8	3	Tree is in shrub form.	Canopy is dying back, significant amount of epicormic sprouting is present.	C	No tag; off-site.	Avoided
59	Tucker oak *Quercus john-tuckeri*	8, 8, 8, 8, 8, 12.5	11	6	6	8	5	5	5	7	7	Tree is in shrub form.	A healing fissure and internal decay are present in one of the main stems.	C	No tag; off-site.	Avoided
60	Tucker oak *Quercus john-tuckeri*	6, 6, 6, 9, 4	8	6	6	8	5	7	9	9	9	Stems are all widely-spaced, spread out, tree is in shrubby form.	Some canopy dieback is present.	B	No tag; off-site, there is a packrat midden in the middle of the trunks.	Avoided
61	Tucker oak *Quercus john-tuckeri*	6, 6, 4, 5, 8, 6, 4, 4	9	8	6	6	6	6	7	9	8	Tree is in shrub form, stems are spread out.	Some canopy dieback, epicormic sprouting, and galls are present.	B		Avoided
62	Tucker oak *Quercus john-tuckeri*	9, 7.5, 5.5, 6.5, 5.5, 8.5, 8, 6.5, 4, 5, 6	9	11	6	5	6	6	7	8	5		Cankers, galls, epicormic sprouting, and canopy dieback are present.	C		Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
63	valley oak *Quercus lobata*	12, 22	20	5	7	7	7	7	7	7	7	V-crotch at 1.5’ and 5’ with included bark, tree is growing straight.	Vigorous growth, healthy specimen, no obvious signs of disease.	A	Circumference and canopy were estimated- tree is on private property.	Avoided
64	Tucker oak *Quercus john-tuckeri*	17, 32.5	19	10	10	10	10	10	8	8	10	Included bark, exposed roots, tree is growing on a steep slope.	Vigorous growth, some canopy dieback is present.	B		Avoided

Attachment B

Representative Photos

Photo 1: Tree 10 (blue oak, *Quercus douglasii*) adjacent to the northwestern corner of the study area.

Photo 2: Tucker oak (*Quercus john-tuckeri*) scrub adjacent to the southwestern corner of the study area.

Photo 3: Tree 51 (Tucker oak, *Quercus john-tuckeri*) assigned an oak tree rating of C for displaying significant amounts of epicormic growth.

Photo 4: Tree 62 (Tucker oak, *Quercus john-tuckeri*) assigned an oak tree rating of C for displaying canopy dieback and significant amounts of epicormic growth.

Attachment C

Oak Tree Appraisal Addendum

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July 7, 2021 IPQ-25

Mr. Peter Vanek
Integral Communities
888 San Clemente Drive
Newport Beach, CA 92660

Subject: Addendum to the Oak Tree Survey Report for the Bouquet Canyon Road Project

Dear Mr. Vanek:

HELIX Environmental Planning, Inc. (HELIX) completed an oak tree survey report for the proposed Bouquet Canyon Road Project (Project) located in the City of Santa Clarita (City), Los Angeles County, California. This letter report is an addendum to the oak tree survey report to provide the appraised value and a photograph of each tree to be removed or subjected to major encroachment by the proposed project. The appraised values and photographs were requested by the City in order to process the Oak Tree Permit, as defined under the City's Oak Tree Preservation Ordinance (17.51.040; ordinance).

METHODS

Photographs

HELIX International Society of Arboriculture (ISA) Certified Arborist Daniel Torres (WE-12249) performed a field visits on June 5, 2020 and October 20, 2020 in order to collect photographs of each oak tree that has been proposed for major encroachment or removal by the proposed project. During the field visits, Mr. Torres located each tree, verified the tree tag number, and collected photographs.

Oak Tree Appraised Values

In order to determine the appraised value of each tree subject to major encroachment or removal, the Trunk Formula Method as described in the 10th Edition of the Council of Tree and Landscape Appraisers (CTLA) Guide for Plant Appraisal was used (CTLA 2019). The Trunk Formula Method is used to extrapolate the costs to purchase the largest commonly available nursey plant to the size of the plant being appraised. Data collected during the oak tree survey was used to assess the condition, functional limitations, and external limitations of each tree. The condition ratings were intuitively designated based on each tree's ratings for health, structure, and form. For trees with multiple trunks at breast height, the aggregate diameter was calculated using the following formula:

Aggregate diameter = $\sqrt{(d1^2 + d2^2 + d3^2 + d4^2)}$

Where d1, d2, etc. are each trunk's diameter at breast height (DBH).

Replacement Tree

As discussed above, the cost of a replacement tree is extrapolated from the largest commonly available nursery stock. On June 12, 2020, several Southern California nurseries were contacted to determine the largest commonly available nursery stock and the cost of this stock., The nurseries contacted included Matilija Nursery in Moorpark, Boething Treeland Farms in Woodland Hills, and Tree of Life Nursey in San Juan Capistrano. The arborist determined that the largest commonly available nursery stock to replace coast live oaks (*Quercus agrifolia*) was a 36"-box sized coast live oak at a cost of $870 per tree from Boething Treeland Farms. The largest commonly available replacement for scrub oaks (*Quercus berberidifolia*), Tucker oaks (*Quercus john-tuckeri*), and blue oaks (*Quercus douglasii*), was a 15-gallon scrub oak at a cost of $63 per tree from Tree of Life Nursery.

Based on coordination with the nurseries mentioned it above, the following assumptions about trunk diameter were applied when calculation the cost of as replacement tree: 15-gallon scrub oaks were assumed to have a diameter of 0.75 inch, 24-inch box sized trees were assumed to have a diameter of 2 inches, and 36-inch box sized trees were assumed to have a diameter of 3 inches.

Blue oaks and Tucker oaks were not available at any of the nurseries mentioned above and are not commonly available. Scrub oaks were used as a replacement for Tucker oak, as this species is commonly available and has similar form, functional value, and growth rate.

On October 6, 2020, the City prepared a Draft Conditions of Approval (COA) for the project. According to OT6 of the draft COA, a scrub oak should be used as a replacement for blue oaks because this species closely matches the growth rate of the blue oak.

Additional Costs

Additional costs include the costs to plant and maintain a replacement tree. For the purposes of this appraisal, HELIX has assumed a maintenance and establishment period of one year. Additional costs include labor, installation of irrigation, equipment to plant a replacement tree, tree stakes, and pruning. Through consultation with HELIX Senior Construction Project Manager Peter Tomsovic, it was determined that the cost to plant and maintain a 36" box sized tree is $2,000. This additional cost was applied to the appraised value of each oak tree to be impacted.

RESULTS AND CONCLUSION

As determined in the oak tree report, the project proposes to subject a total of 12 trees to removal and one tree to major encroachment. This includes one coast live oak (removal), one blue oak (removal), one scrub oak (major encroachment), and ten Tucker oaks (ten removals).

The total appraised value for the trees proposed for impacts is $80,300. Table 1 below provides a summary of the tree appraisals. Attachment A provides a photograph of each tree and the detailed tree appraisal calculations.

Table 1
SUMMARY OF TREE APPRAISALS

Tree Number	Species	DBH*	Appraised Value
1	Tucker oak	1.9	$2,300
2	Tucker oak	2.4	$2,500
3	coast live oak	4.1	$3,100
4	Tucker oak	4.8*	$3,700
5	Tucker oak	6.0*	$5,200
6	Tucker oak	6.5*	$3,700
7	Tucker oak	11.3*	$7,000
8	Tucker oak	3.6*	$2,100
9	Tucker oak	6.4	$3,100
10	blue oak	29.4*	$40,700
11	Tucker oak	2.9	$2,200
12	scrub oak	3.2	$2,300
26	Tucker oak	2.1	$2,400
TOTAL APPRAISED VALUE			**$80,300**

Source: HELIX (2021)
*Indicates a tree with multiple trunks at DBH where the aggregate diameter was calculated

Should you have any questions or require additional information, please do not hesitate to contact me at (949) 234-1515 or DanielT@helixepi.com.

Daniel Torres
ISA Certified Arborist (WE-12249A)

Attachments:

Attachment A: Appraised Values and Photographs

REFERENCES

Council of Tree and Landscape Appraisers (CTLA). 2019. *Guide for Plant Appraisal, 10th Edition.*

Attachment A

Tree Appraisals and Photographs

Tree #1 – Tucker oak (*Quercus john-tuckeri*)

Tree #1 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #1

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)		1.9
Cross-sectional Area (square inches)		2.8
Condition Rating		70%
Health	Health appears normal for this species	80%
Structure	There is a deep v-crotch at 7" above grade	55%
Form	The canopy in not symmetric due to shading by adjacent tree	75%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 404.32
Depreciated Functional Replacement Cost		$ 283.02

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 2,283.02
Rounded Estimate	**$ 2,300.00**

Tree #2 – Tucker oak (*Quercus john-tuckeri*)

Tree #2 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #2

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)		2.4
Cross-sectional Area (square inches)		4.5
Condition Rating		75%
Health	Health appears normal for this species	80%
Structure	Structure appears normal for this species	80%
Form	The tree canopy is fairly symmetric; however, the trunk has a lean	75%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 645.12
Depreciated Functional Replacement Cost		$ 483.84

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 2,483.84
Rounded Estimate	**$ 2,500.00**

Tree #3 – coast live oak (*Quercus agrifolia*)

Tree #3 – coast live oak (*Quercus agrifolia*)

Subject Tree Tree #3

Species	*Quercus agrifolia*	
Trunk diameter, inches (inches)		4.1
Cross-sectional Area (square inches)		13.2
Condition Rating		65%
Health	Tree health appears good	75%
Structure	Structure appears normal for this species	85%
Form	Canopy is not symmetric due to shading by adjacent tree, trunk is leaning	65%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus agrifolia*	
Size (trunk diameter, inches, inches)	36" box	3
Cross-sectional Area (square inches)		7.1
Cost		$ 870

Calculations

Unit Tree Cost ($/sq.in.)		$ 123.08
Basic Replacement Cost		$ 1,624.97
Depreciated Functional Replacement Cost		$ 1,056.23

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 3,056.23
Rounded Estimate	**$ 3,100.00**

Tree #4 – Tucker oak (*Quercus john-tuckeri*)

Tree #4 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #4

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)	3.2, 2.9, 2.2	4.8
Cross-sectional Area (square inches)		18.1
Condition Rating		65%
Health	Tree health appears fair, significant amounts of epicormic sprouting	70%
Structure	Structure appears normal for this species	80%
Form	Canopy is not symmetric; tree has been topped	65%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 2,580.48
Depreciated Functional Replacement Cost		$ 1,677.31

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 3,677.31
Rounded Estimate	**$ 3,700.00**

Tree #5 – Tucker oak (*Quercus john-tuckeri*)

Tree #5 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #5

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)	3.7, 3.8, 2.7	6.0
Cross-sectional Area (square inches)		28.3
Condition Rating		78%
Health	Health appears normal for this species	80%
Structure	Structure appears normal for this species	80%
Form	The tree canopy is fairly symmetric; however, the trunk has a lean due to shading by adjacent tree, some branches were pruned in the past	75%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 4,032.00
Depreciated Functional Replacement Cost		$ 3,158.40

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 5,158.40
Rounded Estimate	**$ 5,200.00**

Tree #6 – Tucker oak (*Quercus john-tuckeri*)

Tree #6 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #6

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)	2.9, 4.1, 4.1	6.5
Cross-sectional Area (square inches)		33.2
Condition Rating		35%
Health	Tree is in decline	35%
Structure	There was a large branch failure at the v-crotch	35%
Form	Tree canopy is not symmetric due to shading by adjacent tree	35%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 4,732.00
Depreciated Functional Replacement Cost		$ 1,656.20

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 3,656.20
Rounded Estimate	**$ 3,700.00**

Tree #7 – Tucker oak (*Quercus john-tuckeri*)

Tree #7 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #7

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)	5.7, 6.1, 7.6	11.3
Cross-sectional Area (square inches)		100.3
Condition Rating		35%
Health	Tree is in decline	35%
Structure	There was a large branch failure at the v-crotch	35%
Form	Tree canopy is not symmetric	35%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 14,301.28
Depreciated Functional Replacement Cost		$ 5,005.45

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 7,005.45
Rounded Estimate	**$ 7,000.00**

Tree #8 – Tucker oak (*Quercus john-tuckeri*)

Tree #8 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #8

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)	3.1, 1.9	3.6
Cross-sectional Area (square inches)		10.2
Condition Rating		10%
Health	Tree is almost dead; canopy is extremely sparse	10%
Structure	Tree has a severe lean to the south	20%
Form	Tree has very poor form- strong lean	20%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 1,451.52
Depreciated Functional Replacement Cost		$ 145.15

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 2,145.15
Rounded Estimate	**$ 2,100.00**

Tree #9 – Tucker oak (*Quercus john-tuckeri*)

Tree #9 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #9

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)		6.4
Cross-sectional Area (square inches)		32.2
Condition Rating		25%
Health	Tree appears to be in decline, exhibiting internal decay throughout	20%
Structure	Large split in main trunk	20%
Form	Form is fair	45%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 4,587.52
Depreciated Functional Replacement Cost		$ 1,146.88

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 3,146.88
Rounded Estimate	**$ 3,100.00**

Tree #10 – blue oak (*Quercus douglasii*)

Tree #10 – blue oak (*Quercus douglasii*)

Subject Tree Tree #10

Species	*Quercus douglasii*	
Trunk diameter, inches (inches)	27.1, 11.5	29.4
Cross-sectional Area (square inches)		678.9
Condition Rating		40%
Health	Tree appears to be in decline	40%
Structure	Main trunk has split, trunks are widely divergent	60%
Form	Canopy is not symmetric	60%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 96,808.32
Depreciated Functional Replacement Cost		$ 38,723.33

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 40,723.33
Rounded Estimate	**$ 40,700.00**

Tree #11 – Tucker oak (*Quercus john-tuckeri*)

Tree #11 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #11

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)		2.9
Cross-sectional Area (square inches)		6.6
Condition Rating		25%
Health	Tree appears to be in decline, canopy is extremely sparse	20%
Structure	Structure appears normal	80%
Form	Form is fair	45%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 941.92
Depreciated Functional Replacement Cost		$ 235.48

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 2,235.48
Rounded Estimate	**$ 2,200.00**

Tree #12 – scrub oak (*Quercus berberidifolia*)

Tree #12 – scrub oak (*Quercus berberidifolia*)

Subject Tree Tree #12

Species	*Quercus berberidifolia*	
Trunk diameter, inches (inches)		3.2
Cross-sectional Area (square inches)		8.0
Condition Rating		25%
Health	Tree appears to be in decline, canopy is extremely sparse	20%
Structure	Structure is poor	35%
Form	Form is poor- not symmetrical and trunk is leaning	25%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 1,146.88
Depreciated Functional Replacement Cost		$ 286.72

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 2,286.72
Rounded Estimate	**$ 2,300.00**

Tree #26 – Tucker oak (*Quercus john-tuckeri*)

Tree #26 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #26

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)		2.1
Cross-sectional Area (square inches)		3.5
Condition Rating		90%
Health	Tree health appears good	90%
Structure	Structure appears normal for this species	90%
Form	Canopy is symmetric	90%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 493.92
Depreciated Functional Replacement Cost		$ 444.53

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 2,444.53
Rounded Estimate	**$ 2,400.00**

Attachment D

Tree Protection Recommendations

General Construction Site Recommendations

- A minimum 4-foot tall, brightly colored, synthetic fence should be installed around the outermost edge of the protected zone of trees that are designated for retention on-site. Encroachment into the fenced areas should be restricted to the minimum amount feasible and fencing should remain in place until all construction activities have ceased
- The fenced area should be kept clear of building materials, waste, and excess soil.
- No digging, trenching, compaction, or other soil disturbance should be allowed in the fenced area.
- The storage of construction equipment or hazardous materials such as gasoline, oil, or other toxic chemicals should not be allowed in or adjacent to the fenced area.
- Storage areas for equipment, soil, and construction materials as well as burn sites (if permitted), cement washout pits, and construction work zones should be kept away from protected trees and outside the fenced in area.
- Cable, chain, rope or signage should not be attached to retained trees.
- Designated roads and parking areas should be established. All construction personnel should be restricted to driving and parking in designated areas. Discharge of exhaust from construction vehicles and equipment should not be allowed near the protected zone of trees.
- Grade changes should be avoided near fenced areas to the maximum extent possible.

Recommendations for Construction Activities in the Vicinity of Retained Trees

- All necessary clearance pruning should be conducted by a Certified Tree Worker or Certified Arborist.
- Trenching within the dripline of retained trees should be avoided to the maximum extent practicable and kept a minimum distance of 10 times the diameter of the tree away from its trunk. If necessary, this trenching should be conducted using hand excavation or compressed air to reduce impacts to tree roots. Machine trenching should not be allowed within the dripline of retained trees. If pipes must be installed closer to the tree than a distance of 10 times the diameter of the tree away from its trunk, they should be bored beneath the tree a minimum of 3 feet below the ground surface to reduce impacts to roots.
- Excavation should also be minimized within the dripline of retained trees. Construction within the dripline of retained trees should be conducted in a manner that minimizes excavation and provides for the best preservation of roots as determined by the Project Arborist.
- If tree roots are severed outside of the fenced area, they should be severed cleanly and kept moist. All exposed roots outside of fenced areas should be covered with protective material during construction such as mulch or plywood sheets to reduce soil

compaction. Protective material should be removed upon completion of construction activities.

- Trenching and excavation should be avoided during hot, dry, weather and trees shall be watered before, during, and after trenching and excavation within the dripline of retained trees to offset water loss due to cut roots.
- Grading within the driplines of retained trees should be avoided wherever feasible.
- To prevent soil compaction, several inches of wood chips should be spread in the root zone area and covered with steel plates.

Recommendations for Protection of Trees Post-Construction

- Post-construction inspections of the trees should be conducted by a Certified Arborist or Certified Tree Worker to determine if retained trees are stressed (e.g., water stress, nutrient stress) or damaged (e.g., broken branches, trunk damage). Appropriate corrective actions should be implemented as necessary. Such corrective actions may include application of root stimulant to encourage new root growth in trees that have a significant portion of their roots lost due to cutting or soil compaction.
- Aeration of soil by vertical mulching or similar technique should be implemented around retained trees to offset the impacts of soil compaction that has already occurred due to construction activities and other site uses.
- Long term maintenance should also be conducted by a Certified Arborist or tree care specialist to assist the trees with recovering from construction related stress and may include watering, fertilization, pruning, and/or pest/disease control.

"Donut Hole" Parcel Addendum

Memorandum

HELIX Environmental Planning, Inc.
16485 Laguna Canyon Road, Suite 150
Irvine, CA 92618
949.234.8770 **tel**
619.462.0552 **fax**
www.**helixepi**.com

Date: October 27, 2021

To: Mr. Peter Vanek
Integral Communities
888 San Clemente Drive
Newport Beach, CA 92660

From: Daniel Torres, HELIX Environmental Planning, Inc.

Subject: Oak Tree Survey Addendum, Additional Survey Area

HELIX Project: 00357.00025.001

Message:

The oak tree survey report[1] and tree appraisal addendum[2] were both dated August 16, 2021. Since submittal of these reports, an additional property along Bouquet Canyon Road was added to the project site (Additional Survey Area; see Figure 5, *Impacts to Oak Trees*). The additional survey area was analyzed as part of the Project's EIR. However, this property was not owned by the project proponent during the time of the oak tree survey, and therefore, an oak tree survey was not performed within this area.

On October 19, 2021, HELIX International Society of Arboriculture (ISA) Certified Arborist Daniel Torres (WE-12249) performed an oak tree survey within the additional survey area. The purpose of the survey was to document the presence of (1) oak trees with at least one trunk over 6 inches in circumference at a point 4.5 feet above natural grade, and (2) Heritage Oak Trees within the additional survey area.

No oak trees, including Heritage trees, were found within the additional survey area.

If you have any questions regarding the information presented in this memorandum, please contact me at DanielT@helixepi.com or at (949) 234-8770.

Enclosures:
Figure 5: Impacts to Oak Trees

[1] HELIX Environmental Planning. 2021. Oak Tree Survey Report for the Bouquet Canyon Road Project. August.
[2] HELIX Environmental Planning. 2021. Addendum to the Oak Tree Survey Report for the Bouquet Canyon Road Project. August.

Source: Base Map Layers (Nearmap, 2017)

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HELIX Environmental Planning

Impacts to Oak Trees

Figure 5

Attachment B

Davenport Oak Tree Survey Report

Carlberg ASSOCIATES
Horticulturists and
Registered Consulting
ARBORISTS

August 15, 2021

Peter Vanek
Vice President of Forward Planning
Integral Communities
888 San Clemente, Suite 100
Newport Beach, California 92660

Re: Oak Tree Health Assessment
Davenport Trailhead Site – 28601 and 28635 Bouquet Canyon Road, Santa Clarita, California

Dear Mr. Vanek,

This letter is presented in response to your request for arboricultural consulting services. You requested a health assessment of 20 oak trees located on and immediately adjacent to 28601 and 28635 Bouquet Canyon Road, Santa Clarita, California. These properties are held by Integral Communities and are the proposed site of the project known as the 'Davenport Trailhead'.

On August 12, 2021, I conducted a site visit to perform a health evaluation of the 20 oak trees identified in the enclosed tree location exhibit (by Helix Environmental Planning) provided to us by you. The trees were assessed for health and structural integrity, and photographs were recorded to support my opinions. No other information was gathered or recorded regarding mapped tree trunk and canopy locations, genera or species identification, impact analysis, etc. I used Helix's exhibit to locate the trees and to fill in the tree number and species listings in the enclosed table.

Table 1 on page 5 summarizes my opinions on the trees' health ratings. Based on the health and structure rating, each tree was assigned an overall grade. In our opinion, both health and structure must be addressed when evaluating the condition of a tree. Definitions for the grading structure are enclosed before the table. Enclosed exhibits and representative photographs illustrate the setting, the oak trees, and their condition at the time of the site visit. Additional photographs are available upon request.

With the exception of one tree, Tree #84, the subject oaks appear to be in fair-to-poor condition. Severe drought stress is evident and most of the trees exhibit sparse foliage, cavities, poor form due to close growing conditions, and two trees were found to have active bee hives.

Please feel free to call or email me with any questions. Thank you.

Very truly yours,

Christine Cuba

Christy Cuba, Senior Arborist
Registered Consulting Arborist, #504
International Society of Arboriculture (ISA) Certified Arborist, #WE1982A
ISA Tree Risk Qualified

CHRISTINE M. CUBA
asca
AMERICAN SOCIETY of CONSULTING ARBORISTS
Registered Consulting Arborist #502

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HEALTH AND STRUCTURE GRADE DEFINITIONS

Health and structure ratings are based on an archetypal tree of the same species, determined by a subjective evaluation of physiological health, aesthetic quality, and structural integrity. Overall physiological condition (health) and structural condition are rated A-D and F:

Health

A) **Outstanding** – Exceptional trees comprising above-average foliage production and vigor for their age class; exhibiting very good to excellent health as evidenced by normal to exceptional shoot growth during the current growing season, good bud development and leaf color, lack of leaf, twig or branch dieback throughout the crown, and the absence of decay, bleeding, or cankers. Common leaf and/or twig pests may be noted at very minor levels.

B) **Above average** – Good to very good trees that exhibit minor necrotic (dead) or physiological symptoms of stress and/or disease; shoot growth is less than reasonably expected, leaf color is less than optimal in some areas, the crown may be thinning, minor levels of leaf, twig, and branch dieback may be present, and minor areas of decay, bleeding, or cankers may be manifesting. Minor amounts of epicormic growth may be present. Minor amounts of fire damage or mechanical damage may be present. Still healthy, but with moderately diminished vigor and vitality. No significant decline noted.

C) **Average** – Average, moderately good trees whose growth habit and physiological or fire-induced symptoms indicate an equal chance to either decline or continue with good health into the near future. Most of these trees exhibit moderate to significant small dead material in outer crown areas, decreased shoot growth, and diminished leaf color and mass. Some stem and branch dieback is usually present and epicormic growth may be moderate to extensive. Cavities, pockets of decay, relatively significant fire damage, bark exfoliation, or cracks may be present. Moderate to significant amounts of insect or disease symptoms may be present; the tree may be shaded or crowded in such a way that it is expected to negatively impact the lifespan of the tree. Tree may be in early decline.

D) **Below Average/Poor** – trees whose growth habit and physiological or fire-induced symptoms indicate significant, irreversible decline. Most of these trees exhibit significant dieback of wood in the crown, possibly accompanied by significant epicormic sprouting. Shoot growth and leaf color and mass is either significantly diminished or nonexistent throughout the crown. Cavities, pockets of decay, significant fire damage, bark exfoliation, and/or cracks may be present. Significant amounts of insect or disease symptoms may be present; the tree may be shaded or crowded in such a way that it has negatively impacted the lifespan of the tree. Tree appears to be in irreversible decline.

F) **Dead or in spiral of decline** – this tree exhibits very little to no signs of life.

Structure

A) **Outstanding** – Trees with outstanding structure for their species exhibit trunk and branch arrangement and orientation that results in a sturdy form or architecture that can resist failure under normal circumstances. The spacing, orientation, and size of the branches relative to the trunk are quintessential for the species and free from defects. No outward signs of decay or pathological disease is present. Some trees exhibit naturally inherent branching defects, like multiple, narrow points of attachment from one point on the trunk, which would preclude them from achieving an "A" grade.

B) **Above average** - Trees with good to very good structure for their species. They exhibit trunk and branch arrangement and orientation that result in a relatively sturdy form or architecture that resists failure under normal circumstances, but may have some mechanical damage, over-pruning, or other minor structural defects. The spacing, orientation, and size of the branches relative to the trunk are still in the normal range for the species, but they exhibit a minor degree of defects. Minor, sub-critical levels of decay or pathological disease may be present, but the degree of damage is not yet structurally significant. Trees that exhibit naturally inherent branching defects, like multiple, narrow points of attachment from one point on the trunk, would generally fall in to this category. A small percentage of the canopy may be shaded or crowded, but not in such a way that it is expected to negatively impact the structural integrity or lifespan of the tree.

C) **Average** - Trees with moderately good structure for their species, but with obvious defects. They exhibit trunk and branch arrangement and orientation that result in a less than sturdy form or architecture, which reduces their resistance to failure under normal circumstances. Moderate levels of mechanical damage, over-pruning, or other structural defects may be present. The spacing, orientation, and size of some of the branches relative to the trunk are not in the normal range for the species. Moderate to significant levels of decay or pathological disease may be present that increase the likelihood of structural instability. Influences such as an excessive trunk lean, slope erosion, root pruning, or other growth-inhibiting factors may be present. A moderate to significant percentage of the canopy may be shaded or crowded in such a way that it is expected to negatively impact the structural integrity or lifespan of the tree. Risk of full or partial failure in the near future appears to be moderately elevated.

D) **Well Below Average/Poor** - Trees with poor structure for their species and with obvious defects. They exhibit trunk and branch arrangement and orientation that result in a significantly less than sturdy form or architecture, significantly reducing their resistance to failure under normal circumstances. Significant levels of mechanical damage, over-pruning, or other structural defects may be present. The spacing, orientation, and size of many of the branches relative to the trunk are not in the normal range for the species. Significant levels of decay or pathological disease may be present that increase the likelihood of structural instability. Influences such as an excessive trunk lean, slope erosion, root pruning, or other growth-inhibiting factors may be present. A significant percentage of the canopy may be shaded or crowded in such a way that it is expected to negatively impact the structural integrity or lifespan of the tree. Risk of full or partial failure in the near future appears to be advanced.

F) **Severely Compromised** – trees with very poor structure and numerous or severe defects due to growing conditions, historical or recent pruning, mechanical damage, history of limb or trunk failures, advanced and irreparable decay, disease, or severe fire damage. Trees with this rating are in severe, irreparable decline, or are barely alive. Risk of full or partial failures in the near future may be severe.

ARBORIST STATEMENT

Arborists are tree specialists who use their education, knowledge, training and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce the risk of living near trees. Clients may choose to accept or disregard the recommendations of the arborist, or to seek additional advice.

Arborists cannot detect every condition that could possibly lead to the structural failure of a tree. Trees are living organisms that fail in ways we do not fully understand. Conditions are often hidden within trees and below ground. Arborists cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Likewise, remedial treatments, like any medicine, cannot be guaranteed.

Treatment, pruning and removal of trees may involve considerations beyond the scope of the arborist's services, such as property boundaries, property ownership, site lines, disputes between neighbors, and other issues. Arborists cannot take such considerations into account unless complete and accurate information is disclosed to the arborist. An arborist should then be expected to reasonably rely upon the completeness and accuracy of the information provided.

Trees contribute greatly to our enjoyment and appreciation of life. Nonetheless, they are subject to the laws of gravity and physiological decline. Any tree, whether it has visible weaknesses or not, will fail if the forces applied exceed the strength of the tree or its parts. Therefore, neither arborists nor tree owners can be reasonably expected to warrant unfailing predictability or elimination of risk.

Trees can be managed, but they cannot be controlled. To live near trees is to accept some degree of risk. The only way to eliminate all risk associated with trees is to eliminate all trees.

No risk assessments were requested or performed for this project.

Health and structure information presented in this report represents the condition of the tree(s) at the time and date of assessment.

Execution of any/all recommendations for cultural care, maintenance, pest or disease treatment, pruning, tree removal, etc., when made verbally or in writing by the arborist, is/are the sole responsibility of the client.

TABLE 1 – SUMMARY OF OAK TREE HEALTH ASSESSMENT – DAVENPORT TRAILHEAD PROJECT

TREE #	COMMON NAME	BOTANICAL NAME	HEALTH GRADE (A -D, F)	STRUCTURE GRADE (A-D, F)	OVERALL GRADE (A-D, F)
65	Tucker's oak	*Quercus john-tuckeri*	C	C	C
66	Tucker's oak	*Quercus john-tuckeri*	D	C-	D
67	Tucker's oak	*Quercus john-tuckeri*	C	C	C
68	Tucker's oak	*Quercus john-tuckeri*	C-	C	C-
69	Tucker's oak	*Quercus john-tuckeri*	D	C-	D
70	Tucker's oak	*Quercus john-tuckeri*	C	C	C
71	Tucker's oak	*Quercus john-tuckeri*	C	C	C
72	Tucker's oak	*Quercus john-tuckeri*	C	C	C
73	Tucker's oak	*Quercus john-tuckeri*	C	C	C
74	Tucker's oak	*Quercus john-tuckeri*	C	C	C
75	Tucker's oak	*Quercus john-tuckeri*	C	C	C
76	Interior live oak	*Quercus wislizenii* var. *wislizenii*	C	C	C
77	Tucker's oak	*Quercus john-tuckeri*	C	C	C
78	Interior live oak	*Quercus wislizenii* var. *wislizenii*	C	C	C
79	Tucker's oak	*Quercus john-tuckeri*	C	C	C
80	Tucker's oak	*Quercus john-tuckeri*	C	C	C
81	Blue oak	*Quercus douglasii*	C	C	C-
82	Tucker's oak	*Quercus john-tuckeri*	D	C	C-
83	Tucker's oak	*Quercus john-tuckeri*	C-	C	C-
84	Tucker's oak	*Quercus john-tuckeri*	A-	B	B

Notes: Tree numbers and species identification are taken from the enclosed Helix Tree Location exhibit.

HELIX Environmental Planning

Oak Tree Locations

Figure 4

Assessed Oak Tree Locations
(Not to Scale)

Facing west – illustrating Tree #84

Facing south – illustrating Trees #79, 80, and 81, from left to right. Tree #79 recently lost a large limb when the adjacent Tree #78 (left and out of photo) suffered two massive limb failures. Tree #81 has cavities and an active bee hive in in the main trunk.

Facing roughly southeast – illustrating Trees #79, 78, 77, 76, 75, 74, and 71, from right to left. Tree #78 (center) recently suffered two massive limb failures. The failed half of Tree #78 is in the foreground.

Facing roughly east – illustrating Trees #65-78 from left to right on the slope.

Facing north – illustrating Trees #78's limb failures. Cavities are present in the trunk and scaffolds, and this tree has an active bee hive in the main trunk.

Facing east – illustrating Tree 65 (center) and a dead portion of the canopy of Tree #68 in the foreground.

Facing roughly east – illustrating Tree #83 on the left and Tree #82 on the right.

Attachment C

Updated Oak Tree Survey Data

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
1	Tucker oak *Quercus john-tuckeri*	6	10	3	1	1	5	6	1	1	3	Deep v-crotch at 7", canopy is N-S oriented, does not extend E-W.	Appears vigorous, some small galls present, some old, healed trunk injuries.	B		Removal
2	Tucker oak *Quercus john-tuckeri*	7.5	9	8	6	3	6	5	6	6	6	Trunk leaning northeast, canopy overall well-distributed.	Galls, insect damage.	B		Removal
3	coast live oak *Quercus agrifolia*	12.75	16	4	3	4	6	7	6	5	6	Tree leaning south.	Has stress-related suckers, sapsucker holes.	B	No tag; off-site.	Removal
4	Tucker oak *Quercus john-tuckeri*	10, 9, 7	9	2	6	3	1	4	3	4	3	Tree has been topped.	All epicormic growth, tree in severe decline.	D	No tag; off-site.	Removal
5	Tucker oak *Quercus john-tuckeri*	11.75, 12, 8.5	15	9	8	6	5	4	4	5	10	Tree leaning north, away from adjacent eucalyptus.	Some galls present, bark damage present (chainsaw cut)-healing.	B	No tag; off-site.	Removal
6	Tucker oak *Quercus john-tuckeri*	9, 13, 13	16	4	6	9	15	10	5	5	2	Large failure at v-crotch with decay (old main stem), exposed roots.	Declining, significant amount of epicormic sprouting.	D		Removal
7	Tucker oak *Quercus john-tuckeri*	18, 19, 24	22	10	10	10	8	15	10	10	9	Exposed roots, wide angle crotch at base.	Declining, epicormic sprouting, canopy dieback.	D		Removal

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
8	Tucker oak *Quercus john-tuckeri*	9.75, 6	5	2	8	2	2	5	10	2	4	Severe lean to south, on steep slope.	Tree is being shaded, very sparse canopy, canopy dieback.	D	Stump shoots from old dead tree.	Removal
9	Tucker oak *Quercus john-tuckeri*	20	15	6	3	12	12	5	5	2	7	Exposed roots, on steep slope.	Large split with internal decay in trunk, internal decay throughout.	D		Removal
10	blue oak *Quercus douglasii*	85, 36	45	10	15	15	20	20	25	10	10	Main trunk split long ago, large trunk leaning north, southern-most trunk with severe lean south, on steep slope.	Lots of mistletoe, canopy very sparse.	D		Removal
11	Tucker oak *Quercus john-tuckeri*	9	16	5	3	3	4	2	6	2	2	On steep slope.	Most of canopy is dead, mistletoe present, epicormic sprouting.	D	Tree is almost completely dead.	Removal
12	scrub oak *Quercus berberidifolia*	10	15	2	8	8	8	2	2	2	2	Trunk leaning to north, multi-stem, one stem is dead, on steep slope.	Epicormic growth, very sparse canopy.	D		Major Encroachment

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
13	scrub oak *Quercus berberidifolia*	12, 9.5, 10, 10	15	5	6	8	8	9	5	2	2	One dead stem, on steep slope.	Epicormic sprouting, severe decline, some galls present.	D		Minor Encroachment
14	scrub oak *Quercus berberidifolia*	22.5. 22, 17, 10, 7.5	20	12	12	12	5	12	10	10	12	Some stems have internal decay, on steep slope.	Epicormic sprouting, mistletoe present, tree in decline.	D		Avoided
15	scrub oak *Quercus berberidifolia*	7.5. 7.5, 8, 5.5	14	5	3	8	6	8	5	5	9	Good balance, on steep slope.	Some mistletoe present, significant amount of epicormic sprouting, some canopy dieback.	C		Avoided
16	Tucker oak *Quercus john-tuckeri*	9.5	10	1	1	1	10	10	10	2	1	Most of canopy is in the south, shaded in the north, on steep slope.	Some dieback present, significant amount of epicormic sprouting.	C		Avoided
17	Tucker oak *Quercus john-tuckeri*	5.5, 6.5, 7, 9	12	7	3	3	4	8	8	8	8	Some included bark at v-crotch about 5" above ground, tree on steep slope.	Small amounts of dieback and epicormic sprouting present.	B		Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
18	blue oak *Quercus douglasii*	40.5, 24, 47, 52.5, 48	35	30	25	25	28	27	30	25	25	Large multi-stem tree with big split and decay, all stems leaning towards the south, tree on steep slope.	Tree is experiencing some dieback, epicormic sprouting, sap sucker and borer holes present.	C	Tree tagged 61 in old survey, probably burned.	Avoided
19	Tucker oak *Quercus john-tuckeri*	22, 16.5, 17, 13, 10, 11	30	18	15	10	15	15	22	15	15	Included bark in all crotches, tree on a steep slope.	Appears vigorous, some cankers, canopy is somewhat sparse.	B		Avoided
20	Tucker oak *Quercus john-tuckeri*	17.5, 17, 14, 14	15	10	10	10	7	8	8	15	10	Tree on steep slope, nexus of stems is 1' above ground.	Some canopy dieback present.	B		Avoided
21	Tucker oak *Quercus john-tuckeri*	21, 25, 20.5, 9	20	20	20	10	20	18	10	15	20	Multiple trunks all leaning in different directions, tree on a steep slope.	Most of canopy is epicormic sprouting, borer and sapsucker holes are present.	C		Avoided
22	Tucker oak *Quercus john-tuckeri*	15, 19, 18.5, 19, 20	25	20	3	2	1	1	20	20	20	Tree is on a steep slope, included bark present.	Tree appears healthy but is being shaded, canopy is somewhat sparse, significant dieback is present.	C		Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
23	Tucker oak *Quercus john-tuckeri*	44.5	35	20	20	5	1	1	10	18	20	Strong lean to the north.	Significant amount of dieback in the lower canopy.	B		Avoided
24	Tucker oak *Quercus john-tuckeri*	18, 12.5, 42, 22.5	30	18	12	9	9	15	15	15	15	V-crotch with included bark at 7”, 1.5’, and 2’ above ground.	Some galls are present.	B	Tree tagged 60 in old survey.	Avoided
25	Tucker oak *Quercus john-tuckeri*	9, 9, 10, 6	9	8	8	8	5	2	6	8	8	Tree is on a steep slope.	Some epicormic sprouting is present, fairly even canopy.	B		Avoided
26	Tucker oak *Quercus john-tuckeri*	6.5	10	8	8	8	8	8	8	8	8	Even canopy spread, tree growing in the open.	Some galls are present, canopy is dense and healthy.	A	Shrub form, more than 25 stems, all 1-3 inches in circumference.	Removal
27	Tucker oak *Quercus john-tuckeri*	6	9	6	4	4	4	6	6	4	5	Structurally good, open, even canopy.	Significant amount of epicormic growth, most leaves are affected by aphids.	D	Some mechanical damage on the east side of the trunk.	Minor Encroachment
28	Tucker oak *Quercus john-tuckeri*	6.5	8	8	8	8	8	8	8	8	8	Tree is on a steep slope.	Some galls are present.	B	No tag; off-site.	Avoided
29	Tucker oak *Quercus john-tuckeri*	10, 6, 6.5, 5.5, 11	9	10	4	9	7	4	5	6	7		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided
30	Tucker oak *Quercus john-tuckeri*	9, 11	12	7	5	6	5	5	6	6	6		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
31	Tucker oak *Quercus john-tuckeri*	6.5, 8, 6.5	8	7	6	4	3	4	4	7	6		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided
32	Tucker oak *Quercus john-tuckeri*	6	9	7	5	6	5	5	5	6	6		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided
33	Tucker oak *Quercus john-tuckeri*	12, 9.5, 14.5	13	14	5	7	1	1	4	12	10	Strong lean downhill.	Tree is vigorous, some minor boring insect damage, significant amount of stress-related sprouting at base.	C	No tag; off-site.	Avoided
34	Tucker oak *Quercus john-tuckeri*	14.5, 11	14	4	5	3	9	7	10	13	3	Good structure.	Tree appears vigorous, lots of stress-related sprouting at base, epicormic sprouting present.	C	No tag; off-site.	Avoided
35	Tucker oak *Quercus john-tuckeri*	8, 13, 16, 9.5	15	10	10	7	5	3	9	4	7	Internal decay present in one main trunk.	Significant amount of stress-related sprouting at base.	C	No tag; off-site.	Avoided
36	Tucker oak *Quercus john-tuckeri*	6	12	5	6	6	4	5	5	5	4		Significant amount of epicormic sprouting, some galls present.	C	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
37	Tucker oak *Quercus john-tuckeri*	8	12	5	5	5	5	4	3	3	5		Significant amount of epicormic sprouting, some galls present.	C	No tag; off-site.	Avoided
38	Tucker oak *Quercus john-tuckeri*	9.5, 10, 8.5	12	12	10	5	10	10	6	5	2	Lean is causing bark to split.	Some internal decay and stress-related sprouting at the base is present.	C	No tag; off-site.	Avoided
39	Tucker oak *Quercus john-tuckeri*	7	10	4	3	3	3	4	4	5	5		Stress-related sprouting at the base and epicormic sprouting is present.	C	No tag; off-site.	Avoided
40	Tucker oak *Quercus john-tuckeri*	6, 5	12	5	4	7	8	8	6	7	5		Some galls are present, tree is in good health overall.	B	No tag; off-site.	Avoided
41	Tucker oak *Quercus john-tuckeri*	8, 6	15	7	6	5	3	10	10	3	3	Bark has a healing fissure down the middle of the trunk.	Some epicormic sprouting is present.	B	No tag; off-site.	Avoided
42	Tucker oak *Quercus john-tuckeri*	6.5, 6	12	8	8	2	2	8	7	7	7	Several branches are rubbing against each other.	Some galls are present.	B	No tag; off-site.	Avoided
43	Tucker oak *Quercus john-tuckeri*	6, 4	12	5	5	3	4	4	6	7	7		Some epicormic sprouting is present.	B	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
44	Tucker oak *Quercus john-tuckeri*	6, 6	12	7	8	9	5	3	3	7	7		Some canopy dieback is present.	C	No tag; off-site.	Avoided
45	Tucker oak *Quercus john-tuckeri*	7, 6, 6, 6, 5	13	8	8	6	6	9	10	9	9	Tree is in shrub form, several widely-spaced branches.	Some epicormic sprouting and galls are present.	B	No tag; off-site.	Avoided
46	Tucker oak *Quercus john-tuckeri*	6, 6, 6, 6, 8, 8.5	9	7	7	7	7	7	7	7	7	Tree is in shrub form, several widely-spaced branches.	Some epicormic sprouting is present, tree exhibiting vigorous growth.	B	No tag; off-site.	Avoided
47	Tucker oak *Quercus john-tuckeri*	6.5, 4	9	9	8	7	4	4	5	7	9	Tree is leaning downslope causing fissures in some stems.	Main stem has a large fissure with internal decay.	C	No tag; off-site.	Avoided
48	Tucker oak *Quercus john-tuckeri*	6, 5, 5	9	7	9	6	3	3	8	9	8	Some healing cracks are present at the base of main stems.	Some galls are present, some canopy dieback.	B	No tag; off-site.	Avoided
49	Tucker oak *Quercus john-tuckeri*	10, 6.5, 9.5	13	11	11	5	5	5	2	5	10	Good structure.	Some dieback and significant amounts of epicormic sprouting are present.	C	No tag; off-site.	Avoided
50	Tucker oak *Quercus john-tuckeri*	9, 7, 6, 6	13	2	8	8	7	7	7	2	2	Good structure.	Significant amount of epicormic sprouting is present.	C	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
51	Tucker oak *Quercus john-tuckeri*	15, 16, 16, 17	18	12	14	15	10	5	9	14	14	V-crotches are 1' above ground, some chainsaw wounds are present.	Significant amount of epicormic sprouting is present.	C	No tag; off-site.	Avoided
52	Tucker oak *Quercus john-tuckeri*	16.5, 10, 9.5, 17, 6, 9, 8.5	17	10	9	9	5	3	4	10	11	Many stems, but good structure.	Significant amount of epicormic sprouting and some canopy dieback are present.	C		Avoided
53	Tucker oak *Quercus john-tuckeri*	13	19	5	8	6	3	2	2	5	5	V-crotch at 6" and 4' above ground, tree has a slight lean.	Most of canopy is epicormic sprouting.	C	No tag; off-site.	Avoided
54	Tucker oak *Quercus john-tuckeri*	10, 8, 10	17	11	11	5	5	3	3	5	5		Most of canopy is epicormic sprouting, significant canopy dieback is present.	C	No tag; off-site.	Avoided
55	Tucker oak *Quercus john-tuckeri*	12	17	11	9	9	1	1	6	8	9	Tree is leaning northeast.	Borer holes and internal decay are present.	C	No tag; off-site.	Avoided
56	Tucker oak *Quercus john-tuckeri*	12, 11, 7, 7, 8, 10.5	15	8	8	6	8	9	10	9	7		Borer holes, some epicormic sprouting, internal decay, and canopy dieback are present.	C	No tag; off-site.	Avoided

Tree Tag No.	Species	Circumference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
57	scrub oak *Quercus berberidifolia*	9.5, 9.5, 7, 10, 8, 6.5, 6	12	9	10	10	7	5	9	9	9	Tree is in shrub form, mostly shaded by surrounding trees.	Some galls and epicormic sprouting are present.	B	No tag; off-site.	Avoided
58	scrub oak *Quercus berberidifolia*	7, 6	11	5	1	3	8	8	8	8	3	Tree is in shrub form.	Canopy is dying back, significant amount of epicormic sprouting is present.	C	No tag; off-site.	Avoided
59	Tucker oak *Quercus john-tuckeri*	8, 8, 8, 8, 8, 12.5	11	6	6	8	5	5	5	7	7	Tree is in shrub form.	A healing fissure and internal decay are present in one of the main stems.	C	No tag; off-site.	Avoided
60	Tucker oak *Quercus john-tuckeri*	6, 6, 6, 9, 4	8	6	6	8	5	7	9	9	9	Stems are all widely-spaced, spread out, tree is in shrubby form.	Some canopy dieback is present.	B	No tag; off-site, there is a packrat midden in the middle of the trunks.	Avoided
61	Tucker oak *Quercus john-tuckeri*	6, 6, 4, 5, 8, 6, 4, 4	9	8	6	6	6	6	7	9	8	Tree is in shrub form, stems are spread out.	Some canopy dieback, epicormic sprouting, and galls are present.	B		Avoided
62	Tucker oak *Quercus john-tuckeri*	9, 7.5, 5.5, 6.5, 5.5, 8.5, 8, 6.5, 4, 5, 6	9	11	6	5	6	6	7	8	5		Cankers, galls, epicormic sprouting, and canopy dieback are present.	C		Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
63	valley oak *Quercus lobata*	12, 22	20	5	7	7	7	7	7	7	7	V-crotch at 1.5’ and 5’ with included bark, tree is growing straight.	Vigorous growth, healthy specimen, no obvious signs of disease.	A	Circumference and canopy were estimated- tree is on private property.	Avoided
64	Tucker oak *Quercus john-tuckeri*	17, 32.5	19	10	10	10	10	10	8	8	10	Included bark, exposed roots, tree is growing on a steep slope.	Vigorous growth, some canopy dieback is present.	B		Avoided

Appendix A.2

Addendum to the Oak Tree Report for the Bouquet Canyon Site

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Irvine, CA 92618
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February 16, 2022

Evan Knapp
Integral Communities
888 San Clemente Drive, Suite 100
Newport Beach, CA 92660

Subject: Addendum to the Oak Tree Report for the Bouquet Canyon Project (Tentative Tract No. 82126)

Dear Mr. Knapp:

HELIX Environmental Planning, Inc. (HELIX) completed an oak tree survey report in August 2021 for the proposed Bouquet Canyon Road Project (Project) located in the City of Santa Clarita (City), Los Angeles County, California. This letter report is an addendum to the oak tree survey report to provide updates to the findings of that report based on revised project plans. The revised study area total 89.73 acres (56.91 acres on-site and 32.82 acres off-site). The revised project is shown on Figure 1, *Regional Location*, Figure 2, *USGS Topography*, and Figure 3, *Aerial Photograph*.

REVISED PROJECT AREAS

The Revised Project Areas and changes made to the project since the BTR are summarized below and depicted on Figure 4, *Revised Project Areas*.:

1. Off-Site Flood Control Outlet- Additional temporary impacts to the concrete banks of the off-site concrete flood control channel required for the revisions related to the alignment of the outlet.

2. Copper Hill Road Improvements – Additional grading/paving for Copper Hill Road.

3. Davenport Trailhead – The addition of the Davenport parcel (APN 2812-008-008) for the construction of a city-required trailhead.

4. Bouquet Canyon Road Improvements North – Additional off-site repaving and improvements to existing Bouquet Canyon Road near the northeast corner of the project.

5. Flood Control Channel Inlet & Diversion Structure – Construction of a slightly larger concrete flow diversion structure intended to convey low flows into the low-flow channel and divert high flows into the proposed concrete-lined flood control channel.

6. Sewer Line - Installation of a sewer line in the northeast portion of the site.

7. Slope Grading – Additional slope grading for the new alignment of Bouquet Canyon Road along the southerly border of the study area.

8. Bouquet Canyon Road Improvements South – Minor additional off-site road repaving and improvements to Bouquet Canyon Road located in the southwesterly portion of the project site.

9. Residential Addition – Addition of the "donut hole" parcel (APN 2812-008-002) in the easterly portion of the project site. Note that this area was evaluated for impacts to biological resources in the 2019 BTR yet was not evaluated as part of the project in the EIR. Additional residential uses have been proposed in the donut hole area since the EIR was certified. As such, the donut hole parcel has been included in this addendum.

10. Residential Reduction - Removal of Planning Area 1a, which was previously proposed to be constructed within the southern portion of the study area per the project BTR and EIR. This planning area presented in the Final EIR for the project will not be constructed as part of the revised project.

UPDATED OAK TREE SURVEY

On February 26, 2021, HELIX biologist and ISA-certified arborist Daniel Torres performed a preliminary oak tree survey on Revised Project Area 3 (Davenport Trailhead). On October 19, 2021, Mr. Torres performed an oak tree survey in Revised Project Area 9 (see *Attachment A*, Oak Tree Survey Report). On August 12, 2021, Carlsberg and Associates performed a follow-up oak tree survey on the Davenport Parcel. The Carlsberg report is included as Attachment B, *Davenport Oak Tree Survey Report*. On December 10, 2021, Mr. Torres performed an oak tree survey on Additional Project Areas 1, 2, 4-8, and 10. Of the Revised Project Areas, City-protected oak trees were detected on the Revised Project Area 3 only.

UPDATED RESULTS

A total of 20 new trees subject to an Oak Tree Permit were identified on Revised Project Area 3 (Attachment B). The total number of trees within the revised study area is 84. Of the 20 new trees, one was a blue oak (*Quercus douglasii*), two were interior live oak (*Quercus wislizeni* var. *wislizeni*), and 17 were Tucker oak (*Quercus john-tuckeri*). The locations of all oak trees are depicted on Figure 5, *Oak Tree Locations*).

REVISED PROJECT EFFECTS

The revised project includes avoidance for all oaks within Revised Project Area 3. Tree 27 (Tucker oak) located in the southwestern portion of the study area was avoided in the original project plan. This tree will be subject to minor encroachment in the revised project plan. The updated oak tree impacts table is included as Attachment C, *Updated Oak Tree Survey Data.* According to the City's Oak Tree Preservation Ordinance, no mitigation is warranted for minor encroachments. With the removal of Planning Area 1a, 69 oaks are now being avoided. A summary of the revised impacts to oak trees is provided in Table 1, *Revised Impacts to Oak Trees*. A map within the location, canopy, and protected zone of the oak trees assessed during this survey is included as Figure 6, *Impacts to Oak Trees*.

Table 1
REVISED IMPACTS TO OAK TREES

Species Name	Common Name	Removed	Major Encroachment	Minor Encroachment	Avoided
Quercus agrifolia	coast live oak	1	0	0	0
Quercus berberidifolia	scrub oak	0	1	1	4
Quercus douglasii	blue oak	1	0	0	2
Quercus john-tuckeri	Tucker oak	10	0	1	60
Quercus lobata	valley oak	0	0	0	1
Quercus wislizeni var. wislizeni	interior live oak	0	0	0	2
	TOTAL	**12**	**1**	**1**	**69**

OAK TREE APPRAISED VALUES

Since the oak trees within Revised Project Area 3 will be avoided, no oak tree appraisal is warranted for these trees. Additionally, no appraisal is warranted for minor encroachment to Tree 27. Therefore, the total appraised value of the oak trees ($80,300) remains the same as presented in the Oak Tree Survey Report (Attachment A). The oak tree appraisals are detailed in Attachment C of Oak Tree Survey Report and summarized in Table 2, *Summary of Tree Appraisals*, below.

To mitigate for the full value of the appraised oak trees, an Oak Tree Mitigation Plan will be prepared detailing the installation of $39,600 worth of oak trees. Additionally, blue oak #10 will be transplanted. If the blue oak tree does not survive after a 5-year monitoring period, the full appraised value of the tree ($40,700) will be paid to the City.

Table 2
SUMMARY OF TREE APPRAISALS

Tree Number	Species	DBH*	Appraised Value
1	Tucker oak	1.9	$2,300
2	Tucker oak	2.4	$2,500
3	coast live oak	4.1	$3,100
4	Tucker oak	4.8*	$3,700
5	Tucker oak	6.0*	$5,200
6	Tucker oak	6.5*	$3,700
7	Tucker oak	11.3*	$7,000
8	Tucker oak	3.6*	$2,100
9	Tucker oak	6.4	$3,100
10	blue oak	29.4*	$40,700
11	Tucker oak	2.9	$2,200
12	scrub oak	3.2	$2,300
26	Tucker oak	2.1	$2,400
TOTAL APPRAISED VALUE			**$80,300**

Source: HELIX (2021)
*Indicates a tree with multiple trunks at DBH where the aggregate diameter was calculated

CONCLUSIONS

The analysis provided above is intended to serve as an addendum to the Oak Tree Survey Report to document revisions to the original proposed project, including nine Revised Project Areas and the removal of Planning Area 1a. The revised study area includes 84 City-protected oak trees. All 20 new oak trees detected within Revised Project Area 3 will be completely avoided. The revised project plan includes minor encroachment to Tree 27. No appraisal or mitigation is warranted for minor encroachment according to the City's Oak Tree Preservation Ordinance. The total appraised value required to mitigate for impacted oak trees is $80,300. This will occur through the planting of $39,600 worth of mitigation oak trees on site and the transplantation of blue oak #10. If the blue oak does not survive the 5-year monitoring period following transplantation, the appraised value of the blue oak ($40,700) will be paid to the City.

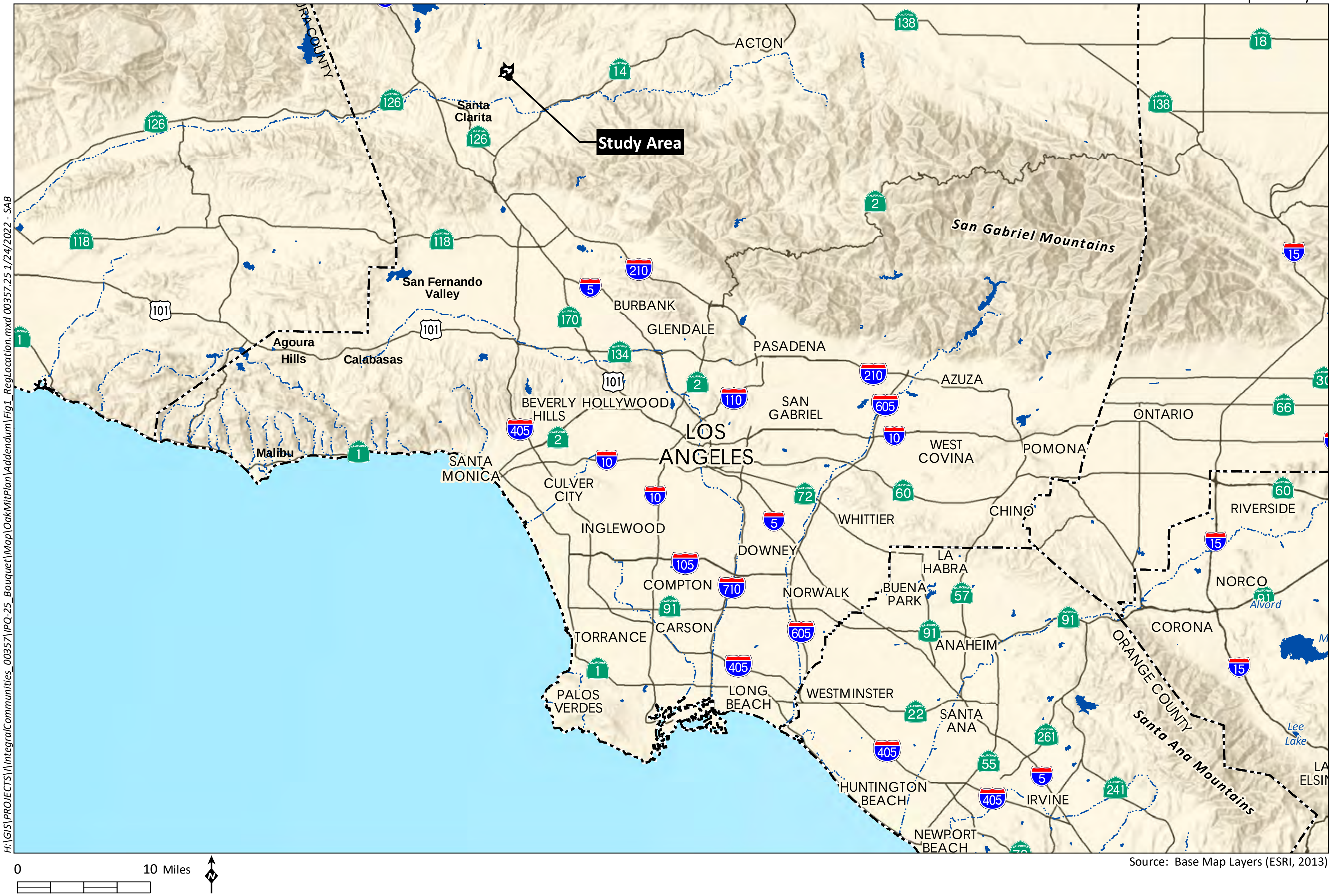
If you have any questions regarding the information presented in this letter report, please contact me at (619) 462-1515 or DanielT@helixepi.com.

Sincerely,

Daniel Torres
Biologist
ISA-Certified Arborist (WE-12249)

Attachments:

Figure 1: Regional Location
Figure 2: USGS Topography
Figure 3: Aerial Vicinity
Figure 4: Revised Project Areas
Figure 5: Oak Tree Locations
Figure 6: Impacts to Oak Trees
Attachment A: Oak Tree Survey Report
Attachment B: Davenport Oak Tree Survey Report
Attachment C: Updated Oak Tree Survey Data

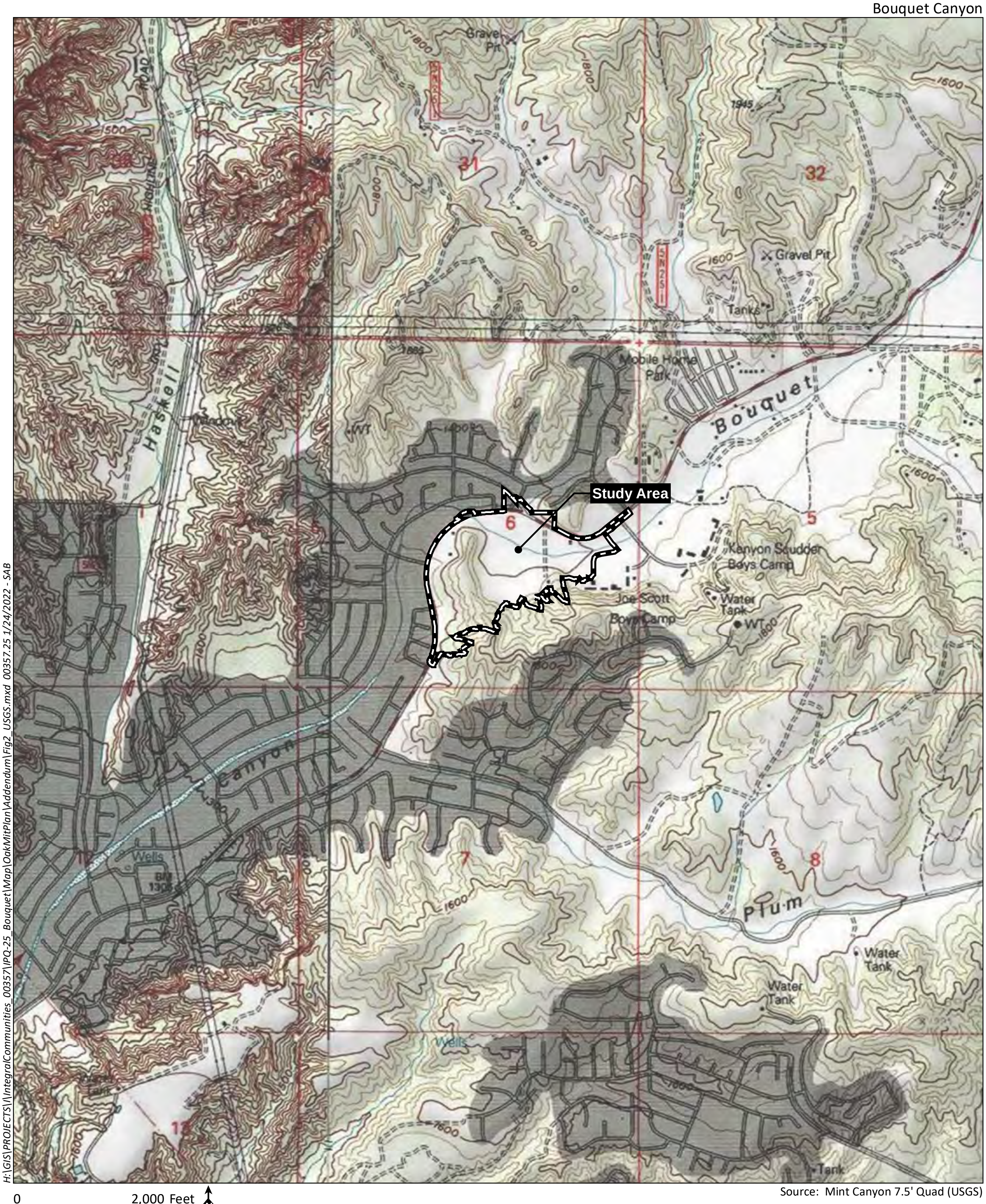


Source: Base Map Layers (ESRI, 2013)

HELIX Environmental Planning

Regional Location

Figure 1



Source: Mint Canyon 7.5' Quad (USGS)

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Vicinity Map

Figure 2

Source: Aerial (NearMap, 2021)

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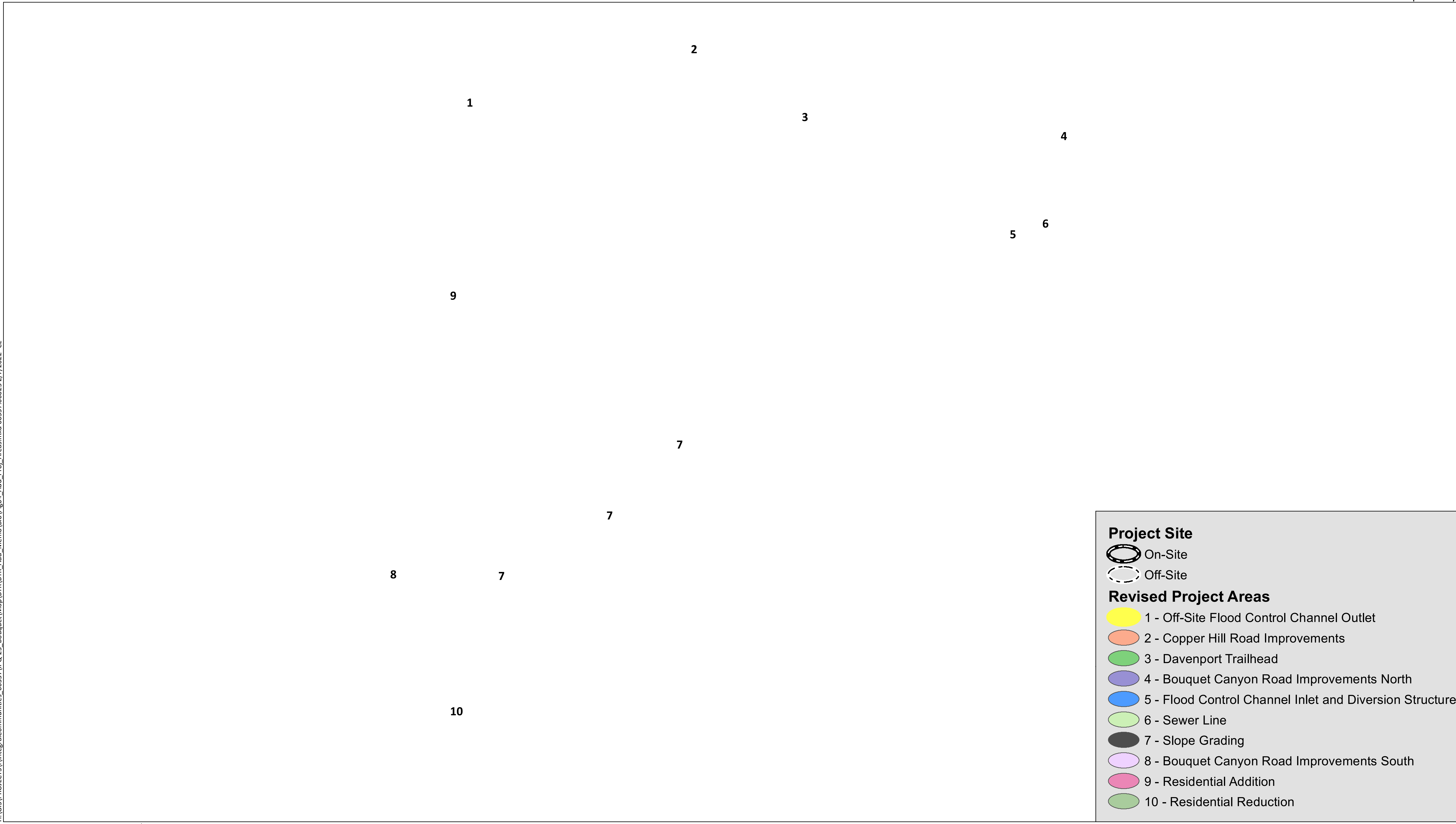
Environmental Planning

Aerial Photograph

Figure 3

Bouquet Canyon



Source: Site Plan (9-29-21)

0 375 Feet

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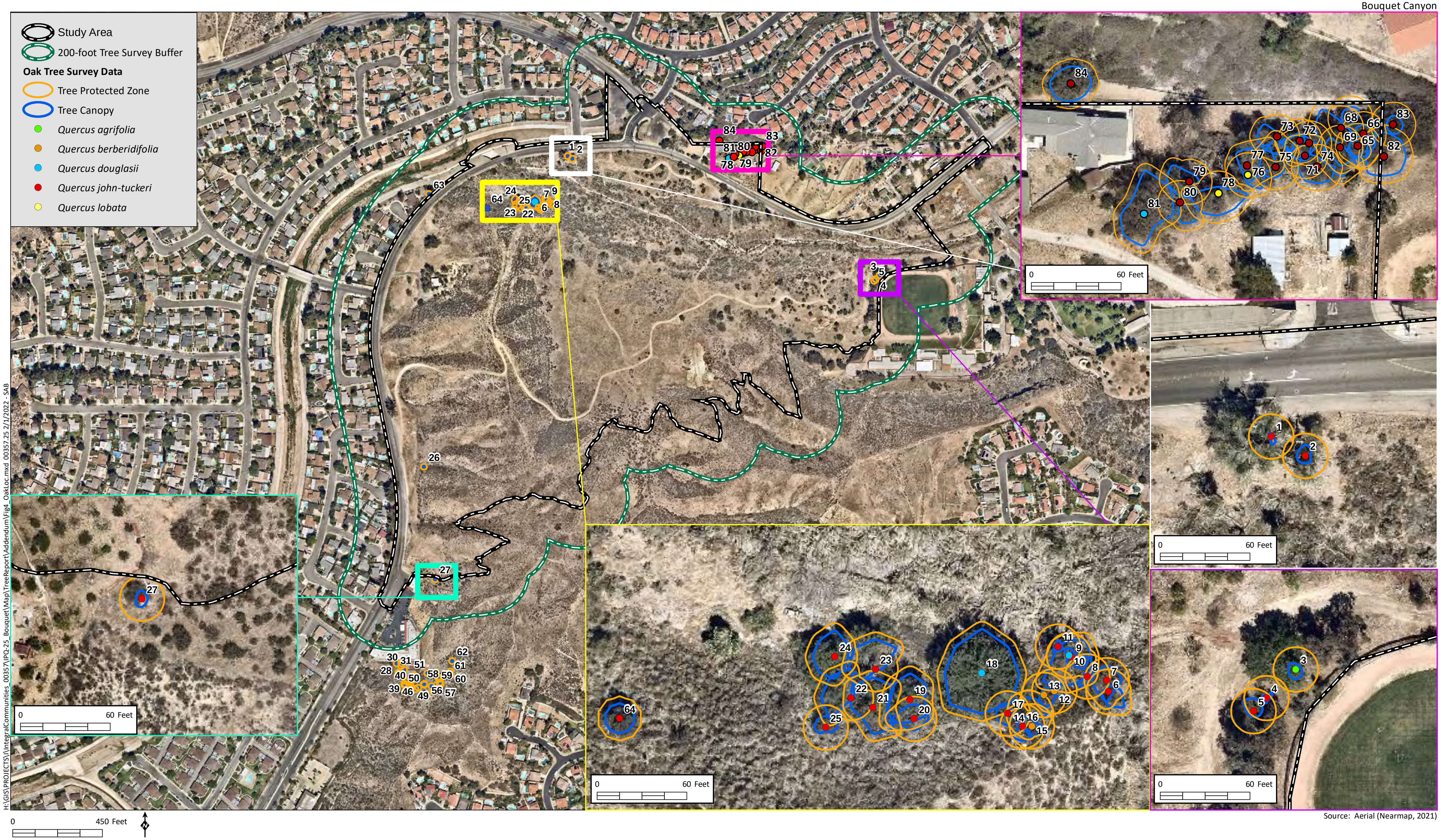
Additional Project Areas

Figure 4



Source: Aerial (Nearmap, 2021)

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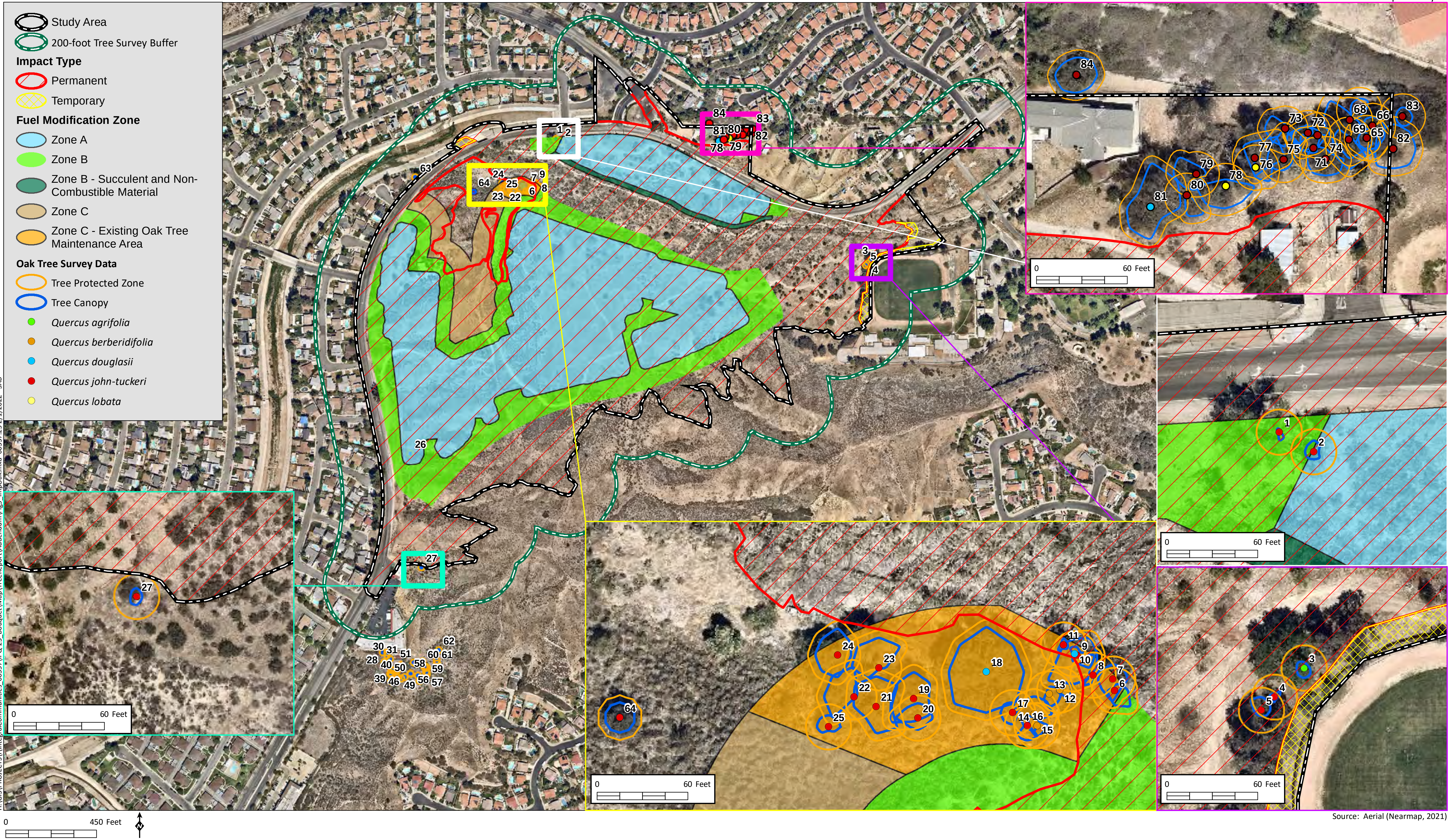
Oak Tree Locations

Figure 5



Source: Aerial (Nearmap, 2021)

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Impacts to Oak Trees

Figure 6

Attachment A

Oak Tree Survey Report

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619.462.1515 fax
www.**helixepi**.com

August 16, 2021 IPQ-25

Mr. Peter Vanek
Integral Communities
888 San Clemente Drive
Newport Beach, CA 92660

Subject: Oak Tree Survey Report for the Bouquet Canyon Road Project

Dear Mr. Covington:

HELIX Environmental Planning, Inc. (HELIX) prepared this report to document the results of an oak tree survey conducted for the proposed Bouquet Canyon Road Project (project) located the City of Santa Clarita (City), Los Angeles County, California. The purpose of this report is to provide an inventory of all species of oak tree (*Quercus* spp.) within 200-feet of the project footprint with at least one trunk over 6 inches in circumference at a point 4.5 feet above natural grade and to determine the presence of Heritage Trees as defined under the City's Oak Tree Preservation Ordinance (17.51.040; ordinance). This report was also prepared to provide supporting information for obtaining an Oak Tree Permit if sought in the future.

STUDY AREA LOCATION

The approximately 94-acre study area is generally located 6.9 miles to the east of Interstate 5 and 3.8 miles to the northwest of California State Route 14 in the City of Santa Clarita (Figure 1, *Regional Location*). Specifically, the study area is located directly south of the intersection of David Way and Bouquet Canyon Road. The study area is within Section 6 of Township 4 North, Range 15 West of the Mint Canyon, USGS 7.5-minute topographic quadrangle (Figure 2, *USGS Topography*).

Immediate surrounding land uses include existing residential developments to the north and west, a mixture of undeveloped land and residential development to the south, and undeveloped land and juvenile detention schools to the east (Figure 3, *Aerial Photograph*). The study area is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest.

REGULATORY FRAMEWORK

The City's Oak Tree Preservation ordinance states, "No person shall cut, prune, remove, relocate, endanger, damage, or encroach into the protected zone of any oak tree on any public or private property within the City" (City of Santa Clarita [City] 2013). The protected zone of the oak tree includes

the area within five feet of the dripline (canopy extent), but no less than 15 feet from the trunk. To remove any oak tree or to subject its protected zone to major encroachment, an Oak Tree Permit must be obtained. Trees subject to the permit include all trees of the oak species (*Quercus* sp.) exceeding 6 inches in circumference when measured at a point 4.5 feet above the tree's natural grade. Encroachment is defined as intrusion into the protected zone of an oak tree, which includes but is not limited to, intrusion by trenching, paving, pruning, dumping, parking of commercial vehicles. Major encroachment is defined by the City's ordinance as "an area between the outer edge of the trunk and fifty percent of the diameter of the protected zone" and minor encroachment is defined as an area between the outermost edge of the protected zone and fifty percent of the diameter of the protected zone" (City 2013).

To obtain an Oak Tree Permit, an application must be submitted to the City Manager or designated representative ("Director") and a filing fee as established by the City Council must be paid. The conditions of the Oak Tree Permit may include replacement or relocation of trees, or payment of a fee based on the ISA's "Guide for Plant Appraisal."

Heritage Oak Trees are given special consideration and may be fully protected or subject to requirements stricter than those of a standard protected oak tree. A Heritage Oak Tree is defined as any oak tree measuring 108 inches in circumference when measured 4.5 feet above the tree's natural grade. In the case of trees with multiple trunks, two or more trunks each must measure 72 inches or greater in circumference when measured 4.5 feet above the tree's natural grade.

METHODS

HELIX International Society of Arboriculture (ISA) Certified Arborist Daniel Torres (WE-12249) and HELIX Biologist/Regulatory Specialist Ezekiel Cooley completed an oak tree survey on the study area and within a 200-foot buffer of the study area (survey area) on December 19 and 20, 2018. The purpose of the survey was to document the presence of: (1) oak trees with at least one trunk over 6 inches in circumference at a point 4.5 feet above natural grade and (2) Heritage Oak Trees.

All oak trees within the survey area that satisfied the previously mentioned criteria were identified to species. The circumference at a point 4.5 feet above natural grade was measured. For trees with co-dominant stems at 4.5 feet above natural grade, the circumference of each stem was measured at this height. Next, the height of each tree was estimated and an aluminum tag with a unique number was affixed to the north side of the tree at approximately three feet above natural grade. Trees located outside of the study area but located within the buffer area were not tagged since Integral Communities does not own this property. Additionally, trees located on the detention school property to the east were not surveyed since permission to access this property was not provided. Finally, the location of each individual tree and the canopy extent were recorded with a global positioning system device with sub-meter accuracy. The collected data are not considered survey-grade accuracy and should not be used for construction purposes.

Physical and horticultural evaluations were performed for each protected tree according to the City's Oak Tree Preservation and Protection Guidelines (City 1990). The physical evaluation included the assessment of structure, terrain, and general appearance. The horticultural evaluation included the detection of any disease or pathogens and an assessment of the tree's overall vigor. The physical and horticultural evaluations were used to rate each tree on a scale ranging from A to F as outlined in the

City's Preservation and Protection Guidelines. The rating system is reproduced below in Table 2, *Oak Tree Rating System*.

Table 2
OAK TREE RATING SYSTEM

Rating	Description
A – Outstanding	A healthy and vigorous tree characteristic of its species and reasonably free of any visible signs of stress, disease or pest infestation.
B – Above Average	A healthy and vigorous tree with minor visible signs of stress, disease or pest infestation.
C – Average	Although healthy in overall appearance there is an abnormal amount of stress or disease and/or pest infestation.
D – Below Average/Poor	This tree is characterized by exhibiting a greater degree of stress, disease and/or pest infestation than normal and appears to be in a state of rapid decline. The degree of decline may vary greatly in signs of dieback, disease and pest infestation and appears to be in an advanced state of decline.
F – Dead	This tree exhibits no signs of life whatsoever.

Source: City of Santa Clarita (1990)

Following the oak tree survey, an impact assessment was conducted using the most recent project grading plans. The impact assessment was used to determine the number of oak trees that would be required to be removed or whose protected zone would be subject to major encroachment to complete project activities.

RESULTS

A total of 64 oak trees subject to an Oak Tree Permit were located within the survey area (Figure 4, *Oak Tree Locations*). Of these trees, one was coast live oak (*Quercus agrifolia*), six were scrub oak (*Quercus berberidifolia*), two were blue oak (*Quercus douglasii*), 54 were Tucker oak (*Quercus john-tuckeri*), and one was a valley oak (*Quercus lobata*). Six trees (approximately 9 percent) were assigned a rating of A – Outstanding, 22 trees (approximately 34 percent) were B – Above Average, 25 trees (approximately 40 percent) were C – Average, and 11 trees (approximately 17 percent) were D – Below Average. No dead trees were observed during the survey. Overall, there was very little disease noted on the oak trees within the survey area. The majority of trees (37 trees, approximately 58 percent) showed evidence of stress-related growth such as epicormic sprouting and suckers. No Heritage Oak Trees were found during the survey. The locations of all oak tree surveyed are shown in Figure 4. The data collected during the survey is included as Attachment A, *Oak Tree Survey Data*. Representative site and tree photographs are included as Attachment B, *Representative Photographs*.

IMPACT ASSESSMENT

All oak trees within the project footprint will be removed. In addition, the project will be required to implement fuel modification. The County Fire Department requires fuel modification zones to create a defensible space in the event a wildlife breaks out (County of Los Angeles N.D.). There are five different zones, which are outlined below:

Zone A (Setback Zone) – This zone extends 30 feet beyond the edge of any structures. The only allowed vegetation within this zone is green lawns, ground cover not exceeding six inches in height, and well-spaced shrubs. The landscape must be irrigated to promote healthy vegetation and fire resistance.

Zone B (Irrigated Zone) – This zone extends from the outermost edge of Zone A to 100 feet from structures. Green lawn, ground cover not exceeding six inches in height, and well-spaced shrubs and trees are allowed in this zone. The landscape must be irrigated to promote healthy vegetation and fire resistance.

Zone B (Succulent and Non-Combustible Material) – This zone is in included within Zone B and will be comprised of a minimum of 50% succulent plant material and non-combustible material (including rock, decomposed granite [DG], or concrete), comprising a minimum 25% succulents and 25% non-combustible material.

Zone C (Native Brush Thinning Zone) – This zone extends from the outermost edge of Zone B to 200 feet from the structures. Well-spaced native vegetation and ornamental shrubs and trees are allowed. Vegetation must be thinned and species that constitute a fire risk are not allowed (e.g., chamise [*Adenostoma fasciculatum*], sages [*Salvia* spp.], California sagebrush, and California buckwheat). This zone does not require irrigation.

Zone C (Existing Oak Tree Maintenance Area) – This zone is included within Zone C and shall comply with the following requirements: (1) any plant material and tree litter under the oak canopies shall be cleared twice yearly, once by May 15th and August 15th of each calendar year; (2) in lieu of plant material where topography allows, DG may be placed, but is not required to be placed, within the drip line area of the oak trees beginning approximately 3-feet from the trunk of the tree with an approximately thickness of 2-inches, DG shall not be compacted, rather shall be loosely placed; and (3) use of soil sterilizers shall be prohibited under and around existing oak trees, use of pre-emergent weed killer shall be prohibited within 100 feet of any individual oak tree or within a natural drainage that seasonally irrigates oak trees.

According to County Fire Department guidelines, all vegetation within Zone A must be irrigated, and the only vegetation allowed is green lawns, ground cover not exceeding six inches in height, and well-spaced shrubs. It was determined that requirements of Zone A are incompatible with the retainment of native oak trees. For the purpose of this assessment, oak trees located within Fuel Modification Zone A were considered removed, while oak trees located within Zones B and C were considered retained. In order to retain oaks within Zones A, authorization from the County Fire Department would be required. No tree pruning will be performed in any of the zones. The fuel modification zone plans were prepared by FireSafe Planning Solutions and were submitted to the County Fire Department on July 20, 2021.

Based on analyzing each surveyed oak's location in respect to the project grading plans and fuel modification zones, the project would require the removal of 12 oak trees, including one coast live oak (*Quercus agrifolia*, Tree 3), one blue oak (*Quercus douglasii*, Tree 10), and 10 Tucker oaks (*Quercus john-tuckeri*, Trees 1,2, 4-9, 11, and 26). Finally, one scrub oak (Tree 12) would be subjected to major encroachment.

One scrub oak (Tree 13) would be subjected to minor encroachment. Additionally, a retaining wall will be built outside of the protected zone of one blue oak (Tree 18), therefore this tree will be avoided. A total of 50 oak trees would be completely avoided by the project (Table 3, *Impacts to Oak Trees*). A map with the location, canopy, and protected zone of the oak trees assessed during this survey is included as Figure 5, *Impacts to Oak Trees*.

Table 3
IMPACTS TO OAK TREES

Species Name	Common Name	Removed	Major Encroachment	Minor Encroachment	Avoided
Quercus agrifolia	coast live oak	1	0	0	0
Quercus berberidifolia	scrub oak	0	1	1	4
Quercus douglasii	blue oak	1	0	0	1
Quercus john-tuckeri	Tucker oak	10	0	0	44
Quercus lobata	valley oak	0	0	0	1
	TOTAL	**12**	**1**	**1**	**50**

MITIGATION

Based on the impacts to oak trees as quantified by the impact assessment, 12 oak trees will be removed, and one will be subjected to major encroachment. In order to receive an Oak Tree Removal Permit for these impacts, the City may determine whether the project proponent shall replace or relocate, pay a fee, or donate boxed trees to the City of an equivalent value to all oak trees removed or subject to major encroachment. In order to determine the value of impacted trees, the appraised value of each tree subject to impacts was calculated using the 10th Edition of the Guide for Plant Appraisal (CTLA 2019). The total appraised value of trees subject to removal or major encroachment is $80,300 (Attachment C). Trees that will be completely avoided or subject to minor encroachment will not require mitigation.

CONCLUSION

Sixty-four (64) oak trees on the survey area were considered City-protected trees. Construction of the project will require 12 of these trees to be removed and one to be subjected to major encroachment. It is anticipated that the City will require mitigation for the value of these trees, which totals $80,300. Fifty

(50) of these trees will be completely avoided or subjected to minor encroachment during project activities and therefore will not require mitigation.

During construction, trees subject to minor or major encroachment will require protection measures, including but not limited to those outlined within Section VII. Standards for Performance of Permitted Work of the Oak Tree Preservation Guidelines. Other general guidelines to protect trees during for project construction are included as Attachment D, *Tree Protection Recommendations*.

Should you have any questions or require additional information, please do not hesitate to contact me at (949) 234-1515 or DanielT@helixepi.com.

Sincerely,

Daniel Torres
ISA Certified Arborist (WE-12249A)

Enclosures:

Figure 1:	Regional Location
Figure 2:	USGS Topography
Figure 3:	Aerial Vicinity
Figure 4:	Oak Tree Locations
Figure 5:	Impacts to Oak Trees

Attachment A:	Oak Tree Survey Data
Attachment B:	Representative Photos
Attachment C	Oak Tree Appraisal Addendum
Attachment D:	Tree Protection Recommendations

REFERENCES

Council of Tree and Landscape Appraisers (CTLA). 2019. *Guide for Plant Appraisal, 10th Edition.*

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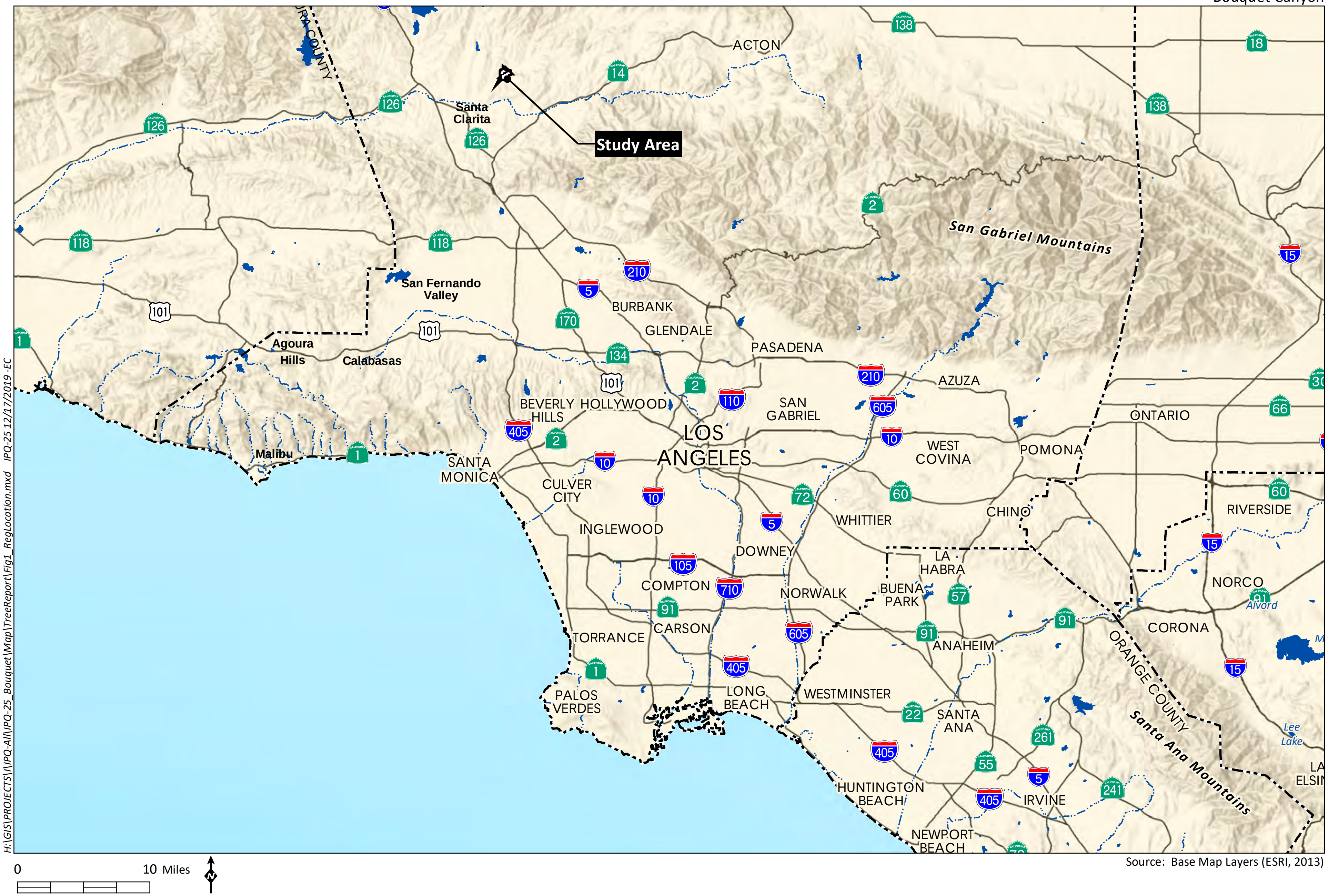

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Source: Base Map Layers (ESRI, 2013)

HELIX Environmental Planning

Regional Location

Figure 1

Source: Mint Canyon 7.5' Quad (USGS)

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Vicinity Map

Figure 2

Source: Base Map Layers (NAIP, 2016)

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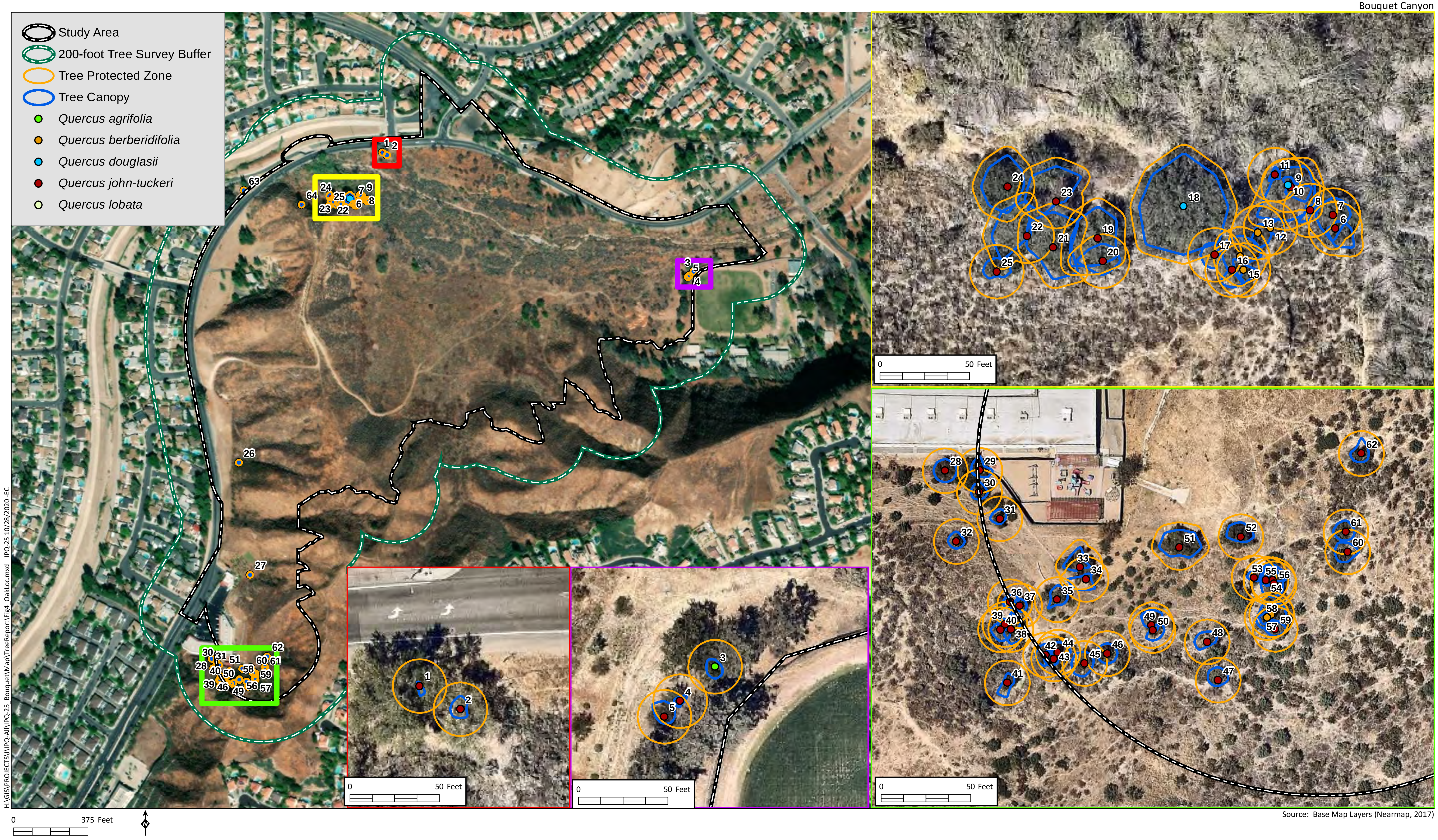
HELIX
Environmental Planning

Aerial Photograph

Figure 3



Source: Base Map Layers (Nearmap, 2017)

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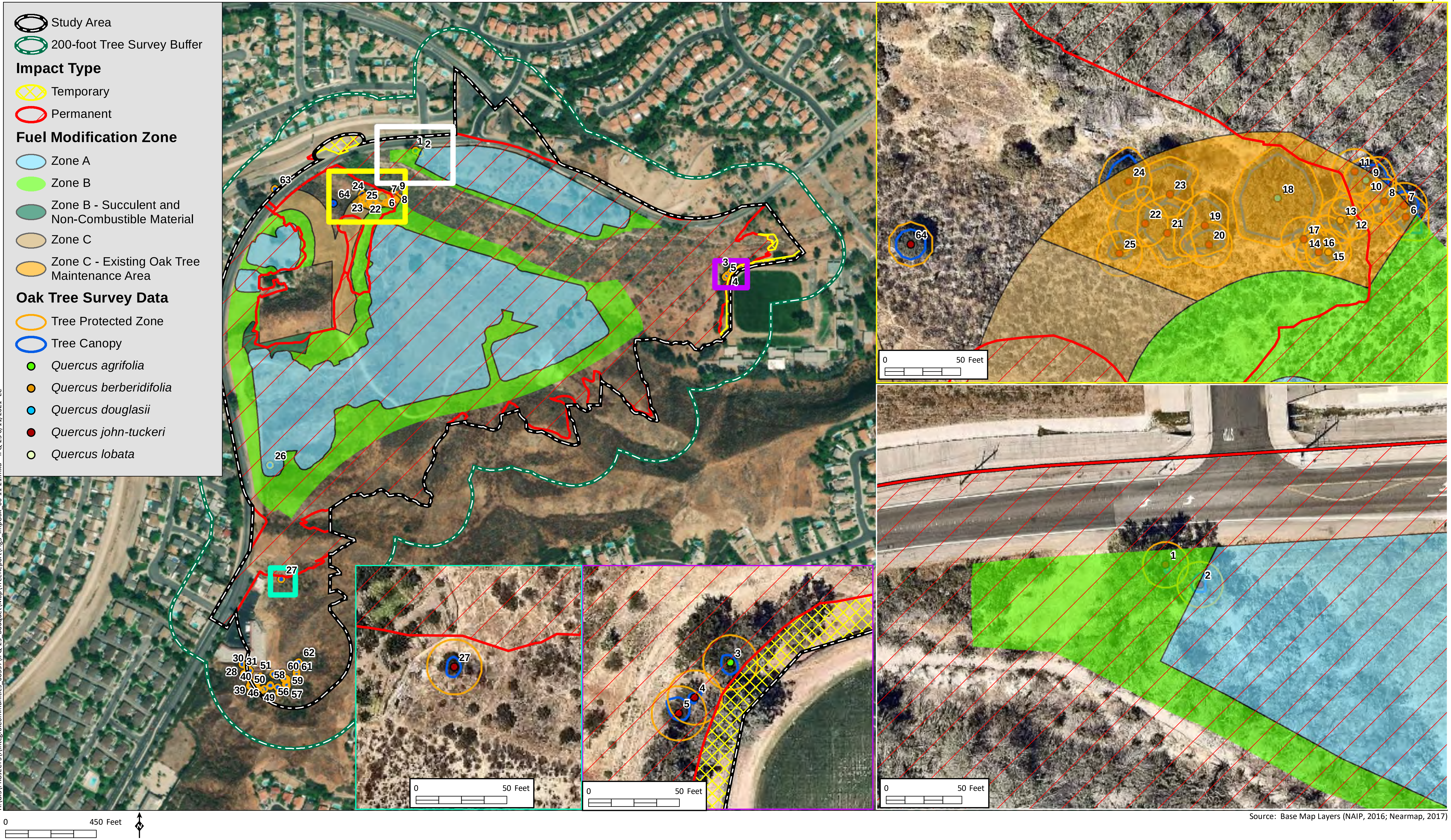
Oak Tree Locations

Figure 4

Bouquet Canyon



Source: Base Map Layers (NAIP, 2016; Nearmap, 2017)

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Impacts to Oak Trees

Figure 5

Attachment A

Oak Tree Survey Data

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
1	Tucker oak *Quercus john-tuckeri*	6	10	3	1	1	5	6	1	1	3	Deep v-crotch at 7", canopy is N-S oriented, does not extend E-W.	Appears vigorous, some small galls present, some old, healed trunk injuries.	B		Removal
2	Tucker oak *Quercus john-tuckeri*	7.5	9	8	6	3	6	5	6	6	6	Trunk leaning northeast, canopy overall well-distributed.	Galls, insect damage.	B		Removal
3	coast live oak *Quercus agrifolia*	12.75	16	4	3	4	6	7	6	5	6	Tree leaning south.	Has stress-related suckers, sapsucker holes.	B	No tag; off-site.	Removal
4	Tucker oak *Quercus john-tuckeri*	10, 9, 7	9	2	6	3	1	4	3	4	3	Tree has been topped.	All epicormic growth, tree in severe decline.	D	No tag; off-site.	Removal
5	Tucker oak *Quercus john-tuckeri*	11.75, 12, 8.5	15	9	8	6	5	4	4	5	10	Tree leaning north, away from adjacent eucalyptus.	Some galls present, bark damage present (chainsaw cut)-healing.	B	No tag; off-site.	Removal
6	Tucker oak *Quercus john-tuckeri*	9, 13, 13	16	4	6	9	15	10	5	5	2	Large failure at v-crotch with decay (old main stem), exposed roots.	Declining, significant amount of epicormic sprouting.	D		Removal
7	Tucker oak *Quercus john-tuckeri*	18, 19, 24	22	10	10	10	8	15	10	10	9	Exposed roots, wide angle crotch at base.	Declining, epicormic sprouting, canopy dieback.	D		Removal

Attachment A

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
8	Tucker oak *Quercus john-tuckeri*	9.75, 6	5	2	8	2	2	5	10	2	4	Severe lean to south, on steep slope.	Tree is being shaded, very sparse canopy, canopy dieback.	D	Stump shoots from old dead tree.	Removal
9	Tucker oak *Quercus john-tuckeri*	20	15	6	3	12	12	5	5	2	7	Exposed roots, on steep slope.	Large split with internal decay in trunk, internal decay throughout.	D		Removal
10	blue oak *Quercus douglasii*	85, 36	45	10	15	15	20	20	25	10	10	Main trunk split long ago, large trunk leaning north, southern-most trunk with severe lean south, on steep slope.	Lots of mistletoe, canopy very sparse.	D		Removal
11	Tucker oak *Quercus john-tuckeri*	9	16	5	3	3	4	2	6	2	2	On steep slope.	Most of canopy is dead, mistletoe present, epicormic sprouting.	D	Tree is almost completely dead.	Removal
12	scrub oak *Quercus berberidifolia*	10	15	2	8	8	8	2	2	2	2	Trunk leaning to north, multi-stem, one stem is dead, on steep slope.	Epicormic growth, very sparse canopy.	D		Major Encroachment

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
13	scrub oak *Quercus berberidifolia*	12, 9.5, 10, 10	15	5	6	8	8	9	5	2	2	One dead stem, on steep slope.	Epicormic sprouting, severe decline, some galls present.	D		Minor Encroachment
14	scrub oak *Quercus berberidifolia*	22.5. 22, 17, 10, 7.5	20	12	12	12	5	12	10	10	12	Some stems have internal decay, on steep slope.	Epicormic sprouting, mistletoe present, tree in decline.	D		Avoided
15	scrub oak *Quercus berberidifolia*	7.5. 7.5, 8, 5.5	14	5	3	8	6	8	5	5	9	Good balance, on steep slope.	Some mistletoe present, significant amount of epicormic sprouting, some canopy dieback.	C		Avoided
16	Tucker oak *Quercus john-tuckeri*	9.5	10	1	1	1	10	10	10	2	1	Most of canopy is in the south, shaded in the north, on steep slope.	Some dieback present, significant amount of epicormic sprouting.	C		Avoided
17	Tucker oak *Quercus john-tuckeri*	5.5, 6.5, 7, 9	12	7	3	3	4	8	8	8	8	Some included bark at v-crotch about 5” above ground, tree on steep slope.	Small amounts of dieback and epicormic sprouting present.	B		Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
18	blue oak *Quercus douglasii*	40.5, 24, 47, 52.5, 48	35	30	25	25	28	27	30	25	25	Large multi-stem tree with big split and decay, all stems leaning towards the south, tree on steep slope.	Tree is experiencing some dieback, epicormic sprouting, sap sucker and borer holes present.	C	Tree tagged 61 in old survey, probably burned.	Avoided
19	Tucker oak *Quercus john-tuckeri*	22, 16.5, 17, 13, 10, 11	30	18	15	10	15	15	22	15	15	Included bark in all crotches, tree on a steep slope.	Appears vigorous, some cankers, canopy is somewhat sparse.	B		Avoided
20	Tucker oak *Quercus john-tuckeri*	17.5, 17, 14, 14	15	10	10	10	7	8	8	15	10	Tree on steep slope, nexus of stems is 1’ above ground.	Some canopy dieback present.	B		Avoided
21	Tucker oak *Quercus john-tuckeri*	21, 25, 20.5, 9	20	20	20	10	20	18	10	15	20	Multiple trunks all leaning in different directions, tree on a steep slope.	Most of canopy is epicormic sprouting, borer and sapsucker holes are present.	C		Avoided
22	Tucker oak *Quercus john-tuckeri*	15, 19, 18.5, 19, 20	25	20	3	2	1	1	20	20	20	Tree is on a steep slope, included bark present.	Tree appears healthy but is being shaded, canopy is somewhat sparse, significant dieback is present.	C		Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
23	Tucker oak *Quercus john-tuckeri*	44.5	35	20	20	5	1	1	10	18	20	Strong lean to the north.	Significant amount of dieback in the lower canopy.	B		Avoided
24	Tucker oak *Quercus john-tuckeri*	18, 12.5, 42, 22.5	30	18	12	9	9	15	15	15	15	V-crotch with included bark at 7”, 1.5’, and 2’ above ground.	Some galls are present.	B	Tree tagged 60 in old survey.	Avoided
25	Tucker oak *Quercus john-tuckeri*	9, 9, 10, 6	9	8	8	8	5	2	6	8	8	Tree is on a steep slope.	Some epicormic sprouting is present, fairly even canopy.	B		Avoided
26	Tucker oak *Quercus john-tuckeri*	6.5	10	8	8	8	8	8	8	8	8	Even canopy spread, tree growing in the open.	Some galls are present, canopy is dense and healthy.	A	Shrub form, more than 25 stems, all 1-3 inches in circum-ference.	Removal
27	Tucker oak *Quercus john-tuckeri*	6	9	6	4	4	4	6	6	4	5	Structurally good, open, even canopy.	Significant amount of epicormic growth, most leaves are affected by aphids.	D	Some mechanical damage on the east side of the trunk.	Avoided
28	Tucker oak *Quercus john-tuckeri*	6.5	8	8	8	8	8	8	8	8	8	Tree is on a steep slope.	Some galls are present.	B	No tag; off-site.	Avoided
29	Tucker oak *Quercus john-tuckeri*	10, 6, 6.5, 5.5, 11	9	10	4	9	7	4	5	6	7		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided
30	Tucker oak *Quercus john-tuckeri*	9, 11	12	7	5	6	5	5	6	6	6		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
31	Tucker oak *Quercus john-tuckeri*	6.5, 8, 6.5	8	7	6	4	3	4	4	7	6		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided
32	Tucker oak *Quercus john-tuckeri*	6	9	7	5	6	5	5	5	6	6		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided
33	Tucker oak *Quercus john-tuckeri*	12, 9.5, 14.5	13	14	5	7	1	1	4	12	10	Strong lean downhill.	Tree is vigorous, some minor boring insect damage, significant amount of stress-related sprouting at base.	C	No tag; off-site.	Avoided
34	Tucker oak *Quercus john-tuckeri*	14.5, 11	14	4	5	3	9	7	10	13	3	Good structure.	Tree appears vigorous, lots of stress-related sprouting at base, epicormic sprouting present.	C	No tag; off-site.	Avoided
35	Tucker oak *Quercus john-tuckeri*	8, 13, 16, 9.5	15	10	10	7	5	3	9	4	7	Internal decay present in one main trunk.	Significant amount of stress-related sprouting at base.	C	No tag; off-site.	Avoided
36	Tucker oak *Quercus john-tuckeri*	6	12	5	6	6	4	5	5	5	4		Significant amount of epicormic sprouting, some galls present.	C	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
37	Tucker oak *Quercus john-tuckeri*	8	12	5	5	5	5	4	3	3	5		Significant amount of epicormic sprouting, some galls present.	C	No tag; off-site.	Avoided
38	Tucker oak *Quercus john-tuckeri*	9.5, 10, 8.5	12	12	10	5	10	10	6	5	2	Lean is causing bark to split.	Some internal decay and stress-related sprouting at the base is present.	C	No tag; off-site.	Avoided
39	Tucker oak *Quercus john-tuckeri*	7	10	4	3	3	3	4	4	5	5		Stress-related sprouting at the base and epicormic sprouting is present.	C	No tag; off-site.	Avoided
40	Tucker oak *Quercus john-tuckeri*	6, 5	12	5	4	7	8	8	6	7	5		Some galls are present, tree is in good health overall.	B	No tag; off-site.	Avoided
41	Tucker oak *Quercus john-tuckeri*	8, 6	15	7	6	5	3	10	10	3	3	Bark has a healing fissure down the middle of the trunk.	Some epicormic sprouting is present.	B	No tag; off-site.	Avoided
42	Tucker oak *Quercus john-tuckeri*	6.5, 6	12	8	8	2	2	8	7	7	7	Several branches are rubbing against each other.	Some galls are present.	B	No tag; off-site.	Avoided
43	Tucker oak *Quercus john-tuckeri*	6, 4	12	5	5	3	4	4	6	7	7		Some epicormic sprouting is present.	B	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
44	Tucker oak *Quercus john-tuckeri*	6, 6	12	7	8	9	5	3	3	7	7		Some canopy dieback is present.	C	No tag; off-site.	Avoided
45	Tucker oak *Quercus john-tuckeri*	7, 6, 6, 6, 5	13	8	8	6	6	9	10	9	9	Tree is in shrub form, several widely-spaced branches.	Some epicormic sprouting and galls are present.	B	No tag; off-site.	Avoided
46	Tucker oak *Quercus john-tuckeri*	6, 6, 6, 6, 8, 8.5	9	7	7	7	7	7	7	7	7	Tree is in shrub form, several widely-spaced branches.	Some epicormic sprouting is present, tree exhibiting vigorous growth.	B	No tag; off-site.	Avoided
47	Tucker oak *Quercus john-tuckeri*	6.5, 4	9	9	8	7	4	4	5	7	9	Tree is leaning downslope causing fissures in some stems.	Main stem has a large fissure with internal decay.	C	No tag; off-site.	Avoided
48	Tucker oak *Quercus john-tuckeri*	6, 5, 5	9	7	9	6	3	3	8	9	8	Some healing cracks are present at the base of main stems.	Some galls are present, some canopy dieback.	B	No tag; off-site.	Avoided
49	Tucker oak *Quercus john-tuckeri*	10, 6.5, 9.5	13	11	11	5	5	5	2	5	10	Good structure.	Some dieback and significant amounts of epicormic sprouting are present.	C	No tag; off-site.	Avoided
50	Tucker oak *Quercus john-tuckeri*	9, 7, 6, 6	13	2	8	8	7	7	7	2	2	Good structure.	Significant amount of epicormic sprouting is present.	C	No tag; off-site.	Avoided

Tree Tag No.	Species	Circumference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
51	Tucker oak *Quercus john-tuckeri*	15, 16, 16, 17	18	12	14	15	10	5	9	14	14	V-crotches are 1’ above ground, some chainsaw wounds are present.	Significant amount of epicormic sprouting is present.	C	No tag; off-site.	Avoided
52	Tucker oak *Quercus john-tuckeri*	16.5, 10, 9.5, 17, 6, 9, 8.5	17	10	9	9	5	3	4	10	11	Many stems, but good structure.	Significant amount of epicormic sprouting and some canopy dieback are present.	C		Avoided
53	Tucker oak *Quercus john-tuckeri*	13	19	5	8	6	3	2	2	5	5	V-crotch at 6” and 4’ above ground, tree has a slight lean.	Most of canopy is epicormic sprouting.	C	No tag; off-site.	Avoided
54	Tucker oak *Quercus john-tuckeri*	10, 8, 10	17	11	11	5	5	3	3	5	5		Most of canopy is epicormic sprouting, significant canopy dieback is present.	C	No tag; off-site.	Avoided
55	Tucker oak *Quercus john-tuckeri*	12	17	11	9	9	1	1	6	8	9	Tree is leaning northeast.	Borer holes and internal decay are present.	C	No tag; off-site.	Avoided
56	Tucker oak *Quercus john-tuckeri*	12, 11, 7, 7, 8, 10.5	15	8	8	6	8	9	10	9	7		Borer holes, some epicormic sprouting, internal decay, and canopy dieback are present.	C	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
57	scrub oak *Quercus berberidifolia*	9.5, 9.5, 7, 10, 8, 6.5, 6	12	9	10	10	7	5	9	9	9	Tree is in shrub form, mostly shaded by surrounding trees.	Some galls and epicormic sprouting are present.	B	No tag; off-site.	Avoided
58	scrub oak *Quercus berberidifolia*	7, 6	11	5	1	3	8	8	8	8	3	Tree is in shrub form.	Canopy is dying back, significant amount of epicormic sprouting is present.	C	No tag; off-site.	Avoided
59	Tucker oak *Quercus john-tuckeri*	8, 8, 8, 8, 8, 12.5	11	6	6	8	5	5	5	7	7	Tree is in shrub form.	A healing fissure and internal decay are present in one of the main stems.	C	No tag; off-site.	Avoided
60	Tucker oak *Quercus john-tuckeri*	6, 6, 6, 9, 4	8	6	6	8	5	7	9	9	9	Stems are all widely-spaced, spread out, tree is in shrubby form.	Some canopy dieback is present.	B	No tag; off-site, there is a packrat midden in the middle of the trunks.	Avoided
61	Tucker oak *Quercus john-tuckeri*	6, 6, 4, 5, 8, 6, 4, 4	9	8	6	6	6	6	7	9	8	Tree is in shrub form, stems are spread out.	Some canopy dieback, epicormic sprouting, and galls are present.	B		Avoided
62	Tucker oak *Quercus john-tuckeri*	9, 7.5, 5.5, 6.5, 5.5, 8.5, 8, 6.5, 4, 5, 6	9	11	6	5	6	6	7	8	5		Cankers, galls, epicormic sprouting, and canopy dieback are present.	C		Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
63	valley oak *Quercus lobata*	12, 22	20	5	7	7	7	7	7	7	7	V-crotch at 1.5' and 5' with included bark, tree is growing straight.	Vigorous growth, healthy specimen, no obvious signs of disease.	A	Circumference and canopy were estimated- tree is on private property.	Avoided
64	Tucker oak *Quercus john-tuckeri*	17, 32.5	19	10	10	10	10	10	8	8	10	Included bark, exposed roots, tree is growing on a steep slope.	Vigorous growth, some canopy dieback is present.	B		Avoided

Attachment B

Representative Photos

Photo 1: Tree 10 (blue oak, *Quercus douglasii*) adjacent to the northwestern corner of the study area.

Photo 2: Tucker oak (*Quercus john-tuckeri*) scrub adjacent to the southwestern corner of the study area.

Photo 3: Tree 51 (Tucker oak, *Quercus john-tuckeri*) assigned an oak tree rating of C for displaying significant amounts of epicormic growth.

Photo 4: Tree 62 (Tucker oak, *Quercus john-tuckeri*) assigned an oak tree rating of C for displaying canopy dieback and significant amounts of epicormic growth.

Attachment C

Oak Tree Appraisal Addendum

HELIX Environmental Planning, Inc.
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July 7, 2021 IPQ-25

Mr. Peter Vanek
Integral Communities
888 San Clemente Drive
Newport Beach, CA 92660

Subject: Addendum to the Oak Tree Survey Report for the Bouquet Canyon Road Project

Dear Mr. Vanek:

HELIX Environmental Planning, Inc. (HELIX) completed an oak tree survey report for the proposed Bouquet Canyon Road Project (Project) located in the City of Santa Clarita (City), Los Angeles County, California. This letter report is an addendum to the oak tree survey report to provide the appraised value and a photograph of each tree to be removed or subjected to major encroachment by the proposed project. The appraised values and photographs were requested by the City in order to process the Oak Tree Permit, as defined under the City's Oak Tree Preservation Ordinance (17.51.040; ordinance).

METHODS

Photographs

HELIX International Society of Arboriculture (ISA) Certified Arborist Daniel Torres (WE-12249) performed a field visits on June 5, 2020 and October 20, 2020 in order to collect photographs of each oak tree that has been proposed for major encroachment or removal by the proposed project. During the field visits, Mr. Torres located each tree, verified the tree tag number, and collected photographs.

Oak Tree Appraised Values

In order to determine the appraised value of each tree subject to major encroachment or removal, the Trunk Formula Method as described in the 10th Edition of the Council of Tree and Landscape Appraisers (CTLA) Guide for Plant Appraisal was used (CTLA 2019). The Trunk Formula Method is used to extrapolate the costs to purchase the largest commonly available nursey plant to the size of the plant being appraised. Data collected during the oak tree survey was used to assess the condition, functional limitations, and external limitations of each tree. The condition ratings were intuitively designated based on each tree's ratings for health, structure, and form. For trees with multiple trunks at breast height, the aggregate diameter was calculated using the following formula:

Aggregate diameter = $\sqrt{(d1^2 + d2^2 + d3^2 + d4^2)}$

Where d1, d2, etc. are each trunk's diameter at breast height (DBH).

Replacement Tree

As discussed above, the cost of a replacement tree is extrapolated from the largest commonly available nursery stock. On June 12, 2020, several Southern California nurseries were contacted to determine the largest commonly available nursery stock and the cost of this stock., The nurseries contacted included Matilija Nursery in Moorpark, Boething Treeland Farms in Woodland Hills, and Tree of Life Nursey in San Juan Capistrano. The arborist determined that the largest commonly available nursery stock to replace coast live oaks (*Quercus agrifolia*) was a 36"-box sized coast live oak at a cost of $870 per tree from Boething Treeland Farms. The largest commonly available replacement for scrub oaks (*Quercus berberidifolia*), Tucker oaks (*Quercus john-tuckeri*), and blue oaks (*Quercus douglasii*), was a 15-gallon scrub oak at a cost of $63 per tree from Tree of Life Nursery.

Based on coordination with the nurseries mentioned it above, the following assumptions about trunk diameter were applied when calculation the cost of as replacement tree: 15-gallon scrub oaks were assumed to have a diameter of 0.75 inch, 24-inch box sized trees were assumed to have a diameter of 2 inches, and 36-inch box sized trees were assumed to have a diameter of 3 inches.

Blue oaks and Tucker oaks were not available at any of the nurseries mentioned above and are not commonly available. Scrub oaks were used as a replacement for Tucker oak, as this species is commonly available and has similar form, functional value, and growth rate.

On October 6, 2020, the City prepared a Draft Conditions of Approval (COA) for the project. According to OT6 of the draft COA, a scrub oak should be used as a replacement for blue oaks because this species closely matches the growth rate of the blue oak.

Additional Costs

Additional costs include the costs to plant and maintain a replacement tree. For the purposes of this appraisal, HELIX has assumed a maintenance and establishment period of one year. Additional costs include labor, installation of irrigation, equipment to plant a replacement tree, tree stakes, and pruning. Through consultation with HELIX Senior Construction Project Manager Peter Tomsovic, it was determined that the cost to plant and maintain a 36" box sized tree is $2,000. This additional cost was applied to the appraised value of each oak tree to be impacted.

RESULTS AND CONCLUSION

As determined in the oak tree report, the project proposes to subject a total of 12 trees to removal and one tree to major encroachment. This includes one coast live oak (removal), one blue oak (removal), one scrub oak (major encroachment), and ten Tucker oaks (ten removals).

The total appraised value for the trees proposed for impacts is $80,300. Table 1 below provides a summary of the tree appraisals. Attachment A provides a photograph of each tree and the detailed tree appraisal calculations.

Table 1
SUMMARY OF TREE APPRAISALS

Tree Number	Species	DBH*	Appraised Value
1	Tucker oak	1.9	$2,300
2	Tucker oak	2.4	$2,500
3	coast live oak	4.1	$3,100
4	Tucker oak	4.8*	$3,700
5	Tucker oak	6.0*	$5,200
6	Tucker oak	6.5*	$3,700
7	Tucker oak	11.3*	$7,000
8	Tucker oak	3.6*	$2,100
9	Tucker oak	6.4	$3,100
10	blue oak	29.4*	$40,700
11	Tucker oak	2.9	$2,200
12	scrub oak	3.2	$2,300
26	Tucker oak	2.1	$2,400
TOTAL APPRAISED VALUE			**$80,300**

Source: HELIX (2021)
*Indicates a tree with multiple trunks at DBH where the aggregate diameter was calculated

Should you have any questions or require additional information, please do not hesitate to contact me at (949) 234-1515 or DanielT@helixepi.com.

Daniel Torres
ISA Certified Arborist (WE-12249A)

Attachments:

Attachment A: Appraised Values and Photographs

REFERENCES

Council of Tree and Landscape Appraisers (CTLA). 2019. *Guide for Plant Appraisal, 10th Edition.*

Attachment A

Tree Appraisals and Photographs

Tree #1 – Tucker oak (*Quercus john-tuckeri*)

Tree #1 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #1

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)		1.9
Cross-sectional Area (square inches)		2.8
Condition Rating		70%
Health	Health appears normal for this species	80%
Structure	There is a deep v-crotch at 7" above grade	55%
Form	The canopy in not symmetric due to shading by adjacent tree	75%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 404.32
Depreciated Functional Replacement Cost		$ 283.02

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 2,283.02
Rounded Estimate	**$ 2,300.00**

Tree #2 – Tucker oak (*Quercus john-tuckeri*)

Tree #2 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #2

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)		2.4
Cross-sectional Area (square inches)		4.5
Condition Rating		75%
Health	Health appears normal for this species	80%
Structure	Structure appears normal for this species	80%
Form	The tree canopy is fairly symmetric; however, the trunk has a lean	75%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 645.12
Depreciated Functional Replacement Cost		$ 483.84

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 2,483.84
Rounded Estimate	**$ 2,500.00**

Tree #3 – coast live oak (*Quercus agrifolia*)

Tree #3 – coast live oak (*Quercus agrifolia*)

Subject Tree Tree #3

Species	*Quercus agrifolia*	
Trunk diameter, inches (inches)		4.1
Cross-sectional Area (square inches)		13.2
Condition Rating		65%
Health	Tree health appears good	75%
Structure	Structure appears normal for this species	85%
Form	Canopy is not symmetric due to shading by adjacent tree, trunk is leaning	65%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus agrifolia*	
Size (trunk diameter, inches, inches)	36" box	3
Cross-sectional Area (square inches)		7.1
Cost		$ 870

Calculations

Unit Tree Cost ($/sq.in.)		$ 123.08
Basic Replacement Cost		$ 1,624.97
Depreciated Functional Replacement Cost		$ 1,056.23

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 3,056.23
Rounded Estimate	**$ 3,100.00**

Tree #4 – Tucker oak (*Quercus john-tuckeri*)

Tree #4 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #4

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)	3.2, 2.9, 2.2	4.8
Cross-sectional Area (square inches)		18.1
Condition Rating		65%
Health	Tree health appears fair, significant amounts of epicormic sprouting	70%
Structure	Structure appears normal for this species	80%
Form	Canopy is not symmetric; tree has been topped	65%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 2,580.48
Depreciated Functional Replacement Cost		$ 1,677.31

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 3,677.31
Rounded Estimate	**$ 3,700.00**

Tree #5 – Tucker oak (*Quercus john-tuckeri*)

Tree #5 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree	Tree #5	
Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)	3.7, 3.8, 2.7	6.0
Cross-sectional Area (square inches)		28.3
Condition Rating		78%
Health	Health appears normal for this species	80%
Structure	Structure appears normal for this species	80%
Form	The tree canopy is fairly symmetric; however, the trunk has a lean due to shading by adjacent tree, some branches were pruned in the past	75%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 4,032.00
Depreciated Functional Replacement Cost		$ 3,158.40

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 5,158.40
Rounded Estimate	**$ 5,200.00**

Tree #6 – Tucker oak (*Quercus john-tuckeri*)

Tree #6 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #6

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)	2.9, 4.1, 4.1	6.5
Cross-sectional Area (square inches)		33.2
Condition Rating		35%
Health	Tree is in decline	35%
Structure	There was a large branch failure at the v-crotch	35%
Form	Tree canopy is not symmetric due to shading by adjacent tree	35%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 4,732.00
Depreciated Functional Replacement Cost		$ 1,656.20

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 3,656.20
Rounded Estimate	**$ 3,700.00**

Tree #7 – Tucker oak (*Quercus john-tuckeri*)

Tree #7 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #7

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)	5.7, 6.1, 7.6	11.3
Cross-sectional Area (square inches)		100.3
Condition Rating		35%
Health	Tree is in decline	35%
Structure	There was a large branch failure at the v-crotch	35%
Form	Tree canopy is not symmetric	35%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 14,301.28
Depreciated Functional Replacement Cost		$ 5,005.45

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 7,005.45
Rounded Estimate	**$ 7,000.00**

Tree #8 – Tucker oak (*Quercus john-tuckeri*)

Tree #8 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #8

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)	3.1, 1.9	3.6
Cross-sectional Area (square inches)		10.2
Condition Rating		10%
Health	Tree is almost dead; canopy is extremely sparse	10%
Structure	Tree has a severe lean to the south	20%
Form	Tree has very poor form- strong lean	20%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 1,451.52
Depreciated Functional Replacement Cost		$ 145.15

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 2,145.15
Rounded Estimate	**$ 2,100.00**

Tree #9 – Tucker oak (*Quercus john-tuckeri*)

Tree #9 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #9

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)		6.4
Cross-sectional Area (square inches)		32.2
Condition Rating		25%
Health	Tree appears to be in decline, exhibiting internal decay throughout	20%
Structure	Large split in main trunk	20%
Form	Form is fair	45%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 4,587.52
Depreciated Functional Replacement Cost		$ 1,146.88

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 3,146.88
Rounded Estimate	**$ 3,100.00**

Tree #10 – blue oak (*Quercus douglasii*)

Tree #10 – blue oak (*Quercus douglasii*)

Subject Tree Tree #10

Species	*Quercus douglasii*	
Trunk diameter, inches (inches)	27.1, 11.5	29.4
Cross-sectional Area (square inches)		678.9
Condition Rating		40%
Health	Tree appears to be in decline	40%
Structure	Main trunk has split, trunks are widely divergent	60%
Form	Canopy is not symmetric	60%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 96,808.32
Depreciated Functional Replacement Cost		$ 38,723.33

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 40,723.33
Rounded Estimate	**$ 40,700.00**

Tree #11 – Tucker oak (*Quercus john-tuckeri*)

Tree #11 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #11

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)		2.9
Cross-sectional Area (square inches)		6.6
Condition Rating		25%
Health	Tree appears to be in decline, canopy is extremely sparse	20%
Structure	Structure appears normal	80%
Form	Form is fair	45%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 941.92
Depreciated Functional Replacement Cost		$ 235.48

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 2,235.48
Rounded Estimate	**$ 2,200.00**

Tree #12 – scrub oak (*Quercus berberidifolia*)

Tree #12 – scrub oak (*Quercus berberidifolia*)

Subject Tree Tree #12

Species	*Quercus berberidifolia*	
Trunk diameter, inches (inches)		3.2
Cross-sectional Area (square inches)		8.0
Condition Rating		25%
Health	Tree appears to be in decline, canopy is extremely sparse	20%
Structure	Structure is poor	35%
Form	Form is poor- not symmetrical and trunk is leaning	25%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 1,146.88
Depreciated Functional Replacement Cost		$ 286.72

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 2,286.72
Rounded Estimate	**$ 2,300.00**

Tree #26 – Tucker oak (*Quercus john-tuckeri*)

Tree #26 – Tucker oak (*Quercus john-tuckeri*)

Subject Tree Tree #26

Species	*Quercus john-tuckeri*	
Trunk diameter, inches (inches)		2.1
Cross-sectional Area (square inches)		3.5
Condition Rating		90%
Health	Tree health appears good	90%
Structure	Structure appears normal for this species	90%
Form	Canopy is symmetric	90%
Functional Limitations	None	100%
External Limitations	None	100%

Replacement Tree

Species	*Quercus berberidifolia*	
Size (trunk diameter, inches)	15-gallon	0.75
Cross-sectional Area (square inches)		0.4
Cost		$ 63

Calculations

Unit Tree Cost ($/sq.in.)		$ 142.60
Basic Replacement Cost		$ 493.92
Depreciated Functional Replacement Cost		$ 444.53

Additional Costs

Installation of Replacement Tree	
Maintenance during establishment	
Total Additional Costs	$ 2,000.00

Total Functional Replacement Cost	$ 2,444.53
Rounded Estimate	**$ 2,400.00**

Attachment D

Tree Protection Recommendations

General Construction Site Recommendations

- A minimum 4-foot tall, brightly colored, synthetic fence should be installed around the outermost edge of the protected zone of trees that are designated for retention on-site. Encroachment into the fenced areas should be restricted to the minimum amount feasible and fencing should remain in place until all construction activities have ceased
- The fenced area should be kept clear of building materials, waste, and excess soil.
- No digging, trenching, compaction, or other soil disturbance should be allowed in the fenced area.
- The storage of construction equipment or hazardous materials such as gasoline, oil, or other toxic chemicals should not be allowed in or adjacent to the fenced area.
- Storage areas for equipment, soil, and construction materials as well as burn sites (if permitted), cement washout pits, and construction work zones should be kept away from protected trees and outside the fenced in area.
- Cable, chain, rope or signage should not be attached to retained trees.
- Designated roads and parking areas should be established. All construction personnel should be restricted to driving and parking in designated areas. Discharge of exhaust from construction vehicles and equipment should not be allowed near the protected zone of trees.
- Grade changes should be avoided near fenced areas to the maximum extent possible.

Recommendations for Construction Activities in the Vicinity of Retained Trees

- All necessary clearance pruning should be conducted by a Certified Tree Worker or Certified Arborist.
- Trenching within the dripline of retained trees should be avoided to the maximum extent practicable and kept a minimum distance of 10 times the diameter of the tree away from its trunk. If necessary, this trenching should be conducted using hand excavation or compressed air to reduce impacts to tree roots. Machine trenching should not be allowed within the dripline of retained trees. If pipes must be installed closer to the tree than a distance of 10 times the diameter of the tree away from its trunk, they should be bored beneath the tree a minimum of 3 feet below the ground surface to reduce impacts to roots.
- Excavation should also be minimized within the dripline of retained trees. Construction within the dripline of retained trees should be conducted in a manner that minimizes excavation and provides for the best preservation of roots as determined by the Project Arborist.
- If tree roots are severed outside of the fenced area, they should be severed cleanly and kept moist. All exposed roots outside of fenced areas should be covered with protective material during construction such as mulch or plywood sheets to reduce soil

compaction. Protective material should be removed upon completion of construction activities.

- Trenching and excavation should be avoided during hot, dry, weather and trees shall be watered before, during, and after trenching and excavation within the dripline of retained trees to offset water loss due to cut roots.
- Grading within the driplines of retained trees should be avoided wherever feasible.
- To prevent soil compaction, several inches of wood chips should be spread in the root zone area and covered with steel plates.

Recommendations for Protection of Trees Post-Construction

- Post-construction inspections of the trees should be conducted by a Certified Arborist or Certified Tree Worker to determine if retained trees are stressed (e.g., water stress, nutrient stress) or damaged (e.g., broken branches, trunk damage). Appropriate corrective actions should be implemented as necessary. Such corrective actions may include application of root stimulant to encourage new root growth in trees that have a significant portion of their roots lost due to cutting or soil compaction.
- Aeration of soil by vertical mulching or similar technique should be implemented around retained trees to offset the impacts of soil compaction that has already occurred due to construction activities and other site uses.
- Long term maintenance should also be conducted by a Certified Arborist or tree care specialist to assist the trees with recovering from construction related stress and may include watering, fertilization, pruning, and/or pest/disease control.

"Donut Hole" Parcel Addendum

Memorandum

HELIX Environmental Planning, Inc.
16485 Laguna Canyon Road, Suite 150
Irvine, CA 92618
949.234.8770 **tel**
619.462.0552 **fax**
www.**helixepi**.com

Date: October 27, 2021

To: Mr. Peter Vanek
Integral Communities
888 San Clemente Drive
Newport Beach, CA 92660

From: Daniel Torres, HELIX Environmental Planning, Inc.

Subject: Oak Tree Survey Addendum, Additional Survey Area

HELIX Project: 00357.00025.001

Message:

The oak tree survey report[1] and tree appraisal addendum[2] were both dated August 16, 2021. Since submittal of these reports, an additional property along Bouquet Canyon Road was added to the project site (Additional Survey Area; see Figure 5, *Impacts to Oak Trees*). The additional survey area was analyzed as part of the Project's EIR. However, this property was not owned by the project proponent during the time of the oak tree survey, and therefore, an oak tree survey was not performed within this area.

On October 19, 2021, HELIX International Society of Arboriculture (ISA) Certified Arborist Daniel Torres (WE-12249) performed an oak tree survey within the additional survey area. The purpose of the survey was to document the presence of (1) oak trees with at least one trunk over 6 inches in circumference at a point 4.5 feet above natural grade, and (2) Heritage Oak Trees within the additional survey area.

No oak trees, including Heritage trees, were found within the additional survey area.

If you have any questions regarding the information presented in this memorandum, please contact me at DanielT@helixepi.com or at (949) 234-8770.

Enclosures:
Figure 5: Impacts to Oak Trees

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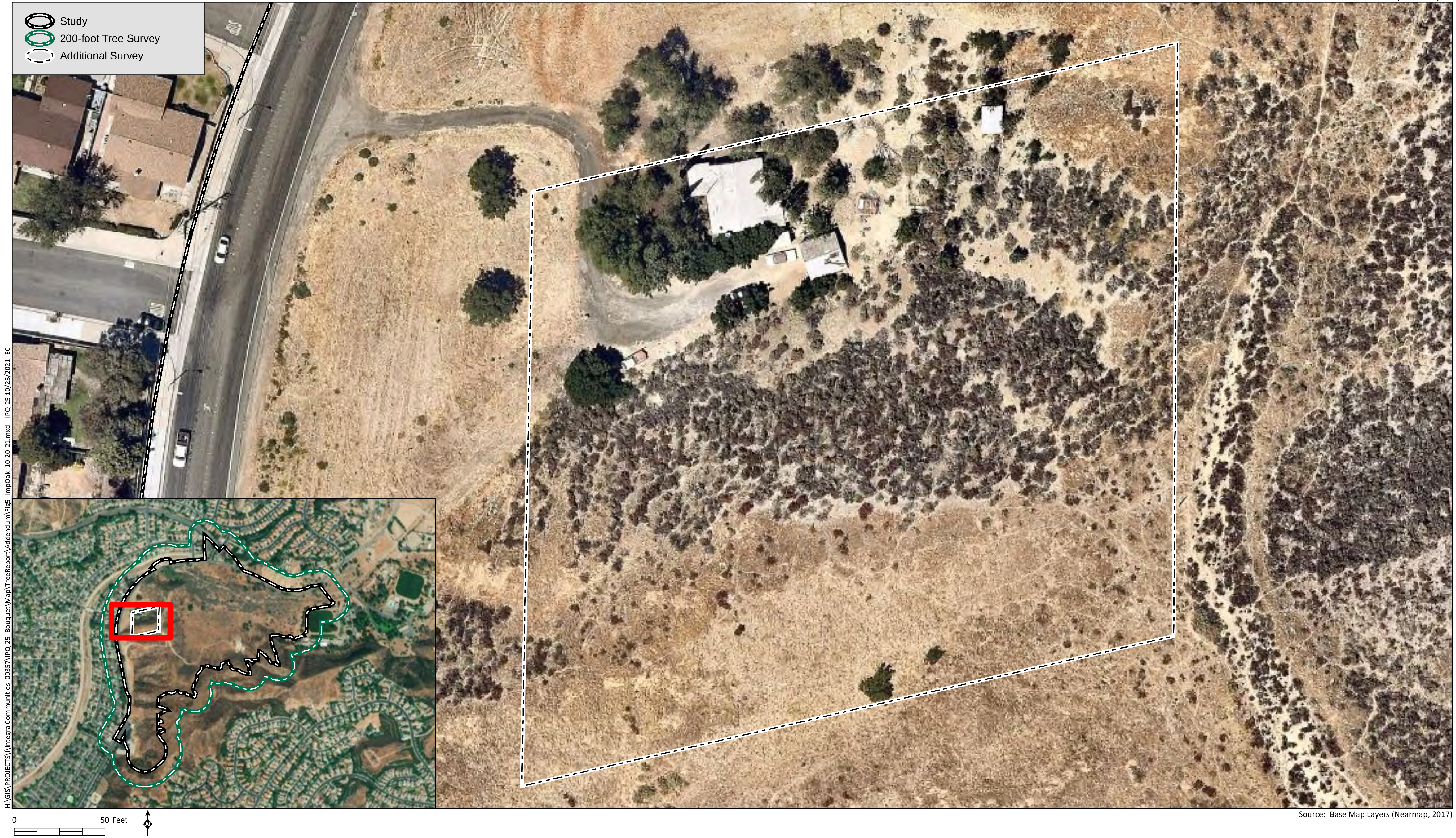
[1] HELIX Environmental Planning. 2021. Oak Tree Survey Report for the Bouquet Canyon Road Project. August.
[2] HELIX Environmental Planning. 2021. Addendum to the Oak Tree Survey Report for the Bouquet Canyon Road Project. August.

Bouquet Canyon



Source: Base Map Layers (Nearmap, 2017)

HELIX
Environmental Planning

Impacts to Oak Trees

Figure 5

Attachment B

Davenport Oak Tree Survey Report

Carlberg ASSOCIATES

Horticulturists and
Registered Consulting
ARBORISTS

August 15, 2021

Peter Vanek
Vice President of Forward Planning
Integral Communities
888 San Clemente, Suite 100
Newport Beach, California 92660

Re: Oak Tree Health Assessment
Davenport Trailhead Site – 28601 and 28635 Bouquet Canyon Road, Santa Clarita, California

Dear Mr. Vanek,

This letter is presented in response to your request for arboricultural consulting services. You requested a health assessment of 20 oak trees located on and immediately adjacent to 28601 and 28635 Bouquet Canyon Road, Santa Clarita, California. These properties are held by Integral Communities and are the proposed site of the project known as the 'Davenport Trailhead'.

On August 12, 2021, I conducted a site visit to perform a health evaluation of the 20 oak trees identified in the enclosed tree location exhibit (by Helix Environmental Planning) provided to us by you. The trees were assessed for health and structural integrity, and photographs were recorded to support my opinions. No other information was gathered or recorded regarding mapped tree trunk and canopy locations, genera or species identification, impact analysis, etc. I used Helix's exhibit to locate the trees and to fill in the tree number and species listings in the enclosed table.

Table 1 on page 5 summarizes my opinions on the trees' health ratings. Based on the health and structure rating, each tree was assigned an overall grade. In our opinion, both health and structure must be addressed when evaluating the condition of a tree. Definitions for the grading structure are enclosed before the table. Enclosed exhibits and representative photographs illustrate the setting, the oak trees, and their condition at the time of the site visit. Additional photographs are available upon request.

With the exception of one tree, Tree #84, the subject oaks appear to be in fair-to-poor condition. Severe drought stress is evident and most of the trees exhibit sparse foliage, cavities, poor form due to close growing conditions, and two trees were found to have active bee hives.

Please feel free to call or email me with any questions. Thank you.

Very truly yours,

Christie Cuba

Christy Cuba, Senior Arborist
Registered Consulting Arborist, #504
International Society of Arboriculture (ISA) Certified Arborist, #WE1982A
ISA Tree Risk Qualified

CHRISTINE M. CUBA
asca
AMERICAN SOCIETY of CONSULTING ARBORISTS
Registered Consulting Arborist #502

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HEALTH AND STRUCTURE GRADE DEFINITIONS

Health and structure ratings are based on an archetypal tree of the same species, determined by a subjective evaluation of physiological health, aesthetic quality, and structural integrity. Overall physiological condition (health) and structural condition are rated A-D and F:

Health

A) **Outstanding** – Exceptional trees comprising above-average foliage production and vigor for their age class; exhibiting very good to excellent health as evidenced by normal to exceptional shoot growth during the current growing season, good bud development and leaf color, lack of leaf, twig or branch dieback throughout the crown, and the absence of decay, bleeding, or cankers. Common leaf and/or twig pests may be noted at very minor levels.

B) **Above average** – Good to very good trees that exhibit minor necrotic (dead) or physiological symptoms of stress and/or disease; shoot growth is less than reasonably expected, leaf color is less than optimal in some areas, the crown may be thinning, minor levels of leaf, twig, and branch dieback may be present, and minor areas of decay, bleeding, or cankers may be manifesting. Minor amounts of epicormic growth may be present. Minor amounts of fire damage or mechanical damage may be present. Still healthy, but with moderately diminished vigor and vitality. No significant decline noted.

C) **Average** – Average, moderately good trees whose growth habit and physiological or fire-induced symptoms indicate an equal chance to either decline or continue with good health into the near future. Most of these trees exhibit moderate to significant small dead material in outer crown areas, decreased shoot growth, and diminished leaf color and mass. Some stem and branch dieback is usually present and epicormic growth may be moderate to extensive. Cavities, pockets of decay, relatively significant fire damage, bark exfoliation, or cracks may be present. Moderate to significant amounts of insect or disease symptoms may be present; the tree may be shaded or crowded in such a way that it is expected to negatively impact the lifespan of the tree. Tree may be in early decline.

D) **Below Average/Poor** – trees whose growth habit and physiological or fire-induced symptoms indicate significant, irreversible decline. Most of these trees exhibit significant dieback of wood in the crown, possibly accompanied by significant epicormic sprouting. Shoot growth and leaf color and mass is either significantly diminished or nonexistent throughout the crown. Cavities, pockets of decay, significant fire damage, bark exfoliation, and/or cracks may be present. Significant amounts of insect or disease symptoms may be present; the tree may be shaded or crowded in such a way that it has negatively impacted the lifespan of the tree. Tree appears to be in irreversible decline.

F) **Dead or in spiral of decline** – this tree exhibits very little to no signs of life.

Structure

A) **Outstanding** – Trees with outstanding structure for their species exhibit trunk and branch arrangement and orientation that results in a sturdy form or architecture that can resist failure under normal circumstances. The spacing, orientation, and size of the branches relative to the trunk are quintessential for the species and free from defects. No outward signs of decay or pathological disease is present. Some trees exhibit naturally inherent branching defects, like multiple, narrow points of attachment from one point on the trunk, which would preclude them from achieving an “A” grade.

B) **Above average** - Trees with good to very good structure for their species. They exhibit trunk and branch arrangement and orientation that result in a relatively sturdy form or architecture that resists failure under normal circumstances, but may have some mechanical damage, over-pruning, or other minor structural defects. The spacing, orientation, and size of the branches relative to the trunk are still in the normal range for the species, but they exhibit a minor degree of defects. Minor, sub-critical levels of decay or pathological disease may be present, but the degree of damage is not yet structurally significant. Trees that exhibit naturally inherent branching defects, like multiple, narrow points of attachment from one point on the trunk, would generally fall in to this category. A small percentage of the canopy may be shaded or crowded, but not in such a way that it is expected to negatively impact the structural integrity or lifespan of the tree.

C) **Average** - Trees with moderately good structure for their species, but with obvious defects. They exhibit trunk and branch arrangement and orientation that result in a less than sturdy form or architecture, which reduces their resistance to failure under normal circumstances. Moderate levels of mechanical damage, over-pruning, or other structural defects may be present. The spacing, orientation, and size of some of the branches relative to the trunk are not in the normal range for the species. Moderate to significant levels of decay or pathological disease may be present that increase the likelihood of structural instability. Influences such as an excessive trunk lean, slope erosion, root pruning, or other growth-inhibiting factors may be present. A moderate to significant percentage of the canopy may be shaded or crowded in such a way that it is expected to negatively impact the structural integrity or lifespan of the tree. Risk of full or partial failure in the near future appears to be moderately elevated.

D) **Well Below Average/Poor** - Trees with poor structure for their species and with obvious defects. They exhibit trunk and branch arrangement and orientation that result in a significantly less than sturdy form or architecture, significantly reducing their resistance to failure under normal circumstances. Significant levels of mechanical damage, over-pruning, or other structural defects may be present. The spacing, orientation, and size of many of the branches relative to the trunk are not in the normal range for the species. Significant levels of decay or pathological disease may be present that increase the likelihood of structural instability. Influences such as an excessive trunk lean, slope erosion, root pruning, or other growth-inhibiting factors may be present. A significant percentage of the canopy may be shaded or crowded in such a way that it is expected to negatively impact the structural integrity or lifespan of the tree. Risk of full or partial failure in the near future appears to be advanced.

F) **Severely Compromised** – trees with very poor structure and numerous or severe defects due to growing conditions, historical or recent pruning, mechanical damage, history of limb or trunk failures, advanced and irreparable decay, disease, or severe fire damage. Trees with this rating are in severe, irreparable decline, or are barely alive. Risk of full or partial failures in the near future may be severe.

ARBORIST STATEMENT

Arborists are tree specialists who use their education, knowledge, training and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce the risk of living near trees. Clients may choose to accept or disregard the recommendations of the arborist, or to seek additional advice.

Arborists cannot detect every condition that could possibly lead to the structural failure of a tree. Trees are living organisms that fail in ways we do not fully understand. Conditions are often hidden within trees and below ground. Arborists cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Likewise, remedial treatments, like any medicine, cannot be guaranteed.

Treatment, pruning and removal of trees may involve considerations beyond the scope of the arborist's services, such as property boundaries, property ownership, site lines, disputes between neighbors, and other issues. Arborists cannot take such considerations into account unless complete and accurate information is disclosed to the arborist. An arborist should then be expected to reasonably rely upon the completeness and accuracy of the information provided.

Trees contribute greatly to our enjoyment and appreciation of life. Nonetheless, they are subject to the laws of gravity and physiological decline. Any tree, whether it has visible weaknesses or not, will fail if the forces applied exceed the strength of the tree or its parts. Therefore, neither arborists nor tree owners can be reasonably expected to warrant unfailing predictability or elimination of risk.

Trees can be managed, but they cannot be controlled. To live near trees is to accept some degree of risk. The only way to eliminate all risk associated with trees is to eliminate all trees.

No risk assessments were requested or performed for this project.

Health and structure information presented in this report represents the condition of the tree(s) at the time and date of assessment.

Execution of any/all recommendations for cultural care, maintenance, pest or disease treatment, pruning, tree removal, etc., when made verbally or in writing by the arborist, is/are the sole responsibility of the client.

TABLE 1 – SUMMARY OF OAK TREE HEALTH ASSESSMENT – DAVENPORT TRAILHEAD PROJECT

TREE #	COMMON NAME	BOTANICAL NAME	HEALTH GRADE (A -D, F)	STRUCTURE GRADE (A-D, F)	OVERALL GRADE (A-D, F)
65	Tucker's oak	*Quercus john-tuckeri*	C	C	C
66	Tucker's oak	*Quercus john-tuckeri*	D	C-	D
67	Tucker's oak	*Quercus john-tuckeri*	C	C	C
68	Tucker's oak	*Quercus john-tuckeri*	C-	C	C-
69	Tucker's oak	*Quercus john-tuckeri*	D	C-	D
70	Tucker's oak	*Quercus john-tuckeri*	C	C	C
71	Tucker's oak	*Quercus john-tuckeri*	C	C	C
72	Tucker's oak	*Quercus john-tuckeri*	C	C	C
73	Tucker's oak	*Quercus john-tuckeri*	C	C	C
74	Tucker's oak	*Quercus john-tuckeri*	C	C	C
75	Tucker's oak	*Quercus john-tuckeri*	C	C	C
76	Interior live oak	*Quercus wislizenii* var. *wislizenii*	C	C	C
77	Tucker's oak	*Quercus john-tuckeri*	C	C	C
78	Interior live oak	*Quercus wislizenii* var. *wislizenii*	C	C	C
79	Tucker's oak	*Quercus john-tuckeri*	C	C	C
80	Tucker's oak	*Quercus john-tuckeri*	C	C	C
81	Blue oak	*Quercus douglasii*	C	C	C-
82	Tucker's oak	*Quercus john-tuckeri*	D	C	C-
83	Tucker's oak	*Quercus john-tuckeri*	C-	C	C-
84	Tucker's oak	*Quercus john-tuckeri*	A-	B	B

Notes: Tree numbers and species identification are taken from the enclosed Helix Tree Location exhibit.

Assessed Oak Tree Locations
(Not to Scale)

Facing west – illustrating Tree #84

Facing south – illustrating Trees #79, 80, and 81, from left to right. Tree #79 recently lost a large limb when the adjacent Tree #78 (left and out of photo) suffered two massive limb failures. Tree #81 has cavities and an active bee hive in in the main trunk.

Facing roughly southeast – illustrating Trees #79, 78, 77, 76, 75, 74, and 71, from right to left. Tree #78 (center) recently suffered two massive limb failures. The failed half of Tree #78 is in the foreground.

Facing roughly east – illustrating Trees #65-78 from left to right on the slope.

Facing north – illustrating Trees #78's limb failures. Cavities are present in the trunk and scaffolds, and this tree has an active bee hive in the main trunk.

Facing east – illustrating Tree 65 (center) and a dead portion of the canopy of Tree #68 in the foreground.

Facing roughly east – illustrating Tree #83 on the left and Tree #82 on the right.

Attachment C

Updated Oak Tree Survey Data

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
1	Tucker oak *Quercus john-tuckeri*	6	10	3	1	1	5	6	1	1	3	Deep v-crotch at 7", canopy is N-S oriented, does not extend E-W.	Appears vigorous, some small galls present, some old, healed trunk injuries.	B		Removal
2	Tucker oak *Quercus john-tuckeri*	7.5	9	8	6	3	6	5	6	6	6	Trunk leaning northeast, canopy overall well-distributed.	Galls, insect damage.	B		Removal
3	coast live oak *Quercus agrifolia*	12.75	16	4	3	4	6	7	6	5	6	Tree leaning south.	Has stress-related suckers, sapsucker holes.	B	No tag; off-site.	Removal
4	Tucker oak *Quercus john-tuckeri*	10, 9, 7	9	2	6	3	1	4	3	4	3	Tree has been topped.	All epicormic growth, tree in severe decline.	D	No tag; off-site.	Removal
5	Tucker oak *Quercus john-tuckeri*	11.75, 12, 8.5	15	9	8	6	5	4	4	5	10	Tree leaning north, away from adjacent eucalyptus.	Some galls present, bark damage present (chainsaw cut)-healing.	B	No tag; off-site.	Removal
6	Tucker oak *Quercus john-tuckeri*	9, 13, 13	16	4	6	9	15	10	5	5	2	Large failure at v-crotch with decay (old main stem), exposed roots.	Declining, significant amount of epicormic sprouting.	D		Removal
7	Tucker oak *Quercus john-tuckeri*	18, 19, 24	22	10	10	10	8	15	10	10	9	Exposed roots, wide angle crotch at base.	Declining, epicormic sprouting, canopy dieback.	D		Removal

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
8	Tucker oak *Quercus john-tuckeri*	9.75, 6	5	2	8	2	2	5	10	2	4	Severe lean to south, on steep slope.	Tree is being shaded, very sparse canopy, canopy dieback.	D	Stump shoots from old dead tree.	Removal
9	Tucker oak *Quercus john-tuckeri*	20	15	6	3	12	12	5	5	2	7	Exposed roots, on steep slope.	Large split with internal decay in trunk, internal decay throughout.	D		Removal
10	blue oak *Quercus douglasii*	85, 36	45	10	15	15	20	20	25	10	10	Main trunk split long ago, large trunk leaning north, southern-most trunk with severe lean south, on steep slope.	Lots of mistletoe, canopy very sparse.	D		Removal
11	Tucker oak *Quercus john-tuckeri*	9	16	5	3	3	4	2	6	2	2	On steep slope.	Most of canopy is dead, mistletoe present, epicormic sprouting.	D	Tree is almost completely dead.	Removal
12	scrub oak *Quercus berberidifolia*	10	15	2	8	8	8	2	2	2	2	Trunk leaning to north, multi-stem, one stem is dead, on steep slope.	Epicormic growth, very sparse canopy.	D		Major Encroachment

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
13	scrub oak *Quercus berberidifolia*	12, 9.5, 10, 10	15	5	6	8	8	9	5	2	2	One dead stem, on steep slope.	Epicormic sprouting, severe decline, some galls present.	D		Minor Encroachment
14	scrub oak *Quercus berberidifolia*	22.5. 22, 17, 10, 7.5	20	12	12	12	5	12	10	10	12	Some stems have internal decay, on steep slope.	Epicormic sprouting, mistletoe present, tree in decline.	D		Avoided
15	scrub oak *Quercus berberidifolia*	7.5. 7.5, 8, 5.5	14	5	3	8	6	8	5	5	9	Good balance, on steep slope.	Some mistletoe present, significant amount of epicormic sprouting, some canopy dieback.	C		Avoided
16	Tucker oak *Quercus john-tuckeri*	9.5	10	1	1	1	10	10	10	2	1	Most of canopy is in the south, shaded in the north, on steep slope.	Some dieback present, significant amount of epicormic sprouting.	C		Avoided
17	Tucker oak *Quercus john-tuckeri*	5.5, 6.5, 7, 9	12	7	3	3	4	8	8	8	8	Some included bark at v-crotch about 5” above ground, tree on steep slope.	Small amounts of dieback and epicormic sprouting present.	B		Avoided

Tree Tag No.	Species	Circumference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
18	blue oak *Quercus douglasii*	40.5, 24, 47, 52.5, 48	35	30	25	25	28	27	30	25	25	Large multi-stem tree with big split and decay, all stems leaning towards the south, tree on steep slope.	Tree is experiencing some dieback, epicormic sprouting, sap sucker and borer holes present.	C	Tree tagged 61 in old survey, probably burned.	Avoided
19	Tucker oak *Quercus john-tuckeri*	22, 16.5, 17, 13, 10, 11	30	18	15	10	15	15	22	15	15	Included bark in all crotches, tree on a steep slope.	Appears vigorous, some cankers, canopy is somewhat sparse.	B		Avoided
20	Tucker oak *Quercus john-tuckeri*	17.5, 17, 14, 14	15	10	10	10	7	8	8	15	10	Tree on steep slope, nexus of stems is 1' above ground.	Some canopy dieback present.	B		Avoided
21	Tucker oak *Quercus john-tuckeri*	21, 25, 20.5, 9	20	20	20	10	20	18	10	15	20	Multiple trunks all leaning in different directions, tree on a steep slope.	Most of canopy is epicormic sprouting, borer and sapsucker holes are present.	C		Avoided
22	Tucker oak *Quercus john-tuckeri*	15, 19, 18.5, 19, 20	25	20	3	2	1	1	20	20	20	Tree is on a steep slope, included bark present.	Tree appears healthy but is being shaded, canopy is somewhat sparse, significant dieback is present.	C		Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
23	Tucker oak *Quercus john-tuckeri*	44.5	35	20	20	5	1	1	10	18	20	Strong lean to the north.	Significant amount of dieback in the lower canopy.	B		Avoided
24	Tucker oak *Quercus john-tuckeri*	18, 12.5, 42, 22.5	30	18	12	9	9	15	15	15	15	V-crotch with included bark at 7”, 1.5’, and 2’ above ground.	Some galls are present.	B	Tree tagged 60 in old survey.	Avoided
25	Tucker oak *Quercus john-tuckeri*	9, 9, 10, 6	9	8	8	8	5	2	6	8	8	Tree is on a steep slope.	Some epicormic sprouting is present, fairly even canopy.	B		Avoided
26	Tucker oak *Quercus john-tuckeri*	6.5	10	8	8	8	8	8	8	8	8	Even canopy spread, tree growing in the open.	Some galls are present, canopy is dense and healthy.	A	Shrub form, more than 25 stems, all 1-3 inches in circumference.	Removal
27	Tucker oak *Quercus john-tuckeri*	6	9	6	4	4	4	6	6	4	5	Structurally good, open, even canopy.	Significant amount of epicormic growth, most leaves are affected by aphids.	D	Some mechanical damage on the east side of the trunk.	Minor Encroachment
28	Tucker oak *Quercus john-tuckeri*	6.5	8	8	8	8	8	8	8	8	8	Tree is on a steep slope.	Some galls are present.	B	No tag; off-site.	Avoided
29	Tucker oak *Quercus john-tuckeri*	10, 6, 6.5, 5.5, 11	9	10	4	9	7	4	5	6	7		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided
30	Tucker oak *Quercus john-tuckeri*	9, 11	12	7	5	6	5	5	6	6	6		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
31	Tucker oak *Quercus john-tuckeri*	6.5, 8, 6.5	8	7	6	4	3	4	4	7	6		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided
32	Tucker oak *Quercus john-tuckeri*	6	9	7	5	6	5	5	5	6	6		Dense canopy, tree appears vigorous.	A	No tag; off-site.	Avoided
33	Tucker oak *Quercus john-tuckeri*	12, 9.5, 14.5	13	14	5	7	1	1	4	12	10	Strong lean downhill.	Tree is vigorous, some minor boring insect damage, significant amount of stress-related sprouting at base.	C	No tag; off-site.	Avoided
34	Tucker oak *Quercus john-tuckeri*	14.5, 11	14	4	5	3	9	7	10	13	3	Good structure.	Tree appears vigorous, lots of stress-related sprouting at base, epicormic sprouting present.	C	No tag; off-site.	Avoided
35	Tucker oak *Quercus john-tuckeri*	8, 13, 16, 9.5	15	10	10	7	5	3	9	4	7	Internal decay present in one main trunk.	Significant amount of stress-related sprouting at base.	C	No tag; off-site.	Avoided
36	Tucker oak *Quercus john-tuckeri*	6	12	5	6	6	4	5	5	5	4		Significant amount of epicormic sprouting, some galls present.	C	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
37	Tucker oak *Quercus john-tuckeri*	8	12	5	5	5	5	4	3	3	5		Significant amount of epicormic sprouting, some galls present.	C	No tag; off-site.	Avoided
38	Tucker oak *Quercus john-tuckeri*	9.5, 10, 8.5	12	12	10	5	10	10	6	5	2	Lean is causing bark to split.	Some internal decay and stress-related sprouting at the base is present.	C	No tag; off-site.	Avoided
39	Tucker oak *Quercus john-tuckeri*	7	10	4	3	3	3	4	4	5	5		Stress-related sprouting at the base and epicormic sprouting is present.	C	No tag; off-site.	Avoided
40	Tucker oak *Quercus john-tuckeri*	6, 5	12	5	4	7	8	8	6	7	5		Some galls are present, tree is in good health overall.	B	No tag; off-site.	Avoided
41	Tucker oak *Quercus john-tuckeri*	8, 6	15	7	6	5	3	10	10	3	3	Bark has a healing fissure down the middle of the trunk.	Some epicormic sprouting is present.	B	No tag; off-site.	Avoided
42	Tucker oak *Quercus john-tuckeri*	6.5, 6	12	8	8	2	2	8	7	7	7	Several branches are rubbing against each other.	Some galls are present.	B	No tag; off-site.	Avoided
43	Tucker oak *Quercus john-tuckeri*	6, 4	12	5	5	3	4	4	6	7	7		Some epicormic sprouting is present.	B	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
44	Tucker oak *Quercus john-tuckeri*	6, 6	12	7	8	9	5	3	3	7	7		Some canopy dieback is present.	C	No tag; off-site.	Avoided
45	Tucker oak *Quercus john-tuckeri*	7, 6, 6, 6, 5	13	8	8	6	6	9	10	9	9	Tree is in shrub form, several widely-spaced branches.	Some epicormic sprouting and galls are present.	B	No tag; off-site.	Avoided
46	Tucker oak *Quercus john-tuckeri*	6, 6, 6, 6, 8, 8.5	9	7	7	7	7	7	7	7	7	Tree is in shrub form, several widely-spaced branches.	Some epicormic sprouting is present, tree exhibiting vigorous growth.	B	No tag; off-site.	Avoided
47	Tucker oak *Quercus john-tuckeri*	6.5, 4	9	9	8	7	4	4	5	7	9	Tree is leaning downslope causing fissures in some stems.	Main stem has a large fissure with internal decay.	C	No tag; off-site.	Avoided
48	Tucker oak *Quercus john-tuckeri*	6, 5, 5	9	7	9	6	3	3	8	9	8	Some healing cracks are present at the base of main stems.	Some galls are present, some canopy dieback.	B	No tag; off-site.	Avoided
49	Tucker oak *Quercus john-tuckeri*	10, 6.5, 9.5	13	11	11	5	5	5	2	5	10	Good structure.	Some dieback and significant amounts of epicormic sprouting are present.	C	No tag; off-site.	Avoided
50	Tucker oak *Quercus john-tuckeri*	9, 7, 6, 6	13	2	8	8	7	7	7	2	2	Good structure.	Significant amount of epicormic sprouting is present.	C	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
51	Tucker oak *Quercus john-tuckeri*	15, 16, 16, 17	18	12	14	15	10	5	9	14	14	V-crotches are 1’ above ground, some chainsaw wounds are present.	Significant amount of epicormic sprouting is present.	C	No tag; off-site.	Avoided
52	Tucker oak *Quercus john-tuckeri*	16.5, 10, 9.5, 17, 6, 9, 8.5	17	10	9	9	5	3	4	10	11	Many stems, but good structure.	Significant amount of epicormic sprouting and some canopy dieback are present.	C		Avoided
53	Tucker oak *Quercus john-tuckeri*	13	19	5	8	6	3	2	2	5	5	V-crotch at 6” and 4’ above ground, tree has a slight lean.	Most of canopy is epicormic sprouting.	C	No tag; off-site.	Avoided
54	Tucker oak *Quercus john-tuckeri*	10, 8, 10	17	11	11	5	5	3	3	5	5		Most of canopy is epicormic sprouting, significant canopy dieback is present.	C	No tag; off-site.	Avoided
55	Tucker oak *Quercus john-tuckeri*	12	17	11	9	9	1	1	6	8	9	Tree is leaning northeast.	Borer holes and internal decay are present.	C	No tag; off-site.	Avoided
56	Tucker oak *Quercus john-tuckeri*	12, 11, 7, 7, 8, 10.5	15	8	8	6	8	9	10	9	7		Borer holes, some epicormic sprouting, internal decay, and canopy dieback are present.	C	No tag; off-site.	Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
57	scrub oak *Quercus berberidifolia*	9.5, 9.5, 7, 10, 8, 6.5, 6	12	9	10	10	7	5	9	9	9	Tree is in shrub form, mostly shaded by surrounding trees.	Some galls and epicormic sprouting are present.	B	No tag; off-site.	Avoided
58	scrub oak *Quercus berberidifolia*	7, 6	11	5	1	3	8	8	8	8	3	Tree is in shrub form.	Canopy is dying back, significant amount of epicormic sprouting is present.	C	No tag; off-site.	Avoided
59	Tucker oak *Quercus john-tuckeri*	8, 8, 8, 8, 8, 12.5	11	6	6	8	5	5	5	7	7	Tree is in shrub form.	A healing fissure and internal decay are present in one of the main stems.	C	No tag; off-site.	Avoided
60	Tucker oak *Quercus john-tuckeri*	6, 6, 6, 9, 4	8	6	6	8	5	7	9	9	9	Stems are all widely-spaced, spread out, tree is in shrubby form.	Some canopy dieback is present.	B	No tag; off-site, there is a packrat midden in the middle of the trunks.	Avoided
61	Tucker oak *Quercus john-tuckeri*	6, 6, 4, 5, 8, 6, 4, 4	9	8	6	6	6	6	7	9	8	Tree is in shrub form, stems are spread out.	Some canopy dieback, epicormic sprouting, and galls are present.	B		Avoided
62	Tucker oak *Quercus john-tuckeri*	9, 7.5, 5.5, 6.5, 5.5, 8.5, 8, 6.5, 4, 5, 6	9	11	6	5	6	6	7	8	5		Cankers, galls, epicormic sprouting, and canopy dieback are present.	C		Avoided

Tree Tag No.	Species	Circum-ference (in)	Height (ft)	Canopy Extent (feet)								Physical Evaluation	Horticultural Evaluation	Oak Tree Rating	Comments	Proposed Impacts
				N	NE	E	SE	S	SW	W	NW					
63	valley oak *Quercus lobata*	12, 22	20	5	7	7	7	7	7	7	7	V-crotch at 1.5’ and 5’ with included bark, tree is growing straight.	Vigorous growth, healthy specimen, no obvious signs of disease.	A	Circumference and canopy were estimated- tree is on private property.	Avoided
64	Tucker oak *Quercus john-tuckeri*	17, 32.5	19	10	10	10	10	10	8	8	10	Included bark, exposed roots, tree is growing on a steep slope.	Vigorous growth, some canopy dieback is present.	B		Avoided

Appendix B

Addendum to the Cultural Resources Survey and Assessment

Bouquet Canyon Road Project

Addendum to the Cultural Resources Survey and Assessment

February 2022 | 00357.00025.001

Prepared for:

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National Archaeological Database Information

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Firm:	HELIX Environmental Planning, Inc.
Client/Project:	Integral Communities / Bouquet Canyon Road Project
Report Date:	February 2022
Report Title:	Addendum to the Cultural Resources Inventory and Assessment for the Bouquet Canyon Road Project, Los Angeles County, California
Type of Study:	Cultural Resources Survey and Assessment
New Sites:	28601 Bouquet Canyon Road
Updated Sites:	None
USGS Quad:	Mint Canyon 7.5-minute Quadrangle
Acreage:	Approximately 7.5 acres
Key Words:	Los Angeles County; Township 4 North, Range 15 West; Santa Clarita; Bouquet Canyon; Bouquet Canyon Road; Copper Hill Road; Davenport

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ACRONYMS AND ABBREVIATIONS

APN	Assessor's Parcel Number
BLM	Bureau of Land Management
CEQA	California Environmental Quality Act
CHRIS	California Historical Resources Information System
CRHR	California Register of Historical Resources
EIR	Environmental Impact Report
GLO	General Land Office
HELIX	HELIX Environmental Planning, Inc.
NAHC	Native American Heritage Commission
NRHP	National Register of Historic Places
OHP	Office of Historic Preservation
SCCIC	South Central Coastal Information Center
SCH	State Clearinghouse
USGS	U.S. Geological Survey

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EXECUTIVE SUMMARY

HELIX Environmental Planning, Inc. (HELIX) was originally contracted by Integral Communities to provide cultural resources services for the Bouquet Canyon Road Project (project) in Los Angeles County, California. Results of the cultural resource survey conducted in 2018 for the project were presented in a Cultural Resources Inventory and Assessment Report (Wilson and Wright 2019) and included in the Final Environmental Impact Report (EIR) for the project, dated November 2020 (Michael Baker International 2020). Several design changes have been proposed following the certification of the Final EIR, resulting in revised project areas totaling 7.5 acres. This cultural resources survey addendum includes a summary of the results of additional historic research and a pedestrian survey undertaken for the revised project areas outside of the original 2019 study area.

The results of the cultural resources survey presented in the 2019 Cultural Resources Report (Wilson and Wright 2019) included the identification of four historic-period cultural resources: P-19-004853, P-19-004854 (CA-LAN-4854), P-19-192514, and P-19-004855. One of these resources, P-19-192514, is a residential structure constructed in the mid-twentieth century situated within Assessor's Parcel Number (APN) 2812-008-002, the residential addition ("donut hole" parcel) included in the revised project area. Resource P-19-192514 was assessed for significance in the 2019 Cultural Resources Report and it was concluded that the resource does not meet the criteria for inclusion in the California Register of Historical Resources (CRHR) or the National Register of Historic Places (NRHP).

The field investigations included an intensive pedestrian survey of the additional areas outside of the original 2019 study area on December 12 and 14, 2021. A single resource was identified during archival research: a single-family home located at 28601 Bouquet Canyon Road. This residence has had multiple modern additions to the main residential structure, and the buildings have undergone extensive changes, including new roofing, stucco siding, along with new windows and doors. As such, the structures do not retain enough of their historic character or appearance to be recognizable as a historical resource, and as such, the resource is not considered a significant historical resource for the purposes of the California Environmental Quality Act (CEQA).

Based on the results of the current study, no significant historical resources will be impacted by the revised project and the results of this addendum demonstrate that the revised project remains consistent with the findings documented in the "Cultural Resources" section of the Final EIR.

Per mitigation measure 3.4-1 within the project's Mitigation Monitoring and Reporting Program, contained within the final EIR, an archaeological and Native American monitoring program will be implemented, during which an archaeologist and Native American monitor shall be present to monitor initial ground disturbance for the project for all ground-disturbing activities within young (Holocene) alluvial deposits (Michael Baker International 2020).

Should the project limits change to incorporate new areas of proposed disturbance, a cultural resources survey of these areas will be required.

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1.0 INTRODUCTION

HELIX Environmental Planning, Inc. (HELIX) prepared this addendum to the Cultural Resources Inventory and Assessment Report (Wilson and Wright 2019) for the Bouquet Canyon Road Project (project). The Bouquet Canyon Project Final Environmental Impact Report (EIR; State Clearinghouse [SCH] Number 2018121009) was prepared by Michael Baker International, Inc. and certified by the City of Santa Clarita (California Environmental Quality Act [CEQA] lead agency) on November 10, 2020 (Michael Baker International 2020). Following certification of the Final EIR, some revisions were made to the project design (revised project), resulting in minor changes to the study area evaluated in the 2019 cultural report. HELIX conducted a review of historic aerial photographs and maps and a pedestrian survey for the portions of the revisions that were outside the original 2019 study area. The purpose of this addendum is to demonstrate that the revised project remains consistent with the findings documented in the "Cultural Resources" section of the Final EIR.

1.1 PROJECT LOCATION AND DESCRIPTION

The project is located in the Saugus Community of the City of Santa Clarita (City) in west-central Los Angeles County, within Section 6 of Township 4 North, Range 15 West, on the U.S. Geological Survey (USGS) 7.5-minute Mint Canyon topographic quadrangle (Figure 1 and 2, *Regional Location* and *USGS Topography*, respectively). The project site is generally located 6.9 miles to the east of Interstate (I-) 5 and 3.8 miles to the northwest of California State Route (SR) 14 and is bordered by Bouquet Canyon Road along the northern and western project boundaries (Figure 3, *Aerial Photograph*).

The previous design analyzed in the Final EIR proposed the development of 375 single-family homes organized into five distinct neighborhoods, along with extensive supporting site improvements including roads, storm drainage, utility facilities, private and public recreation areas, the construction of a new segment of Bouquet Canyon Road, as well as reconfiguration of Bouquet Creek and associated flood controls.

1.1.1 Revised Project Areas

The additional areas and revisions made to the project design since certification of the Final EIR are summarized below. The revised project areas comprise approximately 7.50 acres and are included within the approximately 85.86-acre revised study area for the project (Figure 3).

1. <u>Off-Site Flood Control Channel</u> – Additional temporary impacts to the concrete banks of the off-site concrete flood control channel required for the revisions related to the alignment of the outlet.

2. <u>Copper Hill Road Improvements</u> – Additional grading/paving for Copper Hill Road.

3. <u>Davenport Trailhead</u> – The addition of the Davenport parcel (Assessor's Parcel Number [APN] 2812-008-008) for the construction of a city-required trailhead.

4. <u>Bouquet Canyon Road Improvements North</u> – Additional off-site repaving and improvements to existing Bouquet Canyon Road near the northeast corner of the project.

5. Flow Diversion Structure – Construction of a slightly larger concrete flow diversion structure intended to convey low flows into the low-flow channel and divert high flows into the proposed concrete-lined flood control channel.

6. Sewer Line – Installation of a sewer line in the northeast portion of the site.

7. Slope Grading – Additional slope grading for the new alignment of Bouquet Canyon Road along the southerly border of the study area.

8. Bouquet Canyon Road Improvements South – Minor additional off-site road repaving and improvements to Bouquet Canyon Road located in the southwesterly portion of the project site.

9. Residential Addition – Addition of the "donut hole" parcel (APN 2812-008-002) in the easterly portion of the project site. Note that this area was evaluated for impacts to historical resources in the 2019 Cultural Resources Report yet was not evaluated as part of the project in the EIR. Additional residential uses have been proposed in the donut hole area since the Final EIR was certified. As such, the donut hole parcel has been included in the revised project area.

10. Residential Reduction – Removal of Planning Area 1a, which previously proposed the construction of residential development within the southern portion of the study area per the project Biological Technical Report (BTR) and EIR. This planning area presented in the Final EIR for the project will not be impacted by construction as part of the revised project.

1.2 REGULATORY FRAMEWORK

The regulatory setting was outlined in the 2019 Cultural Resources Report (Wilson and Wright 2019). For a detailed discussion of regulations and applicable laws, please refer to that report.

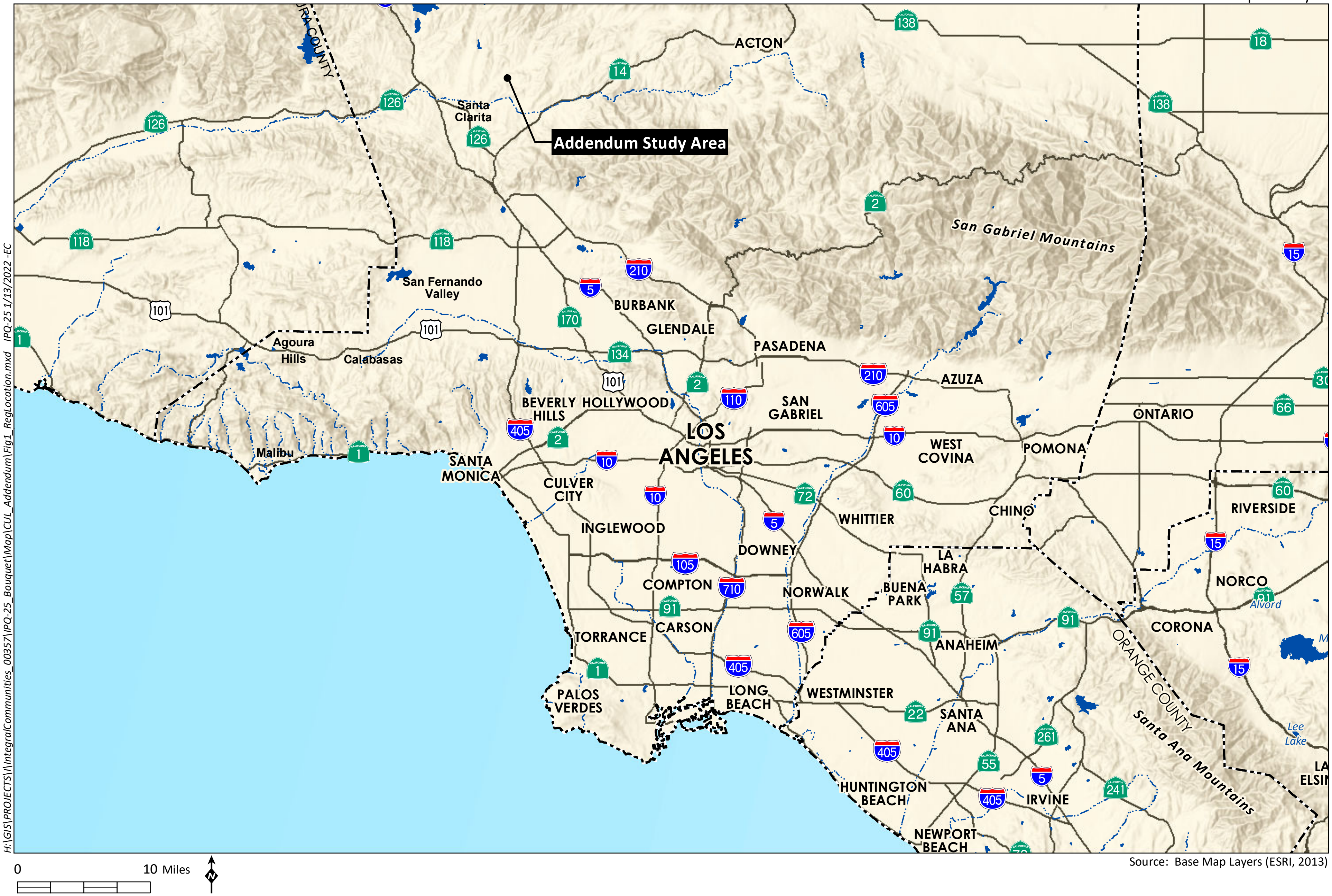
1.3 PROJECT PERSONNEL

Stacie Wilson, M.S., RPA, served as principal investigator. Ms. Wilson meets the qualifications of the Secretary of Interior's Standards and Guidelines for Archaeology and was the principal investigator and primary author of the 2019 Cultural Resources Report (Wilson and Wright 2019). Trevor Gittelhough, M.A., RPA, conducted the field survey and is the primary author of this report. Mx. Gittelhough meets the qualifications of the Secretary of Interior's Standards and Guidelines for archaeology and history.

2.0 PROJECT SETTING

2.1 NATURAL SETTING

The natural context outlined in the 2019 Cultural Resources Report (Wilson and Wright 2019) included information about physiography, geology, flora, and fauna within the region of the study. For a detailed discussion of the natural setting of the Bouquet Canyon Road Project study area, please refer to that report.



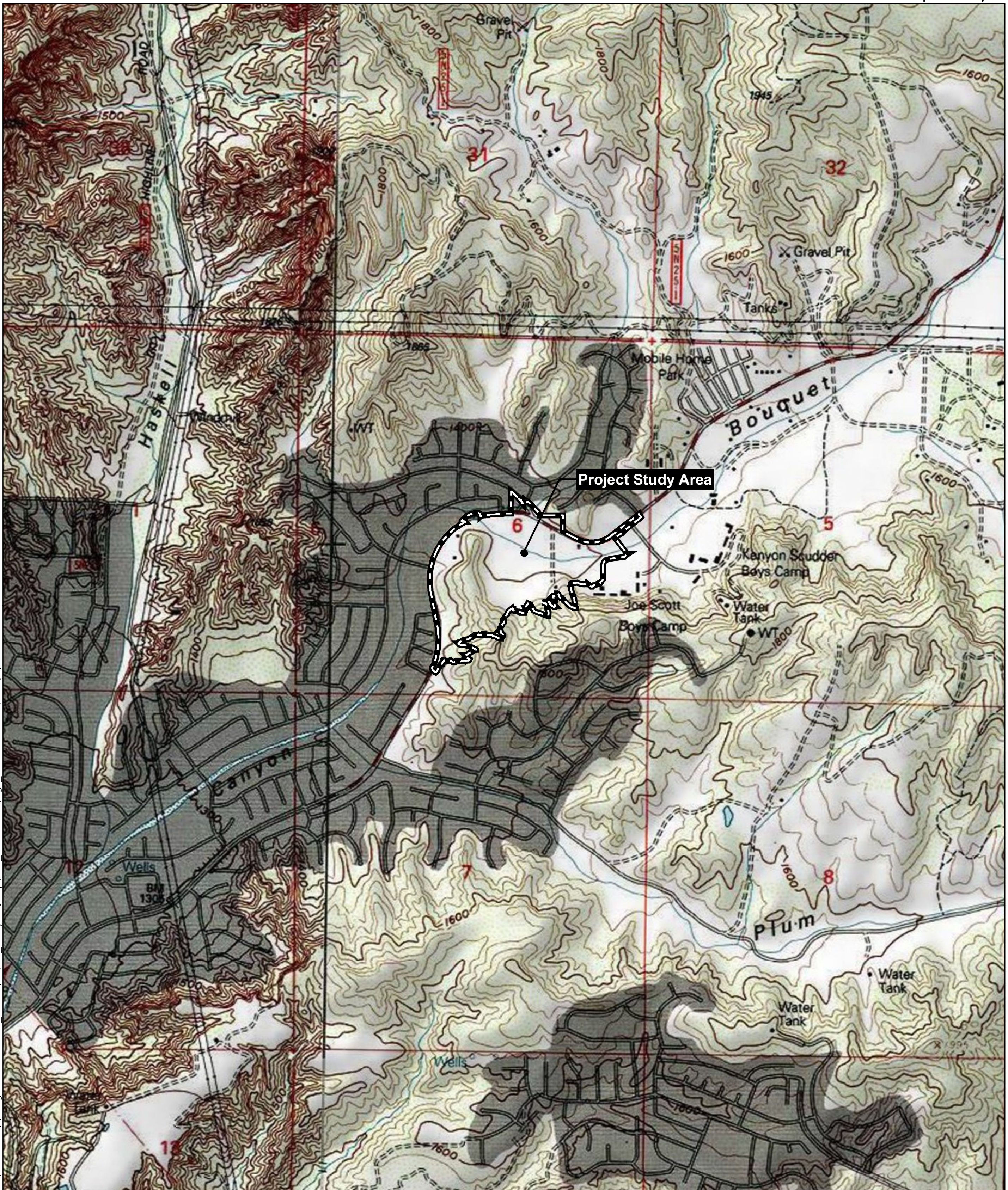
Source: Base Map Layers (ESRI, 2013)

H:\GIS\PROJECTS\IntegralCommunities_00357\IPQ-25_Bouquet\Map\CUL_Addendum\Fig1_RegLocation.mxd IPQ-25 1/13/2022 -EC

HELIX Environmental Planning

Regional Location

Figure 1



Source: Mint Canyon 7.5' Quad (USGS)

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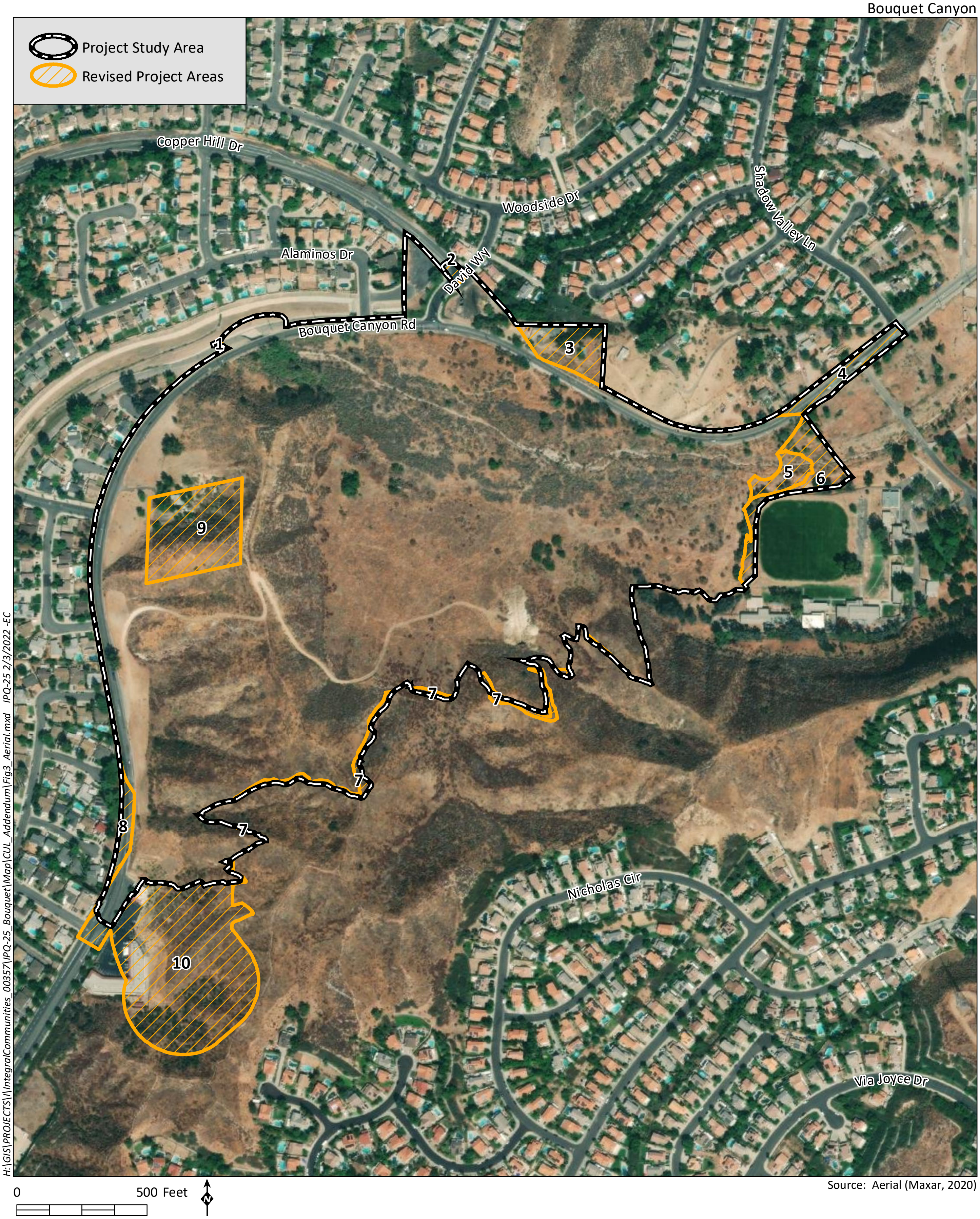
HELIX
Environmental Planning

USGS Topography

Figure 2



Source: Aerial (Maxar, 2020)

HELIX Environmental Planning

Aerial Photograph

Figure 3

2.2 CULTURAL SETTING

2.2.1 Prehistoric Period

The prehistoric background for the proposed project was discussed at length in the 2019 Cultural Resources Report (Wilson and Wright 2019). This included a discussion of the Late Prehistoric period (Early, Milling Stone [Archaic Period], Intermediate, and Late horizons) prior to European contact. For a detailed discussion of the prehistoric background of the Bouquet Canyon Road Project study area, please refer to that report.

2.2.2 Ethnohistory

The ethnographic background for the proposed project was described in the 2019 Cultural Resources Report (Wilson and Wright 2019). This included a discussion of the Tataviam people. For a detailed discussion of the ethnohistory of the Bouquet Canyon Road Project study area, please refer to that report.

2.2.3 Historical Background

The historic context for the proposed was included in the 2019 Cultural Resources Report (Wilson and Wright 2019). This included discussions on the Spanish, Mexican, and American periods and the historical and twentieth-century growth of Santa Clarita, Saugus, and Bouquet Canyon. For a detailed discussion of the historical context for the Bouquet Canyon Road Project, please refer to that report.

3.0 ARCHIVAL RESEARCH AND CONTACT PROGRAM

3.1 RECORDS SEARCH

As part of the 2019 Cultural Resources Report (Wilson and Wright 2019), HELIX staff conducted a record search of the California Historical Resources Information System (CHRIS) at the South Coastal Information Center (SCIC) on March 6, 2016. The records search covered a half-mile radius around the project alignment and included the identification of previously recorded cultural resources and locations and citations for previous cultural resources studies. A review of the California Historical Resources and the state Office of Historic Preservation (OHP) historic properties directories were also included. As the revised project areas are all located within the original records search boundaries, no additional record search was requested by HELIX. A total of 24 previous cultural studies have been completed within the search limits, though none were located within the project study area. Prior to the 2019 survey of the project area, nine previously recorded resources were identified within the record search limits. For the full discussion of the results of the records search, please refer to the 2019 Cultural Resources Report (Wilson and Wright 2019).

3.2 HISTORIC TOPOGRAPHIC MAP AND AERIAL IMAGERY RESEARCH

As part of the 2019 Cultural Resources Report (Wilson and Wright 2019), various archival sources were also consulted, including historic topographic maps, aerial imagery (NETR Online 2018), and the Bureau of Land Management (BLM) General Land Office (GLO) Records. Historic aerials from 1947, 1952, 1959, 1969, 1974, and 1977 were reviewed (NETR Online 2018). Plat maps reviewed included the 1875 survey plat for the Rancho San Francisco and the 1877 survey plats for Township 4 North and Range 15 and 16 West. Topographic maps reviewed included the 1900 Fernando (1:62,500); the 1900 (1930 reprint), 1940, and 1945 San Fernando (1:62,500); the 1932 and 1946 edition of the Humphreys (1:24,000); and the 1960 and 1974 Mint Canyon (1:24,000) topographic maps. The purpose of this research was to identify historic structures and land use in the area.

An updated review of the archival resources was conducted as part of this addendum study. On the 1947 aerial photograph, a single-family home is present within the boundaries of the Davenport parcel (within revised project area number 3). The home was visible in the 1952 aerials with no changes and had an unattached garage in the 1959 aerial. Three additions appear to have been added to the structure between 1994 and 1997. The structure is also shown on topographic maps, beginning with the 1932 Humphreys (1:24,000) quadrangle maps.

3.3 NATIVE AMERICAN CONTACT PROGRAM

As part of the 2019 Cultural Resources Report (Wilson and Wright 2019), HELIX contacted the Native American Heritage Commission (NAHC) in May 2018 for a Sacred Lands File search and list of Native American contacts for the original project alignment. The NAHC responded in June 2018 that the search of their Sacred Lands File was complete for the project area with negative results; a list of Tribal Contacts to be contacted for additional information about the project area was provided with NAHC's response. Letters were sent to these contacts in June 2018, with no responses received. A Native American monitor from the Fernandeño Tataviam Band of Mission Indians accompanied the survey crew during the fieldwork, and upon coordination for the survey, Jairo Avila responded in an email dated June 22, 2018 that their records show the presence of a Tataviam Village and Native burial site in the vicinity of the project.

No new outreach was conducted for this addendum, though the Fernandeño Tataviam Tribe of Mission Indians were invited to participate in the survey for the revised project areas. Due to scheduling urgency, however, they were unable to send someone to be involved in the pedestrian survey.

For copies of the contact program correspondence, see Appendix C of the Cultural Resources Report (Wilson and Wright 2019).

4.0 PREVIOUS SURVEY RESULTS

HELIX performed an intensive pedestrian survey for the original study area in 2018 (Wilson and Wright 2019). The cultural resources study area for the project totaled approximately 94 acres and consisted of the four project-owned parcels (APNs 2812-008-003, 2812-008-013, 2812-008-022, and 2812-008-031) and areas of proposed off-site improvements. Additionally, APN 2812-008-002, which was a private in-holding situated within the western portion of the project, was included in the cultural resources study area.

Results of the cultural resource surveys were presented in the 2019 Cultural Resources Report (Wilson and Wright 2019). In summary, the survey resulted in the identification of four newly recorded historic-period cultural resources: P-19-004853, P-19-004854 (CA-LAN-4854), P-19-192514, and P-19-004855. The resources include a concrete foundation that may represent the remnants of the "New Era School" from the early twentieth century (P-19-004853), the remnants of a ranch dating to the early- to mid-twentieth century (CA-LAN-4854), a residential structure constructed between 1952 and 1959 (P-19-192514), and the remnants of a residence from the turn of the twentieth century (P-19-004855). None of the resources meet the criteria for inclusion in the California Register of Historical Resources (CRHR) or the National Register of Historic Places (NRHP).

Of these resources, P-19-192514 is situated within APN 2812-008-002, the residential addition ("donut hole" parcel) included as revised project area number 9 (Figure 4, *Cultural Resources*). As described in Section 1.1.1. above, this parcel was evaluated for impacts to historical resources in the 2019 Cultural Resources Report as private in-holding situated within the western portion of the project (Wilson and Wright 2019). As such, although the donut hole parcel has been included in the revised project area, the evaluation of the resource (P-19-192514) can be found in that report.

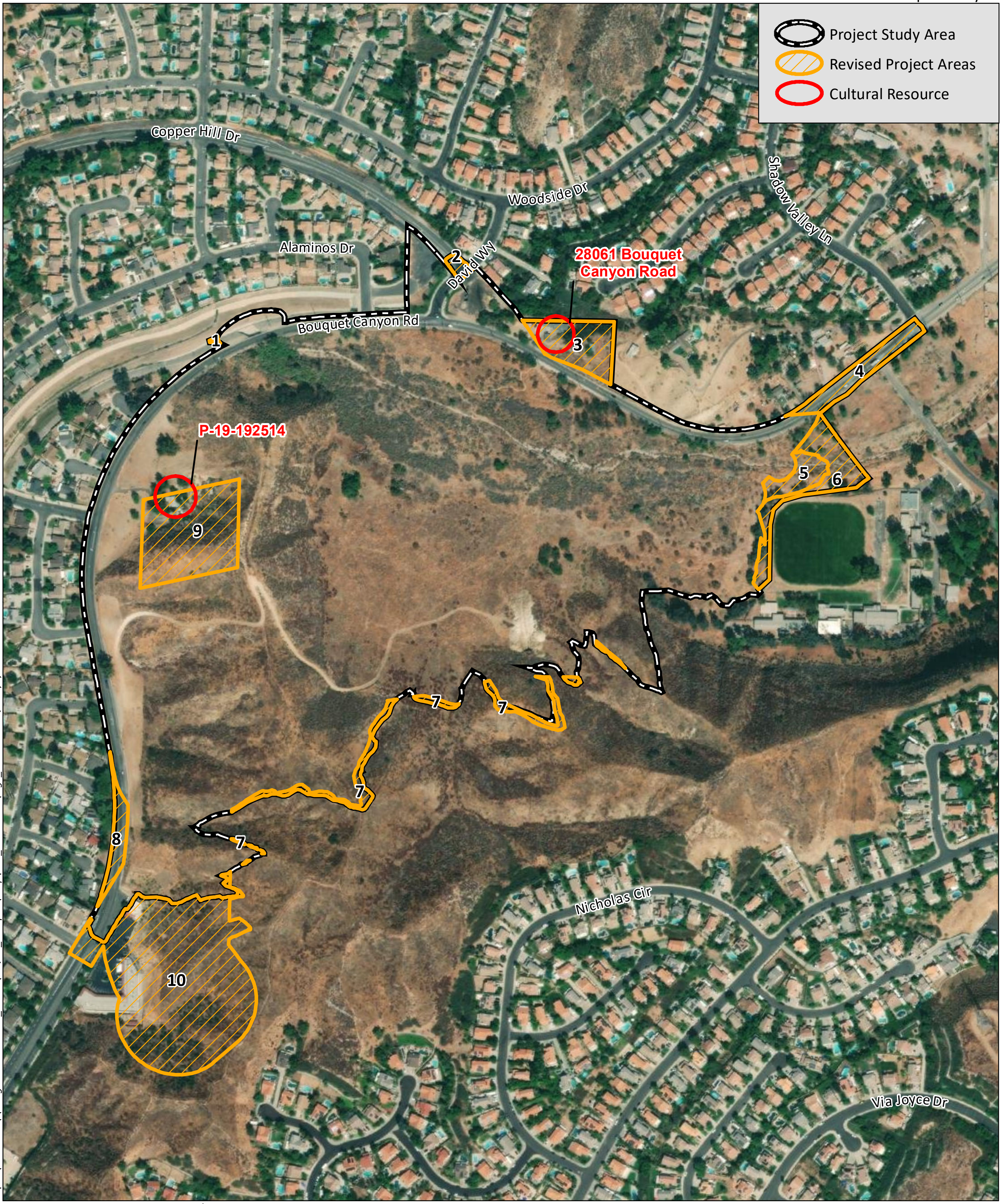
5.0 FIELD SURVEY

5.1 METHODOLOGY

HELIX archaeologist Trevor Gittelhough surveyed the revised project areas on December 12 and 14, 2021 (Plates 1 and 2). During the pedestrian survey, the additional areas within the revised project area were walked in transects, spaced approximately 10 meters apart where possible. Slopes greater than 25 degrees were visually assessed but were not surveyed. Visibility was excellent (76 to 100 percent) throughout the revised project area, though the slope along the northern edge of Bouquet Canyon was very steep and overgrown with sagebrush and buckwheat, hindering visibility and the ability to survey. Mx. Gittelhough also visited the residence located on the Davenport parcel, as part of this pedestrian survey.

Plate 1. Overview of the area containing the Copper Hill reconfiguration. View to the southeast.

Plate 2. Overview of area north of Bouquet Canyon Road. View to the east.



Source: Aerial (Maxar, 2020)

0 500 Feet

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HELIX Environmental Planning

Cultural Resources

Figure 4

5.2 RESULTS

One cultural resource was identified with the additional survey area: a single-family home at 28601 Bouquet Canyon Road (Figure 4; Appendix A). This resource was identified during archival research before being visited as part of the intensive pedestrian survey and is detailed below. No other cultural materials were observed within the additional project areas. Much of the newly added areas had been disturbed by nineteenth- and twentieth-century agriculture, road building, and urban development.

5.2.1 28601 Bouquet Canyon Road

This resource, 28601 Bouquet Canyon Road, is a residential structure situated within the Davenport parcel (APN 2812-008-008; Plates 3 and 4). A structure is indicated at this location on the 1932 Humphreys (1:24,000) topographic map, and two structures (a portion of the main house and the existing garage) appear on the 1947 aerial photograph. As noted earlier in this report, additions to the main structure occurred in the 1990s, as confirmed by the intensive pedestrian survey. These additions included multiple additions to the main residential structure, extending it westward. Furthermore, the structures have undergone extensive changes, including new roofing, stucco siding, along with new windows and doors. Permits from 2003 show that a retaining wall was added, a 247-square foot (sf) bedroom was added, and the remodel of a 210-sf bedroom was undertaken. Previously, in 1996, permits for the addition of a 496-sf master suite, a new bathroom, associated piping and duct work, and a new house connect for the addition were issued. Only a few historic-period components appear to remain—including the chimney, a shed, and a rock wall extending from the shed to the garage.

Plate 3. Overview of 28601 Bouquet Canyon Road. View to the east.

Plate 4. Overview of 28601 Bouquet Canyon Road, view to the north.

5.3 ELIGIBILITY RECOMMENDATION

28601 Bouquet Canyon Road is a historic residence originally constructed in the early twentieth century. The residence is comprised of a single-family home, unattached garage, and small shed. The residence does not appear to meet the criteria for inclusion in the NRHP or CRHR, as addressed below.

- Criterion A: Given the early to mid-twentieth century date of construction, the house does not represent the pioneering phase of Santa Clarita's development in the nineteenth century and is not associated with events that have made a significant contribution to the broad patterns of local or national history.

- Criterion B: The house and associated garage have no known significant association with the lives of persons important to local, California, or national history.

- Criterion C: The residential structures do not embody distinctive architectural characteristics, represent the work of a master, or possess artistic value.

- Criterion D: The structure does not appear to have the potential to yield important information about historic construction materials or technologies and would not be considered significant as a source of information important in history.

In summary, while a few original historic-period components appear to remain—such as the chimney, a shed, and a rock wall extending from the shed to the garage—the residential structure and detached garage have been modified to such degree that they lack historic integrity, and the original character of the buildings is no longer evident. Because the house and the unattached garage do not retain enough of their historic character or appearance to be recognizable as historical resources and do not meet the criteria for inclusion in the NRHP or CRHR, 28601 Bouquet Canyon Road is recommended as not eligible for listing in the NRHP or the CRHR, and as such, is not considered a significant “historical resource” for the purposes of CEQA.

6.0 SUMMARY AND MANAGEMENT RECOMMENDATIONS

A study was undertaken to identify cultural resources that are present in the revised project areas and to determine the effects of the revised project on cultural resources. Based on the results of the 2019 Cultural Resources Report (Wilson and Wright 2019) and the current study addendum, no historical resources, per CEQA, will be affected by the Bouquet Canyon Project.

As such, the additional areas and revisions made to the project design since certification of the Final EIR would not result in new significant or adverse impacts on cultural resources pursuant to CEQA and applicable federal, state, and local policy. The results of this addendum demonstrate that the revised project remains consistent with the findings documented in the “Cultural Resources” section of the Final EIR.

Per mitigation measure 3.4-1 contained within the project’s Mitigation Monitoring and Reporting Program contained within the Final EIR, an archaeological and Native American monitoring program will be implemented, during which an archaeologist and Native American monitor shall be present to monitor initial ground disturbance for the project for all ground-disturbing activities (Michael Baker International 2020).

Should the project limits change to incorporate new areas of proposed disturbance, cultural resources survey of these areas will be required.

7.0 REFERENCES

Michael Baker International Inc.

2020 Final Environmental Impact Report, Bouquet Canyon Project, Master Case 18-089/ Tentative Tract Map No. 82126. Prepared for the City of Santa Clarita.

NETR Online

2021 Historic Aerials. Nationwide Environmental Title Research, LLC. Electronic document available at: http://www.historicaerials.com, accessed December 2021.

Wilson, Stacie and Catherine Wright

2019 *Bouquet Canyon Road Project, City of Santa Clarita, Los Angelese County, California, Cultural Resources Survey and Assessment*. Report on file at the South Coastal Information Center, San Diego State University, San Diego.

Appendix A

Site Form, 28601 Bouquet Canyon Road

State of California — The Resources Agency DEPARTMENT OF PARKS AND RECREATION **PRIMARY RECORD**	Primary # HRI # Trinomial NRHP Status Code
Other Listings Review Code	Reviewer Date

 *Resource Name or #:

P1. Other Identifier: 28601 Bouquet Canyon Road

***P2. Location:** ■ Not for Publication ☐ Unrestricted **and** ***a. County:** Los Angeles

***b. USGS 7.5' Quad:** Mint Canyon **Date: 1995 T 4N; R 15W; NW ¼ of SE ¼ of Sec 6; B.M. San Bernardino**

c. Address: 28061 Bouquet Canyon City: Santa Clarita Zip: 91351

d. UTM: Zone: 11N; 363142 mE/ 3814089 mN (G.P.S.)

e. Other Locational Data: From the intersection of Plum Canyon Road and Bouquet Canyon Road, take Bouquet Canyon Road north for approximately 0.92 miles. The resource will be located immediately to the north side of the road. Elevation: 1,412 feet amsl

***P3a. Description:** This resource consists of residence structures located within the Davenport parcel (APN 2812-008-008) at 28601 Bouquet Canyon Road. The presence of this residence dates back to the 1930s, with a structure indicated at its location on the 1932 Humphreys (1:24,000) topographic map. Structures are notated on all later topographic maps. Later, in 1947, two structures are visible in a 1947 aerial photograph. The structure consists of a residential, single-family home with a detached garage, located at the bottom of a small hill, that has been modified to construct the residence. The house has asphalt roofing shingles, exterior stucco walls, and louvered window, and has been modified numerous times over the years. Permits from 2003 show that a retaining wall was added, a 247-sf bedroom was added, and 210 sf remodel of a bedroom was undertaken. Previously, in 1996, permits for the addition of 496-sf master suite, a new bathroom, associated piping and duct work, and a new house connect for the addition was issued. Only a few of the original historic-period components appear to remain – such as the chimney, a shed, and a rock wall extending from the shed to the garage.

***P3b. Resource Attributes:** HP2. Single family property

***P4. Resources Present:** ☐Building ■Structure ☐Object ☐Site ☐District ☐Element of District ☐Other (Isolates, etc.)

P5a. Photo or Drawing (Photo required for buildings, structures, and objects.)

P5b. Description of Photo: Overview of Residence, View facing east. Photo # 18, 12/13/2021

***P6. Date Constructed/Age and Sources:** ■Historic ☐Prehistoric ☐Both

***P7. Owner and Address:**

***P8. Recorded by:**
Trevor Gittelhough, M.A., RPA
HELIX Environmental Planning
7578 El Cajon Boulevard
La Mesa, CA 91942

***P9. Date Recorded:** 12/13/2021

***P10. Survey Type:** Pedestrian Survey

***P11. Report Citation:** Addendum to the Cultural Resources Inventory and Assessment for the Bouquet Canyon Road Project, Los Angeles County, California.

***Attachments:** ☐NONE ■Location Map ■Sketch Map ■Continuation Sheet ☐Building, Structure, and Object Record ☐Archaeological Record ☐District Record ☐Linear Feature Record ☐Milling Station Record ☐Rock Art Record ☐Artifact Record ☐Photograph Record ☐ Other (List):

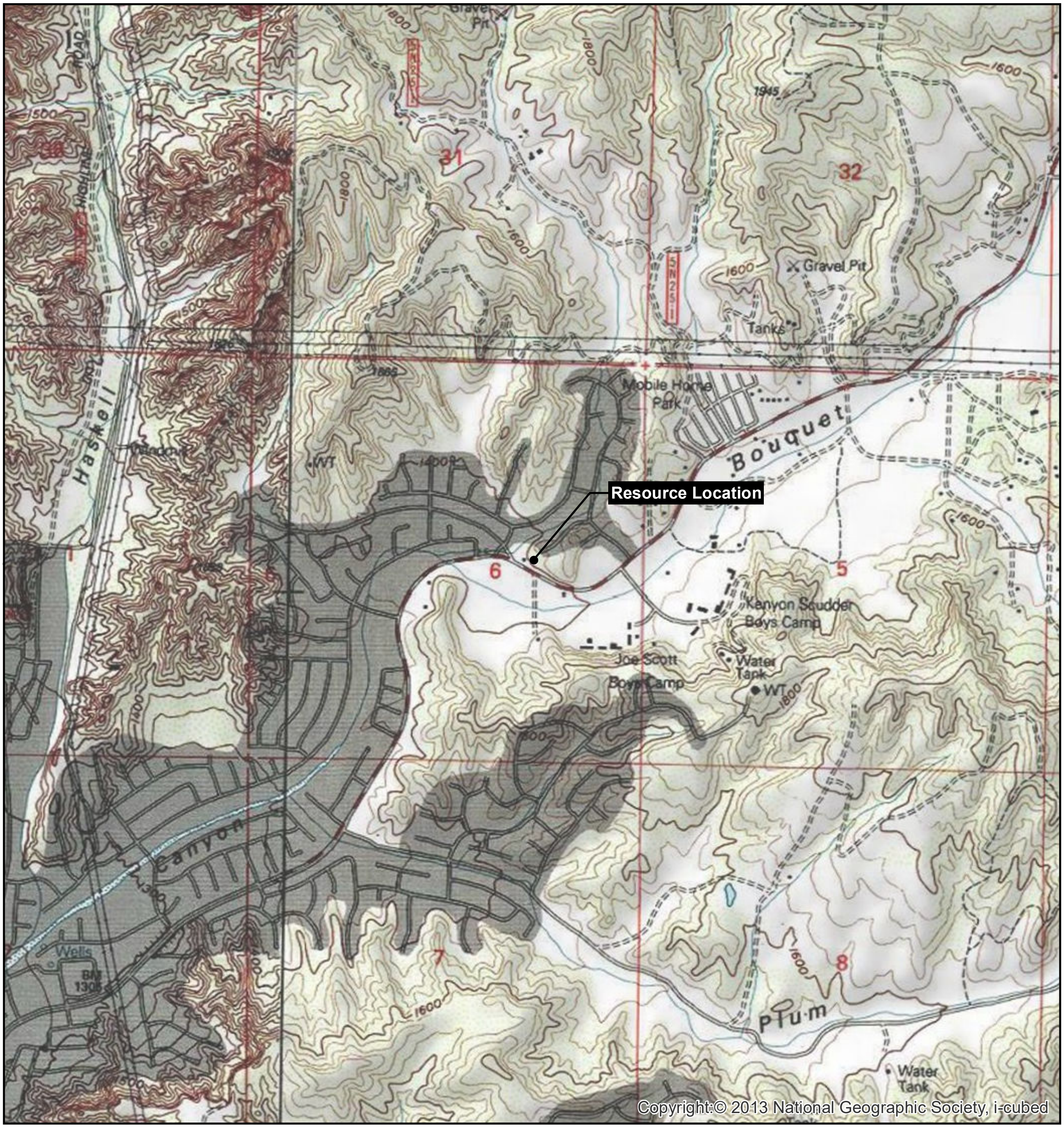
State of California - The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

LOCATION MAP

Primary #:
HRI #
Trinomial:

 ***Resource Name or #:** 28061 Bouquet Canyon Road

***Map Name:** MINT CANYON ***Scale:** 1:24,000 ***Date:** 1995



SCALE 1:24,000

1 0.5 0 1 Miles

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet

1 0.5 0 1 Kilometers

TRUE NORTH

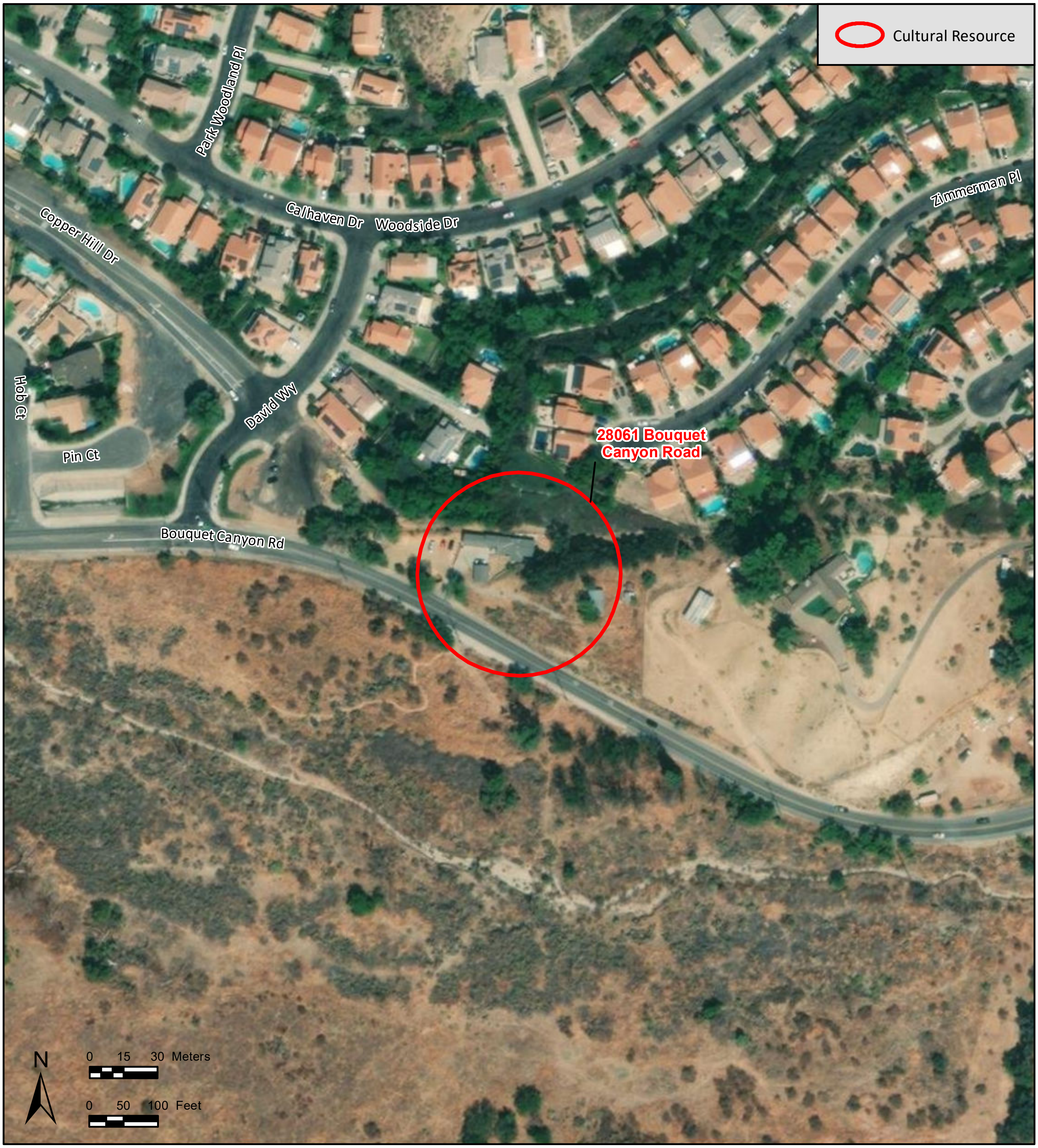
State of California - The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
SKETCH MAP

Primary #:
HRI #
Trinomial:

***Resource Name or #:** 28061 Bouquet Canyon Road

***Drawn By:** DY

***Date of Map:** Jan 2022



Overview of possible historic brick chimney, view to the north. Phot # 22, 12/13/2021

Overview of possible historic retaining wall, view to the south-southwest. Photo # 24, 12/13/2021

Overview of detached shed, view to the east-northeast. Photo # 23, 12/13/2022

Overview of detached garage, view to the southwest. Photo # 25, 12/13/202

Appendix C

Geology and Soils

Appendix C.1

Geotechnical Update Memorandum

October 20, 2021 Project No. 21095-01

Mr. Peter Vanek
Integral Communities
888 San Clemente, Suite 100
Newport Beach, CA 92660

Subject: ***Geotechnical Update to EIR, Revised Site Plan and Additional Developable Parcel, Proposed "Bouquet Canyon" Residential Development, Tract No. 82126, City of Santa Clarita, County of Los Angeles, California***

References: Petra Geosciences, Inc., 2019, Updated Geotechnical EIR-Level Assessment, Bouquet Canyon Project, Tentative Tract Map 82126, Southerly Adjacent to Bouquet Canyon Road at Copper Hill Drive, City of Santa Clarita, Los Angeles County, California, Job Number 18-322, dated October 18, 2019.

LGC Geotechnical, Inc., 2021, Change of Geotechnical Consultant of Record for Proposed "Bouquet Canyon" Residential Development, Tract No. 82126, City of Santa Clarita, County of Los Angeles, California, Project No. 21095-01, dated September 13, 2021.

Introduction

In accordance with your request, LGC Geotechnical, Inc. has prepared this letter to provide a geotechnical update to the Environmental Impact Report (EIR) document with regards to a proposed addition to the developable parcel for the proposed Bouquet Canyon Residential Development, Tract No. 82126, located in the City of Santa Clarita, County of Los Angeles, California.

The intent of this letter is to provide updated geotechnical conclusions for the EIR document with regards to the addition of approximately 2.7-acres of developable land located within the current limits of the subject approximately 75-acre Bouquet Canyon development that was addressed in the referenced report by Petra (2019). It should be noted LGC Geotechnical became the geotechnical consultant of record for the proposed development as explained in the reference letter report (LGC Geotechnical, 2021).

Updated Site Plan

The updated site plan includes a revision to a parallelogram-shaped parcel of land located within the subject development that was previously anticipated to remain undeveloped, see attached Exhibit of Additional Parcel on Geotechnical Map (Sheet 1). The updated site plan provides an additional 12 single-family residential units for the subject project as well as an extension of the north/south trending private street in the same area.

Conclusions

Based on our review of the modified site plan and the geotechnical conditions of the subject site, the conclusions and recommendations with regards to the site-specific geologic impacts and corresponding mitigations presented in the reference geotechnical EIR report (Petra, 2019) remain valid and applicable to the subject parcel addition. No additional changes or updates to the EIR report are required from a geotechnical perspective.

Design level geotechnical recommendations addressing the additional developable parcel located within the original limits of the subject site should be provided in an updated 40-scale grading plan review geotechnical report.

Should you have any questions regarding this letter, please do not hesitate to contact this office. We appreciate the opportunity to be of service.

Sincerely,

LGC Geotechnical, Inc.

Ryan Douglas, PE, GE 3147
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
RYAN L. DOUGLAS
No. 3147
GEOTECHNICAL
STATE OF CALIFORNIA

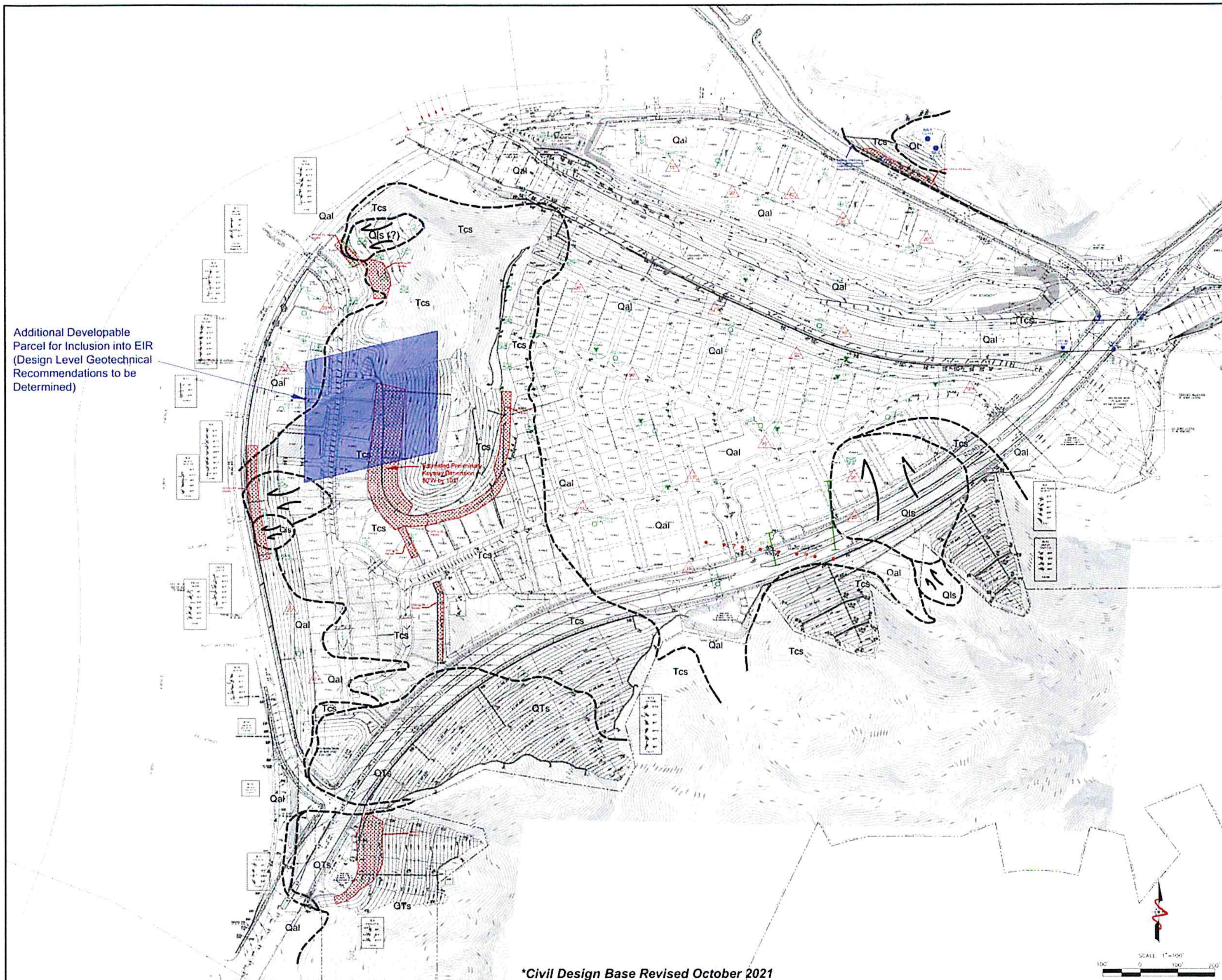
Katie Maes, CEG 2216
Project Geologist

CERTIFIED ENGINEERING GEOLOGIST
KATHERIN M. MAES
No. 2216
STATE OF CALIFORNIA

RLD/KTM/amm

Attachments: Sheet 1 – Exhibit of Additional Parcel on Geotechnical Map

Distribution: (1) Addressee (electronic copy)



*Civil Design Base Revised October 2021

LEGEND

Qal	Quaternary Alluvium
Qt	Quaternary Terrace Deposits
Qls	Quaternary Landslide, Circled where buried
QTs	Quaternary/Tertiary Saugus Formation, Circled where buried
Tcs	Tertiary Castaic Formation, Circled where buried
	Approximate Location of Geologic Contact, Queried Where Uncertain, dotted where buried
?	Approximate Location of Concealed Fault. Queried Where Uncertain
BA-2	Approximate Location of Bucket Auger Boring by LGC Geotechnical, with Total Depth in Feet
CPT-B4	Approximate Location of Cone Penetration Test (CPT) by LGC Geotechnical, with Total Depth in Feet
HP-1	Approximate Location of Hand Pit by LGC Geotechnical
B-15	Approximate Location of Large Diameter Bucket Auger Boring, with Total Depth in Feet (Petra, 2018)
	Approximate Location of Large Diameter Bucket Auger Boring, with Total Depth in Feet (Petra, 2020)
	Approximate Location of Hollow Stem Auger Boring, with Total Depth in Feet (Petra, 2018)
	Approximate Location of Hollow Stem Auger Boring, with Total Depth in Feet (Petra, 2021)
TP-16	Approximate Location of Geotechnical Test Pit (Petra, 2018)
	Approximate Location of Cone Penetration Test (CPT), with Total Depth in Feet (Petra, 2017)
CPT-7	Approximate Location of Cone Penetration Test (CPT), with Total Depth in Feet (Petra, 2018)
	Approximate Location of Cone Penetration Test (CPT), with Total Depth in Feet (Petra, 2021)
	Approximate Location of Fault Trench Excavations (Petra, 2020)
	Anticipated Depth of Remedial Grading (Removal and Recompaction) in Feet from Existing Ground Surface (Minimum 5 Feet)
	Approximate Limits of Buttress and Stabilization Fill Keyways With Approximate Width and Depth Dimensions, in Feet

Geologic Attitudes

Bedding
Joint
Shear
Rupture Surface
Fault

LGC Geotechnical, Inc.
131 Calle Iglesia, Ste. 200
San Clemente, CA 92672
TEL (949) 369-6141 FAX (949) 369-6142

Exhibit of Additional Parcel on Geotechnical Map

PROJECT NAME	Integral - Bouquet Canyon
PROJECT NO.	21095-01
ENG. / GEOL.	RLD / KTM
SCALE	1" = 100'
DATE	October 2021

SHEET
1 of 1

Appendix C.2

Geotechnical Review of Grading Plan Update

April 12, 2022 Project No. 21095-01

Mr. Peter Vanek
Integral Communities
888 San Clemente, Suite 100
Newport Beach, CA 92660

Subject: ***Geotechnical Review of Updated 40-Scale Rough Grading Plan, Proposed Residential Development, Tract No. 82126, City of Santa Clarita, County of Los Angeles, California***

Introduction

In accordance with your request, LGC Geotechnical, Inc. (LGC Geotechnical) has prepared this geotechnical review of the updated 40-scale rough grading plans for the proposed Bouquet Canyon residential development, Tract No. 82126, located in the City of Santa Clarita, Los Angeles County, California. The revised plan review is based on the updated grading plan prepared by Sikand (2022). This map was used as a base for our Geotechnical Map (Sheet 1). The purpose of this letter was to document the changes from the previous grading plan and to update any recommendations due to these changes.

This grading plan review report should be considered part of the project design documents in conjunction with our geotechnical reports (LGC Geotechnical, 2021a through 2021d) and previous geotechnical reports by Petra. In the case of conflict, the recommendations contained herein should supersede those provided in previous reports; the remaining recommendations remain valid and applicable.

Grading Plan Revisions

The major changes on the grading plan can be seen on the western half of the site, Planning Area 1A (see Sheet 1). Originally, an irregular shaped parcel was excluded from development along the western side of the central ridgeline adjacent to old Bouquet Canyon Road (LGC Geotechnical, 2021a). This parcel was referred to as the "donut hole." The original proposed entry road accessed the site from old Bouquet Canyon Road, across from Pam Court, and extended south until reaching a cul-de-sac which serviced a total of 7 single-family units. The updated grading plans present the entry road adjacent to Pam Court extending south and connecting with the remainder of PA-1. An additional 12 single-family units have been added to the development as part of the revised grading plan. A cemetery area exists in a proposed landscape area between Units 4, 6 and 45. Recommendations for grading around the cemetery area are provided in our referenced geotechnical report (LGC Geotechnical, 2022). An approximately 100-foot-tall westerly facing cut slope has been incorporated into the plans (see Cross-

Section W-W’) cutting into the natural ridge to create building pads for the residential units and connecting the two portions of PA-1 with a road.

The general proximity of the grading plans revisions for PA-1 have been clouded in red on the updated Geotechnical Map (Sheet 1). Updated geotechnical recommendations are provided on Sheets 1 through 3 and should be included as part of the design documents.

Updated Slope Stability Analysis

Due to the changes in the rough grading plan, a portion of our geotechnical map (Sheet 1) and nine cross-sections (Sheets 2 & 3) were updated. The nine updated cross-sections are F-F’, G-G’, H-H’, I-I’, U-U’, V-V’, W-W’, X-X’ and Y-Y’. The majority of the cross sections only had minor changes. Cross-section W-W’ was added to address the major new cut slope presented on the updated grading plans (Sikand, 2022). The revisions to the grading plan have been reflected on the updated Geotechnical Map (Sheet 1) and cross-sections (Sheets 2 & 3).

Updates to cross-sections F-F’, I-I’ and X-X’ from the updated rough grading plans were negligible compared to the grading plans reviewed for our 40-scale geotechnical report (LGC Geotechnical, 2021a), refer to the 40-scale geotechnical report (LGC Geotechnical, 2021a) for slope stability analysis.

Updated slope stability analysis was performed on critical cross-sections V-V’ and W-W’ as part of this study. Shear strengths were taken from our 40-scale geotechnical report (LGC Geotechnical, 2021a). Slope stability analysis was performed using the computer program GSTABL7 with STEDwin version 2.005.3 (Gregory Geotechnical Software, 2013). Potential rotational and block failure modes were analyzed using Bishop’s Modified Method and Janbu’s Simplified Method, respectively. Slope stability analysis was performed for static and pseudo-static (seismic) loading conditions. A minimum factor of safety of 1.5 and 1.1 is typically required for static and seismic loading conditions.

Based on the proposed rough grading plan (Sikand, 2022), slope stability analysis indicates global factors of safety greater than 1.5 and 1.1 for static and seismic loading conditions, respectively. Slope stability analysis is provided in Appendix B.

Conclusions

Based on our review, it is our opinion that the subject rough grading plans (Sikand, 2022) are considered acceptable for construction from a geotechnical viewpoint and were found to be in general conformance with the recommendations provided in our reference geotechnical reports (LGC Geotechnical, 2021a through 2021d) and those contained in this report. The previously provided preliminary geotechnical recommendations (LGC Geotechnical, 2021a through 2021d) remain valid and applicable. Updated Geotechnical Map (Sheet 1) and Cross Sections (Sheets 2 & 3) attached to this report supersede previous version in the areas identified and should be included in the project design documents.

LGC Geotechnical should provide geotechnical observation and testing during grading and construction operations to confirm anticipated site geotechnical conditions. If geotechnical conditions differ from those that are anticipated, additional recommendations will be provided during rough grading.

Closure

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

We appreciate this opportunity to be of service. Should you have any questions or concerns regarding this proposal, please do not hesitate to contact our office.

Respectfully,

LGC Geotechnical, Inc.

REGISTERED PROFESSIONAL ENGINEER RYAN L. DOUGLAS No. 3147 GEOTECHNICAL STATE OF CALIFORNIA

Ryan Douglas, PE, GE 3147
Project Engineer

CERTIFIED ENGINEERING GEOLOGIST KATHERIN M. MAES No. 2216 STATE OF CALIFORNIA

Katie Maes, CEG 2216
Project Geologist

RLD/KTM/BPP/klr

Attachment: Appendix A – References
Appendix B – Slope Stability Analysis
Sheet 1 – Geotechnical Map
Sheet 2 & 3 – Geotechnical Cross Sections

Distribution: (1) Addressee (electronic copy)

Appendix A
References

References

American Concrete Institute, 2014, Building Code Requirements for Structural Concrete (ACI 318-14) and Commentary (ACI 318R-14).

California Building Standards Commission, 2019, California Building Code, California Code of Regulations Title 24, Volumes 1 and 2, dated July 2019.

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R.T. Frankian and Associates (RT&A), 2019a, Peer Review Geotechnical EIR-Level Assessment Report, Bouquet canyon Project, prepared by Petra Geosciences, Inc., Tentative Tract Map 82126, Southerly Adjacent to Bouquet Canyon Road at Copper Hill Drive, City of Santa Clarita, Los Angeles County, California, dated April 23, 2019.

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________, 2020, Review of Petra Review of Petra Geosciences, Inc. Report, Geotechnical Review, Tentative Tract Map No. 82126, Bouquet Canyon Project, Santa Clarita, California, Job No. 2018-010-650, dated November 5, 2020.

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Appendix B
Slope Stability Analysis

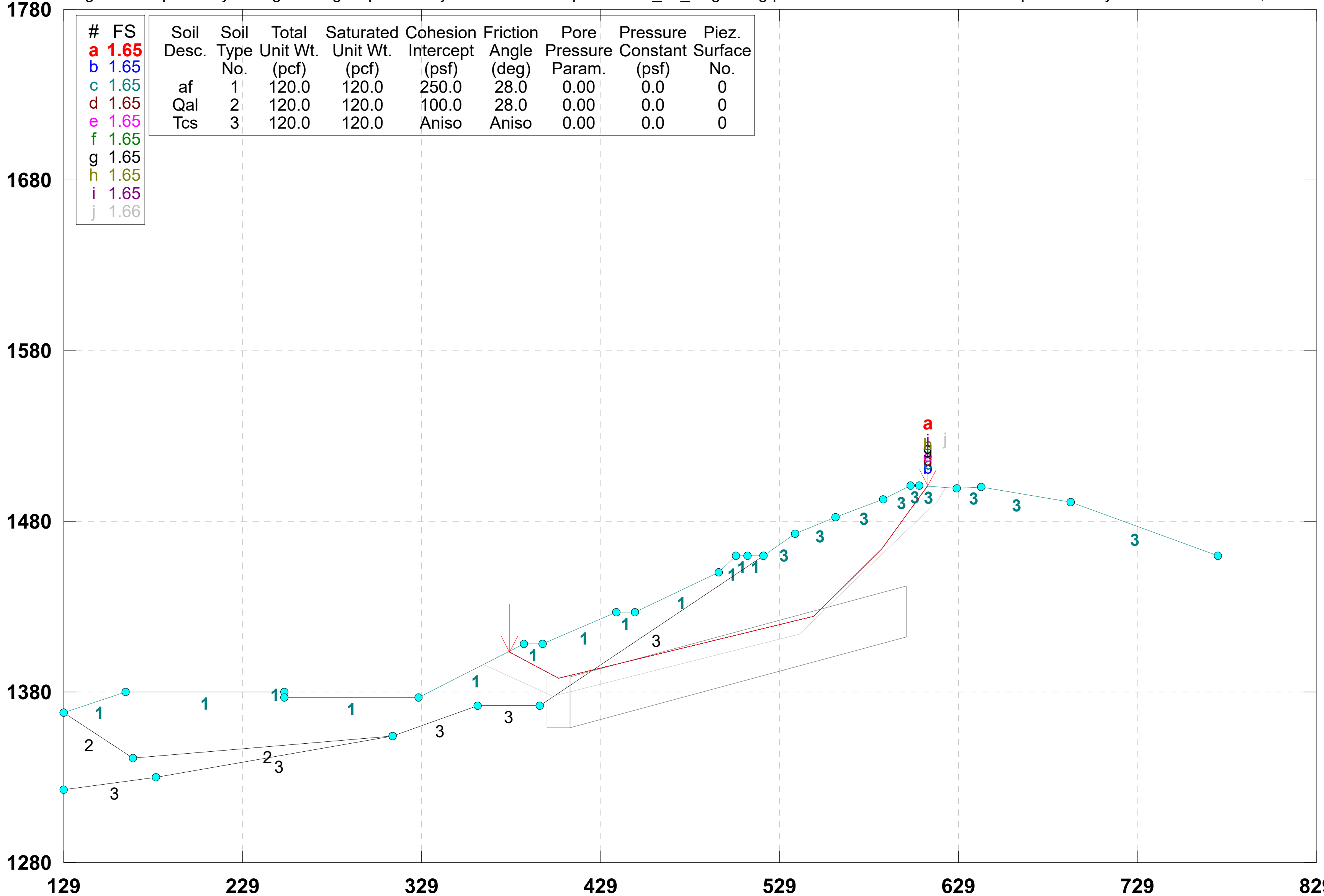
Appendix B

Summary of Slope Stability Analysis

Cross-Section	File Name	Factor of Safety	Description
V-V'	xvb2	1.65	Static; Block Search
	xvb2e	1.16	Seismic
	xvb2-1	1.60	Static; Block Search
	xvb2-1e	1.13	Seismic
	xvb2-2	1.62	Static; Block Search
	xvb2-2e	1.14	Seismic
	xvc2	1.69	Static; Circular Search
	xvc2e	1.21	Seismic
	xvb2t	1.35	Temporary; Block Search
	xvc2t	1.42	Temporary; Circular Search
W-W'	xwb	1.65	Static; Block Search
	xwbe	1.14	Seismic
	xwb-2	1.80	Static; Block Search
	xwb-2e	1.26	Seismic
	xwb-3	1.68	Static; Block Search
	xwb-3e	1.17	Seismic
	xwc	1.87	Static; Circular Search
	xwce	1.31	Seismic
	xwtb	1.48	Temporary; Block Search
	xwtc	1.65	Temporary; Circular Search

Bouquet Canyon/21095-01/Section V-V'/ Static

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xvb2.pl2 Run By: LGC Geotechnical, Inc. 4/5/2022 10:02A



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
af	1	120.0	120.0	250.0	28.0	0.00	0.0	0
Qal	2	120.0	120.0	100.0	28.0	0.00	0.0	0
Tcs	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=1.65

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/5/2022
Time of Run: 10:02AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section V-V'/ Static

BOUNDARY COORDINATES

21 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	129.00	1368.00	164.00	1380.00	1
2	164.00	1380.00	252.00	1380.00	1
3	252.00	1380.00	252.10	1377.00	1
4	252.10	1377.00	327.00	1377.00	1
5	327.00	1377.00	386.00	1408.00	1
6	386.00	1408.00	397.00	1408.00	1
7	397.00	1408.00	438.00	1427.00	1
8	438.00	1427.00	448.00	1427.00	1
9	448.00	1427.00	495.00	1450.00	1
10	495.00	1450.00	505.00	1460.00	1
11	505.00	1460.00	511.00	1460.00	1
12	511.00	1460.00	520.00	1460.00	1
13	520.00	1460.00	538.00	1473.00	3
14	538.00	1473.00	560.00	1482.00	3
15	560.00	1482.00	587.00	1493.00	3
16	587.00	1493.00	602.00	1501.00	3
17	602.00	1501.00	607.00	1501.00	3
18	607.00	1501.00	628.00	1499.00	3
19	628.00	1499.00	642.00	1500.00	3
20	642.00	1500.00	692.00	1491.00	3
21	692.00	1491.00	774.00	1460.00	3
22	129.00	1368.00	168.00	1341.00	2
23	168.00	1341.00	313.00	1354.00	2
24	313.00	1354.00	360.00	1372.00	3
25	360.00	1372.00	395.00	1372.00	3
26	395.00	1372.00	520.00	1460.00	3
27	129.00	1323.00	181.00	1330.00	3
28	181.00	1330.00	313.00	1354.00	3

User Specified Y-Origin = 1280.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	100.0	28.0	0.00	0.0	0
3	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)

1	10.0	250.00	32.00
2	15.0	150.00	25.00
3	90.0	250.00	32.00

ANISOTROPIC SOIL NOTES:

(1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.

(2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.

(3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

Janbus Empirical Coef is being used for the case of c & phi both > 0

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

4999 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 55.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	399.00	1374.00	412.00	1374.00	30.00
2	412.10	1374.00	600.00	1427.00	30.00

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	350.28	1389.23
2	355.60	1384.36
3	408.68	1369.95
4	429.70	1377.48
5	429.78	1423.19

Factor of Safety for the Preceding Surface is Between89.790 and87.995

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	360.95	1394.84
2	366.54	1391.70
3	411.47	1359.99
4	440.71	1369.68
5	441.14	1424.68
6	441.93	1427.00

Factor of Safety for the Preceding Surface is Between47.451 and47.442

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	380.07	1404.89
2	411.33	1380.78
3	558.66	1400.95
4	558.79	1455.95
5	567.63	1485.11

Factor of Safety for the Preceding Surface is Between 6.865 and 6.859

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	350.28	1389.23
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   No.        (ft)        (ft)

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   No.        (ft)        (ft)

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```

```
            2        366.54     1391.70
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4	558.79	1455.95
5	567.63	1485.11

Factor of Safety for the Preceding Surface is Between 6.865 and 6.859

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	350.28	1389.23
2	355.60	1384.36
3	408.68	1369.95
4	429.70	1377.48
5	429.78	1423.19

Factor of Safety for the Preceding Surface is Between89.790 and87.995

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	360.95	1394.84
2	366.54	1391.70
3	411.47	1359.99
4	440.71	1369.68
5	441.14	1424.68
6	441.93	1427.00

Factor of Safety for the Preceding Surface is Between47.451 and47.442

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	380.07	1404.89
2	411.33	1380.78
3	558.66	1400.95
4	558.79	1455.95
5	567.63	1485.11

Factor of Safety for the Preceding Surface is Between 6.865 and 6.859

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 4999

WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
Did Not Converge in 20 Iterations.

Number of Trial Surfaces with Non-Converged FS = 27

Number of Trial Surfaces With Valid FS = 4972

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 0.5 %

Statistical Data On All Valid FS Values:
FS **Max** = 19.824 FS **Min** = 1.645 FS Ave = 2.931
Standard Deviation = 1.868 Coefficient of Variation = 63.73 %

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	377.780	1403.681
2	405.639	1387.951
3	547.967	1424.267
4	585.779	1464.208
5	612.100	1500.514

Factor of Safety
*** 1.645 ***

Individual data on the 18 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	8.2	4419.4	0.0	0.0	0.	0.	0.0	0.0	0.0
2	11.0	15927.0	0.0	0.0	0.	0.	0.0	0.0	0.0
3	8.6	20331.1	0.0	0.0	0.	0.	0.0	0.0	0.0
4	18.9	58849.7	0.0	0.0	0.	0.	0.0	0.0	0.0
5	13.5	47640.2	0.0	0.0	0.	0.	0.0	0.0	0.0
6	10.0	35419.3	0.0	0.0	0.	0.	0.0	0.0	0.0
7	47.0	190316.3	0.0	0.0	0.	0.	0.0	0.0	0.0
8	10.0	51566.5	0.0	0.0	0.	0.	0.0	0.0	0.0
9	6.0	33070.2	0.0	0.0	0.	0.	0.0	0.0	0.0
10	9.0	47538.5	0.0	0.0	0.	0.	0.0	0.0	0.0
11	18.0	101676.4	0.0	0.0	0.	0.	0.0	0.0	0.0
12	10.0	62248.2	0.0	0.0	0.	0.	0.0	0.0	0.0
13	12.0	70630.9	0.0	0.0	0.	0.	0.0	0.0	0.0
14	25.8	113402.4	0.0	0.0	0.	0.	0.0	0.0	0.0
15	1.2	4058.6	0.0	0.0	0.	0.	0.0	0.0	0.0
16	15.0	37372.4	0.0	0.0	0.	0.	0.0	0.0	0.0
17	5.0	6581.4	0.0	0.0	0.	0.	0.0	0.0	0.0
18	5.1	2301.3	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	377.780	1403.681
2	405.639	1387.951
3	547.967	1424.267
4	585.779	1464.208
5	612.100	1500.514

Factor of Safety
*** 1.645 ***

1

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	377.780	1403.681
2	405.639	1387.951
3	547.967	1424.267
4	585.779	1464.208
5	612.100	1500.514

Factor of Safety
*** 1.645 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
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4	585.779	1464.208
5	612.100	1500.514

Factor of Safety
*** 1.645 ***

1

Failure Surface Specified By 5 Coordinate Points

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5	612.100	1500.514

Factor of Safety
*** 1.645 ***

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Point No.	X-Surf (ft)	Y-Surf (ft)
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5	612.100	1500.514

Factor of Safety
*** 1.645 ***

1

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

```
             1        377.780     1403.681
             2        405.639     1387.951
             3        547.967     1424.267
             4        585.779     1464.208
             5        612.100     1500.514


                  Factor of Safety
                 ***    1.645   ***




           Failure Surface Specified By  5 Coordinate Points


             Point      X-Surf      Y-Surf
              No.        (ft)        (ft)

             1        377.780     1403.681
             2        405.639     1387.951
             3        547.967     1424.267
             4        585.779     1464.208
             5        612.100     1500.514


                  Factor of Safety
                 ***    1.645   ***



 1

           Failure Surface Specified By  5 Coordinate Points


             Point      X-Surf      Y-Surf
              No.        (ft)        (ft)

             1        377.780     1403.681
             2        405.639     1387.951
             3        547.967     1424.267
             4        585.779     1464.208
             5        612.100     1500.514


                  Factor of Safety
                 ***    1.645   ***




           Failure Surface Specified By  6 Coordinate Points


             Point      X-Surf      Y-Surf
              No.        (ft)        (ft)

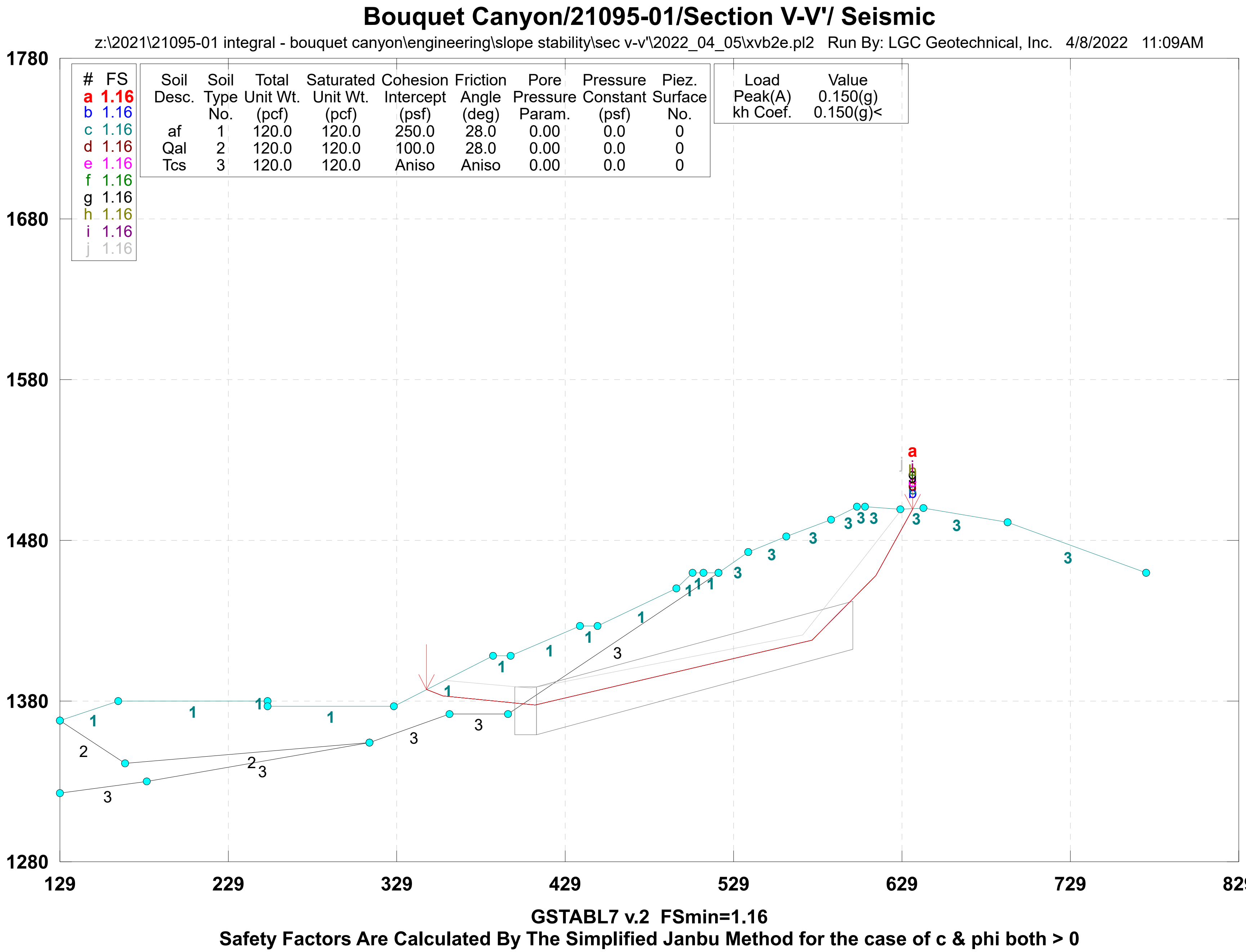
             1        363.608     1396.235
             2        402.341     1377.382
             3        540.306     1413.940
             4        579.036     1452.992
             5        617.402     1492.400
             6        621.816     1499.589


                  Factor of Safety
                 ***    1.659   ***






                      **** END OF GSTABL7 OUTPUT ****
```



Bouquet Canyon/21095-01/Section V-V'/ Seismic
z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\sec v-v'\2022_04_05\xvb2e.pl2 Run By: LGC Geotechnical, Inc. 4/8/2022 11:09AM
FS
a 1.16
b 1.16
c 1.16
d 1.16
e 1.16
f 1.16
g 1.16
h 1.16
i 1.16
j 1.16
Soil Desc. | Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Pore Pressure Param. | Pressure Constant (psf) | Piez. Surface No.
af 1 120.0 120.0 250.0 28.0 0.00 0.0 0
Qal 2 120.0 120.0 100.0 28.0 0.00 0.0 0
Tcs 3 120.0 120.0 Aniso Aniso 0.00 0.0 0
Load Value
Peak(A) 0.150(g)
kh Coef. 0.150(g)<
1780
1680
1580
1480
1380
1280
129
229
329
429
529
629
729
829
GSTABL7 v.2 FSmin=1.16
Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/8/2022
Time of Run: 11:09AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2e.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2e.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2e.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section V-V'/ Seismic

BOUNDARY COORDINATES

21 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	129.00	1368.00	164.00	1380.00	1
2	164.00	1380.00	252.00	1380.00	1
3	252.00	1380.00	252.10	1377.00	1
4	252.10	1377.00	327.00	1377.00	1
5	327.00	1377.00	386.00	1408.00	1
6	386.00	1408.00	397.00	1408.00	1
7	397.00	1408.00	438.00	1427.00	1
8	438.00	1427.00	448.00	1427.00	1
9	448.00	1427.00	495.00	1450.00	1
10	495.00	1450.00	505.00	1460.00	1
11	505.00	1460.00	511.00	1460.00	1
12	511.00	1460.00	520.00	1460.00	1
13	520.00	1460.00	538.00	1473.00	3
14	538.00	1473.00	560.00	1482.00	3
15	560.00	1482.00	587.00	1493.00	3
16	587.00	1493.00	602.00	1501.00	3
17	602.00	1501.00	607.00	1501.00	3
18	607.00	1501.00	628.00	1499.00	3
19	628.00	1499.00	642.00	1500.00	3
20	642.00	1500.00	692.00	1491.00	3
21	692.00	1491.00	774.00	1460.00	3
22	129.00	1368.00	168.00	1341.00	2
23	168.00	1341.00	313.00	1354.00	2
24	313.00	1354.00	360.00	1372.00	3
25	360.00	1372.00	395.00	1372.00	3
26	395.00	1372.00	520.00	1460.00	3
27	129.00	1323.00	181.00	1330.00	3
28	181.00	1330.00	313.00	1354.00	3

User Specified Y-Origin = 1280.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	100.0	28.0	0.00	0.0	0
3	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)

```
          1             10.0             250.00         32.00
          2             15.0             150.00         25.00
          3             90.0             250.00         32.00

      ANISOTROPIC SOIL NOTES:
         (1) An input value of 0.01 for C and/or Phi will cause Aniso
             C and/or Phi to be ignored in that range.
         (2) An input value of 0.02 for Phi will set both Phi and
             C equal to zero, with no water weight in the tension crack.
         (3) An input value of 0.03 for Phi will set both Phi and
             C equal to zero, with water weight in the tension crack.


      Specified Peak Ground Acceleration Coefficient (A) =   0.150(g)
      Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
      Specified Vertical Earthquake Coefficient (kv) =   0.000(g)

      Specified Seismic Pore-Pressure Factor =   0.000

      Janbus Empirical Coef is being used for the case of  c & phi both > 0
1


      A Critical Failure Surface Searching Method, Using A Random
      Technique For Generating Sliding Block Surfaces, Has Been
      Specified.


      4999 Trial Surfaces Have Been Generated.


      2 Boxes Specified For Generation Of Central Block Base


      Length Of Line Segments For Active And Passive Portions Of
      Sliding Block Is  55.0


      Box        X-Left     Y-Left    X-Right    Y-Right      Height
      No.         (ft)       (ft)       (ft)       (ft)        (ft)

       1         399.00    1374.00     412.00    1374.00      30.00
       2         412.10    1374.00     600.00    1427.00      30.00


      WARNING! The factor of safety calculation did not converge in 20 iterations.



      The Trial Failure Surface In Question Is Defined
      By The Following  5 Coordinate Points


        Point      X-Surf      Y-Surf
         No.        (ft)        (ft)

          1        350.28     1389.23
          2        355.60     1384.36
          3        408.68     1369.95
          4        429.70     1377.48
          5        429.78     1423.19


      Factor of Safety for the Preceding Surface is Between10.595 and10.509


      WARNING! The factor of safety calculation did not converge in 20 iterations.



      The Trial Failure Surface In Question Is Defined
      By The Following  6 Coordinate Points


        Point      X-Surf      Y-Surf
         No.        (ft)        (ft)

          1        360.95     1394.84
          2        366.54     1391.70
          3        411.47     1359.99
          4        440.71     1369.68
          5        441.14     1424.68
          6        441.93     1427.00


      Factor of Safety for the Preceding Surface is Between17.011 and16.974


      WARNING! The factor of safety calculation did not converge in 20 iterations.



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6	441.93	1427.00

Factor of Safety for the Preceding Surface is Between17.011 and16.974

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 4999

WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
Did Not Converge in 20 Iterations.

Number of Trial Surfaces with Non-Converged FS = 18

Number of Trial Surfaces With Valid FS = 4981

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 0.4 %

Statistical Data On All Valid FS Values:
FS **Max** = 12.740 FS **Min** = 1.157 FS Ave = 1.973
Standard Deviation = 1.037 Coefficient of Variation = 52.57 %

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	346.853	1387.431
2	356.334	1383.224
3	411.066	1377.799
4	575.767	1418.090
5	613.237	1458.352
6	635.595	1499.542

Factor of Safety
*** 1.157 ***

Individual data on the 20 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force **Norm** (lbs)	Tie Force **Tan** (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge **Load** (lbs)
1	9.5	5227.3	0.0	0.0	0.	0.	784.1	0.0	0.0
2	29.7	65689.3	0.0	0.0	0.	0.	9853.4	0.0	0.0
3	11.0	37305.0	0.0	0.0	0.	0.	5595.7	0.0	0.0
4	7.2	26653.8	0.0	0.0	0.	0.	3998.1	0.0	0.0
5	6.9	28647.5	0.0	0.0	0.	0.	4297.1	0.0	0.0
6	26.9	128201.3	0.0	0.0	0.	0.	19230.2	0.0	0.0
7	10.0	49666.3	0.0	0.0	0.	0.	7449.9	0.0	0.0
8	47.0	258969.8	0.0	0.0	0.	0.	38845.5	0.0	0.0
9	10.0	66533.6	0.0	0.0	0.	0.	9980.0	0.0	0.0
10	6.0	42111.1	0.0	0.0	0.	0.	6316.7	0.0	0.0
11	9.0	61185.2	0.0	0.0	0.	0.	9177.8	0.0	0.0
12	18.0	129277.0	0.0	0.0	0.	0.	19391.6	0.0	0.0
13	22.0	174128.8	0.0	0.0	0.	0.	26119.3	0.0	0.0
14	15.8	130646.2	0.0	0.0	0.	0.	19596.9	0.0	0.0
15	11.2	89755.9	0.0	0.0	0.	0.	13463.4	0.0	0.0
16	15.0	105805.8	0.0	0.0	0.	0.	15870.9	0.0	0.0
17	5.0	31221.5	0.0	0.0	0.	0.	4683.2	0.0	0.0
18	6.2	34204.1	0.0	0.0	0.	0.	5130.6	0.0	0.0
19	14.8	49165.3	0.0	0.0	0.	0.	7374.8	0.0	0.0
20	7.6	6129.5	0.0	0.0	0.	0.	919.4	0.0	0.0

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	346.853	1387.431
2	356.334	1383.224
3	411.066	1377.799
4	575.767	1418.090
5	613.237	1458.352
6	635.595	1499.542

Factor of Safety
*** 1.157 ***

```
1

          Failure Surface Specified By  6 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        346.853     1387.431
              2        356.334     1383.224
              3        411.066     1377.799
              4        575.767     1418.090
              5        613.237     1458.352
              6        635.595     1499.542


                 Factor of Safety
                ***    1.157   ***




          Failure Surface Specified By  6 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        346.853     1387.431
              2        356.334     1383.224
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              6        635.595     1499.542


                 Factor of Safety
                ***    1.157   ***



1

          Failure Surface Specified By  6 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        346.853     1387.431
              2        356.334     1383.224
              3        411.066     1377.799
              4        575.767     1418.090
              5        613.237     1458.352
              6        635.595     1499.542


                 Factor of Safety
                ***    1.157   ***




          Failure Surface Specified By  6 Coordinate Points


            Point      X-Surf      Y-Surf
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                 Factor of Safety
                ***    1.157   ***



1

          Failure Surface Specified By  6 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        346.853     1387.431
              2        356.334     1383.224
              3        411.066     1377.799
              4        575.767     1418.090
              5        613.237     1458.352
              6        635.595     1499.542


                 Factor of Safety
                ***    1.157   ***




          Failure Surface Specified By  6 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        346.853     1387.431
              2        356.334     1383.224
              3        411.066     1377.799
              4        575.767     1418.090
              5        613.237     1458.352
              6        635.595     1499.542


                 Factor of Safety
                ***    1.157   ***



1

          Failure Surface Specified By  6 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        346.853     1387.431
```

```
            2        356.334     1383.224
            3        411.066     1377.799
            4        575.767     1418.090
            5        613.237     1458.352
            6        635.595     1499.542


               Factor of Safety
              ***    1.157   ***




       Failure Surface Specified By  5 Coordinate Points


         Point      X-Surf      Y-Surf
          No.        (ft)        (ft)

            1        357.902     1393.237
            2        408.965     1388.361
            3        569.620     1420.941
            4        602.792     1464.811
            5        629.108     1499.079


               Factor of Safety
              ***    1.158   ***

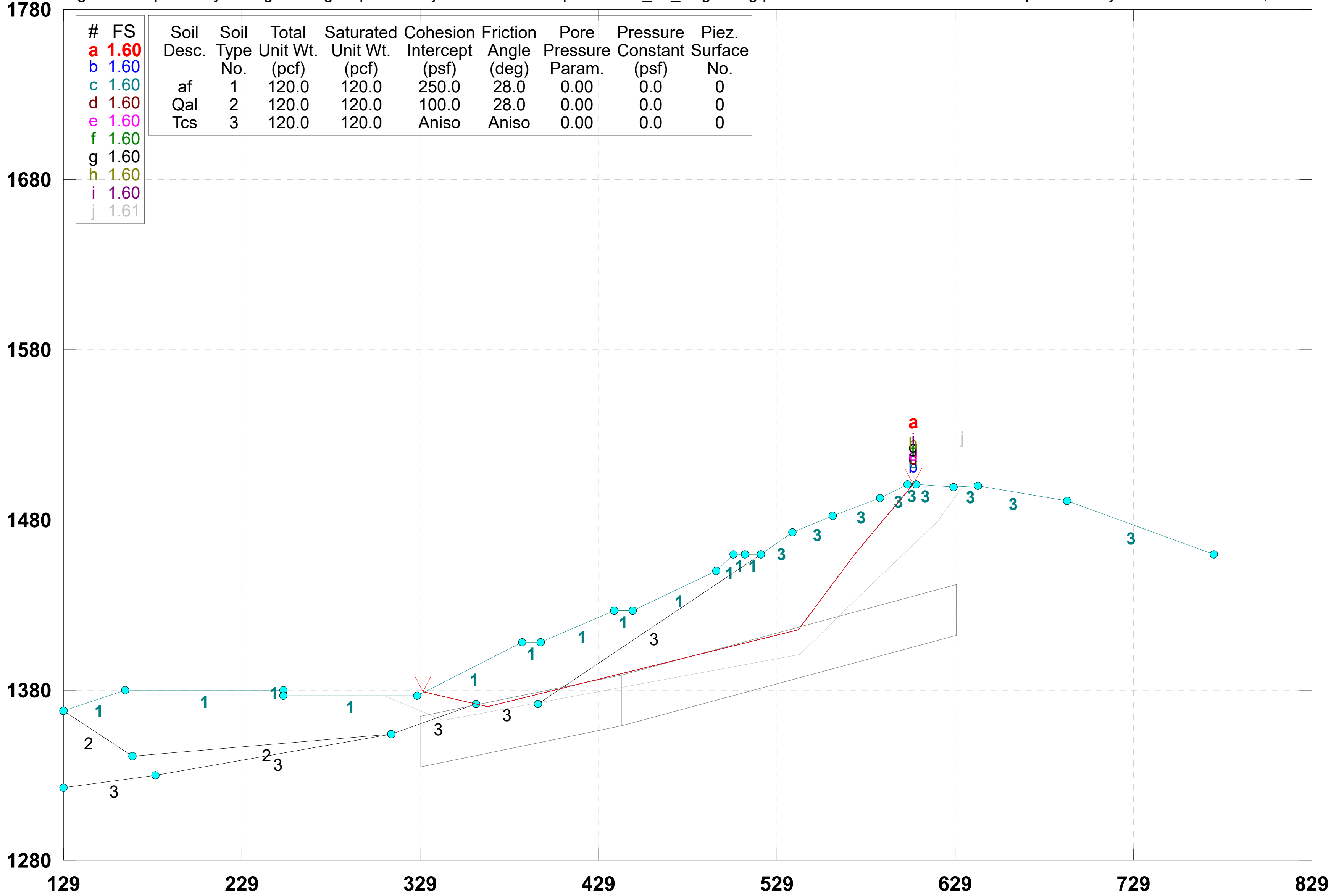




                   **** END OF GSTABL7 OUTPUT ****
```

Bouquet Canyon/21095-01/Section V-V'/ Static

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xvb2-1.pl2 Run By: LGC Geotechnical, Inc. 4/5/2022 10:03



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
af	1	120.0	120.0	250.0	28.0	0.00	0.0	0
Qal	2	120.0	120.0	100.0	28.0	0.00	0.0	0
Tcs	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=1.60

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/5/2022
Time of Run: 10:03AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2-1.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2-1.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2-1.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section V-V'/ Static

BOUNDARY COORDINATES

21 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	129.00	1368.00	164.00	1380.00	1
2	164.00	1380.00	252.00	1380.00	1
3	252.00	1380.00	252.10	1377.00	1
4	252.10	1377.00	327.00	1377.00	1
5	327.00	1377.00	386.00	1408.00	1
6	386.00	1408.00	397.00	1408.00	1
7	397.00	1408.00	438.00	1427.00	1
8	438.00	1427.00	448.00	1427.00	1
9	448.00	1427.00	495.00	1450.00	1
10	495.00	1450.00	505.00	1460.00	1
11	505.00	1460.00	511.00	1460.00	1
12	511.00	1460.00	520.00	1460.00	1
13	520.00	1460.00	538.00	1473.00	3
14	538.00	1473.00	560.00	1482.00	3
15	560.00	1482.00	587.00	1493.00	3
16	587.00	1493.00	602.00	1501.00	3
17	602.00	1501.00	607.00	1501.00	3
18	607.00	1501.00	628.00	1499.00	3
19	628.00	1499.00	642.00	1500.00	3
20	642.00	1500.00	692.00	1491.00	3
21	692.00	1491.00	774.00	1460.00	3
22	129.00	1368.00	168.00	1341.00	2
23	168.00	1341.00	313.00	1354.00	2
24	313.00	1354.00	360.00	1372.00	3
25	360.00	1372.00	395.00	1372.00	3
26	395.00	1372.00	520.00	1460.00	3
27	129.00	1323.00	181.00	1330.00	3
28	181.00	1330.00	313.00	1354.00	3

User Specified Y-Origin = 1280.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	100.0	28.0	0.00	0.0	0
3	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)

```
                1             10.0            250.00          32.00
                2             15.0            150.00          25.00
                3             90.0            250.00          32.00

          ANISOTROPIC SOIL NOTES:
             (1) An input value of 0.01 for C and/or Phi will cause Aniso
                 C and/or Phi to be ignored in that range.
             (2) An input value of 0.02 for Phi will set both Phi and
                 C equal to zero, with no water weight in the tension crack.
             (3) An input value of 0.03 for Phi will set both Phi and
                 C equal to zero, with water weight in the tension crack.


          Specified Peak Ground Acceleration Coefficient (A) =   0.150(g)
          Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
          Specified Vertical Earthquake Coefficient (kv) =   0.000(g)

          Specified Seismic Pore-Pressure Factor =   0.000

          EARTHQUAKE DATA HAS BEEN SUPPRESSED

          Janbus Empirical Coef is being used for the case of  c & phi both > 0
1


          A Critical Failure Surface Searching Method, Using A Random
          Technique For Generating Sliding Block Surfaces, Has Been
          Specified.


          4999 Trial Surfaces Have Been Generated.


          2 Boxes Specified For Generation Of Central Block Base


          Length Of Line Segments For Active And Passive Portions Of
          Sliding Block Is  55.0


          Box        X-Left     Y-Left    X-Right    Y-Right      Height
          No.         (ft)       (ft)       (ft)       (ft)        (ft)

           1         329.00    1350.00     442.00    1374.00      30.00
           2         442.10    1374.00     630.00    1427.00      30.00


          WARNING! The factor of safety calculation did not converge in 20 iterations.



          The Trial Failure Surface In Question Is Defined
          By The Following  6 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        382.59     1406.21
              2        387.20     1401.86
              3        428.89     1365.98
              4        491.40     1379.79
              5        492.10     1434.79
              6        496.93     1451.93


          Factor of Safety for the Preceding Surface is Between14.754 and14.747


          WARNING! The factor of safety calculation did not converge in 20 iterations.



          The Trial Failure Surface In Question Is Defined
          By The Following  6 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        382.59     1406.21
              2        387.20     1401.86
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             No.        (ft)        (ft)

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              2        387.20     1401.86
              3        428.89     1365.98
              4        491.40     1379.79
              5        492.10     1434.79
              6        496.93     1451.93
```

```
Factor of Safety for the Preceding Surface is Between14.754 and14.747

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following  6 Coordinate Points

  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1        382.59     1406.21
    2        387.20     1401.86
    3        428.89     1365.98
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   No.        (ft)        (ft)

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    2        387.20     1401.86
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    4        491.40     1379.79
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By The Following  6 Coordinate Points

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   No.        (ft)        (ft)

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    2        387.20     1401.86
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Factor of Safety for the Preceding Surface is Between14.754 and14.747

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The Trial Failure Surface In Question Is Defined
By The Following  6 Coordinate Points

  Point      X-Surf      Y-Surf
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    2        387.20     1401.86
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    5        492.10     1434.79
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By The Following  6 Coordinate Points

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    2        387.20     1401.86
    3        428.89     1365.98
    4        491.40     1379.79
    5        492.10     1434.79
    6        496.93     1451.93

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WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following  6 Coordinate Points

  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1        382.59     1406.21
    2        387.20     1401.86
    3        428.89     1365.98
    4        491.40     1379.79
    5        492.10     1434.79
    6        496.93     1451.93
```

Factor of Safety for the Preceding Surface is Between14.754 and14.747

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 4999

WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
Did Not Converge in 20 Iterations.

Number of Trial Surfaces with Non-Converged FS = 10

Number of Trial Surfaces With Valid FS = 4989

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 0.2 %

Statistical Data On All Valid FS Values:
FS Max = 18.080 FS Min = 1.596 FS Ave = 2.470
Standard Deviation = 1.153 Coefficient of Variation = 46.69 %

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	330.374	1378.773
2	366.789	1370.263
3	541.176	1415.809
4	572.918	1460.725
5	605.344	1501.000

Factor of Safety
*** 1.596 ***

Individual data on the 20 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	29.4	39319.6	0.0	0.0	0.	0.	0.0	0.0	0.0
2	0.2	657.0	0.0	0.0	0.	0.	0.0	0.0	0.0
3	6.8	20419.6	0.0	0.0	0.	0.	0.0	0.0	0.0
4	6.7	22765.1	0.0	0.0	0.	0.	0.0	0.0	0.0
5	12.6	46814.2	0.0	0.0	0.	0.	0.0	0.0	0.0
6	11.0	41293.7	0.0	0.0	0.	0.	0.0	0.0	0.0
7	10.7	39774.2	0.0	0.0	0.	0.	0.0	0.0	0.0
8	30.3	127469.2	0.0	0.0	0.	0.	0.0	0.0	0.0
9	10.0	44199.0	0.0	0.0	0.	0.	0.0	0.0	0.0
10	47.0	230614.2	0.0	0.0	0.	0.	0.0	0.0	0.0
11	10.0	59934.5	0.0	0.0	0.	0.	0.0	0.0	0.0
12	6.0	38056.4	0.0	0.0	0.	0.	0.0	0.0	0.0
13	9.0	54969.0	0.0	0.0	0.	0.	0.0	0.0	0.0
14	18.0	116362.1	0.0	0.0	0.	0.	0.0	0.0	0.0
15	3.2	22205.6	0.0	0.0	0.	0.	0.0	0.0	0.0
16	18.8	110733.7	0.0	0.0	0.	0.	0.0	0.0	0.0
17	12.9	51227.4	0.0	0.0	0.	0.	0.0	0.0	0.0
18	14.1	34913.6	0.0	0.0	0.	0.	0.0	0.0	0.0
19	15.0	17043.3	0.0	0.0	0.	0.	0.0	0.0	0.0
20	3.3	833.1	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	330.374	1378.773
2	366.789	1370.263
3	541.176	1415.809
4	572.918	1460.725
5	605.344	1501.000

Factor of Safety
*** 1.596 ***

1

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	330.374	1378.773
2	366.789	1370.263
3	541.176	1415.809
4	572.918	1460.725
5	605.344	1501.000

Factor of Safety
*** 1.596 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	330.374	1378.773
2	366.789	1370.263
3	541.176	1415.809
4	572.918	1460.725
5	605.344	1501.000

Factor of Safety

```
                  ***    1.596   ***



1


            Failure Surface Specified By  5 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        330.374     1378.773
                2        366.789     1370.263
                3        541.176     1415.809
                4        572.918     1460.725
                5        605.344     1501.000


                   Factor of Safety
                  ***    1.596   ***




            Failure Surface Specified By  5 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        330.374     1378.773
                2        366.789     1370.263
                3        541.176     1415.809
                4        572.918     1460.725
                5        605.344     1501.000


                   Factor of Safety
                  ***    1.596   ***



1


            Failure Surface Specified By  5 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        330.374     1378.773
                2        366.789     1370.263
                3        541.176     1415.809
                4        572.918     1460.725
                5        605.344     1501.000


                   Factor of Safety
                  ***    1.596   ***




            Failure Surface Specified By  5 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        330.374     1378.773
                2        366.789     1370.263
                3        541.176     1415.809
                4        572.918     1460.725
                5        605.344     1501.000


                   Factor of Safety
                  ***    1.596   ***



1


            Failure Surface Specified By  5 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        330.374     1378.773
                2        366.789     1370.263
                3        541.176     1415.809
                4        572.918     1460.725
                5        605.344     1501.000


                   Factor of Safety
                  ***    1.596   ***




            Failure Surface Specified By  6 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        308.772     1377.000
                2        341.601     1362.123
                3        541.498     1401.332
                4        580.386     1440.225
                5        619.259     1479.134
                6        632.597     1499.328


                   Factor of Safety
                  ***    1.611   ***

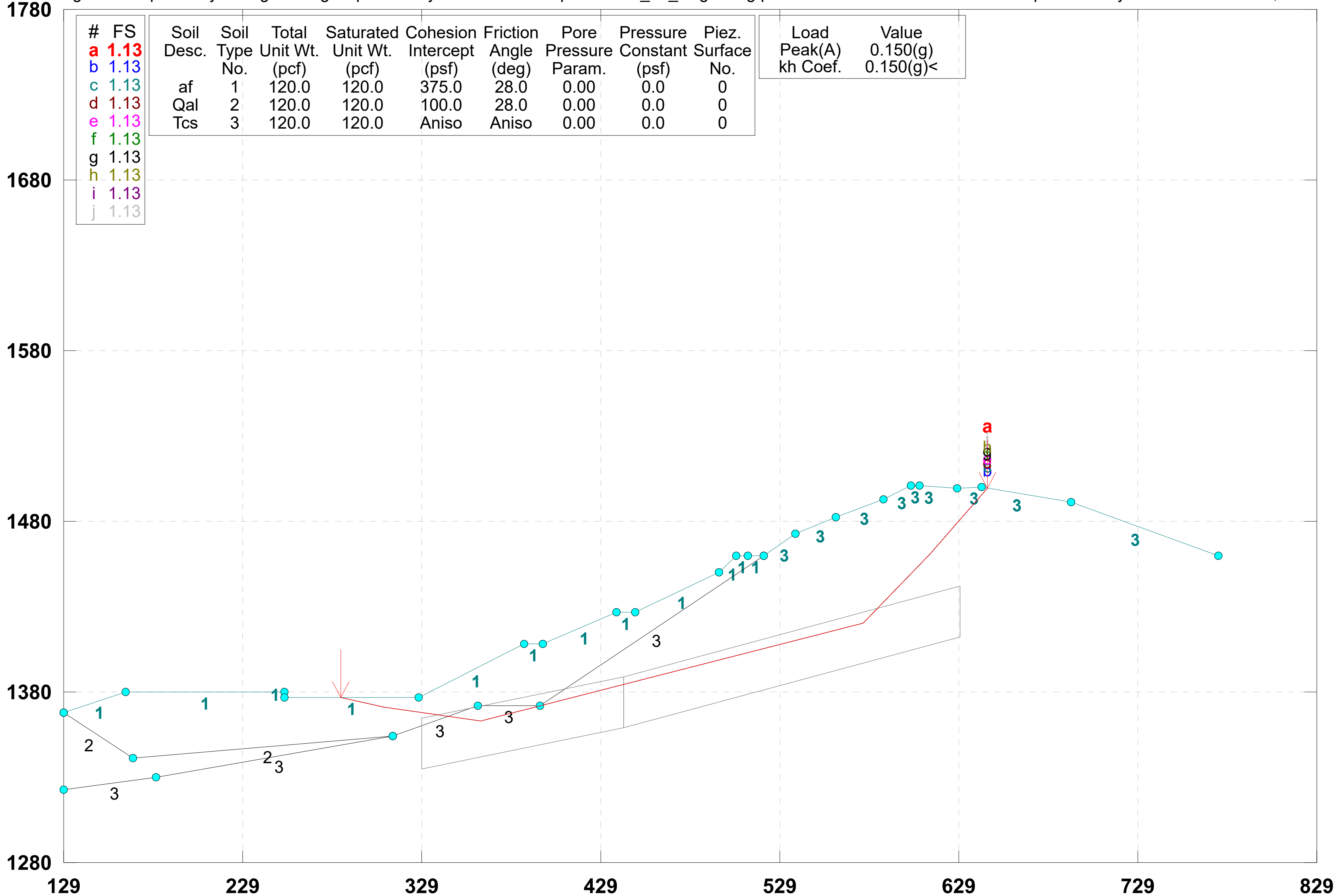





                       **** END OF GSTABL7 OUTPUT ****
```

Bouquet Canyon/21095-01/Section V-V'/ Seismic

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xvb2-1e.pl2 Run By: LGC Geotechnical, Inc. 4/5/2022 10:04



GSTABL7 v.2 FSmin=1.13

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/5/2022
Time of Run: 10:04AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2-1e.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2-1e.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2-1e.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section V-V'/ Seismic

BOUNDARY COORDINATES

21 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	129.00	1368.00	164.00	1380.00	1
2	164.00	1380.00	252.00	1380.00	1
3	252.00	1380.00	252.10	1377.00	1
4	252.10	1377.00	327.00	1377.00	1
5	327.00	1377.00	386.00	1408.00	1
6	386.00	1408.00	397.00	1408.00	1
7	397.00	1408.00	438.00	1427.00	1
8	438.00	1427.00	448.00	1427.00	1
9	448.00	1427.00	495.00	1450.00	1
10	495.00	1450.00	505.00	1460.00	1
11	505.00	1460.00	511.00	1460.00	1
12	511.00	1460.00	520.00	1460.00	1
13	520.00	1460.00	538.00	1473.00	3
14	538.00	1473.00	560.00	1482.00	3
15	560.00	1482.00	587.00	1493.00	3
16	587.00	1493.00	602.00	1501.00	3
17	602.00	1501.00	607.00	1501.00	3
18	607.00	1501.00	628.00	1499.00	3
19	628.00	1499.00	642.00	1500.00	3
20	642.00	1500.00	692.00	1491.00	3
21	692.00	1491.00	774.00	1460.00	3
22	129.00	1368.00	168.00	1341.00	2
23	168.00	1341.00	313.00	1354.00	2
24	313.00	1354.00	360.00	1372.00	3
25	360.00	1372.00	395.00	1372.00	3
26	395.00	1372.00	520.00	1460.00	3
27	129.00	1323.00	181.00	1330.00	3
28	181.00	1330.00	313.00	1354.00	3

User Specified Y-Origin = 1280.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	375.0	28.0	0.00	0.0	0
2	120.0	120.0	100.0	28.0	0.00	0.0	0
3	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)

1	10.0	250.00	32.00
2	15.0	150.00	25.00
3	90.0	250.00	32.00

ANISOTROPIC SOIL NOTES:
(1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
(2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
(3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

Specified Peak Ground Acceleration Coefficient (A) = 0.150(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)

Specified Seismic Pore-Pressure Factor = 0.000

Janbus Empirical Coef is being used for the case of c & phi both > 0

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

4999 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 55.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	329.00	1350.00	442.00	1374.00	30.00
2	442.10	1374.00	630.00	1427.00	30.00

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 7.731 FS Min = 1.125 FS Ave = 1.693
Standard Deviation = 0.567 Coefficient of Variation = 33.49 %

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	284.115	1377.000
2	307.794	1371.329
3	362.209	1363.328
4	575.398	1420.086
5	612.835	1460.378
6	645.327	1499.401

Factor of Safety
*** 1.125 ***

Individual data on the 25 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	23.7	8056.3	0.0	0.0	0.	0.	1208.5	0.0	0.0
2	19.2	16323.2	0.0	0.0	0.	0.	2448.5	0.0	0.0
3	17.3	29593.8	0.0	0.0	0.	0.	4439.1	0.0	0.0
4	15.7	47983.6	0.0	0.0	0.	0.	7197.5	0.0	0.0
5	2.2	8330.8	0.0	0.0	0.	0.	1249.6	0.0	0.0
6	23.8	100649.1	0.0	0.0	0.	0.	15097.4	0.0	0.0
7	8.8	39167.2	0.0	0.0	0.	0.	5875.1	0.0	0.0
8	0.4	1517.2	0.0	0.0	0.	0.	227.6	0.0	0.0
9	1.9	7988.8	0.0	0.0	0.	0.	1198.3	0.0	0.0
10	41.0	194102.2	0.0	0.0	0.	0.	29115.3	0.0	0.0
11	10.0	50595.3	0.0	0.0	0.	0.	7589.3	0.0	0.0
12	47.0	259864.1	0.0	0.0	0.	0.	38979.6	0.0	0.0
13	10.0	65985.2	0.0	0.0	0.	0.	9897.8	0.0	0.0
14	6.0	41657.6	0.0	0.0	0.	0.	6248.6	0.0	0.0
15	9.0	60330.0	0.0	0.0	0.	0.	9049.5	0.0	0.0
16	18.0	126936.6	0.0	0.0	0.	0.	19040.5	0.0	0.0
17	22.0	170127.9	0.0	0.0	0.	0.	25519.2	0.0	0.0
18	15.4	123989.8	0.0	0.0	0.	0.	18598.5	0.0	0.0
19	11.6	89528.4	0.0	0.0	0.	0.	13429.3	0.0	0.0
20	15.0	101439.8	0.0	0.0	0.	0.	15216.0	0.0	0.0
21	5.0	29755.5	0.0	0.0	0.	0.	4463.3	0.0	0.0
22	5.8	30447.5	0.0	0.0	0.	0.	4567.1	0.0	0.0
23	15.2	55025.8	0.0	0.0	0.	0.	8253.9	0.0	0.0
24	14.0	21002.7	0.0	0.0	0.	0.	3150.4	0.0	0.0
25	3.3	917.2	0.0	0.0	0.	0.	137.6	0.0	0.0

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	284.115	1377.000
2	307.794	1371.329
3	362.209	1363.328
4	575.398	1420.086
5	612.835	1460.378
6	645.327	1499.401

```
               Factor of Safety
              ***    1.125   ***



 1

          Failure Surface Specified By  6 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        284.115     1377.000
              2        307.794     1371.329
              3        362.209     1363.328
              4        575.398     1420.086
              5        612.835     1460.378
              6        645.327     1499.401


               Factor of Safety
              ***    1.125   ***




          Failure Surface Specified By  6 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        284.115     1377.000
              2        307.794     1371.329
              3        362.209     1363.328
              4        575.398     1420.086
              5        612.835     1460.378
              6        645.327     1499.401


               Factor of Safety
              ***    1.125   ***



 1

          Failure Surface Specified By  6 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        284.115     1377.000
              2        307.794     1371.329
              3        362.209     1363.328
              4        575.398     1420.086
              5        612.835     1460.378
              6        645.327     1499.401


               Factor of Safety
              ***    1.125   ***




          Failure Surface Specified By  6 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        284.115     1377.000
              2        307.794     1371.329
              3        362.209     1363.328
              4        575.398     1420.086
              5        612.835     1460.378
              6        645.327     1499.401


               Factor of Safety
              ***    1.125   ***



 1

          Failure Surface Specified By  6 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        284.115     1377.000
              2        307.794     1371.329
              3        362.209     1363.328
              4        575.398     1420.086
              5        612.835     1460.378
              6        645.327     1499.401


               Factor of Safety
              ***    1.125   ***




          Failure Surface Specified By  6 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        284.115     1377.000
              2        307.794     1371.329
              3        362.209     1363.328
              4        575.398     1420.086
              5        612.835     1460.378
              6        645.327     1499.401


               Factor of Safety
              ***    1.125   ***



 1

          Failure Surface Specified By  6 Coordinate Points

```

```
          Point      X-Surf      Y-Surf
           No.        (ft)        (ft)

            1        284.115     1377.000
            2        307.794     1371.329
            3        362.209     1363.328
            4        575.398     1420.086
            5        612.835     1460.378
            6        645.327     1499.401


               Factor of Safety
              ***    1.125   ***





        Failure Surface Specified By  6 Coordinate Points


          Point      X-Surf      Y-Surf
           No.        (ft)        (ft)

            1        284.115     1377.000
            2        307.794     1371.329
            3        362.209     1363.328
            4        575.398     1420.086
            5        612.835     1460.378
            6        645.327     1499.401


               Factor of Safety
              ***    1.125   ***

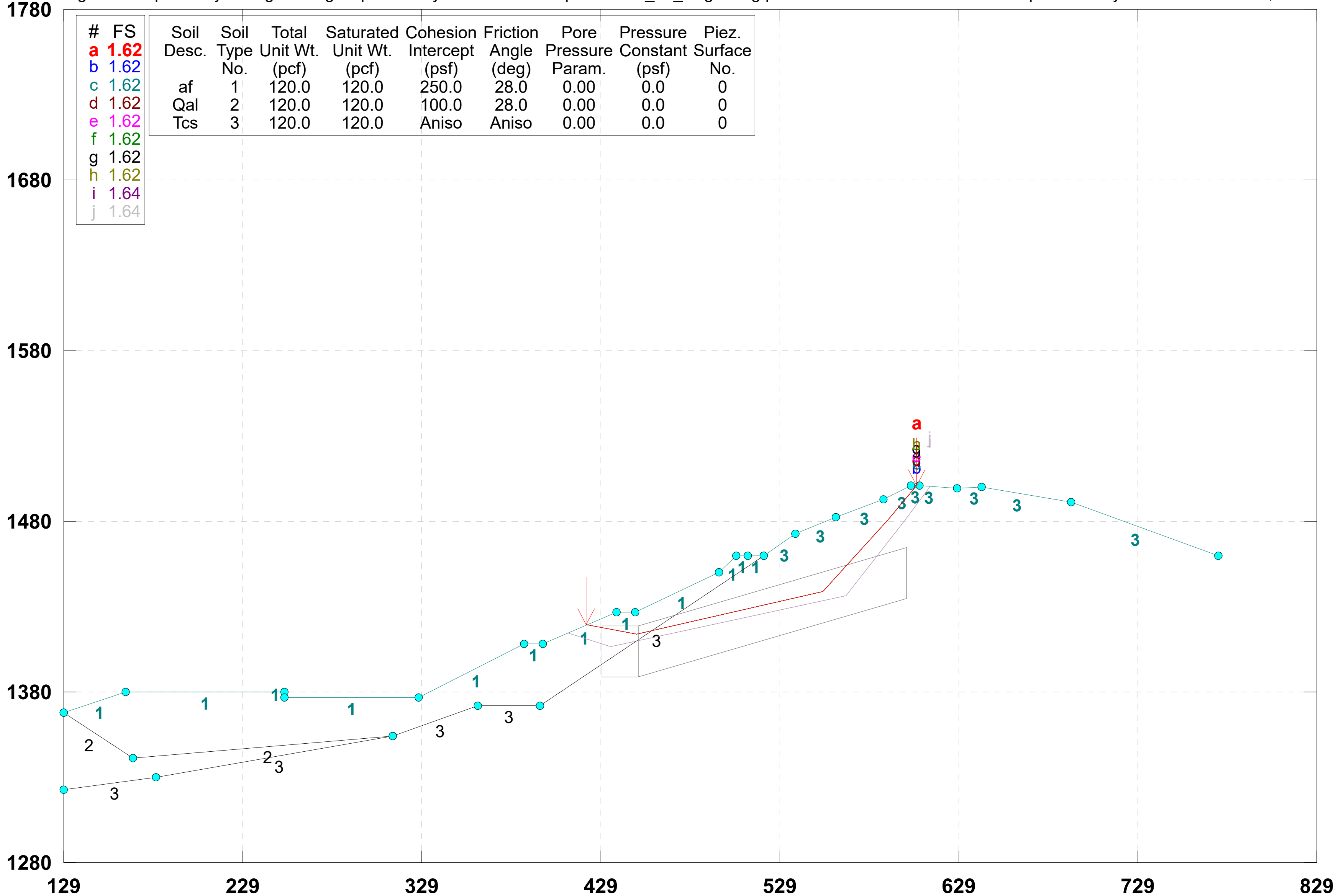




                   **** END OF GSTABL7 OUTPUT ****
```

Bouquet Canyon/21095-01/Section V-V'/ Static

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xvb2-2.pl2 Run By: LGC Geotechnical, Inc. 4/5/2022 10:05



GSTABL7 v.2 FSmin=1.62

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/5/2022
Time of Run: 10:05AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2-2.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2-2.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2-2.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section V-V'/ Static

BOUNDARY COORDINATES

21 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	129.00	1368.00	164.00	1380.00	1
2	164.00	1380.00	252.00	1380.00	1
3	252.00	1380.00	252.10	1377.00	1
4	252.10	1377.00	327.00	1377.00	1
5	327.00	1377.00	386.00	1408.00	1
6	386.00	1408.00	397.00	1408.00	1
7	397.00	1408.00	438.00	1427.00	1
8	438.00	1427.00	448.00	1427.00	1
9	448.00	1427.00	495.00	1450.00	1
10	495.00	1450.00	505.00	1460.00	1
11	505.00	1460.00	511.00	1460.00	1
12	511.00	1460.00	520.00	1460.00	1
13	520.00	1460.00	538.00	1473.00	3
14	538.00	1473.00	560.00	1482.00	3
15	560.00	1482.00	587.00	1493.00	3
16	587.00	1493.00	602.00	1501.00	3
17	602.00	1501.00	607.00	1501.00	3
18	607.00	1501.00	628.00	1499.00	3
19	628.00	1499.00	642.00	1500.00	3
20	642.00	1500.00	692.00	1491.00	3
21	692.00	1491.00	774.00	1460.00	3
22	129.00	1368.00	168.00	1341.00	2
23	168.00	1341.00	313.00	1354.00	2
24	313.00	1354.00	360.00	1372.00	3
25	360.00	1372.00	395.00	1372.00	3
26	395.00	1372.00	520.00	1460.00	3
27	129.00	1323.00	181.00	1330.00	3
28	181.00	1330.00	313.00	1354.00	3

User Specified Y-Origin = 1280.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	100.0	28.0	0.00	0.0	0
3	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)

```
        1              10.0             250.00         32.00
        2              15.0             150.00         25.00
        3              90.0             250.00         32.00

    ANISOTROPIC SOIL NOTES:
       (1) An input value of 0.01 for C and/or Phi will cause Aniso
           C and/or Phi to be ignored in that range.
       (2) An input value of 0.02 for Phi will set both Phi and
           C equal to zero, with no water weight in the tension crack.
       (3) An input value of 0.03 for Phi will set both Phi and
           C equal to zero, with water weight in the tension crack.


    Janbus Empirical Coef is being used for the case of  c & phi both > 0
1


    A Critical Failure Surface Searching Method, Using A Random
    Technique For Generating Sliding Block Surfaces, Has Been
    Specified.


    4999 Trial Surfaces Have Been Generated.


    2 Boxes Specified For Generation Of Central Block Base


    Length Of Line Segments For Active And Passive Portions Of
    Sliding Block Is  55.0


    Box        X-Left     Y-Left    X-Right    Y-Right      Height
    No.         (ft)       (ft)       (ft)       (ft)        (ft)

     1         430.00    1404.00     450.00    1404.00      30.00
     2         450.10    1404.00     600.00    1450.00      30.00


    WARNING! The factor of safety calculation did not converge in 20 iterations.



    The Trial Failure Surface In Question Is Defined
    By The Following  4 Coordinate Points


      Point      X-Surf      Y-Surf
       No.        (ft)        (ft)

        1        426.81     1421.81
        2        446.49     1403.05
        3        487.86     1402.67
        4        488.22     1446.68


    Factor of Safety for the Preceding Surface is Between48.909 and48.901


    WARNING! The factor of safety calculation did not converge in 20 iterations.



    The Trial Failure Surface In Question Is Defined
    By The Following  4 Coordinate Points


      Point      X-Surf      Y-Surf
       No.        (ft)        (ft)

        1        426.81     1421.81
        2        446.49     1403.05
        3        487.86     1402.67
        4        488.22     1446.68


    Factor of Safety for the Preceding Surface is Between48.909 and48.901


    WARNING! The factor of safety calculation did not converge in 20 iterations.



    The Trial Failure Surface In Question Is Defined
    By The Following  4 Coordinate Points


      Point      X-Surf      Y-Surf
       No.        (ft)        (ft)

        1        426.81     1421.81
        2        446.49     1403.05
        3        487.86     1402.67
        4        488.22     1446.68


    Factor of Safety for the Preceding Surface is Between48.909 and48.901


    WARNING! The factor of safety calculation did not converge in 20 iterations.



    The Trial Failure Surface In Question Is Defined
    By The Following  4 Coordinate Points


      Point      X-Surf      Y-Surf
       No.        (ft)        (ft)

        1        426.81     1421.81
        2        446.49     1403.05
        3        487.86     1402.67
        4        488.22     1446.68


    Factor of Safety for the Preceding Surface is Between48.909 and48.901


    WARNING! The factor of safety calculation did not converge in 20 iterations.



    The Trial Failure Surface In Question Is Defined
    By The Following  4 Coordinate Points


      Point      X-Surf      Y-Surf
       No.        (ft)        (ft)

        1        426.81     1421.81
        2        446.49     1403.05
```

3	487.86	1402.67
4	488.22	1446.68

Factor of Safety for the Preceding Surface is Between48.909 and48.901

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	426.81	1421.81
2	446.49	1403.05
3	487.86	1402.67
4	488.22	1446.68

Factor of Safety for the Preceding Surface is Between48.909 and48.901

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	426.81	1421.81
2	446.49	1403.05
3	487.86	1402.67
4	488.22	1446.68

Factor of Safety for the Preceding Surface is Between48.909 and48.901

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	426.81	1421.81
2	446.49	1403.05
3	487.86	1402.67
4	488.22	1446.68

Factor of Safety for the Preceding Surface is Between48.909 and48.901

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 4999

WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
Did Not Converge in 20 Iterations.

Number of Trial Surfaces with Non-Converged FS = 8

Number of Trial Surfaces With Valid FS = 4991

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 0.2 %

Statistical Data On All Valid FS Values:
FS **Max** = 28.257 FS **Min** = 1.621 FS Ave = 2.714
Standard Deviation = 1.686 Coefficient of Variation = 62.12 %

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	420.945	1419.096
2	449.374	1413.761
3	553.367	1438.991
4	589.159	1480.751
5	605.510	1501.000

Factor of Safety
*** 1.621 ***

Individual data on the 15 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force **Norm** (lbs)	Tie Force **Tan** (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	17.1	11363.4	0.0	0.0	0.	0.	0.0	0.0	0.0
2	10.0	14451.1	0.0	0.0	0.	0.	0.0	0.0	0.0
3	1.4	2216.6	0.0	0.0	0.	0.	0.0	0.0	0.0
4	7.5	13441.9	0.0	0.0	0.	0.	0.0	0.0	0.0
5	38.1	93543.3	0.0	0.0	0.	0.	0.0	0.0	0.0
6	10.0	34747.6	0.0	0.0	0.	0.	0.0	0.0	0.0
7	6.0	23051.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	9.0	32611.5	0.0	0.0	0.	0.	0.0	0.0	0.0
9	18.0	72188.6	0.0	0.0	0.	0.	0.0	0.0	0.0
10	15.4	71946.1	0.0	0.0	0.	0.	0.0	0.0	0.0

```
  11      6.6   30074.9     0.0     0.0       0.      0.     0.0     0.0      0.0
  12     27.0   81062.5     0.0     0.0       0.      0.     0.0     0.0      0.0
  13      2.2    3649.9     0.0     0.0       0.      0.     0.0     0.0      0.0
  14     12.8   13673.3     0.0     0.0       0.      0.     0.0     0.0      0.0
  15      3.5     915.2     0.0     0.0       0.      0.     0.0     0.0      0.0

          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        420.945     1419.096
              2        449.374     1413.761
              3        553.367     1438.991
              4        589.159     1480.751
              5        605.510     1501.000


                 Factor of Safety
                ***    1.621   ***



1


          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        420.945     1419.096
              2        449.374     1413.761
              3        553.367     1438.991
              4        589.159     1480.751
              5        605.510     1501.000


                 Factor of Safety
                ***    1.621   ***




          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        420.945     1419.096
              2        449.374     1413.761
              3        553.367     1438.991
              4        589.159     1480.751
              5        605.510     1501.000


                 Factor of Safety
                ***    1.621   ***



1


          Failure Surface Specified By  5 Coordinate Points



            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        420.945     1419.096
              2        449.374     1413.761
              3        553.367     1438.991
              4        589.159     1480.751
              5        605.510     1501.000


                 Factor of Safety
                ***    1.621   ***






          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        420.945     1419.096
              2        449.374     1413.761
              3        553.367     1438.991
              4        589.159     1480.751
              5        605.510     1501.000


                 Factor of Safety
                ***    1.621   ***



1


          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        420.945     1419.096
              2        449.374     1413.761
              3        553.367     1438.991
              4        589.159     1480.751
              5        605.510     1501.000


                 Factor of Safety
                ***    1.621   ***




          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        420.945     1419.096
              2        449.374     1413.761
              3        553.367     1438.991
```

```
              4        589.159     1480.751
              5        605.510     1501.000


                 Factor of Safety
                ***    1.621   ***



1

         Failure Surface Specified By  5 Coordinate Points


           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)

              1        410.622     1414.313
              2        434.408     1406.693
              3        566.212     1436.744
              4        598.989     1480.910
              5        613.116     1500.417


                 Factor of Safety
                ***    1.643   ***




         Failure Surface Specified By  5 Coordinate Points


           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)

              1        410.622     1414.313
              2        434.408     1406.693
              3        566.212     1436.744
              4        598.989     1480.910
              5        613.116     1500.417


                 Factor of Safety
                ***    1.643   ***

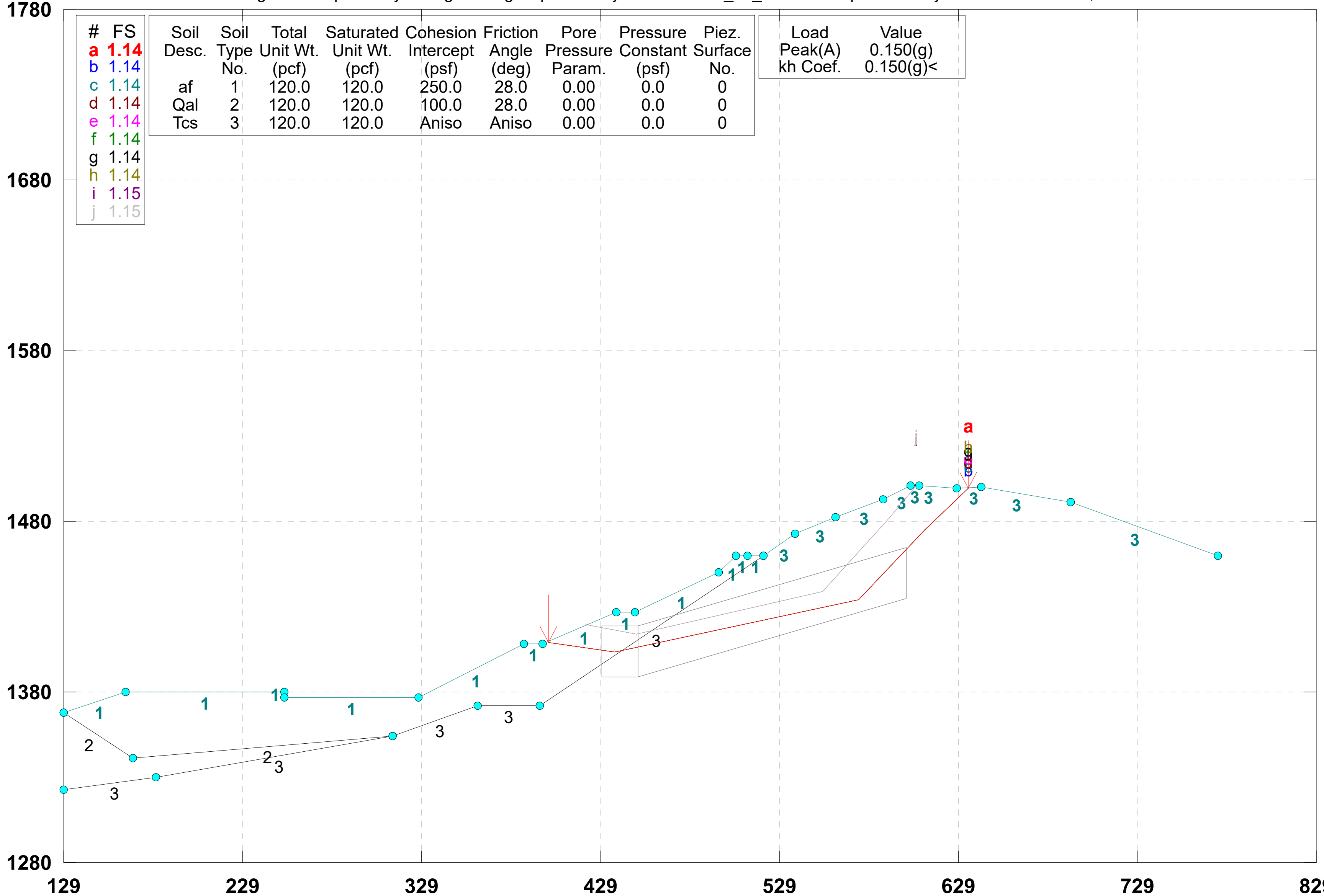




                     **** END OF GSTABL7 OUTPUT ****
```

Bouquet Canyon/21095-01/Section V-V'/ Seismic

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\sec v-v'\2022_04_05\xvb2-2e.pl2 Run By: LGC Geotechnical, Inc. 4/8/2022 11:10AM



GSTABL7 v.2 FSmin=1.14

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****
**

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****
**

Analysis Run Date: 4/8/2022
Time of Run: 11:10AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2-2e.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2-2e.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2-2e.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section V-V'/ Seismic

BOUNDARY COORDINATES

21 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	129.00	1368.00	164.00	1380.00	1
2	164.00	1380.00	252.00	1380.00	1
3	252.00	1380.00	252.10	1377.00	1
4	252.10	1377.00	327.00	1377.00	1
5	327.00	1377.00	386.00	1408.00	1
6	386.00	1408.00	397.00	1408.00	1
7	397.00	1408.00	438.00	1427.00	1
8	438.00	1427.00	448.00	1427.00	1
9	448.00	1427.00	495.00	1450.00	1
10	495.00	1450.00	505.00	1460.00	1
11	505.00	1460.00	511.00	1460.00	1
12	511.00	1460.00	520.00	1460.00	1
13	520.00	1460.00	538.00	1473.00	3
14	538.00	1473.00	560.00	1482.00	3
15	560.00	1482.00	587.00	1493.00	3
16	587.00	1493.00	602.00	1501.00	3
17	602.00	1501.00	607.00	1501.00	3
18	607.00	1501.00	628.00	1499.00	3
19	628.00	1499.00	642.00	1500.00	3
20	642.00	1500.00	692.00	1491.00	3
21	692.00	1491.00	774.00	1460.00	3
22	129.00	1368.00	168.00	1341.00	2
23	168.00	1341.00	313.00	1354.00	2
24	313.00	1354.00	360.00	1372.00	3
25	360.00	1372.00	395.00	1372.00	3
26	395.00	1372.00	520.00	1460.00	3
27	129.00	1323.00	181.00	1330.00	3
28	181.00	1330.00	313.00	1354.00	3

User Specified Y-Origin = 1280.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	100.0	28.0	0.00	0.0	0
3	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

1 soil type(s)

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)

1	10.0	250.00	32.00
2	15.0	150.00	25.00
3	90.0	250.00	32.00

ANISOTROPIC SOIL NOTES:
(1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
(2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
(3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

Specified Peak Ground Acceleration Coefficient (A) = 0.150(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)

Specified Seismic Pore-Pressure Factor = 0.000

Janbus Empirical Coef is being used for the case of c & phi both > 0
1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

4999 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 55.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	430.00	1404.00	450.00	1404.00	30.00
2	450.10	1404.00	600.00	1450.00	30.00

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	426.81	1421.81
2	446.49	1403.05
3	487.86	1402.67
4	488.22	1446.68

Factor of Safety for the Preceding Surface is Between19.512 and19.461

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	426.81	1421.81
2	446.49	1403.05
3	487.86	1402.67
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The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

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2	446.49	1403.05
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4	488.22	1446.68

Factor of Safety for the Preceding Surface is Between19.512 and19.461

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	426.81	1421.81
2	446.49	1403.05
3	487.86	1402.67
4	488.22	1446.68

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The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
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2	446.49	1403.05
3	487.86	1402.67
4	488.22	1446.68

Factor of Safety for the Preceding Surface is Between19.512 and19.461

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	426.81	1421.81
2	446.49	1403.05
3	487.86	1402.67
4	488.22	1446.68

Factor of Safety for the Preceding Surface is Between19.512 and19.461

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 4999

WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
Did Not Converge in 20 Iterations.

Number of Trial Surfaces with Non-Converged FS = 8

Number of Trial Surfaces With Valid FS = 4991

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 0.2 %

Statistical Data On All Valid FS Values:
FS **Max** = 16.243 FS **Min** = 1.140 FS Ave = 1.868
Standard Deviation = 0.976 Coefficient of Variation = 52.23 %

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	399.754	1409.276
2	437.191	1403.310
3	573.605	1434.340
4	610.291	1475.316
5	634.376	1499.455

Factor of Safety
*** 1.140 ***

Individual data on the 17 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force **Norm** (lbs)	Tie Force **Tan** (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge **Load** (lbs)
1	37.4	52371.6	0.0	0.0	0.	0.	7855.7	0.0	0.0
2	0.8	2272.3	0.0	0.0	0.	0.	340.8	0.0	0.0
3	2.6	7141.8	0.0	0.0	0.	0.	1071.3	0.0	0.0
4	7.4	19700.9	0.0	0.0	0.	0.	2955.1	0.0	0.0

```
     5    47.0  154457.7     0.0     0.0      0.     0. 23168.6     0.0      0.0
     6    10.0   44883.8     0.0     0.0      0.     0.  6732.6     0.0      0.0
     7     6.0   29220.1     0.0     0.0      0.     0.  4383.0     0.0      0.0
     8     9.0   41987.6     0.0     0.0      0.     0.  6298.1     0.0      0.0
     9    18.0   91382.3     0.0     0.0      0.     0. 13707.4     0.0      0.0
    10    22.0  128719.0     0.0     0.0      0.     0. 19307.9     0.0      0.0
    11    13.6   84859.1     0.0     0.0      0.     0. 12728.9     0.0      0.0
    12    13.4   77881.7     0.0     0.0      0.     0. 11682.3     0.0      0.0
    13    15.0   70778.8     0.0     0.0      0.     0. 10616.8     0.0      0.0
    14     5.0   19291.3     0.0     0.0      0.     0.  2893.7     0.0      0.0
    15     3.3   10807.6     0.0     0.0      0.     0.  1621.1     0.0      0.0
    16    17.7   33262.6     0.0     0.0      0.     0.  4989.4     0.0      0.0
    17     6.4    2270.6     0.0     0.0      0.     0.   340.6     0.0      0.0

          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        399.754     1409.276
              2        437.191     1403.310
              3        573.605     1434.340
              4        610.291     1475.316
              5        634.376     1499.455


                 Factor of Safety
                ***    1.140   ***



1


          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        399.754     1409.276
              2        437.191     1403.310
              3        573.605     1434.340
              4        610.291     1475.316
              5        634.376     1499.455


                 Factor of Safety
                ***    1.140   ***




          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        399.754     1409.276
              2        437.191     1403.310
              3        573.605     1434.340
              4        610.291     1475.316
              5        634.376     1499.455


                 Factor of Safety
                ***    1.140   ***



1


          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        399.754     1409.276
              2        437.191     1403.310
              3        573.605     1434.340
              4        610.291     1475.316
              5        634.376     1499.455


                 Factor of Safety
                ***    1.140   ***




          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        399.754     1409.276
              2        437.191     1403.310
              3        573.605     1434.340
              4        610.291     1475.316
              5        634.376     1499.455


                 Factor of Safety
                ***    1.140   ***



1


          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        399.754     1409.276
              2        437.191     1403.310
              3        573.605     1434.340
              4        610.291     1475.316
              5        634.376     1499.455


                 Factor of Safety
                ***    1.140   ***




          Failure Surface Specified By  5 Coordinate Points
```

```
       Point      X-Surf      Y-Surf
        No.        (ft)        (ft)

         1        399.754     1409.276
         2        437.191     1403.310
         3        573.605     1434.340
         4        610.291     1475.316
         5        634.376     1499.455


            Factor of Safety
           ***    1.140   ***



1

     Failure Surface Specified By  5 Coordinate Points


       Point      X-Surf      Y-Surf
        No.        (ft)        (ft)

         1        420.945     1419.096
         2        449.374     1413.761
         3        553.367     1438.991
         4        589.159     1480.751
         5        605.510     1501.000


            Factor of Safety
           ***    1.146   ***




     Failure Surface Specified By  5 Coordinate Points


       Point      X-Surf      Y-Surf
        No.        (ft)        (ft)

         1        420.945     1419.096
         2        449.374     1413.761
         3        553.367     1438.991
         4        589.159     1480.751
         5        605.510     1501.000


            Factor of Safety
           ***    1.146   ***

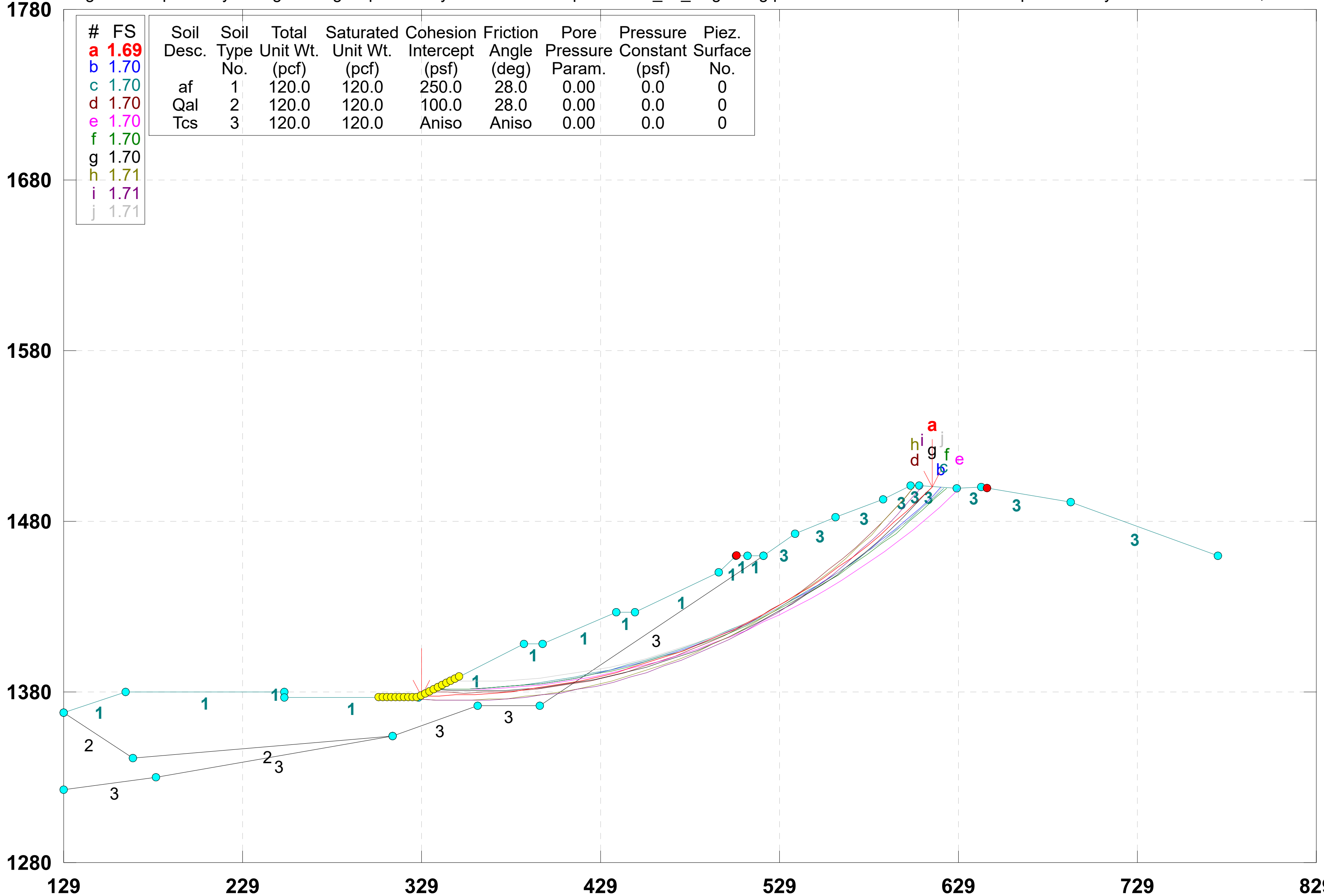





               **** END OF GSTABL7 OUTPUT ****
```

Bouquet Canyon/21095-01/Section V-V'/ Static

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xvc2.pl2 Run By: LGC Geotechnical, Inc. 4/5/2022 10:05A



GSTABL7 v.2 FSmin=1.69
Safety Factors Are Calculated By The Modified Bishop Method

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/5/2022
Time of Run: 10:05AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvc2.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvc2.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvc2.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section V-V'/ Static

BOUNDARY COORDINATES

21 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	129.00	1368.00	164.00	1380.00	1
2	164.00	1380.00	252.00	1380.00	1
3	252.00	1380.00	252.10	1377.00	1
4	252.10	1377.00	327.00	1377.00	1
5	327.00	1377.00	386.00	1408.00	1
6	386.00	1408.00	397.00	1408.00	1
7	397.00	1408.00	438.00	1427.00	1
8	438.00	1427.00	448.00	1427.00	1
9	448.00	1427.00	495.00	1450.00	1
10	495.00	1450.00	505.00	1460.00	1
11	505.00	1460.00	511.00	1460.00	1
12	511.00	1460.00	520.00	1460.00	1
13	520.00	1460.00	538.00	1473.00	3
14	538.00	1473.00	560.00	1482.00	3
15	560.00	1482.00	587.00	1493.00	3
16	587.00	1493.00	602.00	1501.00	3
17	602.00	1501.00	607.00	1501.00	3
18	607.00	1501.00	628.00	1499.00	3
19	628.00	1499.00	642.00	1500.00	3
20	642.00	1500.00	692.00	1491.00	3
21	692.00	1491.00	774.00	1460.00	3
22	129.00	1368.00	168.00	1341.00	2
23	168.00	1341.00	313.00	1354.00	2
24	313.00	1354.00	360.00	1372.00	3
25	360.00	1372.00	395.00	1372.00	3
26	395.00	1372.00	520.00	1460.00	3
27	129.00	1323.00	181.00	1330.00	3
28	181.00	1330.00	313.00	1354.00	3

User Specified Y-Origin = 1280.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	100.0	28.0	0.00	0.0	0
3	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)

1	10.0	250.00	32.00
2	15.0	150.00	25.00
3	90.0	250.00	32.00

ANISOTROPIC SOIL NOTES:

(1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.

(2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.

(3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

4980 Trial Surfaces Have Been Generated.

249 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced Along The Ground Surface Between X = 305.00(ft) and X = 350.00(ft)

Each Surface Terminates Between X = 505.00(ft) and X = 645.00(ft)

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00(ft)

10.00(ft) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Total Number of Trial Surfaces Attempted = 4980

Number of Trial Surfaces With Valid FS = 4980

Statistical Data On All Valid FS Values:

FS Max = 3.488 FS Min = 1.689 FS Ave = 2.400

Standard Deviation = 0.411 Coefficient of Variation = 17.13 %

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	328.684	1377.885
2	338.684	1377.818
3	348.682	1378.016
4	358.671	1378.479
5	368.645	1379.207
6	378.595	1380.200
7	388.516	1381.456
8	398.400	1382.974
9	408.240	1384.754
10	418.030	1386.795
11	427.762	1389.094
12	437.430	1391.651
13	447.026	1394.463
14	456.545	1397.529
15	465.978	1400.846
16	475.321	1404.412
17	484.566	1408.224
18	493.706	1412.281
19	502.736	1416.578
20	511.648	1421.114
21	520.437	1425.884
22	529.096	1430.885
23	537.620	1436.115
24	546.002	1441.568
25	554.236	1447.242
26	562.317	1453.133
27	570.239	1459.235
28	577.997	1465.546
29	585.584	1472.060
30	592.996	1478.773
31	600.227	1485.681
32	607.272	1492.777
33	614.127	1500.058
34	614.343	1500.301

Circle Center At X = 336.215 ; Y = 1754.814 ; and Radius = 377.005

Factor of Safety

*** 1.689 ***

Individual data on the 47 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.0	3192.6	0.0	0.0	0.	0.	0.0	0.0	0.0
2	10.0	9416.5	0.0	0.0	0.	0.	0.0	0.0	0.0
3	10.0	15306.0	0.0	0.0	0.	0.	0.0	0.0	0.0
4	10.0	20845.6	0.0	0.0	0.	0.	0.0	0.0	0.0
5	10.0	26021.1	0.0	0.0	0.	0.	0.0	0.0	0.0
6	7.4	22557.5	0.0	0.0	0.	0.	0.0	0.0	0.0
7	2.5	8062.8	0.0	0.0	0.	0.	0.0	0.0	0.0
8	8.5	26360.5	0.0	0.0	0.	0.	0.0	0.0	0.0
9	1.4	4277.4	0.0	0.0	0.	0.	0.0	0.0	0.0
10	9.8	31958.9	0.0	0.0	0.	0.	0.0	0.0	0.0
11	6.9	24388.7	0.0	0.0	0.	0.	0.0	0.0	0.0
12	2.9	10504.8	0.0	0.0	0.	0.	0.0	0.0	0.0
13	9.7	37436.5	0.0	0.0	0.	0.	0.0	0.0	0.0
14	9.7	39586.7	0.0	0.0	0.	0.	0.0	0.0	0.0
15	0.6	2404.3	0.0	0.0	0.	0.	0.0	0.0	0.0

16	9.0	36674.5	0.0	0.0	0.	0.	0.0	0.0	0.0
17	1.0	3784.0	0.0	0.0	0.	0.	0.0	0.0	0.0
18	8.5	33773.2	0.0	0.0	0.	0.	0.0	0.0	0.0
19	9.4	38832.5	0.0	0.0	0.	0.	0.0	0.0	0.0
20	9.3	39748.9	0.0	0.0	0.	0.	0.0	0.0	0.0
21	9.2	40285.1	0.0	0.0	0.	0.	0.0	0.0	0.0
22	9.1	40449.0	0.0	0.0	0.	0.	0.0	0.0	0.0
23	1.3	5759.9	0.0	0.0	0.	0.	0.0	0.0	0.0
24	7.7	36323.4	0.0	0.0	0.	0.	0.0	0.0	0.0
25	2.3	11335.1	0.0	0.0	0.	0.	0.0	0.0	0.0
26	6.0	29334.8	0.0	0.0	0.	0.	0.0	0.0	0.0
27	0.6	3036.2	0.0	0.0	0.	0.	0.0	0.0	0.0
28	8.4	36702.4	0.0	0.0	0.	0.	0.0	0.0	0.0
29	0.4	1803.1	0.0	0.0	0.	0.	0.0	0.0	0.0
30	8.7	36429.6	0.0	0.0	0.	0.	0.0	0.0	0.0
31	8.5	36973.1	0.0	0.0	0.	0.	0.0	0.0	0.0
32	0.4	1670.4	0.0	0.0	0.	0.	0.0	0.0	0.0
33	8.0	34252.7	0.0	0.0	0.	0.	0.0	0.0	0.0
34	8.2	33153.9	0.0	0.0	0.	0.	0.0	0.0	0.0
35	5.8	21771.6	0.0	0.0	0.	0.	0.0	0.0	0.0
36	2.3	8393.3	0.0	0.0	0.	0.	0.0	0.0	0.0
37	7.9	26972.9	0.0	0.0	0.	0.	0.0	0.0	0.0
38	7.8	23607.9	0.0	0.0	0.	0.	0.0	0.0	0.0
39	7.6	20097.8	0.0	0.0	0.	0.	0.0	0.0	0.0
40	1.4	3400.7	0.0	0.0	0.	0.	0.0	0.0	0.0
41	6.0	13339.4	0.0	0.0	0.	0.	0.0	0.0	0.0
42	7.2	13796.1	0.0	0.0	0.	0.	0.0	0.0	0.0
43	1.8	2969.3	0.0	0.0	0.	0.	0.0	0.0	0.0
44	5.0	6609.1	0.0	0.0	0.	0.	0.0	0.0	0.0
45	0.3	272.5	0.0	0.0	0.	0.	0.0	0.0	0.0
46	6.9	3479.5	0.0	0.0	0.	0.	0.0	0.0	0.0
47	0.2	3.4	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	335.789	1381.618
2	345.789	1381.518
3	355.787	1381.683
4	365.778	1382.112
5	375.754	1382.805
6	385.708	1383.763
7	395.634	1384.983
8	405.523	1386.466
9	415.370	1388.210
10	425.167	1390.214
11	434.908	1392.476
12	444.585	1394.996
13	454.192	1397.771
14	463.723	1400.799
15	473.170	1404.078
16	482.527	1407.606
17	491.787	1411.381
18	500.944	1415.399
19	509.992	1419.659
20	518.923	1424.156
21	527.733	1428.888
22	536.414	1433.852
23	544.960	1439.044
24	553.367	1444.460
25	561.627	1450.096
26	569.735	1455.950
27	577.685	1462.016
28	585.472	1468.290
29	593.090	1474.768
30	600.534	1481.446
31	607.798	1488.318
32	614.878	1495.380
33	619.124	1499.845

Circle Center At X = 344.570 ; Y = 1759.298 ; and Radius = 377.782

Factor of Safety
*** 1.697 ***

1

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	335.789	1381.618
2	345.789	1381.644
3	355.785	1381.924
4	365.771	1382.457
5	375.740	1383.243
6	385.686	1384.281
7	395.603	1385.572
8	405.483	1387.114
9	415.321	1388.906
10	425.111	1390.946
11	434.845	1393.235
12	444.519	1395.769
13	454.125	1398.548
14	463.657	1401.570
15	473.110	1404.833
16	482.477	1408.334
17	491.752	1412.072
18	500.930	1416.044
19	510.004	1420.247
20	518.968	1424.679
21	527.817	1429.337
22	536.545	1434.218
23	545.146	1439.318
24	553.615	1444.636
25	561.947	1450.166
26	570.135	1455.906
27	578.176	1461.852
28	586.063	1467.999
29	593.792	1474.345
30	601.357	1480.885
31	608.754	1487.614
32	615.977	1494.529
33	621.072	1499.660

Circle Center At X = 339.766 ; Y = 1775.850 ; and Radius = 394.252

Factor of Safety
*** 1.700 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	333.421	1380.374
2	343.404	1379.800
3	353.401	1379.545
4	363.401	1379.607
5	373.394	1379.987
6	383.369	1380.684
7	393.318	1381.698
8	403.229	1383.027
9	413.093	1384.670
10	422.900	1386.627
11	432.640	1388.893
12	442.302	1391.469
13	451.878	1394.349
14	461.358	1397.533
15	470.732	1401.016
16	479.990	1404.796
17	489.124	1408.868
18	498.123	1413.227
19	506.980	1417.871
20	515.684	1422.794
21	524.228	1427.990
22	532.602	1433.456
23	540.798	1439.185
24	548.808	1445.172
25	556.624	1451.410
26	564.238	1457.893
27	571.642	1464.615
28	578.828	1471.568
29	585.790	1478.747
30	592.520	1486.143
31	599.012	1493.749
32	604.813	1501.000

Circle Center At X = 356.455 ; Y = 1694.159 ; and Radius = 314.630

Factor of Safety
*** 1.701 ***

1

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	335.789	1381.618
2	345.788	1381.448
3	355.788	1381.530
4	365.782	1381.864
5	375.765	1382.449
6	385.730	1383.284
7	395.671	1384.370
8	405.581	1385.706
9	415.455	1387.291
10	425.285	1389.123
11	435.067	1391.203
12	444.793	1393.527
13	454.457	1396.096
14	464.054	1398.907
15	473.577	1401.958
16	483.021	1405.248
17	492.378	1408.775
18	501.644	1412.536
19	510.812	1416.528
20	519.877	1420.750
21	528.833	1425.199
22	537.674	1429.872
23	546.395	1434.765
24	554.990	1439.876
25	563.454	1445.202
26	571.781	1450.740
27	579.966	1456.484
28	588.004	1462.433
29	595.890	1468.583
30	603.619	1474.928
31	611.185	1481.466
32	618.585	1488.193
33	625.813	1495.103
34	629.819	1499.130

Circle Center At X = 347.563 ; Y = 1778.764 ; and Radius = 397.320

Factor of Safety
*** 1.701 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	335.789	1381.618
2	345.789	1381.537
3	355.787	1381.715
4	365.778	1382.150
5	375.754	1382.843
6	385.709	1383.793
7	395.636	1384.999
8	405.528	1386.461
9	415.380	1388.178
10	425.184	1390.149
11	434.933	1392.372
12	444.622	1394.846
13	454.245	1397.569
14	463.793	1400.540
15	473.262	1403.755
16	482.645	1407.214
17	491.935	1410.914
18	501.127	1414.853
19	510.214	1419.027
20	519.190	1423.435
21	528.050	1428.072
22	536.787	1432.937
23	545.395	1438.025
24	553.870	1443.334
25	562.204	1448.860
26	570.394	1454.599
27	578.432	1460.548

28	586.314	1466.701
29	594.035	1473.057
30	601.589	1479.609
31	608.972	1486.354
32	616.178	1493.287
33	622.348	1499.538

Circle Center At X = 343.920 ; Y = 1769.051 ; and Radius = 387.518

Factor of Safety
*** 1.702 ***

1

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	335.789	1381.618
2	345.773	1381.040
3	355.769	1380.765
4	365.769	1380.792
5	375.763	1381.122
6	385.743	1381.754
7	395.700	1382.687
8	405.623	1383.921
9	415.505	1385.455
10	425.336	1387.287
11	435.107	1389.415
12	444.808	1391.839
13	454.433	1394.554
14	463.970	1397.560
15	473.413	1400.852
16	482.751	1404.429
17	491.977	1408.287
18	501.082	1412.422
19	510.058	1416.830
20	518.896	1421.508
21	527.589	1426.452
22	536.128	1431.656
23	544.506	1437.116
24	552.715	1442.827
25	560.747	1448.783
26	568.596	1454.980
27	576.253	1461.411
28	583.713	1468.072
29	590.967	1474.954
30	598.010	1482.053
31	604.835	1489.362
32	611.436	1496.874
33	614.273	1500.307

Circle Center At X = 359.874 ; Y = 1711.263 ; and Radius = 330.523

Factor of Safety
*** 1.703 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	316.842	1377.000
2	326.801	1376.094
3	336.783	1375.499
4	346.779	1375.217
5	356.779	1375.248
6	366.773	1375.591
7	376.752	1376.246
8	386.705	1377.213
9	396.623	1378.491
10	406.496	1380.078
11	416.315	1381.973
12	426.070	1384.174
13	435.751	1386.679
14	445.349	1389.486
15	454.855	1392.591
16	464.259	1395.992
17	473.552	1399.685
18	482.725	1403.667
19	491.769	1407.934
20	500.675	1412.481
21	509.435	1417.305
22	518.039	1422.400
23	526.480	1427.762
24	534.750	1433.385
25	542.839	1439.263
26	550.741	1445.392
27	558.447	1451.765
28	565.951	1458.375
29	573.244	1465.217
30	580.319	1472.284
31	587.170	1479.568
32	593.790	1487.063
33	600.173	1494.762
34	605.024	1501.000

Circle Center At X = 350.818 ; Y = 1694.912 ; and Radius = 319.723

Factor of Safety
*** 1.705 ***

1

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	316.842	1377.000
2	326.796	1376.046
3	336.776	1375.401
4	346.770	1375.063
5	356.770	1375.035
6	366.766	1375.316
7	376.749	1375.905
8	386.708	1376.802
9	396.635	1378.006

10	406.521	1379.517
11	416.355	1381.332
12	426.128	1383.450
13	435.831	1385.868
14	445.455	1388.586
15	454.990	1391.599
16	464.427	1394.905
17	473.758	1398.501
18	482.974	1402.384
19	492.065	1406.550
20	501.023	1410.994
21	509.840	1415.713
22	518.507	1420.702
23	527.015	1425.956
24	535.357	1431.470
25	543.525	1437.240
26	551.511	1443.259
27	559.307	1449.522
28	566.905	1456.022
29	574.300	1462.754
30	581.483	1469.712
31	588.447	1476.888
32	595.187	1484.275
33	601.695	1491.868
34	607.966	1499.657
35	608.847	1500.824

Circle Center At X = 352.687 ; Y = 1698.738 ; and Radius = 323.729

Factor of Safety
*** 1.705 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	345.263	1386.596
2	355.261	1386.389
3	365.261	1386.460
4	375.254	1386.809
5	385.235	1387.435
6	395.194	1388.338
7	405.124	1389.517
8	415.018	1390.971
9	424.868	1392.699
10	434.665	1394.700
11	444.404	1396.973
12	454.075	1399.515
13	463.672	1402.324
14	473.188	1405.399
15	482.614	1408.737
16	491.945	1412.335
17	501.171	1416.191
18	510.287	1420.302
19	519.286	1424.664
20	528.160	1429.274
21	536.902	1434.129
22	545.506	1439.224
23	553.966	1444.557
24	562.274	1450.123
25	570.424	1455.917
26	578.411	1461.935
27	586.227	1468.172
28	593.867	1474.624
29	601.325	1481.286
30	608.595	1488.152
31	615.672	1495.217
32	619.980	1499.764

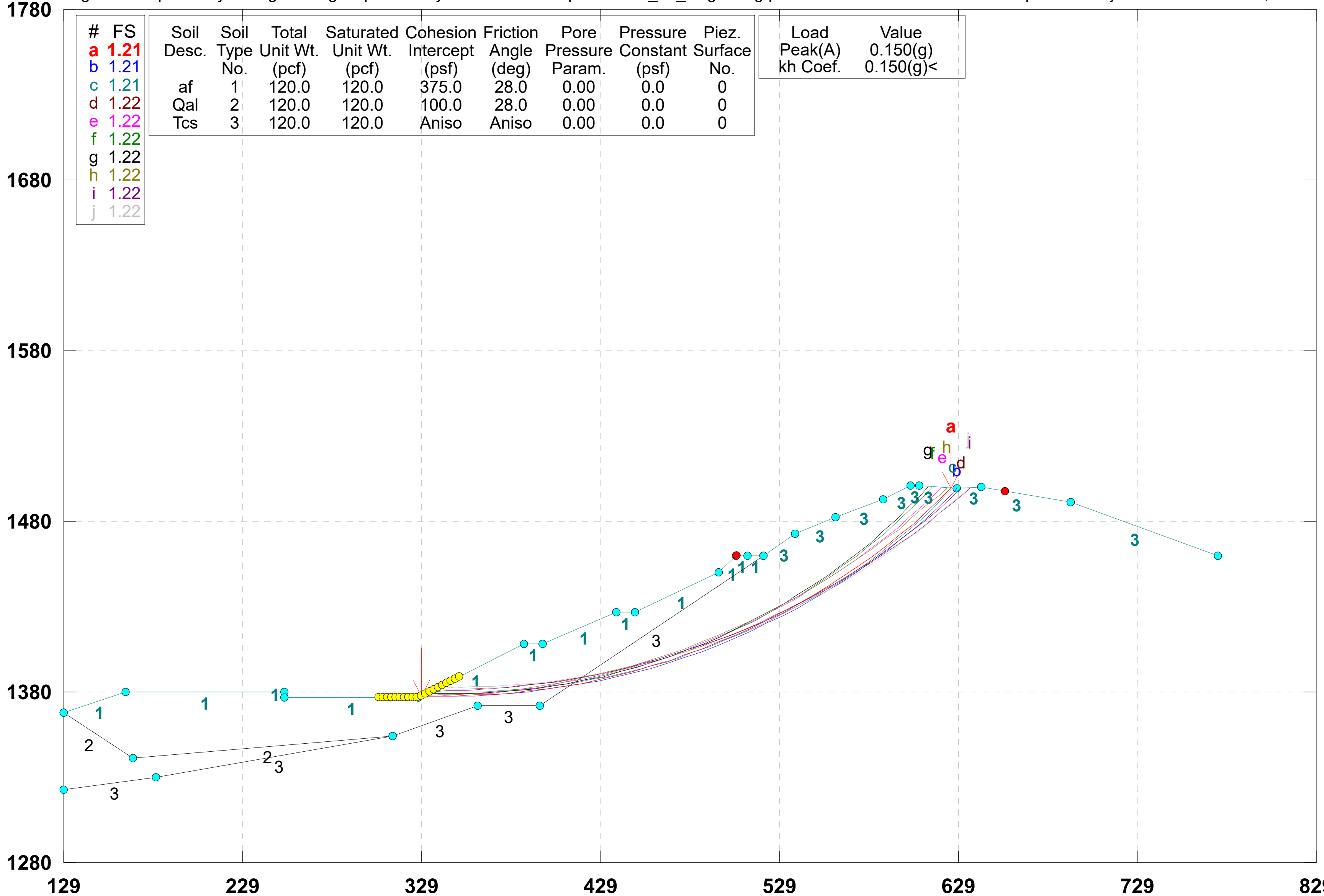
Circle Center At X = 357.735 ; Y = 1746.344 ; and Radius = 359.965

Factor of Safety
*** 1.706 ***

**** END OF GSTABL7 OUTPUT ****

Bouquet Canyon/21095-01/Section V-V'/ Seismic

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xvc2e.pl2   Run By: LGC Geotechnical, Inc.   4/5/2022   10:06A



GSTABL7 v.2 FSmin=1.21

Safety Factors Are Calculated By The Modified Bishop Method

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

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SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

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Analysis Run Date: 4/5/2022
Time of Run: 10:06AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvc2e.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvc2e.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvc2e.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section V-V'/ Seismic

BOUNDARY COORDINATES

21 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	129.00	1368.00	164.00	1380.00	1
2	164.00	1380.00	252.00	1380.00	1
3	252.00	1380.00	252.10	1377.00	1
4	252.10	1377.00	327.00	1377.00	1
5	327.00	1377.00	386.00	1408.00	1
6	386.00	1408.00	397.00	1408.00	1
7	397.00	1408.00	438.00	1427.00	1
8	438.00	1427.00	448.00	1427.00	1
9	448.00	1427.00	495.00	1450.00	1
10	495.00	1450.00	505.00	1460.00	1
11	505.00	1460.00	511.00	1460.00	1
12	511.00	1460.00	520.00	1460.00	1
13	520.00	1460.00	538.00	1473.00	3
14	538.00	1473.00	560.00	1482.00	3
15	560.00	1482.00	587.00	1493.00	3
16	587.00	1493.00	602.00	1501.00	3
17	602.00	1501.00	607.00	1501.00	3
18	607.00	1501.00	628.00	1499.00	3
19	628.00	1499.00	642.00	1500.00	3
20	642.00	1500.00	692.00	1491.00	3
21	692.00	1491.00	774.00	1460.00	3
22	129.00	1368.00	168.00	1341.00	2
23	168.00	1341.00	313.00	1354.00	2
24	313.00	1354.00	360.00	1372.00	3
25	360.00	1372.00	395.00	1372.00	3
26	395.00	1372.00	520.00	1460.00	3
27	129.00	1323.00	181.00	1330.00	3
28	181.00	1330.00	313.00	1354.00	3

User Specified Y-Origin = 1280.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	375.0	28.0	0.00	0.0	0
2	120.0	120.0	100.0	28.0	0.00	0.0	0
3	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)

1	10.0	250.00	32.00
2	15.0	150.00	25.00
3	90.0	250.00	32.00

ANISOTROPIC SOIL NOTES:
(1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
(2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
(3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

Specified Peak Ground Acceleration Coefficient (A) = 0.150(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)

Specified Seismic Pore-Pressure Factor = 0.000

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

4980 Trial Surfaces Have Been Generated.

249 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced Along The Ground Surface Between X = 305.00(ft) and X = 350.00(ft)

Each Surface Terminates Between X = 505.00(ft) and X = 655.00(ft)

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00(ft)

10.00(ft) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Total Number of Trial Surfaces Attempted = 4980

Number of Trial Surfaces With Valid FS = 4980

Statistical Data On All Valid FS Values:
FS Max = 3.048 FS Min = 1.207 FS Ave = 1.740
Standard Deviation = 0.303 Coefficient of Variation = 17.40 %

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	328.684	1377.885
2	338.682	1377.675
3	348.682	1377.721
4	358.677	1378.024
5	368.662	1378.583
6	378.628	1379.398
7	388.571	1380.469
8	398.483	1381.794
9	408.357	1383.373
10	418.188	1385.204
11	427.969	1387.287
12	437.693	1389.620
13	447.354	1392.202
14	456.945	1395.031
15	466.461	1398.105
16	475.895	1401.422
17	485.241	1404.980
18	494.492	1408.776
19	503.643	1412.809
20	512.688	1417.074
21	521.620	1421.571
22	530.434	1426.295
23	539.123	1431.243
24	547.683	1436.413
25	556.108	1441.800
26	564.392	1447.402
27	572.529	1453.214
28	580.515	1459.233
29	588.343	1465.455
30	596.010	1471.876
31	603.509	1478.492
32	610.836	1485.297
33	617.986	1492.288
34	624.803	1499.304

Circle Center At X = 341.875 ; Y = 1767.514 ; and Radius = 389.852

Factor of Safety
*** 1.207 ***

Individual data on the 47 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.0	3277.2	0.0	0.0	0.	0.	491.6	0.0	0.0
2	10.0	9680.3	0.0	0.0	0.	0.	1452.0	0.0	0.0
3	10.0	15767.4	0.0	0.0	0.	0.	2365.1	0.0	0.0
4	10.0	21522.3	0.0	0.0	0.	0.	3228.3	0.0	0.0
5	10.0	26931.2	0.0	0.0	0.	0.	4039.7	0.0	0.0
6	7.4	23237.2	0.0	0.0	0.	0.	3485.6	0.0	0.0
7	2.6	8536.0	0.0	0.0	0.	0.	1280.4	0.0	0.0
8	8.4	27278.1	0.0	0.0	0.	0.	4091.7	0.0	0.0
9	1.5	4741.3	0.0	0.0	0.	0.	711.2	0.0	0.0

10	9.9	33643.0	0.0	0.0	0.	0.	5046.5	0.0	0.0
11	3.8	13883.4	0.0	0.0	0.	0.	2082.5	0.0	0.0
12	6.0	22985.3	0.0	0.0	0.	0.	3447.8	0.0	0.0
13	9.8	39716.6	0.0	0.0	0.	0.	5957.5	0.0	0.0
14	9.7	42183.4	0.0	0.0	0.	0.	6327.5	0.0	0.0
15	0.3	1374.3	0.0	0.0	0.	0.	206.1	0.0	0.0
16	9.4	40461.0	0.0	0.0	0.	0.	6069.2	0.0	0.0
17	0.6	2691.6	0.0	0.0	0.	0.	403.7	0.0	0.0
18	8.9	38081.4	0.0	0.0	0.	0.	5712.2	0.0	0.0
19	9.5	42407.4	0.0	0.0	0.	0.	6361.1	0.0	0.0
20	9.4	43673.7	0.0	0.0	0.	0.	6551.1	0.0	0.0
21	9.3	44563.8	0.0	0.0	0.	0.	6684.6	0.0	0.0
22	9.3	45083.5	0.0	0.0	0.	0.	6762.5	0.0	0.0
23	0.5	2498.7	0.0	0.0	0.	0.	374.8	0.0	0.0
24	8.6	45030.3	0.0	0.0	0.	0.	6754.6	0.0	0.0
25	1.4	7522.4	0.0	0.0	0.	0.	1128.4	0.0	0.0
26	6.0	32498.3	0.0	0.0	0.	0.	4874.7	0.0	0.0
27	1.7	8773.0	0.0	0.0	0.	0.	1316.0	0.0	0.0
28	7.3	36052.2	0.0	0.0	0.	0.	5407.8	0.0	0.0
29	1.6	7661.8	0.0	0.0	0.	0.	1149.3	0.0	0.0
30	8.8	42750.9	0.0	0.0	0.	0.	6412.6	0.0	0.0
31	7.6	37970.5	0.0	0.0	0.	0.	5695.6	0.0	0.0
32	1.1	5703.0	0.0	0.0	0.	0.	855.5	0.0	0.0
33	8.6	42508.6	0.0	0.0	0.	0.	6376.3	0.0	0.0
34	8.4	40011.8	0.0	0.0	0.	0.	6001.8	0.0	0.0
35	3.9	17788.4	0.0	0.0	0.	0.	2668.3	0.0	0.0
36	4.4	19487.5	0.0	0.0	0.	0.	2923.1	0.0	0.0
37	8.1	34312.2	0.0	0.0	0.	0.	5146.8	0.0	0.0
38	8.0	31150.5	0.0	0.0	0.	0.	4672.6	0.0	0.0
39	6.5	23245.0	0.0	0.0	0.	0.	3486.7	0.0	0.0
40	1.3	4583.3	0.0	0.0	0.	0.	687.5	0.0	0.0
41	7.7	24926.4	0.0	0.0	0.	0.	3739.0	0.0	0.0
42	6.0	17888.2	0.0	0.0	0.	0.	2683.2	0.0	0.0
43	1.5	4195.6	0.0	0.0	0.	0.	629.3	0.0	0.0
44	3.5	8750.7	0.0	0.0	0.	0.	1312.6	0.0	0.0
45	3.8	7963.8	0.0	0.0	0.	0.	1194.6	0.0	0.0
46	7.2	9868.6	0.0	0.0	0.	0.	1480.3	0.0	0.0
47	6.8	3135.5	0.0	0.0	0.	0.	470.3	0.0	0.0

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	328.684	1377.885
2	338.680	1377.610
3	348.680	1377.590
4	358.678	1377.825
5	368.666	1378.314
6	378.638	1379.057
7	388.588	1380.054
8	398.510	1381.304
9	408.396	1382.806
10	418.241	1384.560
11	428.039	1386.563
12	437.782	1388.816
13	447.464	1391.315
14	457.080	1394.061
15	466.623	1397.050
16	476.086	1400.282
17	485.464	1403.753
18	494.751	1407.462
19	503.940	1411.406
20	513.026	1415.583
21	522.003	1419.990
22	530.864	1424.624
23	539.605	1429.482
24	548.219	1434.561
25	556.701	1439.858
26	565.045	1445.369
27	573.246	1451.091
28	581.299	1457.020
29	589.199	1463.152
30	596.939	1469.483
31	604.516	1476.009
32	611.925	1482.726
33	619.160	1489.629
34	626.216	1496.714
35	628.407	1499.029

Circle Center At X = 344.465 ; Y = 1770.276 ; and Radius = 392.708

Factor of Safety

*** 1.211 ***

1

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	333.421	1380.374
2	343.415	1380.042
3	353.415	1379.976
4	363.413	1380.175
5	373.402	1380.639
6	383.376	1381.368
7	393.326	1382.361
8	403.247	1383.617
9	413.131	1385.136
10	422.971	1386.917
11	432.761	1388.958
12	442.493	1391.258
13	452.160	1393.815
14	461.757	1396.628
15	471.275	1399.694
16	480.709	1403.012
17	490.051	1406.578
18	499.295	1410.391
19	508.436	1414.448
20	517.465	1418.746
21	526.377	1423.282
22	535.166	1428.052
23	543.825	1433.054
24	552.349	1438.284
25	560.730	1443.738
26	568.965	1449.412
27	577.045	1455.303
28	584.967	1461.406
29	592.724	1467.716
30	600.312	1474.231
31	607.723	1480.944
32	614.954	1487.851
33	622.000	1494.948
34	625.994	1499.191

Circle Center At X = 350.942 ; Y = 1756.851 ; and Radius = 376.885

Factor of Safety
*** 1.211 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	335.789	1381.618
2	345.789	1381.537
3	355.788	1381.702
4	365.779	1382.111
5	375.758	1382.766
6	385.717	1383.665
7	395.652	1384.807
8	405.555	1386.193
9	415.422	1387.822
10	425.245	1389.691
11	435.020	1391.802
12	444.740	1394.151
13	454.400	1396.737
14	463.993	1399.560
15	473.515	1402.617
16	482.958	1405.907
17	492.318	1409.427
18	501.589	1413.176
19	510.765	1417.151
20	519.841	1421.349
21	528.811	1425.769
22	537.670	1430.408
23	546.413	1435.262
24	555.034	1440.329
25	563.528	1445.607
26	571.890	1451.090
27	580.116	1456.777
28	588.199	1462.665
29	596.136	1468.748
30	603.921	1475.024
31	611.550	1481.490
32	619.018	1488.140
33	626.321	1494.972
34	630.610	1499.186

Circle Center At X = 344.117 ; Y = 1789.175 ; and Radius = 407.642

Factor of Safety
*** 1.217 ***

1

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	328.684	1377.885
2	338.684	1377.931
3	348.680	1378.227
4	358.665	1378.771
5	368.633	1379.565
6	378.579	1380.607
7	388.495	1381.897
8	398.376	1383.433
9	408.216	1385.216
10	418.009	1387.243
11	427.747	1389.515
12	437.426	1392.028
13	447.040	1394.782
14	456.581	1397.775
15	466.045	1401.005
16	475.426	1404.469
17	484.717	1408.167
18	493.913	1412.096
19	503.008	1416.252
20	511.997	1420.635
21	520.873	1425.240
22	529.632	1430.064
23	538.268	1435.106
24	546.776	1440.362
25	555.150	1445.828
26	563.384	1451.502
27	571.475	1457.379
28	579.417	1463.456
29	587.204	1469.729
30	594.833	1476.195
31	602.298	1482.848
32	609.595	1489.686
33	616.719	1496.704
34	619.700	1499.791

Circle Center At X = 331.872 ; Y = 1778.588 ; and Radius = 400.715

Factor of Safety
*** 1.219 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	331.052	1379.129
2	341.050	1378.915
3	351.050	1378.977
4	361.044	1379.315
5	371.026	1379.927
6	380.986	1380.815
7	390.918	1381.977
8	400.815	1383.412
9	410.668	1385.119
10	420.470	1387.097
11	430.215	1389.345
12	439.893	1391.860
13	449.498	1394.641
14	459.024	1397.686
15	468.461	1400.992
16	477.804	1404.557

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          17        487.045     1408.379
          18        496.178     1412.453
          19        505.194     1416.778
          20        514.088     1421.349
          21        522.853     1426.164
          22        531.481     1431.218
          23        539.967     1436.509
          24        548.304     1442.031
          25        556.485     1447.781
          26        564.505     1453.755
          27        572.357     1459.947
          28        580.036     1466.353
          29        587.535     1472.968
          30        594.849     1479.788
          31        601.972     1486.806
          32        608.899     1494.019
          33        614.587     1500.277

     Circle Center At X =   343.808 ; Y =  1741.696 ; and Radius =   362.791


            Factor of Safety
           ***    1.220   ***



1

     Failure Surface Specified By 33 Coordinate Points


       Point      X-Surf      Y-Surf
        No.        (ft)        (ft)

           1        331.052     1379.129
           2        341.049     1378.867
           3        351.049     1378.888
           4        361.044     1379.191
           5        371.027     1379.777
           6        380.989     1380.645
           7        390.923     1381.794
           8        400.820     1383.224
           9        410.673     1384.933
          10        420.474     1386.921
          11        430.214     1389.184
          12        439.887     1391.722
          13        449.484     1394.533
          14        458.997     1397.614
          15        468.420     1400.962
          16        477.744     1404.576
          17        486.962     1408.452
          18        496.067     1412.587
          19        505.052     1416.978
          20        513.908     1421.622
          21        522.630     1426.514
          22        531.210     1431.650
          23        539.641     1437.027
          24        547.917     1442.641
          25        556.031     1448.486
          26        563.976     1454.559
          27        571.746     1460.853
          28        579.335     1467.365
          29        586.737     1474.089
          30        593.946     1481.020
          31        600.956     1488.152
          32        607.761     1495.479
          33        612.174     1500.507

     Circle Center At X =   345.321 ; Y =  1732.412 ; and Radius =   353.571


            Factor of Safety
           ***    1.221   ***




     Failure Surface Specified By 34 Coordinate Points


       Point      X-Surf      Y-Surf
        No.        (ft)        (ft)

           1        328.684     1377.885
           2        338.683     1378.058
           3        348.674     1378.470
           4        358.653     1379.119
           5        368.614     1380.005
           6        378.550     1381.128
           7        388.458     1382.487
           8        398.330     1384.082
           9        408.161     1385.911
          10        417.946     1387.974
          11        427.679     1390.268
          12        437.355     1392.794
          13        446.968     1395.550
          14        456.512     1398.533
          15        465.983     1401.742
          16        475.375     1405.177
          17        484.683     1408.833
          18        493.900     1412.710
          19        503.023     1416.806
          20        512.046     1421.117
          21        520.964     1425.642
          22        529.772     1430.377
          23        538.464     1435.321
          24        547.036     1440.471
          25        555.484     1445.823
          26        563.801     1451.374
          27        571.984     1457.122
          28        580.028     1463.063
          29        587.928     1469.194
          30        595.680     1475.510
          31        603.280     1482.010
          32        610.723     1488.689
          33        618.005     1495.543
          34        622.078     1499.564

     Circle Center At X =   326.433 ; Y =  1797.869 ; and Radius =   419.990


            Factor of Safety
           ***    1.221   ***



1

     Failure Surface Specified By 35 Coordinate Points


       Point      X-Surf      Y-Surf
```

No.	(ft)	(ft)
1	333.421	1380.374
2	343.420	1380.484
3	353.415	1380.821
4	363.399	1381.383
5	373.368	1382.171
6	383.316	1383.184
7	393.239	1384.422
8	403.132	1385.884
9	412.989	1387.570
10	422.805	1389.478
11	432.576	1391.607
12	442.296	1393.957
13	451.960	1396.526
14	461.564	1399.313
15	471.102	1402.316
16	480.570	1405.535
17	489.963	1408.966
18	499.276	1412.609
19	508.504	1416.462
20	517.642	1420.522
21	526.687	1424.789
22	535.632	1429.258
23	544.474	1433.929
24	553.209	1438.798
25	561.831	1443.864
26	570.336	1449.123
27	578.720	1454.574
28	586.979	1460.212
29	595.108	1466.036
30	603.103	1472.042
31	610.961	1478.228
32	618.676	1484.589
33	626.246	1491.124
34	633.666	1497.828
35	635.470	1499.534

Circle Center At X = 333.539 ; Y = 1822.553 ; and Radius = 442.180

Factor of Safety
*** 1.221 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	338.158	1382.863
2	348.157	1382.715
3	358.156	1382.814
4	368.150	1383.158
5	378.133	1383.748
6	388.098	1384.583
7	398.040	1385.662
8	407.952	1386.985
9	417.828	1388.551
10	427.663	1390.360
11	437.451	1392.409
12	447.185	1394.699
13	456.861	1397.227
14	466.471	1399.991
15	476.010	1402.992
16	485.473	1406.225
17	494.853	1409.690
18	504.146	1413.385
19	513.345	1417.306
20	522.445	1421.453
21	531.440	1425.822
22	540.325	1430.410
23	549.095	1435.215
24	557.744	1440.234
25	566.267	1445.465
26	574.659	1450.903
27	582.915	1456.546
28	591.030	1462.389
29	598.999	1468.431
30	606.817	1474.666
31	614.479	1481.092
32	621.981	1487.703
33	629.319	1494.498
34	634.419	1499.458

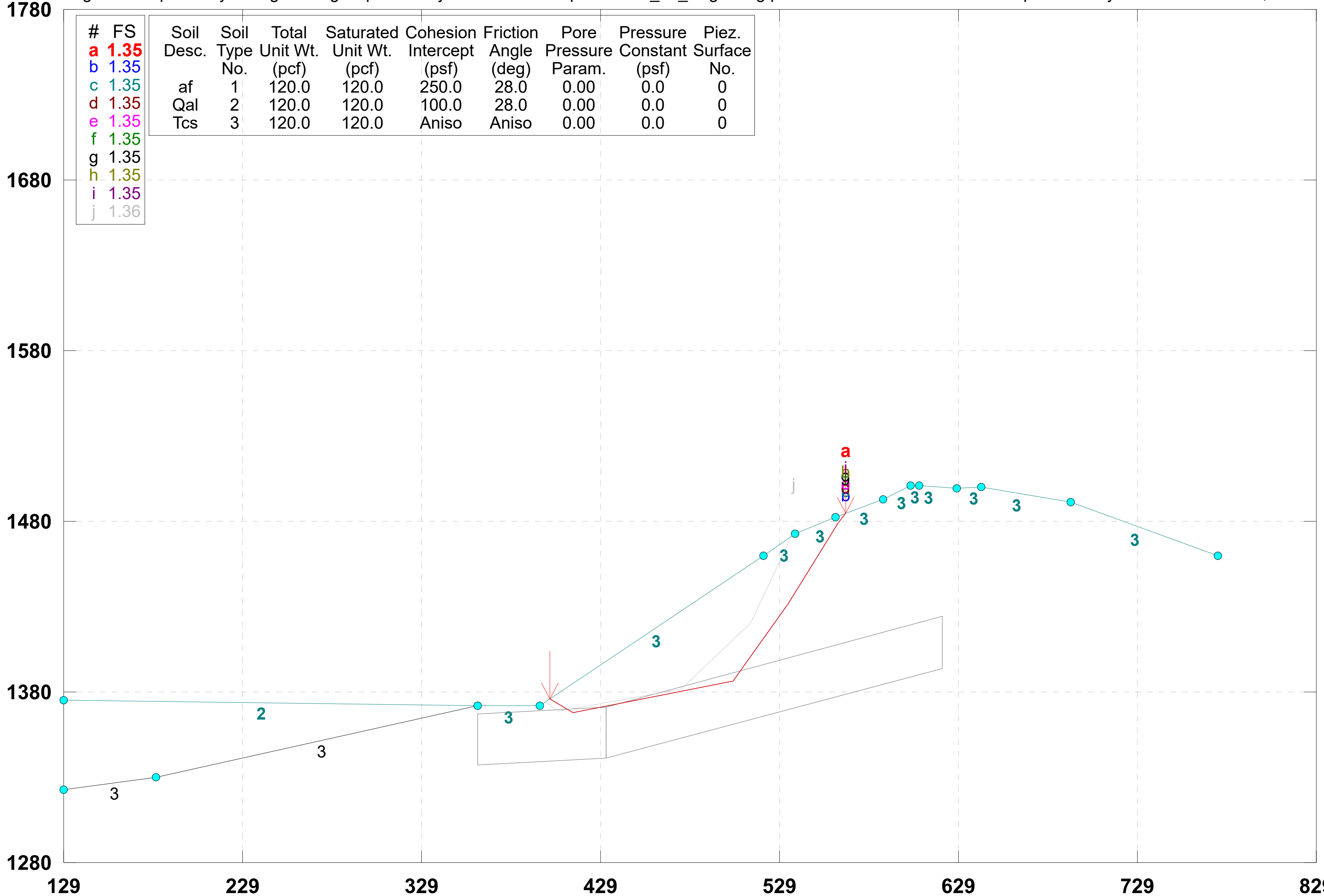
Circle Center At X = 349.171 ; Y = 1789.565 ; and Radius = 406.851

Factor of Safety
*** 1.222 ***

**** END OF GSTABL7 OUTPUT ****

Bouquet Canyon/21095-01/Section V-V'/ Temporary

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xvb2t.pl2 Run By: LGC Geotechnical, Inc. 4/5/2022 10:08A



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
af	1	120.0	120.0	250.0	28.0	0.00	0.0	0
Qal	2	120.0	120.0	100.0	28.0	0.00	0.0	0
Tcs	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=1.35

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/5/2022
Time of Run: 10:08AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2t.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2t.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2t.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section V-V'/ Temporary

BOUNDARY COORDINATES

12 Top Boundaries
14 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	129.00	1375.00	360.00	1372.00	2
2	360.00	1372.00	395.00	1372.00	3
3	395.00	1372.00	520.00	1460.00	3
4	520.00	1460.00	538.00	1473.00	3
5	538.00	1473.00	560.00	1482.00	3
6	560.00	1482.00	587.00	1493.00	3
7	587.00	1493.00	602.00	1501.00	3
8	602.00	1501.00	607.00	1501.00	3
9	607.00	1501.00	628.00	1499.00	3
10	628.00	1499.00	642.00	1500.00	3
11	642.00	1500.00	692.00	1491.00	3
12	692.00	1491.00	774.00	1460.00	3
13	129.00	1323.00	181.00	1330.00	3
14	181.00	1330.00	360.00	1372.00	3

User Specified Y-Origin = 1280.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	100.0	28.0	0.00	0.0	0
3	120.0	120.0	250.0	36.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	10.0	250.00	36.00
2	15.0	150.00	25.00
3	90.0	250.00	36.00

ANISOTROPIC SOIL NOTES:

(1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
(2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
(3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

Janbus Empirical Coef is being used for the case of c & phi both > 0

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

4999 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 55.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	360.00	1352.00	432.00	1356.00	30.00
2	432.10	1356.00	620.00	1409.00	30.00

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	326.73	1372.43
2	365.34	1354.44
3	481.54	1368.44
4	481.86	1423.44
5	511.96	1454.34

Factor of Safety for the Preceding Surface is Between 8.482 and 8.466

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	396.82	1373.28
2	416.26	1353.97
3	454.80	1365.62
4	454.84	1414.13

Factor of Safety for the Preceding Surface is Between22.157 and21.551

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	326.73	1372.43
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```
The Trial Failure Surface In Question Is Defined
By The Following  4 Coordinate Points


  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1        396.82     1373.28
    2        416.26     1353.97
    3        454.80     1365.62
    4        454.84     1414.13


Factor of Safety for the Preceding Surface is Between22.157 and21.551


WARNING! The factor of safety calculation did not converge in 20 iterations.



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By The Following  5 Coordinate Points


  Point      X-Surf      Y-Surf
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The Trial Failure Surface In Question Is Defined
By The Following  4 Coordinate Points


  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1        396.82     1373.28
    2        416.26     1353.97
```

```
              3        454.80     1365.62
              4        454.84     1414.13


         Factor of Safety for the Preceding Surface is Between22.157 and21.551


         WARNING! The factor of safety calculation did not converge in 20 iterations.



         The Trial Failure Surface In Question Is Defined
         By The Following  5 Coordinate Points


           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)

              1        326.73     1372.43
              2        365.34     1354.44
              3        481.54     1368.44
              4        481.86     1423.44
              5        511.96     1454.34


         Factor of Safety for the Preceding Surface is Between 8.482 and 8.466


         WARNING! The factor of safety calculation did not converge in 20 iterations.



         The Trial Failure Surface In Question Is Defined
         By The Following  4 Coordinate Points


           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)

              1        396.82     1373.28
              2        416.26     1353.97
              3        454.80     1365.62
              4        454.84     1414.13


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         The Trial Failure Surface In Question Is Defined
         By The Following  5 Coordinate Points


           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)

              1        326.73     1372.43
              2        365.34     1354.44
              3        481.54     1368.44
              4        481.86     1423.44
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         The Trial Failure Surface In Question Is Defined
         By The Following  4 Coordinate Points


           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)

              1        396.82     1373.28
              2        416.26     1353.97
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              4        454.84     1414.13


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         By The Following  5 Coordinate Points


           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)

              1        326.73     1372.43
              2        365.34     1354.44
              3        481.54     1368.44
              4        481.86     1423.44
              5        511.96     1454.34


         Factor of Safety for the Preceding Surface is Between 8.482 and 8.466


         WARNING! The factor of safety calculation did not converge in 20 iterations.



         The Trial Failure Surface In Question Is Defined
         By The Following  4 Coordinate Points


           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)

              1        396.82     1373.28
              2        416.26     1353.97
              3        454.80     1365.62
              4        454.84     1414.13


         Factor of Safety for the Preceding Surface is Between22.157 and21.551


         WARNING! The factor of safety calculation did not converge in 20 iterations.
```

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By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
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2	365.34	1354.44
3	481.54	1368.44
4	481.86	1423.44
5	511.96	1454.34

Factor of Safety for the Preceding Surface is Between 8.482 and 8.466

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	396.82	1373.28
2	416.26	1353.97
3	454.80	1365.62
4	454.84	1414.13

Factor of Safety for the Preceding Surface is Between22.157 and21.551

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 4999

WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
Did Not Converge in 20 Iterations.

Number of Trial Surfaces with Non-Converged FS = 20

Number of Trial Surfaces With Valid FS = 4979

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 0.4 %

Statistical Data On All Valid FS Values:
FS **Max** = 9.606 FS **Min** = 1.352 FS Ave = 2.170
Standard Deviation = 0.776 Coefficient of Variation = 35.74 %

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	400.442	1375.831
2	413.503	1367.693
3	503.010	1386.246
4	533.940	1431.724
5	561.682	1479.215
6	566.083	1484.478

Factor of Safety
*** 1.352 ***

Individual data on the 8 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force **Norm** (lbs)	Tie Force **Tan** (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge **Load** (lbs)
1	13.1	13584.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	89.5	424940.6	0.0	0.0	0.	0.	0.0	0.0	0.0
3	17.0	112712.2	0.0	0.0	0.	0.	0.0	0.0	0.0
4	13.9	72866.1	0.0	0.0	0.	0.	0.0	0.0	0.0
5	4.1	17700.7	0.0	0.0	0.	0.	0.0	0.0	0.0
6	22.0	52787.4	0.0	0.0	0.	0.	0.0	0.0	0.0
7	1.7	922.0	0.0	0.0	0.	0.	0.0	0.0	0.0
8	4.4	916.3	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	400.442	1375.831
2	413.503	1367.693
3	503.010	1386.246
4	533.940	1431.724
5	561.682	1479.215
6	566.083	1484.478

Factor of Safety
*** 1.352 ***

1

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	400.442	1375.831

```
               2        413.503     1367.693
               3        503.010     1386.246
               4        533.940     1431.724
               5        561.682     1479.215
               6        566.083     1484.478


                   Factor of Safety
                  ***    1.352   ***




          Failure Surface Specified By  6 Coordinate Points


             Point      X-Surf      Y-Surf
              No.        (ft)        (ft)

               1        400.442     1375.831
               2        413.503     1367.693
               3        503.010     1386.246
               4        533.940     1431.724
               5        561.682     1479.215
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                   Factor of Safety
                  ***    1.352   ***



 1

          Failure Surface Specified By  6 Coordinate Points


             Point      X-Surf      Y-Surf
              No.        (ft)        (ft)

               1        400.442     1375.831
               2        413.503     1367.693
               3        503.010     1386.246
               4        533.940     1431.724
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                   Factor of Safety
                  ***    1.352   ***




          Failure Surface Specified By  6 Coordinate Points


             Point      X-Surf      Y-Surf
              No.        (ft)        (ft)

               1        400.442     1375.831
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               3        503.010     1386.246
               4        533.940     1431.724
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                   Factor of Safety
                  ***    1.352   ***




 1

          Failure Surface Specified By  6 Coordinate Points


             Point      X-Surf      Y-Surf
              No.        (ft)        (ft)

               1        400.442     1375.831
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               3        503.010     1386.246
               4        533.940     1431.724
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                   Factor of Safety
                  ***    1.352   ***




          Failure Surface Specified By  6 Coordinate Points


             Point      X-Surf      Y-Surf
              No.        (ft)        (ft)

               1        400.442     1375.831
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               3        503.010     1386.246
               4        533.940     1431.724
               5        561.682     1479.215
               6        566.083     1484.478


                   Factor of Safety
                  ***    1.352   ***



 1

          Failure Surface Specified By  6 Coordinate Points


             Point      X-Surf      Y-Surf
              No.        (ft)        (ft)

               1        400.442     1375.831
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               3        503.010     1386.246
               4        533.940     1431.724
               5        561.682     1479.215
               6        566.083     1484.478


                   Factor of Safety
                  ***    1.352   ***
```

```
          Failure Surface Specified By  6 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        398.360     1374.365
              2        405.382     1368.721
              3        473.742     1381.462
              4        512.448     1420.538
              5        535.318     1470.557
              6        537.112     1472.359


                 Factor of Safety
                ***    1.362   ***

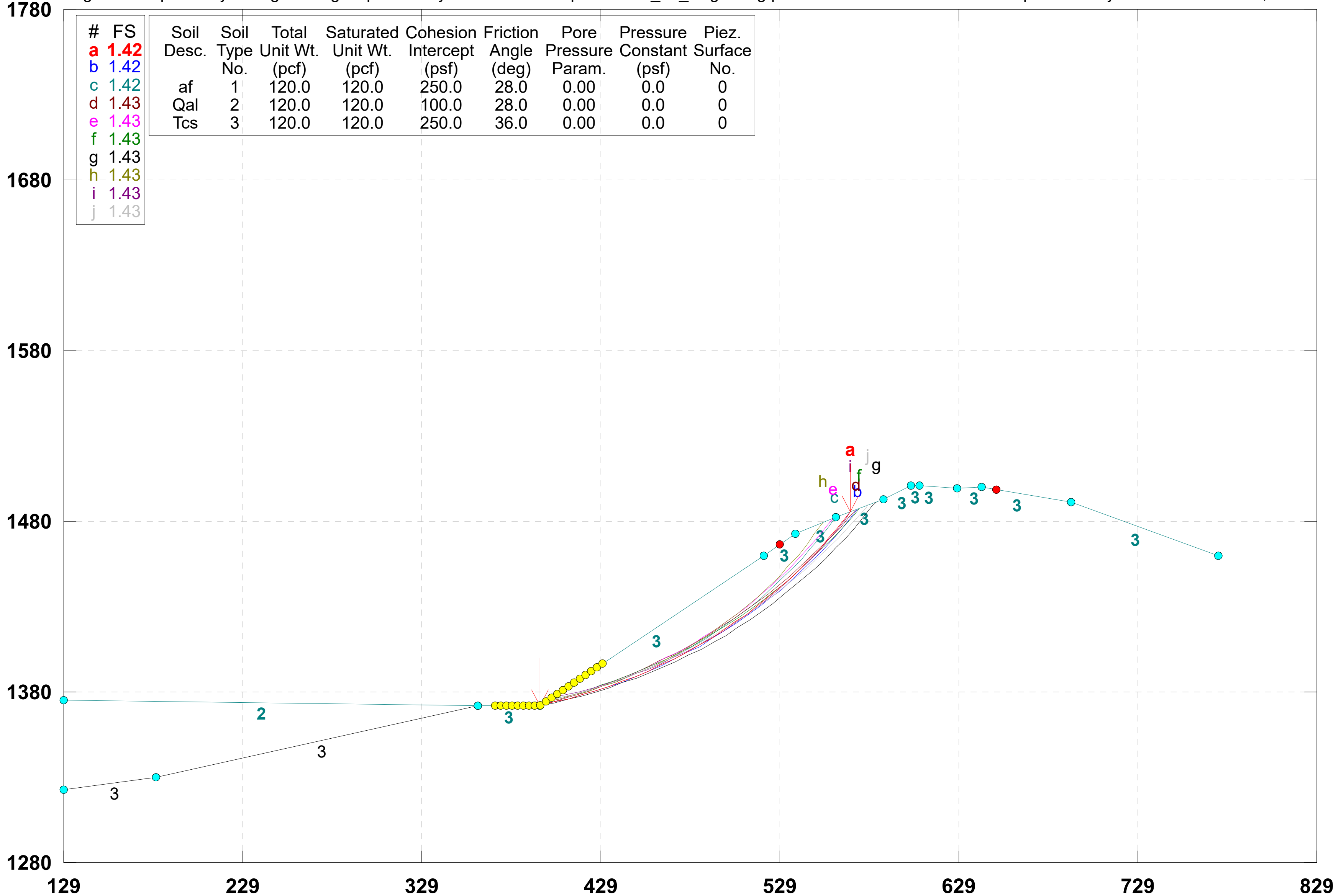




                     **** END OF GSTABL7 OUTPUT ****
```

Bouquet Canyon/21095-01/Section V-V'/ Temporary

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xvc2t.pl2   Run By: LGC Geotechnical, Inc.   4/5/2022   10:12A



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
af	1	120.0	120.0	250.0	28.0	0.00	0.0	0
Qal	2	120.0	120.0	100.0	28.0	0.00	0.0	0
Tcs	3	120.0	120.0	250.0	36.0	0.00	0.0	0

GSTABL7 v.2 FSmin=1.42

Safety Factors Are Calculated By The Modified Bishop Method

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/5/2022
Time of Run: 10:12AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvc2t.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvc2t.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvc2t.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section V-V'/ Temporary

BOUNDARY COORDINATES

12 Top Boundaries
14 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	129.00	1375.00	360.00	1372.00	2
2	360.00	1372.00	395.00	1372.00	3
3	395.00	1372.00	520.00	1460.00	3
4	520.00	1460.00	538.00	1473.00	3
5	538.00	1473.00	560.00	1482.00	3
6	560.00	1482.00	587.00	1493.00	3
7	587.00	1493.00	602.00	1501.00	3
8	602.00	1501.00	607.00	1501.00	3
9	607.00	1501.00	628.00	1499.00	3
10	628.00	1499.00	642.00	1500.00	3
11	642.00	1500.00	692.00	1491.00	3
12	692.00	1491.00	774.00	1460.00	3
13	129.00	1323.00	181.00	1330.00	3
14	181.00	1330.00	360.00	1372.00	3

User Specified Y-Origin = 1280.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	100.0	28.0	0.00	0.0	0
3	120.0	120.0	250.0	36.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	10.0	250.00	36.00
2	15.0	150.00	25.00
3	90.0	250.00	36.00

ANISOTROPIC SOIL NOTES:
(1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
(2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
(3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

ANISOTROPIC STRENGTH DATA HAS BEEN SUPPRESSED

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

4980 Trial Surfaces Have Been Generated.

249 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced Along The Ground Surface Between X = 370.00(ft) and X = 430.00(ft)

Each Surface Terminates Between X = 529.00(ft) and X = 650.00(ft)

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00(ft)

8.00(ft) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Total Number of Trial Surfaces Attempted = 4980

Number of Trial Surfaces With Valid FS = 4980

Statistical Data On All Valid FS Values:
FS **Max** = 2.927 FS **Min** = 1.419 FS Ave = 2.112
Standard Deviation = 0.405 Coefficient of Variation = 19.16 %

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	395.263	1372.185
2	403.065	1373.956
3	410.813	1375.945
4	418.503	1378.151
5	426.129	1380.571
6	433.683	1383.204
7	441.160	1386.048
8	448.555	1389.100
9	455.862	1392.358
10	463.074	1395.820
11	470.186	1399.482
12	477.193	1403.343
13	484.089	1407.398
14	490.868	1411.646
15	497.526	1416.081
16	504.057	1420.702
17	510.456	1425.503
18	516.717	1430.482
19	522.837	1435.635
20	528.810	1440.957
21	534.631	1446.445
22	540.296	1452.094
23	545.800	1457.899
24	551.140	1463.856
25	556.311	1469.961
26	561.308	1476.208
27	566.128	1482.593
28	568.037	1485.275

Circle Center At X = 336.075 ; Y = 1651.136 ; and Radius = 285.161

Factor of Safety
*** 1.419 ***

Individual data on the 30 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force **Norm** (lbs)	Tie Force **Tan** (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	7.8	1741.9	0.0	0.0	0.	0.	0.0	0.0	0.0
2	7.7	5071.7	0.0	0.0	0.	0.	0.0	0.0	0.0
3	7.7	8112.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	7.6	10860.9	0.0	0.0	0.	0.	0.0	0.0	0.0
5	7.6	13313.3	0.0	0.0	0.	0.	0.0	0.0	0.0
6	7.5	15468.8	0.0	0.0	0.	0.	0.0	0.0	0.0
7	7.4	17327.3	0.0	0.0	0.	0.	0.0	0.0	0.0
8	7.3	18890.7	0.0	0.0	0.	0.	0.0	0.0	0.0
9	7.2	20162.2	0.0	0.0	0.	0.	0.0	0.0	0.0
10	7.1	21146.2	0.0	0.0	0.	0.	0.0	0.0	0.0
11	7.0	21848.7	0.0	0.0	0.	0.	0.0	0.0	0.0
12	6.9	22276.9	0.0	0.0	0.	0.	0.0	0.0	0.0
13	6.8	22439.8	0.0	0.0	0.	0.	0.0	0.0	0.0
14	6.7	22347.4	0.0	0.0	0.	0.	0.0	0.0	0.0
15	6.5	22010.9	0.0	0.0	0.	0.	0.0	0.0	0.0
16	6.4	21443.0	0.0	0.0	0.	0.	0.0	0.0	0.0
17	6.3	20657.3	0.0	0.0	0.	0.	0.0	0.0	0.0
18	3.3	10627.8	0.0	0.0	0.	0.	0.0	0.0	0.0
19	2.8	9050.1	0.0	0.0	0.	0.	0.0	0.0	0.0
20	6.0	18570.0	0.0	0.0	0.	0.	0.0	0.0	0.0
21	5.8	17298.2	0.0	0.0	0.	0.	0.0	0.0	0.0
22	3.4	9565.1	0.0	0.0	0.	0.	0.0	0.0	0.0
23	2.3	6204.8	0.0	0.0	0.	0.	0.0	0.0	0.0
24	5.5	13256.4	0.0	0.0	0.	0.	0.0	0.0	0.0
25	5.3	10512.1	0.0	0.0	0.	0.	0.0	0.0	0.0
26	5.2	7771.1	0.0	0.0	0.	0.	0.0	0.0	0.0
27	3.7	3975.1	0.0	0.0	0.	0.	0.0	0.0	0.0
28	1.3	1079.3	0.0	0.0	0.	0.	0.0	0.0	0.0
29	4.8	2380.0	0.0	0.0	0.	0.	0.0	0.0	0.0
30	1.9	218.1	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	395.263	1372.185
2	403.063	1373.963
3	410.813	1375.950
4	418.505	1378.145
5	426.136	1380.548
6	433.699	1383.156
7	441.189	1385.967
8	448.600	1388.979
9	455.928	1392.190
10	463.166	1395.597
11	470.309	1399.199
12	477.352	1402.993
13	484.291	1406.975
14	491.119	1411.143
15	497.833	1415.494
16	504.426	1420.025
17	510.895	1424.731
18	517.234	1429.611
19	523.439	1434.661
20	529.506	1439.875
21	535.430	1445.252
22	541.206	1450.787
23	546.831	1456.476
24	552.300	1462.314
25	557.610	1468.298
26	562.756	1474.423
27	567.735	1480.685
28	572.543	1487.079
29	572.574	1487.123

Circle Center At X = 333.346 ; Y = 1661.940 ; and Radius = 296.297

Factor of Safety
*** 1.421 ***

1

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	398.421	1374.408
2	406.222	1376.180
3	413.966	1378.190
4	421.644	1380.435
5	429.251	1382.914
6	436.777	1385.624
7	444.218	1388.563
8	451.565	1391.728
9	458.812	1395.117
10	465.953	1398.725
11	472.979	1402.549
12	479.885	1406.587
13	486.665	1410.834
14	493.312	1415.286
15	499.819	1419.939
16	506.182	1424.789
17	512.393	1429.831
18	518.447	1435.060
19	524.338	1440.472
20	530.062	1446.062
21	535.611	1451.824
22	540.982	1457.753
23	546.170	1463.843
24	551.168	1470.089
25	555.974	1476.485
26	559.803	1481.919

Circle Center At X = 344.408 ; Y = 1630.365 ; and Radius = 261.593

Factor of Safety
*** 1.424 ***

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	395.263	1372.185
2	402.960	1374.365
3	410.605	1376.724
4	418.192	1379.261
5	425.718	1381.975
6	433.178	1384.863
7	440.569	1387.925
8	447.886	1391.158
9	455.126	1394.561
10	462.285	1398.133
11	469.358	1401.870
12	476.342	1405.772
13	483.233	1409.836
14	490.028	1414.059
15	496.721	1418.440
16	503.311	1422.976
17	509.793	1427.665
18	516.164	1432.503
19	522.420	1437.489
20	528.558	1442.620
21	534.575	1447.893
22	540.467	1453.304
23	546.231	1458.852
24	551.863	1464.533
25	557.362	1470.344
26	562.724	1476.281
27	567.945	1482.342
28	571.520	1486.693

Circle Center At X = 305.827 ; Y = 1702.757 ; and Radius = 342.456

Factor of Safety
*** 1.425 ***

1

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	398.421	1374.408
2	406.183	1376.346
3	413.885	1378.510
4	421.520	1380.898
5	429.082	1383.508
6	436.565	1386.338
7	443.962	1389.385
8	451.267	1392.647
9	458.473	1396.121
10	465.575	1399.804
11	472.566	1403.693
12	479.440	1407.785
13	486.192	1412.076
14	492.816	1416.562
15	499.306	1421.240
16	505.656	1426.105
17	511.862	1431.154
18	517.917	1436.382
19	523.818	1441.785
20	529.557	1447.357
21	535.132	1453.095
22	540.536	1458.994
23	545.766	1465.048
24	550.816	1471.252
25	555.684	1477.601
26	558.378	1481.336

Circle Center At X = 336.077 ; Y = 1640.777 ; and Radius = 273.567

Factor of Safety
*** 1.427 ***

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	398.421	1374.408
2	406.162	1376.429
3	413.850	1378.642
4	421.480	1381.046
5	429.047	1383.641
6	436.548	1386.424
7	443.976	1389.394
8	451.328	1392.548
9	458.598	1395.885
10	465.783	1399.403
11	472.878	1403.100
12	479.878	1406.973
13	486.779	1411.019
14	493.577	1415.237
15	500.267	1419.624
16	506.846	1424.176
17	513.308	1428.891
18	519.651	1433.767
19	525.870	1438.800
20	531.961	1443.986
21	537.920	1449.323
22	543.744	1454.808
23	549.430	1460.436
24	554.972	1466.205
25	560.369	1472.110
26	565.616	1478.149
27	570.711	1484.317
28	573.073	1487.326

Circle Center At X = 321.591 ; Y = 1684.770 ; and Radius = 319.729

Factor of Safety
*** 1.428 ***

1

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	395.263	1372.185
2	403.086	1373.860
3	410.863	1375.737
4	418.588	1377.815
5	426.257	1380.092
6	433.865	1382.567
7	441.405	1385.238
8	448.875	1388.104
9	456.267	1391.163
10	463.577	1394.412
11	470.801	1397.849
12	477.934	1401.472
13	484.970	1405.279
14	491.905	1409.267
15	498.735	1413.433
16	505.454	1417.775
17	512.059	1422.289
18	518.544	1426.974
19	524.906	1431.824
20	531.140	1436.838
21	537.242	1442.011
22	543.208	1447.341
23	549.034	1452.824
24	554.715	1458.455
25	560.249	1464.232
26	565.632	1470.151
27	570.859	1476.207
28	575.928	1482.396
29	580.834	1488.715
30	582.697	1491.247

Circle Center At X = 334.615 ; Y = 1674.727 ; and Radius = 308.560

Factor of Safety
*** 1.428 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	398.421	1374.408
2	406.233	1376.133
3	413.984	1378.114
4	421.665	1380.350
5	429.268	1382.838
6	436.785	1385.576
7	444.207	1388.561
8	451.527	1391.789
9	458.736	1395.258
10	465.827	1398.962
11	472.791	1402.899
12	479.622	1407.063
13	486.311	1411.451
14	492.852	1416.057
15	499.237	1420.877
16	505.460	1425.905
17	511.513	1431.135
18	517.390	1436.563
19	523.085	1442.182
20	528.591	1447.985
21	533.902	1453.968
22	539.013	1460.122
23	543.918	1466.442
24	548.612	1472.921
25	552.736	1479.028

Circle Center At X = 350.131 ; Y = 1611.776 ; and Radius = 242.230

Factor of Safety
*** 1.429 ***

1

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	401.579	1376.632
2	409.405	1378.293
3	417.177	1380.187
4	424.889	1382.314
5	432.534	1384.671
6	440.105	1387.256
7	447.595	1390.067
8	454.997	1393.101
9	462.305	1396.355
10	469.513	1399.827
11	476.613	1403.513
12	483.599	1407.411
13	490.466	1411.516
14	497.206	1415.825
15	503.815	1420.333
16	510.285	1425.038
17	516.611	1429.935
18	522.788	1435.019
19	528.809	1440.286
20	534.670	1445.731
21	540.366	1451.349
22	545.890	1457.136
23	551.238	1463.085
24	556.406	1469.192
25	561.389	1475.451
26	566.181	1481.856
27	568.801	1485.586

Circle Center At X = 350.074 ; Y = 1638.556 ; and Radius = 266.940

Factor of Safety
*** 1.431 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	398.421	1374.408
2	406.175	1376.376
3	413.879	1378.533
4	421.527	1380.879
5	429.116	1383.411
6	436.641	1386.128
7	444.096	1389.028
8	451.479	1392.110
9	458.784	1395.373
10	466.006	1398.813
11	473.142	1402.429
12	480.188	1406.218
13	487.138	1410.179
14	493.990	1414.310
15	500.738	1418.606
16	507.379	1423.067
17	513.908	1427.689
18	520.323	1432.470
19	526.618	1437.406
20	532.791	1442.495
21	538.837	1447.734
22	544.753	1453.120
23	550.535	1458.648
24	556.180	1464.317
25	561.685	1470.122
26	567.045	1476.060
27	572.259	1482.128
28	577.323	1488.321
29	578.160	1489.398

Circle Center At X = 321.973 ; Y = 1691.910 ; and Radius = 326.575

Factor of Safety
*** 1.431 ***

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**** END OF GSTABL7 OUTPUT ****
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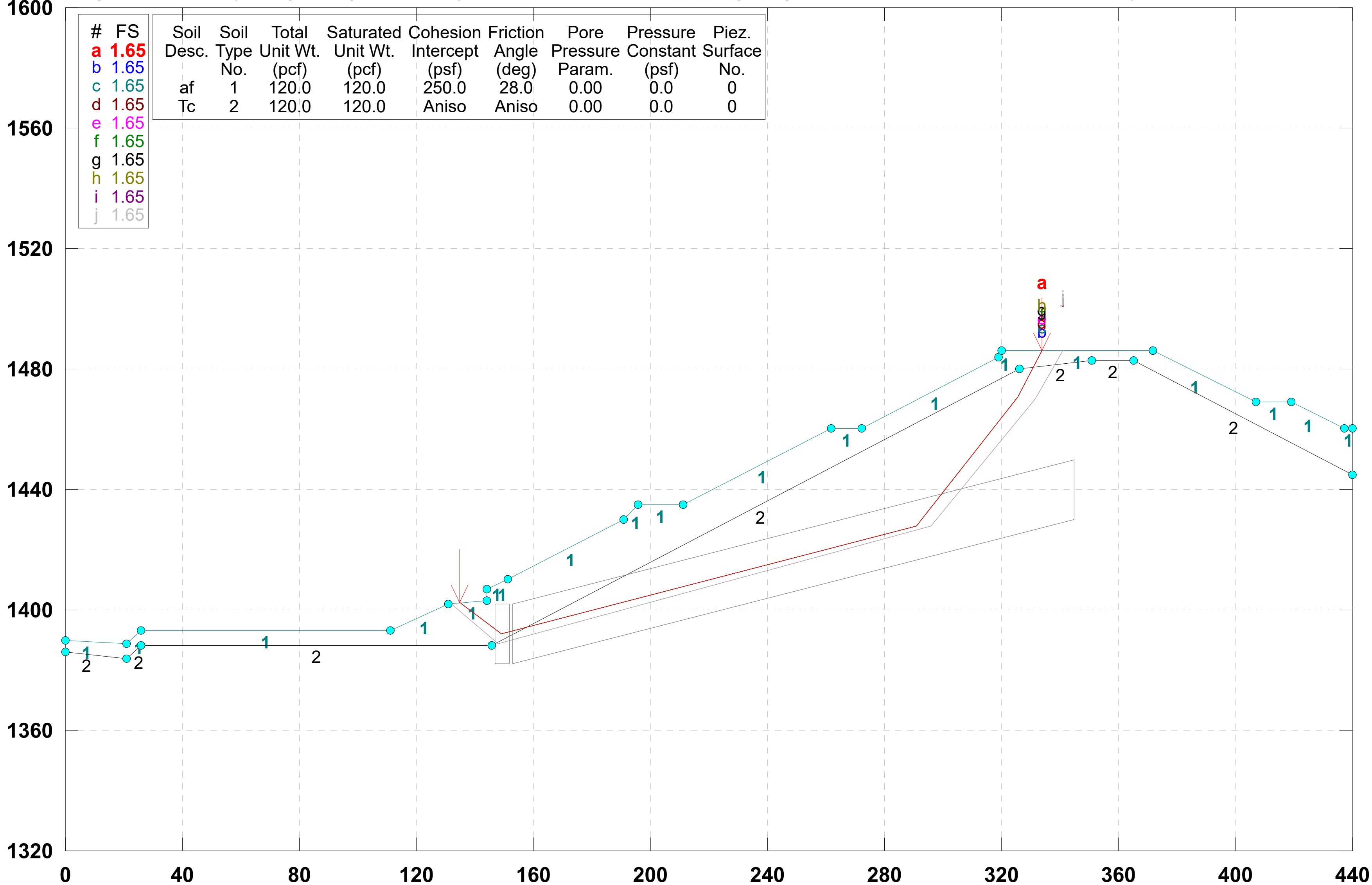
Bouquet Canyon/21095-01/Section W-W'/ Static

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xwb.pl2 Run By: LGC Geotechnical, Inc. 4/8/2022 10:11AM



GSTABL7 v.2 FSmin=1.65

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

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**

SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****
**

Analysis Run Date: 4/8/2022
Time of Run: 10:11AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwb.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwb.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwb.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section W-W'/ Static

BOUNDARY COORDINATES

19 Top Boundaries
26 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	1390.00	21.00	1389.00	1
2	21.00	1389.00	26.00	1393.00	1
3	26.00	1393.00	111.00	1393.00	1
4	111.00	1393.00	131.00	1402.00	1
5	131.00	1402.00	144.00	1403.00	1
6	144.00	1403.00	144.10	1407.00	1
7	144.10	1407.00	151.00	1410.00	1
8	151.00	1410.00	191.00	1430.00	1
9	191.00	1430.00	196.00	1435.00	1
10	196.00	1435.00	211.00	1435.00	1
11	211.00	1435.00	262.00	1460.00	1
12	262.00	1460.00	272.00	1460.00	1
13	272.00	1460.00	319.00	1484.00	1
14	319.00	1484.00	320.00	1486.00	1
15	320.00	1486.00	372.00	1486.00	1
16	372.00	1486.00	407.00	1469.00	1
17	407.00	1469.00	419.00	1469.00	1
18	419.00	1469.00	437.00	1460.00	1
19	437.00	1460.00	440.00	1460.00	1
20	0.00	1386.00	21.00	1384.00	2
21	21.00	1384.00	26.00	1388.00	2
22	26.00	1388.00	146.00	1388.00	2
23	146.00	1388.00	326.00	1480.00	2
24	326.00	1480.00	351.00	1483.00	2
25	351.00	1483.00	365.00	1483.00	2
26	365.00	1483.00	440.00	1445.00	2

User Specified Y-Origin = 1320.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.0	250.00	32.00
2	15.0	150.00	25.00
3	90.0	250.00	32.00

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          ANISOTROPIC SOIL NOTES:
             (1) An input value of 0.01 for C and/or Phi will cause Aniso
                 C and/or Phi to be ignored in that range.
             (2) An input value of 0.02 for Phi will set both Phi and
                 C equal to zero, with no water weight in the tension crack.
             (3) An input value of 0.03 for Phi will set both Phi and
                 C equal to zero, with water weight in the tension crack.


          Janbus Empirical Coef is being used for the case of  c & phi both > 0
1


          A Critical Failure Surface Searching Method, Using A Random
          Technique For Generating Sliding Block Surfaces, Has Been
          Specified.


          4999 Trial Surfaces Have Been Generated.


          2 Boxes Specified For Generation Of Central Block Base


          Length Of Line Segments For Active And Passive Portions Of
          Sliding Block Is  55.0


          Box        X-Left     Y-Left    X-Right    Y-Right       Height
          No.         (ft)       (ft)       (ft)       (ft)         (ft)

           1         147.00    1392.00     152.00    1392.00      20.00
           2         153.00    1392.00     345.00    1440.00      20.00


          WARNING! The factor of safety calculation did not converge in 20 iterations.



          The Trial Failure Surface In Question Is Defined
          By The Following  4 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        144.00     1403.12
              2        147.58     1401.81
              3        237.32     1411.75
              4        237.46     1447.97


          Factor of Safety for the Preceding Surface is Between10.374 and10.344


          WARNING! The factor of safety calculation did not converge in 20 iterations.



          The Trial Failure Surface In Question Is Defined
          By The Following  4 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        139.30     1402.64
              2        151.12     1391.37
              3        201.36     1395.48
              4        201.68     1435.00


          Factor of Safety for the Preceding Surface is Between18.765 and18.723


          WARNING! The factor of safety calculation did not converge in 20 iterations.



          The Trial Failure Surface In Question Is Defined
          By The Following  4 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

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              2        147.58     1401.81
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Factor of Safety for the Preceding Surface is Between18.765 and18.723

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 4999

WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
Did Not Converge in 20 Iterations.

Number of Trial Surfaces with Non-Converged FS = 16

Number of Trial Surfaces With Valid FS = 4983

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 0.3 %

Statistical Data On All Valid FS Values:
FS **Max** = 13.789 FS **Min** = 1.648 FS Ave = 2.382
Standard Deviation = 0.977 Coefficient of Variation = 41.02 %

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	134.600	1402.277
2	148.848	1391.799
3	290.988	1428.005
4	325.725	1470.647
5	333.711	1486.000

Factor of Safety
*** 1.648 ***

Individual data on the 17 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.4	4307.0	0.0	0.0	0.	0.	0.0	0.0	0.0
2	0.1	116.1	0.0	0.0	0.	0.	0.0	0.0	0.0
3	4.7	8254.2	0.0	0.0	0.	0.	0.0	0.0	0.0
4	2.2	4509.1	0.0	0.0	0.	0.	0.0	0.0	0.0
5	7.0	15518.0	0.0	0.0	0.	0.	0.0	0.0	0.0
6	33.0	92764.4	0.0	0.0	0.	0.	0.0	0.0	0.0
7	5.0	17596.6	0.0	0.0	0.	0.	0.0	0.0	0.0
8	15.0	52704.7	0.0	0.0	0.	0.	0.0	0.0	0.0
9	51.0	204252.8	0.0	0.0	0.	0.	0.0	0.0	0.0
10	10.0	45726.9	0.0	0.0	0.	0.	0.0	0.0	0.0
11	19.0	89461.5	0.0	0.0	0.	0.	0.0	0.0	0.0
12	28.0	106388.6	0.0	0.0	0.	0.	0.0	0.0	0.0
13	1.0	2639.4	0.0	0.0	0.	0.	0.0	0.0	0.0
14	5.7	12961.6	0.0	0.0	0.	0.	0.0	0.0	0.0
15	0.3	498.0	0.0	0.0	0.	0.	0.0	0.0	0.0
16	4.9	5944.0	0.0	0.0	0.	0.	0.0	0.0	0.0
17	2.8	914.3	0.0	0.0	0.	0.	0.0	0.0	0.0

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1

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```
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           No.        (ft)        (ft)

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               Factor of Safety
              ***    1.648   ***




        Failure Surface Specified By  5 Coordinate Points


          Point      X-Surf      Y-Surf
           No.        (ft)        (ft)

            1        134.600     1402.277
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               Factor of Safety
              ***    1.648   ***



1

        Failure Surface Specified By  5 Coordinate Points


          Point      X-Surf      Y-Surf
           No.        (ft)        (ft)

            1        132.261     1402.097
            2        148.081     1388.810
            3        296.051     1428.001
            4        331.691     1469.891
            5        341.092     1486.000


               Factor of Safety
              ***    1.652   ***




        Failure Surface Specified By  5 Coordinate Points


          Point      X-Surf      Y-Surf
           No.        (ft)        (ft)

            1        132.261     1402.097
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            3        296.051     1428.001
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            5        341.092     1486.000


               Factor of Safety
              ***    1.652   ***

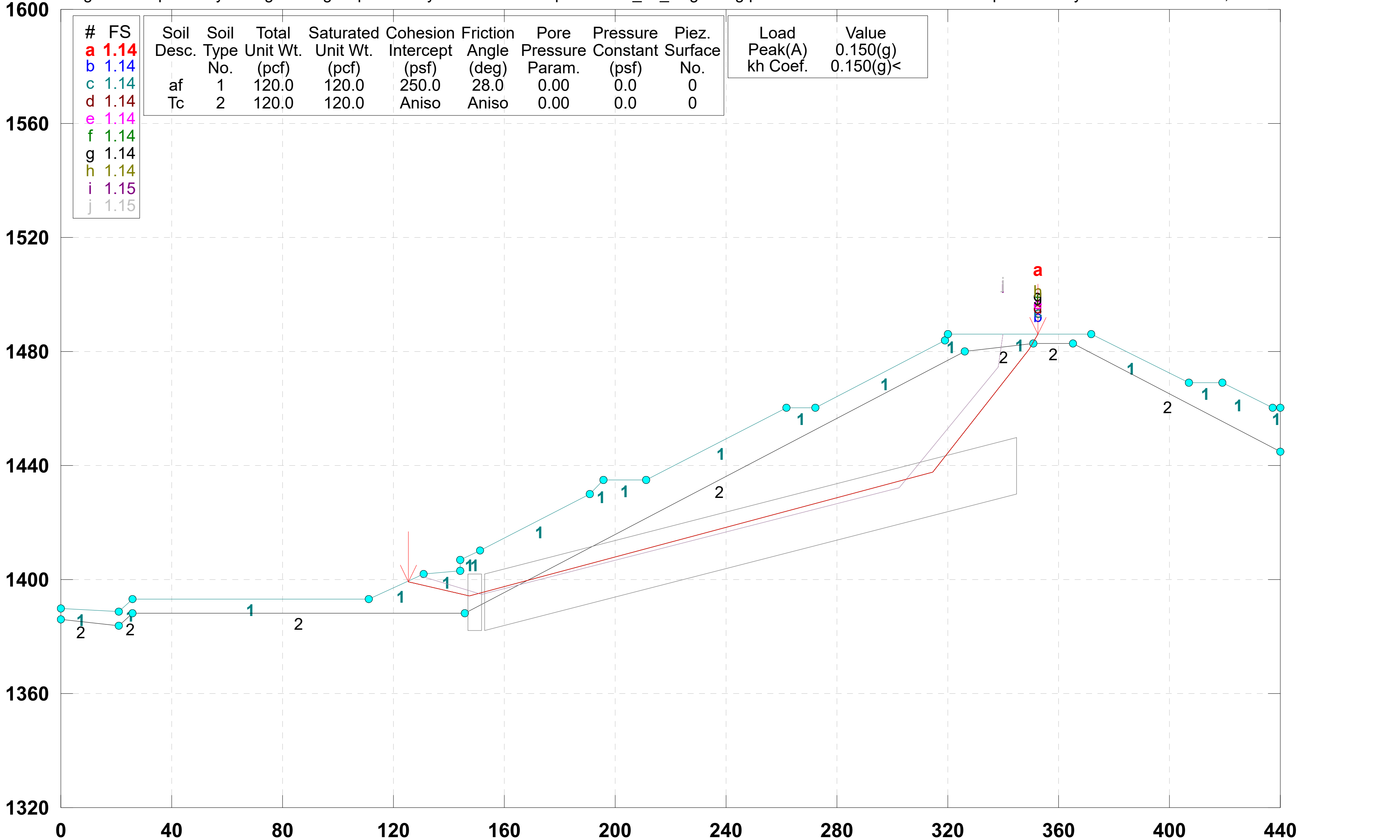





                   **** END OF GSTABL7 OUTPUT ****
```

Bouquet Canyon/21095-01/Section W-W'/ Seismic

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xwbe.pl2 Run By: LGC Geotechnical, Inc. 4/8/2022 10:12A



GSTABL7 v.2 FSmin=1.14

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

```
***  GSTABL7  ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **
```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*****************************************************************************
**
SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*****************************************************************************
**
```

Analysis Run Date: 4/8/2022
Time of Run: 10:12AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwbe.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwbe.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwbe.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section W-W'/ Seismic

BOUNDARY COORDINATES

19 Top Boundaries
26 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	1390.00	21.00	1389.00	1
2	21.00	1389.00	26.00	1393.00	1
3	26.00	1393.00	111.00	1393.00	1
4	111.00	1393.00	131.00	1402.00	1
5	131.00	1402.00	144.00	1403.00	1
6	144.00	1403.00	144.10	1407.00	1
7	144.10	1407.00	151.00	1410.00	1
8	151.00	1410.00	191.00	1430.00	1
9	191.00	1430.00	196.00	1435.00	1
10	196.00	1435.00	211.00	1435.00	1
11	211.00	1435.00	262.00	1460.00	1
12	262.00	1460.00	272.00	1460.00	1
13	272.00	1460.00	319.00	1484.00	1
14	319.00	1484.00	320.00	1486.00	1
15	320.00	1486.00	372.00	1486.00	1
16	372.00	1486.00	407.00	1469.00	1
17	407.00	1469.00	419.00	1469.00	1
18	419.00	1469.00	437.00	1460.00	1
19	437.00	1460.00	440.00	1460.00	1
20	0.00	1386.00	21.00	1384.00	2
21	21.00	1384.00	26.00	1388.00	2
22	26.00	1388.00	146.00	1388.00	2
23	146.00	1388.00	326.00	1480.00	2
24	326.00	1480.00	351.00	1483.00	2
25	351.00	1483.00	365.00	1483.00	2
26	365.00	1483.00	440.00	1445.00	2

User Specified Y-Origin = 1320.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.0	250.00	32.00
2	15.0	150.00	25.00
3	90.0	250.00	32.00

```
          ANISOTROPIC SOIL NOTES:
             (1) An input value of 0.01 for C and/or Phi will cause Aniso
                 C and/or Phi to be ignored in that range.
             (2) An input value of 0.02 for Phi will set both Phi and
                 C equal to zero, with no water weight in the tension crack.
             (3) An input value of 0.03 for Phi will set both Phi and
                 C equal to zero, with water weight in the tension crack.


          Specified Peak Ground Acceleration Coefficient (A) =   0.150(g)
          Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
          Specified Vertical Earthquake Coefficient (kv) =   0.000(g)

          Specified Seismic Pore-Pressure Factor =   0.000

          Janbus Empirical Coef is being used for the case of  c & phi both > 0
1


          A Critical Failure Surface Searching Method, Using A Random
          Technique For Generating Sliding Block Surfaces, Has Been
          Specified.


          4999 Trial Surfaces Have Been Generated.


          2 Boxes Specified For Generation Of Central Block Base


          Length Of Line Segments For Active And Passive Portions Of
          Sliding Block Is  55.0


          Box        X-Left     Y-Left    X-Right    Y-Right      Height
          No.         (ft)       (ft)       (ft)       (ft)        (ft)

           1         147.00    1392.00     152.00    1392.00      20.00
           2         153.00    1392.00     345.00    1440.00      20.00


          WARNING! The factor of safety calculation did not converge in 20 iterations.



          The Trial Failure Surface In Question Is Defined
          By The Following  4 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

               1        139.30     1402.64
               2        151.12     1391.37
               3        201.36     1395.48
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          Factor of Safety for the Preceding Surface is Between 6.358 and 6.351


          WARNING! The factor of safety calculation did not converge in 20 iterations.



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Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 4999

WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
Did Not Converge in 20 Iterations.

Number of Trial Surfaces with Non-Converged FS = 8

Number of Trial Surfaces With Valid FS = 4991

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 0.2 %

Statistical Data On All Valid FS Values:
FS **Max** = 10.120 FS **Min** = 1.138 FS Ave = 1.654
Standard Deviation = 0.671 Coefficient of Variation = 40.56 %

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	125.355	1399.460
2	147.571	1394.465
3	314.707	1437.616
4	349.045	1480.580
5	352.824	1486.000

Factor of Safety
*** 1.138 ***

Individual data on the 18 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force **Norm** (lbs)	Tie Force **Tan** (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge **Load** (lbs)
1	5.6	1290.4	0.0	0.0	0.	0.	193.6	0.0	0.0
2	13.0	9002.9	0.0	0.0	0.	0.	1350.4	0.0	0.0
3	0.1	116.9	0.0	0.0	0.	0.	17.5	0.0	0.0
4	3.5	5373.0	0.0	0.0	0.	0.	805.9	0.0	0.0
5	3.4	5903.7	0.0	0.0	0.	0.	885.5	0.0	0.0
6	19.0	38536.5	0.0	0.0	0.	0.	5780.5	0.0	0.0
7	21.0	54998.3	0.0	0.0	0.	0.	8249.7	0.0	0.0

```
    8     5.0   15706.4     0.0     0.0      0.      0.  2356.0     0.0      0.0
    9    15.0   46972.0     0.0     0.0      0.      0.  7045.8     0.0      0.0
   10    51.0  184062.4     0.0     0.0      0.      0. 27609.4     0.0      0.0
   11    10.0   41641.3     0.0     0.0      0.      0.  6246.2     0.0      0.0
   12    42.7  198849.2     0.0     0.0      0.      0. 29827.4     0.0      0.0
   13     4.3   21946.8     0.0     0.0      0.      0.  3292.0     0.0      0.0
   14     1.0    4966.4     0.0     0.0      0.      0.   745.0     0.0      0.0
   15     6.0   27365.6     0.0     0.0      0.      0.  4104.8     0.0      0.0
   16    23.0   54857.2     0.0     0.0      0.      0.  8228.6     0.0      0.0
   17     1.7     843.6     0.0     0.0      0.      0.   126.5     0.0      0.0
   18     2.1     385.4     0.0     0.0      0.      0.    57.8     0.0      0.0

          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        125.355     1399.460
              2        147.571     1394.465
              3        314.707     1437.616
              4        349.045     1480.580
              5        352.824     1486.000


                 Factor of Safety
                ***    1.138   ***



 1

          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        125.355     1399.460
              2        147.571     1394.465
              3        314.707     1437.616
              4        349.045     1480.580
              5        352.824     1486.000


                 Factor of Safety
                ***    1.138   ***




          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        125.355     1399.460
              2        147.571     1394.465
              3        314.707     1437.616
              4        349.045     1480.580
              5        352.824     1486.000


                 Factor of Safety
                ***    1.138   ***




 1

          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        125.355     1399.460
              2        147.571     1394.465
              3        314.707     1437.616
              4        349.045     1480.580
              5        352.824     1486.000


                 Factor of Safety
                ***    1.138   ***




          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

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              3        314.707     1437.616
              4        349.045     1480.580
              5        352.824     1486.000


                 Factor of Safety
                ***    1.138   ***



 1

          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        125.355     1399.460
              2        147.571     1394.465
              3        314.707     1437.616
              4        349.045     1480.580
              5        352.824     1486.000


                 Factor of Safety
                ***    1.138   ***




          Failure Surface Specified By  5 Coordinate Points

```

```
             Point      X-Surf      Y-Surf
              No.        (ft)        (ft)

               1        125.355     1399.460
               2        147.571     1394.465
               3        314.707     1437.616
               4        349.045     1480.580
               5        352.824     1486.000


                  Factor of Safety
                 ***    1.138   ***




 1

           Failure Surface Specified By  5 Coordinate Points


             Point      X-Surf      Y-Surf
              No.        (ft)        (ft)

               1        129.394     1401.277
               2        151.824     1394.992
               3        302.520     1432.440
               4        338.067     1474.409
               5        339.894     1486.000


                  Factor of Safety
                 ***    1.148   ***




           Failure Surface Specified By  5 Coordinate Points


             Point      X-Surf      Y-Surf
              No.        (ft)        (ft)

               1        129.394     1401.277
               2        151.824     1394.992
               3        302.520     1432.440
               4        338.067     1474.409
               5        339.894     1486.000


                  Factor of Safety
                 ***    1.148   ***

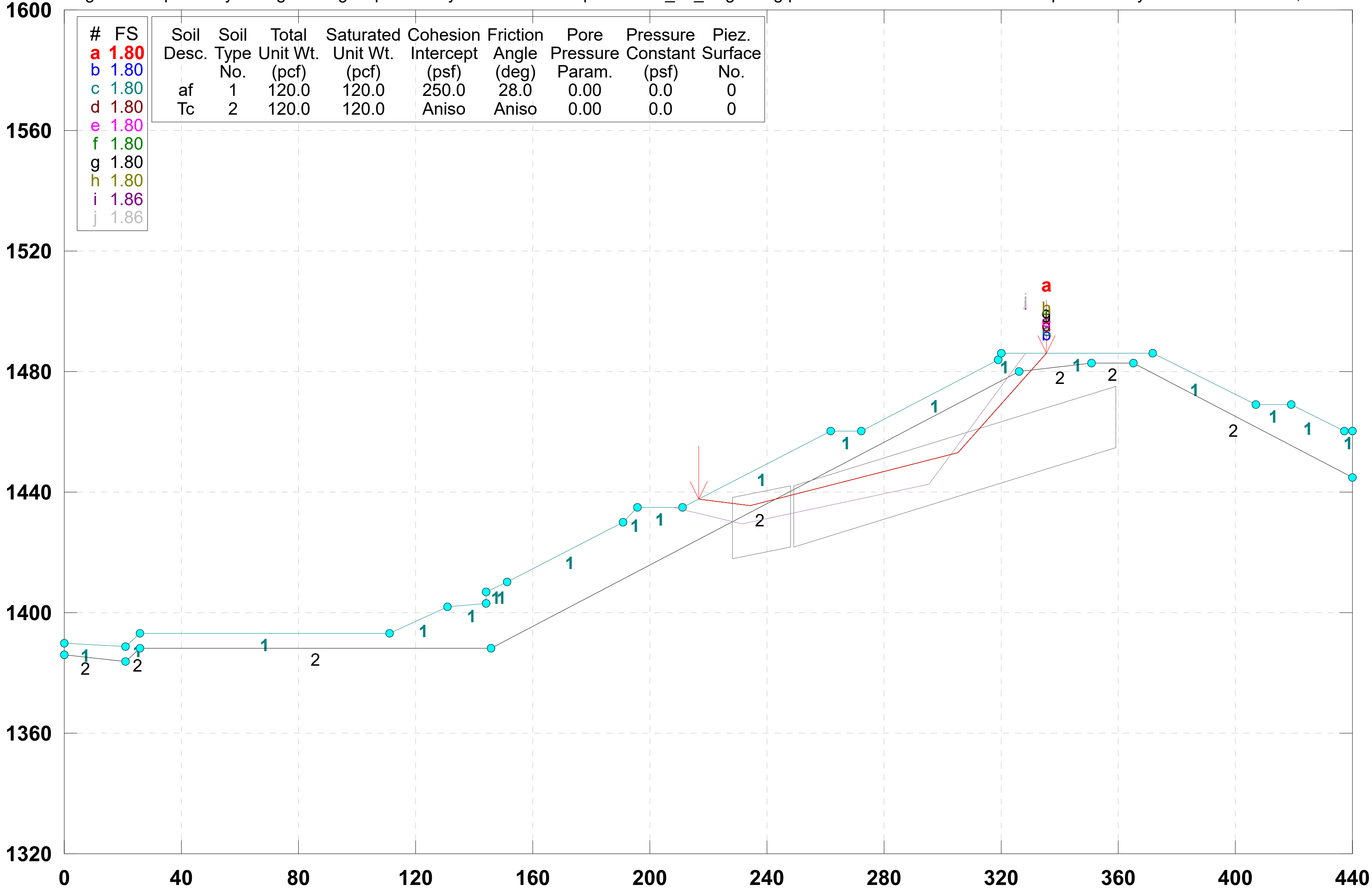





                     **** END OF GSTABL7 OUTPUT ****
```

Bouquet Canyon/21095-01/Section W-W'/ Static

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xwb-2.pl2 Run By: LGC Geotechnical, Inc. 4/8/2022 10:12A



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
af	1	120.0	120.0	250.0	28.0	0.00	0.0	0
Tc	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=1.80

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/8/2022
Time of Run: 10:12AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwb-2.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwb-2.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwb-2.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section W-W'/ Static

BOUNDARY COORDINATES

19 Top Boundaries
26 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	1390.00	21.00	1389.00	1
2	21.00	1389.00	26.00	1393.00	1
3	26.00	1393.00	111.00	1393.00	1
4	111.00	1393.00	131.00	1402.00	1
5	131.00	1402.00	144.00	1403.00	1
6	144.00	1403.00	144.10	1407.00	1
7	144.10	1407.00	151.00	1410.00	1
8	151.00	1410.00	191.00	1430.00	1
9	191.00	1430.00	196.00	1435.00	1
10	196.00	1435.00	211.00	1435.00	1
11	211.00	1435.00	262.00	1460.00	1
12	262.00	1460.00	272.00	1460.00	1
13	272.00	1460.00	319.00	1484.00	1
14	319.00	1484.00	320.00	1486.00	1
15	320.00	1486.00	372.00	1486.00	1
16	372.00	1486.00	407.00	1469.00	1
17	407.00	1469.00	419.00	1469.00	1
18	419.00	1469.00	437.00	1460.00	1
19	437.00	1460.00	440.00	1460.00	1
20	0.00	1386.00	21.00	1384.00	2
21	21.00	1384.00	26.00	1388.00	2
22	26.00	1388.00	146.00	1388.00	2
23	146.00	1388.00	326.00	1480.00	2
24	326.00	1480.00	351.00	1483.00	2
25	351.00	1483.00	365.00	1483.00	2
26	365.00	1483.00	440.00	1445.00	2

User Specified Y-Origin = 1320.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.0	250.00	32.00
2	15.0	150.00	25.00
3	90.0	250.00	32.00

```
          ANISOTROPIC SOIL NOTES:
             (1) An input value of 0.01 for C and/or Phi will cause Aniso
                 C and/or Phi to be ignored in that range.
             (2) An input value of 0.02 for Phi will set both Phi and
                 C equal to zero, with no water weight in the tension crack.
             (3) An input value of 0.03 for Phi will set both Phi and
                 C equal to zero, with water weight in the tension crack.


          Janbus Empirical Coef is being used for the case of  c & phi both > 0
1


          A Critical Failure Surface Searching Method, Using A Random
          Technique For Generating Sliding Block Surfaces, Has Been
          Specified.


          4999 Trial Surfaces Have Been Generated.


          2 Boxes Specified For Generation Of Central Block Base


          Length Of Line Segments For Active And Passive Portions Of
          Sliding Block Is  55.0


          Box        X-Left     Y-Left    X-Right    Y-Right      Height
          No.         (ft)       (ft)       (ft)       (ft)        (ft)

           1         228.00    1428.00     248.00    1432.00      20.00
           2         249.00    1432.00     359.00    1465.00      20.00


          WARNING! The factor of safety calculation did not converge in 20 iterations.



          The Trial Failure Surface In Question Is Defined
          By The Following  4 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        214.49     1436.71
              2        229.48     1429.73
              3        277.94     1439.68
              4        278.08     1463.10


          Factor of Safety for the Preceding Surface is Between 7.088 and 7.082


          WARNING! The factor of safety calculation did not converge in 20 iterations.



          The Trial Failure Surface In Question Is Defined
          By The Following  4 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        214.49     1436.71
              2        229.48     1429.73
              3        277.94     1439.68
              4        278.08     1463.10


          Factor of Safety for the Preceding Surface is Between 7.088 and 7.082


          WARNING! The factor of safety calculation did not converge in 20 iterations.



          The Trial Failure Surface In Question Is Defined
          By The Following  4 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        214.49     1436.71
              2        229.48     1429.73
              3        277.94     1439.68
              4        278.08     1463.10


          Factor of Safety for the Preceding Surface is Between 7.088 and 7.082


          WARNING! The factor of safety calculation did not converge in 20 iterations.



          The Trial Failure Surface In Question Is Defined
          By The Following  4 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        214.49     1436.71
              2        229.48     1429.73
              3        277.94     1439.68
              4        278.08     1463.10


          Factor of Safety for the Preceding Surface is Between 7.088 and 7.082


          WARNING! The factor of safety calculation did not converge in 20 iterations.



          The Trial Failure Surface In Question Is Defined
          By The Following  4 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        214.49     1436.71
              2        229.48     1429.73
              3        277.94     1439.68
              4        278.08     1463.10
```

Factor of Safety for the Preceding Surface is Between 7.088 and 7.082

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	214.49	1436.71
2	229.48	1429.73
3	277.94	1439.68
4	278.08	1463.10

Factor of Safety for the Preceding Surface is Between 7.088 and 7.082

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	214.49	1436.71
2	229.48	1429.73
3	277.94	1439.68
4	278.08	1463.10

Factor of Safety for the Preceding Surface is Between 7.088 and 7.082

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 4999

WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
Did Not Converge in 20 Iterations.

Number of Trial Surfaces with Non-Converged FS = 7

Number of Trial Surfaces With Valid FS = 4992

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 0.1 %

Statistical Data On All Valid FS Values:
FS **Max** = 48.290 FS **Min** = 1.799 FS Ave = 2.993
Standard Deviation = 2.509 Coefficient of Variation = 83.82 %

Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	216.972	1437.927
2	234.483	1435.726
3	305.443	1452.931
4	335.503	1486.000

Factor of Safety
*** 1.799 ***

Individual data on the 10 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force **Norm** (lbs)	Tie Force **Tan** (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	17.5	11331.8	0.0	0.0	0.	0.	0.0	0.0	0.0
2	9.3	13338.8	0.0	0.0	0.	0.	0.0	0.0	0.0
3	18.2	33529.3	0.0	0.0	0.	0.	0.0	0.0	0.0
4	10.0	19668.0	0.0	0.0	0.	0.	0.0	0.0	0.0
5	33.4	78908.8	0.0	0.0	0.	0.	0.0	0.0	0.0
6	13.6	32781.3	0.0	0.0	0.	0.	0.0	0.0	0.0
7	1.0	1992.6	0.0	0.0	0.	0.	0.0	0.0	0.0
8	6.0	9903.5	0.0	0.0	0.	0.	0.0	0.0	0.0
9	4.5	4338.4	0.0	0.0	0.	0.	0.0	0.0	0.0
10	5.0	1622.7	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	216.972	1437.927
2	234.483	1435.726
3	305.443	1452.931
4	335.503	1486.000

Factor of Safety
*** 1.799 ***

1

Failure Surface Specified By 4 Coordinate Points

Point X-Surf Y-Surf

```
               No.        (ft)        (ft)

                1        216.972     1437.927
                2        234.483     1435.726
                3        305.443     1452.931
                4        335.503     1486.000


                   Factor of Safety
                  ***    1.799   ***




            Failure Surface Specified By  4 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        216.972     1437.927
                2        234.483     1435.726
                3        305.443     1452.931
                4        335.503     1486.000


                   Factor of Safety
                  ***    1.799   ***



 1

            Failure Surface Specified By  4 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        216.972     1437.927
                2        234.483     1435.726
                3        305.443     1452.931
                4        335.503     1486.000


                   Factor of Safety
                  ***    1.799   ***




            Failure Surface Specified By  4 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        216.972     1437.927
                2        234.483     1435.726
                3        305.443     1452.931
                4        335.503     1486.000


                   Factor of Safety
                  ***    1.799   ***



 1

            Failure Surface Specified By  4 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        216.972     1437.927
                2        234.483     1435.726
                3        305.443     1452.931
                4        335.503     1486.000


                   Factor of Safety
                  ***    1.799   ***




            Failure Surface Specified By  4 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        216.972     1437.927
                2        234.483     1435.726
                3        305.443     1452.931
                4        335.503     1486.000


                   Factor of Safety
                  ***    1.799   ***



 1

            Failure Surface Specified By  4 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        207.853     1435.000
                2        231.739     1429.191
                3        295.077     1442.507
                4        328.466     1486.000


                   Factor of Safety
                  ***    1.855   ***




            Failure Surface Specified By  4 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        207.853     1435.000
```

```
             2        231.739     1429.191
             3        295.077     1442.507
             4        328.466     1486.000

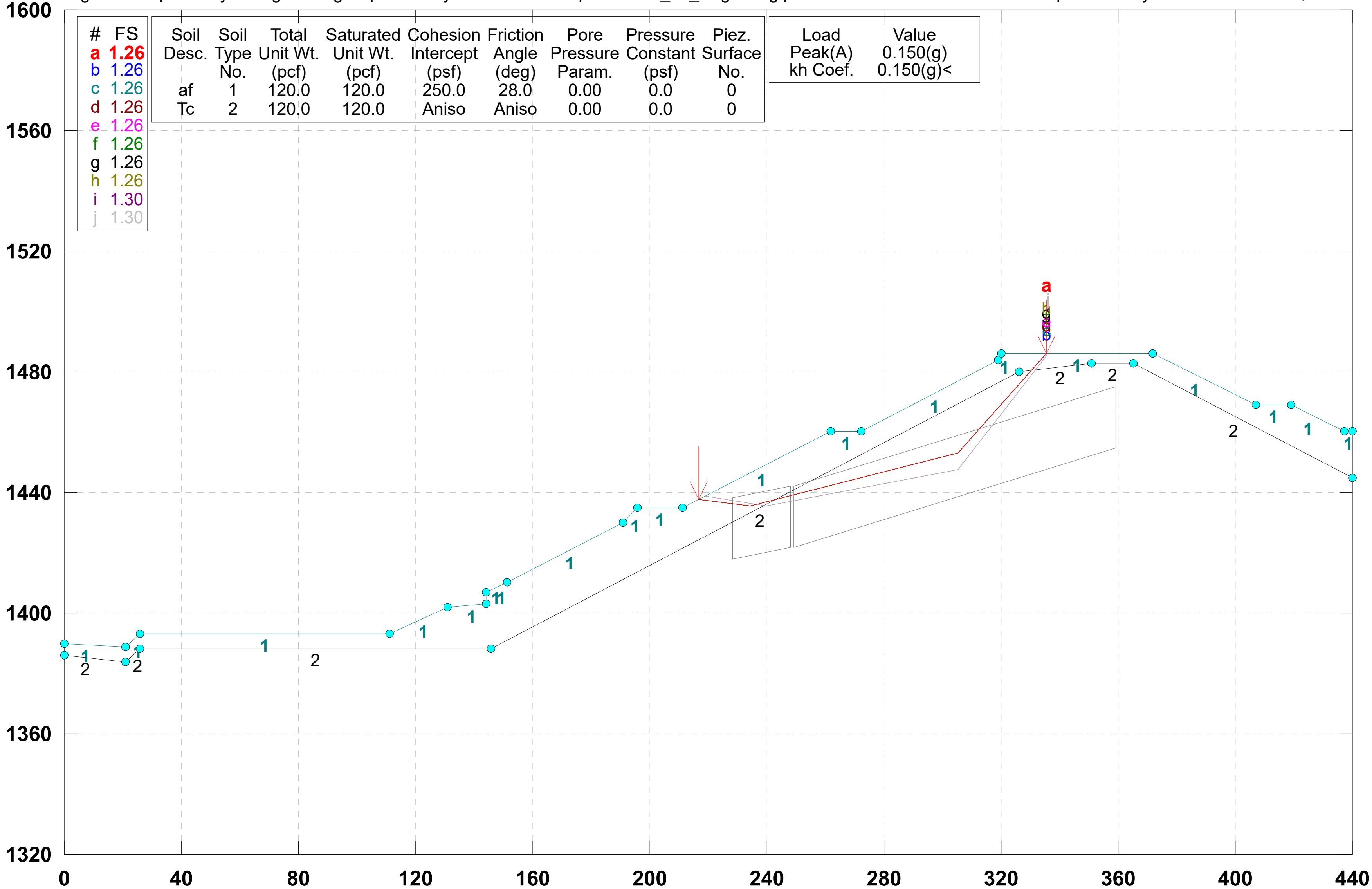

                Factor of Safety
               ***    1.855   ***




                   **** END OF GSTABL7 OUTPUT ****
```

Bouquet Canyon/21095-01/Section W-W'/ Seismic

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xwb-2e.pl2 Run By: LGC Geotechnical, Inc. 4/8/2022 10:12/



GSTABL7 v.2 FSmin=1.26

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/8/2022
Time of Run: 10:12AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwb-2e.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwb-2e.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwb-2e.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section W-W'/ Seismic

BOUNDARY COORDINATES

19 Top Boundaries
26 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	1390.00	21.00	1389.00	1
2	21.00	1389.00	26.00	1393.00	1
3	26.00	1393.00	111.00	1393.00	1
4	111.00	1393.00	131.00	1402.00	1
5	131.00	1402.00	144.00	1403.00	1
6	144.00	1403.00	144.10	1407.00	1
7	144.10	1407.00	151.00	1410.00	1
8	151.00	1410.00	191.00	1430.00	1
9	191.00	1430.00	196.00	1435.00	1
10	196.00	1435.00	211.00	1435.00	1
11	211.00	1435.00	262.00	1460.00	1
12	262.00	1460.00	272.00	1460.00	1
13	272.00	1460.00	319.00	1484.00	1
14	319.00	1484.00	320.00	1486.00	1
15	320.00	1486.00	372.00	1486.00	1
16	372.00	1486.00	407.00	1469.00	1
17	407.00	1469.00	419.00	1469.00	1
18	419.00	1469.00	437.00	1460.00	1
19	437.00	1460.00	440.00	1460.00	1
20	0.00	1386.00	21.00	1384.00	2
21	21.00	1384.00	26.00	1388.00	2
22	26.00	1388.00	146.00	1388.00	2
23	146.00	1388.00	326.00	1480.00	2
24	326.00	1480.00	351.00	1483.00	2
25	351.00	1483.00	365.00	1483.00	2
26	365.00	1483.00	440.00	1445.00	2

User Specified Y-Origin = 1320.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.0	250.00	32.00
2	15.0	150.00	25.00
3	90.0	250.00	32.00

```
          ANISOTROPIC SOIL NOTES:
             (1) An input value of 0.01 for C and/or Phi will cause Aniso
                 C and/or Phi to be ignored in that range.
             (2) An input value of 0.02 for Phi will set both Phi and
                 C equal to zero, with no water weight in the tension crack.
             (3) An input value of 0.03 for Phi will set both Phi and
                 C equal to zero, with water weight in the tension crack.


          Specified Peak Ground Acceleration Coefficient (A) =   0.150(g)
          Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
          Specified Vertical Earthquake Coefficient (kv) =   0.000(g)

          Specified Seismic Pore-Pressure Factor =   0.000

          Janbus Empirical Coef is being used for the case of  c & phi both > 0
1


          A Critical Failure Surface Searching Method, Using A Random
          Technique For Generating Sliding Block Surfaces, Has Been
          Specified.


          4999 Trial Surfaces Have Been Generated.


          2 Boxes Specified For Generation Of Central Block Base


          Length Of Line Segments For Active And Passive Portions Of
          Sliding Block Is  55.0


          Box        X-Left     Y-Left    X-Right    Y-Right      Height
          No.         (ft)       (ft)       (ft)       (ft)        (ft)

           1         228.00    1428.00     248.00    1432.00      20.00
           2         249.00    1432.00     359.00    1465.00      20.00


          Following Are Displayed The Ten Most Critical Of The Trial
          Failure Surfaces Evaluated. They Are
          Ordered - Most Critical First.


          * * Safety Factors Are Calculated By The Simplified Janbu Method * *



          Total Number of Trial Surfaces Attempted =  4999

          Number of Trial Surfaces With Valid FS = 4999


          Statistical Data On All Valid FS Values:
             FS Max =  28.337   FS Min =   1.261   FS Ave =   2.022
             Standard Deviation =    1.498   Coefficient of Variation =   74.08 %


          Failure Surface Specified By  4 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        216.972     1437.927
              2        234.483     1435.726
              3        305.443     1452.931
              4        335.503     1486.000


                 Factor of Safety
                ***    1.261   ***




               Individual data on the    10  slices


                                     Water  Water     Tie     Tie     Earthquake
                                     Force  Force    Force   Force       Force   Surcharge
 Slice  Width    Weight    Top    Bot     Norm     Tan     Hor     Ver    Load
  No.    (ft)    (lbs)    (lbs)  (lbs)    (lbs)   (lbs)   (lbs)   (lbs)   (lbs)

   1     17.5   11331.8    0.0    0.0       0.      0.  1699.8    0.0     0.0
   2      9.3   13338.8    0.0    0.0       0.      0.  2000.8    0.0     0.0
   3     18.2   33529.3    0.0    0.0       0.      0.  5029.4    0.0     0.0
   4     10.0   19668.0    0.0    0.0       0.      0.  2950.2    0.0     0.0
   5     33.4   78908.8    0.0    0.0       0.      0. 11836.3    0.0     0.0
   6     13.6   32781.3    0.0    0.0       0.      0.  4917.2    0.0     0.0
   7      1.0    1992.6    0.0    0.0       0.      0.   298.9    0.0     0.0
   8      6.0    9903.5    0.0    0.0       0.      0.  1485.5    0.0     0.0
   9      4.5    4338.4    0.0    0.0       0.      0.   650.8    0.0     0.0
  10      5.0    1622.7    0.0    0.0       0.      0.   243.4    0.0     0.0

          Failure Surface Specified By  4 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        216.972     1437.927
              2        234.483     1435.726
              3        305.443     1452.931
              4        335.503     1486.000


                 Factor of Safety
                ***    1.261   ***



1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             No.        (ft)        (ft)

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                 Factor of Safety
                ***    1.261   ***
```

```
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                 Factor of Safety
                ***    1.261   ***



1

          Failure Surface Specified By  4 Coordinate Points


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             No.        (ft)        (ft)

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              3        305.443     1452.931
              4        335.503     1486.000


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          Failure Surface Specified By  4 Coordinate Points


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             No.        (ft)        (ft)

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              3        305.443     1452.931
              4        335.503     1486.000


                 Factor of Safety
                ***    1.261   ***




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            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

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              2        234.483     1435.726
              3        305.443     1452.931
              4        335.503     1486.000


                 Factor of Safety
                ***    1.261   ***



1

          Failure Surface Specified By  4 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        219.153     1438.997
              2        239.595     1435.552
              3        304.987     1447.809
              4        336.299     1486.000


                 Factor of Safety
                ***    1.297   ***




          Failure Surface Specified By  4 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

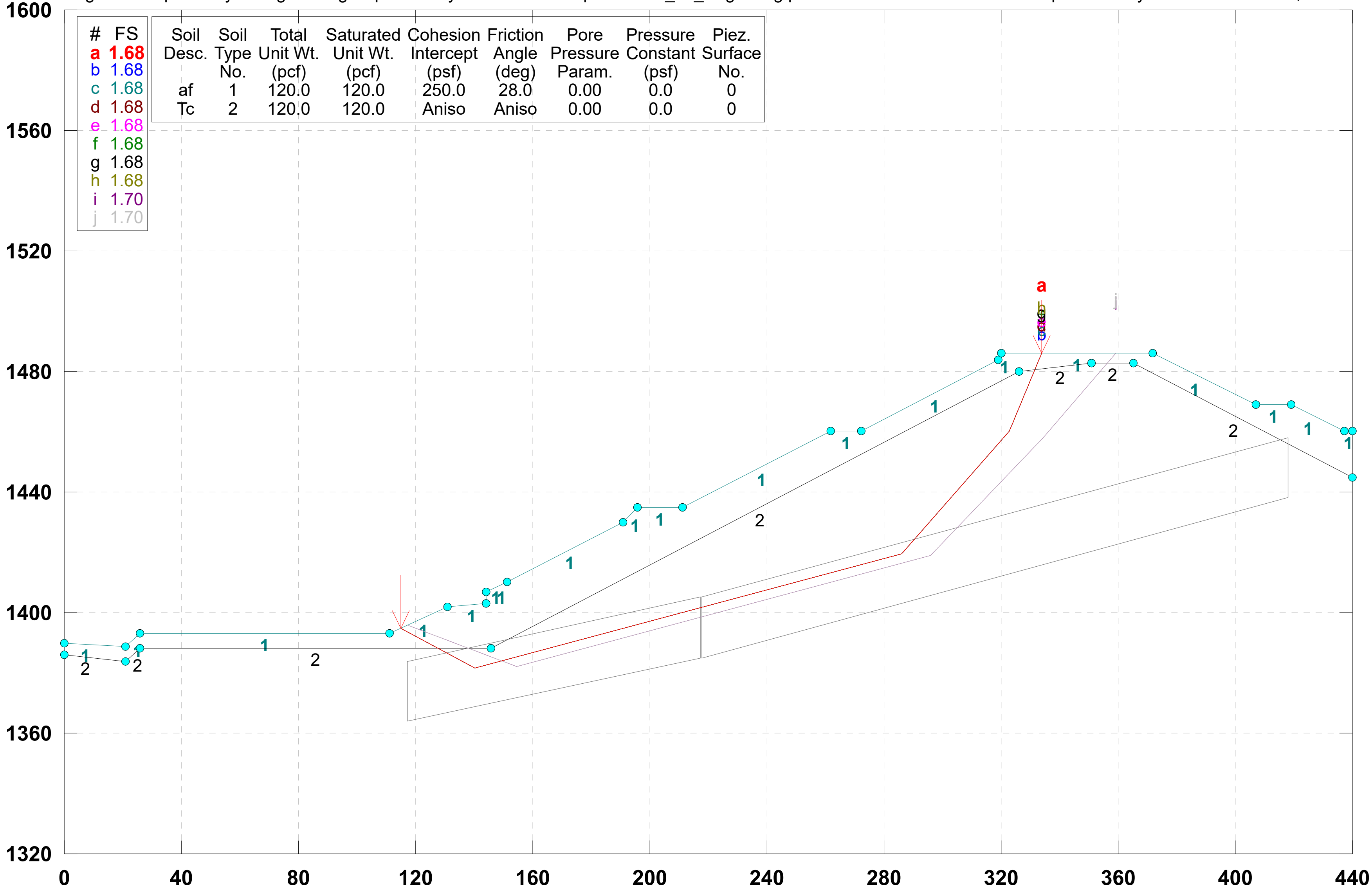
              1        219.153     1438.997
              2        239.595     1435.552
              3        304.987     1447.809
              4        336.299     1486.000


                 Factor of Safety
                ***    1.297   ***
```

```
**** END OF GSTABL7 OUTPUT ****
```

Bouquet Canyon/21095-01/Section W-W'/ Static

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xwb-3.pl2 Run By: LGC Geotechnical, Inc. 4/8/2022 10:12A



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
af	1	120.0	120.0	250.0	28.0	0.00	0.0	0
Tc	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=1.68

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/8/2022
Time of Run: 10:12AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwb-3.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwb-3.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwb-3.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section W-W'/ Static

BOUNDARY COORDINATES

19 Top Boundaries
26 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	1390.00	21.00	1389.00	1
2	21.00	1389.00	26.00	1393.00	1
3	26.00	1393.00	111.00	1393.00	1
4	111.00	1393.00	131.00	1402.00	1
5	131.00	1402.00	144.00	1403.00	1
6	144.00	1403.00	144.10	1407.00	1
7	144.10	1407.00	151.00	1410.00	1
8	151.00	1410.00	191.00	1430.00	1
9	191.00	1430.00	196.00	1435.00	1
10	196.00	1435.00	211.00	1435.00	1
11	211.00	1435.00	262.00	1460.00	1
12	262.00	1460.00	272.00	1460.00	1
13	272.00	1460.00	319.00	1484.00	1
14	319.00	1484.00	320.00	1486.00	1
15	320.00	1486.00	372.00	1486.00	1
16	372.00	1486.00	407.00	1469.00	1
17	407.00	1469.00	419.00	1469.00	1
18	419.00	1469.00	437.00	1460.00	1
19	437.00	1460.00	440.00	1460.00	1
20	0.00	1386.00	21.00	1384.00	2
21	21.00	1384.00	26.00	1388.00	2
22	26.00	1388.00	146.00	1388.00	2
23	146.00	1388.00	326.00	1480.00	2
24	326.00	1480.00	351.00	1483.00	2
25	351.00	1483.00	365.00	1483.00	2
26	365.00	1483.00	440.00	1445.00	2

User Specified Y-Origin = 1320.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.0	250.00	32.00
2	15.0	150.00	25.00
3	90.0	250.00	32.00

```
          ANISOTROPIC SOIL NOTES:
             (1) An input value of 0.01 for C and/or Phi will cause Aniso
                 C and/or Phi to be ignored in that range.
             (2) An input value of 0.02 for Phi will set both Phi and
                 C equal to zero, with no water weight in the tension crack.
             (3) An input value of 0.03 for Phi will set both Phi and
                 C equal to zero, with water weight in the tension crack.


          Janbus Empirical Coef is being used for the case of  c & phi both > 0
1


          A Critical Failure Surface Searching Method, Using A Random
          Technique For Generating Sliding Block Surfaces, Has Been
          Specified.


          4999 Trial Surfaces Have Been Generated.


          2 Boxes Specified For Generation Of Central Block Base


          Length Of Line Segments For Active And Passive Portions Of
          Sliding Block Is  55.0


          Box        X-Left     Y-Left    X-Right    Y-Right      Height
          No.         (ft)       (ft)       (ft)       (ft)        (ft)

           1         117.00    1374.00     217.00    1395.00      20.00
           2         218.00    1395.00     418.00    1448.00      20.00


          WARNING! The factor of safety calculation did not converge in 20 iterations.



          The Trial Failure Surface In Question Is Defined
          By The Following  4 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        145.49     1407.60
              2        170.39     1394.14
              3        230.93     1402.54
              4        231.45     1445.02


          Factor of Safety for the Preceding Surface is Between10.956 and10.951


          WARNING! The factor of safety calculation did not converge in 20 iterations.



          The Trial Failure Surface In Question Is Defined
          By The Following  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        144.08     1406.31
              2        174.32     1391.59
              3        275.12     1404.35
              4        275.19     1459.35
              5        279.84     1464.00


          Factor of Safety for the Preceding Surface is Between14.802 and14.663


          WARNING! The factor of safety calculation did not converge in 20 iterations.



          The Trial Failure Surface In Question Is Defined
          By The Following  4 Coordinate Points


            Point      X-Surf      Y-Surf
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```

```
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```

```
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         By The Following  5 Coordinate Points


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            No.        (ft)        (ft)

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             2        174.32     1391.59
             3        275.12     1404.35
             4        275.19     1459.35
             5        279.84     1464.00


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         By The Following  4 Coordinate Points


           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)

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             2        170.39     1394.14
             3        230.93     1402.54
             4        231.45     1445.02


         Factor of Safety for the Preceding Surface is Between10.956 and10.951


         Following Are Displayed The Ten Most Critical Of The Trial
         Failure Surfaces Evaluated. They Are
         Ordered - Most Critical First.


         * * Safety Factors Are Calculated By The Simplified Janbu Method * *



         Total Number of Trial Surfaces Attempted =  4999

         WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
```

Did Not Converge in 20 Iterations.

Number of Trial Surfaces with Non-Converged FS = 17

Number of Trial Surfaces With Valid FS = 4982

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 0.3 %

Statistical Data On All Valid FS Values:
FS **Max** = 10.601 FS **Min** = 1.677 FS Ave = 2.531
Standard Deviation = 0.712 Coefficient of Variation = 28.11 %

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	114.700	1394.665
2	140.383	1381.541
3	286.152	1419.431
4	322.801	1460.442
5	333.651	1486.000

Factor of Safety
*** 1.677 ***

Individual data on the 19 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force **Norm** (lbs)	Tie Force **Tan** (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	13.0	9808.9	0.0	0.0	0.	0.	0.0	0.0	0.0
2	3.3	5511.6	0.0	0.0	0.	0.	0.0	0.0	0.0
3	9.4	20742.2	0.0	0.0	0.	0.	0.0	0.0	0.0
4	3.6	9050.7	0.0	0.0	0.	0.	0.0	0.0	0.0
5	0.1	270.1	0.0	0.0	0.	0.	0.0	0.0	0.0
6	1.9	5622.2	0.0	0.0	0.	0.	0.0	0.0	0.0
7	5.0	15157.3	0.0	0.0	0.	0.	0.0	0.0	0.0
8	40.0	146402.3	0.0	0.0	0.	0.	0.0	0.0	0.0
9	5.0	22291.3	0.0	0.0	0.	0.	0.0	0.0	0.0
10	15.0	66694.9	0.0	0.0	0.	0.	0.0	0.0	0.0
11	51.0	250766.8	0.0	0.0	0.	0.	0.0	0.0	0.0
12	10.0	54656.4	0.0	0.0	0.	0.	0.0	0.0	0.0
13	14.2	78154.5	0.0	0.0	0.	0.	0.0	0.0	0.0
14	32.8	149012.4	0.0	0.0	0.	0.	0.0	0.0	0.0
15	1.0	3390.2	0.0	0.0	0.	0.	0.0	0.0	0.0
16	2.8	9116.5	0.0	0.0	0.	0.	0.0	0.0	0.0
17	3.2	8365.6	0.0	0.0	0.	0.	0.0	0.0	0.0
18	5.4	7543.3	0.0	0.0	0.	0.	0.0	0.0	0.0
19	2.3	730.4	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	114.700	1394.665
2	140.383	1381.541
3	286.152	1419.431
4	322.801	1460.442
5	333.651	1486.000

Factor of Safety
*** 1.677 ***

1

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	114.700	1394.665
2	140.383	1381.541
3	286.152	1419.431
4	322.801	1460.442
5	333.651	1486.000

Factor of Safety
*** 1.677 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	114.700	1394.665
2	140.383	1381.541
3	286.152	1419.431
4	322.801	1460.442
5	333.651	1486.000

Factor of Safety
*** 1.677 ***

1

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	114.700	1394.665
2	140.383	1381.541
3	286.152	1419.431
4	322.801	1460.442

```
                 5        333.651     1486.000


                Factor of Safety
               ***    1.677   ***




          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        114.700     1394.665
              2        140.383     1381.541
              3        286.152     1419.431
              4        322.801     1460.442
              5        333.651     1486.000


                Factor of Safety
               ***    1.677   ***



1

          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        114.700     1394.665
              2        140.383     1381.541
              3        286.152     1419.431
              4        322.801     1460.442
              5        333.651     1486.000


                Factor of Safety
               ***    1.677   ***




          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        114.700     1394.665
              2        140.383     1381.541
              3        286.152     1419.431
              4        322.801     1460.442
              5        333.651     1486.000


                Factor of Safety
               ***    1.677   ***



1

          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        117.002     1395.701
              2        154.299     1382.208
              3        296.015     1418.930
              4        334.601     1458.124
              5        359.073     1486.000


                Factor of Safety
               ***    1.701   ***




          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        117.002     1395.701
              2        154.299     1382.208
              3        296.015     1418.930
              4        334.601     1458.124
              5        359.073     1486.000


                Factor of Safety
               ***    1.701   ***






                   **** END OF GSTABL7 OUTPUT ****

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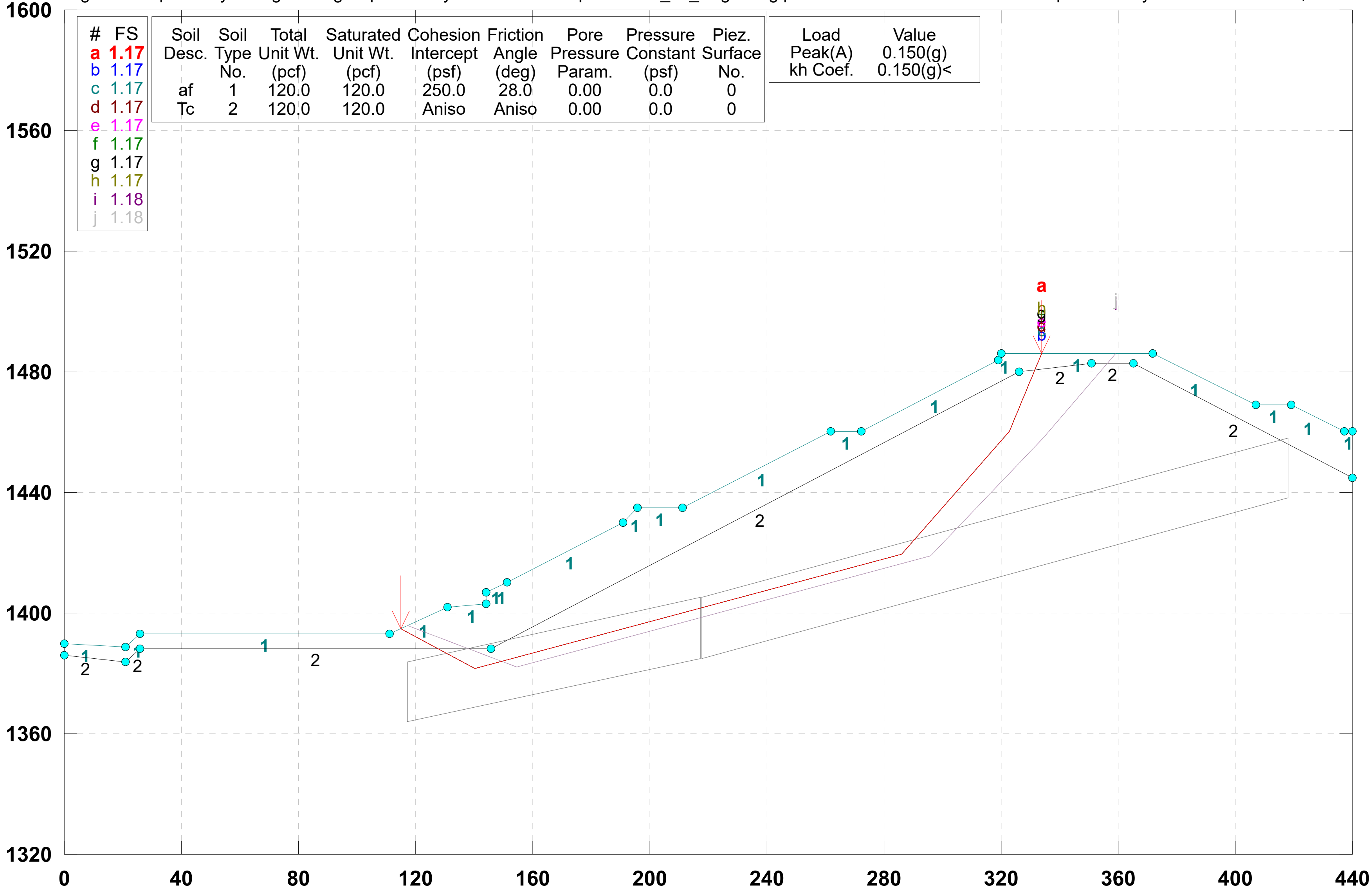
Bouquet Canyon/21095-01/Section W-W'/ Seismic

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xwb-3e.pl2   Run By: LGC Geotechnical, Inc.   4/8/2022   10:13/



GSTABL7 v.2 FSmin=1.17

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/8/2022
Time of Run: 10:13AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwb-3e.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwb-3e.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwb-3e.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section W-W'/ Seismic

BOUNDARY COORDINATES

19 Top Boundaries
26 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	1390.00	21.00	1389.00	1
2	21.00	1389.00	26.00	1393.00	1
3	26.00	1393.00	111.00	1393.00	1
4	111.00	1393.00	131.00	1402.00	1
5	131.00	1402.00	144.00	1403.00	1
6	144.00	1403.00	144.10	1407.00	1
7	144.10	1407.00	151.00	1410.00	1
8	151.00	1410.00	191.00	1430.00	1
9	191.00	1430.00	196.00	1435.00	1
10	196.00	1435.00	211.00	1435.00	1
11	211.00	1435.00	262.00	1460.00	1
12	262.00	1460.00	272.00	1460.00	1
13	272.00	1460.00	319.00	1484.00	1
14	319.00	1484.00	320.00	1486.00	1
15	320.00	1486.00	372.00	1486.00	1
16	372.00	1486.00	407.00	1469.00	1
17	407.00	1469.00	419.00	1469.00	1
18	419.00	1469.00	437.00	1460.00	1
19	437.00	1460.00	440.00	1460.00	1
20	0.00	1386.00	21.00	1384.00	2
21	21.00	1384.00	26.00	1388.00	2
22	26.00	1388.00	146.00	1388.00	2
23	146.00	1388.00	326.00	1480.00	2
24	326.00	1480.00	351.00	1483.00	2
25	351.00	1483.00	365.00	1483.00	2
26	365.00	1483.00	440.00	1445.00	2

User Specified Y-Origin = 1320.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.0	250.00	32.00
2	15.0	150.00	25.00
3	90.0	250.00	32.00

ANISOTROPIC SOIL NOTES:

(1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.

(2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.

(3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

Specified Peak Ground Acceleration Coefficient (A) = 0.150(g)

Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)

Specified Vertical Earthquake Coefficient (kv) = 0.000(g)

Specified Seismic Pore-Pressure Factor = 0.000

Janbus Empirical Coef is being used for the case of c & phi both > 0

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

4999 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 55.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	117.00	1374.00	217.00	1395.00	20.00
2	218.00	1395.00	418.00	1448.00	20.00

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:

FS Max = 5.694 FS Min = 1.174 FS Ave = 1.663

Standard Deviation = 0.430 Coefficient of Variation = 25.85 %

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	114.700	1394.665
2	140.383	1381.541
3	286.152	1419.431
4	322.801	1460.442
5	333.651	1486.000

Factor of Safety

*** 1.174 ***

Individual data on the 19 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	13.0	9808.9	0.0	0.0	0.	0.	1471.3	0.0	0.0
2	3.3	5511.6	0.0	0.0	0.	0.	826.7	0.0	0.0
3	9.4	20742.2	0.0	0.0	0.	0.	3111.3	0.0	0.0
4	3.6	9050.7	0.0	0.0	0.	0.	1357.6	0.0	0.0
5	0.1	270.1	0.0	0.0	0.	0.	40.5	0.0	0.0
6	1.9	5622.2	0.0	0.0	0.	0.	843.3	0.0	0.0
7	5.0	15157.3	0.0	0.0	0.	0.	2273.6	0.0	0.0
8	40.0	146402.3	0.0	0.0	0.	0.	21960.4	0.0	0.0
9	5.0	22291.3	0.0	0.0	0.	0.	3343.7	0.0	0.0
10	15.0	66694.9	0.0	0.0	0.	0.	10004.2	0.0	0.0
11	51.0	250766.8	0.0	0.0	0.	0.	37615.0	0.0	0.0
12	10.0	54656.4	0.0	0.0	0.	0.	8198.5	0.0	0.0
13	14.2	78154.5	0.0	0.0	0.	0.	11723.2	0.0	0.0
14	32.8	149012.4	0.0	0.0	0.	0.	22351.9	0.0	0.0
15	1.0	3390.2	0.0	0.0	0.	0.	508.5	0.0	0.0
16	2.8	9116.5	0.0	0.0	0.	0.	1367.5	0.0	0.0
17	3.2	8365.6	0.0	0.0	0.	0.	1254.8	0.0	0.0
18	5.4	7543.3	0.0	0.0	0.	0.	1131.5	0.0	0.0
19	2.3	730.4	0.0	0.0	0.	0.	109.6	0.0	0.0

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	114.700	1394.665
2	140.383	1381.541
3	286.152	1419.431
4	322.801	1460.442
5	333.651	1486.000

Factor of Safety

*** 1.174 ***

1

Failure Surface Specified By 5 Coordinate Points

Point X-Surf Y-Surf

```
               No.        (ft)        (ft)

                1        114.700     1394.665
                2        140.383     1381.541
                3        286.152     1419.431
                4        322.801     1460.442
                5        333.651     1486.000


                   Factor of Safety
                  ***    1.174   ***




            Failure Surface Specified By  5 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        114.700     1394.665
                2        140.383     1381.541
                3        286.152     1419.431
                4        322.801     1460.442
                5        333.651     1486.000


                   Factor of Safety
                  ***    1.174   ***



 1

            Failure Surface Specified By  5 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        114.700     1394.665
                2        140.383     1381.541
                3        286.152     1419.431
                4        322.801     1460.442
                5        333.651     1486.000


                   Factor of Safety
                  ***    1.174   ***




            Failure Surface Specified By  5 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        114.700     1394.665
                2        140.383     1381.541
                3        286.152     1419.431
                4        322.801     1460.442
                5        333.651     1486.000


                   Factor of Safety
                  ***    1.174   ***




 1

            Failure Surface Specified By  5 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        114.700     1394.665
                2        140.383     1381.541
                3        286.152     1419.431
                4        322.801     1460.442
                5        333.651     1486.000


                   Factor of Safety
                  ***    1.174   ***




            Failure Surface Specified By  5 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        114.700     1394.665
                2        140.383     1381.541
                3        286.152     1419.431
                4        322.801     1460.442
                5        333.651     1486.000


                   Factor of Safety
                  ***    1.174   ***



 1

            Failure Surface Specified By  5 Coordinate Points


              Point      X-Surf      Y-Surf
               No.        (ft)        (ft)

                1        117.002     1395.701
                2        154.299     1382.208
                3        296.015     1418.930
                4        334.601     1458.124
                5        359.073     1486.000


                   Factor of Safety
                  ***    1.176   ***
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          Failure Surface Specified By  5 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        117.002     1395.701
              2        154.299     1382.208
              3        296.015     1418.930
              4        334.601     1458.124
              5        359.073     1486.000


                 Factor of Safety
                ***    1.176   ***





                    **** END OF GSTABL7 OUTPUT ****
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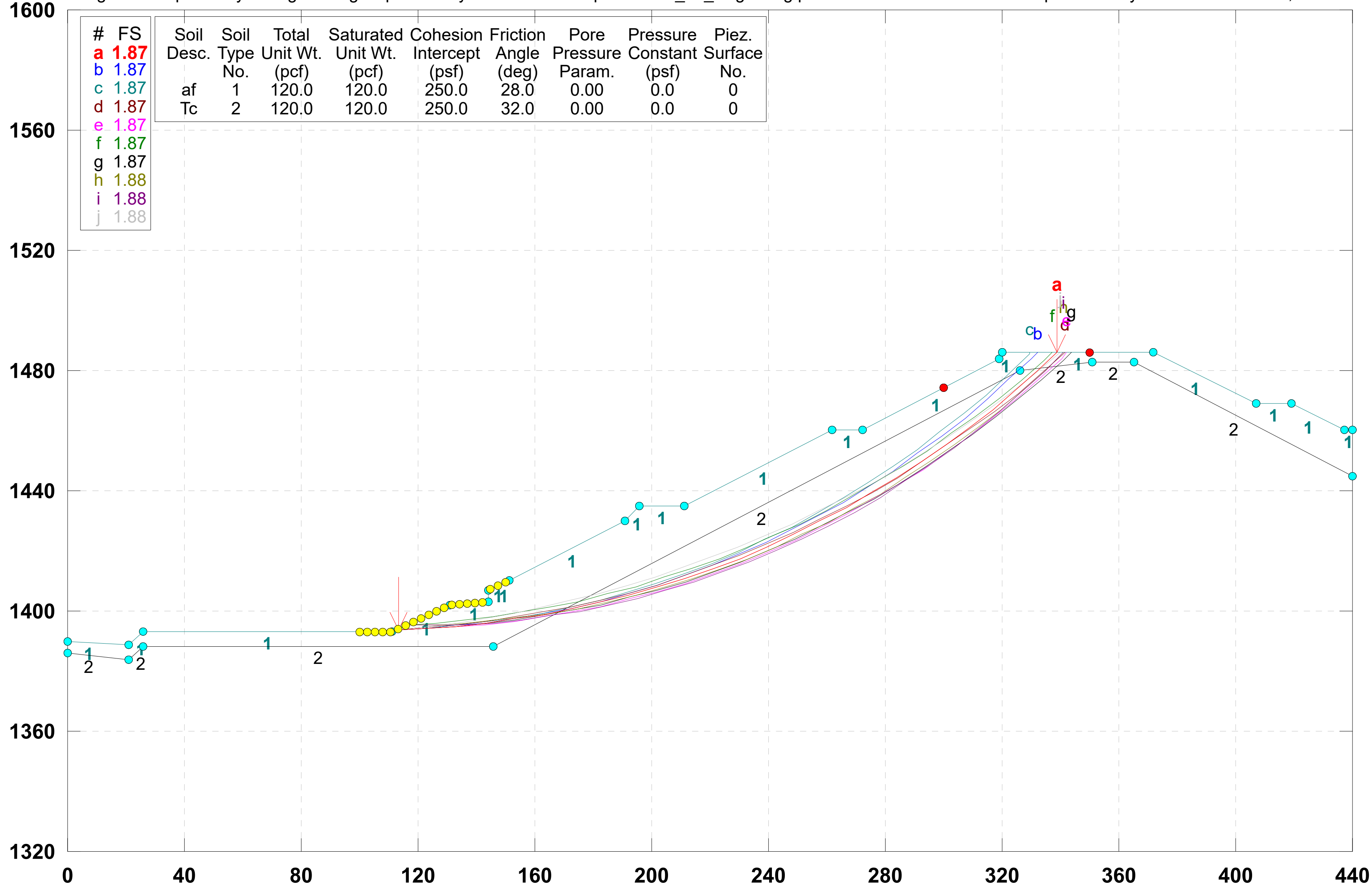
Bouquet Canyon/21095-01/Section W-W'/ Static

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xwc.pl2   Run By: LGC Geotechnical, Inc.   4/8/2022   10:13AM



GSTABL7 v.2 FSmin=1.87

Safety Factors Are Calculated By The Modified Bishop Method

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/8/2022
Time of Run: 10:13AM
Run By: LGC Geotechnical, Inc.

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Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwc.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwc.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section W-W'/ Static

BOUNDARY COORDINATES

19 Top Boundaries
26 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	1390.00	21.00	1389.00	1
2	21.00	1389.00	26.00	1393.00	1
3	26.00	1393.00	111.00	1393.00	1
4	111.00	1393.00	131.00	1402.00	1
5	131.00	1402.00	144.00	1403.00	1
6	144.00	1403.00	144.10	1407.00	1
7	144.10	1407.00	151.00	1410.00	1
8	151.00	1410.00	191.00	1430.00	1
9	191.00	1430.00	196.00	1435.00	1
10	196.00	1435.00	211.00	1435.00	1
11	211.00	1435.00	262.00	1460.00	1
12	262.00	1460.00	272.00	1460.00	1
13	272.00	1460.00	319.00	1484.00	1
14	319.00	1484.00	320.00	1486.00	1
15	320.00	1486.00	372.00	1486.00	1
16	372.00	1486.00	407.00	1469.00	1
17	407.00	1469.00	419.00	1469.00	1
18	419.00	1469.00	437.00	1460.00	1
19	437.00	1460.00	440.00	1460.00	1
20	0.00	1386.00	21.00	1384.00	2
21	21.00	1384.00	26.00	1388.00	2
22	26.00	1388.00	146.00	1388.00	2
23	146.00	1388.00	326.00	1480.00	2
24	326.00	1480.00	351.00	1483.00	2
25	351.00	1483.00	365.00	1483.00	2
26	365.00	1483.00	440.00	1445.00	2

User Specified Y-Origin = 1320.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.0	250.00	32.00
2	15.0	150.00	25.00
3	90.0	250.00	32.00

ANISOTROPIC SOIL NOTES:
(1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
(2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
(3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

ANISOTROPIC STRENGTH DATA HAS BEEN SUPPRESSED

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

4980 Trial Surfaces Have Been Generated.

249 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced Along The Ground Surface Between X = 100.00(ft) and X = 150.00(ft)

Each Surface Terminates Between X = 300.00(ft) and X = 350.00(ft)

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00(ft)

10.00(ft) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Total Number of Trial Surfaces Attempted = 4980

Number of Trial Surfaces With Valid FS = 4980

Statistical Data On All Valid FS Values:
FS Max = 3.242 FS Min = 1.867 FS Ave = 2.490
Standard Deviation = 0.399 Coefficient of Variation = 16.02 %

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.158	1393.971
2	123.150	1394.366
3	133.127	1395.052
4	143.079	1396.027
5	152.999	1397.290
6	162.878	1398.841
7	172.708	1400.678
8	182.480	1402.800
9	192.186	1405.205
10	201.819	1407.890
11	211.370	1410.855
12	220.830	1414.095
13	230.193	1417.609
14	239.449	1421.393
15	248.592	1425.444
16	257.613	1429.759
17	266.505	1434.334
18	275.260	1439.166
19	283.871	1444.249
20	292.332	1449.581
21	300.633	1455.156
22	308.770	1460.970
23	316.734	1467.017
24	324.519	1473.294
25	332.118	1479.793
26	338.962	1486.000

Circle Center At X = 104.557 ; Y = 1738.110 ; and Radius = 344.246

Factor of Safety
*** 1.867 ***

Individual data on the 39 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.0	2458.6	0.0	0.0	0.	0.	0.0	0.0	0.0
2	7.8	5273.0	0.0	0.0	0.	0.	0.0	0.0	0.0
3	2.1	1812.6	0.0	0.0	0.	0.	0.0	0.0	0.0
4	10.0	8368.5	0.0	0.0	0.	0.	0.0	0.0	0.0
5	0.9	760.4	0.0	0.0	0.	0.	0.0	0.0	0.0
6	0.1	106.2	0.0	0.0	0.	0.	0.0	0.0	0.0
7	6.9	9856.3	0.0	0.0	0.	0.	0.0	0.0	0.0
8	2.0	3198.9	0.0	0.0	0.	0.	0.0	0.0	0.0
9	9.9	18260.5	0.0	0.0	0.	0.	0.0	0.0	0.0
10	6.8	14891.6	0.0	0.0	0.	0.	0.0	0.0	0.0
11	3.0	7091.8	0.0	0.0	0.	0.	0.0	0.0	0.0
12	9.8	25280.2	0.0	0.0	0.	0.	0.0	0.0	0.0
13	8.5	24552.8	0.0	0.0	0.	0.	0.0	0.0	0.0
14	1.2	3635.5	0.0	0.0	0.	0.	0.0	0.0	0.0
15	3.8	12519.2	0.0	0.0	0.	0.	0.0	0.0	0.0
16	5.8	19496.7	0.0	0.0	0.	0.	0.0	0.0	0.0
17	9.2	28297.3	0.0	0.0	0.	0.	0.0	0.0	0.0
18	0.4	1077.6	0.0	0.0	0.	0.	0.0	0.0	0.0
19	9.5	28410.1	0.0	0.0	0.	0.	0.0	0.0	0.0
20	9.4	29504.7	0.0	0.0	0.	0.	0.0	0.0	0.0
21	9.3	30186.7	0.0	0.0	0.	0.	0.0	0.0	0.0
22	9.1	30464.9	0.0	0.0	0.	0.	0.0	0.0	0.0

23	9.0	30351.0	0.0	0.0	0.	0.	0.0	0.0	0.0
24	4.4	14761.0	0.0	0.0	0.	0.	0.0	0.0	0.0
25	4.5	14500.4	0.0	0.0	0.	0.	0.0	0.0	0.0
26	5.5	15925.2	0.0	0.0	0.	0.	0.0	0.0	0.0
27	3.3	8828.2	0.0	0.0	0.	0.	0.0	0.0	0.0
28	8.6	22895.3	0.0	0.0	0.	0.	0.0	0.0	0.0
29	8.5	21631.2	0.0	0.0	0.	0.	0.0	0.0	0.0
30	8.3	20057.0	0.0	0.0	0.	0.	0.0	0.0	0.0
31	8.1	18195.2	0.0	0.0	0.	0.	0.0	0.0	0.0
32	8.0	16070.8	0.0	0.0	0.	0.	0.0	0.0	0.0
33	2.3	4212.6	0.0	0.0	0.	0.	0.0	0.0	0.0
34	1.0	1890.3	0.0	0.0	0.	0.	0.0	0.0	0.0
35	4.5	7878.0	0.0	0.0	0.	0.	0.0	0.0	0.0
36	1.5	2145.8	0.0	0.0	0.	0.	0.0	0.0	0.0
37	6.1	6478.0	0.0	0.0	0.	0.	0.0	0.0	0.0
38	1.2	812.7	0.0	0.0	0.	0.	0.0	0.0	0.0
39	5.6	1736.0	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.158	1393.971
2	123.150	1394.375
3	133.124	1395.086
4	143.073	1396.102
5	152.985	1397.423
6	162.852	1399.047
7	172.665	1400.974
8	182.414	1403.200
9	192.090	1405.724
10	201.684	1408.544
11	211.187	1411.657
12	220.591	1415.060
13	229.885	1418.750
14	239.062	1422.723
15	248.112	1426.976
16	257.028	1431.504
17	265.801	1436.304
18	274.423	1441.371
19	282.885	1446.699
20	291.179	1452.285
21	299.299	1458.123
22	307.235	1464.206
23	314.981	1470.531
24	322.529	1477.090
25	329.873	1483.877
26	332.033	1486.000

Circle Center At X = 105.026 ; Y = 1719.603 ; and Radius = 325.733

Factor of Safety
*** 1.868 ***

1

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.158	1393.971
2	123.146	1394.451
3	133.115	1395.238
4	143.056	1396.330
5	152.958	1397.726
6	162.812	1399.425
7	172.610	1401.426
8	182.342	1403.726
9	191.999	1406.323
10	201.571	1409.216
11	211.050	1412.401
12	220.428	1415.875
13	229.694	1419.635
14	238.840	1423.677
15	247.858	1427.998
16	256.740	1432.594
17	265.476	1437.460
18	274.059	1442.591
19	282.481	1447.984
20	290.733	1453.632
21	298.808	1459.530
22	306.698	1465.674
23	314.397	1472.056
24	321.895	1478.672
25	329.188	1485.515
26	329.674	1486.000

Circle Center At X = 102.513 ; Y = 1719.730 ; and Radius = 325.932

Factor of Safety
*** 1.871 ***

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.158	1393.971
2	123.141	1394.545
3	133.106	1395.388
4	143.044	1396.500
5	152.948	1397.881
6	162.811	1399.528
7	172.627	1401.442
8	182.386	1403.620
9	192.084	1406.061
10	201.712	1408.764
11	211.263	1411.725
12	220.731	1414.944
13	230.109	1418.417
14	239.389	1422.142
15	248.565	1426.117
16	257.630	1430.339
17	266.578	1434.804
18	275.402	1439.509
19	284.095	1444.451
20	292.652	1449.626
21	301.066	1455.030
22	309.331	1460.660
23	317.440	1466.511

Point No.	X-Surf (ft)	Y-Surf (ft)
24	325.389	1472.580
25	333.170	1478.860
26	340.779	1485.349
27	341.501	1486.000

Circle Center At X = 96.928 ; Y = 1763.588 ; and Radius = 369.973

Factor of Safety
*** 1.871 ***

1

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.158	1393.971
2	123.156	1394.181
3	133.143	1394.688
4	143.110	1395.492
5	153.050	1396.592
6	162.952	1397.986
7	172.809	1399.675
8	182.611	1401.655
9	192.349	1403.926
10	202.016	1406.485
11	211.603	1409.330
12	221.101	1412.459
13	230.501	1415.869
14	239.797	1419.557
15	248.978	1423.519
16	258.038	1427.753
17	266.968	1432.253
18	275.760	1437.017
19	284.407	1442.041
20	292.900	1447.319
21	301.233	1452.847
22	309.398	1458.620
23	317.388	1464.634
24	325.196	1470.882
25	332.814	1477.360
26	340.237	1484.061
27	342.261	1486.000

Circle Center At X = 111.085 ; Y = 1730.427 ; and Radius = 336.462

Factor of Safety
*** 1.872 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	115.789	1395.155
2	125.766	1395.834
3	135.721	1396.786
4	145.646	1398.011
5	155.533	1399.508
6	165.375	1401.276
7	175.166	1403.313
8	184.896	1405.619
9	194.560	1408.190
10	204.149	1411.026
11	213.657	1414.124
12	223.077	1417.482
13	232.400	1421.098
14	241.621	1424.967
15	250.732	1429.089
16	259.727	1433.459
17	268.598	1438.074
18	277.339	1442.932
19	285.944	1448.027
20	294.405	1453.356
21	302.717	1458.916
22	310.874	1464.702
23	318.868	1470.710
24	326.694	1476.934
25	334.347	1483.372
26	337.303	1486.000

Circle Center At X = 96.130 ; Y = 1758.581 ; and Radius = 363.957

Factor of Safety
*** 1.873 ***

1

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.158	1393.971
2	123.153	1394.296
3	133.134	1394.906
4	143.094	1395.799
5	153.025	1396.976
6	162.918	1398.435
7	172.765	1400.175
8	182.559	1402.194
9	192.291	1404.492
10	201.955	1407.066
11	211.540	1409.913
12	221.041	1413.033
13	230.450	1416.422
14	239.758	1420.077
15	248.958	1423.996
16	258.043	1428.175
17	267.005	1432.611
18	275.837	1437.301
19	284.532	1442.240
20	293.083	1447.424
21	301.483	1452.850
22	309.725	1458.513
23	317.803	1464.409
24	325.709	1470.532
25	333.438	1476.877

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              26        340.983     1483.440
              27        343.762     1486.000

          Circle Center At X =   106.739 ; Y =  1745.118 ; and Radius =   351.205


                 Factor of Safety
                ***    1.874   ***




          Failure Surface Specified By 26 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        115.789     1395.155
              2        125.787     1395.385
              3        135.773     1395.917
              4        145.738     1396.749
              5        155.674     1397.881
              6        165.571     1399.312
              7        175.420     1401.042
              8        185.213     1403.067
              9        194.940     1405.387
             10        204.593     1407.999
             11        214.163     1410.900
             12        223.641     1414.089
             13        233.018     1417.562
             14        242.286     1421.317
             15        251.437     1425.349
             16        260.463     1429.656
             17        269.354     1434.232
             18        278.103     1439.075
             19        286.703     1444.179
             20        295.144     1449.540
             21        303.420     1455.153
             22        311.523     1461.013
             23        319.446     1467.115
             24        327.181     1473.453
             25        334.721     1480.021
             26        341.181     1486.000

          Circle Center At X =   113.183 ; Y =  1726.650 ; and Radius =   331.505


                 Factor of Safety
                ***    1.875   ***



 1

          Failure Surface Specified By 26 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        115.789     1395.155
              2        125.789     1395.169
              3        135.784     1395.502
              4        145.763     1396.154
              5        155.715     1397.124
              6        165.632     1398.411
              7        175.503     1400.014
              8        185.317     1401.932
              9        195.066     1404.162
             10        204.738     1406.701
             11        214.324     1409.549
             12        223.814     1412.700
             13        233.199     1416.153
             14        242.469     1419.904
             15        251.614     1423.949
             16        260.626     1428.284
             17        269.495     1432.904
             18        278.212     1437.805
             19        286.767     1442.981
             20        295.154     1448.428
             21        303.362     1454.141
             22        311.383     1460.112
             23        319.210     1466.336
             24        326.835     1472.807
             25        334.248     1479.517
             26        340.966     1486.000

          Circle Center At X =   120.367 ; Y =  1708.303 ; and Radius =   313.181


                 Factor of Safety
                ***    1.877   ***




          Failure Surface Specified By 26 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        113.158     1393.971
              2        123.111     1394.939
              3        133.038     1396.147
              4        142.932     1397.594
              5        152.789     1399.281
              6        162.602     1401.205
              7        172.366     1403.367
              8        182.074     1405.763
              9        191.722     1408.394
             10        201.304     1411.257
             11        210.813     1414.351
             12        220.245     1417.674
             13        229.593     1421.224
             14        238.853     1424.999
             15        248.019     1428.997
             16        257.086     1433.215
             17        266.048     1437.652
             18        274.900     1442.304
             19        283.637     1447.168
             20        292.254     1452.243
             21        300.746     1457.524
             22        309.107     1463.009
             23        317.334     1468.694
             24        325.420     1474.577
             25        333.362     1480.654
             26        340.010     1486.000

          Circle Center At X =    78.160 ; Y =  1805.853 ; and Radius =   413.366

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                Factor of Safety
               ***    1.877   ***




                   **** END OF GSTABL7 OUTPUT ****
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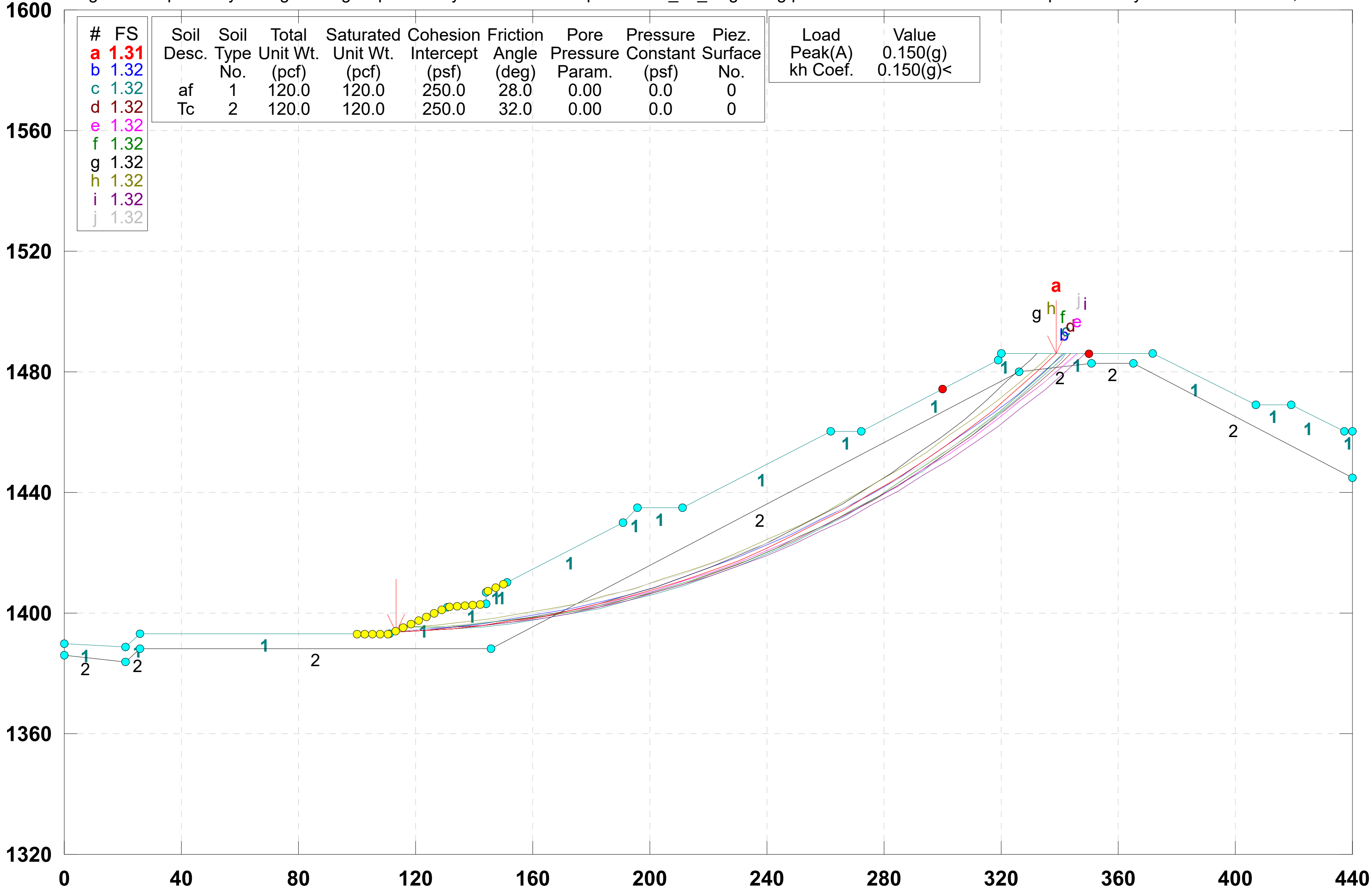
Bouquet Canyon/21095-01/Section W-W'/ Seismic

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xwce.pl2   Run By: LGC Geotechnical, Inc.   4/8/2022   10:13A



GSTABL7 v.2 FSmin=1.31

Safety Factors Are Calculated By The Modified Bishop Method

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/8/2022
Time of Run: 10:13AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwce.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwce.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwce.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section W-W'/ Seismic

BOUNDARY COORDINATES

19 Top Boundaries
26 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	1390.00	21.00	1389.00	1
2	21.00	1389.00	26.00	1393.00	1
3	26.00	1393.00	111.00	1393.00	1
4	111.00	1393.00	131.00	1402.00	1
5	131.00	1402.00	144.00	1403.00	1
6	144.00	1403.00	144.10	1407.00	1
7	144.10	1407.00	151.00	1410.00	1
8	151.00	1410.00	191.00	1430.00	1
9	191.00	1430.00	196.00	1435.00	1
10	196.00	1435.00	211.00	1435.00	1
11	211.00	1435.00	262.00	1460.00	1
12	262.00	1460.00	272.00	1460.00	1
13	272.00	1460.00	319.00	1484.00	1
14	319.00	1484.00	320.00	1486.00	1
15	320.00	1486.00	372.00	1486.00	1
16	372.00	1486.00	407.00	1469.00	1
17	407.00	1469.00	419.00	1469.00	1
18	419.00	1469.00	437.00	1460.00	1
19	437.00	1460.00	440.00	1460.00	1
20	0.00	1386.00	21.00	1384.00	2
21	21.00	1384.00	26.00	1388.00	2
22	26.00	1388.00	146.00	1388.00	2
23	146.00	1388.00	326.00	1480.00	2
24	326.00	1480.00	351.00	1483.00	2
25	351.00	1483.00	365.00	1483.00	2
26	365.00	1483.00	440.00	1445.00	2

User Specified Y-Origin = 1320.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.0	250.00	32.00
2	15.0	150.00	25.00
3	90.0	250.00	32.00

ANISOTROPIC SOIL NOTES:
(1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
(2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
(3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

ANISOTROPIC STRENGTH DATA HAS BEEN SUPPRESSED

Specified Peak Ground Acceleration Coefficient (A) = 0.150(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)

Specified Seismic Pore-Pressure Factor = 0.000

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

4980 Trial Surfaces Have Been Generated.

249 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced Along The Ground Surface Between X = 100.00(ft) and X = 150.00(ft)

Each Surface Terminates Between X = 300.00(ft) and X = 350.00(ft)

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00(ft)

10.00(ft) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Total Number of Trial Surfaces Attempted = 4980

Number of Trial Surfaces With Valid FS = 4980

Statistical Data On All Valid FS Values:
FS Max = 2.315   FS Min = 1.314   FS Ave = 1.777
Standard Deviation = 0.296   Coefficient of Variation = 16.68 %

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.158	1393.971
2	123.150	1394.366
3	133.127	1395.052
4	143.079	1396.027
5	152.999	1397.290
6	162.878	1398.841
7	172.708	1400.678
8	182.480	1402.800
9	192.186	1405.205
10	201.819	1407.890
11	211.370	1410.855
12	220.830	1414.095
13	230.193	1417.609
14	239.449	1421.393
15	248.592	1425.444
16	257.613	1429.759
17	266.505	1434.334
18	275.260	1439.166
19	283.871	1444.249
20	292.332	1449.581
21	300.633	1455.156
22	308.770	1460.970
23	316.734	1467.017
24	324.519	1473.294
25	332.118	1479.793
26	338.962	1486.000

Circle Center At X = 104.557 ; Y = 1738.110 ; and Radius = 344.246

Factor of Safety
*** 1.314 ***

Individual data on the 39 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.0	2458.6	0.0	0.0	0.	0.	368.8	0.0	0.0
2	7.8	5273.0	0.0	0.0	0.	0.	790.9	0.0	0.0
3	2.1	1812.6	0.0	0.0	0.	0.	271.9	0.0	0.0
4	10.0	8368.5	0.0	0.0	0.	0.	1255.3	0.0	0.0
5	0.9	760.4	0.0	0.0	0.	0.	114.1	0.0	0.0
6	0.1	106.2	0.0	0.0	0.	0.	15.9	0.0	0.0
7	6.9	9856.3	0.0	0.0	0.	0.	1478.5	0.0	0.0
8	2.0	3198.9	0.0	0.0	0.	0.	479.8	0.0	0.0
9	9.9	18260.5	0.0	0.0	0.	0.	2739.1	0.0	0.0
10	6.8	14891.6	0.0	0.0	0.	0.	2233.7	0.0	0.0
11	3.0	7091.8	0.0	0.0	0.	0.	1063.8	0.0	0.0
12	9.8	25280.2	0.0	0.0	0.	0.	3792.0	0.0	0.0
13	8.5	24552.8	0.0	0.0	0.	0.	3682.9	0.0	0.0
14	1.2	3635.5	0.0	0.0	0.	0.	545.3	0.0	0.0
15	3.8	12519.2	0.0	0.0	0.	0.	1877.9	0.0	0.0
16	5.8	19496.7	0.0	0.0	0.	0.	2924.5	0.0	0.0

17	9.2	28297.3	0.0	0.0	0.	0.	4244.6	0.0	0.0	
18	0.4	1077.6	0.0	0.0	0.	0.	161.6	0.0	0.0	
19	9.5	28410.1	0.0	0.0	0.	0.	4261.5	0.0	0.0	
20	9.4	29504.7	0.0	0.0	0.	0.	4425.7	0.0	0.0	
21	9.3	30186.7	0.0	0.0	0.	0.	4528.0	0.0	0.0	
22	9.1	30464.9	0.0	0.0	0.	0.	4569.7	0.0	0.0	
23	9.0	30351.0	0.0	0.0	0.	0.	4552.6	0.0	0.0	
24	4.4	14761.0	0.0	0.0	0.	0.	2214.1	0.0	0.0	
25	4.5	14500.4	0.0	0.0	0.	0.	2175.1	0.0	0.0	
26	5.5	15925.2	0.0	0.0	0.	0.	2388.8	0.0	0.0	
27	3.3	8828.2	0.0	0.0	0.	0.	1324.2	0.0	0.0	
28	8.6	22895.3	0.0	0.0	0.	0.	3434.3	0.0	0.0	
29	8.5	21631.2	0.0	0.0	0.	0.	3244.7	0.0	0.0	
30	8.3	20057.0	0.0	0.0	0.	0.	3008.6	0.0	0.0	
31	8.1	18195.2	0.0	0.0	0.	0.	2729.3	0.0	0.0	
32	8.0	16070.8	0.0	0.0	0.	0.	2410.6	0.0	0.0	
33	2.3	4212.6	0.0	0.0	0.	0.	631.9	0.0	0.0	
34	1.0	1890.3	0.0	0.0	0.	0.	283.5	0.0	0.0	
35	4.5	7878.0	0.0	0.0	0.	0.	1181.7	0.0	0.0	
36	1.5	2145.8	0.0	0.0	0.	0.	321.9	0.0	0.0	
37	6.1	6478.0	0.0	0.0	0.	0.	971.7	0.0	0.0	
38	1.2	812.7	0.0	0.0	0.	0.	121.9	0.0	0.0	
39	5.6	1736.0	0.0	0.0	0.	0.	260.4	0.0	0.0	

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.158	1393.971
2	123.141	1394.545
3	133.106	1395.388
4	143.044	1396.500
5	152.948	1397.881
6	162.811	1399.528
7	172.627	1401.442
8	182.386	1403.620
9	192.084	1406.061
10	201.712	1408.764
11	211.263	1411.725
12	220.731	1414.944
13	230.109	1418.417
14	239.389	1422.142
15	248.565	1426.117
16	257.630	1430.339
17	266.578	1434.804
18	275.402	1439.509
19	284.095	1444.451
20	292.652	1449.626
21	301.066	1455.030
22	309.331	1460.660
23	317.440	1466.511
24	325.389	1472.580
25	333.170	1478.860
26	340.779	1485.349
27	341.501	1486.000

Circle Center At X = 96.928 ; Y = 1763.588 ; and Radius = 369.973

Factor of Safety
*** 1.315 ***

1

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.158	1393.971
2	123.156	1394.181
3	133.143	1394.688
4	143.110	1395.492
5	153.050	1396.592
6	162.952	1397.986
7	172.809	1399.675
8	182.611	1401.655
9	192.349	1403.926
10	202.016	1406.485
11	211.603	1409.330
12	221.101	1412.459
13	230.501	1415.869
14	239.797	1419.557
15	248.978	1423.519
16	258.038	1427.753
17	266.968	1432.253
18	275.760	1437.017
19	284.407	1442.041
20	292.900	1447.319
21	301.233	1452.847
22	309.398	1458.620
23	317.388	1464.634
24	325.196	1470.882
25	332.814	1477.360
26	340.237	1484.061
27	342.261	1486.000

Circle Center At X = 111.085 ; Y = 1730.427 ; and Radius = 336.462

Factor of Safety
*** 1.315 ***

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.158	1393.971
2	123.153	1394.296
3	133.134	1394.906
4	143.094	1395.799
5	153.025	1396.976
6	162.918	1398.435
7	172.765	1400.175
8	182.559	1402.194
9	192.291	1404.492
10	201.955	1407.066
11	211.540	1409.913
12	221.041	1413.033
13	230.450	1416.422
14	239.758	1420.077
15	248.958	1423.996

16	258.043	1428.175
17	267.005	1432.611
18	275.837	1437.301
19	284.532	1442.240
20	293.083	1447.424
21	301.483	1452.850
22	309.725	1458.513
23	317.803	1464.409
24	325.709	1470.532
25	333.438	1476.877
26	340.983	1483.440
27	343.762	1486.000

Circle Center At X = 106.739 ; Y = 1745.118 ; and Radius = 351.205

Factor of Safety
*** 1.315 ***

1

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.158	1393.971
2	123.148	1394.415
3	133.122	1395.130
4	143.074	1396.115
5	152.995	1397.369
6	162.878	1398.891
7	172.717	1400.681
8	182.503	1402.737
9	192.230	1405.057
10	201.891	1407.639
11	211.478	1410.483
12	220.985	1413.585
13	230.404	1416.944
14	239.729	1420.557
15	248.952	1424.421
16	258.067	1428.534
17	267.067	1432.892
18	275.946	1437.492
19	284.697	1442.332
20	293.314	1447.406
21	301.790	1452.713
22	310.119	1458.247
23	318.295	1464.004
24	326.312	1469.982
25	334.165	1476.174
26	341.846	1482.576
27	345.734	1486.000

Circle Center At X = 101.763 ; Y = 1762.802 ; and Radius = 369.007

Factor of Safety
*** 1.316 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	115.789	1395.155
2	125.787	1395.385
3	135.773	1395.917
4	145.738	1396.749
5	155.674	1397.881
6	165.571	1399.312
7	175.420	1401.042
8	185.213	1403.067
9	194.940	1405.387
10	204.593	1407.999
11	214.163	1410.900
12	223.641	1414.089
13	233.018	1417.562
14	242.286	1421.317
15	251.437	1425.349
16	260.463	1429.656
17	269.354	1434.232
18	278.103	1439.075
19	286.703	1444.179
20	295.144	1449.540
21	303.420	1455.153
22	311.523	1461.013
23	319.446	1467.115
24	327.181	1473.453
25	334.721	1480.021
26	341.181	1486.000

Circle Center At X = 113.183 ; Y = 1726.650 ; and Radius = 331.505

Factor of Safety
*** 1.318 ***

1

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.158	1393.971
2	123.150	1394.375
3	133.124	1395.086
4	143.073	1396.102
5	152.985	1397.423
6	162.852	1399.047
7	172.665	1400.974
8	182.414	1403.200
9	192.090	1405.724
10	201.684	1408.544
11	211.187	1411.657
12	220.591	1415.060
13	229.885	1418.750
14	239.062	1422.723
15	248.112	1426.976
16	257.028	1431.504
17	265.801	1436.304

18	274.423	1441.371
19	282.885	1446.699
20	291.179	1452.285
21	299.299	1458.123
22	307.235	1464.206
23	314.981	1470.531
24	322.529	1477.090
25	329.873	1483.877
26	332.033	1486.000

Circle Center At X = 105.026 ; Y = 1719.603 ; and Radius = 325.733

Factor of Safety
*** 1.318 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	115.789	1395.155
2	125.766	1395.834
3	135.721	1396.786
4	145.646	1398.011
5	155.533	1399.508
6	165.375	1401.276
7	175.166	1403.313
8	184.896	1405.619
9	194.560	1408.190
10	204.149	1411.026
11	213.657	1414.124
12	223.077	1417.482
13	232.400	1421.098
14	241.621	1424.967
15	250.732	1429.089
16	259.727	1433.459
17	268.598	1438.074
18	277.339	1442.932
19	285.944	1448.027
20	294.405	1453.356
21	302.717	1458.916
22	310.874	1464.702
23	318.868	1470.710
24	326.694	1476.934
25	334.347	1483.372
26	337.303	1486.000

Circle Center At X = 96.130 ; Y = 1758.581 ; and Radius = 363.957

Factor of Safety
*** 1.319 ***

1

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.158	1393.971
2	123.153	1394.287
3	133.135	1394.877
4	143.098	1395.741
5	153.033	1396.879
6	162.933	1398.289
7	172.791	1399.970
8	182.599	1401.922
9	192.349	1404.142
10	202.035	1406.629
11	211.648	1409.382
12	221.183	1412.397
13	230.631	1415.673
14	239.986	1419.208
15	249.240	1422.998
16	258.386	1427.041
17	267.418	1431.333
18	276.328	1435.873
19	285.111	1440.655
20	293.758	1445.676
21	302.265	1450.933
22	310.624	1456.422
23	318.829	1462.139
24	326.874	1468.078
25	334.752	1474.237
26	342.459	1480.609
27	348.625	1486.000

Circle Center At X = 106.662 ; Y = 1757.920 ; and Radius = 364.007

Factor of Safety
*** 1.319 ***

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	113.158	1393.971
2	123.123	1394.803
3	133.066	1395.872
4	142.980	1397.179
5	152.860	1398.721
6	162.701	1400.499
7	172.497	1402.511
8	182.241	1404.757
9	191.930	1407.234
10	201.556	1409.942
11	211.115	1412.879
12	220.601	1416.042
13	230.009	1419.432
14	239.334	1423.045
15	248.570	1426.879
16	257.711	1430.933
17	266.753	1435.204
18	275.691	1439.689
19	284.519	1444.386
20	293.232	1449.293
21	301.826	1454.406

```
                22        310.296     1459.723
                23        318.636     1465.240
                24        326.842     1470.955
                25        334.910     1476.864
                26        342.834     1482.964
                27        346.589     1486.000

        Circle Center At X =    83.286 ; Y =  1811.941 ; and Radius =   419.036


               Factor of Safety
              ***    1.319   ***



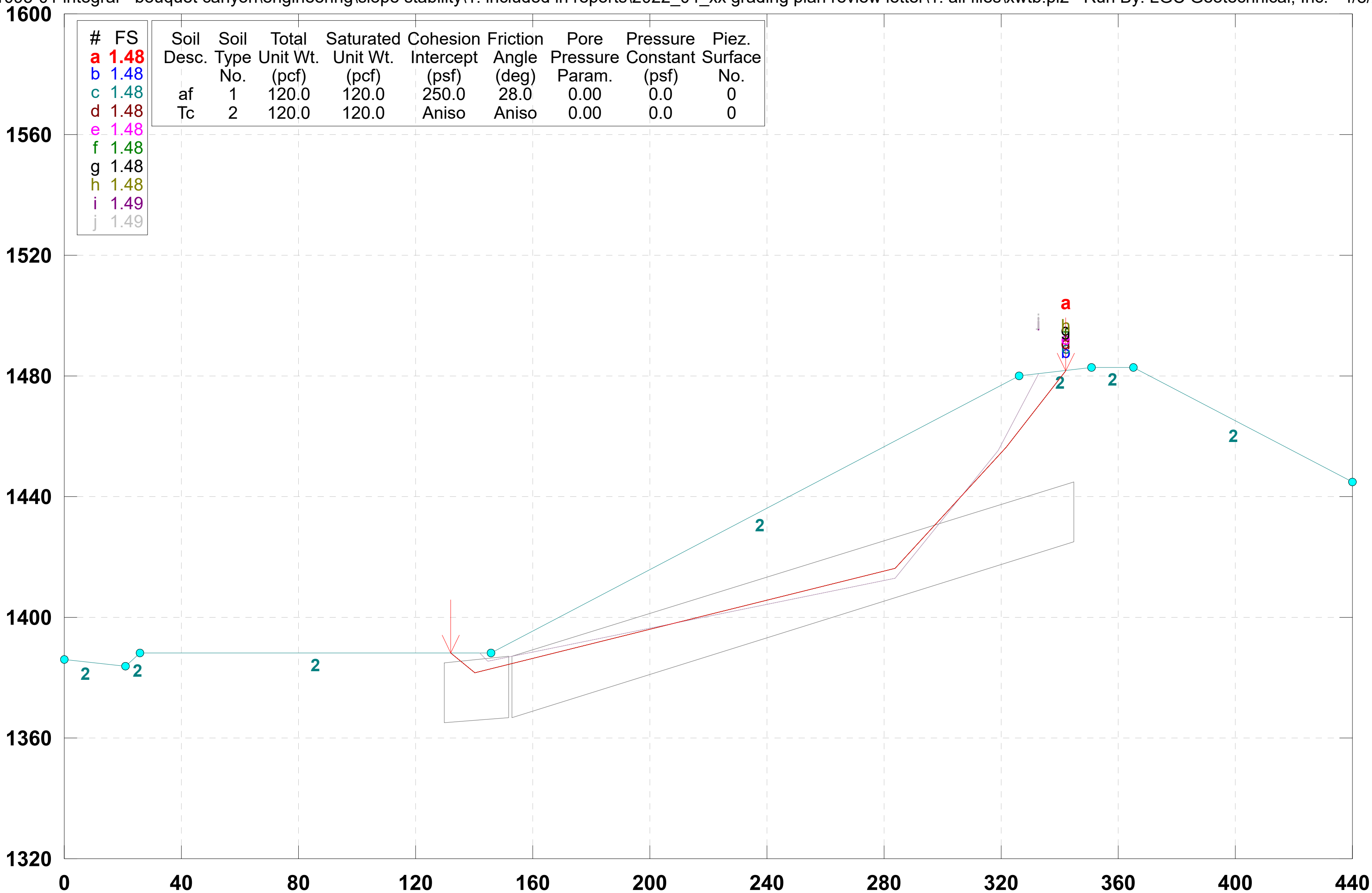


                  **** END OF GSTABL7 OUTPUT ****

```

Bouquet Canyon/21095-01/Section W-W'/ Temporary

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xwtb.pl2 Run By: LGC Geotechnical, Inc. 4/8/2022 10:25AI



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
af	1	120.0	120.0	250.0	28.0	0.00	0.0	0
Tc	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=1.48

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/8/2022
Time of Run: 10:25AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwtb.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwtb.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwtb.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section W-W'/ Temporary

BOUNDARY COORDINATES

7 Top Boundaries
7 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	1386.00	21.00	1384.00	2
2	21.00	1384.00	26.00	1388.00	2
3	26.00	1388.00	146.00	1388.00	2
4	146.00	1388.00	326.00	1480.00	2
5	326.00	1480.00	351.00	1483.00	2
6	351.00	1483.00	365.00	1483.00	2
7	365.00	1483.00	440.00	1445.00	2

User Specified Y-Origin = 1320.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.0	250.00	32.00
2	15.0	150.00	25.00
3	90.0	250.00	32.00

ANISOTROPIC SOIL NOTES:
(1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
(2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
(3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

Janbus Empirical Coef is being used for the case of c & phi both > 0

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

```
4999 Trial Surfaces Have Been Generated.


2 Boxes Specified For Generation Of Central Block Base


Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is  55.0

Box        X-Left     Y-Left    X-Right    Y-Right      Height
No.         (ft)       (ft)       (ft)       (ft)        (ft)

 1         130.00    1375.00     152.00    1377.00      20.00
 2         153.00    1377.00     345.00    1435.00      20.00


WARNING! The factor of safety calculation did not converge in 20 iterations.



The Trial Failure Surface In Question Is Defined
By The Following  4 Coordinate Points


  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1        145.17     1388.00
    2        149.05     1384.48
    3        235.16     1392.88
    4        235.41     1433.70


Factor of Safety for the Preceding Surface is Between10.308 and10.279


WARNING! The factor of safety calculation did not converge in 20 iterations.



The Trial Failure Surface In Question Is Defined
By The Following  4 Coordinate Points


  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1        135.57     1388.00
    2        148.14     1376.02
    3        201.36     1383.00
    4        201.64     1416.44


Factor of Safety for the Preceding Surface is Between13.400 and13.374


WARNING! The factor of safety calculation did not converge in 20 iterations.



The Trial Failure Surface In Question Is Defined
By The Following  4 Coordinate Points


  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1        145.17     1388.00
    2        149.05     1384.48
    3        235.16     1392.88
    4        235.41     1433.70


Factor of Safety for the Preceding Surface is Between10.308 and10.279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The Trial Failure Surface In Question Is Defined
By The Following  4 Coordinate Points


  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1        135.57     1388.00
    2        148.14     1376.02
    3        201.36     1383.00
    4        201.64     1416.44


Factor of Safety for the Preceding Surface is Between13.400 and13.374


WARNING! The factor of safety calculation did not converge in 20 iterations.



The Trial Failure Surface In Question Is Defined
By The Following  4 Coordinate Points


  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1        145.17     1388.00
    2        149.05     1384.48
    3        235.16     1392.88
    4        235.41     1433.70


Factor of Safety for the Preceding Surface is Between10.308 and10.279


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The Trial Failure Surface In Question Is Defined
By The Following  4 Coordinate Points


  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1        135.57     1388.00
    2        148.14     1376.02
    3        201.36     1383.00
    4        201.64     1416.44
```

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Factor of Safety for the Preceding Surface is Between13.400 and13.374


WARNING! The factor of safety calculation did not converge in 20 iterations.



The Trial Failure Surface In Question Is Defined
By The Following  4 Coordinate Points


  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1        145.17     1388.00
    2        149.05     1384.48
    3        235.16     1392.88
    4        235.41     1433.70


Factor of Safety for the Preceding Surface is Between10.308 and10.279


WARNING! The factor of safety calculation did not converge in 20 iterations.



The Trial Failure Surface In Question Is Defined
By The Following  4 Coordinate Points


  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1        135.57     1388.00
    2        148.14     1376.02
    3        201.36     1383.00
    4        201.64     1416.44


Factor of Safety for the Preceding Surface is Between13.400 and13.374


WARNING! The factor of safety calculation did not converge in 20 iterations.



The Trial Failure Surface In Question Is Defined
By The Following  4 Coordinate Points


  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1        145.17     1388.00
    2        149.05     1384.48
    3        235.16     1392.88
    4        235.41     1433.70


Factor of Safety for the Preceding Surface is Between10.308 and10.279


WARNING! The factor of safety calculation did not converge in 20 iterations.



The Trial Failure Surface In Question Is Defined
By The Following  4 Coordinate Points


  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1        135.57     1388.00
    2        148.14     1376.02
    3        201.36     1383.00
    4        201.64     1416.44


Factor of Safety for the Preceding Surface is Between13.400 and13.374


WARNING! The factor of safety calculation did not converge in 20 iterations.



The Trial Failure Surface In Question Is Defined
By The Following  4 Coordinate Points


  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1        145.17     1388.00
    2        149.05     1384.48
    3        235.16     1392.88
    4        235.41     1433.70


Factor of Safety for the Preceding Surface is Between10.308 and10.279


WARNING! The factor of safety calculation did not converge in 20 iterations.



The Trial Failure Surface In Question Is Defined
By The Following  4 Coordinate Points


  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1        135.57     1388.00
    2        148.14     1376.02
    3        201.36     1383.00
    4        201.64     1416.44


Factor of Safety for the Preceding Surface is Between13.400 and13.374


WARNING! The factor of safety calculation did not converge in 20 iterations.



The Trial Failure Surface In Question Is Defined
By The Following  4 Coordinate Points
```

Point No.	X-Surf (ft)	Y-Surf (ft)
1	145.17	1388.00
2	149.05	1384.48
3	235.16	1392.88
4	235.41	1433.70

Factor of Safety for the Preceding Surface is Between10.308 and10.279

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	135.57	1388.00
2	148.14	1376.02
3	201.36	1383.00
4	201.64	1416.44

Factor of Safety for the Preceding Surface is Between13.400 and13.374

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	145.17	1388.00
2	149.05	1384.48
3	235.16	1392.88
4	235.41	1433.70

Factor of Safety for the Preceding Surface is Between10.308 and10.279

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	135.57	1388.00
2	148.14	1376.02
3	201.36	1383.00
4	201.64	1416.44

Factor of Safety for the Preceding Surface is Between13.400 and13.374

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 4999

WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
Did Not Converge in 20 Iterations.

Number of Trial Surfaces with Non-Converged FS = 16

Number of Trial Surfaces With Valid FS = 4983

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 0.3 %

Statistical Data On All Valid FS Values:
FS **Max** = 58.784 FS **Min** = 1.482 FS Ave = 2.720
Standard Deviation = 2.711 Coefficient of Variation = 99.68 %

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	131.779	1388.000
2	140.198	1381.570
3	283.910	1416.125
4	321.521	1456.254
5	342.145	1481.937

Factor of Safety
*** 1.482 ***

Individual data on the 6 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force **Norm** (lbs)	Tie Force **Tan** (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	8.4	3247.9	0.0	0.0	0.	0.	0.0	0.0	0.0
2	5.8	3990.6	0.0	0.0	0.	0.	0.0	0.0	0.0
3	137.9	392193.5	0.0	0.0	0.	0.	0.0	0.0	0.0
4	37.6	144018.7	0.0	0.0	0.	0.	0.0	0.0	0.0

```
      5      4.5   10647.9      0.0      0.0       0.       0.      0.0      0.0       0.0
      6     16.1   17598.8      0.0      0.0       0.       0.      0.0      0.0       0.0

         Failure Surface Specified By  5 Coordinate Points


           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)

             1        131.779     1388.000
             2        140.198     1381.570
             3        283.910     1416.125
             4        321.521     1456.254
             5        342.145     1481.937


                Factor of Safety
               ***    1.482   ***



1

         Failure Surface Specified By  5 Coordinate Points


           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)

             1        131.779     1388.000
             2        140.198     1381.570
             3        283.910     1416.125
             4        321.521     1456.254
             5        342.145     1481.937


                Factor of Safety
               ***    1.482   ***




         Failure Surface Specified By  5 Coordinate Points


           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)

             1        131.779     1388.000
             2        140.198     1381.570
             3        283.910     1416.125
             4        321.521     1456.254
             5        342.145     1481.937


                Factor of Safety
               ***    1.482   ***



1

         Failure Surface Specified By  5 Coordinate Points


           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)

             1        131.779     1388.000
             2        140.198     1381.570
             3        283.910     1416.125
             4        321.521     1456.254
             5        342.145     1481.937


                Factor of Safety
               ***    1.482   ***





         Failure Surface Specified By  5 Coordinate Points


           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)

             1        131.779     1388.000
             2        140.198     1381.570
             3        283.910     1416.125
             4        321.521     1456.254
             5        342.145     1481.937


                Factor of Safety
               ***    1.482   ***



1

         Failure Surface Specified By  5 Coordinate Points


           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)

             1        131.779     1388.000
             2        140.198     1381.570
             3        283.910     1416.125
             4        321.521     1456.254
             5        342.145     1481.937


                Factor of Safety
               ***    1.482   ***




         Failure Surface Specified By  5 Coordinate Points


           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)

             1        131.779     1388.000
             2        140.198     1381.570
             3        283.910     1416.125
             4        321.521     1456.254
             5        342.145     1481.937
```

```
                  Factor of Safety
                 ***    1.482   ***



 1

           Failure Surface Specified By  5 Coordinate Points


             Point      X-Surf      Y-Surf
              No.        (ft)        (ft)

               1        141.988     1388.000
               2        144.742     1385.372
               3        283.816     1413.157
               4        319.167     1455.291
               5        332.758     1480.811


                  Factor of Safety
                 ***    1.494   ***




           Failure Surface Specified By  5 Coordinate Points


             Point      X-Surf      Y-Surf
              No.        (ft)        (ft)

               1        141.988     1388.000
               2        144.742     1385.372
               3        283.816     1413.157
               4        319.167     1455.291
               5        332.758     1480.811


                  Factor of Safety
                 ***    1.494   ***

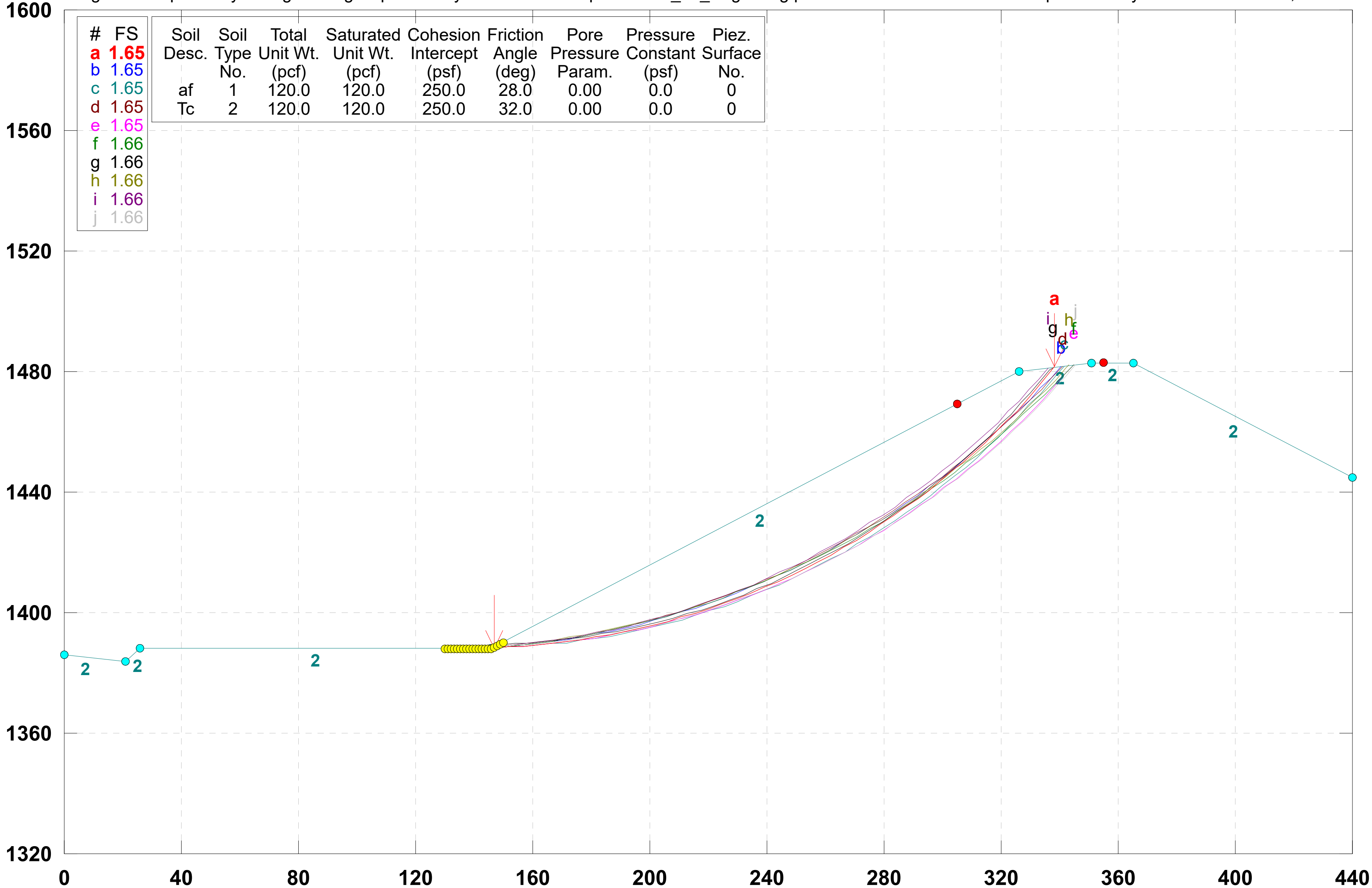




                     **** END OF GSTABL7 OUTPUT ****
```

Bouquet Canyon/21095-01/Section W-W'/ Temporary

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xwtc.pl2 Run By: LGC Geotechnical, Inc. 4/8/2022 10:26AM



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
af	1	120.0	120.0	250.0	28.0	0.00	0.0	0
Tc	2	120.0	120.0	250.0	32.0	0.00	0.0	0

GSTABL7 v.2 FSmin=1.65
Safety Factors Are Calculated By The Modified Bishop Method

*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **

** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **

****

SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/8/2022
Time of Run: 10:26AM
Run By: LGC Geotechnical, Inc.

Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwtc.in

Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwtc.OUT

Unit System: English

Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwtc.PLT

PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section W-W'/ Temporary

BOUNDARY COORDINATES

7 Top Boundaries
7 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	1386.00	21.00	1384.00	2
2	21.00	1384.00	26.00	1388.00	2
3	26.00	1388.00	146.00	1388.00	2
4	146.00	1388.00	326.00	1480.00	2
5	326.00	1480.00	351.00	1483.00	2
6	351.00	1483.00	365.00	1483.00	2
7	365.00	1483.00	440.00	1445.00	2

User Specified Y-Origin = 1320.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	250.0	28.0	0.00	0.0	0
2	120.0	120.0	250.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	9.0	250.00	32.00
2	15.0	150.00	25.00
3	90.0	250.00	32.00

ANISOTROPIC SOIL NOTES:
(1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
(2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
(3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

ANISOTROPIC STRENGTH DATA HAS BEEN SUPPRESSED

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

4980 Trial Surfaces Have Been Generated.

249 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 130.00(ft)
and X = 150.00(ft)

Each Surface Terminates Between X = 305.00(ft)
and X = 355.00(ft)

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)

5.00(ft) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Total Number of Trial Surfaces Attempted = 4980

Number of Trial Surfaces With Valid FS = 4980

Statistical Data On All Valid FS Values:
FS **Max** = 2.634 FS **Min** = 1.652 FS Ave = 2.144
Standard Deviation = 0.290 Coefficient of Variation = 13.51 %

Failure Surface Specified By 45 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	146.842	1388.430
2	151.838	1388.632
3	156.829	1388.930
4	161.814	1389.324
5	166.790	1389.813
6	171.755	1390.398
7	176.709	1391.078
8	181.648	1391.854
9	186.572	1392.724
10	191.478	1393.688
11	196.365	1394.746
12	201.230	1395.899
13	206.073	1397.144
14	210.890	1398.482
15	215.681	1399.913
16	220.444	1401.436
17	225.176	1403.049
18	229.877	1404.753
19	234.544	1406.548
20	239.175	1408.431
21	243.770	1410.404
22	248.326	1412.464
23	252.841	1414.611
24	257.314	1416.845
25	261.744	1419.164
26	266.128	1421.568
27	270.465	1424.056
28	274.754	1426.626
29	278.992	1429.279
30	283.179	1432.012
31	287.312	1434.826
32	291.391	1437.718
33	295.413	1440.688
34	299.378	1443.735
35	303.283	1446.857
36	307.127	1450.054
37	310.910	1453.324
38	314.628	1456.667
39	318.282	1460.080
40	321.870	1463.562
41	325.390	1467.114
42	328.841	1470.731
43	332.222	1474.415
44	335.531	1478.163
45	338.351	1481.482

Circle Center At X = 138.834 ; Y = 1648.523 ; and Radius = 260.216

Factor of Safety
*** 1.652 ***

Individual data on the 45 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force **Norm** (lbs)	Tie Force **Tan** (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	5.0	704.9	0.0	0.0	0.	0.	0.0	0.0	0.0
2	5.0	2083.2	0.0	0.0	0.	0.	0.0	0.0	0.0
3	5.0	3398.5	0.0	0.0	0.	0.	0.0	0.0	0.0
4	5.0	4648.9	0.0	0.0	0.	0.	0.0	0.0	0.0
5	5.0	5833.1	0.0	0.0	0.	0.	0.0	0.0	0.0
6	5.0	6949.7	0.0	0.0	0.	0.	0.0	0.0	0.0
7	4.9	7997.3	0.0	0.0	0.	0.	0.0	0.0	0.0
8	4.9	8975.0	0.0	0.0	0.	0.	0.0	0.0	0.0
9	4.9	9881.7	0.0	0.0	0.	0.	0.0	0.0	0.0
10	4.9	10717.1	0.0	0.0	0.	0.	0.0	0.0	0.0
11	4.9	11480.1	0.0	0.0	0.	0.	0.0	0.0	0.0
12	4.8	12170.8	0.0	0.0	0.	0.	0.0	0.0	0.0
13	4.8	12788.7	0.0	0.0	0.	0.	0.0	0.0	0.0
14	4.8	13333.8	0.0	0.0	0.	0.	0.0	0.0	0.0
15	4.8	13806.3	0.0	0.0	0.	0.	0.0	0.0	0.0
16	4.7	14206.4	0.0	0.0	0.	0.	0.0	0.0	0.0
17	4.7	14534.8	0.0	0.0	0.	0.	0.0	0.0	0.0
18	4.7	14791.9	0.0	0.0	0.	0.	0.0	0.0	0.0
19	4.6	14978.6	0.0	0.0	0.	0.	0.0	0.0	0.0
20	4.6	15095.8	0.0	0.0	0.	0.	0.0	0.0	0.0
21	4.6	15144.6	0.0	0.0	0.	0.	0.0	0.0	0.0
22	4.5	15126.3	0.0	0.0	0.	0.	0.0	0.0	0.0

23	4.5	15042.6	0.0	0.0	0.	0.	0.0	0.0	0.0
24	4.4	14894.9	0.0	0.0	0.	0.	0.0	0.0	0.0
25	4.4	14684.8	0.0	0.0	0.	0.	0.0	0.0	0.0
26	4.3	14414.4	0.0	0.0	0.	0.	0.0	0.0	0.0
27	4.3	14085.9	0.0	0.0	0.	0.	0.0	0.0	0.0
28	4.2	13701.1	0.0	0.0	0.	0.	0.0	0.0	0.0
29	4.2	13262.6	0.0	0.0	0.	0.	0.0	0.0	0.0
30	4.1	12772.6	0.0	0.0	0.	0.	0.0	0.0	0.0
31	4.1	12234.2	0.0	0.0	0.	0.	0.0	0.0	0.0
32	4.0	11649.6	0.0	0.0	0.	0.	0.0	0.0	0.0
33	4.0	11021.9	0.0	0.0	0.	0.	0.0	0.0	0.0
34	3.9	10354.0	0.0	0.0	0.	0.	0.0	0.0	0.0
35	3.8	9649.0	0.0	0.0	0.	0.	0.0	0.0	0.0
36	3.8	8910.1	0.0	0.0	0.	0.	0.0	0.0	0.0
37	3.7	8140.4	0.0	0.0	0.	0.	0.0	0.0	0.0
38	3.7	7343.5	0.0	0.0	0.	0.	0.0	0.0	0.0
39	3.6	6522.7	0.0	0.0	0.	0.	0.0	0.0	0.0
40	3.5	5681.5	0.0	0.0	0.	0.	0.0	0.0	0.0
41	0.6	908.9	0.0	0.0	0.	0.	0.0	0.0	0.0
42	2.8	3725.4	0.0	0.0	0.	0.	0.0	0.0	0.0
43	3.4	3233.8	0.0	0.0	0.	0.	0.0	0.0	0.0
44	3.3	1849.2	0.0	0.0	0.	0.	0.0	0.0	0.0
45	2.8	504.3	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 46 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	146.842	1388.430
2	151.827	1388.813
3	156.805	1389.282
4	161.774	1389.836
5	166.733	1390.477
6	171.680	1391.204
7	176.614	1392.016
8	181.533	1392.913
9	186.435	1393.896
10	191.320	1394.963
11	196.186	1396.114
12	201.030	1397.350
13	205.853	1398.669
14	210.653	1400.072
15	215.427	1401.557
16	220.175	1403.125
17	224.895	1404.775
18	229.585	1406.506
19	234.245	1408.318
20	238.873	1410.211
21	243.468	1412.184
22	248.027	1414.235
23	252.551	1416.366
24	257.037	1418.574
25	261.484	1420.860
26	265.890	1423.222
27	270.255	1425.661
28	274.578	1428.174
29	278.856	1430.762
30	283.089	1433.424
31	287.275	1436.158
32	291.413	1438.965
33	295.501	1441.843
34	299.540	1444.791
35	303.526	1447.809
36	307.460	1450.895
37	311.340	1454.049
38	315.165	1457.270
39	318.933	1460.556
40	322.644	1463.907
41	326.296	1467.322
42	329.889	1470.799
43	333.421	1474.338
44	336.891	1477.938
45	340.298	1481.598
46	340.417	1481.730

Circle Center At X = 127.248 ; Y = 1676.544 ; and Radius = 288.779

Factor of Safety
*** 1.653 ***

1

Failure Surface Specified By 46 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	146.842	1388.430
2	151.840	1388.574
3	156.834	1388.813
4	161.823	1389.149
5	166.804	1389.581
6	171.776	1390.108
7	176.737	1390.731
8	181.685	1391.450
9	186.619	1392.264
10	191.535	1393.173
11	196.434	1394.177
12	201.312	1395.275
13	206.168	1396.466
14	211.000	1397.751
15	215.806	1399.129
16	220.585	1400.599
17	225.335	1402.161
18	230.054	1403.814
19	234.740	1405.557
20	239.391	1407.391
21	244.007	1409.314
22	248.584	1411.326
23	253.122	1413.425
24	257.619	1415.612
25	262.072	1417.884
26	266.481	1420.242
27	270.844	1422.685
28	275.159	1425.211
29	279.424	1427.820
30	283.639	1430.511
31	287.801	1433.282
32	291.908	1436.133
33	295.960	1439.063
34	299.954	1442.070
35	303.890	1445.154
36	307.766	1448.312
37	311.580	1451.545
38	315.332	1454.851
39	319.018	1458.229

40	322.639	1461.676
41	326.193	1465.193
42	329.679	1468.778
43	333.095	1472.430
44	336.439	1476.146
45	339.712	1479.927
46	341.302	1481.836

Circle Center At X = 141.926 ; Y = 1647.789 ; and Radius = 259.405

Factor of Safety
*** 1.653 ***

Failure Surface Specified By 46 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	146.842	1388.430
2	151.824	1388.854
3	156.798	1389.361
4	161.763	1389.952
5	166.718	1390.626
6	171.660	1391.384
7	176.589	1392.225
8	181.503	1393.148
9	186.400	1394.155
10	191.280	1395.244
11	196.141	1396.415
12	200.982	1397.667
13	205.800	1399.002
14	210.596	1400.417
15	215.367	1401.912
16	220.112	1403.488
17	224.830	1405.144
18	229.519	1406.879
19	234.179	1408.693
20	238.807	1410.584
21	243.403	1412.554
22	247.965	1414.601
23	252.492	1416.724
24	256.982	1418.923
25	261.434	1421.198
26	265.848	1423.547
27	270.222	1425.971
28	274.554	1428.468
29	278.843	1431.037
30	283.088	1433.678
31	287.289	1436.391
32	291.443	1439.174
33	295.549	1442.026
34	299.607	1444.948
35	303.615	1447.937
36	307.572	1450.993
37	311.477	1454.116
38	315.329	1457.303
39	319.127	1460.556
40	322.869	1463.872
41	326.555	1467.250
42	330.183	1470.690
43	333.753	1474.191
44	337.264	1477.751
45	340.714	1481.370
46	341.123	1481.815

Circle Center At X = 124.229 ; Y = 1684.264 ; and Radius = 296.697

Factor of Safety
*** 1.654 ***

1

Failure Surface Specified By 47 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	146.842	1388.430
2	151.838	1388.624
3	156.830	1388.910
4	161.816	1389.286
5	166.794	1389.754
6	171.763	1390.313
7	176.720	1390.963
8	181.665	1391.704
9	186.596	1392.534
10	191.510	1393.455
11	196.407	1394.466
12	201.284	1395.566
13	206.141	1396.756
14	210.975	1398.034
15	215.784	1399.400
16	220.568	1400.854
17	225.325	1402.395
18	230.052	1404.023
19	234.749	1405.738
20	239.414	1407.538
21	244.045	1409.423
22	248.641	1411.393
23	253.199	1413.447
24	257.720	1415.583
25	262.201	1417.802
26	266.640	1420.103
27	271.036	1422.484
28	275.388	1424.946
29	279.695	1427.486
30	283.954	1430.106
31	288.164	1432.802
32	292.325	1435.576
33	296.434	1438.425
34	300.490	1441.348
35	304.491	1444.346
36	308.438	1447.416
37	312.327	1450.558
38	316.159	1453.771
39	319.931	1457.053
40	323.642	1460.403
41	327.291	1463.822
42	330.877	1467.306
43	334.399	1470.855
44	337.855	1474.468
45	341.244	1478.144
46	344.566	1481.882

```
         47        344.896     1482.268

Circle Center At X =   138.743 ; Y =  1661.463 ; and Radius =   273.152


       Factor of Safety
      ***    1.654   ***




Failure Surface Specified By 46 Coordinate Points


  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)

    1        146.842     1388.430
    2        151.824     1388.860
    3        156.797     1389.371
    4        161.762     1389.963
    5        166.717     1390.636
    6        171.660     1391.389
    7        176.590     1392.223
    8        181.505     1393.137
    9        186.406     1394.131
   10        191.289     1395.205
   11        196.154     1396.358
   12        201.000     1397.591
   13        205.825     1398.902
   14        210.628     1400.292
   15        215.407     1401.760
   16        220.163     1403.305
   17        224.892     1404.928
   18        229.594     1406.628
   19        234.268     1408.404
   20        238.912     1410.256
   21        243.526     1412.183
   22        248.107     1414.186
   23        252.656     1416.263
   24        257.170     1418.413
   25        261.648     1420.637
   26        266.089     1422.934
   27        270.492     1425.303
   28        274.856     1427.743
   29        279.180     1430.254
   30        283.462     1432.835
   31        287.702     1435.486
   32        291.898     1438.205
   33        296.049     1440.992
   34        300.154     1443.847
   35        304.212     1446.768
   36        308.222     1449.755
   37        312.182     1452.807
   38        316.093     1455.923
   39        319.952     1459.102
   40        323.758     1462.344
   41        327.512     1465.647
   42        331.211     1469.012
   43        334.854     1472.436
   44        338.442     1475.918
   45        341.972     1479.459
   46        344.653     1482.238

Circle Center At X =   122.979 ; Y =  1694.215 ; and Radius =   306.715


       Factor of Safety
      ***    1.655   ***



1

          Failure Surface Specified By 45 Coordinate Points


            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)

              1        148.947     1389.506
              2        153.943     1389.704
              3        158.935     1390.000
              4        163.919     1390.393
              5        168.895     1390.884
              6        173.860     1391.473
              7        178.813     1392.159
              8        183.751     1392.941
              9        188.673     1393.821
             10        193.577     1394.797
             11        198.461     1395.868
             12        203.323     1397.036
             13        208.161     1398.298
             14        212.973     1399.655
             15        217.758     1401.106
             16        222.513     1402.651
             17        227.238     1404.289
             18        231.929     1406.018
             19        236.585     1407.840
             20        241.205     1409.752
             21        245.786     1411.755
             22        250.328     1413.847
             23        254.827     1416.028
             24        259.283     1418.297
             25        263.693     1420.652
             26        268.056     1423.094
             27        272.371     1425.620
             28        276.635     1428.231
             29        280.848     1430.925
             30        285.006     1433.701
             31        289.110     1436.558
             32        293.156     1439.495
             33        297.144     1442.510
             34        301.073     1445.603
             35        304.940     1448.773
             36        308.744     1452.018
             37        312.483     1455.337
             38        316.157     1458.728
             39        319.764     1462.191
             40        323.302     1465.724
             41        326.770     1469.326
             42        330.167     1472.995
             43        333.491     1476.730
             44        336.742     1480.529
             45        337.435     1481.372

          Circle Center At X =   141.363 ; Y =  1644.391 ; and Radius =   254.998


                 Factor of Safety
                ***    1.655   ***
```

Failure Surface Specified By 46 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	147.895	1388.968
2	152.877	1389.392
3	157.851	1389.899
4	162.816	1390.488
5	167.771	1391.160
6	172.714	1391.914
7	177.643	1392.750
8	182.558	1393.668
9	187.457	1394.667
10	192.339	1395.748
11	197.202	1396.909
12	202.046	1398.152
13	206.867	1399.475
14	211.667	1400.877
15	216.442	1402.360
16	221.192	1403.921
17	225.915	1405.561
18	230.610	1407.280
19	235.277	1409.076
20	239.912	1410.950
21	244.516	1412.900
22	249.087	1414.927
23	253.624	1417.029
24	258.124	1419.207
25	262.589	1421.459
26	267.015	1423.785
27	271.401	1426.184
28	275.748	1428.656
29	280.052	1431.200
30	284.314	1433.814
31	288.532	1436.500
32	292.704	1439.255
33	296.830	1442.079
34	300.909	1444.971
35	304.939	1447.931
36	308.919	1450.957
37	312.848	1454.049
38	316.726	1457.206
39	320.550	1460.427
40	324.320	1463.711
41	328.035	1467.058
42	331.695	1470.465
43	335.296	1473.933
44	338.840	1477.460
45	342.325	1481.046
46	343.292	1482.075

Circle Center At X = 124.905 ; Y = 1688.802 ; and Radius = 300.714

Factor of Safety
*** 1.656 ***

1

Failure Surface Specified By 45 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	147.895	1388.968
2	152.881	1389.343
3	157.859	1389.808
4	162.828	1390.362
5	167.786	1391.007
6	172.732	1391.741
7	177.664	1392.565
8	182.580	1393.478
9	187.479	1394.479
10	192.358	1395.569
11	197.217	1396.748
12	202.054	1398.014
13	206.868	1399.367
14	211.656	1400.807
15	216.417	1402.334
16	221.150	1403.947
17	225.853	1405.645
18	230.524	1407.428
19	235.162	1409.295
20	239.766	1411.246
21	244.334	1413.280
22	248.864	1415.396
23	253.355	1417.594
24	257.805	1419.873
25	262.214	1422.232
26	266.579	1424.670
27	270.899	1427.187
28	275.173	1429.782
29	279.399	1432.454
30	283.577	1435.202
31	287.703	1438.025
32	291.779	1440.922
33	295.800	1443.893
34	299.768	1446.935
35	303.680	1450.050
36	307.535	1453.234
37	311.331	1456.488
38	315.068	1459.810
39	318.744	1463.199
40	322.358	1466.654
41	325.910	1470.173
42	329.396	1473.757
43	332.818	1477.403
44	336.173	1481.111
45	336.280	1481.234

Circle Center At X = 129.700 ; Y = 1664.575 ; and Radius = 276.207

Factor of Safety
*** 1.656 ***

Failure Surface Specified By 46 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	147.895	1388.968
2	152.891	1389.159
3	157.883	1389.442
4	162.869	1389.815
5	167.847	1390.281
6	172.816	1390.837
7	177.774	1391.484
8	182.719	1392.222
9	187.650	1393.051
10	192.565	1393.969
11	197.462	1394.978
12	202.340	1396.076
13	207.197	1397.263
14	212.032	1398.540
15	216.842	1399.904
16	221.626	1401.357
17	226.383	1402.897
18	231.111	1404.524
19	235.809	1406.237
20	240.474	1408.036
21	245.105	1409.920
22	249.701	1411.889
23	254.260	1413.941
24	258.781	1416.077
25	263.262	1418.295
26	267.702	1420.595
27	272.099	1422.976
28	276.451	1425.438
29	280.757	1427.978
30	285.017	1430.597
31	289.227	1433.294
32	293.387	1436.067
33	297.496	1438.916
34	301.552	1441.840
35	305.554	1444.838
36	309.500	1447.908
37	313.389	1451.051
38	317.220	1454.264
39	320.991	1457.547
40	324.702	1460.898
41	328.351	1464.317
42	331.936	1467.802
43	335.457	1471.352
44	338.912	1474.966
45	342.300	1478.643
46	345.594	1482.351

Circle Center At X = 139.978 ; Y = 1661.692 ; and Radius = 272.839

Factor of Safety
*** 1.657 ***

**** END OF GSTABL7 OUTPUT ****

LEGEND

Qal	Quaternary Alluvium
Qt	Quaternary Terrace Deposits
Qls	Quaternary Landslide, Circled where buried
QTs	Quaternary/Tertiary Saugus Formation, Circled where buried
Tcs	Tertiary Castaic Formation, Circled where buried
	Approximate Location of Geologic Contact; Queried Where Uncertain, dotted where buried
	Approximate Location of Fault; Queried Where Uncertain
BA-2 T.D.=15'	Approximate Location of Bucket Auger Boring by LGC Geotechnical, with Total Depth in Feet
CPT-B4 T.D.=63'	Approximate Location of Cone Penetration Test (CPT) by LGC Geotechnical, with Total Depth in Feet
HP-1	Approximate Location of Hand Pit by LGC Geotechnical
B-15 T.D. = 17'	Approximate Location of Large Diameter Bucket Auger Boring, with Total Depth in Feet (Petra, 2018)
PB-2A T.D. = 68'	Approximate Location of Large Diameter Bucket Auger Boring, with Total Depth in Feet (Petra, 2020)
HS-15 T.D. = 43.5'	Approximate Location of Hollow Stem Auger Boring, with Total Depth in Feet (Petra, 2018)
BH-17 T.D. = 51.5'	Approximate Location of Hollow Stem Auger Boring, with Total Depth in Feet (Petra, 2021)
TP-16	Approximate Location of Geotechnical Test Pit (Petra, 2018)
CPT-P4 T.D. = 31'	Approximate Location of Cone Penetration Test (CPT), with Total Depth in Feet (Petra, 2017)
CPT-7 T.D. = 21.5'	Approximate Location of Cone Penetration Test (CPT), with Total Depth in Feet (Petra, 2018)
CP-5 T.D. = 43'	Approximate Location of Cone Penetration Test (CPT), with Total Depth in Feet (Petra, 2021)
FT-3	Approximate Location of Fault Trench Excavations (Petra, 2020)
25'	Anticipated Depth of Remedial Grading (Removal and Recompaction) in Feet from Existing Ground Surface (Minimum 5 Feet)
1370'	Approximate Location of Removal Bottom, With Elevation Above Mean Sea Level Shown in Feet
A A'	Approximate Location of Geotechnical Cross-Section
	Approximate Limits of Buttress and Stabilization Fill Keyways With Approximate Width and Depth Dimensions, in Feet
	Approximate Limits of Updates to Grading Plan in PA-1, Revised Geotechnical Recommendations Included on Map

Geologic Attitudes

Bedding — Rupture Surface
Joint — Fault
Shear

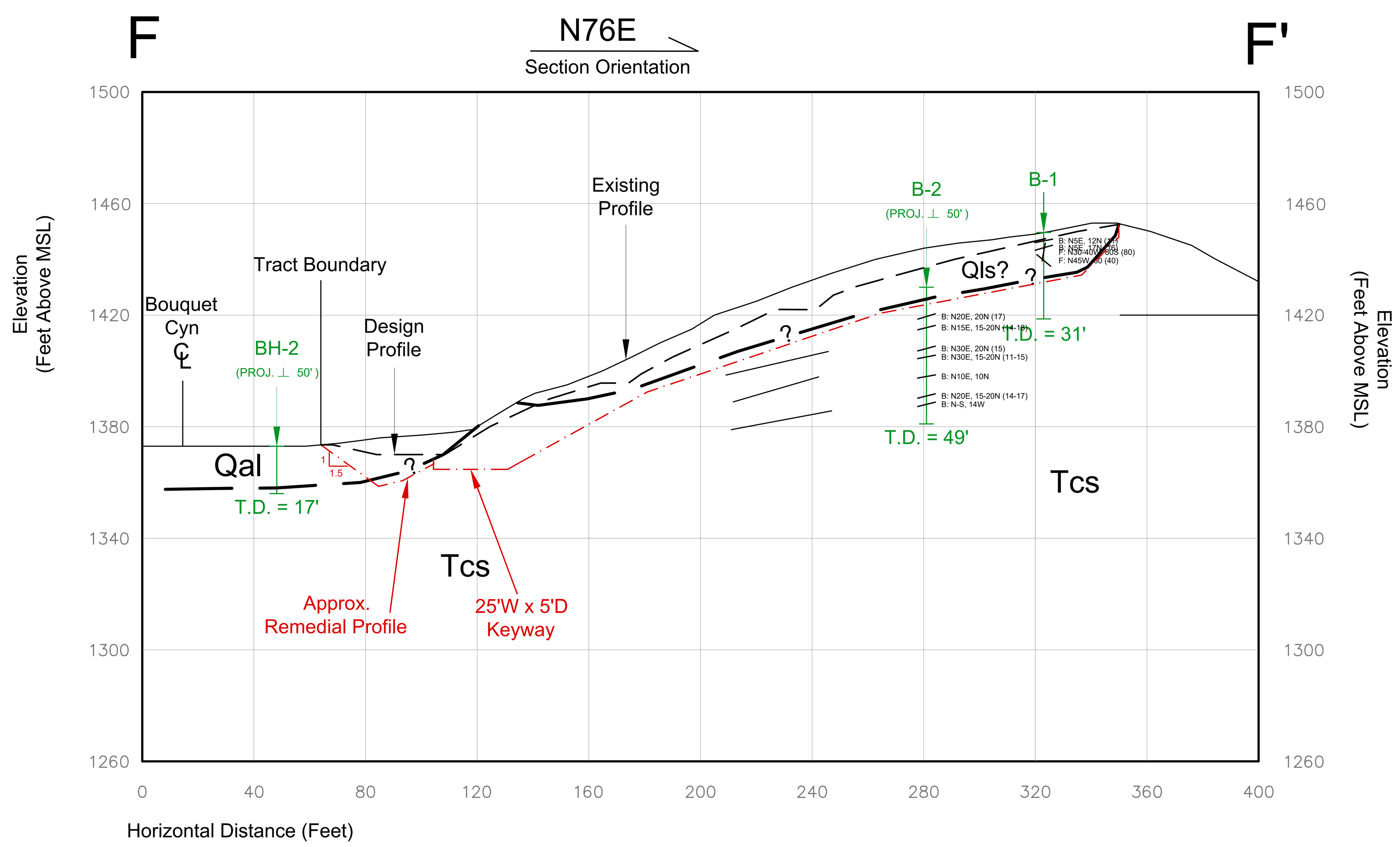
Note: Refer to LGC Geotechnical, 2021a For Geotechnical Recommendations Outside of Revised Area

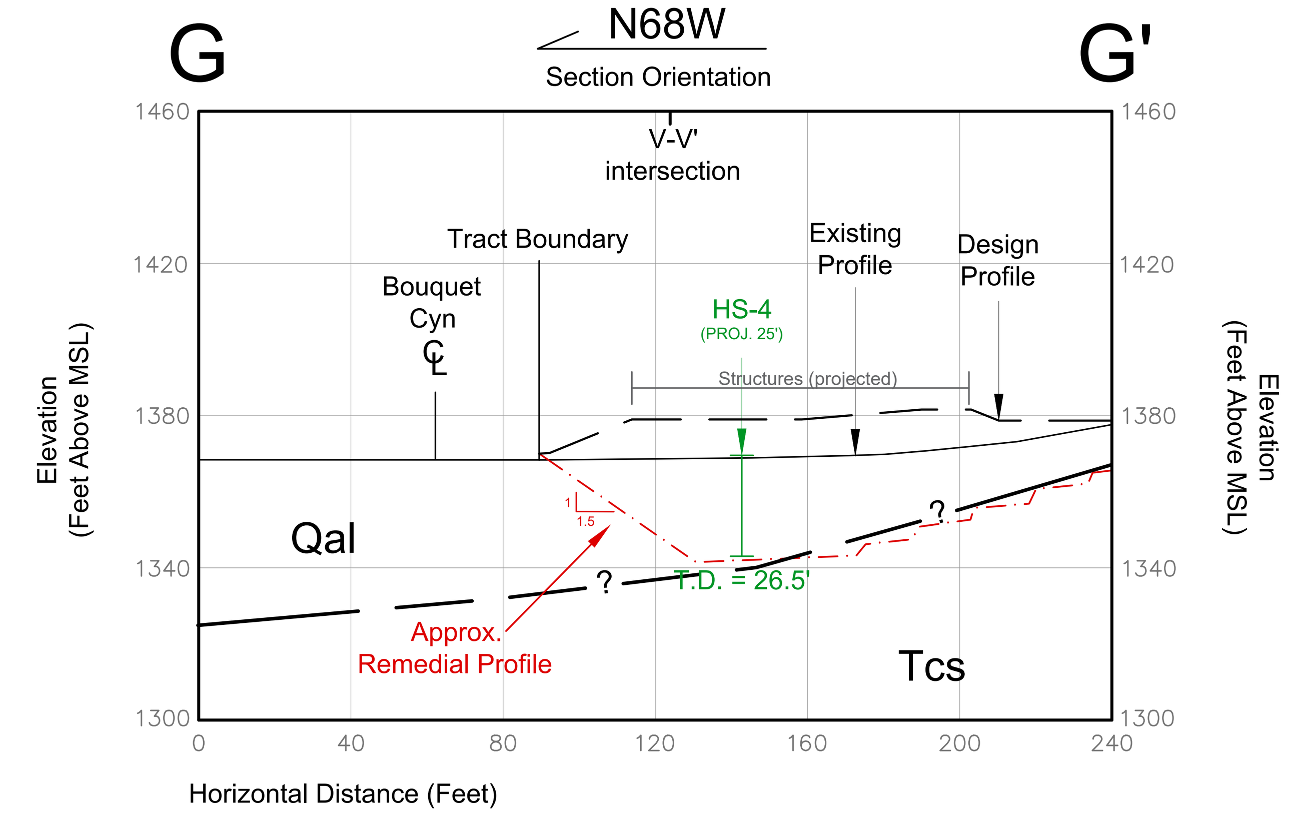
LGC Geotechnical, Inc.
131 Calle Iglesia, Ste. 200
San Clemente, CA 92672
TEL (949) 369-6141 FAX (949) 369-6142

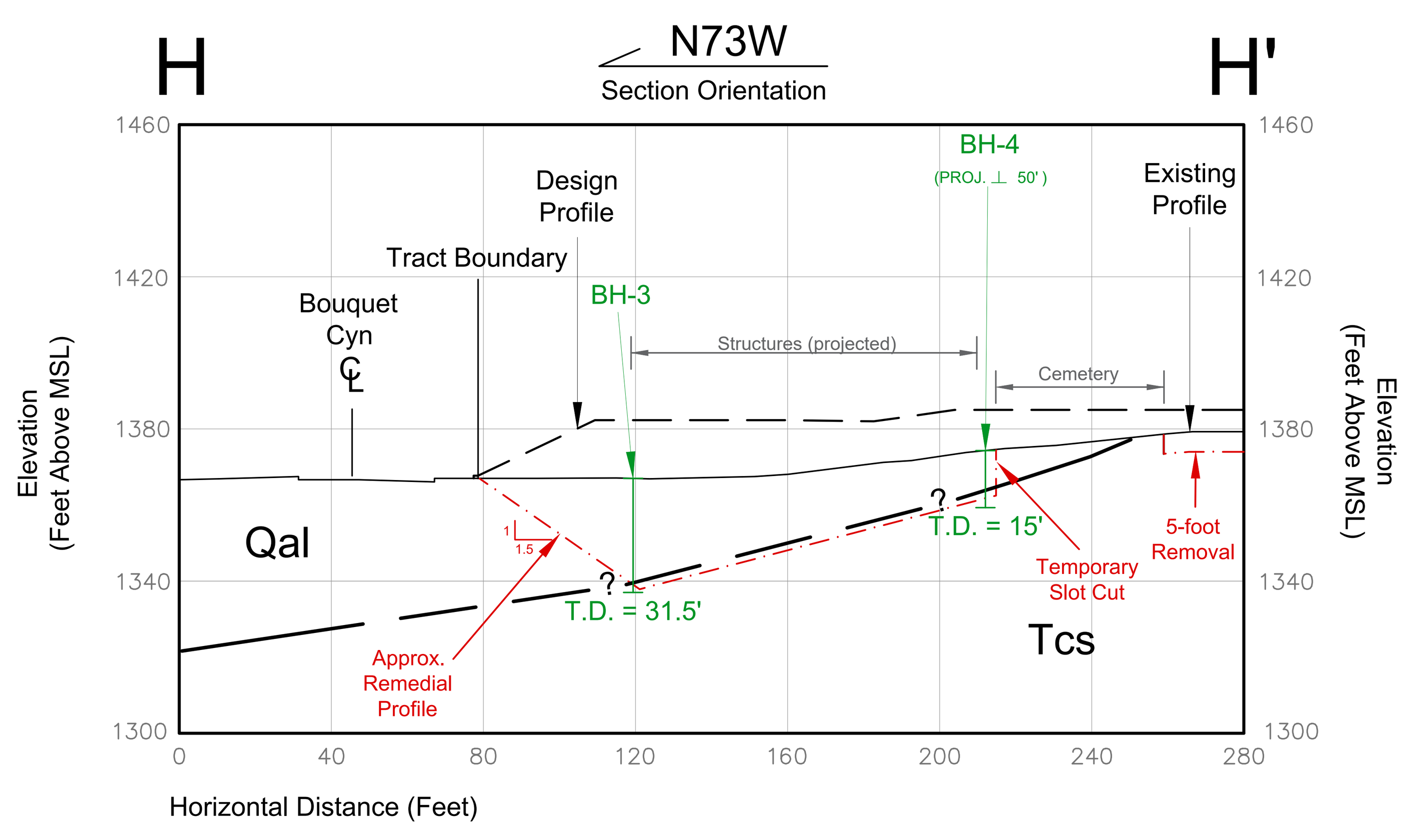
Geotechnical Map

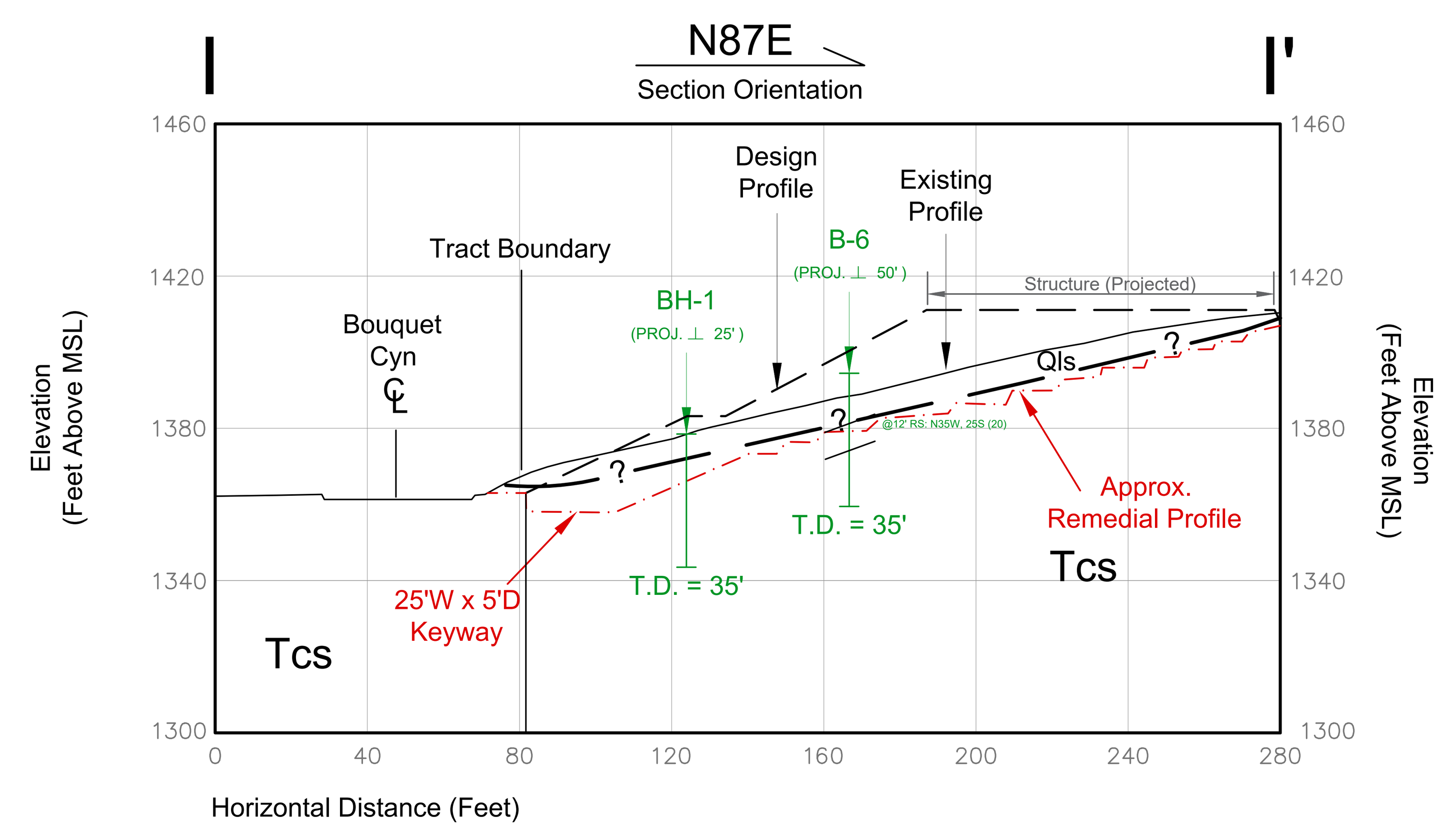
PROJECT NAME	Bouquet Canyon
PROJECT NO.	21095-01
ENG. / GEOL.	RLD / KTM
SCALE	1" = 40'
DATE	April 2022

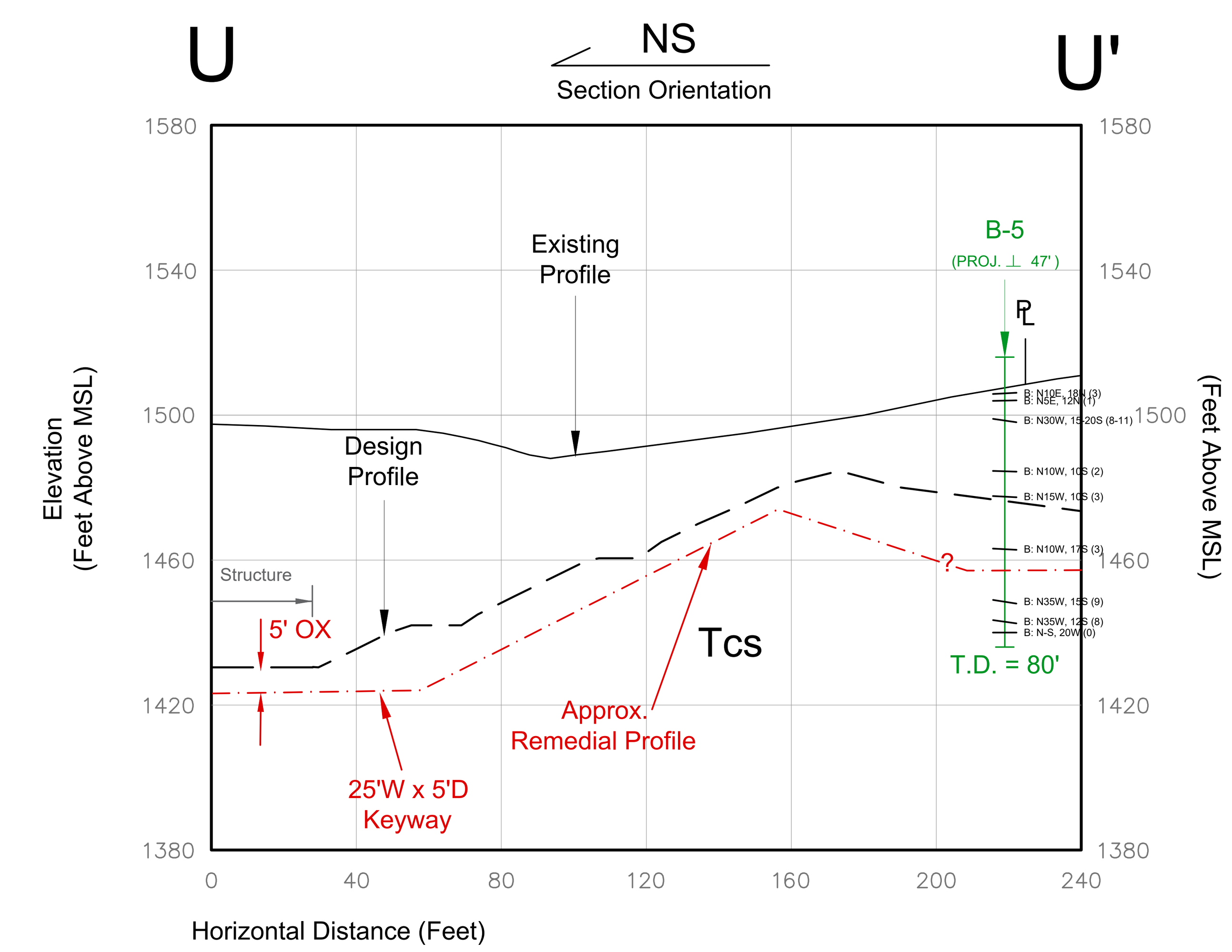
SHEET 1 of 3











SCALE: 1"=40'

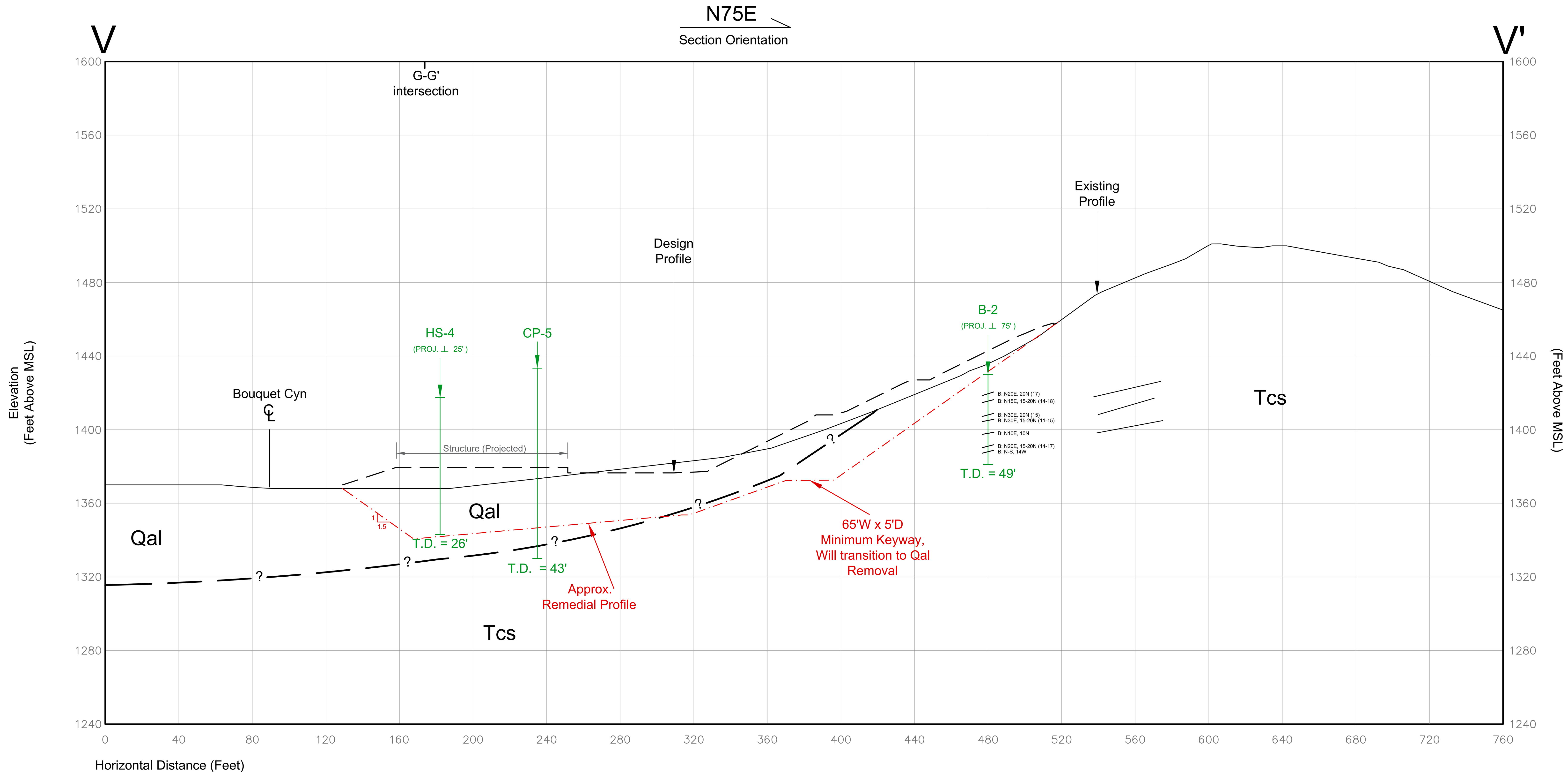
40' 0 40' 80'

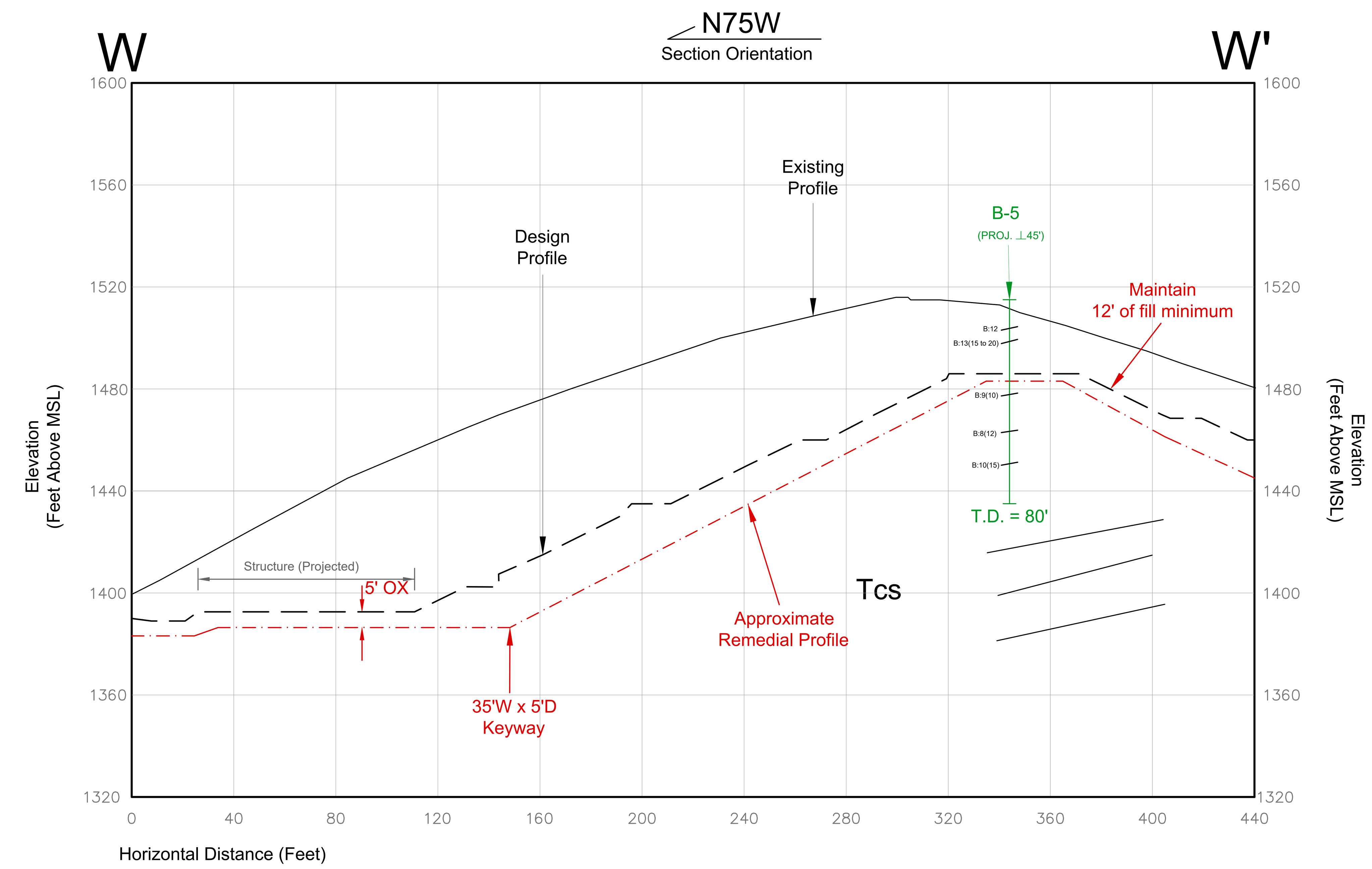
LGC Geotechnical, Inc.
131 Calle Iglesia, Ste. 200
San Clemente, CA 92672
TEL (949) 369-6141 FAX (949) 369-6142

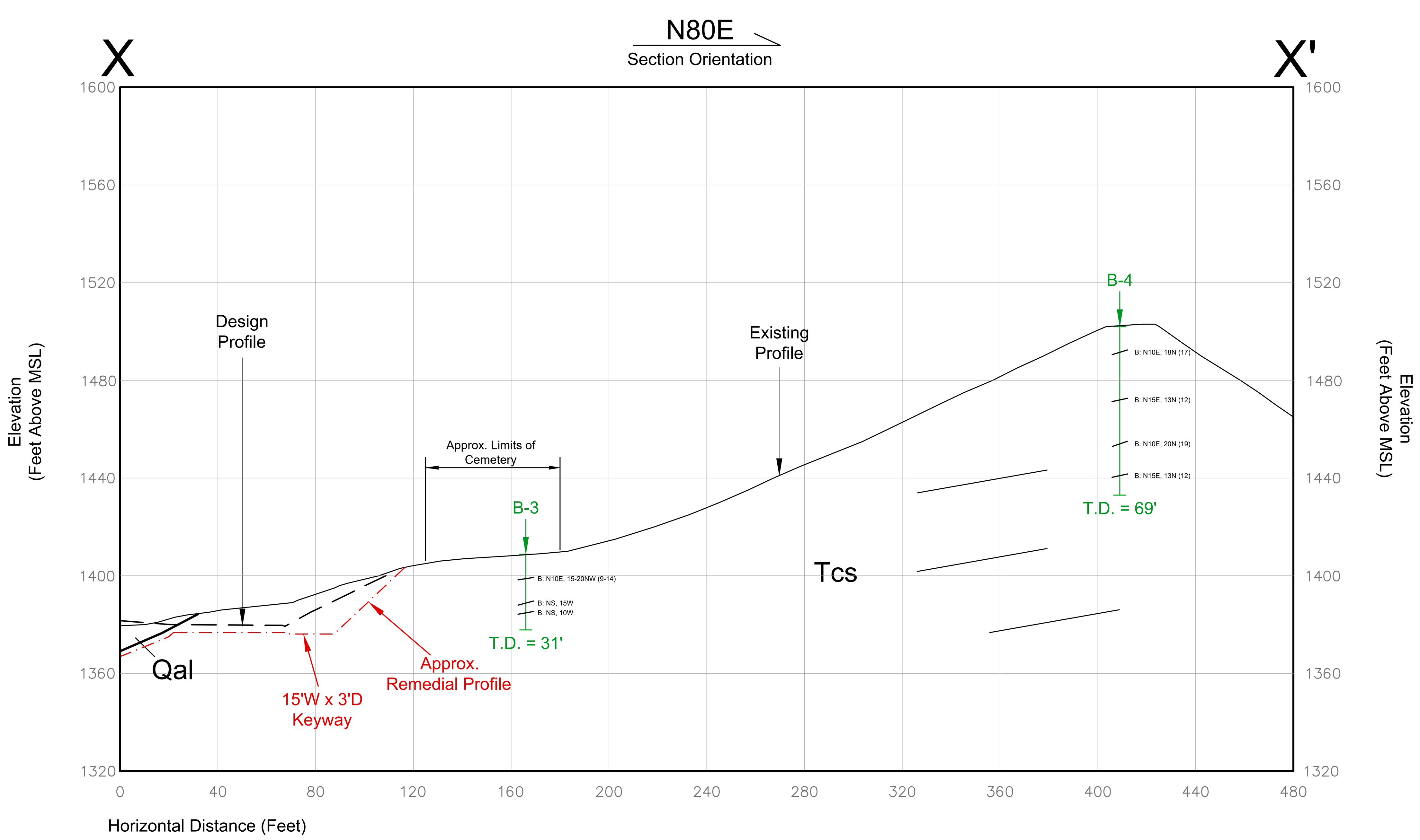
Geotechnical Cross Sections F-F', G-G', H-H', I-I' and U-U'

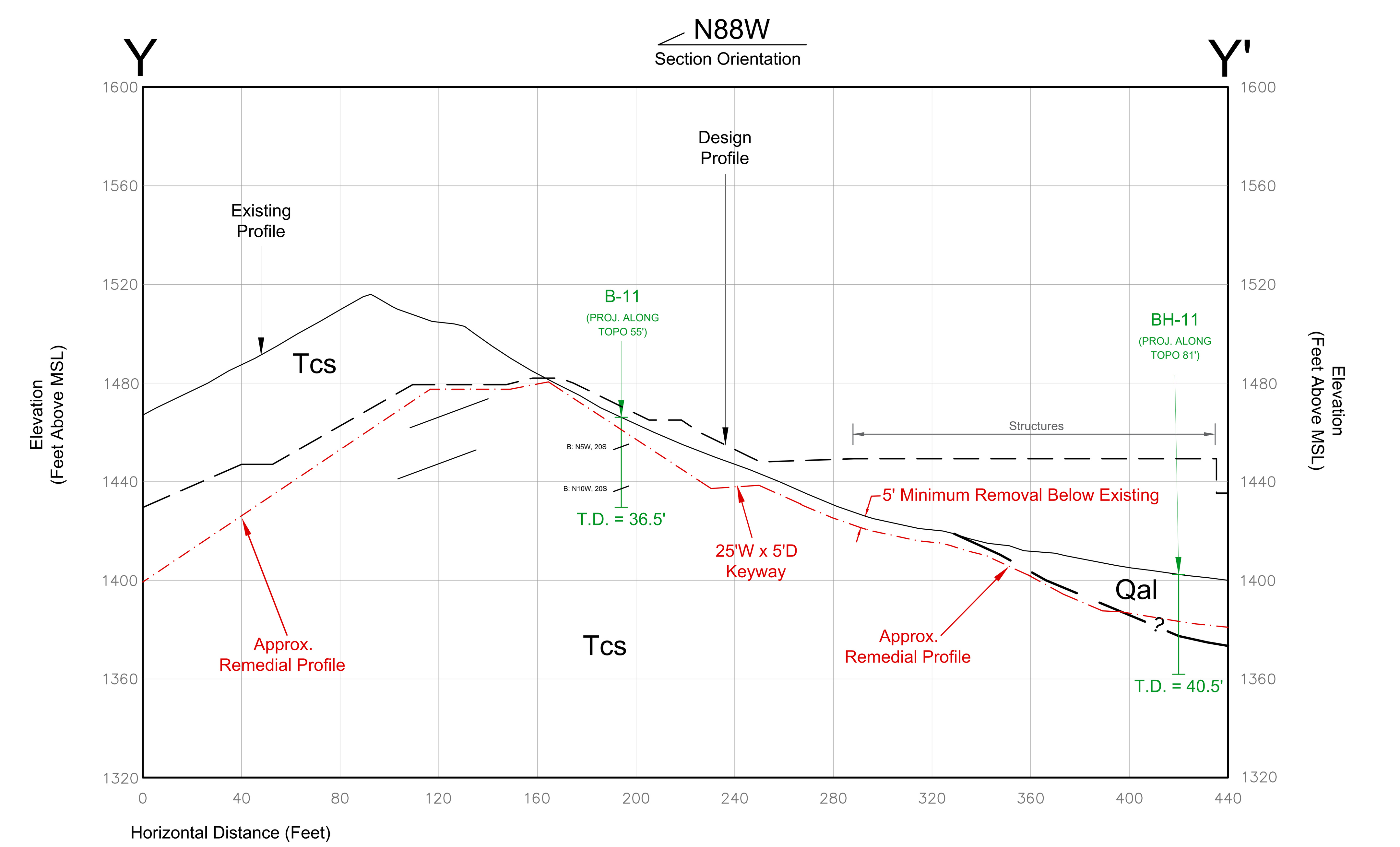
PROJECT NAME	Bouquet Canyon
PROJECT NO.	21095-01
ENG. / GEOL.	RLD / KTM
SCALE	1" = 40'
DATE	April 2022

SHEET 2 of 3









SCALE: 1"=40'

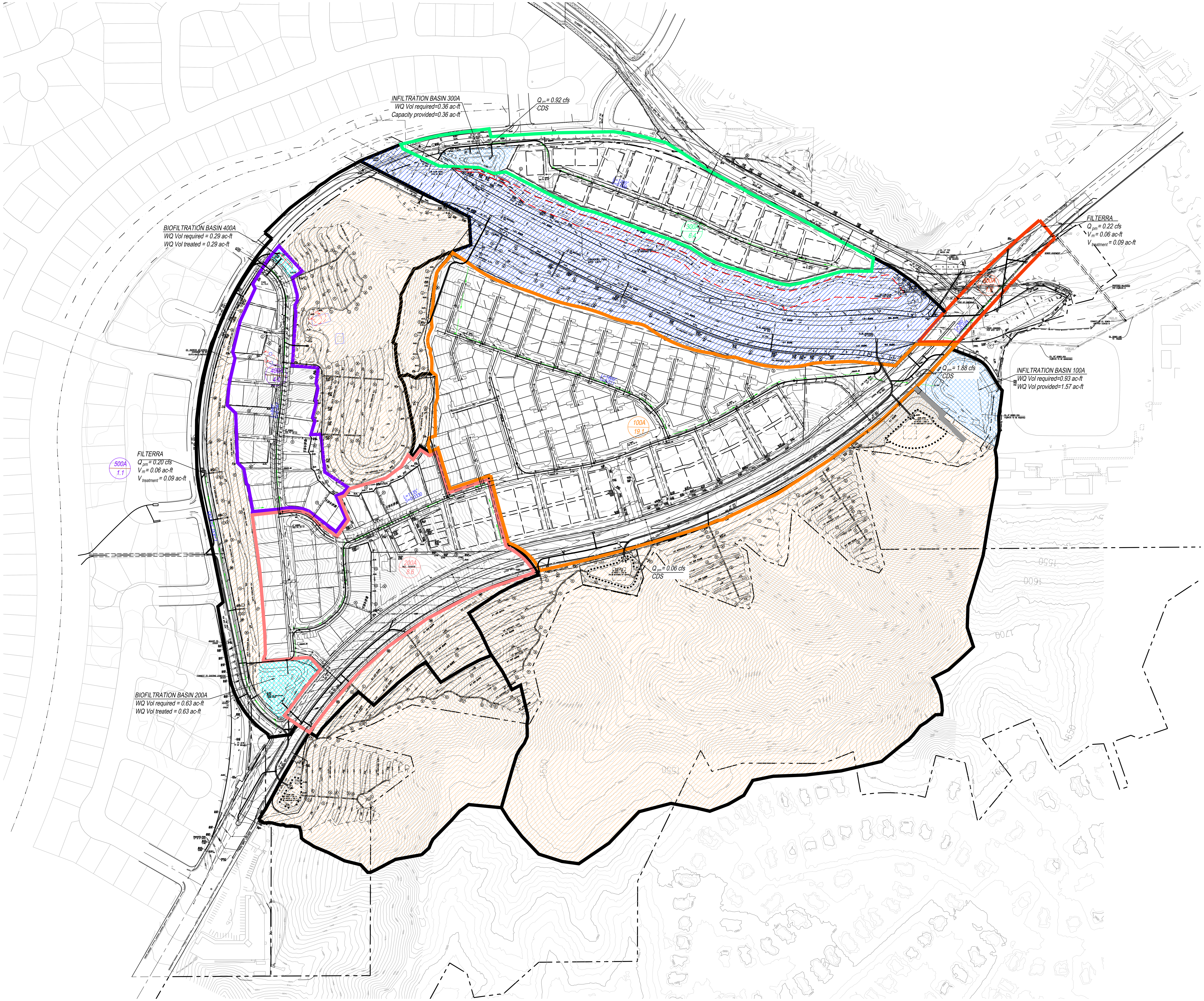
LGC Geotechnical, Inc.
131 Calle Iglesia, Ste. 200
San Clemente, CA 92672
TEL (949) 369-6141 FAX (949) 369-6142

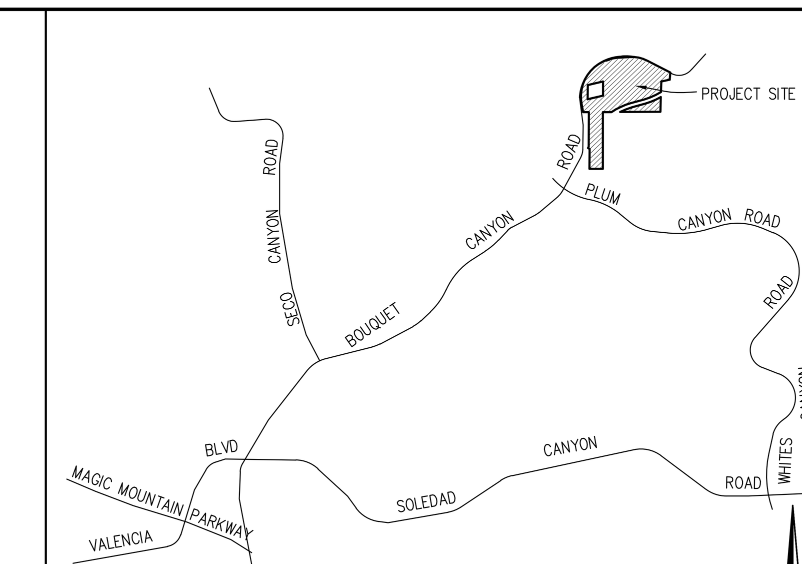
Geotechnical Cross Sections V-V', W-W', X-X' and Y-Y'

PROJECT NAME	Bouquet Canyon
PROJECT NO.	21095-01
ENG. / GEOL.	RLD / KTM
SCALE	1" = 40'
DATE	April 2022

Appendix D

Urban Stormwater Mitigation Plan





VICINITY MAP

NOT TO SCALE

LEGEND

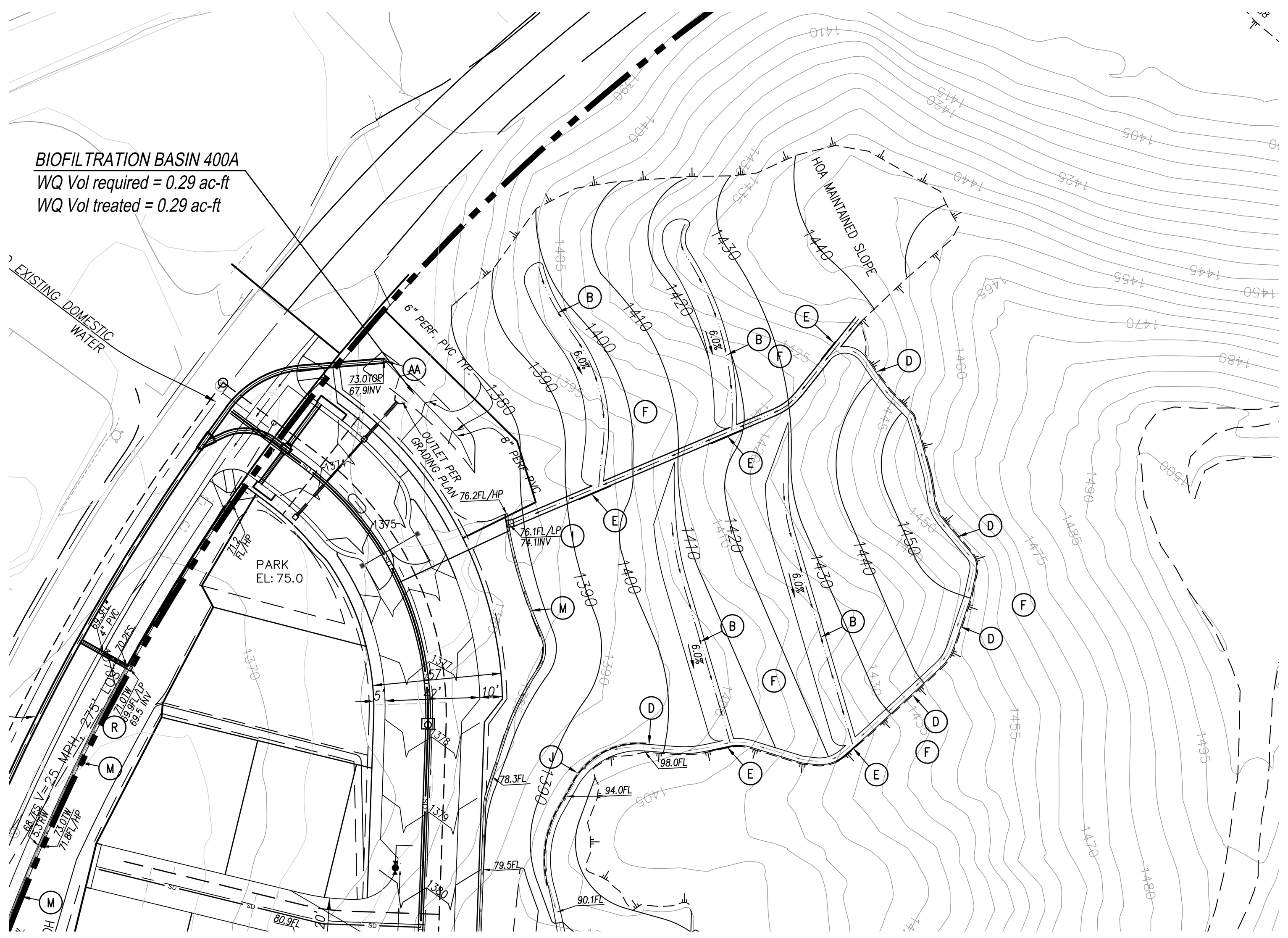
- MAIN DRAINAGE BOUNDARY
- SUB-AREA BOUNDARY
- FLOW LINE
- TRACT BOUNDARY
- PROPOSED STORM DRAIN PIPE
- LOW FLOW STORM DRAIN
- C .... CDS UNIT
- F .... FILTERRA
- INFILTRATION BASIN PER RET-2
- BIOFILTRATION BASIN PER BIO-1
- PERVIOUS AREA INCLUDING NATIVE AND MANUFACTURED SLOPES (NOT SUBJECT TO LID REQUIREMENTS)
- DRAINAGE FACILITIES INCLUDING COUNTY MAINTAINED CHANNEL, LOW FLOW CHANNEL, AND BRIDGE (NOT SUBJECT TO LID REQUIREMENTS)
- RIPARIAN / WETLAND AREAS IN BOUQUET CREEK TO BE REPLACED INCLUDING BUFFER AREA

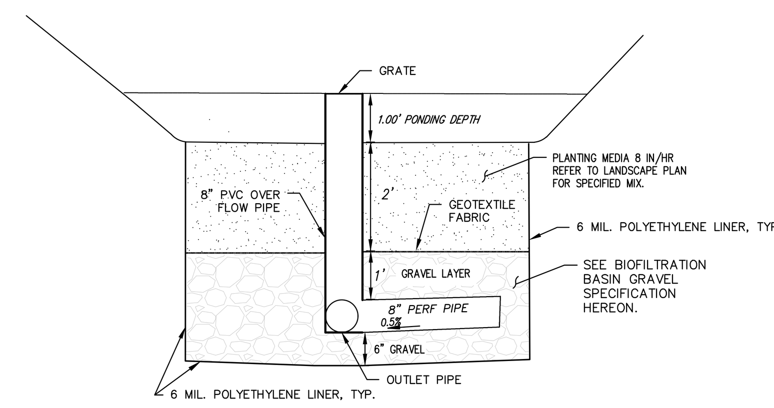
USMP EXHIBIT

TENTATIVE TRACT NO. 82126

IN THE CITY OF SANTA CLARITA

NORTH SCALE: 1"=100'	PREPARED FOR : Lennar Homes of California, LLC 2000 Five Point, Suite 365 Irvine, CA 92618 DATE: 3/8/2022 W.O. NO.: 5117-006-02	PREPARED BY : SIKAND Engineering | Planning | Surveying 15230 Burbank Blvd. #100, Van Nuys, CA 91411 Phone : (818) 787- 8550, Fax : (818) 901-7451 www.sikand.com, E-mail: info@sikand.com	REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2022 CIVIL STATE OF CALIFORNIA	SHEET 1 OF 1 SHEETS





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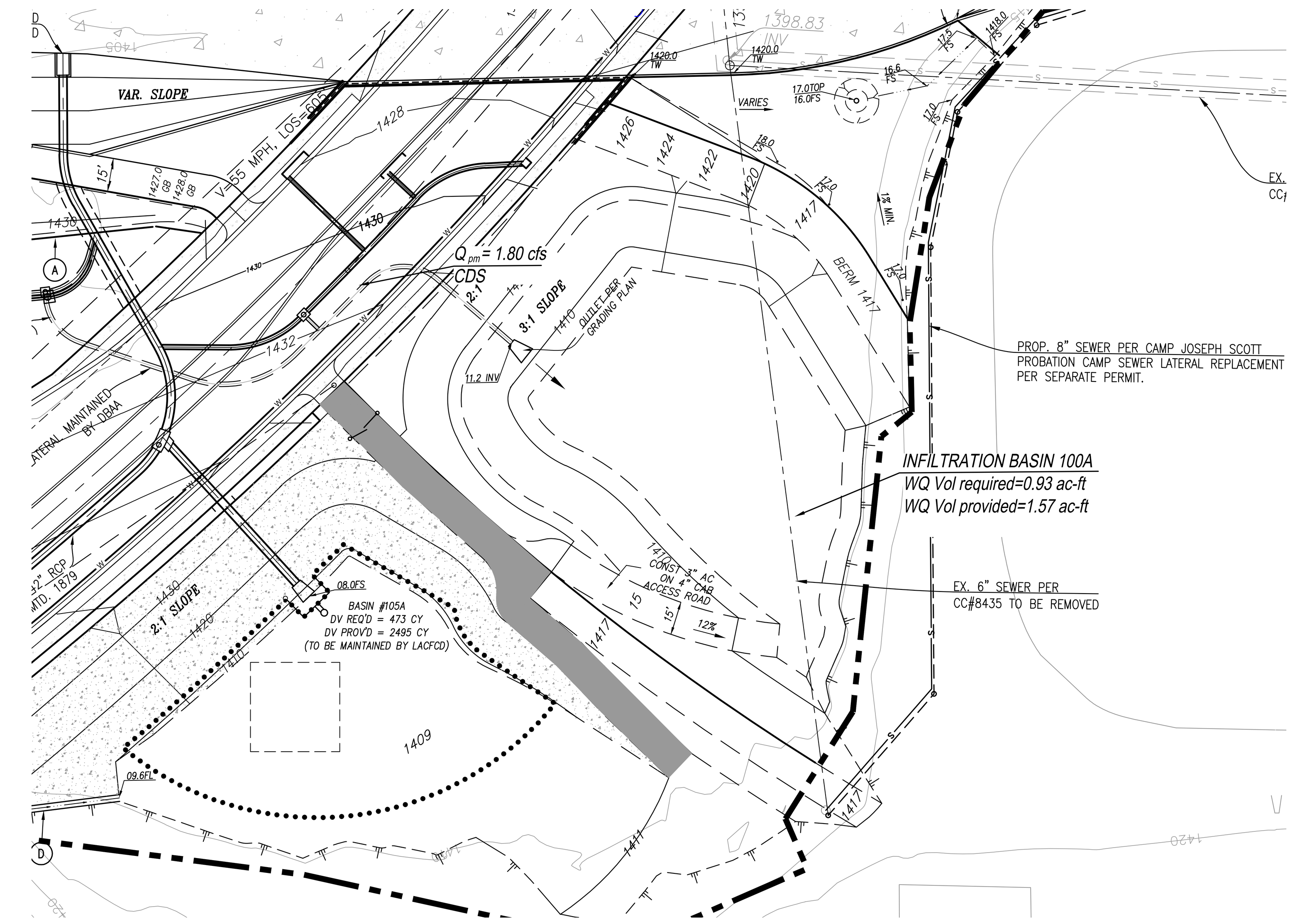
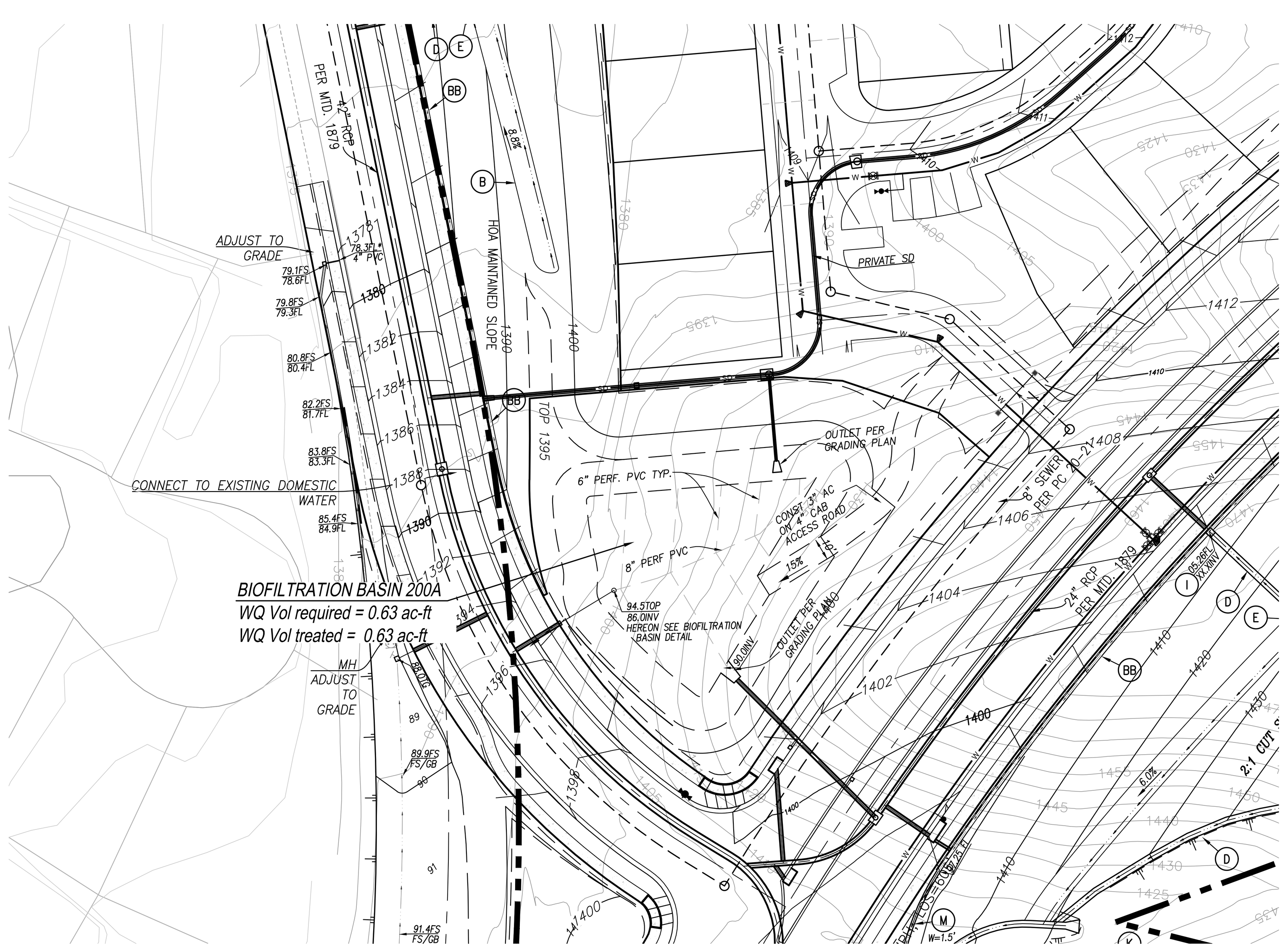
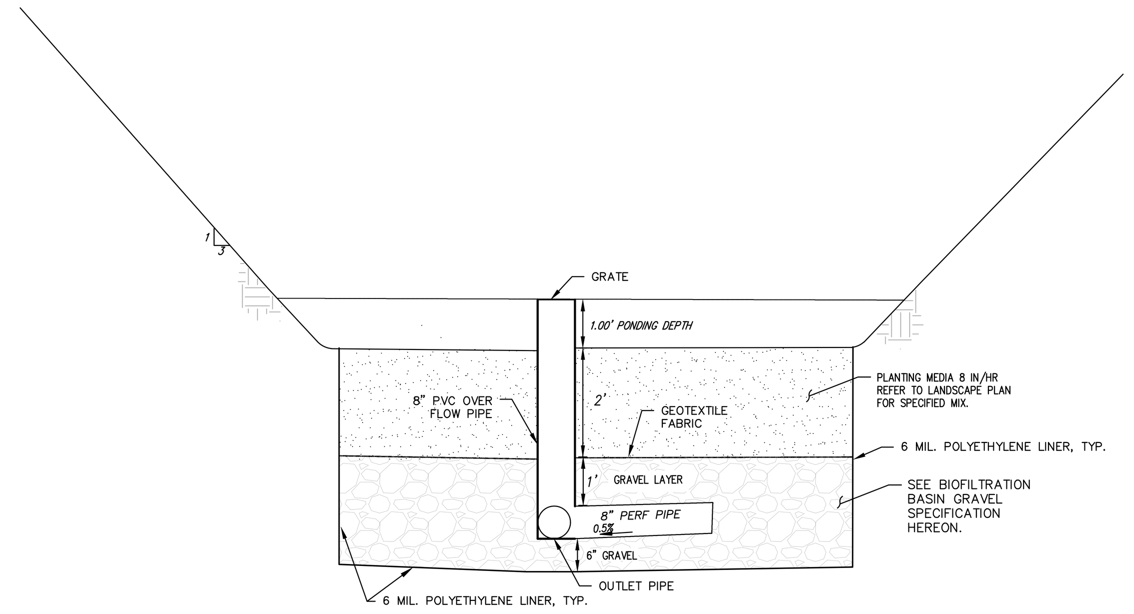
TYPICAL SECTION
NOT TO SCALE







BIOFILTRATION BASIN 200A
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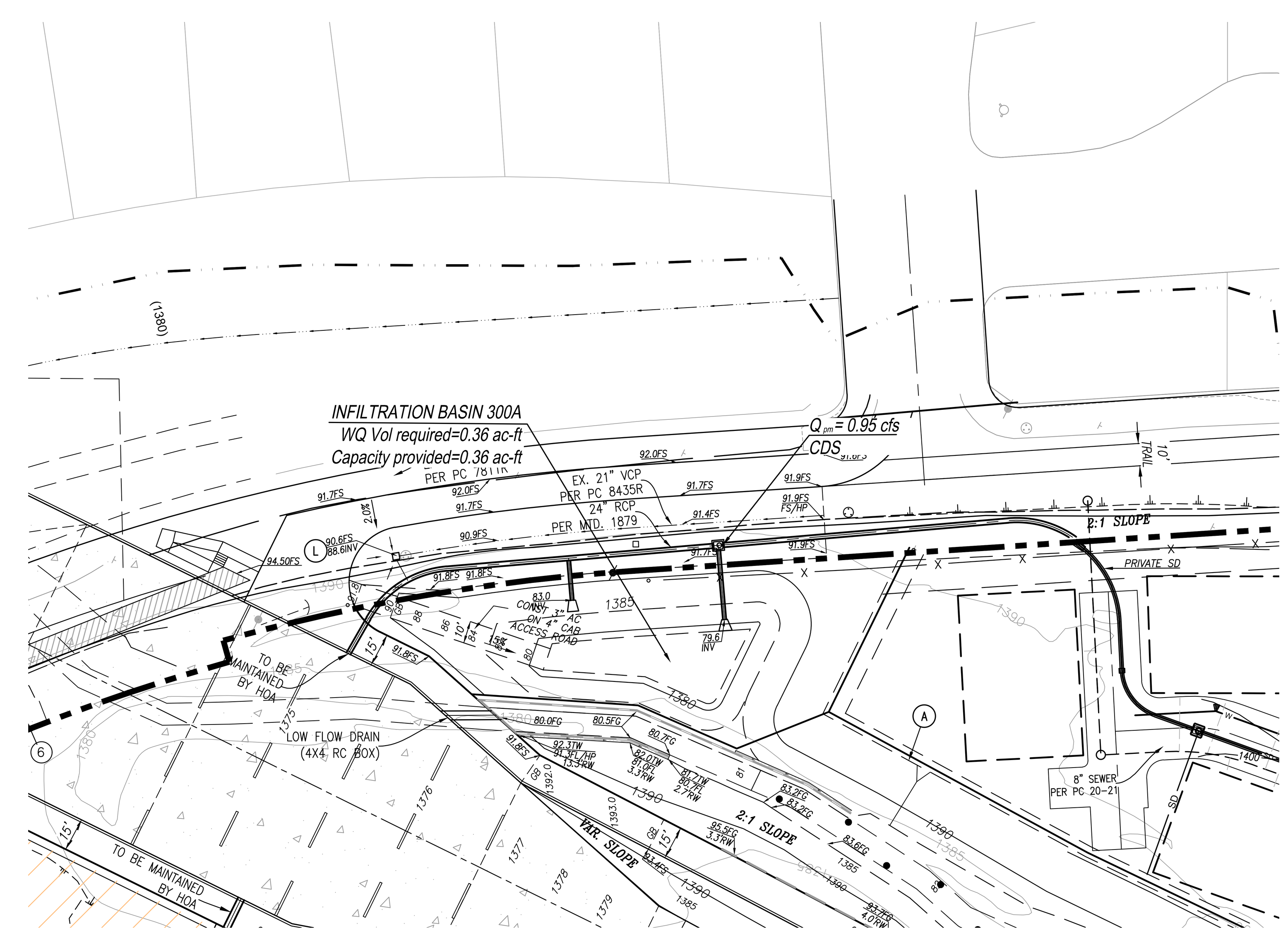

USMP EXHIBIT
TENTATIVE TRACT NO. 82126
IN THE CITY OF SANTA CLARITA

NORTH	PREPARED FOR: INTEGRAL PARTNERS FUNDING, LLC 888 SAN CLEMENTE DRIVE, SUITE 100 NEWPORT BEACH, CA 92660	PREPARED BY: SIKAND Engineering | Planning | Surveying 15230 Burbank Blvd. #100, Van Nuys, CA 91411 Phone: (818) 787-8550, Fax: (818) 901-7451 www.sikand.com, E-mail: info@sikand.com	REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2022 CIVIL STATE OF CALIFORNIA	SHEET 1 OF 1 SHEETS
SCALE: 1"=100'	DATE: 8/6/2021	W.O. NO.: 5117-006-02		