

APPENDIX C-1  
INITIAL STUDY BIOLOGICAL ASSESSMENT REPORT FOR  
PACIFIC ROCK—LU10-0003 (CUP 3817-3), MODIFICATION

# Initial Study Biological Assessment

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## Cover Page

**Original ISBA report date:** January 15, 2010

**Revision report date(s):** February 16, 2017

**Case number** (to be entered by Planning Div.): LU10-0003

**Permit type:** Conditional Use Permit

**Applicant:** Pacific Rock, Inc.

**Case Planner** (to be entered by Planning Div.): Ebony McGee-Andersen


**Total parcel(s) size:** 718.11 acres

**Assessor Parcel Number(s):** 234-0-060-22 and 234-0-060-19

**Development proposal description:** Modification of existing Conditional Use Permit and the approval of an amended Reclamation Plan to authorize mining expansion area. Mining would occur over an approximate 172.8-acre area with a maximum depth of 180 feet.

### Prepared for Ventura County Planning Division by:

As a Qualified Biologist, approved by the Ventura County Planning Division, I hereby certify that this Initial Study Biological Assessment was prepared according to the Planning Division's requirements and that the statements furnished in the report and associated maps are true and correct to the best of my knowledge.

<b>Qualified Biologist (signature):</b>		Date: 2/16/17
		
Name (printed): Matt Schaap	Title: Biologist	Company: BioResource Consultants Inc.
Phone: 831.710.7687	email: matt@biorc.com	
<b>Other Biologist (signature):</b>		Date: 2/16/17
		
Name (printed): Sarah Termond	Title: Biologist	Company: BioResource Consultants Inc.
Phone: 805.794.7324	email: sarah@biorc.com	
Role: Biologist conducted field work, mapped data, assisted in the report writing.		

## Initial Study Checklist

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This Biological Assessment DID NOT provide adequate information to make CEQA findings regarding potentially significant impacts or to develop mitigation measures necessary to mitigate potentially significant project and cumulative impacts.

Additional biology-related information, studies, or outside agency permits needed to make CEQA findings, develop mitigation measures, or to satisfy other regulatory agencies will be required.

Per consultation with Ventura County (W. Wilkinson, personal communication, Feb. 9, 2017), focused studies to be conducted in order to provide information for CEQA will include:

- Focused Botanical Surveys for all species with High Potential (see Observed and Potentially Occurring Special-Status Species Table) during appropriate bloom periods in the spring of 2017.
  - Update/Amendment to the Jurisdictional Wetland Delineation in the spring of 2017.
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## Summary

The Project site is located within the westernmost Santa Monica Mountains and contains native and non-native vegetation types. Non-native vegetation is of a ruderal character and is directly associated with the existing mining operation. Native plant communities are primarily undisturbed except for portions of the chaparral and coastal sage scrub which have undergone past grading disturbances and through which a small number of unpaved access roads are routed.

On-site vegetation communities support habitat for five special-status species that were observed within the Survey Area (SA1) conducted by BioResource Consultants, Inc. (BRC) in 2016: southern California black walnut (*Juglans californica*), coastal whiptail (*Aspidoscelis tigris stejnegeri*), loggerhead shrike (*Lanius ludovicianus*), sharp-shinned hawk (*Accipiter striatus*), and San Diego desert woodrat (*Neotoma lepida intermedia*). Previous studies conducted within the SA1 in 2010 identified populations of Blochman's dudleya (*Dudleya blochmaniae* ssp. *blochmaniae*), Conejo dudleya (*Dudleya parva*), Verity's dudleya (*Dudleya verity*), Conejo buckwheat (*Eriogonum crocatum*), and an individual yellow warbler (*Setophaga petechia*).

Although not observed on-site during BRC's survey, suitable habitat is available for an additional 17 special-status species: Catalina mariposa-lily (*Calochortus catalinae*), Plummer's mariposa-lily (*Calochortus plummerae*), Blochman's dudleya, Conejo dudleya, Verity's dudleya, Conejo buckwheat, Ojai navarretia (*Navarretia ojaiensis*), Lyon's pentachaeta (*Pentachaeta lyonii*), woven-spored lichen (*Texosporium sancti-jacobi*), Crotch bumble bee (*Bombus crotchii*), Santa Monica grasshopper (*Trimerotropis occidentiloides*), western pond turtle (*Emys marmorata*), golden eagle (*Aquila chrysaetos*), burrowing owl (*Athene cunicularia*), coastal California gnatcatcher (*Polioptila californica californica*), yellow warbler, and least Bell's vireo (*Vireo bellii pusillus*).

SA1 also provides suitable habitat for nesting birds protected by the California Department of Fish and Wildlife (CDFW) and the Migratory Bird Treaty Act (MBTA). Project implementation may impact nesting birds due to crushing, trampling, or removal of vegetation, which could result in the mortality of nesting birds or their eggs and/or young. In addition, indirect impacts to nesting birds could occur due to elevated noise levels and vibrations associated with construction equipment, which could result in nesting birds abandoning their nests, eggs, or young. Potential impacts to protected nesting birds are considered less than significant.

Fifteen southern California black walnut trees (two adults and 13 saplings) fall within the Project Construction Footprint and will likely need to be removed. Due to their size and maturity, these trees are not seen as significant to the local habitat community, and therefore merit implementing a 1:1 mitigation measure to remove the trees and plant replacements in an unaffected area of the parcel. Thirteen coast live oak trees (*Quercus agrifolia*) are located within SA1, with three 'heritage' individuals falling within the Construction Footprint. Consultation with the county Planning Division and an arborist report will likely be required to address the removal of these protected trees.

Twenty-four water features (W1-W24) were identified within SA1 during the 2016 survey. All drainages encountered within SA1 deliver ephemeral or intermittent surface flows (W1-W23); have a defined bed and bank, and at some points are culverted; and generally flow westward and southwestward until they are ultimately impounded in a man-made detention basin (W24) forming a perennial lacustrine system (a limnetic and littoral-emergent wetland). All features except W6, W11, W18, W19, and W24 are expected to be impacted as a result of the Project.

The Project is located within the Santa Monica–Sierra Madre Connection (Connection), one of the few coastal-to-inland connections remaining in the South Coast Ecoregion. The Connection stretches from the rugged Santa Monica Mountains at the coast inward to the jagged peaks of the Santa Susana Mountains and the Sierra Madre Ranges of the Los Padres National Forest. Within SA1, the Connection is characterized as a corridor connecting the Santa Monica Mountains to Conejo Mountain. The expansion of the quarry will narrow the corridor connecting the Santa Monica Mountains to Conejo Mountain, but may not be determined to be significant being that the wildlife movement through the area will not be impeded.

Eight vegetation communities within the SA1 were recognized as locally important communities. These communities include Laurel Sumac Scrub, California Sagebrush Scrub, Deerweed Scrub, Giant Wild Rye Grasslands, Red Willow Thicket, Mountain Mahogany Scrub, and Disturbed Chamise/Ceanothus Chaparral and Coast Live Oak Woodland. These communities were determined to be locally important due to a combination of habitat suitability, limited range, and proximity of known occurrences to several listed species of which include: Verity's dudleya, Conejo buckwheat, Plummer's mariposa lily, Catalina mariposa lily, Least Bell's Vireo, coastal California Gnatcatcher, and Yellow Warbler. Red Willow Thicket and Coast Live Oak Woodland are the only two locally important communities that would not be impacted by Project activities. Additionally, SA1 supports moderate to high quality habitat for four recognized locally important species determined to have high potential to occur on the Project site including: Plummer's mariposa lily, Conejo dudleya, Verity's dudleya, and Conejo buckwheat.

## Section 1: Construction Footprint Description

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*Construction Footprint Definition (per the Ventura County Planning Division): The construction footprint includes the proposed maximum limits of temporary or permanent direct land or vegetation disturbance for a project including such things as the building pad(s), roads/road improvements, grading, septic systems, wells, drainage improvements, fire hazard brush clearance area(s), tennis courts, pools/spas, landscaping, storage/stockpile areas, construction staging areas, fire department turnarounds, utility trenching and other grading areas. The construction footprint on some types of projects, such as mining, oil and gas exploration or agricultural operations, may be quite different than the above.*

### **Development Proposal Description:**

#### **Mining Operations**

The Applicant requests a modification to the existing Conditional Use Permit (CUP) and the approval of an amended Reclamation Plan to authorize the extraction (mining) of approximately 13.2 million tons of construction aggregate and the reclamation of the mined lands (i.e. the areas disturbed by mining activities).

The requested CUP modification would authorize a maximum production limit of 468,000 tons per year. Total material production from the site is estimated to be 13.2 million tons (19.8 million cubic yards). Operations would occur Monday through Saturday between the hours of 7:00 am to 4:00 pm. Mining would occur over an approximate 172.8-acre area with a maximum depth of 180 feet.

Mining operations will continue in generally the same manner as they have since the early 1900s. The mining area is being expanded to the east to correct the existing "over steepened" slope conditions at the northerly and northeasterly sided of the quarry and for expansion onto recently acquired adjacent land. The mining methods will include blasting to loosen the hard rock material and various processing methods.

At the proposed maximum mining rate of 468,000 tons per year, mining the 13.2 million tons of material would require approximately 28 years (i.e. to the year 2045). The maximum production limit is not expected to be achieved for each of the 28 years; hence the Applicant is proposing a 30-year mining permit and is proposing the end of mine life to be December 31, 2050, which includes an additional five years for reclamation and monitoring.

#### **End Use**

The mine site would be reclaimed to Agricultural Open Space, including an agricultural grazing area. The final reclaimed surface would be characterized by a near-level quarry floor with an adjacent excavated slope. The slope would be a maximum of 1:1 (h:v) overall gradient with intervening 50-foot wide benches placed every 50 feet of elevation. The bench surfaces would be re-vegetated with native

species compatible with the surrounding area and the floor would be vegetated with an agricultural barley crop to support grazing cattle. Site drainage would be directed to sedimentation basins to minimize the offsite transport of eroded material while the vegetation is established.

**Construction Footprint Size**

172.8 acres (Entirely within APN 234006022 and 234006019)

**Project Design for Impact Avoidance or Minimization**

None

**Coastal Zone/Overlay Zones**

The Construction Footprint is located outside of the Coastal Zone. No overlay zones were depicted in the Ventura County zoning website for APN 234006022 or 234006019.

**Zoning**

APN 234006022 – Agricultural Exclusive Zone – 40 acres.

APN 234006019 – Open Space – 160 acres.

**Elevation**

180 – 1,248 feet above mean sea level (amsl).

**Other**

An SCE power line easement runs adjacent to the eastern edge of the site.

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## **Section 2: Survey Area Description and Methodology**

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### **2.1 Survey Purpose**

Discretionary actions undertaken by public agencies are required to demonstrate compliance with the California Environmental Quality Act (CEQA). The purpose of this Initial Study Biological Assessment (ISBA) is to gather enough information about the biological resources associated with the proposed project, and their potential to be impacted by the project, to make a CEQA Initial Study significance finding for biological resources. In general, ISBA's are intended to:

- Provide an inventory of the biological resources on a project site and the values of those resources.
- Determine if a proposed project has the potential to impact any significant biological resources.
- Recommend project redesign to avoid, minimize or reduce impacts to significant biological resources.
- Recommend additional studies necessary to adequately assess potential impacts and/or to develop adequate mitigation measures.
- Develop mitigation measures, when necessary, in cases where adequate information is available.

### **2.2 Survey Area Description**

*Survey Area Definition (per the Ventura County Planning Division): The physical area a biologist evaluates as part of a biological assessment. This includes all areas that could potentially be subject to direct or indirect impacts from the project, including, but not limited to: the construction footprint; areas that would be subject to noise, light, dust or runoff generated by the project; any required buffer areas (e.g., buffers surrounding wetland habitat). The construction*

*footprint plus a 100 to 300-foot buffer—beyond the required fire hazard brush clearance boundary—(or 20-foot from the cut/fill boundary or road fire hazard brush clearance boundary – whichever is greater) is generally the size of a survey area. Required off-site improvements—such as roads or fire hazard brush clearance—are included in the survey area. Survey areas can extend off the project’s parcel(s) because indirect impacts may cross property lines. The extent of the survey area shall be determined by the biologist in consultation with the lead agency.*

SA1 is associated with the existing Pacific Rock Quarry and adjacent areas at 1000 Howard Road, Camarillo, CA 93012 (APN 234006022, 234006019, 234008079, 234008038, and 234006012), within unincorporated Ventura County on the *Piru* USGS 7.5-minute quadrangle.

## **Survey Area 1 (SA1)**

### **Location**

SA1 is located to the southwest of the city of Camarillo, approximately 1.5 miles southwest of Highway 101, and is bordered by Conejo Mountain Memorial Park to the west. SA1 extends approximately 1,200 feet northward and eastward from the existing boundary of the quarry and approximately 700 feet southward from the southern boundary of the quarry.

### **Survey Area Environmental Setting**

SA1 ranges in elevation from approximately 180 to 1,248 feet above mean sea level (amsl). In general, the topography of the quarry is generally flat within the existing mining area. Within the remainder of SA1, steep slopes are found just outside the existing quarry, notably to the north, inhibiting safe foot access. These areas are referred to as Inaccessible Areas (See Site and Survey Area Map). Habitat within this area was assessed with binoculars and aerial photographs. A large portion of SA1 is considered disturbed due to previous and current mining activities as well as the 2013 Springs Fire that burned much of the surrounding area. The majority of the surrounding habitat is dominated by chaparral, and coastal sage scrub vegetation communities. Multiple ephemeral drainages exist within SA1; these drainages flow into a detention basin located on the western side of the property.

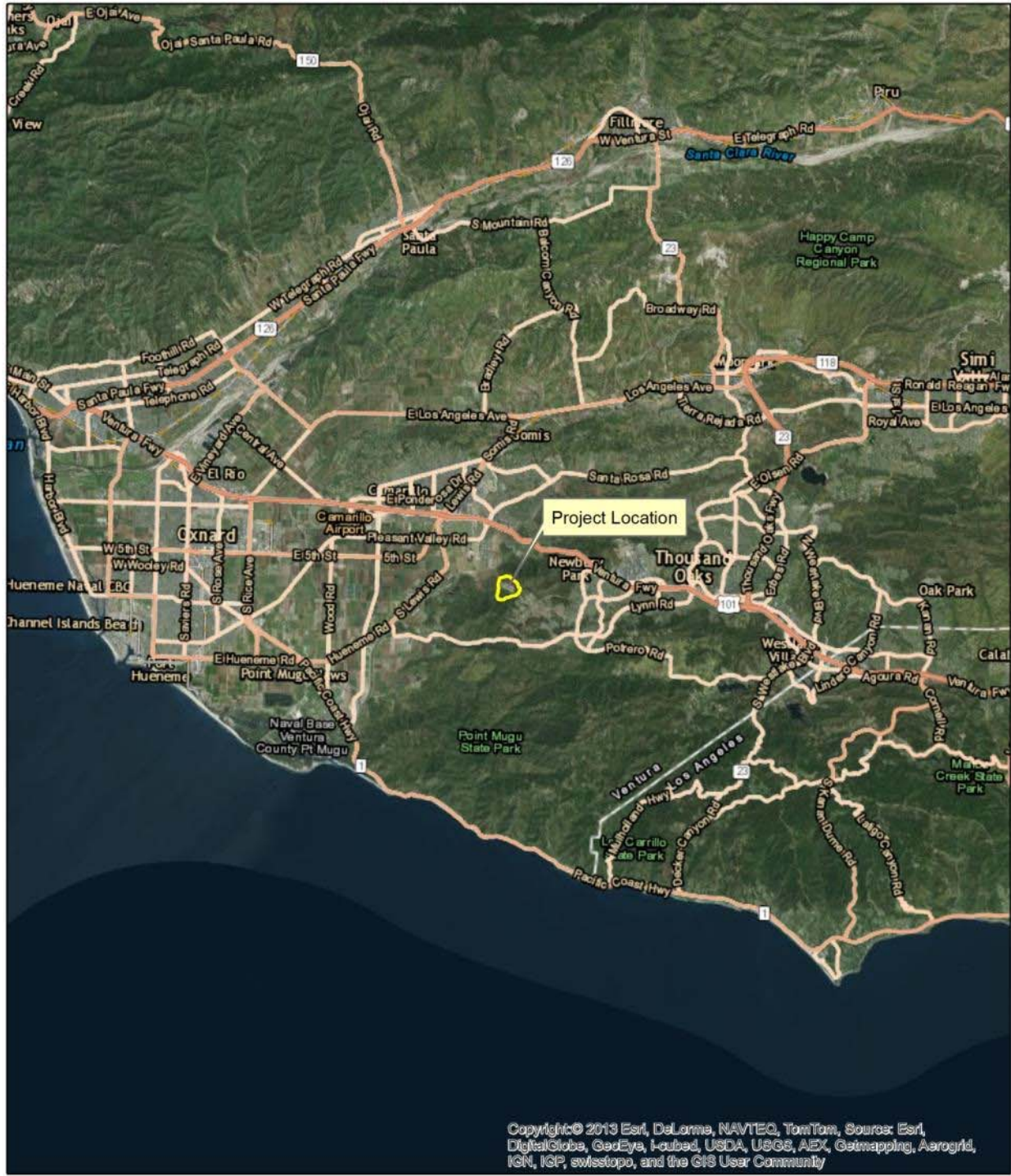
### **Surrounding Area Environmental Setting**

Land uses within and surrounding the SA1 include the existing Pacific Rock Mine quarry, located at the center of the Project site; agricultural lands and the Conejo Mountain Cemetery to the west; residential lands to the southeast; and open space to the north, south, and northeast. Undeveloped lands are composed of natural habitats like those found on site in these open space areas.

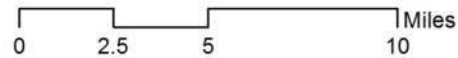
### **Cover**

50.3%	Native vegetation
9.2%	Non-native vegetation
50.3%	Recently burned
7.4%	Agricultural/grazing
31%	Bare ground/cleared/graded
0.6%	Buildings, paved roads, and other impervious cover
1.5%	Open water

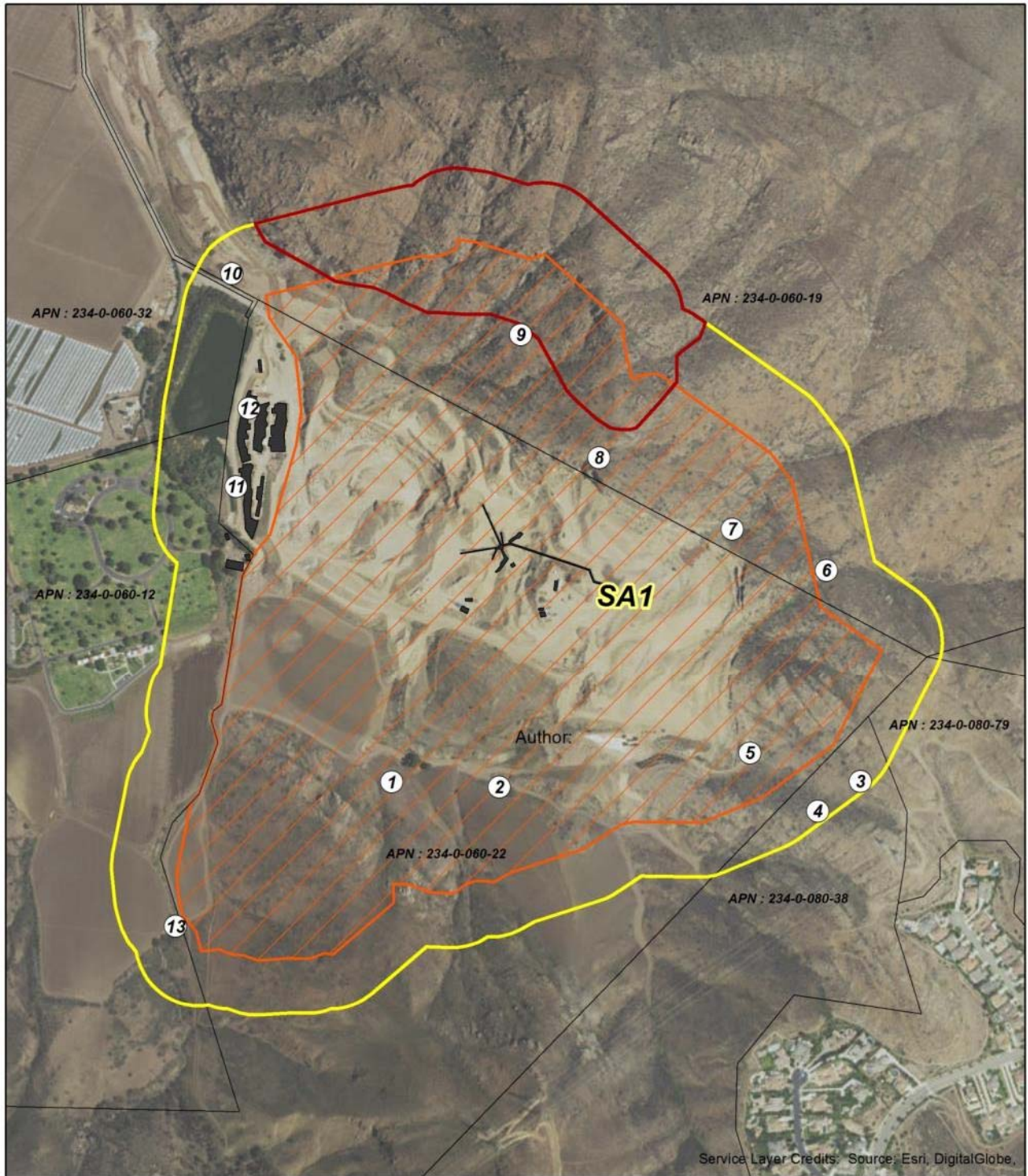




 Project Location



Project Vicinity Map



- SA1
- Existing Structures
- Inaccessible Areas
- Construction Footprint
- Photo Points (Photo Number)
- Ventura County Parcels



**Site and Survey Area Map**

## 2.3 Methodology

### References

- Aquatic Consulting Services, Inc. January 2010. Preliminary Biological Assessment of the Pacific Rock, Inc. Mining Expansion Area. Prepared for Sespe Consulting, Ventura, California.
- Aquatic Consulting Services, Inc. 1995. Appendix 3. Plant Species Observed within the Lease Boundaries during the December 1994 and May 1995 Field Surveys. Prepared for Sespe Consulting, Ventura, California.
- Baldwin, B.G. et al. [eds]. 2012. The Jepson Manual: Vascular Plants of California: Second Edition. University of California Press. Berkeley and Los Angeles, California.
- Calflora. 2016. The Calflora Database [a non-profit organization]. Berkeley, California. Available online: <http://www.calflora.org/>. Accessed November, 2016).
- [CNDDDB] California Natural Diversity Database. 2016. BIOS [Internet]/ California Department of Fish and Wildlife [v5.47.21].
- CNDDDB. 2016. Rarefind 5 [Internet]. California Department of Fish and Wildlife [v5.2.7].
- [CNPS] California Native Plant Society. 2016. Inventory of Rare and Endangered Plants (online edition, v8-02). CNPS. Sacramento, California. <http://www.cnps.org/inventory>. Accessed September 2016.
- Impact Sciences, Inc. August 2010. Initial Study Biological Assessment Report of the Pacific Rock, Inc. Mining Expansion Area. Prepared for Sespe Consulting. Ventura, California.
- Sawyer, J., T. Keeler-Wolf, and J. Evens. 2009. A Manual of California Vegetation, Second Edition. California Native Plant Society. Sacramento, California.
- South Coast Wildlands. 2008. South Coast Missing Linkages: A Wildland Network for the South Coast Ecoregion. Regional Report. March.
- [VCPD] Ventura County Planning Division. 2016. GIS Biology Map Packet; Regional Wildlife Corridor and Waterbodies Buffered. Ventura, California.
- VCPD. 2014. Ventura County Locally Important Species. Ventura, California.

BRC performed a site visit to map the vegetation; assess the habitat suitability for potential special-status species and wildlife movement; map any sensitive biological resources encountered on-site; and, record observations of plant and wildlife species.

**Survey Details Table**

Survey Date & Details							
Survey Key	Survey Date	Survey Area Map Key(s)*	Survey Type	Time Period	Methods/Constraints	GPS	Surveyors
SD1	12/5/1994	Unknown	ISBA	7:00am - 5:00pm	Surveys consisted of walking the disturbed and undisturbed areas within the initial lease boundary as well as areas adjacent to the east and south of the initial site. Animal and plant species observed were recorded.	Unknown	Aquatic Consulting Services
SD2	5/19/1995	Unknown	ISBA	7:00am - 5:00pm	Surveys consisted of walking the disturbed and undisturbed areas within the initial lease boundary as well as areas adjacent to the east and south of the initial site. Animal and plant species observed were recorded.	Unknown	Aquatic Consulting Services
SD3	12/30/09	SA1	ISBA	Unknown	Surveys conducted to evaluate the existing on-site habitat, flora, fauna, and hydrologic features within the proposed expansion	Unknown	Aquatic Consulting Services; Louis A. Courtois
SD4	1/5/2010	SA1	ISBA	Unknown	Surveys conducted evaluate the existing on-site habitat, flora, fauna, and hydrologic features within the proposed expansion	Unknown	Aquatic Consulting Services; Louis A. Courtois
SD5	5/3/2010	SA1	ISBA	8:00 am - 1:00 pm	A walking reconnaissance survey of the site to review habitat types and determine placement of trap lines for mammals and habitat areas in which special-status plant species focused surveys would be appropriate.	N/A	Joe Decruyenaere
SD6	5/3/2010	SA1	Wetlands	8:00 am - 12:30 pm	Walking site. Approximately 90 percent of the drainages and wetland features were accessible; approximately 10 percent of the drainages areas were mapped using aerial imagery and custom topography.	N/A	R.C. Brody
SD7	5/11/2010	SA1	Botanical	9:00 am - 10:30 am	All accessible habitats were investigated for general plant species, and accessible rocky habitats were investigated in depth for quantitative mapping of special-status Blochman's dudleya and Conejo buckwheat.	Trimble Geo XH sub-meter	Joe Decruyenaere

Survey Date & Details							
Survey Key	Survey Date	Survey Area Map Key(s)*	Survey Type	Time Period	Methods/Constraints	GPS	Surveyors
SD8	5/19/2010	SA1	Botanical	9:00 am - 10:30 am	All accessible habitats were investigated for general plant species, and accessible rocky habitats were investigated in depth for quantitative mapping of special-status Blochman's dudleya and Conejo buckwheat.	Trimble Geo XH sub-meter	Joe Decruyenaere
SD9	05/03/2010	SA1	LBV/CAGN Surveys	8:30 am - 11:05 pm	Conducted protocol surveys for least Bell's vireo and coastal California gnatcatcher	Unknown	Thomas Ryan
SD10	5/4/2010	SA1	Mammal trapping	7:00 pm - 8:00 pm	Initial trapping set-up and baiting. 30 traps were used, placed to sample coastal sage scrub, chaparral, and disturbed areas, both upland and near riparian vegetation south of the agricultural field. Traps were placed in SA1 (3 traps in ruderal vegetation), SA2 (13 traps in ruderal and coastal sage scrub vegetation), SA3 (4 traps in disturbed coastal sage scrub vegetation), and SA4 (10 traps in coastal sage scrub and chaparral vegetation).	Unknown	Joe Decruyenaere; R.C. Brody
SD11	5/5/2010	SA1	Mammal trapping	6:00 am - 8:00 am	Recordation and release of captured animals	Unknown	Joe Decruyenaere; R.C. Brody
SD12	5/5/2010	SA1	Mammal trapping	7:00 pm - 8:00 pm	Trap set-up and baiting	Unknown	Joe Decruyenaere
SD13	5/6/2010	SA1	Mammal trapping	6:00 am - 8:00 am	Recordation and release of captured animals	Unknown	Joe Decruyenaere; R.C. Brody
SD14	5/6/2010	SA1	Mammal trapping	7:00 pm - 8:00 pm	Trap set-up and baiting	Unknown	Joe Decruyenaere
SD15	5/7/2010	SA1	Mammal trapping	6:00 am - 8:00 am	Recordation and release of captured animals	Unknown	Joe Decruyenaere; R.C. Brody
SD16	05/13/2010	SA1	LBV/CAGN Surveys	8:42 am - 10:15 pm	Conducted protocol surveys for least Bell's vireo and coastal California gnatcatcher	Unknown	Thomas Ryan
SD17	05/24/2010	SA1	LBV/CAGN Surveys	8:15 am - 9:48 pm	Conducted protocol surveys for least Bell's vireo and coastal California gnatcatcher	Unknown	Thomas Ryan
SD18	5/25/2010	SA1	Mammal trapping	6:30 pm - 8:00 pm	Trap set-up and baiting	Unknown	Joe Decruyenaere
SD19	5/26/2010	SA1	Mammal trapping	6:00 am - 8:00 am	Recordation and release of captured animals	Unknown	Joe Decruyenaere; R.C. Brody

Survey Date & Details							
Survey Key	Survey Date	Survey Area Map Key(s)*	Survey Type	Time Period	Methods/Constraints	GPS	Surveyors
SD20	5/26/2010	SA1	Mammal trapping	6:30 pm - 8:00 pm	Trap set-up and baiting	Unknown	Joe Decruyenaere
SD21	5/27/2010	SA1	Mammal trapping	6:00 am - 8:00 am	Recordation and release of captured animals	Unknown	Joe Decruyenaere; R.C. Brody
SD22	5/27/2010	SA1	Mammal trapping	6:30 pm - 8:00 pm	Trap set-up and baiting	Unknown	Joe Decruyenaere
SD23	5/28/2010	SA1	Mammal trapping	6:00 am - 8:00 am	Recordation and release of captured animals	Unknown	Joe Decruyenaere; R.C. Brody
SD24	06/05/2010	SA1	LBV/CAGN Surveys	7:03 am - 9:10 am	Conducted protocol surveys for least Bell's vireo and coastal California gnatcatcher	Unknown	Thomas Ryan
SD25	06/16/2010	SA1	LBV/CAGN Surveys	8:36 am - 10:00 am	Conducted protocol surveys for least Bell's vireo and coastal California gnatcatcher	Unknown	Thomas Ryan
SD26	06/26/2010	SA1	LBV/CAGN Surveys	9:18 am - 10:25 am	Conducted protocol surveys for least Bell's vireo and coastal California gnatcatcher	Unknown	Thomas Ryan
SD27	6/29/2010	SA1	Mammal trapping	6:00 pm - 8:00 pm	Trap set-up and baiting	Unknown	Joe Decruyenaere
SD28	6/30/2010	SA1	Mammal trapping	6:00 am - 8:00 am	Recordation and release of captured animals	Unknown	Joe Decruyenaere; Ty Garrison
SD29	6/30/2010	SA1	Mammal trapping	6:00 pm - 8:00 pm	Trap set-up and baiting	Unknown	Joe Decruyenaere
SD30	7/1/2010	SA1	Mammal trapping	6:00 am - 8:00 am	Recordation and release of captured animals	Unknown	Joe Decruyenaere; Ty Garrison
SD31	07/07/2010	SA1,	LBV/CAGN Surveys	9:00 am - 9:40 am	Conducted protocol surveys for least Bell's vireo and coastal California gnatcatcher	Unknown	Thomas Ryan
SD32	07/21/2010	SA1	LBV/CAGN Surveys	5:50 am - 6:28 pm	Conducted protocol surveys for least Bell's vireo and coastal California gnatcatcher	Unknown	Thomas Ryan
SD33	11/04/2016	SA1*	ISBA	8:30 am - 4:30 pm	Surveys consisted of walking undisturbed areas within the revised Construction Footprint and 300-ft. buffer (SA1). Animal and plant species observed were recorded.	Digiland DL721-RB	Matt Schaap, Sarah Termond

\* SA1 adjusted in 2016 to reflect proposed change in Construction Footprint. From this point on in the document, SA1 refers to revised Survey Area for 2016.

ISBA .....Initial Study Biological Assessment  
 Botanical..... Botanical Survey  
 LBV/CAGN.....Least Bell's Vireo and California Gnatcatcher Protocol Survey  
 Mammal Trapping.....Mammal Trapping Surveys  
 Wetlands.....Jurisdictional Delineation of drainages and wetlands

## Section 3: The Biological Inventory

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See Appendix 1 for an overview of the types of biological resources that are protected in Ventura County.

### 3.1 Habitats: Plant Communities, Physical Features and Wetlands

#### Plant Communities

One CDFW sensitive plant communities and eight locally-important plant communities were found within SA1.

#### Major Plant Communities Summary

##### **PC1 - Laurel Sumac Scrub (*Malosma laurina* Alliance; S4, G4; Locally Important Community)**

In this community within SA1, laurel sumac (*Malosma laurina*) is the dominant species in the shrub canopy. Associated species include chaparral yucca (*Hesperoyucca whipplei*), sugar bush (*Rhus ovata*), and red-topped buckwheat (*Eriogonum fasciculatum* var. *foliolosum*). A sparse-to-grassy herbaceous understory of intermittent non-native grasses is present. Within SA1, this community ranges from open/intermittent to moderately-dense cover because of the 2013 Springs Fire. This community was found to be the predominant vegetation type within SA1 with shrubs located on moderate to steep slopes of variable aspect. It occurs at elevations ranging from 5 to 400 meters amsl (Sawyer et al. 2009). This shrubland alliance is not considered to be unique habitat within Ventura County; however, this community was determined to be considered locally important because special-status species with limited range including state rare Conejo buckwheat (*Eriogonum crocatum*) and federally threatened Verity's dudleya (*Dudleya verityi*), have been previously recorded to occupy this community within SA1 (See Special-Status Plant Species Map). Additionally, this alliance does support wildlife connectivity outside of the SA1.

##### **PC2 - California Sagebrush Scrub (*Artemisia californica* Alliance; S5, G5; Locally Important Community)**

In this community within SA1, California sagebrush (*Artemisia californica*) is the dominant species in the shrub canopy, with occurrences of black sage (*Salvia mellifera*) and deerweed (*Acmispon glaber*). A sparse herbaceous understory of intermittent non-native grasses is present. Within SA1, this community was found to be intact with principally dried/dormant vegetation and is located on gentle slopes of variable aspect. It occurs at elevations ranging from 50 to 925 meters amsl (Sawyer et al. 2009). This shrubland alliance is not considered to be unique habitat within Ventura County; however, this community was determined to be considered locally important because special-status species with limited range including Conejo buckwheat and Verity's dudleya, have been previously recorded within similar habitat in the SA1. Additionally, this alliance does support habitat for the federally threatened coastal California Gnatcatcher (*Polioptila californica californica*) within SA1.

##### **PC3 - Deerweed Scrub (*Acmispon glaber* [form. *Lotus scoparius*] Alliance; S5, G5; Locally Important Community)**

In this community within SA1, deerweed is the dominant species in the shrub canopy with red-topped buckwheat and sparse occurrences of laurel sumac. A sparse herbaceous understory of intermittent non-native grasses is present. Within SA1, this community was found to be intermittent with principally dried/dormant vegetation and is located on gentle slopes of variable aspect with rocky outcroppings. It occurs at elevations ranging from 50 to 925 meters amsl (Sawyer et al. 2009). This shrubland alliance is not considered to be unique habitat within Ventura County; however this community was determined to be locally important due to its potential to support Catalina mariposa-lily (*Calochortus catalinae*) and Plummer's mariposa-lily (*Calochortus plummerae*), both CNPS 4.2 listed species. Additionally, this alliance does support foraging habitat for the coastal California Gnatcatcher and does support wildlife connectivity outside of the SA1.

**PC4 - Giant Wild Rye Grasslands (*Elymus condensatus* [form. *Leymus condensatus*] Alliance; S3, G3; Locally Important Community)**

In this community within SA1, giant wild rye (*Elymus condensatus*) is the dominant species in the herbaceous layer, with a sparse herbaceous understory of intermittent non-native grasses. This community was found on north facing slopes and in association with ephemeral drainages on the eastern portion of SA1. It occurs at elevations ranging from 0 to 1500 meters amsl (Sawyer et al. 2009). This shrubland alliance is not considered to be unique habitat within Ventura County; however this community was determined to be locally important due to its potential to support special-status plant species including Catalina mariposa-lily and Plummer's mariposa-lily. It should be noted that listed plant species including Conejo buckwheat and Verity's dudleya, were documented within this general area in 2010, but it is assumed these specific population locations were limited to rock outcroppings found within or adjacent to this community.

**PC5 - Cattail Marsh (*Typha latifolia* Alliance; S5, G5)**

In this community within SA1, broadleaf cattail (*Typha latifolia*) is the dominant species in the herbaceous layer, with occurrences of poison hemlock (*Conium maculatum*) and tule (*Schoenoplectus acutus* var. *occidentalis*). This community occurs adjacent to an annual spring and within the bed and bank of an intermittent drainage found in the south-central portion of SA1 as well as near the southwestern portion of the retention pond. It occurs at elevations ranging from 0 to 350 meters amsl (Sawyer et al. 2009).

**PC6 - Red Willow Thicket (*Salix laevigata* Alliance; S3, G3; CDFW Sensitive Community; Locally Important Community)**

In this community within SA1, red willow (*Salix laevigata*) is the dominant species in the tree canopy, with occurrences of broadleaf cattail and tule. The trees form a continuous canopy adjacent to a culverted drainage feeding into the retention pond. This community occurs at elevations ranging from 0 to 1700 meters amsl (Sawyer et al. 2009). CDFW considers this a sensitive community type synonymous with Southern Willow Scrub (CNDDDB, Holland 1986). This woodland alliance is considered a unique habitat within Ventura County and is considered a locally-important community yellow warbler (*Setophaga petechial*), a CDFW Species of Special Concern, was observed previously nesting within it. Additionally, federally and state endangered least Bell's vireo (*Vireo bellii pusillus*), which has been recorded within one mile of the Project site and has the potential to occur within SA1 (CNDDDB, eBird 2016), may utilize this community for nesting. This alliance supports wildlife connectivity outside of the parcel boundary.

**PC7 – Mountain Mahogany Scrub (*Cercocarpus betuloides* [form. *Cercocarpus montanus*] Alliance; S4, G5; Locally Important Community)**

In this community within SA1, birchleaf mountain mahogany (*Cercocarpus betuloides*) is the dominant species in the shrub layer with sparse occurrences of laurel sumac and an understory of intermittent non-native grasses. This community was found in the eastern portion of SA1 in association with an ephemeral drainage. It occurs at elevations ranging from 100 to 2400 meters amsl (Sawyer et al. 2009). This shrubland alliance is not considered to be unique habitat within Ventura County; however this community was determined to be locally important due to its potential to support special-status plant species including Catalina mariposa-lily and Plummer's mariposa-lily. Additionally, this alliance does support foraging habitat for the coastal California Gnatcatcher. It should be noted that special-status plant species including Conejo buckwheat and Verity's dudleya, were documented within this general area in 2010, but it is assumed these specific population locations were limited to rock outcroppings found within or adjacent to the area.



**PC8 – Disturbed Chamise/Ceanothus Chaparral (*Adenostoma fasciculatum* Alliance; S5, G5; Locally Important Community)**

In this community within SA1, an open to sparse tree/shrub canopy of chamise (*Adenostoma fasciculatum*) and ceanothus (*Ceanothus* sp.) exists. Within SA1, this vegetation community was recently burned by the 2013 Springs Fire and was starting to show signs of regrowth at the time of BRC's 2016 survey. This community is found adjacent to rock outcroppings in the northeastern portion of SA1. It occurs at elevations ranging from 10 to 1800 meters amsl (Sawyer et al. 2009). This shrubland alliance is not considered to be unique habitat within Ventura County; however, this community was determined to be considered locally important because special-status species with limited range including Conejo buckwheat and Verity's dudleya, have been previously recorded within similar habitat in the SA1.

**PC9- Coast Live Oak Woodland – (*Quercus agrifolia* Woodland Alliance; S4, G5, County Locally Important Community)**

In this community within SA1, coast live oak trees form a continuous canopy with California sagebrush, saw-toothed goldenbush (*Hazardia squarrosa*), and features a mixed grassy understory with black sage. This community occurs at elevations ranging from 0 to 1200 meters amsl. The Ventura County Board of Supervisors has deemed oak woodlands to be a locally important community.

**PC 10 – Russian Thistle Fields**

This community is characterized by a dense cover of Russian thistle (*Salsola tragus*), a non-native invasive weed species. This community occurs in the southwestern corner of SA1 within a previously-cleared parcel that is adjacent to several agricultural fields.

**PC11- Non-Native Annual Grassland**

This community is characterized by a dense-to-sparse cover of annual grasses with germination at the onset of the late fall rains, and growth, flowering, and seed-set occurring from winter through spring. The plants are dead through the summer-to-fall dry season, persisting instead as seeds during that time. Species present include short-pod mustard (*Hirschfeldia incana*), mustard (*Brassica* sp.), ripgut brome (*Bromus diandrus*), yellow star thistle (*Centaurea melitensis*), and foxtail brome (*Bromus madritensis*). Populations of special-status plant species previously recorded in 2010 in these areas no longer exist and conditions are currently considered too disturbed to provide suitable habitat (See Special-Status Plant Species Map).

**PC12 – Agriculture**

Agriculture includes areas currently utilized for agricultural purposes. Within SA1, this predominantly includes strawberry and palm fields.

**PC13 – Undifferentiated Ornamental**

Undifferentiated Ornamental includes areas landscaped with non-native ornamental trees and shrubs. Within SA1, this community includes predominantly non-native tree species located within and on the border of the Conejo Mountain Cemetery, which is located directly east of the existing quarry. One coast live oak tree and several oak saplings were located within the community, immediately adjacent to a hedge of ornamental trees and shrubs on the quarry property.

**PC14 - Developed**

Developed includes areas currently developed with structures or roads. This includes existing paved areas and offices.

**PC15 – Previously Cleared Land**

Previously Cleared Land includes areas that were previously graded lands that are not vegetated. Within SA1, this area includes the current rock quarry and associated vehicle storage yards. Aerial views show these areas were cleared prior to 1989. Utilizing existing plant communities located adjacent to SA1 as a guide, it is likely these cleared areas were initially composed of intact coastal sage scrub and chaparral communities including Laurel Sumac Scrub and California Sagebrush Scrub.

Plant Communities								
Map Key	SVC Alliance	SVC Association	Misc.	Status	Condition	Acres Total	Acres Impacted	Comments
PC1	Laurel Sumac Scrub			LIC (S4,G4)	Overall Intact with portions recovering from 2013 burn	120.52	71.02	Impacted acreage falls within Construction Footprint.
PC2	California Sagebrush Scrub			LIC (S5,G5)	Intact	0.14	0.14	Impacted acreage falls within Construction Footprint.
PC3	Deerweed Scrub			LIC (S5,G5)	Intact	1.30	0	Vegetation community falls outside of Construction Footprint to the east.
PC4	Giant Wild Rye Grasslands			LIC (S3, G3)	Intact	2.04	1.50	Impacted acreage falls within Construction Footprint.
PC5	Cattail Marsh			(S5, G5)	Intact	0.32	0.19	Impacted acreage falls within Construction Footprint.
PC6	Red Willow Thicket			SC LIC (S3, G3)	Intact	2.01	0	Impacted acreage falls within Construction Footprint.
PC7	Mountain Mahogany Scrub			LIC (S4, G5)	Intact	0.23	0.23	Impacted acreage falls within Construction Footprint.
PC8	Disturbed Chamise/ Ceanothus Chaparral			LIC (S5, G5)	Burn	1.43	1.34	Impacted acreage falls within Construction Footprint.

Plant Communities								
PC9	Coast Live Oak Woodland			LIC (S4, G5)	Intact	1.52	0	No anticipated impacts, outside of Construction Footprint.
PC10			Russian Thistle Fields			2.93	1.52	Non-native, falls within Construction Footprint
PC11			Non-Native Annual Grassland			16.38	11.50	Non-native, falls within Construction Footprint
PC12			Agriculture			19	10.21	Within proposed Construction footprint
PC13			Ornamental			4.25	0.01	Within proposed Construction footprint
PC14			Developed			1.70	0.29	Existing structures and paved areas
PC15			Previously Cleared Land			79.90	69.03	Within Construction Footprint. Likely previously intact Laurel Sumac Scrub and California Sagebrush Scrub.
-			Detention Pond			3.75	0	-
Totals						257.40	166.98	
LIC.....Locally Important Plant Community SC.....CDFW Recognized Sensitive Community G1 or S1 .....Critically Imperiled Globally or Sub-nationally (state) G2 or S2 .....Imperiled Globally or Sub-nationally (state) G3 or S3 .....Vulnerable to extirpation or extinction Globally or Sub-nationally (state) G4 or S4.....Apparently Secure, uncommon but not rare (state) G5 or S5.....Secure, common, widespread and abundant (state)								

### Physical Features

Physical Features		
Map Key	Physical Feature	Comments
PF1 (a,b,c,d)	Volcanic rock outcrop	The north, east, and south central portions of SA1 comprise large sections of volcanic rock outcrops. These areas provide habitat for special status species, including <i>Dudleya blochmaniae</i> ssp. <i>blochmaniae</i> (Blochman’s dudleya, CNPS List 1B.1), <i>Eriogonum crocatum</i> (Conejo buckwheat, California Rare; CNPS List 1B.2).
PF2	Cliff face	Large cliff face that provides habitat for roosting bats and nesting birds.
PF3	Cliff face	Large cliff face that provides habitat for roosting bats and nesting birds.
PF4	Cliff face	Large cliff face that provides habitat for roosting bats and nesting birds.

## **Waters and Wetlands**

*See Appendix 1 for an overview of the local, state and federal regulations protecting waters, wetlands and riparian habitats. Wetlands are complex systems; delineating their specific boundaries, functions and values generally takes a level of effort beyond the scope of an Initial Study Biological Assessment (ISBA). The goal of the ISBA with regard to waters and wetlands is simply to identify whether they may exist or not and to determine the potential for impacts to them from the proposed project. This much information can be adequate for designing projects to avoid impacts to waters and wetlands. Additional studies are generally warranted to delineate specific wetland boundaries and to develop recommendations for impact minimization or impact mitigation measures.*

Waters and/or wetlands were found within SA1.

### **Waters and Wetlands Summary**

Twenty-four water features (W1-W24) were identified within SA1 during the 2016 survey. All drainages encountered with SA1 deliver ephemeral or intermittent surface flows (W1-W23); have a defined bed and bank and at some points are culverted; and generally flow westward and southwestward until they are ultimately impounded in a man-made detention basin (W24) to form a perennial lacustrine system (a limnetic and littoral-emergent wetland). These ephemeral and intermittent flows can serve as an indirect tributary to Conejo Creek (a WPD redline and regionally-important stream drainage for a substantial portion of southern Ventura County); however, surface flows generated from this site join Conejo Creek (via an off-site laurel sumac chaparral swale) only during noteworthy flood events when floodwaters are able to significantly breach the detention pond. As such, on-site drainages do not hold regional significance as they primarily drain onto the immediate property and their flows are contained on-site. A wetland delineation was conducted as part of original ISBA submission by Impact Sciences, Inc., in 2010; however, this delineation did not include the additional impact areas that were added to the revised Construction Footprint. Therefore, an updated formal wetland delineation should be conducted for the revised Project.

Eight natural ephemeral drainages (W1-W8) exist in the northwestern and north-central portions of SA1. W1 through W7 are tributaries to W8, which the existing mining operation has disconnected. W8 is culverted at C3, which feeds into the detention pond (W24). Seven natural ephemeral drainages (W9-W15) exist in the east-central portion of SA1. These features were also disconnected by the existing mining operation. The accumulation of sheet flow produced by these features is collected at the lowest point of the quarry and culverted at C2, which also feeds into the detention pond (W24).

In the southern central portion of SA1, an intermittent drainage with water present, potentially sourced from an annual spring was encountered (W17). This feature supports a small area of a persistent stand of emergent vegetation (PC-5 Cattail Marsh) within its bed and bank. Four ephemeral drainages (W18-W21) located in the southern portion of SA1 serve as tributaries to W17, which is disconnected by an agricultural field and culverted at C1. C1 connects these features to W23, a natural ephemeral drainage that borders agricultural fields to the south and eventually feeds into the detention pond (W24). An additional natural ephemeral drainage (W22) was identified in the southwestern portion of SA1 and appears to have been disconnected by the existing mining/agricultural operation. Currently, flows from W22 appear to either dissipate or to connect to W23 via sheet flow across the disturbed Russian Thistle Fields.

The man-made detention basin (W24) is located outside and along the western boundary of the property between the headquarters of the mining operation and Conejo Creek. This lacustrine feature is bounded by willow woodlands, supports a persistent stand of emergent vegetation (bulrush and cattail) throughout much of the entire littoral zone, and has no regular connection to any other downstream waters or wetlands. The detention basin is shared by neighbors as a water source for commercial operations.

**Waters and Wetlands Table**

<b>Waters and Wetlands</b>						
<b>Map Key</b>	<b>Wetland Type</b>	<b>Wetland Name (if any)</b>	<b>Wetland Status (if known)</b>	<b>Wetland Size</b>	<b>Hydrologic Status</b>	<b>Primary Water Source</b>
W1	Ephemeral drainage	Unnamed	CDFW	842 linear feet	Dry	Precipitation, natural runoff
W2	Ephemeral drainage	Unnamed	CDFW	1,228 linear feet	Dry	Precipitation, natural runoff
W3	Ephemeral drainage	Unnamed	CDFW	1,062 linear feet	Dry	Precipitation, natural runoff
W4	Ephemeral drainage	Unnamed	CDFW	552 linear feet	Dry	Precipitation, natural runoff
W5	Ephemeral drainage	Unnamed	CDFW	829 linear feet	Dry	Precipitation, natural runoff
W6	Ephemeral drainage	Unnamed	CDFW	308 linear feet	Dry	Precipitation, natural runoff
W7	Ephemeral drainage	Unnamed	CDFW	980 linear feet	Dry	Precipitation, natural runoff
W8	Ephemeral drainage	Unnamed	CDFW	988 linear feet	Dry	Precipitation, natural runoff. Features W1-W7 serve as tributaries to W8.
W9	Ephemeral drainage	Unnamed	CDFW	714 linear feet	Dry	Precipitation, natural runoff
W10	Ephemeral drainage	Unnamed	CDFW	910 linear feet	Dry	Precipitation, natural runoff
W11	Ephemeral drainage	Unnamed	CDFW	322 linear feet	Dry	Precipitation, natural runoff
W12	Ephemeral drainage	Unnamed	CDFW	681 linear feet	Dry	Precipitation, natural runoff
W13	Ephemeral drainage	Unnamed	CDFW	894 linear feet	Dry	Precipitation, natural runoff
W14	Ephemeral drainage	Unnamed	CDFW	212 linear feet	Dry	Precipitation, natural runoff
W15	Ephemeral drainage	Unnamed	CDFW	946 linear feet	Dry	Precipitation, natural runoff
W16	Ephemeral drainage	Unnamed	CDFW	555 linear feet	Dry	Precipitation, natural runoff
W17	Intermittent drainage	Unnamed	CDFW County	2046 linear feet	Ponded	Annual spring, precipitation, groundwater, natural and agricultural runoff. Features W18-W21 serve as tributaries to W17.
W18	Ephemeral drainage	Unnamed	CDFW	154 linear feet	Dry	Precipitation, natural runoff
W19	Ephemeral drainage	Unnamed	CDFW	292 linear feet	Dry	Precipitation, natural runoff
W20	Ephemeral drainage	Unnamed	CDFW	1,070 linear feet	Dry	Precipitation, natural runoff
W21	Ephemeral drainage	Unnamed	CDFW	796 linear feet	Dry	Precipitation, natural runoff
W22	Ephemeral drainage	Unnamed	CDFW	678 linear feet	Dry	Precipitation, natural runoff
W23	Ephemeral drainage	Unnamed	CDFW	2,405 linear feet	Dry	Precipitation, natural runoff

Waters and Wetlands						
W24	Detention Basin	Unnamed	CDFW, County	3.75 acres	Ponded	Precipitation, groundwater, natural and agricultural runoff. Artificially impounded
CDFW ..... California Department of Fish & Game regulated County ..... County General Plan protected wetland						

Waters and Wetlands (continued)			
Map Key	County Wetland Significance	Wetland Distance from Project	Comments
W1	Unknown	Within Construction Footprint and immediately adjacent	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W2	Unknown	Within Construction Footprint and immediately adjacent	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W3	Unknown	Within Construction Footprint and immediately adjacent	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W4	Unknown	Within Construction Footprint	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W5	Unknown	Within Construction Footprint and immediately adjacent	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W6	Unknown	Adjacent to Construction Footprint	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W7	Unknown	Within Construction Footprint and immediately adjacent	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W8	Unknown	Within Construction Footprint	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W9	Unknown	Within Construction Footprint	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W10	Unknown	Within Construction Footprint and immediately adjacent	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W11	Unknown	Adjacent to Construction Footprint	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W12	Unknown	Within Construction Footprint and immediately adjacent	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W13	Unknown	Within Construction Footprint and immediately adjacent	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W14	Unknown	Within Construction Footprint	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W15	Unknown	Within Construction Footprint and immediately adjacent	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W16	Unknown	Within Construction Footprint and immediately adjacent	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W17	Unknown	Within Construction Footprint and immediately adjacent	Intermittent drainage within moderately disturbed sumac scrub and contains a small section of cattail marsh habitat within bed and bank. Moderately disturbed with few invasive species.
W18	Unknown	Adjacent to Construction Footprint	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W19	Unknown	Adjacent to Construction Footprint	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W20	Unknown	Within Construction Footprint	Ephemeral drainage contains healthy, moderately disturbed

<b>Waters and Wetlands (continued)</b>			
		and immediately adjacent	chaparral and few invasive species.
W21	Unknown	Within Construction Footprint	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W22	Unknown	Within Construction Footprint	Ephemeral drainage contains healthy, moderately disturbed chaparral and few invasive species.
W23	Unknown	Immediately adjacent to Construction Footprint	Ephemeral drainage that runs through small section of oak woodland and then borders agricultural fields running in a northerly direction. Relatively disturbed in sections adjacent to agricultural fields. Contains numerous invasive species.
W24	Significant	Adjacent to Construction Footprint	The detention pond contains habitat for multiple federal, state, and CDFW listed species including least bell's vireo, yellow warbler, and western pond turtle. The feature is situated immediately adjacent to existing mining operations and captures all runoff from the facility. Consequently, this feature receives moderately high levels of continual disturbance.

<b>Water/Wetland Buffers</b>		
Map Key (1)	Recommended Buffer (2)	Comments
W24B1	100'	The feature provides suitable habitat for special-status wildlife species.



- |   |                                    |                          |
|---|------------------------------------|--------------------------|
| PC1 : Laurel Sumac Scrub                    | PC9 : Coast Live Oak Woodland      | SA1                      |
| PC2 : California Sagebrush Scrub            | PC10 : Russian Thistle Field       | ● Physical Feature       |
| PC3 : Deerweed Scrub                        | PC11 : Non-Native Annual Grassland | ▨ Construction Footprint |
| PC4 : Giant Wild Rye Grassland              | PC12 : Agriculture                 | ▭ Ventura County Parcels |
| PC5 : Cattail Marsh                         | PC13 : Ornamental                  | ▭ Pond                   |
| PC6 : Red Willow Thicket                    | PC14 : Developed                   |                          |
| PC7 : Mountain Mahogany Scrub               | PC15 : Previously Cleared Land     |                          |
| PC8 : Disturbed Chamise/Ceanothus Chaparral |                                    |                          |




0 250 500 1,000 Feet

**Plant Communities Map**





- |                    |                        |
|--------------------|------------------------|
| SA1                | Construction Footprint |
| Culvert            | Ventura County Parcels |
| Drainage Feature   | Pond                   |
| Culvert Connection | 100 Foot Pond Buffer   |

**Waters and Wetlands Map**

## 3.2 Species

### Observed Species

**Plants:** The vegetation on the slopes within SA1 consists primarily of chaparral vegetation and portions of coastal sage scrub with openings dominated by a combination of native and non-native grasses, as is expected following a fire. Characteristic species found within SA1 include laurel sumac, California sagebrush, giant wild rye, deerweed, black sage, coast prickly-pear (*Opuntia littoralis*), California buckwheat, ashy-leaf buckwheat (*Eriogonum cinereum*), and yucca. Understory vegetation within chaparral and coastal sage scrub communities on-site supports a variety of herbaceous annuals, perennials, and woody species, including poison-oak (*Toxicodendron diversilobum*), Pacific sanicle (*Sanicula crassicaulis*), California aster (*Corethrogyne filaginifolia*), golden yarrow (*Eriophyllum confertiflorum* var. *confertiflorum*), chalk liveforever (*Dudleya pulverulenta*), big-fruited man-root (*Marah macrocarpus* var. *macrocarpus*), California wishbone bush (*Mirabilis laevis* var. *crassifolia*), and bluedicks (*Dichelostemma capitatum*).

Invasive species such as short-pod mustard, Russian thistle, yellow star thistle, slender oat (*Avena barbata*), ripgut brome, soft chess (*Bromus hordeaceus*), and red brome were observed to dominate previously disturbed areas at the margins of the active quarry and along the fire road that extends eastward along the southern and western edges of the mining expansion area.

A total of 205 plant species were observed within SA1 during surveys in 2010 by Impact Sciences, Inc., and in 2016 by BRC. Of the 205 plant species observed, 166 are native species (75%) and 39 non-native species (25%). Refer to Appendix 2 for a full list of observed plant species during surveys.

**Wildlife:** The site provides habitat for upland and riparian/wetland adapted wildlife species, including amphibians, reptiles, birds, and mammals. Reptile species were observed throughout the site. Reptile observations included Great Basin fence lizard (*Sceloporus occidentalis longipes*), California side-blotched lizard (*Uta stansburiana elegans*), coastal whiptail, and San Diego gopher snake (*Pituophis catenifer annectens*) within relatively drier upland vegetation types.

Several bird species were observed utilizing aquatic and riparian habitats located in the western portion of SA1, including pied-billed grebe (*Podilymbus podiceps*), American coot (*Fulica americana*), black phoebe (*Sayornis nigricans*), American pipit (*Anthus rubescens*), ring-necked duck (*Aythya collaris*), and ruddy duck (*Oxyura jamaicensis*). Upland bird species observed include American kestrel (*Falco sparverius*), red-tailed hawk (*Buteo jamaicensis*), turkey vulture (*Cathartes aura*), mourning dove (*Zenaida macroura*), Anna's hummingbird (*Calypte anna*), Allen's hummingbird (*Selasphorus sasin*), Nuttall's woodpecker (*Picoides nuttallii*), downy woodpecker (*Picoides pubescens*), California scrub-jay (*Aphelocoma californica*), common raven (*Corvus corax*), bushtit (*Psaltriparus minimus*), rock wren (*Salpinctes obsoletus*), canyon wren (*Catherpes mexicanus*), Bewick's wren (*Thryomanes bewickii*), northern mockingbird (*Mimus polyglottos*), California towhee (*Pipilo crissalis*), house finch (*Carpodacus mexicanus*), and lesser goldfinch (*Carduelis psaltria*).

Two special-status bird species, loggerhead shrike and sharp-shinned hawk, were observed during the 2016 survey. A single loggerhead shrike was observed perched on a small snag on the north side of the quarry. It then flew to east side of SA1 where it was observed a second time. A single sharp-shinned hawk was observed foraging over the quarry throughout the day.

Scat and tracks of coyote (*Canis latrans*) were observed throughout SA1 and a coyote carcass was observed in a northeastern drainage. In addition, burrows and middens of Botta's pocket gopher (*Thomomys bottae*), dusky-footed woodrat (*Neotoma fuscipes*), San Diego desert woodrat, and California ground squirrel (*Spermophilus beecheyi*) are all common throughout undisturbed portions of the Project site.

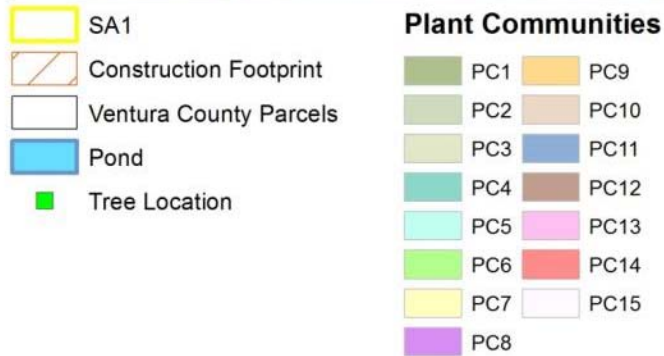
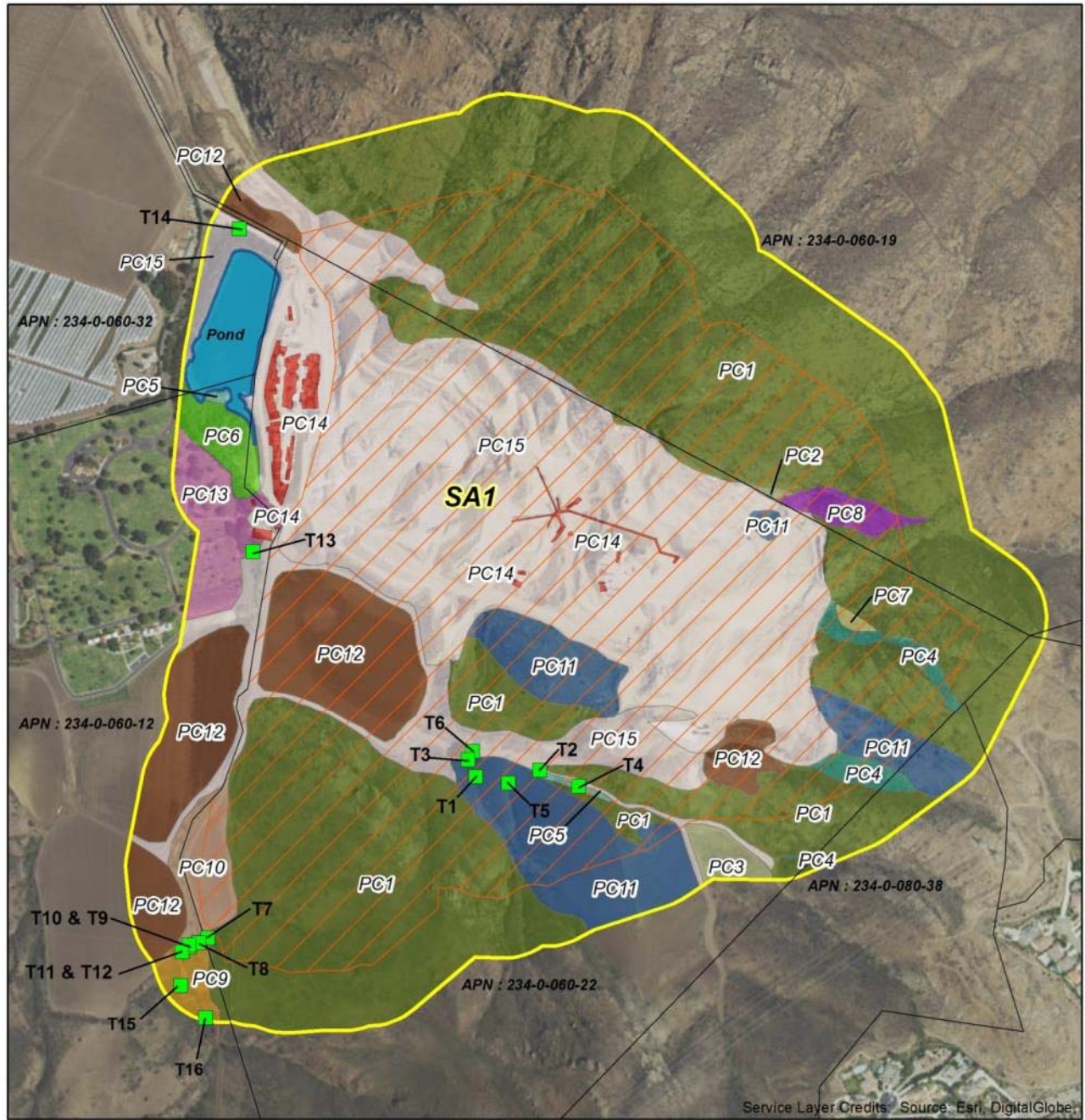
BRC observed 43 wildlife species during the 2016 survey. In total, 99 species were observed during the surveys conducted in 2016 by BRC and in 2010 by Impact Sciences. All 99 species are considered native with the exception of the rock pigeon (*Columba livia*). Refer to Appendix 2 for a full list of observed wildlife species during surveys.

### Protected Trees

Protected trees do occur within SA1 and within the Construction Footprint. Below is an inventory of protected trees based on the Ventura County Tree Protection Ordinance and the California National Plant Society (CNPS) special-status plant ranking system. The following oak trees are protected based on the Ventura County standards, as outlined in Appendix 1. The southern California black walnut trees are protected because they are ranked CNPS 4.2, defined as a plant or tree that is being watched due to its limited distribution, and the species is facing a moderate degree and immediacy of threat. Trees of any species measuring 90 inches in girth for single-trunk or 72 inches for multiple-trunk are considered to have “heritage” status and are protected.

Three heritage coast live oak trees and 15 (two adults, 13 saplings) southern California black walnut trees are located within the Construction Footprint and may need to be removed. Ten coast live oak trees are located within SA1 but outside of the Construction Footprint and are not anticipated to be impacted. Consultation with the County Planning Division and an arborist report will likely be required to address the removal of protected trees.

Protected Trees				
Map Key	Species	Common Name	Girth (circumference)	Impact
T1	<i>Juglans californica</i>	Southern California black walnut (Multi-stem)	10 stems each 1.5 inches	Removal – Tree located within proposed Project footprint.
T2	<i>Juglans californica</i>	Southern California black walnut (Sapling)	13 saplings <1 inch	Removal – Trees located within proposed Project footprint.
T3	<i>Quercus agrifolia</i>	Coast live oak (Multi-trunk)	39 inches, 44 inches, 20 inches (Heritage)	Removal – Tree located within proposed Project footprint.
T4	<i>Quercus agrifolia</i>	Coast live oak	115.5 inches (Heritage)	Removal – Tree located within proposed Project footprint.
T5	<i>Quercus agrifolia</i>	Coast live oak (Multi-trunk)	14 inches, 15.5 inches, 8.5 inches, 9.5 inches, 8.5 inches, 7.5 inches, 8.5 inches, 14.5 inches (Heritage)	Removal – Tree located within proposed Project footprint.
T6	<i>Juglans californica</i>	Southern California black walnut (Multi-stem)	7 stems each 1.5 inches	Removal – Tree located within proposed Project footprint.
T7	<i>Quercus agrifolia</i>	Coast live oak (Multi-trunk)	6 inches, 5 inches, 3.5 inches	Tree located within SA1 and outside of Construction Footprint. Tree falls >50 ft. away from Construction Footprint, no encroachment.
T8	<i>Quercus agrifolia</i>	Coast live oak	87.5 inches	Not Impacted
T9	<i>Quercus agrifolia</i>	Coast live oak	82 inches	Not Impacted
T10	<i>Quercus agrifolia</i>	Coast live oak	80 inches	Not Impacted
T11	<i>Quercus agrifolia</i>	Coast live oak	27 inches and 51 inches	Not Impacted
T12	<i>Quercus agrifolia</i>	Coast live oak	32 inches, 47 inches, and 37 inches	Not Impacted
T13	<i>Quercus agrifolia</i>	Coast live oak	10 inches, 7 inches, and inches	Not Impacted
T14	<i>Quercus agrifolia</i>	Coast live oak	8 inches, 9 inches, 13 inches, 4 inches.	Not Impacted
T15	<i>Quercus agrifolia</i>	Coast live oak	Estimated 60"	Not Impacted
T16	<i>Quercus agrifolia</i>	Coast live oak	Estimated 60"	Not Impacted



Service Layer Credits: Source: Esri, DigitalGlobe



**Protected Trees Map**

## **Endangered, Threatened, Rare, and Locally Important Species and Nests (Initial Study Checklist A & E)**

*See Appendix 1 for definitions of the types of special status species that have federal, state or local protection and for more information on the regulations that protect birds' nests.*

Endangered, threatened, rare, or locally important species were observed or have a moderate to high potential to occur within the SA1.

Suitable habitat for nesting birds protected under the MBTA exists within SA1.

### **Special Status Species Summary**

Information on special-status species and habitats within a 10-mile radius of SA1 was obtained from the California Natural Diversity Database (CNDDDB), U.S. Fish and Wildlife Service (USFWS) Critical Habitat maps, the Calflora database, and Ventura County Planning Division's GIS layer of past biological reports for reference materials. The special-status species that were observed are listed below in the Special Status Species table.

During the 2016 general biological assessment survey, BRC observed multiple individuals of southern California black walnut (see Protected Trees), as well as a sharp-shinned hawk, a CDFW Watch List Species, and a single loggerhead shrike and coastal whiptail, both CDFW species of special concern. Additionally, a CDFW-listed sensitive community, Red Willow Thicket, was encountered within SA1 (see Plant Communities). The Project site contains vegetation that could support nesting birds.

### **Potential Species**

The table below includes all special-status species potentially at the Project site that are recorded in the CNDDDB within five miles of the Project site.

#### **Definitions of Low, Moderate and High Potential to Occur**

**High** potential for occurrence: (1) The habitat on the Project site is the species' preferred habitat and is in good condition (has not been degraded by human disturbance); and/or (2) there is record of the species occurring on or adjacent to the Project site.

**Moderate** potential for occurrence: (1) The habitat on the Project site is the species' preferred habitat, but it has been disturbed or disturbance encompasses the Project site, reducing the quality of the habitat to below a high likelihood that the species would inhabit it; or (2) the habitat on the Project site is not the species' preferred habitat, but it contains a similar structure to the preferred habitat and the species has been observed in this habitat type; or (3) the habitat on the Project site is not the species' preferred habitat, but there is record of the species occurring in the immediate vicinity of the Project site, and there is potential for the species to forage within the habitat on-site.

**Low** potential for occurrence: The habitat on the Project site is not the species' preferred habitat, the habitat is highly disturbed, and/or there are no records of the species occurring on or near the Project site.

**None** potential for occurrence: the habitat does not exist on the Project site and the species requires this habitat for survival.

Observed and Potentially Occurring Special-Status Species						
Map Key	Survey/ Source	Scientific Name	Common Name	Species Status	Potential to Occur	Habitat Requirements
<b>PLANTS</b>						
SSP1	CNDDDB	<i>Astragalus brauntonii</i>	Braunton's milk-vetch	FE, CRPR 1B.1, G2, S2	None	Requires recent burns or disturbed areas; usually on sandstone with carbonate layers. Chaparral, coastal scrub, valley and foothill grassland on hilltops, saddles or bowls between hills at elevations of 3-640 meters amsl. Required limestone outcrops are not present on site. Flowering Time: Mar--Jul
SSP2	Impact Sciences, Inc. 2010	<i>Calochortus catalinae</i>	Catalina mariposa-lily	CRPR 4.2	High	Observed in 2010 by Impact Sciences, not observed in 2016 by BRC likely as a result of survey being conducted outside of blooming period. Occurs in chaparral, cismontane woodland, coastal scrub, and valley and foothill grassland communities between 15 and 700 meters amsl. Flowering Time: Mar--May
SSP3	CNDDDB	<i>Calochortus plummerae</i>	Plummer's mariposa-lily	LIS, CRPR 4.2	High	Occurs on rocky and sandy sites, usually of granitic or alluvial material. Common after fire at elevations of 60-2500 meters amsl. Found in coastal scrub, chaparral, valley and foothill grassland, cismontane woodland, lower montane coniferous forest. Flowering Time: May--Jul
SSP4	CNDDDB	<i>Centromadia parryi</i> ssp. <i>australis</i>	southern tarplant	CRPR 1B.1, G3, S2	None	Often in disturbed sites near the coast at marsh edges; also in alkaline soils sometimes with saltgrass. Sometimes on vernal pool margins. 0-975 meters amsl. No vernal mesic, alkaline habitat is not present on site. Flowering Time: Jun--Oct
SSP5	CNDDDB	<i>Delphinium parryi</i> ssp. <i>blochmaniae</i>	dune larkspur	CRPR 1B.1, S2	None	Requires maritime chaparral and coastal dunes between 0 and 200 meters amsl. No suitable habitat present. Flowering Time: Apr--May
SSP6	CNDDDB, Impact Sciences, Inc. 2010	<i>Dudleya blochmaniae</i> ssp. <i>blochmaniae</i>	Blochman's dudleya	CRPR 1B.1, G3, S2	High	Not observed on site in 2016, but previously reported as present by Impact Sciences, Inc. 2010. This species has potential to occur in cliffs and rock outcroppings of SA1. Rocky, clay or serpentine soils in coastal bluff scrub, chaparral, coastal scrub, and valley and foothill grassland communities between 5 and 450 meters amsl. Flowering Time: Apr--Jun
SSP7	CNDDDB	<i>Dudleya cymosa</i> ssp. <i>marcescens</i>	marcescent dudleya	FT, SR, LIS, CRPR 1B.2, S2	Low	Occurs on sheer rock surfaces and rocky volcanic cliffs at elevations of 145-670 meters amsl in chaparral habitats. Suitable habitat but no known occurrences within 3 miles of Project site. Project area on edge of species' known range. Flowering Time: May--Jun

Observed and Potentially Occurring Special-Status Species						
SSP8	CNDDDB, Aquatic Consulting Services, 2010.	<i>Dudleya parva</i>	Conejo dudleya	FT, LIS CRPR 1B.2, G1, S1	High	Not observed on site in 2016, but previously reported as present by Hunt (in Aquatic Consulting Services, 2010). This species has potential to occur in inaccessible portions of SA1. Grows on clay or volcanic substrates in coastal scrub and valley and foothill grassland communities between 60 and 450 meters amsl. Flowering Time: May--Jul
SSP9	CNDDDB	<i>Dudleya verityi</i>	Verity's dudleya	FT, LIS CRPR 1B.1, G1, S1	High	Not observed on site in 2016, but previously reported as present by Hunt (in Aquatic Consulting Services, 2010). This species has potential to occur in inaccessible portions of SA1. Occurs on volcanic outcrops in chaparral, cismontane woodland, and coastal scrub communities between 60 and 120 meters amsl. Flowering Time: May--Jun
SSP10	CNDDDB	<i>Eriogonum crocatum</i>	Conejo buckwheat	SR, LIS CRPR 1B.2, G1, S1	High	Not observed within SA1 in 2016, but previously reported as present by Impact Sciences, Inc. 2010. Occurs on Conejo volcanic outcrops in chaparral, coastal scrub, valley and foothill grassland communities between 50 and 580 meters amsl. Flowering Time: Apr--Jul
SSO1	Impact Sciences, Inc. 2010, BRC 2016	<i>Juglans californica</i>	southern California black walnut	CRPR 4.2, G3, S3	Observed	Observed in 2010 by Impact Sciences as well in 2016 by BRC. Occurs in chaparral, cismontane woodland and coastal scrub communities between 50 and 900 meters amsl. Flowering Time: Mar--May
SSP11	CNDDDB	<i>Monardella hypoleuca</i> ssp. <i>hypoleuca</i>	white-veined monardella	LIS, CRPR 1B.3, S2	Low	Found on dry slopes in chaparral, cismontane woodland communities from 50-1525 meters amsl. CNDDDB occurrence #4 located 4 miles to southeast but site but needs additional information/fieldwork. Flowering Time: May--Oct
SSP12	CNDDDB	<i>Navarretia ojaiensis</i>	Ojai navarretia	CRPR 1B.1, G2, S2	Moderate	Openings in chaparral, coastal scrub, and valley and foothill grassland communities between 275 and 620 meters amsl. Flowering Time: May--Jul
SSP13	CNDDDB	<i>Pentachaeta lyonii</i>	Lyon's pentachaeta	FE, SE, CRPR 1B.1, G1, S1	Moderate	Rocky clay soils of volcanic origin in openings within chaparral, coastal scrub, and valley and foothill grassland communities between 30 and 630 m. It does not compete well with dense annual grasses or shrubs, but occurs where there is a majority of bare ground. Flowering Time: Mar--Aug
SSP14	CNDDDB	<i>Pseudognaphalium leucocephalum</i>	white rabbit-tobacco	CRPR 2B.2, G4, S2	None	Requires open washes, Sandy or gravelly alluvium in chaparral, cismontane woodland, coastal scrub, and riparian woodland habitats between 0 and 2100 meter amsl No suitable habitat within SA1 due to the absence of appropriate alluvial soils. Flowering Time: Jul--Oct

Observed and Potentially Occurring Special-Status Species						
SSP15	CNDDDB	<i>Senecio aphanactis</i>	chaparral ragwort	LIS, CRPR 2B,2 G3, S2	None	Occurs on drying alkaline flats within chaparral, cismontane woodland, and coastal scrub habitats at elevations from 20 and 855 meters amsl. No suitable habitat. Flowering Time: Feb--May
SSP16	CNDDDB	<i>Texosporium sancti-jacobi</i>	woven-spored lichen	CRPR 3, G3, S1	Moderate	Occurs in open sites; in California with chamise, <i>Eriogonum</i> ssp., and <i>Selaginella</i> spp. at elevations of 290-660 meters amsl.
<b>INSECTS</b>						
SSP17	CNDDDB	<i>Bombus crotchii</i>	Crotch bumble bee	G3, S1	Moderate	Found in areas within food plant genera include <i>Antirrhinum</i> , <i>Phacelia</i> , <i>Clarkia</i> , <i>Dendromecon</i> , <i>Eschscholzia</i> , and <i>Eriogonum</i> .
SSP18	CNDDDB	<i>Trimerotropis occidentiloides</i>	Santa Monica grasshopper	G1, S1	High	Found on bare hillsides and along dirt trails in chaparral. Suitable habitat is found in the chaparral vegetation communities found throughout the project site.
<b>FISH</b>						
SSP19	CNDDDB	<i>Gila orcuttii</i>	arroyo chub	SSC, G2, S2	None	Requires slow water stream sections with mud or sand bottoms. Feeds heavily on aquatic vegetation and associated invertebrates. There is no direct connection between the quarry's irrigation pond and Conejo Creek. No surveys for chubs were conducted during the current survey, and no chubs are believed to have been previously reported for this site. Conversation with client mentioned poor water quality within pond and possible anoxic conditions due to runoff.
SSP20	CNDDDB	<i>Oncorhynchus mykiss irideus</i>	steelhead - southern California DPS	FE, S1	None	Requires aquatic habitat with flowing waters. No permanent water on site. There is no direct connection between the quarry's irrigation pond and Conejo Creek. No surveys for chubs were conducted during the current survey, and no chubs are believed to have been previously reported for this site. Conversation with client mentioned poor water quality within pond and possible anoxic conditions due to runoff.
<b>REPTILES</b>						
SSO2	CNDDDB	<i>Aspidoscelis tigris stejnegeri</i>	coastal whiptail	SSC, S3	Observed	Found in deserts & semiarid areas with sparse vegetation and open areas. Also found in woodland & riparian areas. Potential habitat is found within the Project site, but heavy disturbance encompasses portions of the Project site reducing the quality of the habitat.



Observed and Potentially Occurring Special-Status Species						
SSP21	CNDDDB	<i>Thamnophis hammondi</i>	two-striped garter snake	SSC, S3	None	Coastal California from vicinity of Salinas to northwest Baja California. From sea to about 7,000 feet elevation. Highly aquatic, found in or near permanent fresh water. Often along streams with rocky beds and riparian growth.
SSP22	CNDDDB	<i>Emys marmorata</i>	western pond turtle	SSC, G3, S3	High	A thoroughly aquatic turtle of ponds, marshes, rivers, streams & irrigation ditches, usually with aquatic vegetation, below 6000 feet elevation. Habitat exists in the retention pond.
<b>BIRDS</b>						
SSO3	BRC 2016	<i>Accipiter striatus</i>	sharp-shinned hawk	WL	Observed	Observed in 2016 by BRC. Prefers riparian areas. North-facing slopes, with plucking perches are critical requirements. Nests usually within 275 feet of water.
SSP23	CNDDDB	<i>Aquila chrysaetos</i>	golden eagle	FP, WL, S3	Moderate	Requires cliffs for nesting in grassland, chaparral, shrubland, forest, and other vegetated areas They avoid developed areas and uninterrupted stretches of forest. They are found primarily in mountains up to 12,000 feet. Suitable nesting habitat is present within SA1; however high levels of disturbance occur at the site as a result of the quarry.
SSP24	Aquatic Consulting Services	<i>Athene cunicularia</i>	burrowing owl	SSC,	High	Not observed on site in 2016, but previously reported as present by Hunt (in Aquatic Consulting Services, 2010). This species has potential to occur in open areas of grassland, chaparral and coastal scrub communities within SA1.
SSP25	CNDDDB	<i>Elanus leucurus</i>	white-tailed kite	FP, S3	None	Requires open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching. No suitable habitat within the Project area.
SSO4	BRC 2016	<i>Lanius ludovicianus</i>	loggerhead shrike	SSC	Observed	Observed in 2016 by BRC. Inhabits open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns. They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses, and cemeteries. The species was observed on the slopes west of the existing quarry.
SSP26	CNDDDB	<i>Polioptila californica californica</i>	coastal California gnatcatcher	FT, SSC, G4, S2	High	Inhabits dry coastal slopes, washes, and mesas, they are restricted to areas of coastal sage scrub below 2,000 feet in elevation. Suitable habitat exists for this species on the lower slopes of SA1.

Observed and Potentially Occurring Special-Status Species						
SSP27	Impact Sciences, Inc. 2010	<i>Setophaga petechia</i>	yellow warbler	SSC	High	Not observed on site in 2016, but previously reported as present by Impact Sciences, Inc. in 2010. Believed to be nesting in red willow thicket. This species is frequently found nesting and foraging in willow thickets and in other riparian plants including cottonwoods, sycamores, ash, and alders.
SSP28	CNDDDB	<i>Vireo bellii pusillus</i>	least Bell's vireo	FE, SE, G5T2, S2	High	Summer resident of Southern California in low riparian in vicinity of water or in dry river bottoms; below 2,000 feet Nests placed along margins of bushes or on twigs projecting into pathways, usually willow, mulefat, and mesquite. Suitable habitat is located west of the Project Construction Footprint within red willow thickets.
<b>MAMMALS</b>						
SSO5	Impact Sciences, Inc. 2010	<i>Neotoma lepida intermedia</i>	San Diego desert woodrat	SSC, S3	Observed	Observed in 2010 by Impact Sciences as well as in 2016 by BRC (middens). Occurs in Moderate to dense canopies preferred. They are particularly abundant in rock outcrops & rocky cliffs & slopes within coastal scrub

Special-Status Species (continued)				
Map Key	Adequate Habitat Onsite	Adequate Habitat Size	Acreage Impacted	Comments
SSP2	Yes	Yes	72.50	Observed in 2010 by Impact Sciences, not observed in 2016 by BRC likely as a result of survey being conducted outside of blooming period. The location of the species was not recorded by Impact Sciences, Inc. Suitable habitat is present throughout SA1 in chaparral, cismontane woodland, coastal scrub, and grassland communities. There are no CNDDDB records within 10 miles of the site. Several records of the species are present along Highway 101 within the Consortium of California Herbaria database.
SSP3	Yes	Yes	72.50	Species was not observed during surveys likely since BRC conducted survey outside of the known blooming period for the species. The species tend to be common after fire and would be expected to occur within suitable habitat found on the slopes throughout SA1. A review of CalFlora records identified a recent (2012) record on Conejo Mountain.
SSP6	Yes	Yes	72.36	Not observed within SA1 in 2016, but previously reported as present by Impact Sciences, Inc. 2010. This species has potential to occur in cliffs and rock outcroppings of SA1. Impact Sciences, Inc. identified an area of approximately 0.5 acres of occupied habitat on the rock outcroppings located on the eastern portion of the quarry expansion area. An incidental population of approximately 15 individuals was discovered 200 ft. east of SA1 in 2016. The recent fire of the area may have resulted in the loss of individuals from the previously documented 2010 population. Previously documented observations are mapped.

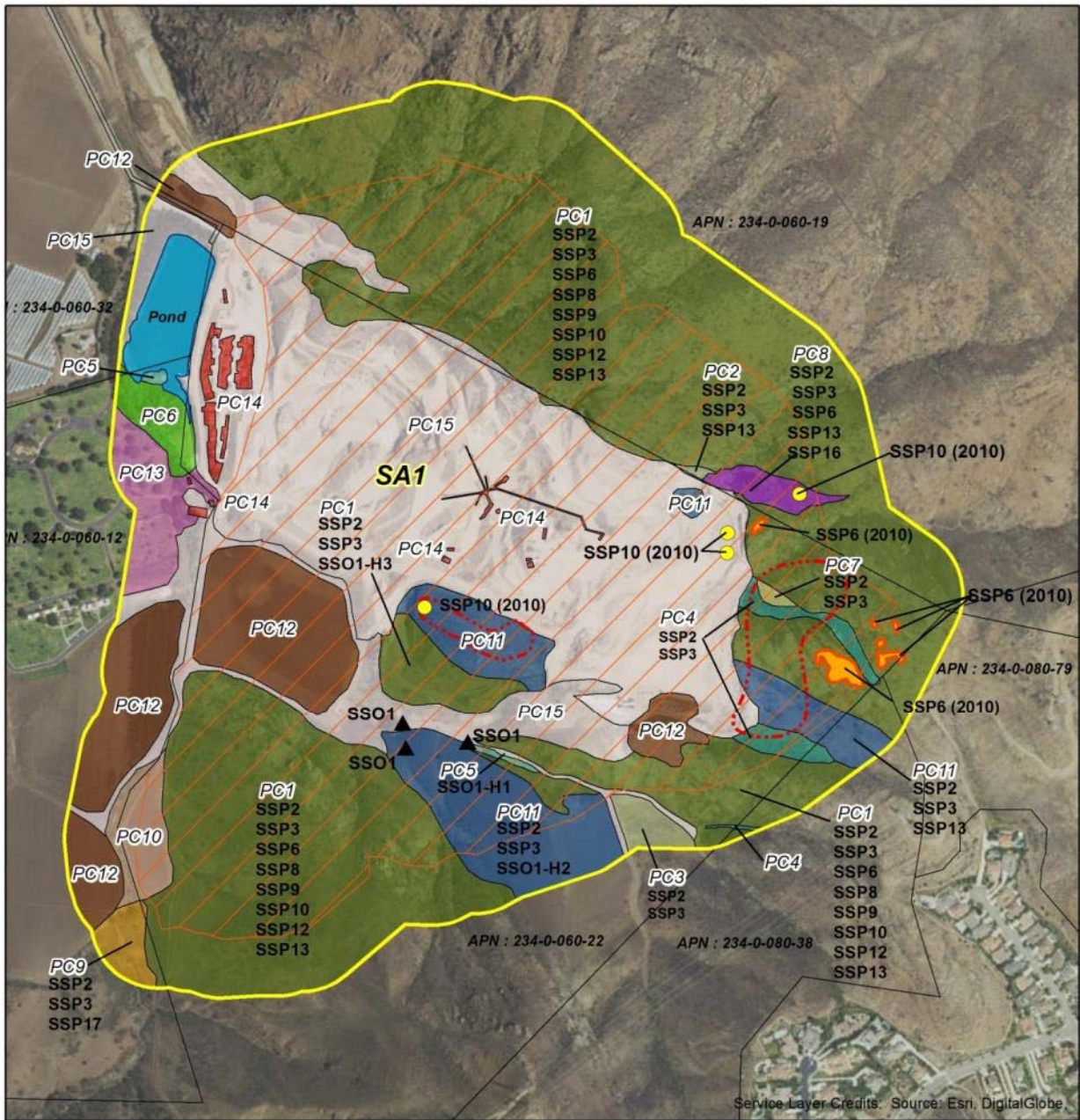
Special-Status Species (continued)				
SSP8	Yes	Yes	71.02	Not observed on site in 2016, but previously reported as present by Hunt (in Aquatic Consulting Services, 2010). The location of the species was not provided in previous reporting rock outcroppings located on the eastern portion of the mining expansion area.. This species has potential to occur in portions of SA1 on cliffs and rock outcroppings. The species is documented within one mile of the proposed northern expansion area. Surveys conducted by Hunt in 1998 identified the species on the rock outcroppings located in the eastern portion of the mine expansion. Surveys were conducted outside of the blooming period for the species. CNDDDB records for the species are located within one mile of the mine expansion area.
SSP9	Yes	Yes	71.02	Not observed on site in 2016, but previously reported as present by Hunt (in Aquatic Consulting Services, 2010). The location of the species was not provided in previous reporting in the rock outcroppings located on the eastern portion of the mining expansion area. This This species has potential to occur in inaccessible portions of SA1. Surveys conducted by Hunt in 1998 identified the species on the rock outcroppings located in the eastern portion of the mine expansion. Surveys were conducted BRC outside of the blooming period for the species. The recent fire of the area may have resulted in the loss of individuals from the documented population. A search of CNDDDB has identified several occurrences of the species located within one mile of the site.
SSP10	Yes	Yes	83.86	Not observed within SA1 in 2016, but previously reported as present by Impact Sciences, Inc. 2010. The 25 individuals that were observed by Impact Sciences were not observed by BRC in 2016. These plants were located on the south edge of the quarry and on the eastern edge and are mapped. These individuals may not been observed because of the fire and drought. An incidental population of 9 individuals was discovered by BRC approximately 200 ft. east of SA1 in 2016.
SSO1	Yes	Yes	11.69	Species was observed in 2010 by Impact Sciences as well in 2016 by BRC. Several large trees were observed by Impact Sciences, Inc., along the drainage in the southern portion of SA1. BRC identified 15 trees, 13 of which are saplings. All of which are located within the drainage located within the southern portion of the site. The large trees observed by Impact Sciences were likely burned during the fire.
SSP12	Yes	Yes	72.36	Suitable habitat is present within the chaparral habitat within SA1; however, the species has not been identified during surveys. BRC surveys were conducted outside of known blooming period for the species. The nearest document population (CNDDDB occurrence #20) of the species is located 3 miles northeast of SA1.
SSP13	Yes	Yes	72.52	Suitable habitat is present within openings of chaparral, coastal scrub communities observed within SA1. The species was not observed during surveys; however BRC conducted surveys outside of the known blooming period for the species. The nearest documented population (CNDDDB occurrence #22) is located 3 miles northeast of the project location.
SSP16	Yes	Yes	1.34	Not detected on site during surveys. Considered to have potential to be present on site because of the presence of chamise, <i>Eriogonum</i> spp. within SA1. Species may have been impacted by recent fire. The nearest documented CNDDDB occurrence (occurrence #20) is located 2.8 miles south of SA1 along Potrero Road.
SSP17	Yes	Yes	85.26	Not observed during surveys; however suitable food plants genera including <i>Phacelia</i> and <i>Eriogonum</i> were observed within the survey. The nearest known occurrence (CNDDDB occurrence # 124) is located 1.9 miles west of the project site in the city of Camarillo.

Special-Status Species (continued)				
SSP18	Yes	Yes	85.50	Suitable habitat present on the bare hillsides in coastal sage scrub and chaparral communities on site, but species was not observed during surveys. The species is documented (CNDDDB occurrence #3) is located 2.8 miles south of SA1 along Potrero Road.
SSO2	Yes	Yes	85.50	Observed in 2010 by Impact Sciences, Inc. as well as in 2016 by BRC. The locations of observations made by Impact Sciences, Inc. were not recorded. A single individual was observed by BRC on the western portion of SA1 located along the western drainage in an area dominated by non-native vegetation. Suitable habitat for the species is found throughout the mining expansion area within the chaparral and coastal scrub vegetation communities.
SSP22	Yes	Yes	0	Not detected on site but considered potentially present due to the presence of permanent surface water (retention pond) and basking and aestivation habitat. Nearby CNDDDB records include the North Fork of Conejo Creek; Arroyo Conejo and Conejo Creek, in the eastern region of Pleasant Valley; and 1.6 miles northwest of the intersection of Potrero Road and North Potrero Road.
SSO3	Yes	Yes	71.02	Observed in 2016 by BRC, however the project is located outside of the nesting range of the species. The species is only considered a CDFW WL species for nesting, not wintering.
SSP23	Yes	Yes	71.02	Not observed during surveys. SA1 provides suitable nesting and wintering habitat is present in rocky escarpments in the northern and eastern portion of the project site. The nearest CNDDDB occurrence (occurrence # 77) is located 4.2 miles south of SA1. Disturbance as result of quarry activities has potential to impacts nesting and foraging activities.
SSP24	Yes	Yes	72.53	Not observed on site in 2016, but previously reported as present by Hunt (in Aquatic Consulting Services, 2010). Suitable habitat and burrow locations are present within SA1. The nearest eBird record of the species is for a single wintering individual located 1.5 miles of SA1 near Potrero Road.
SSO4	Yes	Yes	72.25	Observed in 2016 by BRC. The species was observed on the slopes west of the existing quarry. Suitable habitat is present within the chaparral and coastal scrub communities present within SA1. The vegetation present on site provides suitable nesting and foraging habitat for the species.
SSP26	Yes	Yes	72.25	Not observed on site during protocol surveys conducted in 2010. Suitable nesting habitat is present within the coastal scrub vegetation communities. The nearest CNDDDB occurrence (occurrence # 918) is located 2.8 miles south of the survey along Potrero Road. The recent fire has impacted vegetation communities within SA1 and likely has decreased the suitability of the site for the species.
SSP27	Yes	Yes	0	Observed within red willow thickets located on the southern end of pond during focused least Bell's vireo surveys conducted by Impact Sciences in 2010. BRC did not observe species since survey was conducted outside of the breeding season for the species. Suitable habitat is restricted to red willow thickets.

Special-Status Species (continued)				
SSP28	Yes	Yes	0	Not observed on site during protocol surveys conducted in 2010. Suitable nesting habitat is present within the red willow thickets located on the western end of pond. BRC did not observe species since survey was conducted outside of the breeding season for the species. Suitable habitat is restricted to red willow thickets.
SSO5	Yes	Yes	84	Small mammal trapping was conducted Impact Sciences, Inc. in 2010. The species is documented to occur throughout the chaparral and coastal scrub vegetation communities present on site prior to the fire. The species was caught throughout SA1. During BRC's survey in 2016 desert woodrat middens were observed in the northeastern portion of the mining expansion area.
FE ..... Federal Endangered FT ..... Federal Threatened SFP ..... California Fully Protected Species SE ..... California Endangered SR ..... California Rare SSC ..... California Species of Special Concern FP ..... California Fully Protected Species WL ..... California Watch List Species  CDFG/NatureServe Rank G1 or S1 - Critically Imperiled Globally or Subnationally (state) G2 or S2 - Imperiled Globally or Subnationally (state) G3 or S3 - Vulnerable to extirpation or extinction Globally or Subnationally (state) California Rare Plant Rank (CRPR) CRPR 1A- California Native Plant Society/CDFG listed as presumed to be extinct CRPR 1B- California Native Plant Society/CDFG listed as rare or endangered in California and elsewhere CRPR 2 - California Native Plant Society/CDFG listed as rare or endangered in California but more common elsewhere CRPR 3 - California Native Plant Society/CDFG listed as in need of more information. CRPR 4 - California Native Plant Society/CDFG listed as of limited distribution or infrequent throughout a broader area in California. LIS ..... Locally Important Species				

### Nesting Bird Summary

Most of the bird species that were observed during the survey (Appendix 2) likely nest within SA1, predominantly within the vegetated areas and with preference show towards undisturbed native habitats such as the riparian and chaparral scrub communities. Several species, however, were also observed within the quarry and likely nest there, including the white-throated swift (*Aeronautes saxatalis*), which nests in crevices on rock faces, and the canyon wren and rock wren, which both nest on ledges on rock faces. These species are protected under the MBTA and the California Department of Fish and Game Code (Section 3503).



- SA1
- Construction Footprint
- Ventura County Parcels
- Pond
- ▲ SSO1
- SSP10 (2010)
- SSP6 (2010)
- SSP6, SSP8, SSP9 SSP10 (2010)

**Plant Communities**

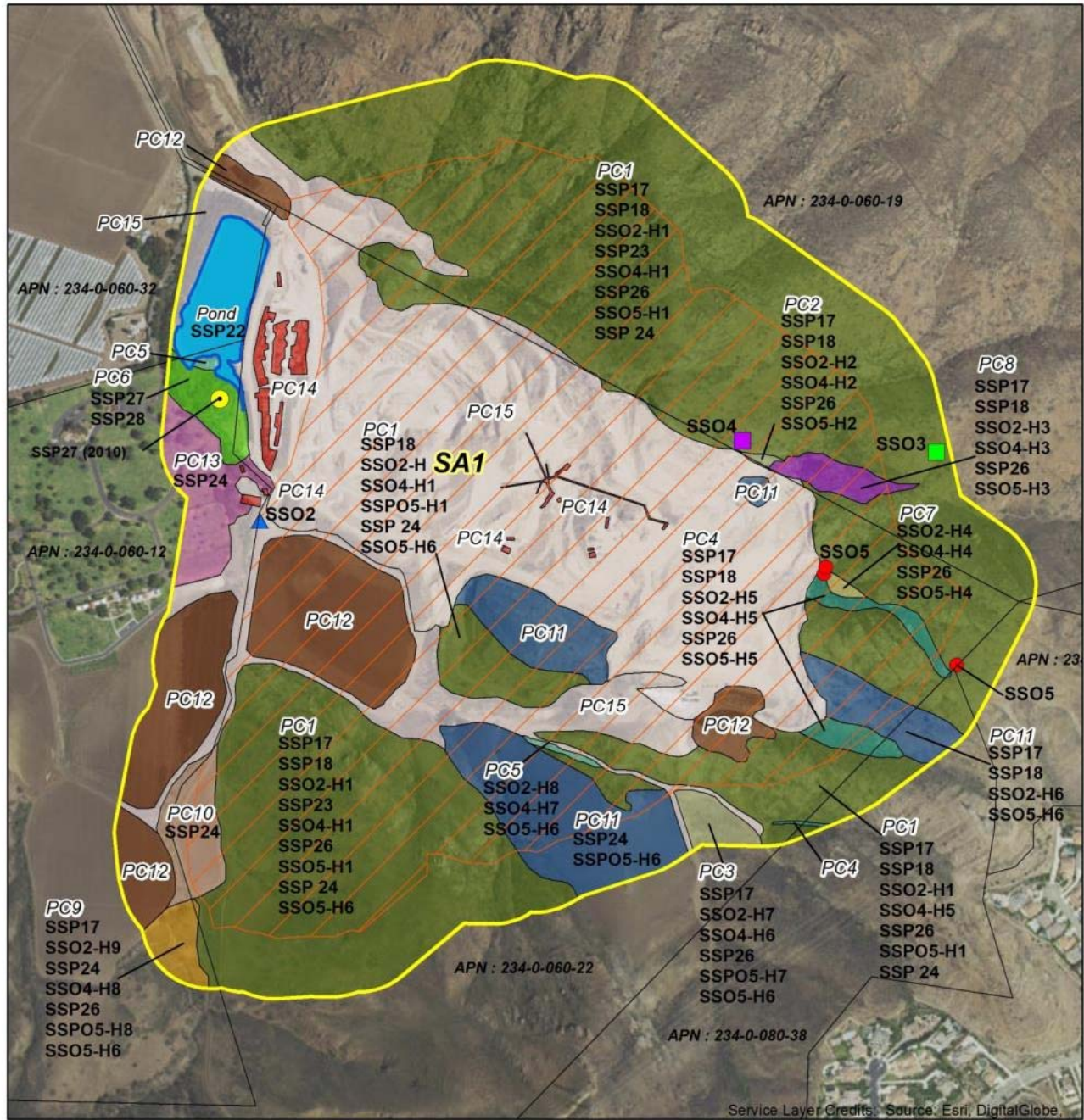
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BRC  
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N

Feet  
 0 250 500 1,000

**Special-Status Plant Species Map**



- SA1
- Construction Footprint
- Ventura County Parcels
- Pond
- ▲ SSO2
- SSO3
- SSO4
- SSO5
- SSP27 (2010)

**Plant Communities**

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**Special-Status Wildlife Species Map**

### 3.3 Wildlife Movement and Connectivity

(Initial Study Checklist D)

Wildlife movement or connectivity features, or evidence thereof, were found within SA1.

#### Mapped Corridors or Linkage

##### Connectivity Feature 1 (C1)

Santa Monica-Sierra Madre Connection

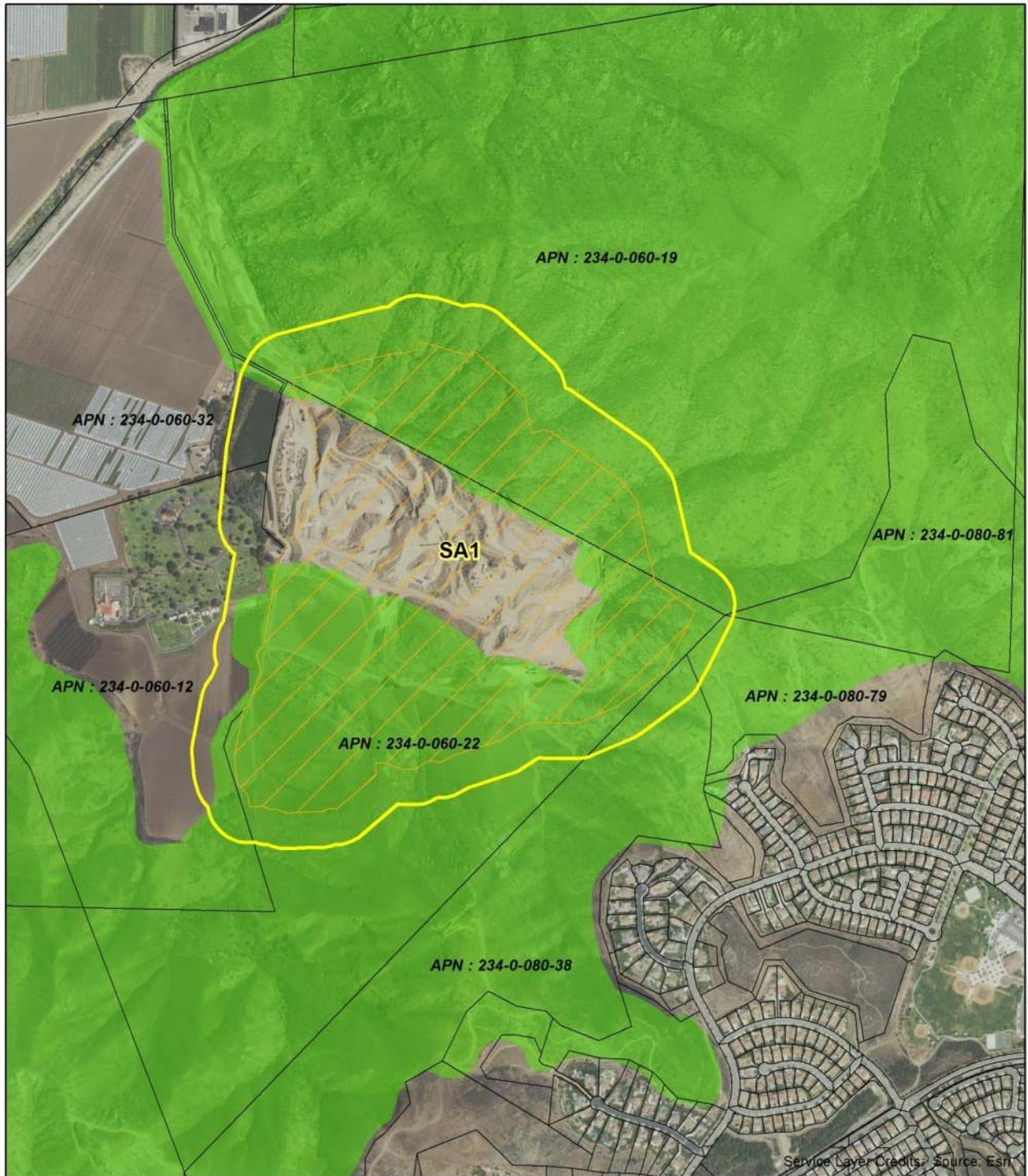
##### Description

The Santa Monica–Sierra Madre Connection is one of the few coastal to inland connections remaining in the South Coast Ecoregion. The Connection stretches from the rugged Santa Monica Mountains at the coast inland to the jagged peaks of the Santa Susana Mountains and the Sierra Madre Ranges of Los Padres National Forest. The Linkage Design includes substantial public ownership that protects natural habitats from development, with 34% (43,249 of 125,613 acres) of the connection currently receiving some level of conservation protection. The connection comprises a rich mosaic of oak woodland, savanna, chaparral, coastal sage scrub, grasslands, and riparian forests and woodlands, and has several major strands to accommodate diverse species and ecosystem functions.

Within SA1, the connection is characterized as a corridor linking the Santa Monica Mountains to Conejo Mountain. The portion of the corridor that falls within the SA1 consists of scattered rock outcroppings within Deerweed Scrub and Laurel Sumac Scrub. The SA1 corridor/linkage provides essential habitat for foraging, cover, and local and regional movement in a generally west-to-east direction.

Connectivity Features							
Map Key	Type of Connectivity Feature	Description	Species Observed	Evidence	Functional Group/Species Expected	Habitats Connected	Comments
C1	chokepoint	Saddle between Mountains	Coyote, mule deer ( <i>Odocoileus hemionus</i> )	Carcass, tracks, scat	Mammals, birds, reptiles	Santa Monica Mountains – Conejo Mountain	Connection abuts the north, south and east edges of the expansion areas. Development of the area will narrow the connection, but will not impede movement.





-  SA1
-  Construction Footprint
-  Ventura County Parcels
-  Regional Wildlife Corridor

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0 500 1,000 2,000 Feet

**Habitat Connectivity Map**

## Section 4: Recommended Impact Assessment & Mitigation

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### 4.1 Sufficiency of Biological Data

#### Additional information needed to make CEQA findings and develop mitigation measures:

Additional information IS needed to make CEQA findings.

#### Additional biology-related surveys or permits needed prior to issuance of land use permit:

Focused studies that need to be conducted in order to provide information for CEQA include:

- Focused Botanical Surveys for all species with High Potential (see Observed and Potentially Occurring Special-Status Species Table) during appropriate bloom periods in the spring of 2017.
- Update/Amendment to the Jurisdictional Wetland Delineation in the spring of 2017.

BRC has also determined that a discretionary Tree Ordinance Permit will be required for this project and a certified arborist will need to prepare an Arborist Tree Report and Protection Plan. In addition, a Streambed Alteration Agreement will need to be prepared and submitted to the CDFG for issuance. The Project will not impact waters of the U.S., and therefore, permit requirements under Section 404 of the Clean Water Act and water certification under Section 401 are not required.

### 4.2 Impacts and Mitigation

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#### A. Species

Project: PS-M; Cumulative: PS-M

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No federally- or state-listed endangered, threatened, or rare animal species were observed within SA1 by BRC during the 2016 survey. Special-status species observed within SA1 include southern California black walnut trees, as well as sharp-shinned hawk, CDFW Watch list species, and loggerhead shrike, coastal whiptail, loggerhead shrike, sharp-shinned hawk, and San Diego desert woodrat, all CDFW Species of Special Concern (see Special-Status Wildlife Map, mapped as SS01 through SS05).

Additionally, SA1 supports moderate to high quality habitat for an additional 17 special-status species—Catalina mariposa-lily, Plummer's mariposa-lily, Blochman's dudleya, Conejo dudleya, Verity's dudleya, Ojai navarretia, Conejo buckwheat, Lyon's pentachaeta, woven-spored lichen, Crotch bumble bee, Santa Monica grasshopper, western pond turtle, golden eagle, burrowing owl, coastal California gnatcatcher, yellow warbler, and least Bell's vireo. SA1 also supports suitable roosting and nesting sites for birds protected by the CDFW and the MBTA.

*Significance Finding – Project Impacts:* 15 southern California black walnuts and three coast live oak trees were observed within the Construction Footprint. Project implementation may result in impact/removal of these trees as they are located within the mining expansion area.

Though they were not observed within SA1 during the 2016 surveys, Blochman's dudleya, Conejo dudleya, Verity's dudleya, and Conejo buckwheat have been documented to occur in previous surveys within the rocky outcroppings located in the central and eastern portions of the Construction Footprint. In total, 17 special-status species are documented to occur within the mining expansion area or were determined to have potential to occur on site and may therefore be impacted by the Project.

The Project will result in the loss of 87.44 acres of suitable habitat for special-status species. It is anticipated that, as a result of Project implementation, Project-related activities including vegetation removal, grading, compaction, and construction, may result in the loss of individual coastal whiptails, San

Diego desert woodrats, Crotch bumble bees, Santa Monica grasshoppers, western pond turtles, burrowing owls, loggerhead shrikes, and/or coastal California gnatcatchers and/or their nests. These losses are considered potentially significant but mitigable.

Project implementation may also indirectly impact nesting birds due to elevated noise levels and vibration associated with construction equipment, which may result in birds abandoning their nests, eggs, or young. Potential impacts to protected nesting birds are considered potentially significant but mitigable.

*Significance Finding – Cumulative Impacts:* Project activities have the potential to indirectly impact several wildlife species. Noise and increased construction activities have the potential to disrupt breeding or foraging special-status wildlife outside of the mine expansion area, including golden eagles, loggerhead shrikes, burrowing owls, coastal California gnatcatchers, and nesting habitat for birds protected under MBTA, which would be considered potentially cumulatively significant but mitigable.

## **Avoidance and Minimization Measures**

### **MM1: Nesting Birds**

*Purpose:* In order to minimize impacts to nesting birds protected by the MBTA. Active nests of native bird species are protected by the MBTA (16 U.S.C. 704) and the California Fish and Game Code (Section 3503) within the Construction Footprint.

*Requirement:* If activities associated with construction or grading are planned to occur during the bird nesting/breeding season, generally January through March for early nesting birds (e.g., Cooper's hawks or hummingbirds) and from mid-March through September for most bird species, the applicant should have a qualified biologist conduct surveys for active nests to determine the presence/absence of active nests. Pre-construction nesting bird surveys should be conducted weekly beginning 30 days prior to the initiation of ground-disturbance and vegetation removal activities, with the last survey conducted no more than three days prior to the start of clearance/construction work. If ground-disturbing activities are delayed, additional pre-construction surveys should be conducted so that no more than three days have elapsed between the survey and ground-disturbing activities. Surveys should include examination of trees, shrubs, and the ground for nesting birds. Several bird species such as killdeer and night hawks are known to nest on bare ground.

Protected bird nests that are found within or adjacent to the construction zone should be protected by a buffer deemed suitable by a qualified biologist and verified by the CDFW. Typically, a 300-foot buffer is required for most species and a 500-foot buffer is required for raptor species. Buffer areas should be delineated with orange construction fencing or other exclusionary material that would inhibit access within the buffer zone. Installation of the exclusionary material delineating the buffer zone should be verified by a qualified biologist prior to initiation of construction activities. The buffer zone should remain intact and maintained while the nest is active (i.e.: occupied or being constructed by the adults bird[s]) and until young birds have fledged and no continued use of the nest is observed, as determined by a qualified biologist.

*Documentation:* The Permittee will provide to the Planning Division and the CDFW a Survey Report documenting the results of the pre-construction survey and noting the location species and anticipated fledge date of all active nests within undisturbed areas of SA1.

*Timing:* January through March for early nesting birds (e.g., Cooper's hawks or hummingbirds) and from mid-March through September for most other bird species, 30 days prior to ground disturbance.

## **MM2: Rare Plant surveys**

*Purpose:* To minimize impacts to rare plants that have been documented, or have potential to occur within the Construction Footprint.

*Requirement:* Conduct rare plant surveys within the undisturbed areas of SA1 during the known blooming period for species with potential to document the occurrence and population size of each species occurring within the Construction Footprint.

*Documentation:* The Permittee will provide to the Planning Division and CDFW a Survey Report documenting the results of the pre-construction survey.

*Timing:* Prior to land clearing in undisturbed areas of the mine site, rare plant surveys should be conducted during known blooming period for species with potential to occur within the Construction Footprint. Two surveys, occurring between April and June should be conducted in all habitats that have potential to support special-status plants.

## **MM3: Rare Plant Mitigation Plan**

*Purpose:* To minimize impacts to rare plants that have been documented, or have potential to occur within the Construction Footprint.

*Requirement:* If rare plants are observed during surveys, a Draft Rare Plant Mitigation and Monitoring Plan shall be submitted to Ventura County and CDFW for review and approval prior to ground disturbance to occupied habitat. Upon approval, the plan will be implemented by the applicant or its designee. The plan will demonstrate the feasibility of enhancing or restoring habitat of documented rare plants, hereby known as target rare plant species, in selected areas to be managed as natural open space without conflicting with other resource management objectives. The plan shall provide for replacement target rare plant species to be removed at a minimum 1:1 ratio, within suitable habitat at a site where no future mining-related disturbance will occur. The plan shall specify the following:

1. The location of the mitigation site in protected/preserved areas within the Pacific Rock site.
2. Methods for harvesting seeds or salvaging and transplantation of individual plants to be impacted.
3. Measures for propagating target rare plants (from seed or cuttings) or transferring living specimens from the salvage site to the introduction site.
4. Site preparation procedures for the mitigation site.
5. A schedule and action plan to maintain and monitor the mitigation area.
6. The list of criteria and performance standards by which to measure the success of the mitigation site.
7. Measures to exclude unauthorized entry into the mitigation areas.
8. Contingency measures such as erosion control, replanting, or weeding to implement in the event that mitigation efforts are not successful.

The plan will specify methods to collect target plant propagules and to introduce them into these mitigation sites. Introductions will use source material from the Pacific Rock site unless otherwise approved by CDFW. Alternatively, seed may be collected from protected occurrences, following CDFW-approved seed collection guidelines. The applicant or its designee will monitor the reintroduction sites for no fewer than five additional years to estimate survivorship or seedling establishment. Annual monitoring reports will be prepared and submitted to CDFW to guide future mitigation planning for target species. Monitoring reports will describe all restoration/enhancement measures taken in the preceding year; describe success and completion of those efforts and other pertinent site conditions (erosion, trespass, animal damage) in qualitative terms; and describe target plant species survival or establishment in quantitative terms.

The performance standards for the Rare Plant Mitigation and Monitoring Plan shall be the following:

1. Within five years after reintroducing target rare plant individuals to the mitigation site, the extent of occupied acreage and the number of established reproductive plants will be no smaller than at the site lost to the project.
2. Non-native species cover will be no more than 5% absolute cover through the term of the restoration period.

*Documentation:* A Draft Rare Plant Mitigation and Monitoring Plan shall be submitted to Ventura County and CDFW six months prior to vegetation removal.

*Timing:* Implementation of the mitigation plan and the introduction of plantings would ideally be timed prior to winter rain events. Weeding activities would ideally be timed prior to seed set.

#### **MM4: Oak Trees**

*Purpose:* To mitigate the loss of coast live oaks impacted within the Construction Footprint.

*Requirement:* Mitigation for impacts to protected oaks will be set forth as conditions of a Tree Permit, issued by Ventura County. If approved, the Tree Permit will include conditions relating to the following general issues:

1. Replacement of removed or relocated oaks at a minimum 2:1 ratio, or 10:1 for heritage oaks.
2. Provisions to ensure that replacement oaks are of the correct type and provenance, and that they are planted in appropriate locations on or off-site.
3. Provisions to ensure the maintenance of replaced and encroached oaks through a monitoring period of at least 2 years, and the reportage of mitigation success through the monitoring period.
4. Provisions to ensure proper supervision by a licensed arborist of protective measures during the construction phase of the project, including provisions that encroaching activities are minimally invasive (e.g. that they be carried out with hand tools).
5. Provisions to ensure proper supervision by a licensed arborist of replacement plantings.

*Documentation:* The Permittee will provide the Planning Division and CDFW a Survey Report documenting the results of the initial pre-construction survey efforts upon completion of the pre-construction surveys.

*Timing:* Conduct surveys at least 30 days prior to the tree removal.

*Monitoring and Reporting:* Provisions to ensure the maintenance of replaced and encroached oaks through a monitoring period of at least 2 years, and the annual reportage of mitigation success through the monitoring period. The Permittee will provide the Planning Division and CDFW a Survey Report documenting the results of the initial pre-construction survey and passive relocation prior to tree removal.

#### **MM5: Burrowing owl surveys**

*Purpose:* To minimize impacts to nesting/wintering burrowing owls within the Construction Footprint.

*Requirement:* Conduct protocol-level surveys following CDFW guidelines. Breeding season and non-breeding surveys should be conducted if feasible to determine the presence of burrowing owls within the mine expansion area. Surveys should be conducted in all areas that have been determined to provide suitable habitat for the species. If burrowing owls are determined to be present, consultation with CDFW should occur and an appropriate method for passively relocating the burrowing owl should be developed.

*Documentation:* The Permittee will provide to the Planning Division and CDFW a Survey Report documenting the results of the pre-construction survey and passive relocation efforts.

*Timing:* Surveys should be conducted no more than 30 days prior to vegetation removal. Surveys should be conducted weekly. If occupied burrows are identified within SA1, passive relocation efforts will occur no more than two weeks prior to the vegetation removal.

*Monitoring and Reporting:* Upon Project completion, the Permittee will provide the Planning Division and CDFW a Survey Report documenting the results of the initial pre-construction survey and passive relocation efforts.

#### **MM6: Least Bell's vireo and Coastal California gnatcatcher surveys**

*Purpose:* To minimize impacts to nesting least Bell's vireo and coastal California gnatcatcher within the Construction Footprint.

*Requirement:* Conduct pre-construction protocol-level surveys for least Bell's vireo and coastal California gnatcatcher (per USFWS protocol) within areas with suitable habitat for each species.

*Documentation:* The Permittee will provide the Planning Division and CDFW/USFWS a Survey Report documenting the results of the protocol-level surveys for the coastal California gnatcatcher and least Bell's vireo upon completion of the pre-construction surveys at Project completion.

*Timing:* Surveys will occur within the recommended survey period described within the USFWS survey protocols.

- Protocol Least Bell's Vireo Surveys between April 10<sup>th</sup>- July 31<sup>st</sup>
- Protocol California Gnatcatcher Surveys between February 15<sup>th</sup> – August 30<sup>th</sup>

*Monitoring and Reporting:* No additional monitoring or reporting is necessary.

#### **MM5: Coastal Whiptail, Western Pond Turtle Surveys**

*Purpose:* To prevent impacts to coastal whiptails and western pond turtles occurring within the Construction Footprint.

*Requirement:* A qualified biologist will conduct a pre-construction survey within 72 hours of any ground disturbance, and provide periodic site surveys during construction to determine presence of coastal whiptails, western pond turtles, and other reptiles. All reptiles found within the work area shall be relocated by the qualified biologist. If any of these reptiles are detected, they should be relocated to undeveloped areas prior to the commencement of construction, and provisions should be made to prevent their reentry to the site, such as by the placement of silt fencing or other means which would provide a physical barrier to movement. A survey for aestivating southwestern pond turtle is recommended to determine if burrows are available for use by southwestern pond turtle and, if present, whether they are being used by aestivating individuals. If aestivating southwestern pond turtles are found on-site, the formulation of a habitat replacement program is recommended which would incorporate details of replacement aestivation burrows, relocation of aestivating individuals to new burrows and monitoring of habitat replacement success.

*Documentation:* Upon Project completion, the Permittee will provide the Planning Division and the CDFW a Survey Report documenting the results of the pre-construction survey for coastal whiptails and western pond turtles.

*Timing:* A pre-construction survey will be conducted within 72 hours of ground disturbance within the Construction Footprint and vegetation removal to determine presence of coastal whiptail and western pond turtle.

*Monitoring and Reporting:* No additional monitoring or reporting is necessary.

### **MM7: San Diego Desert Woodrat Trapping**

*Purpose:* To prevent impacts to San Diego desert woodrats and other small mammals occurring within the Construction Footprint.

*Requirement:* Prior to vegetation removal, trapping and relocation of small mammals should be conducted by a qualified biologist. Trapping should occur outside of the breeding season of the San Diego desert woodrat. Within seven days prior to vegetation removal, a qualified biologist will conduct surveys for small mammals. All small mammals captured during trapping will be relocated to suitable habitat on site outside of the proposed mine expansion area. During trapping efforts all woodrat middens will be dismantled and the material shall be relocated to a suitable receiver location identified on site.

*Documentation:* The Permittee will provide to the Planning Division and CDFW a Survey Report documenting the results of the trapping and relocation efforts.

*Monitoring and Reporting:* No additional monitoring or reporting is necessary.

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## **B. Ecological Communities**

Project: PS-M; Cumulative: LS

### Sensitive Plant Communities

One CDFW sensitive plant community was found within SA1: Red Willow Thickets. This sensitive community provides high quality suitable habitat for one federally-endangered species: least Bell's vireo (see Special-Status Wildlife Species Map, mapped as SSP28).

Red Willow Thicket makes up 1.52 acres of SA1 and is located outside of the Construction Footprint. No trees, shrubs, or understory of these communities are anticipated to be impacted by Project activities. Individual oak trees lost as a result of Project activities are addressed in MM4.

*Significance Finding – Project Impacts:* The Project will not impact or alter any CDFW sensitive plant communities. No impact mitigation measures are necessary.

*Significance Findings – Cumulative Impacts:* The Project will not have cumulative impacts to this community.

No mitigation measures are necessary.

### Waters and Wetlands

Mitigation for impacts to drainages may be accomplished through habitat creation, restoration, or conservation. The required mitigation ratio for each of these approaches varies with the type of habitats affected, the type of mitigation chosen, and the distance of the mitigation site from the Project site.

If impacts to CDFW-jurisdictional areas are foreseen as a result of proposed Project implementation, a Streambed Alteration Agreement (SAA) should be processed with CDFW in parallel with any other permit processing done through local, state or federal agencies. Any conditions or mitigation measures of the SAA should be included as conditions of the lead-agency issued permit granting development entitlements for the Project site.

**MM8: Wetland and Waters Delineation**

*Purpose:* To identify wetlands within the project and determine the extent of impact that may occur to each of the drainages as a result of project.

*Requirement:* Conduct a formal wetland delineation

*Documentation:* The Permittee will provide the Ventura County Planning Division and CDFW a Jurisdictional Delineation Report documenting the results of the formal wetland delineation.

*Timing:* The wetland delineation should occur at minimum 90 days prior to ground disturbance.

*Monitoring and Reporting:* No additional monitoring or reporting is necessary.

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**C. Coastal Habitat** Project: None; Cumulative: None

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SA1 is not located within or adjacent to the coastal zone. No mitigation measures are necessary.

Environmentally Sensitive Habitat Areas

N/A

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**D. Habitat Connectivity (migration corridors)** Project: PS; Cumulative: LS

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The Santa Monica–Sierra Madre Connection is one of the few coastal to inland connections remaining in the South Coast Ecoregion. It stretches from the rugged Santa Monica Mountains at the coast inland to the jagged peaks of the Santa Susana Mountains and the Sierra Madre Ranges of the Los Padres National Forest. Within SA1, the Connection is characterized as a corridor linking the Santa Monica Mountains to Conejo Mountain. Vegetation within the area consists of scattered rock outcroppings within Deerweed Scrub and Laurel Sumac Scrub. The SA1 corridor/linkage provides essential habitat for foraging, cover, and local and regional movement in a generally west-to-east direction (South Coast Wildlands 2008). The Project site contains an undeveloped area that provides habitat for migrating species and may facilitate movement between developed areas, but there is no evidence that the Construction Footprint contains a significant linkage or corridor necessary for migrating species.

*Significance Finding – Project Impacts:* Project implementation will reduce the area of the Santa Monica-Sierra Madre Connection around the Conejo Mountain and narrow the corridor between the quarry and residential development to the east. Although the implementation of the Project may reduce available habitat for wildlife Santa Monica-Sierra Madre Connection, the project is not expected to be significant being that the wildlife movement through the area will not be impeded.

*Significance Findings – Cumulative Impacts:* The Project will not have cumulative impacts.

No mitigation measures are necessary.

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**E. Locally Important Species/Communities** Project: PS; Cumulative: LS

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SA1 contains eight recognized locally important communities including Laurel Sumac Scrub, California Sagebrush Scrub, Deerweed Scrub, Giant Wild Rye Grasslands, Red Willow Thicket, Mountain Mahogany Scrub, and Disturbed Chamise/Ceanothus Chaparral, and Coast Live Oak Woodland. The



majority of these communities were determined to be locally important due to a combination of habitat suitability, limited range, and proximity of known occurrences to several listed species of which include: Verity's dudleya, Conejo buckwheat, Plummer's mariposa lily, Catalina mariposa lily, Least Bell's Vireo, coastal California Gnatcatcher, and Yellow Warbler.

SA1 supports moderate to high quality habitat for six recognized locally important species including Plummer's mariposa-lily, marcescent dudleya, Conejo dudleya, Verity's dudleya, Conejo buckwheat, white-veined monardella, and chaparral ragwort. Of these species, Plummer's mariposa lily, Conejo dudleya, Verity's dudleya, and Conejo buckwheat were determined to have a high potential to occur.

*Significance Finding – Project Impacts:* Project implementation will result in the removal of 74.23 acres of habitat determined to be Locally Important (See Plant Community Table for individual community acreage loss). Of the eight recognized locally important communities, only Red Willow Thicket and Coast Live Oak Woodlands will avoid Project related impacts.

Locally important species that are documented to occur within or in the immediate vicinity of the mining expansion area and were determined to have potential to occur on site may be impacted by the Project. These include Plummer's mariposa lily, Conejo dudleya, Verity's dudleya, and Conejo buckwheat. Though they were not observed within SA1 during the 2016 survey, Conejo dudleya, Verity's dudleya and Conejo buckwheat have been documented to occur in previous surveys within the rocky outcroppings located in the eastern portion of the Construction Footprint.

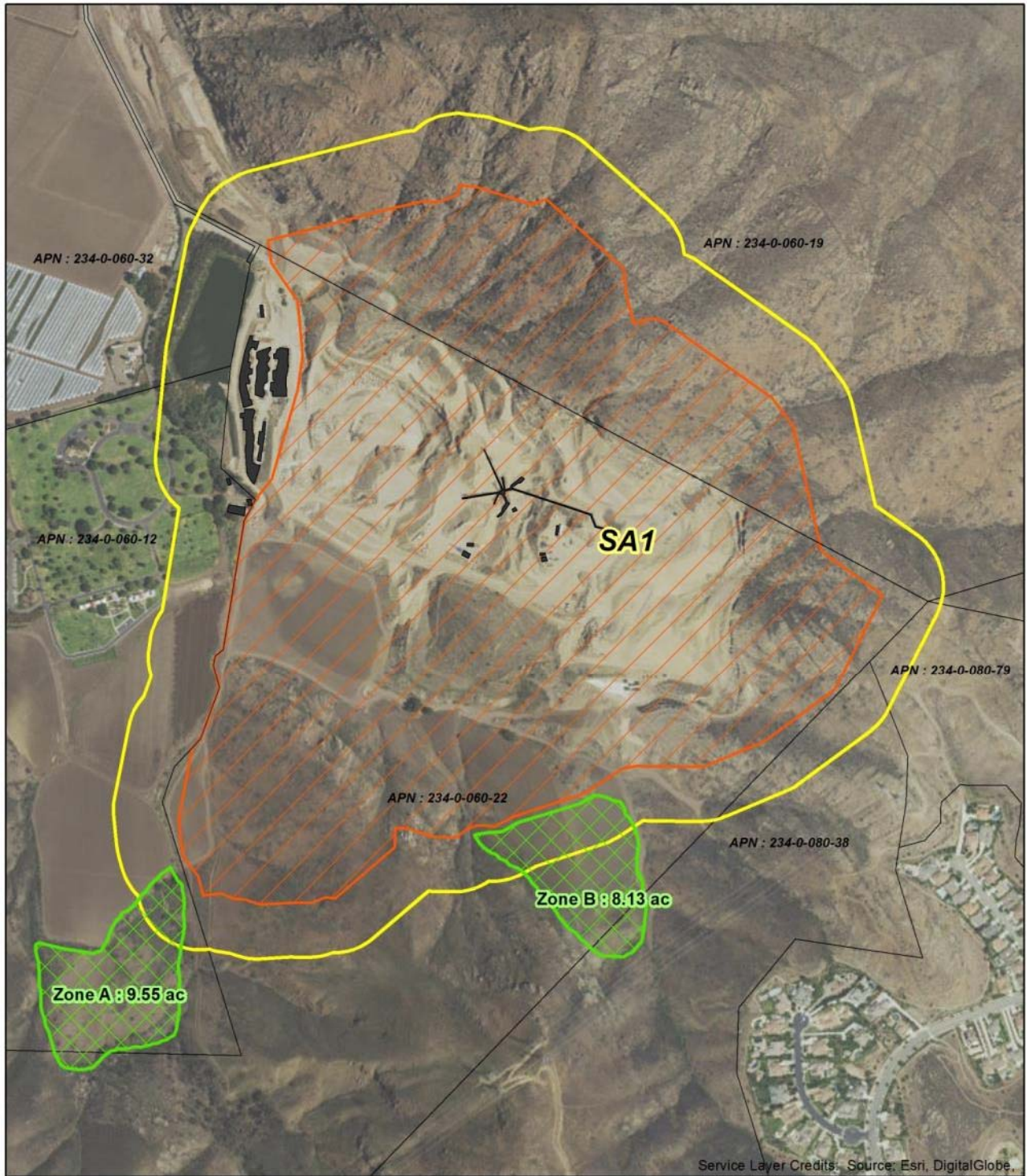
*Significance Finding – Cumulative Impacts:* The Project will not have cumulative impacts on any recognized Locally Important Species or Communities.

#### **Avoidance and Minimization Measures**

Please see above:

MM2: Rare Plant surveys

MM3: Rare Plant Mitigation Plan





-  SA1
-  Existing Structures
-  Construction Footprint
-  Ventura County Parcels
-  Potential Mitigation Zones



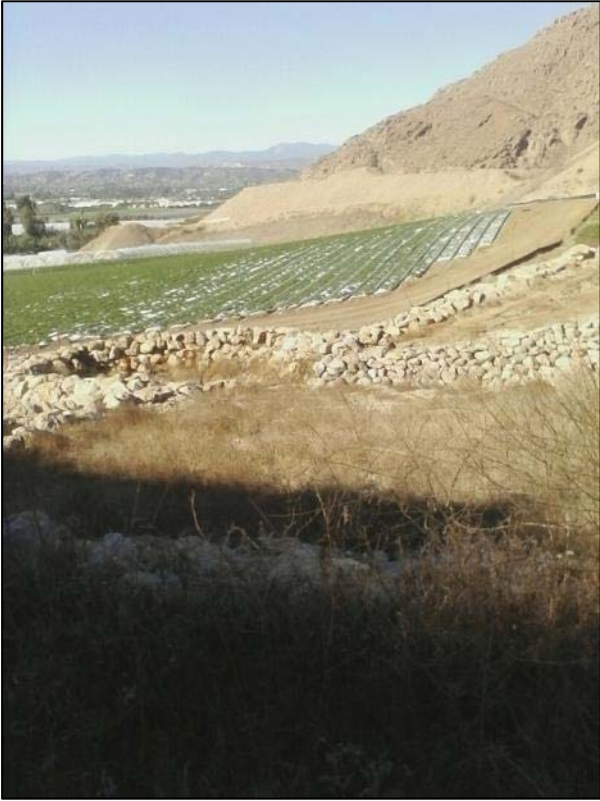
Potential Mitigation Areas Map

## Section 5: Photos

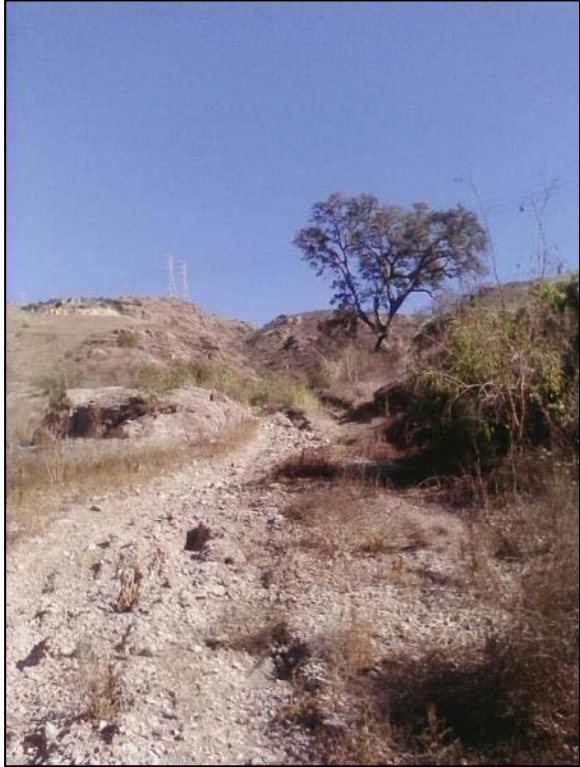
Photos									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="padding: 2px;"><b>Location</b></td></tr> <tr><td style="padding: 2px;">SA1</td></tr> <tr><td style="padding: 2px;"><b>Map Key</b></td></tr> <tr><td style="padding: 2px;">PS1</td></tr> <tr><td style="padding: 2px;"><b>View Direction</b></td></tr> <tr><td style="padding: 2px;">Southeast</td></tr> <tr><td style="padding: 2px;"><b>Description</b></td></tr> <tr><td style="padding: 2px;">Transition between Laurel Sumac Scrub and non-native grassland</td></tr> </table>	<b>Location</b>	SA1	<b>Map Key</b>	PS1	<b>View Direction</b>	Southeast	<b>Description</b>	Transition between Laurel Sumac Scrub and non-native grassland	
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<b>Description</b>									
Transition between Laurel Sumac Scrub and non-native grassland									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="padding: 2px;"><b>Location</b></td></tr> <tr><td style="padding: 2px;">SA1</td></tr> <tr><td style="padding: 2px;"><b>Map Key</b></td></tr> <tr><td style="padding: 2px;">PS1</td></tr> <tr><td style="padding: 2px;"><b>View Direction</b></td></tr> <tr><td style="padding: 2px;">Northeast</td></tr> <tr><td style="padding: 2px;"><b>Description</b></td></tr> <tr><td style="padding: 2px;">Oak tree (left edge of photo) within the Construction Footprint, intermittent Laurel Sumac Scrub shown in the background.</td></tr> </table>	<b>Location</b>	SA1	<b>Map Key</b>	PS1	<b>View Direction</b>	Northeast	<b>Description</b>	Oak tree (left edge of photo) within the Construction Footprint, intermittent Laurel Sumac Scrub shown in the background.	
<b>Location</b>									
SA1									
<b>Map Key</b>									
PS1									
<b>View Direction</b>									
Northeast									
<b>Description</b>									
Oak tree (left edge of photo) within the Construction Footprint, intermittent Laurel Sumac Scrub shown in the background.									

**Photos**

<b>Location</b>
SA1
<b>Map Key</b>
PS1
<b>View Direction</b>
Southeast
<b>Description</b>
Transition between Laurel Sumac Scrub and non-native grassland



<b>Location</b>
SA1
<b>Map Key</b>
PS2
<b>View Direction</b>
East
<b>Description</b>
Intermittent drainage with oak individual in background.



**Photos**

**Location**  
SA1

**Map Key**  
PS2

**View Direction**  
West

**Description**  
Looking downstream in intermittent drainage at cattail marsh and annual spring area in foreground. Agriculture (strawberry) field and oaks in background.



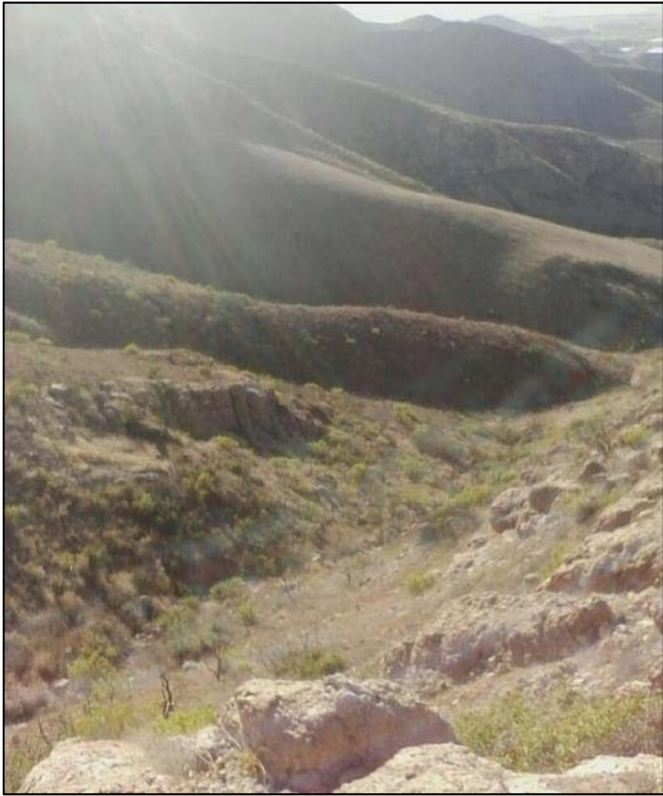

**Location**  
SA1

**Map Key**  
PS3

**View Direction**  
Southwest


**Description**  
Non-native grassland in foreground with Laurel Sumac Scrub (sub dominant of giant rye) in background on hillside.



Photos									
<table border="1"> <tr><td><b>Location</b></td></tr> <tr><td>SA1</td></tr> <tr><td><b>Map Key</b></td></tr> <tr><td>PS4</td></tr> <tr><td><b>View Direction</b></td></tr> <tr><td>Southeast</td></tr> <tr><td><b>Description</b></td></tr> <tr><td>At edge of rock outcrop facing down into drainage with adjacent hillsides of Laurel Sumac Scrub with understory of deerweed and intermittent <i>Ceanothus</i> sp. individuals. Background shows non-native grassland.</td></tr> </table>	<b>Location</b>	SA1	<b>Map Key</b>	PS4	<b>View Direction</b>	Southeast	<b>Description</b>	At edge of rock outcrop facing down into drainage with adjacent hillsides of Laurel Sumac Scrub with understory of deerweed and intermittent <i>Ceanothus</i> sp. individuals. Background shows non-native grassland.	
<b>Location</b>									
SA1									
<b>Map Key</b>									
PS4									
<b>View Direction</b>									
Southeast									
<b>Description</b>									
At edge of rock outcrop facing down into drainage with adjacent hillsides of Laurel Sumac Scrub with understory of deerweed and intermittent <i>Ceanothus</i> sp. individuals. Background shows non-native grassland.									
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<b>Location</b>									
SA1									
<b>Map Key</b>									
PS5									
<b>View Direction</b>									
Northwest									
<b>Description</b>									
View of quarry operation (previous cleared land) and surrounding area.									

**Photos**

<b>Location</b>	
SA1	
<b>Map Key</b>	
PS6	
<b>View Direction</b>	
Southeast	
<b>Description</b>	
Looking down at ephemeral drainage with giant rye grass vegetation community.	

<b>Location</b>	
SA1	
<b>Map Key</b>	
PS7	
<b>View Direction</b>	
Northwest	
<b>Description</b>	
Example of cliff-face physical feature.	

**Photos**

<b>Location</b>
SA1
<b>Map Key</b>
PS8
<b>View Direction</b>
West
<b>Description</b>
Disturbed intermittent sumac scrub, evidence of fire.



<b>Location</b>
SA1
<b>Map Key</b>
PS9
<b>View Direction</b>
North
<b>Description</b>
Scattered Laurel Sumac Scrub among portions of inaccessible steep rocky cliffside.






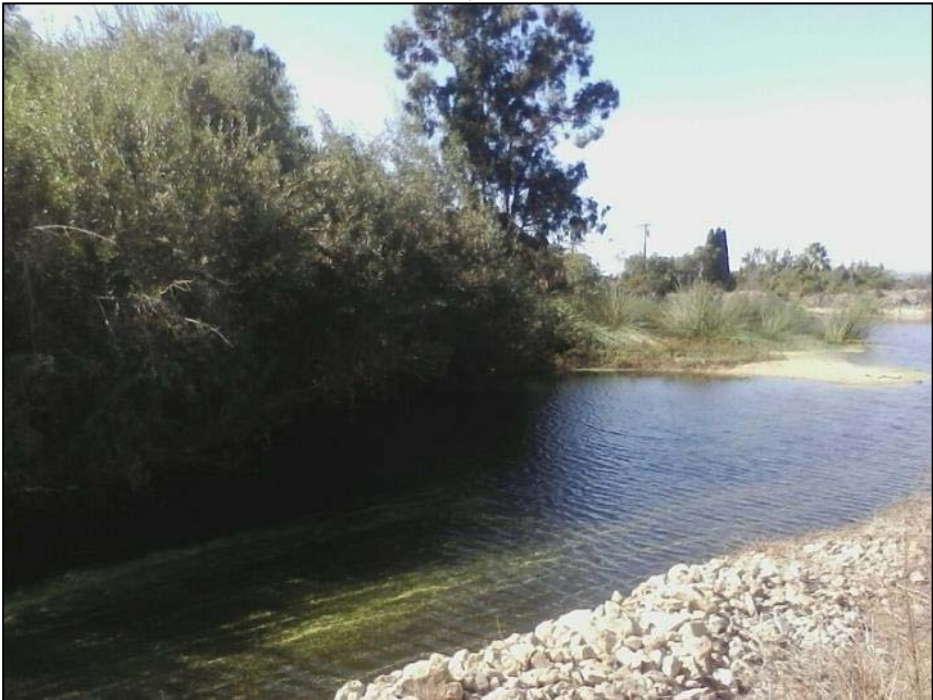
**Photos**



<b>Location</b>
SA1
<b>Map Key</b>
PS9
<b>View Direction</b>
West
<b>Description</b>
Scattered Laurel Sumac Scrub among steep rocky hillsides.



<b>Location</b>
SA1
<b>Map Key</b>
PS10
<b>View Direction</b>
South
<b>Description</b>
Culvert – Overflow from detention pond. Only during significant flooding events can water breach into this area from the detention pond.



Photos	
<p><b>Location</b> SA1</p> <p><b>Map Key</b> PS10</p> <p><b>View Direction</b> West</p> <p><b>Description</b> Overflow directed into this drain – Directed back into detention pond and used for irrigation.</p>	
<p><b>Location</b> SA1</p> <p><b>Map Key</b> PS11</p> <p><b>View Direction</b> West</p> <p><b>Description</b> Red Willow Thicket adjacent to pond with cattail marsh visible in background.</p>	

Photos									
<table border="1"> <tr><td><b>Location</b></td></tr> <tr><td>SA1</td></tr> <tr><td><b>Map Key</b></td></tr> <tr><td>PS12</td></tr> <tr><td><b>View Direction</b></td></tr> <tr><td>West</td></tr> <tr><td><b>Description</b></td></tr> <tr><td>Detention Pond (W23). All drainages on site are diverted into this pond.</td></tr> </table>	<b>Location</b>	SA1	<b>Map Key</b>	PS12	<b>View Direction</b>	West	<b>Description</b>	Detention Pond (W23). All drainages on site are diverted into this pond.	
<b>Location</b>									
SA1									
<b>Map Key</b>									
PS12									
<b>View Direction</b>									
West									
<b>Description</b>									
Detention Pond (W23). All drainages on site are diverted into this pond.									
<table border="1"> <tr><td><b>Location</b></td></tr> <tr><td>SA1</td></tr> <tr><td><b>Map Key</b></td></tr> <tr><td>PS13</td></tr> <tr><td><b>View Direction</b></td></tr> <tr><td>Northeast</td></tr> <tr><td><b>Description</b></td></tr> <tr><td>Russian Thistle Field in foreground with scattered Laurel Sumac Scrub in background.</td></tr> </table>	<b>Location</b>	SA1	<b>Map Key</b>	PS13	<b>View Direction</b>	Northeast	<b>Description</b>	Russian Thistle Field in foreground with scattered Laurel Sumac Scrub in background.	
<b>Location</b>									
SA1									
<b>Map Key</b>									
PS13									
<b>View Direction</b>									
Northeast									
<b>Description</b>									
Russian Thistle Field in foreground with scattered Laurel Sumac Scrub in background.									

### Photos

<b>Location</b>
SA1
<b>Map Key</b>
PS13
<b>View Direction</b>
Southwest
<b>Description</b>

Oak woodland at the southwestern tip of SA1, outside of Construction Footprint.



## Appendix 1

# Summary of Biological Resource Regulations

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The Ventura County Planning Division, as “lead agency” under CEQA for issuing discretionary land use permits, uses the relationship of a potential environmental effect from a proposed project to an established regulatory standard to determine the significance of the potential environmental effect. This Appendix summarizes important biological resource regulations which are used by the Division's biologists (consultants and staff) in making CEQA findings of significance:

- Sensitive Status Species Regulations
- Nesting Bird Regulations
- Plant Community Regulations
- Tree Regulations
- Waters and Wetlands Regulations
- Coastal Habitat Regulations
- Wildlife Migration Regulations
- Locally Important Species/Communities Regulations

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## Sensitive Status Species Regulations

### ***Federally Protected Species***

Ventura County is home to 29 federally listed endangered and threatened plant and wildlife species. The U.S. Fish and Wildlife Service (USFWS) regulates the protection of federally listed endangered and threatened plant and wildlife species.

**FE (Federally Endangered):** A species that is in danger of extinction throughout all or a significant portion of its range.

**FT (Federally Threatened):** A species that is likely to become endangered in the foreseeable future.

**FC (Federal Candidate):** A species for which USFWS has sufficient information on its biological status and threats to propose it as endangered or threatened under the Endangered Species Act (ESA), but for which development of a proposed listing regulation is precluded by other higher priority listing activities.

**FSC (Federal Species of Concern):** A species under consideration for listing, for which there is insufficient information to support listing at this time. These species may or may not be listed in the future, and many of these species were formerly recognized as "Category-2 Candidate" species.

The USFWS requires permits for the “take” of any federally listed endangered or threatened species. “Take” is defined by the USFWS as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct; may include significant habitat modification or degradation if it kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering.”

The Endangered Species Act (ESA) does not provide statutory protection for candidate species or species of concern, but USFWS encourages conservation efforts to protect these species. USFWS can set up voluntary Candidate Conservation Agreements and Assurances, which provide non-Federal landowners (public and private) with the assurance that if they implement various conservation activities to protect a given candidate species, they will not be subject to additional restrictions if the species becomes listed under the ESA.

### ***State Protected Species***

The California Department of Fish and Game (CDFG) regulates the protection of endangered, threatened, and fully protected species listed under the California Endangered Species Act. Some species may be jointly listed under the State and Federal Endangered Species Acts.

**SE (California Endangered):** A native species or subspecies which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease.

**ST (California Threatened):** A native species or subspecies that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by this chapter. Any animal determined by the commission as "rare" on or before January 1, 1985, is a "threatened species."

**SFP (California Fully Protected Species):** This designation originated from the State's initial effort in the 1960's to identify and provide additional protection to those animals that were rare or faced possible extinction. Lists were created for fish, mammals, amphibians, reptiles, and birds. Most fully protected species have also been listed as threatened or endangered species under the more recent endangered species laws and regulations.

**SR (California Rare):** A species, subspecies, or variety of plant is rare under the Native Plant Protection Act when, although not presently threatened with extinction, it is in such small numbers throughout its range that it may become endangered if its present environment worsens. Animals are no longer listed as rare; all animals listed as rare before 1985 have been listed as threatened.

**SSC (California Species of Special Concern):** Animals that are not listed under the California Endangered Species Act, but which nonetheless 1) are declining at a rate that could result in listing, or 2) historically occurred in low numbers and known threats to their persistence currently exist.

The CDFG requires permits for the "take" of any State-listed endangered or threatened species. Section 2080 of the Fish and Game Code prohibits "take" of any species that the California Fish and Game Commission determines to be endangered or threatened. "Take" is defined in Section 86 of the Fish and Game Code as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

The California Native Plant Protection Act protects endangered and rare plants of California. Section 1908, which regulates plants listed under this act, states: "no person shall import into this state, or take, possess, or sell within this state, except as incident to the possession or sale of the real property on which the plant is growing, any native plant, or any part or product thereof, that the commission determines to be an endangered native plant or rare native plant, except as otherwise provided in this chapter."

Unlike endangered, threatened, and rare species, for which a take permit may be issued, California Fully Protected species may not be taken or possessed at any time and no licenses or permits may be issued for their take except for collecting these species for necessary scientific research and relocation of the bird species for the protection of livestock.

The California Endangered Species Act does not provide statutory protection for California species of special concern, but they should be considered during the environmental review process.

### **California Rare Plant Ranks (RPR)**

Plants with 1A, 1B, 2 or 4 should always be addressed in CEQA documents. Plants with a RPR 3 do not need to be addressed in CEQA documents unless there is sufficient information to demonstrate that a RPR 3 plant meets the criteria to be listed as a RPR 1, 2, or 4.

**RPR 1A:** Plants presumed to be extinct because they have not been seen or collected in the wild in California for many years. This list includes plants that are both presumed extinct in California, as well as those plants which are presumed extirpated in California. A plant is extinct in California if it no longer occurs in or outside of California. A plant that is extirpated from California has been eliminated from California, but may still occur elsewhere in its range.

**RPR 1B:** Plants that are rare throughout their range with the majority of them endemic to California. Most of the plants of List 1B have declined significantly over the last century.

**RPR 2:** Plants that are rare throughout their range in California, but are more common beyond the boundaries of California. List 2 recognizes the importance of protecting the geographic range of widespread species.

Plants identified as RPR 1A, 1B, and 2 meet the definitions of Sec. 1901, Chapter 10 (Native Plant Protection Act) or Secs. 2062 and 2067 (California Endangered Species Act) of the California Department of Fish and Game Code, and are eligible for state listing.

**RPR 3:** A review list for plants for which there is inadequate information to assign them to one of the other lists or to reject them.

**RPR 4:** A watch list for plants that are of limited distribution in California.

## **Global and Subnational Rankings**

Though not associated directly with legal protections, species have been given a conservation status rank by NatureServe, an international non-profit conservation organization that is the leading source for information about rare and endangered species and threatened ecosystems. The Ventura County Planning Division considers the following ranks as sensitive for the purposes of CEQA impact assessment (G = Global, S = Subnational or State):

- G1 or S1 - Critically Imperiled
- G2 or S2 – Imperiled
- G3 or S3 - Vulnerable to extirpation or extinction

## **Locally Important Species**

Locally important species' protections are addressed below under "Locally Important Species/Communities Regulations."

For lists of some of the species in Ventura County that are protected by the above regulations, go to [http://www.ventura.org/rma/planning/ceqa/bio\\_resource\\_review.html](http://www.ventura.org/rma/planning/ceqa/bio_resource_review.html).

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## **Migratory Bird Regulations**

The Federal Migratory Bird Treaty Act (MBTA) and the California Department of Fish and Game (CDFG) Code (3503, 3503.5, 3511, 3513 and 3800) protect most native birds. In addition, the federal and state endangered species acts protect some bird species listed as threatened or endangered. Project-related impacts to birds protected by these regulations would normally occur during the breeding season, because unlike adult birds, eggs and chicks are unable to escape impacts.

The MBTA implements various treaties and conventions between the U.S. and Canada, Japan, Mexico, and Russia for the protection of migratory birds, which occur in two of these countries over the course of one year. The Act maintains that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. Bird species protected under the provisions of the MBTA are identified by the List of Migratory Birds (Title 50 of the Code of Federal Regulations, Section 10.13 as updated by the 1983 American Ornithologists' Union (AOU) Checklist and published supplements through 1995 by the USFWS).

CDFG Code 3513 upholds the MBTA by prohibiting any take or possession of birds that are designated by the MBTA as migratory nongame birds except as allowed by federal rules and regulations promulgated pursuant to the MBTA. In addition, there are CDFG Codes (3503, 3503.5, 3511, and 3800) which further protect nesting birds and their parts, including passerine birds, raptors, and state "fully protected" birds.

NOTE: These regulations protect almost all *native nesting birds*, not just sensitive status birds.

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## **Plant Community Regulations**

Plant communities are provided legal protection when they provide habitat for protected species or when the community is in the coastal zone and qualifies as environmentally sensitive habitat area (ESHA).

## **Global and Subnational Rankings**

Though not associated directly with legal protections, plant communities have been given a conservation status rank by NatureServe, an international non-profit conservation organization that is the leading source for information about rare and endangered species and threatened ecosystems. The Ventura County Planning Division considers the following ranks as sensitive for the purposes of CEQA impact assessment (G = Global, S = Subnational or State):

- G1 or S1 - Critically Imperiled
- G2 or S2 - Imperiled
- G3 or S3 - Vulnerable to extirpation or extinction

## **CDFG Rare**

Rare natural communities are those communities that are of highly limited distribution. These communities may or may not contain rare, threatened, or endangered species. Though the Native Plant Protection Act and the California Endangered Species Act provide no legal protection to plant communities, CDFG considers plant communities that

are ranked G1-G3 or S1-S3 (as defined above) to be rare or sensitive, and therefore these plant communities should be addressed during CEQA review.

### Environmentally Sensitive Habitat Areas

The Coastal Act specifically calls for protection of “environmentally sensitive habitat areas” or ESHA, which it defines as: “Any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments” (Section 30107.5).

ESHA has been specifically defined in the Santa Monica Mountains. For ESHA identification in this location, the Coastal Commission, the agency charged with administering the Coastal Act, has described the habitats that are considered ESHA. A memo from a Coastal Commission biologist that describes ESHA in the Santa Monica Mountains can be found at: [http://www.ventura.org/rma/planning/ceqa/bio\\_resource\\_review.html](http://www.ventura.org/rma/planning/ceqa/bio_resource_review.html).

### Locally Important Communities

The Ventura County Initial Study Assessment Guidelines defines a locally important community as one that is considered by qualified biologists to be a quality example characteristic of or unique to the County or region, with this determination being made on a case-by-case basis. The County has not developed a list of locally important communities, but has deemed oak woodlands to be a locally important community through the County’s *Oak Woodland Management Plan*.

## Tree Regulations

Selected trees are protected by the Ventura County Tree Protection Ordinance, found in Section 8107-25 of the Ventura County Non-Coastal Zoning Ordinance. This ordinance, which applies in the unincorporated areas of the County outside the coastal zone, regulates—through a tree permit program—the removal, trimming of branches or roots, or grading or excavating within the root zone of a “protected tree.” Individual trees are the focus of the ordinance, while oak woodlands are additionally protected as “locally important communities.”

The ordinance allows removal of five protected trees (only three of which can be oaks or sycamores; none of which can be heritage or historical trees) through a ministerial permit process. Removal of more/other than this may trigger a discretionary tree permit.

If a proposed project cannot avoid impacts to protected trees, mitigation of these impacts (such as replacement of lost trees) is addressed through the tree permit process—**unless the impacts may affect biological resources beyond the tree itself**, such as to sensitive status species that may be using the tree, nesting birds, the tree’s role as part of a larger habitat, etc. These secondary impacts have not been addressed through the tree permit program and must be addressed by the biologist in the biological assessment in accordance with the California Environmental Quality Act (CEQA).

A tree permit does not, however, substitute as mitigation for impacts to oak woodlands. The Public Resources Code requires that when a county is determining the applicability of CEQA to a project, it must determine whether that project “may result in a conversion of oak woodlands that will have a significant effect on the environment.” If such effects (either individual impacts or cumulative) are identified, the law requires that they be mitigated. Acceptable mitigation measures include, but are not limited to, conservation of other oak woodlands through the use of conservation easements and planting replacement trees, which must be maintained for seven years. In addition, only 50% of the mitigation required for significant impacts to oak woodlands may be fulfilled by replanting oak trees.

The following trees are protected in the specified zones. Girth is measured at 4.5 feet from the midpoint between the uphill and downhill side of the root crown.

PROTECTED TREES			
Common Name/Botanical Name (Genus species)	Girth Standard (Circumference)	Applicable Zones	
		All Base Zones	SRP <sub>1</sub>
Alder ( <i>Alnus</i> all species)	9.5 in.		X
Ash ( <i>Fraxinus</i> all species)	9.5 in.		X



Bay ( <i>Umbellularia californica</i> )	9.5 in.		X
Cottonwood ( <i>Populus</i> all species)	9.5 in.		X
Elderberry ( <i>Sambucus</i> all species)	9.5 in.		X
Big Cone Douglas Fir ( <i>Pseudotsuga macrocarpa</i> )	9.5 in.		X
White Fir ( <i>Abies concolor</i> )	9.5 in.		X
Juniper ( <i>Juniperus californica</i> )	9.5 in.		X
Maple ( <i>Acer macrophyllum</i> )	9.5 in.		X
Oak (Single) ( <i>Quercus</i> all species)	9.5 in.	X	X
Oak (Multi) ( <i>Quercus</i> all species)	6.25 in.	X	X
Pine ( <i>Pinus</i> all species)	9.5 in.		X
Sycamore ( <i>Platanus</i> all species)	9.5 in.	X	X
Walnut ( <i>Juglans</i> all species)	9.5 in.		X
Historical Tree <sup>3</sup> (any species)	(any size)	X	X
Heritage Tree <sup>4</sup> (any species)	90.0 in.	X	X

X Indicates the zones in which the subject trees are considered protected trees.

1. SRP - Scenic Resource Protection Overlay Zone

2. SHP - Scenic Highway Protection Overlay Zone

3. Any tree or group of trees identified by the County or a city as a landmark, or identified on the Federal or California Historic Resources Inventory to be of historical or cultural significance, or identified as contributing to a site or structure of historical or cultural significance.

4. Any species of tree with a single trunk of 90 or more inches in girth or with multiple trunks, two of which collectively measure 72 inches in girth or more. Species with naturally thin trunks when full grown or naturally large trunks at an early age, or trees with unnaturally enlarged trunks due to injury or disease must be at least 60 feet tall or 75 years old.

## Waters and Wetlands Regulations

Numerous agencies control what can and cannot be done in or around streams and wetlands. If a project affects an area where water flows, ponds or is present even part of the year, it is likely to be regulated by one or more agencies. Many wetland or stream projects will require three main permits or approvals (in addition to CEQA compliance). These are:

- 404 Permit (U.S. Army Corps of Engineers)
- 401 Certification (California Regional Water Quality Control Board)
- Streambed Alteration Agreement (California Department of Fish and Game)

For a more thorough explanation of wetland permitting, see the Ventura County’s “Wetland Project Permitting Guide” at [http://www.ventura.org/rma/planning/ceqa/bio\\_resource\\_review.html](http://www.ventura.org/rma/planning/ceqa/bio_resource_review.html).

### 404 Permit (U.S. Army Corps of Engineers)

Most projects that involve streams or wetlands will require a 404 Permit from the U.S. Army Corps of Engineers (USACE). Section 404 of the federal Clean Water Act is the primary federal program regulating activities in wetlands. The Act regulates areas defined as “waters of the United States.” This includes streams, wetlands in or next to streams, areas influenced by tides, navigable waters, lakes, reservoirs and other impoundments. For nontidal waters, USACE jurisdiction extends up to what is referred to as the “ordinary high water mark” as well as to the landward limits of adjacent Corps-defined wetlands, if present. The ordinary high water mark is an identifiable natural line visible on the bank of a stream or water body that shows the upper limit of typical stream flow or water level. The mark is made from the action of water on the streambank over the course of years.

**Permit Triggers:** A USACE 404 Permit is triggered by moving (discharging) or placing materials—such as dirt, rock, geotextiles, concrete or culverts—into or within USACE jurisdictional areas. This type of activity is also referred to as a “discharge of dredged or fill material.”

### **401 Certification (Regional Water Quality Control Board)**

If your project requires a USACE 404 Permit, then you will also need a Regional Water Quality Control Board (RWQCB) 401 Certification. The federal Clean Water Act, in Section 401, specifies that states must certify that any activity subject to a permit issued by a federal agency, such as the USACE, meets all state water quality standards. In California, the state and regional water boards are responsible for certification of activities subject to USACE Section 404 Permits.

**Permit Trigger:** A RWQCB 401 Certification is triggered whenever a USACE 404 Permit is required, or whenever an activity could cause a discharge of dredged or fill material into waters of the U.S. or wetlands.

### **Streambed Alteration Agreement (California Department of Fish and Game)**

If your project includes alteration of the bed, banks or channel of a stream, or the adjacent riparian vegetation, then you may need a Streambed Alteration Agreement from the California Department of Fish and Game (CDFG). The California Fish and Game Code, Sections 1600-1616, regulates activities that would alter the flow, bed, banks, channel or associated riparian areas of a river, stream or lake. The law requires any person, state or local governmental agency or public utility to notify CDFG before beginning an activity that will substantially modify a river, stream or lake.

**Permit Triggers:** A Streambed Alteration Agreement (SAA) is triggered when a project involves altering a stream or disturbing riparian vegetation, including any of the following activities:

- Substantially obstructing or diverting the natural flow of a river, stream or lake
- Using any material from these areas
- Disposing of waste where it can move into these areas

Some projects that involve routine maintenance may qualify for long-term maintenance agreements from CDFG. Discuss this option with CDFG staff.

### **Ventura County General Plan**

The Ventura County General Plan contains policies which also strongly protect wetland habitats.

Biological Resources Policy 1.5.2-3 states:

Discretionary development that is proposed to be located within 300 feet of a marsh, small wash, intermittent lake, intermittent stream, spring, or perennial stream (as identified on the latest USGS 7½ minute quad map), shall be evaluated by a County approved biologist for potential impacts on wetland habitats. Discretionary development that would have a significant impact on significant wetland habitats shall be prohibited, unless mitigation measures are adopted that would reduce the impact to a less than significant level; or for lands designated "Urban" or "Existing Community", a statement of overriding considerations is adopted by the decision-making body.

Biological Resources Policy 1.5.2-4 states:

Discretionary development shall be sited a minimum of 100 feet from significant wetland habitats to mitigate the potential impacts on said habitats. Buffer areas may be increased or decreased upon evaluation and recommendation by a qualified biologist and approval by the decision-making body. Factors to be used in determining adjustment of the 100 foot buffer include soil type, slope stability, drainage patterns, presence or absence of endangered, threatened or rare plants or animals, and compatibility of the proposed development with the wildlife use of the wetland habitat area. The requirement of a buffer (setback) shall not preclude the use of replacement as a mitigation when there is no other feasible alternative to allowing a permitted use, and if the replacement results in no net loss of wetland habitat. Such replacement shall be "in kind" (i.e. same type and acreage), and provide wetland habitat of comparable biological value. On-site replacement shall be preferred wherever possible. The replacement plan shall be developed in consultation with California Department of Fish and Game.

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## **Coastal Habitat Regulations**

Ventura County's Coastal Area Plan and the Coastal Zoning Ordinance, which constitute the "Local Coastal Program" (LCP) for the unincorporated portions of Ventura County's coastal zone, ensure that the County's land use plans, zoning ordinances, zoning maps, and implemented actions meet the requirements of, and implement the provisions and policies of California's 1976 Coastal Act at the local level.

### ***Environmentally Sensitive Habitats***

The Coastal Act specifically calls for protection of "environmentally sensitive habitat areas" or ESHA, which it defines as: "Any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments" (Section 30107.5).

Section 30240 of the Coastal Act states:

- (a) **"Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on such resources shall be allowed within such areas."**
- (b) **"Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade such areas, and shall be compatible with the continuance of such habitat areas."**

There are three important elements to the definition of ESHA. First, a geographic area can be designated ESHA either because of the presence of individual species of plants or animals or because of the presence of a particular habitat. Second, in order for an area to be designated as ESHA, the species or habitat must be either rare or it must be especially valuable. Finally, the area must be easily disturbed or degraded by human activities.

Protection of ESHA is of particular concern in the southeastern part of Ventura County, where the coastal zone extends inland (~5 miles) to include an extensive area of the Santa Monica Mountains. For ESHA identification in this location, the Coastal Commission, the agency charged with administering the Coastal Act, has described the habitats that are considered ESHA. A memo from a Coastal Commission biologist that describes ESHA in the Santa Monica Mountains can be found at: [http://www.ventura.org/rma/planning/ceqa/bio\\_resource\\_review.html](http://www.ventura.org/rma/planning/ceqa/bio_resource_review.html).

The County's Local Coastal Program outlines other specific protections to environmentally sensitive habitats in the Coastal Zone, such as to wetlands, riparian habitats, dunes, and upland habitats within the Santa Monica Mountains (M Overlay Zone). Protections in some cases are different for different segments of the coastal zone.

Copies of the Coastal Area Plan and the Coastal Zoning Ordinance can be found at: <http://www.ventura.org/rma/planning/Programs/local.html>.

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## **Wildlife Migration Regulations**

The Ventura County General Plan specifically includes wildlife migration corridors as an element of the region's significant biological resources. In addition, protecting habitat connectivity is critical to the success of special status species and other biological resource protections. Potential project impacts to wildlife migration are analyzed by biologists on a case-by-case basis. The issue involves both a macro-scale analysis—where routes used by large carnivores connecting very large core habitat areas may be impacted—as well as a micro-scale analysis—where a road or stream crossing may impact localized movement by many different animals.

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## **Locally Important Species/Communities Regulations**

Locally important species/communities are considered to be significant biological resources in the Ventura County General Plan.

### ***Locally Important Species***

The Ventura County General Plan defines a Locally Important Species as a plant or animal species that is not an endangered, threatened, or rare species, but is considered by qualified biologists to be a quality example or unique species within the County and region. The following criteria further define what local qualified biologists have determined to be Locally Important Species:

#### **Locally Important Animal Species Criteria**

Taxa for which habitat in Ventura County is crucial for their existence either globally or in Ventura County. This includes:

- Taxa for which the population(s) in Ventura County represents 10 percent or more of the known extant global distribution; or
- Taxa for which there are five or fewer *element occurrences*, or less than 1,000 individuals, or less than 2,000 acres of habitat that sustains populations in Ventura County; or,
- Native taxa that are generally declining throughout their range or are in danger of extirpation in Ventura County.

#### **Locally Important Plant Species Criteria**

- Taxa that are declining throughout the extent of their range AND have five (5) or fewer element occurrences in Ventura County.

The County maintains a list of locally important species, which can be found on the Planning Division website at: [http://www.ventura.org/rma/planning/ceqa/bio\\_resource\\_review.html](http://www.ventura.org/rma/planning/ceqa/bio_resource_review.html). *This list should not be considered comprehensive.* Any species that meets the criteria qualifies as locally important, whether or not it is included on this list.

#### **Locally Important Communities**

The Ventura County Initial Study Assessment Guidelines defines a locally important community as one that is considered by qualified biologists to be a quality example characteristic of or unique to the County or region, with this determination being made on a case-by-case basis. The County has not developed a list of locally important communities. Oak woodlands have however been deemed by the Ventura County Board of Supervisors to be a locally important community.

The state passed legislation in 2001, the Oak Woodland Conservation Act, to emphasize that oak woodlands are a vital and threatened statewide resource. In response, the County of Ventura prepared and adopted an Oak Woodland Management Plan that recommended, among other things, amending the County's Initial Study Assessment Guidelines to include an explicit reference to oak woodlands as part of its definition of locally important communities. The Board of Supervisors approved this management plan and its recommendations.

Appendix 2  
Observed Species Tables

Species Observed					
Scientific name	Common Name	Native	Observed in 2010	Observed in 2016	Notes
<b>PLANTS</b>					
<b>Ferns and Allies</b>					
<i>Pellaea andromedifolia</i>	coffee fern	Y	X		
<i>Pentagramma triangularis</i>	goldenback fern	Y	X	X	
<i>Selaginella bigelovii</i>	Bigelow's spike-moss	Y	X	X	
<b>Monocots</b>					
<i>Agrostis microphylla</i>	small-leaf bentgrass	Y	X		
<i>Allium peninsulare</i> var. <i>peninsulare</i>	purple wild onion	Y	X		
<i>Avena barbata</i>	slender oat	N	X	X	
<i>Bloomeria crocea</i>	common goldenstar	Y	X		
<i>Bromus catharticus</i>	rescue brome	N	X		
<i>Bromus diandrus</i>	ripgut brome	N	X	X	
<i>Bromus hordeaceus</i>	soft chess	N	X		
<i>Bromus madritensis</i> ssp. <i>rubens</i>	red brome	N	X	X	
<b><i>Calochortus catalinae</i></b>	<b>Catalina mariposa-lily</b>	Y	X		<b>CNPS listed 4.2, not observed in 2016 potentially as a result of recent fire.</b>
<i>Chlorogalum pomeridianum</i> var. <i>pomeridianum</i>	wavy-leaf soap plant	Y	X		
<i>Cynodon dactylon</i>	Bermuda grass	N	X	X	
<i>Cyperus eragrostis</i>	nutsedge	Y	X	X	

<i>Dichelostemma capitatum</i>	bluedicks	Y	X	X	
<i>Hordeum murinum</i> ssp. <i>leporinum</i>	hare barley	N	X		
<i>Lamarckia aurea</i>	goldentop grass	N	X		
<i>Leymus condensatus</i>	giant wildrye	Y	X	X	
<i>Melica imperfecta</i>	Coast Range melic	Y	X	X	
<i>Nassella pulchra</i>	purple needlegrass	Y	X		
<i>Pennisetum setaceum</i>	African fountaingrass	N	X		
<i>Piptatherum miliaceum</i>	smilo grass	N	X	X	
<i>Poa secunda</i> ssp. <i>secunda</i>	one-sided bluegrass	Y	X		
<i>Schismus barbatus</i>	Mediterranean splitgrass	N	X		
<i>Vulpia microstachys</i> var. <i>ciliata</i>	Eastwood's fescue	Y	X		
<i>Yucca whipplei</i>	Whipple's yucca	Y	X	X	
<b>Dicots</b>					
<i>Achillea millefolium</i>	common yarrow	Y	X		
<i>Acourtia microcephala</i>	scapellote	Y	X	X	
<i>Adenostoma fasciculatum</i>	chamise	Y	X	X	
<i>Anagallis arvensis</i>	scarlet pimpernel	N	X		
<i>Anthemis arvensis</i>	dog-fennel	N	X		
<i>Apiastrum angustifolium</i>	wild celery	Y	X	X	
<i>Artemisia californica</i>	California sagebrush	Y	X	X	
<i>Artemisia douglasiana</i>	mugwort	Y	X	X	
<i>Asclepias fascicularis</i>	narrow-leaf milkweed	Y	X		
<i>Atriplex lentiformis</i>	quailbush	Y	X	X	
<i>Baccharis pilularis</i>	coyote bush	Y	X	X	
<i>Baccharis salicifolia</i>	mulefat	Y	X	X	
<i>Brassica nigra</i>	black mustard	N	X	X	
<i>Brickellia californica</i>	California brickellbush	Y	X	X	

<i>Calystegia macrostegia</i> sp.	coast/island morning-glory	Y	X	X	
<i>Carduus pycnocephalus</i>	Italian thistle	N	X	X	
<i>Ceanothus crassifolius</i>	hoaryleaf ceanothus	Y	X	X	Ceanothus sp. observed in 2016, indistinguishable due to fire.
<i>Ceanothus megacarpus</i>	big pod ceanothus	Y	X		
<i>Centaurea melitensis</i>	tocolote	N	X	X	
<i>Cercocarpus betuloides</i> var. <i>betuloides</i>	mountain mahogany	Y	X	X	
<i>Chamaesyce albomarginata</i>	rattlesnake weed	Y	X	X	
<i>Chenopodium album</i>	lamb's quarters	N	X		
<i>Clarkia bottae</i>	punch-bowl clarkia	Y	X		
<i>Collinsia parryi</i>	Parry's blue-eyed Mary	Y	X		
<i>Conium maculatum</i>	poison hemlock	N	X	X	
<i>Convolvulus arvensis</i>	field bindweed	N	X		
<i>Corethrogyne filaginifolia</i>	California aster	Y	X		
<i>Crassula connata</i>	pigmy weed	Y	X		
<i>Cryptantha intermedia</i>	common cryptantha	Y	X		
<i>Cryptantha muricata</i>	muricate cryptantha	Y	X		
<i>Deinandra fasciculata</i>	clustered tarplant	Y	X	X	
<i>Descurainia pinnata</i> ssp. <i>glabra</i>	smooth western tansy mustard	Y	X		
<i>Dodecatheon clevelandii</i> ssp. <i>sanctarum</i>	coastal shooting-star	Y	X		
<b><i>Dudleya blochmaniae</i> ssp. <i>blochmaniae</i></b>	<b>Blochman's dudleya</b>	<b>Y</b>	<b>X</b>		<b>CNPS Listed, not observed in 2016 potentially as a result of recent fire.</b>

<i>Dudleya lanceolata</i>	lance-leaved dudleya	Y	X	X	
<i>Dudleya pulverulenta</i>	chalk live-forever	Y	X	X	
<i>Encelia californica</i>	California bush sunflower	Y	X		
<i>Epilobium canum</i> ssp. <i>canum</i>	gray California fuschia	Y	X		
<i>Eriastrum sapphirinum</i>	sapphire woolystar	Y	X		
<i>Eriogonum cinereum</i>	ashy-leaf buckwheat	Y	X	X	
<b><i>Eriogonum crocatum</i></b>	<b>Conejo buckwheat</b>	<b>Y</b>	<b>X</b>	<b>X</b>	<b>California Rare; CNPS List 1B.2</b>
<i>Eriogonum fasciculatum</i> var. <i>foliolosum</i>	red-topped buckwheat	Y	X	X	
<i>Eriophyllum confertiflorum</i> var. <i>confertiflorum</i>	golden yarrow	Y	X		
<i>Erodium cicutarium</i>	red-stem filaree	N	X	X	
<i>Eucrypta chrysanthemifolia</i> var. <i>chrysanthemifolia</i>	spotted hideseed	Y	X		
<i>Foeniculum vulgare</i>	fennel	N	X	X	
<i>Galium angustifolium</i> ssp. <i>angustifolium</i>	narrow-leaf bedstraw	Y	X		
<i>Galium aparine</i>	goose-grass	Y	X		
<i>Gilia angelensis</i>	chaparral gily-flower	Y	X		
<i>Gnaphalium californicum</i>	California everlasting	Y	X		
<i>Hazardia squarrosa</i> var. <i>grindelioides</i>	saw-toothed goldenbush	Y	X	X	
<i>Helminthotheca echioides</i>	bristly ox-tongue	N	X		
<i>Heteromeles arbutifolia</i>	toyon	Y	X	X	
<i>Hirschfeldia incana</i>	short-pod mustard	N	X	X	
<i>Isocoma menziesii</i>	coastal goldenbush	Y	X		
<b><i>Juglans californica</i></b>	<b>southern California black walnut</b>	<b>Y</b>	<b>X</b>	<b>X</b>	<b>CNPS List 4.2</b>
<i>Lactuca saligna</i>	willow-lettuce	N	X		



<i>Lactuca serriola</i>	prickly lettuce	N	X		
<i>Lasthenia californica</i> ssp. <i>californica</i>	California goldfields	Y	X		
<i>Leptosyne gigantea</i>	giant coreopsis	Y	X		
<i>Logfia filaginoides</i>	California cottonrose	Y	X		
<i>Lotus scoparius</i> var. <i>scoparius</i>	deerweed	Y	X	X	
<i>Lotus strigosus</i>	bishop's lotus	Y	X		
<i>Malacothamnus fasciculatus</i> var. <i>fasciculatus</i>	chaparral bush mallow	Y	X	X	
<i>Malacothrix saxatilis</i> var. <i>tenuifolia</i>	short leaved cliff aster	Y	X	X	
<i>Malosma laurina</i>	laurel sumac	Y	X	X	
<i>Malva parviflora</i>	cheese weed	N	X	X	
<i>Marah macrocarpus</i> var. <i>macrocarpus</i>	big-fruited man-root	Y	X	X	
<i>Medicago polymorpha</i>	burclover	N	X	X	
<i>Melilotus albus</i>	white melilot	N	X		
<i>Melilotus indicus</i>	yellow sweet-clover	N	X		
<i>Mimulus aurantiacus</i> var. <i>pubescens</i>	southern bush monkeyflower	Y	X		
<i>Mimulus cardinalis</i>	scarlet monkey flower	Y		X	
<i>Minuartia douglasii</i>	Douglass's stichwort	Y	X		
<i>Mirabilis laevis</i> var. <i>crassifolia</i>	California wishbone bush	Y	X	X	
<i>Nicotiana glauca</i>	tree tobacco	N	X	X	
<i>Opuntia littoralis</i>	coast prickly-pear	Y	X	X	
<i>Oxalis pes-caprae</i>	Cape sorrel	N	X	X	
<i>Phacelia cicutaria</i>	caterpillar phacelia	Y	X	X	Phacelia sp. observed in 2016

<i>Phacelia ramosissima</i>	branching phacelia	Y	X		
<i>Phacelia viscida</i>	sticky phacelia	Y	X		
<i>Polygonum aviculare</i>	prostrate knotweed	N	X	X	
<i>Populus fremontii</i> ssp. <i>fremontii</i>	Fremont cottonwood	Y	X		
<i>Pterostegia drymarioides</i>	fairy mist	Y	X		
<i>Quercus agrifolia</i> var. <i>agrifolia</i>	coast live oak	Y	X	X	
<i>Rafinesquia californica</i>	California chicory	Y	X		
<i>Rhamnus ilicifolia</i>	holly-leaf redberry	Y	X	X	
<i>Rhus integrifolia</i>	lemonade berry	Y	X		
<i>Rhus ovata</i>	sugar bush	Y	X	X	
<i>Ricinus communis</i>	castor-bean	N	X	X	
<i>Rumex crispus</i>	curly dock	N	X		
<i>Salix laevigata</i>	red willow	Y	X	X	
<i>Salix lasiolepis</i>	arroyo willow	Y	X	X	
<i>Salsola tragus</i>	Russian-thistle	N	X	X	
<i>Salvia apiana</i>	white sage	Y	X	X	
<i>Salvia leucophylla</i>	purple sage	Y	X	X	
<i>Salvia mellifera</i>	black sage	Y	X	X	
<i>Sambucus nigra</i> ssp. <i>caerulea</i>	blue elderberry	Y	X		
<i>Sanicula crassicaulis</i>	Pacific sanicle	Y	X		
<i>Schoenoplectus acutus</i> var. <i>occidentalis</i>	tule	Y		X	
<i>Senecio vulgaris</i>	common groundsel	N	X		
<i>Silene gallica</i>	windmill pink	N	X		
<i>Silene laciniata</i> ssp. <i>laciniata</i>	fringed Indian-pink	Y	X		
<i>Sisymbrium orientale</i>	eastern rocket	N	X		

<i>Solanum xanti</i>	chaparral nightshade	Y			
<i>Sonchus oleraceus</i>	common sow thistle	N			
<i>Stachys ajugoides</i> var. <i>rigida</i>	rigid woodmint	Y			
<i>Stylocline gnaphaloides</i>	everlasting nest-straw	Y			
<i>Thysanocarpus laciniatus</i>	narrow-leaf fringedpod	Y	X	X	
<i>Toxicodendron diversilobum</i>	poison oak	Y	X	X	
<i>Trifolium willdenovii</i>	tomcat clover	Y	X		
<i>Typha latifolia</i> -	broadleaf cattail	Y		X	
<i>Uropappus lindleyi</i>	silver puffs	Y	X		
<i>Venegasia carpesioides</i>	canyon sunflower	Y	X		
<i>Verbena lasiostachys</i> var. <i>lasiostachys</i>	western vervain	Y	X		
<i>Xanthium spinosum</i>	spiny cocklebur	Y	X		
<i>Xanthium strumarium</i>	cocklebur	Y	X	X	
<b>ANIMALS</b>					
<b>Amphibians</b>					
<i>Lithobates catesbeianus</i>	American bullfrog	N	X		
<b>Reptiles</b>					
<b>Aspidoscelis tigris stejnegeri</b>	<b>coastal whiptail</b>	<b>Y</b>	<b>X</b>	<b>X</b>	<b>CDFW SSC</b>
<i>Crotalus helleri</i>	southern pacific rattlesnake	Y	X		
<i>Elgaria multicarinata webbii</i>	San Diego alligator lizard	Y	X		
<i>Pituophis catenifer annectens</i>	San Diego gopher snake	Y	X	X	
<i>Sceloporus occidentalis</i>	western fence lizard	Y		X	
<i>Trachemys scripta elegans</i>	red-eared slider	N	X		
<i>Uta stansburiana elegans</i>	California side-blotched	Y	X	X	

	lizard				
<b>Birds</b>					
<b><i>Accipiter striatus</i></b>	<b>sharp-shinned hawk</b>	<b>Y</b>		<b>X</b>	<b>CDFW WL, observed in 2016 by BRC</b>
<i>Aeronautes saxatalis</i>	white-throated swift	Y	X	X	
<i>Agelaius phoeniceus</i>	red-winged blackbird	Y	X		
<i>Anas platyrhynchos</i>	mallard	Y	X		
<i>Anas strepera</i>	gadwall	Y	X		
<i>Anthus rubescens</i>	American pipit			X	
<i>Aphelocoma californica</i>	California scrub-Jay		X	X	
<i>Ardea alba</i>	great egret	Y	X		
<i>Ardea herodias</i>	great blue heron	Y	X		
<i>Aythya collaris</i>	ring-necked duck			X	
<i>Baeolophus inornatus</i>	oak titmouse	Y	X		
<i>Buteo jamaicensis</i>	red-tailed hawk	Y	X	X	
<i>Butorides virescens</i>	green heron	Y	X		
<i>Callipepla californica</i>	California quail	Y	X		
<i>Calypte anna</i>	Anna's Hummingbird		X	X	
<i>Carduelis psaltria</i>	lesser goldfinch	Y	X		
<i>Carduelis tristis</i>	American goldfinch	Y	X		
<i>Cathartes aura</i>	turkey vulture	Y	X		
<i>Catharus guttatus</i>	hermit thrush	Y	X		
<i>Catherpes mexicanus</i>	canyon wren	Y	X	X	
<i>Chamaea fasciata</i>	wrentit	Y	X		
<i>Charadrius vociferus</i>	killdeer	Y	X		
<i>Chondestes grammacus</i>	lark sparrow			X	
<i>Chordeiles acutipennis</i>	lesser nighthawk	Y	X		
<i>Colaptes auratus</i>	northern flicker			X	

<i>Columba livia</i>	rock pigeon	Y	X		
<i>Columbina passerina</i>	common ground-dove	Y	X		
<i>Contopus sordidulus</i>	western wood-pewee	Y	X		
<i>Corvus brachyrhynchos</i>	American crow	Y	X	X	
<i>Corvus corax</i>	common raven	Y	X		
<i>Dendroica occidentalis</i>	hermit warbler	Y	X		
<b><i>Dendroica petechia</i></b>	<b>yellow warbler</b>	<b>Y</b>	<b>X</b>		<b>SSC, not observed in 2016.</b>
<i>Empidonax difficilis</i>	Pacific-slope flycatcher	Y	X		
<i>Euphagus cyanocephalus</i>	Brewer's blackbird	Y	X		
<i>Falco sparverius</i>	American kestrel	Y	X	X	
<i>Fulica americana</i>	American coot	Y	X	X	
<i>Geococcyx californianus</i>	greater roadrunner	Y	X		
<i>Geothlypis trichas</i>	common yellowthroat	Y	X		
<i>Haemorhous mexicanus</i>	house Finch	Y	X	X	
<i>Hirundo rustica</i>	barn swallow	Y	X		
<i>Icterus bullockii</i>	Bullock's oriole	Y	X		
<i>Icterus cucullatus</i>	hooded oriole	Y	X		
<i>Junco hyemalis</i>	Dark-eyed Junco	Y		X	
<b><i>Lanius ludovicianus</i></b>	<b>loggerhead Shrike</b>	<b>Y</b>		<b>X</b>	<b>CDFW SSC, observed in 2016 by BRC</b>
<i>Megaceryle alcyon</i>	belted kingfisher	Y	X		
<i>Melospiza melodia</i>	song sparrow	Y	X		
<i>Melospiza crissalis</i>	California towhee	Y	X	X	
<i>Mimus polyglottos</i>	northern mockingbird	Y	X		
<i>Molothrus ater</i>	brown-headed cowbird	N	X		
<i>Myiarchus cinerascens</i>	ash-throated flycatcher	Y	X		
<i>Nycticorax nycticorax</i>	black-crowned night-heron	Y	X		

<i>Oxyura jamaicensis</i>	ruddy duck	Y		X	
<i>Passerina amoena</i>	lazuli bunting	Y	X		
<i>Passerina caerulea</i>	blue grosbeak	Y	X		
<i>Petrochelidon pyrrhonota</i>	cliff swallow	Y	X		
<i>Phainopepla nitens</i>	phainopepla	Y	X		
<i>Phalacrocorax auritus</i>	double-crested cormorant	Y	X		
<i>Pheucticus melanocephalus</i>	black-headed grosbeak	Y	X		
<i>Picoides nuttallii</i>	Nuttall's woodpecker	Y	X		
<i>Picoides pubescens</i>	downy woodpecker	Y	X		
<i>Pipilo maculatus</i>	spotted towhee	Y	X		
<i>Podilymbus podiceps</i>	pie-billed grebe	Y	X	X	
<i>Polioptila caerulea</i>	blue-gray Gnatcatcher	Y		X	
<i>Porzana carolina</i>	sora	Y		X	
<i>Psaltriparus minimus</i>	bushtit	Y	X		
<i>Quiscalus mexicanus</i>	great-tailed grackle	Y	X		
<i>Salpinctes obsoletus</i>	rock wren	Y	X	X	
<i>Sayornis nigricans</i>	Black phoebe	Y	X	X	
<i>Sayornis saya</i>	Say's phoebe	Y		X	
<i>Selasphorus sasin</i>	Allen's hummingbird	Y	X		
<i>Sialia mexicana</i>	western bluebird	Y		X	
<i>Spinus psaltria</i>	lesser goldfinch	Y		X	
<i>Stelgidopteryx serripennis</i>	northern rough-winged swallow	Y	X		
<i>Turdus migratorius</i>	American robin	Y		X	
<i>Tyrannus verticalis</i>	western kingbird	Y		X	
<i>Tyto alba</i>	barn owl	Y		X	
<i>Yellow-rumped warbler</i>	yellow-rumped warbler	Y		X	
<i>Zenaida macroura</i>	mourning dove	Y		X	

<i>Zonotrichia leucophrys</i>	white-crowned sparrow	Y		X	
<b>Mammals</b>					
<i>Canis latrans</i>	coyote	Y	X	X	
<i>Chaetodipus californicus</i>	California pocket mouse	Y	X		
<i>Lynx rufus</i>	bobcat	Y	X		
<i>Neotoma fuscipes</i>	dusky-footed woodrat	Y	X	X	
<b><i>Neotoma lepida intermedia</i></b>	<b>San Diego desert woodrat</b>	<b>Y</b>	<b>X</b>	<b>X</b>	<b>CDFW SSC, trapped in 2010; middens observed in 2016 by BRC</b>
<i>Odocoileus hemionus</i>	mule deer	Y	X		
<i>Peromyscus californicus</i>	California mouse	Y	X		
<i>Peromyscus eremicus</i>	cactus mouse	Y	X		
<i>Peromyscus maniculatus</i>	deer mouse	Y	X		
<i>Spermophilus beecheyi</i>	California ground squirrel	Y	X	X	
<i>Sylvilagus audubonii</i>	desert cottontail	Y	X	X	
<i>Thomomys bottae</i>	Botta's pocket gopher	Y	X	X	

APPENDIX C-2  
PACIFIC ROCK QUARRY EXPANSION PROJECT:  
JUNE 2018 RARE PLANT SURVEY AND BURROWING OWL HABITAT  
ASSESSMENT RESULTS MEMORANDUM





# Memorandum

date           October 23, 2018

to             Bob Delp, Benchmark Resources

from          Dale Hameister, Senior Biologist, ESA  
              Greg Ainsworth, Director of Biological Resources, ESA

subject       Pacific Rock Quarry Expansion Project: June 18 Rare Plant Survey and Burrowing Owl Habitat Assessment Results

## Introduction

This technical memorandum describes the methods and results of a rare plant survey and burrowing owl habitat assessment conducted by Environmental Science Associates, Inc. (ESA) in June of 2018 to provide information in support of the environmental impact report (EIR) being prepared for the proposed Pacific Rock Quarry Expansion Project (project).

Approval of the project is subject to discretionary review by the County of Ventura (County), requiring environmental review in compliance with the California Environmental Quality Act (CEQA). ESA is subcontracted to Benchmark Resources which is contracted with the County to prepare the an EIR for the project. Because the project would expand mining operations to areas with the potential to contain habitat and species with special status under federal, state, and or local regulations, an assessment of these habitats and potential special-status species occurrence is required. The application materials include a 2017 Initial Study Biological Assessment (ISBA) prepared by BioResources Consultants, Inc., on behalf of the applicant. Upon review of that report, the County determined that supplemental information including rare plant surveys and burrowing owl habitat surveys are necessary to provide information for the EIR. The survey results documented herein are intended for use by ESA and Benchmark Resources in preparing the biological resources impact assessment for the EIR.

## Project Overview

The proposed project includes a modification to the existing Conditional Use Permit (CUP) and the approval of an amended Reclamation Plan to authorize the expansion of ongoing mining operations at the Pacific Rock Quarry. The project site is located on Howard Road in unincorporated Ventura County, California, south of the city of Camarillo, south of State Highway 101, and north of Portero Road (**Attachment A, Figure 1**), immediately to the east of active agricultural fields and the Conejo Mountain Funeral Home, Memorial Park & Crematory (**Attachment A, Figure 2**).

As proposed, mining would occur over an approximately 172.8-acre area (entirely within APNs 234006022 and 234006019). Mining operations would continue in the same manner as under current operations, involving blasting to loosen the hard rock material and various processing methods.

## Methodology

### Literature Review

ESA conducted a literature review to gather information on the natural resources and special status species known or likely to occur in the area. This included a review of the following:

- Initial Study Biological Assessment (ISBA), BioResource Consultants, Inc. Report Revised February 16, 2017.
- California Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDDB). Accessed May, 2018.
- CDFW. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities, March 20, 2018
- United States Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPac) Environmental Conservation Online System (ECOS). Accessed May, 2018.

### Rare Plant Survey

ESA biologists/botanists Robert Sweet and Dale Hameister led a plant survey on the project site on June 4, 5 and 6, 2018. The survey included the entire mine area boundary, including areas within the existing CUP and existing mining areas, as well as an approximately 200 ft. “buffer” beyond the proposed project’s expansion limits (the combined expansion area and buffer are referred to herein as the “study area”). The survey focused primarily on rare plants; however, all species were inventoried (See **Attachment B, Species Compendium**).

The plant survey was conducted during the blooming periods of potentially-occurring special-status plant species (See **Table 1, Targeted Species for Rare Plant Survey**) and in accordance with the *CDFW Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities* (CDFW, March 20, 2018). A known reference site located approximately one-half mile from the project site that contains blooming populations of Blochman’s dudleya (*Dudleya blochmaniae ssp. blochmaniae*), Conejo buckwheat (*Eriogonum crocatum*), and Verity’s dudleya (*Dudleya parva*), was surveyed and all three species were in full bloom at the time of the surveys. The study area includes steep slopes and vertical rock faces. Pedestrian transects spaced approximately 30 feet apart were walked in all accessible areas within the study area in search of any rare plants. Steep terrain that was not accessible is located at the northern portion of the expansion area, which was assessed from the nearest vantage point using binoculars. Biologists identified each plant to the species- or subspecies-level using a dichotomous key. Plant species observed are listed in Attachment A.

All wildlife species observed, including any sign such as scat, tracks, feathers, bones, etc. were documented and are listed in Attachment B, Observed Wildlife Species.

### Burrowing Owl Habitat Assessment

The ISBA (BioResource Consultants, February 2017) concluded that western burrowing owl (*Athene cunicularia hypugaea*) are known to occur in the region, and therefore, have potential to occur within the low-lying grass-dominated areas located within the lower elevation of the study area. Therefore, during the plant survey, ESA biologists searched for any sign of burrowing owl presence, including any ground squirrel burrows capable of supporting burrowing owls, as well as feathers, scat, pellets, bone fragments, etc. Burrowing owls are also known

to use man-made structures for wintering and breeding, such as irrigation pipes, culverts, and debris stockpiles, each of which are present within the site and were visually inspected during the survey.

## Results

### **Rare Plant Survey**

Ten special-status species were determined to have a high potential to occur in the study area based on the results of the CNDDDB search and the presence of suitable habitat in the study area (e.g., coastal sage scrub, native soils, elevation, slope). Five of the special-status species were observed during the surveys: Catalina mariposa lily (*Calochortus catalinae*), club haired mariposa lily (*Calochortus clavatus* var. *clavatus*), Blochman's dudleya (*Blochman's dudleya*), Conejo buckwheat (*Eriogonum crocatum*), and southern California black walnut (*Juglans californica*). As depicted in **Attachment A, Figure 3, Rare Plant Locations**, all of the rare plants were observed within the study area. Representative photographs of the habitat within the study area is provided in **Attachment C, Photographs**.

**Table 1, Targeted Species for Rare Plant Survey**, lists the ten special-status plant species and status, and identifies whether they were observed as present within the survey area and, if so, the general locations/terrain in which they were observed. **Table 2, Rare Plant Survey Results**, identifies the number of individual plants of each species observed within the study area.

Specifically, the two mariposa lily species were observed in clustered populations within the grassland areas in the southwest and southern portions of the study area that are dominated by short-pod mustard and non-native grasses including non-native compact brome (*Bromus madritensis*), wild oats (*Avena fatua*), and Harding grass (*Phalaris aquatica*). The Blochman's dudleya were observed in large numbers on rock outcrops located in the eastern portion of the study area with smaller populations also observed within the rock outcrops located at the southwest portion of the study area. The areas where Blochman's dudleya were observed were commonly associated with Bigelow's spikemoss (*Selaginella bigelovii*) and compact brome. Conejo buckwheat was observed northern, eastern, and southern portions of the study area, generally on south-facing steep to vertical surfaces. The majority of the Conejo buckwheat was observed using binoculars from the nearest vantage point due to its presence on steep slopes that are not accessible.

**TABLE 1:  
TARGETED SPECIES FOR RARE PLANT SURVEY**

Scientific Name	Common Names	Status Federal/State/CNPS	Present or Absent	Location Observed
<i>Calochortus catalinae</i>	Catalina mariposa-lily	None/None/4.2	Present	Observed within grassland slopes in the southern portion of the survey area.
<i>Calochortus clavatus</i> <i>var. clavatus</i>	Club haired mariposa-ily	None/None/4.3	Present	Observed within grassland slopes in the southern portion of the survey area.
<i>Calochortus plummerae</i>	Plummer's mariposa-lily	None/None/4.2	Absent	
<i>Dudleya blochmaniae</i> <i>ssp. blochmaniae</i>	Blochman's dudleya	None/None/1B.1	Present	Observed on flat tops of large boulders and steep to vertical surfaces in the east, and southwestern portions of the survey area. Commonly associated with Bigelow's spikemoss and compact brome in patches of soil on the flat tops of large rocks.
<i>Dudleya parva</i>	Verity's dudleya	FT/None/1B.1	Absent	
<i>Eriogonum crocatum</i>	Conejo buckwheat	None/Rare/1B.1	Present	Observed on generally south and east facing steep to vertical surfaces in the north, eastern and southern parts of the survey area.
<i>Juglans californica</i>	Southern California black walnut	None/None/4.2	Present	Observed within the drainage on the south side of the survey area.
<i>Navarretia ojaiensis</i>	Ojai navarretia	None/None/1B.1	Absent	
<i>Pentachaeta lyonii</i>	Lyon's pentachaeta	FE/ SE/1B.1	Absent	
<i>Texosporium sancti-jacobi</i>	woven-spored lichen	None/None/3	Absent	

Federal  
 FE = Endangered  
 FT = Threatened  
 State  
 SE = Endangered  
 ST = Threatened  
 CNPS - California Rare Plant Rank  
 1B. Rare or Endangered in California and elsewhere  
 3. Plants for which we need more information - Review list  
 4. Plants of limited distribution - Watch list

**TABLE 2:  
RARE PLANT SURVEY RESULTS**

Scientific Name	Common Names	Number of Plants within Proposed CUP Boundary	Number of Plants within 200-foot Buffer Area
<i>Calochortus catalinae</i>	Catalina mariposa-lily	180	4
<i>Calochortus clavatus</i> var. <i>clavatus</i>	Club haired mariposa lily	13	
<i>Dudleya blochmaniae</i> ssp. <i>blochmaniae</i>	Blochman's dudleya	857	21
<i>Eriogonum crocatum</i>	Conejo buckwheat	54	35
<i>Juglans californica</i>	Southern California black walnut	6	

### **Burrowing Owl Habitat Assessment**

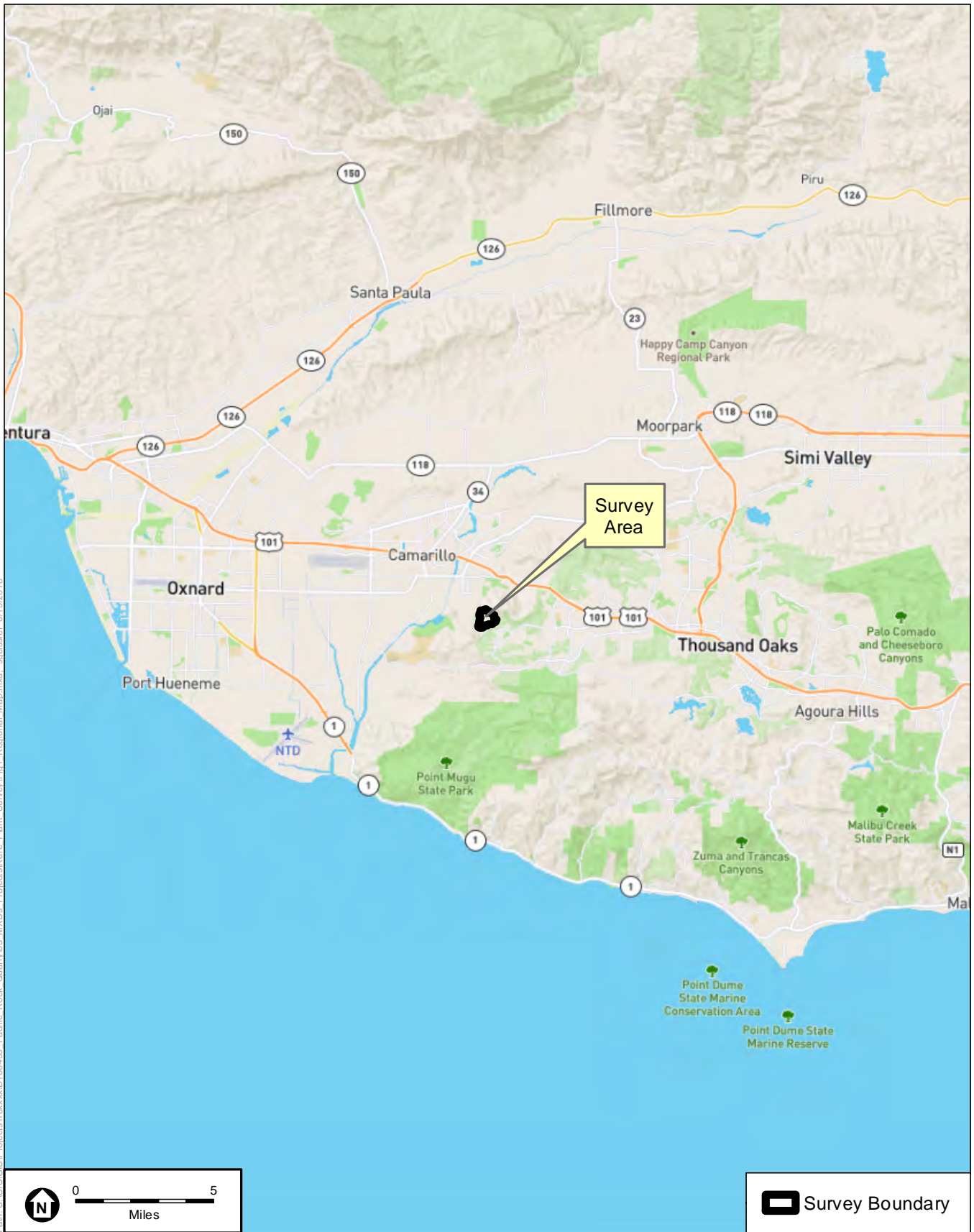
Burrowing owls generally occur on flat terrain; therefore, the study area provides marginal habitat for burrowing owls due to the presence of steep slopes in much of the site. No suitable burrows were observed within the study area and no burrowing owl individuals or sign of presence was observed; therefore, burrowing owls are not expected to occur within the study area.

The following common wildlife species were observed: reptiles - western fence lizard (*Sceloporus occidentalis*), southern Pacific rattlesnake (*Crotalus oreganus helleri*), and granite spiny lizard (*Sceloporus orcutti*); birds - red-tailed hawk (*Buteo jamaicensis*), turkey vulture (*Cathartes aura*), Anna's hummingbird (*Calypte anna*), Allen's hummingbird (*Selasphorus sasin*), mourning dove (*Zenaida macroura*), Nuttall's woodpecker (*Picoides nuttallii*), Western scrub-jay (*Aphelocoma californica*), common raven (*Corvus corax*), bushtit (*Psaltriparus minimus*), northern mockingbird (*Mimus polyglottos*), California towhee (*Pipilo crissalis*), house finch (*Carpodacus mexicanus*), Bewick's wren (*Thryomanes bewickii*), and lesser goldfinch (*Carduelis psaltria*); mammals - desert cottontail (*Sylvilagus audubonii*), and sign of coyote (*Canis latrans*) and southern mule deer (*Odocoileus hemionus*).

Several species of common waterfowl and wading birds were observed at the basin/pond in the western portion of the study area, including American coot (*Fulica americana*), mallard (*Anas platyrhynchos*), ruddy duck (*Oxyura jamaicensis*), and black-crowned night heron (*Nycticorax nycticorax*). A complete list of wildlife species observed during the field surveys is provided in Attachment B, Species Compendium.

# Attachment A

## **Figures**

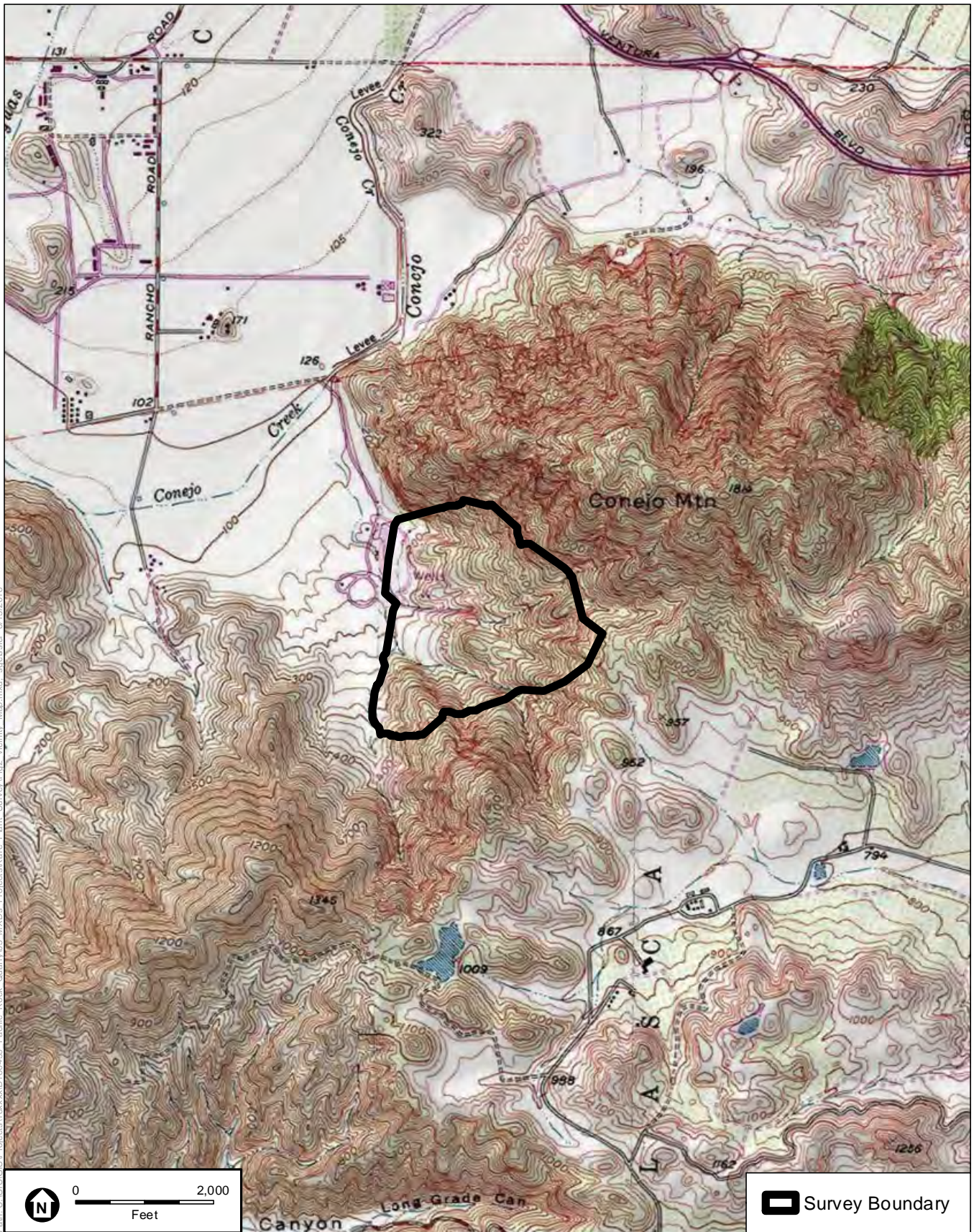


SOURCE: Open Street Map, 2018.

Pacific Rock Quarry Mine Expansion

**Figure 1**  
Regional Map



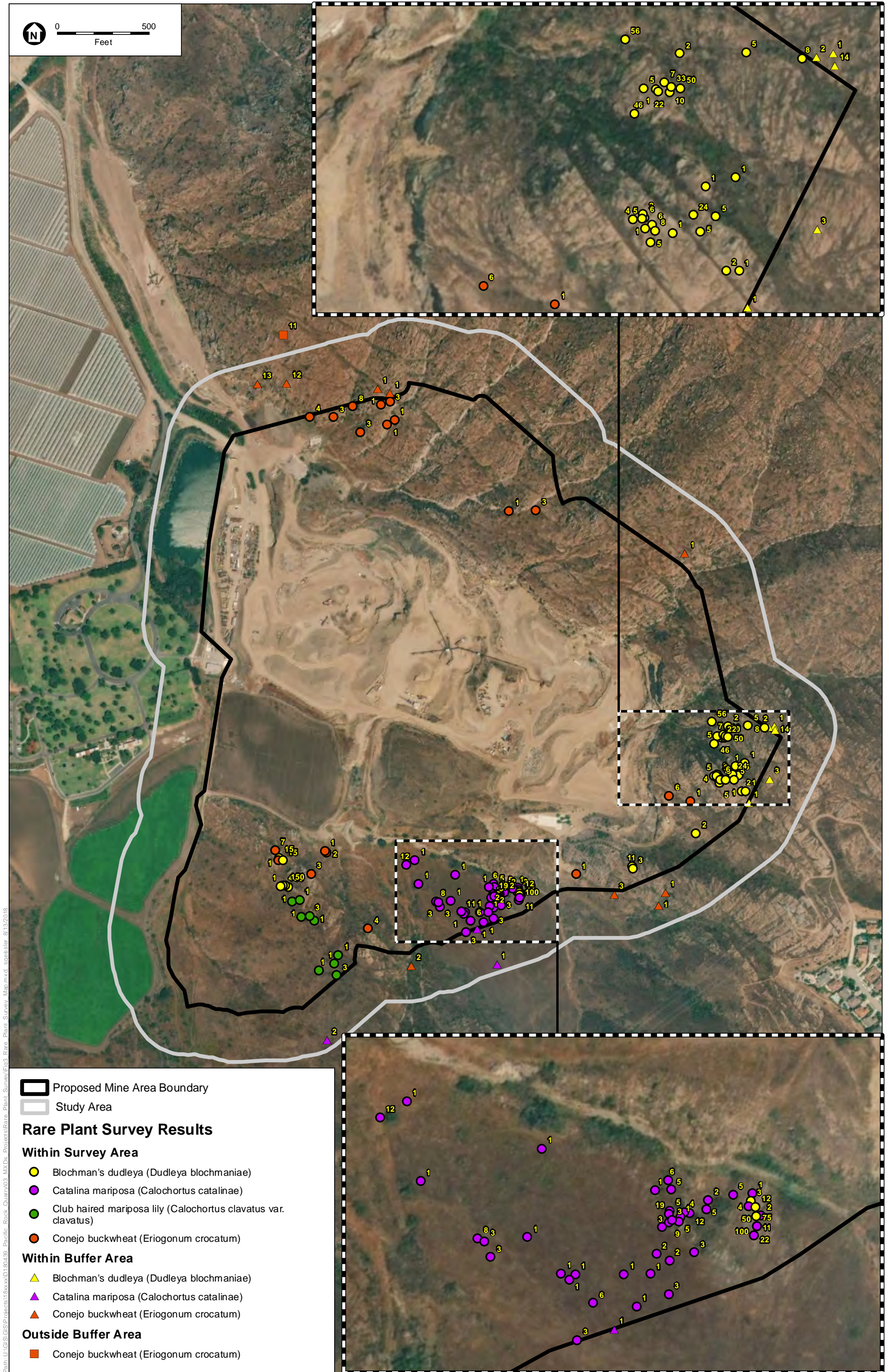


SOURCE: USGS Topographic Series (Camarillo, Newbury Park, CA).

Pacific Rock Quarry Mine Expansion

**Figure 2**  
Vicinity Map





Path: U:\GIS\Projects\18xxx\180428\_Pacific\_Rock\_Quarry\03\_Maps\Projects\Rare\_Plant\_Survey\Map.mxd\_spteb18\_8/18/2018

SOURCE: ESRI, 2018.

Pacific Rock Quarry Mine Expansion

**Figure 3**  
Rare Plant Survey Map



**Attachment B**  
**Species Compendium**

# Pacific Rock Plant Species Compendia

Scientific Name	Common Name	Special Status
<b>LYCOPHYTES</b>		
<b>Selaginellaceae - Spike-moss family</b>		
<i>Selaginella bigelovii</i>	Bushy spike-moss	
<b>FERNS</b>		
<b>Pteridaceae - Brake family</b>		
<i>Cheilanthes newberryi</i>	Newberry's lip fern	
<b>EUDICOTS</b>		
<b>Aizoaceae - Fig-marigold family</b>		
* <i>Carpobrotus edulis</i>	Freeway iceplant	
<b>Anacardiaceae - Sumac Or Cashew family</b>		
<i>Malosma laurina</i>	Laurel sumac	
<i>Rhus aromatica</i>	Skunk bush	
<i>Rhus integrifolia</i>	Lemonade berry	
<i>Rhus ovata</i>	Sugar bush	
<i>Toxicodendron diversilobum</i>	Western poison oak	
<b>Apiaceae - Carrot family</b>		
* <i>Conium maculatum</i>	Poison hemlock	
<i>Sanicula crassicaulis</i>	Pacific blacksnakeroot	
<b>Apocynaceae - Dogbane family</b>		
<i>Asclepias fascicularis</i>	Narrow-leaf milkweed	
<b>Asteraceae - Sunflower family</b>		
<i>Ambrosia dumosa</i>	White bur-sage	
<i>Anaphalis margaritacea</i>	Western pearly everlasting	
<i>Artemisia californica</i>	California sagebrush	
<i>Artemisia douglasiana</i>	Mugwort	
<i>Baccharis salicifolia</i> ssp. <i>salicifolia</i>	Mule fat	
* <i>Centaurea melitensis</i>	Tocalote	
<i>Deinandra fasciculata</i>	Clustered tarweed	
<i>Encelia californica</i>	California brittlebush	
* <i>Erigeron bonariensis</i>	Flax-leaved horseweed	
<i>Erigeron canadensis</i>	Horseweed	
<i>Eriophyllum confertiflorum</i>	Golden-yarrow, yellow-yarrow	
<i>Hazardia squarrosa</i>	Saw-toothed goldenbush	
<i>Helianthus annuus</i>	Common sunflower	
<i>Isocoma menziesii</i>	Coastal goldenbush	
* <i>Lactuca serriola</i>	Prickly lettuce	

Scientific Name	Common Name	Special Status
<i>Lasthenia californica</i>	California goldfields	
* <i>Logfia gallica</i>	Daggerleaf cottonrose	
<i>Microseris douglasii</i>	Douglas' silverpuffs	
<i>Pseudognaphalium beneolens</i>		
* <i>Pseudognaphalium luteoalbum</i>	Jersey cudweed	
* <i>Sonchus asper ssp. asper</i>	Prickly sow thistle	
* <i>Sonchus oleraceus</i>	Common sow thistle	
<i>Venegasia carpesioides</i>	Canyon sunflower	
<b>Boraginaceae - Borage family</b>		
<i>Cryptantha sp.</i>	Cryptantha	
<i>Phacelia cicutaria var. hispida</i>	Caterpillar phacelia	
<i>Phacelia parryi</i>	Parry's phacelia	
<b>Brassicaceae - Mustard family</b>		
* <i>Brassica rapa</i>	Turnip, field mustard	
* <i>Hirschfeldia incana</i>	Shortpod mustard	
<i>Lepidium densiflorum</i>	Common pepperweed	
* <i>Sisymbrium irio</i>	London rocket	
<b>Cactaceae - Cactus family</b>		
<i>Opuntia littoralis</i>	Coastal prickly-pear	
<b>Chenopodiaceae - Goosefoot family</b>		
* <i>Chenopodium album</i>	Lamb's quarters	
* <i>Salsola tragus</i>	Russian thistle, tumbleweed	
<b>Convolvulaceae - Morning-glory family</b>		
<i>Calystegia macrostegia</i>	Island false bindweed	
<i>Cuscuta californica</i>	Chaparral dodder	
<b>Crassulaceae - Stonecrop family</b>		
<i>Dudleya blochmaniae ssp. blochmaniae</i>	Blochman's dudleya	CRPR 1B.1
<i>Dudleya cymosa</i>	Canyon liveforever	
<i>Dudleya pulverulenta</i>	Chalk dudleya	
<b>Cucurbitaceae - Gourd family</b>		
<i>Marah macrocarpa</i>	Chilicothe	
<b>Euphorbiaceae - Spurge family</b>		
<i>Croton setigerus</i>	Turkey-Mullein	
* <i>Ricinus communis</i>	Castorbean	
<b>Fabaceae - Legume family</b>		
<i>Acmispon argophyllus</i>	Silver bird's-foot trefoil	
<i>Acmispon glaber</i>	Deerweed, California broom	
<i>Lupinus succulentus</i>	Arroyo lupine	

Scientific Name	Common Name	Special Status
* <i>Melilotus indicus</i>	Sourclover	
* <i>Trifolium hirtum</i>	Rose clover	
<b>Fagaceae - Oak family</b>		
<i>Quercus agrifolia</i>	Coast live oak, encina	
<b>Geraniaceae - Geranium family</b>		
* <i>Erodium cicutarium</i>	Redstem filaree	
<b>Grossulariaceae - Gooseberry family</b>		
<i>Ribes malvaceum</i>	Chaparral currant	
<b>Juglandaceae - Walnut family</b>		
<i>Juglans californica</i>	Southern California black walnut	CRPR 4.2
<b>Lamiaceae - Mint family</b>		
<i>Salvia columbariae</i>	Chia	
<i>Salvia leucophylla</i>	Purple sage	
<i>Salvia mellifera</i>	Black sage	
<b>Malvaceae - Mallow family</b>		
<i>Malacothamnus fasciculatus</i>	Chaparral mallow	
* <i>Malva parviflora</i>	Cheeseweed, little mallow	
<b>Nyctaginaceae - Four O'clock family</b>		
<i>Mirabilis laevis var. crassifolia</i>	Wishbone bush	
<b>Onagraceae - Evening Primrose family</b>		
<i>Clarkia bottae</i>	Punchbowl godetia	
<i>Epilobium ciliatum</i>	Fringed willowherb	
<b>Orobanchaceae - Broom-rape family</b>		
<i>Castilleja affinis</i>	Coast indian paintbrush	
<i>Castilleja exserta</i>	Purple owl's-clover	
<b>Oxalidaceae - Oxalis family</b>		
* <i>Oxalis pes-caprae</i>	Bermuda buttercup	
<b>Phrymaceae - Lopseed family</b>		
<i>Diplacus aurantiacus</i>	Stickly monkeyflower	
<i>Erythranthe cardinalis</i>	Scarlet monkeyflower	
<b>Plantaginaceae - Plantain family</b>		
<i>Antirrhinum nuttallianum</i>		
<i>Collinsia concolor</i>	Chinese houses	
<b>Polygonaceae - Buckwheat family</b>		
<i>Eriogonum cinereum</i>	Coastal wild buckwheat	
<i>Eriogonum crocatum</i>	Conejo buckwheat	SR, CRPR 1B.2
<i>Eriogonum fasciculatum</i>	California buckwheat	
* <i>Rumex crispus</i>	Curly dock	

Scientific Name	Common Name	Special Status
<b>Primulaceae - Primrose family</b>		
<i>Dodecatheon clevelandii</i>	Padre's shooting star	
<b>Ranunculaceae - Buttercup family</b>		
<i>Delphinium parryi</i> ssp. <i>parryi</i>	Parry's larkspur	
<b>Rhamnaceae - Buckthorn family</b>		
<i>Ceanothus megacarpus</i>	Bigpod ceanothus	
<i>Frangula californica</i>	California coffee berry	
<i>Rhamnus ilicifolia</i>	Hollyleaf redberry	
<b>Rosaceae - Rose family</b>		
<i>Adenostoma fasciculatum</i>	Chamise, greasewood	
<i>Cercocarpus betuloides</i>		
<b>Rubiaceae - Madder family</b>		
<i>Galium angustifolium</i>	Narrowly leaved bedstraw	
<b>Salicaceae - Willow family</b>		
<i>Salix exigua</i>	Narrowleaf willow	
<i>Salix gooddingii</i>	Goodding's black willow	
<i>Salix laevigata</i>	Red willow	
<i>Salix lasiolepis</i>	Arroyo willow	
<b>Solanaceae - Nightshade family</b>		
<i>Datura wrightii</i>	Sacred thorn-apple	
* <i>Nicotiana glauca</i>	Tree tobacco	
<i>Solanum americanum</i>	American black nightshade	
<i>Solanum umbelliferum</i>	Bluewitch nightshade	
<b>Tamaricaceae - Tamarisk family</b>		
* <i>Tamarix ramosissima</i>	Saltcedar	
<b>Valerianaceae - Valerian family</b>		
<i>Valeriana occidentalis</i>	Western valerian	
<b>MONOCOTS</b>		
<b>Agavaceae - Century Plant family</b>		
<i>Hesperoyucca whipplei</i>	Chaparral yucca	
<b>Arecaceae - Palm family</b>		
<i>Washingtonia filifera</i>	California fan palm	
* <i>Washingtonia robusta</i>	Mexican fan palm	
<b>Cyperaceae - Sedge family</b>		
<i>Cyperus eragrostis</i>	Tall flatsedge	
<i>Schoenoplectus californicus</i>	Southern bulrush	
<b>Iridaceae - Iris family</b>		
<i>Sisyrinchium bellum</i>	Western blue-eyed-grass	

Scientific Name	Common Name	Special Status
<b>Liliaceae - Lily family</b>		
<i>Calochortus catalinae</i>	Catalina mariposa lily	CRPR 4.2
<i>Calochortus clavatus</i> var. <i>clavatus</i>	Club-haired mariposa lily	CRPR 4.3
<b>Poaceae - Grass family</b>		
* <i>Avena barbata</i>	Slender wild oat	
* <i>Avena fatua</i>	Wild oat	
* <i>Bromus diandrus</i>	Ripgut grass	
* <i>Bromus madritensis</i>	Compact brome	
<i>Elymus condensatus</i>	Giant wild-rye	
<i>Festuca microstachys</i>	Pacific fescue	
* <i>Festuca myuros</i>	Rattail sixweeks grass	
* <i>Lamarckia aurea</i>	Goldentop grass	
<i>Melica imperfecta</i>	Little California melica	
* <i>Pennisetum setaceum</i>	Crimson fountain grass	
* <i>Phalaris aquatica</i>	Harding grass	
* <i>Polypogon monspeliensis</i>	Annual beard grass, rabbitfoot grass	
<i>Stipa lepida</i>	Foothill needle grass	
<i>Stipa pulchra</i>	Purple needle grass	
<b>Themidaceae - Brodiaea family</b>		
<i>Bloomeria crocea</i>	Common goldenstar	
<i>Dichelostemma capitatum</i>	Blue dicks	
<b>Typhaceae - Cattail family</b>		
<i>Typha domingensis</i>	Southern cattail	

Scientific Name	Common Name	Special Status
<b>Legend</b>		
* = Non-native or invasive species		
Special Status:		
Federal:		
FE = Endangered		
FT = Threatened		
State:		
SE = Endangered		
ST = Threatened		
CRPR – California Rare Plant Rank		
1A. Presumed extinct in California		
1B. Rare or Endangered in California and elsewhere		
2. Rare or Endangered in California, more common elsewhere		
3. Plants for which we need more information - Review list		
4. Plants of limited distribution - Watch list		
Threat Ranks		
.1 - Seriously endangered in California		
.2 – Fairly endangered in California		



Pacific Rock **Wildlife Species Compendia**

<b>Scientific Name</b>	<b>Common Name</b>	<b>Special Status</b>
<b>VERTEBRATES</b>		
<b>Reptiles</b>		
<i>Sceloporus occidentalis</i>	Western Fence Lizard	
<i>Sceloporus orcutti</i>	Granite Spiny Lizard	
<i>Uta stansburiana</i>	Side-blotched Lizard	
<i>Aspidoscelis tigris multiscutatus</i>	Coastal Western Whiptail	
<i>Crotalus oreganus helleri</i>	Southern Pacific Rattlesnake	
<b>Birds</b>		
<i>Anas platyrhynchos</i>	Mallard	
<i>Oxyura jamaicensis</i>	Ruddy Duck	
<i>Ardea herodias</i>	Great Blue Heron	
<i>Ardea alba</i>	Great Egret	
<i>Egretta thula</i>	Snowy Egret	
<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	
<i>Cathartes aura</i>	Turkey Vulture	
<i>Buteo lineatus</i>	Red-shouldered Hawk	
<i>Buteo jamaicensis</i>	Red-tailed Hawk	
<i>Falco sparverius</i>	American Kestrel	
<i>Fulica americana</i>	American Coot	
* <i>Columba livia</i>	Rock Pigeon	
* <i>Streptopelia decaocto</i>	Eurasian Collared-Dove	
<i>Zenaida macroura</i>	Mourning Dove	
<i>Bubo virginianus</i>	Great Horned Owl	
<i>Calypte anna</i>	Anna's Hummingbird	
<i>Selasphorus sasin</i>	Allen's Hummingbird	
<i>Picoides nuttallii</i>	Nuttall's Woodpecker	
<i>Sayornis nigricans</i>	Black Phoebe	
<i>Sayornis saya</i>	Say's Phoebe	
<i>Tyrannus vociferans</i>	Cassin's Kingbird	
<i>Aphelocoma californica</i>	Western Scrub-Jay	
<i>Corvus brachyrhynchos</i>	American Crow	
<i>Corvus corax</i>	Common Raven	

Scientific Name	Common Name	Special Status
<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow	
<i>Petrochelidon pyrrhonota</i>	Cliff Swallow	
<i>Hirundo rustica</i>	Barn Swallow	
<i>Psaltriparus minimus</i>	Bushtit	
<i>Thryomanes bewickii</i>	Bewick's Wren	
<i>Mimus polyglottos</i>	Northern Mockingbird	
* <i>Sturnus vulgaris</i>	European Starling	
<i>Pipilo maculatus</i>	Spotted Towhee	
<i>Aimophila ruficeps canescens</i>	Southern California Rufous-crowned Sparrow	
<i>Melospiza crissalis</i>	California Towhee	
<i>Melospiza melodia</i>	Song Sparrow	
<i>Icterus cucullatus</i>	Hooded Oriole	
<i>Carpodacus mexicanus</i>	House Finch	
<i>Carduelis psaltria</i>	Lesser Goldfinch	
<b>Mammals</b>		
<i>Sylvilagus audubonii</i>	Desert Cottontail	
<i>Canis latrans</i>	Coyote	
<i>Procyon lotor</i>	Northern Raccoon	
<i>Odocoileus hemionus</i>	Southern Mule Deer	

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### Legend

\*= Non-native or invasive species

Special Status:

Federal:

FE = Endangered

FT = Threatened

State:

SE = Endangered

ST =Threatened

CSC = California Species of Special Concern

CFP = California Fully Protected Species

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Attachment C  
**Site Photographs**



Photograph 1: Blochman's dudleya observed in rocky area in the eastern portion of the expansion area.



Photograph 2: Catalina mariposa-lily observed in the grassland areas in the southern portion of the expansion area.



Photograph 3: Club haired mariposa in the grassland areas in the southern portion of the expansion area.



Photograph 4: Conejo buckwheat observed on steep cliff in the southeastern portion of the expansion area.



Photograph 5: Agricultural area in the western portion of the expansion area. The area was surveyed for potential habitat and suitable burrow for burrowing owl. No suitable burrows were observed.



Photograph 6: Showing habitat for Conejo buckwheat and Blochman's dudleya in the northern section of the expansion area.

APPENDIX D-1  
UPDATED GEOLOGIC AND GEOTECHNICAL REVIEW REPORT,  
MODIFICATION TO CONDITIONAL USE PERMIT (CUP) FOR PACIFIC  
ROCK QUARRY, AS RELATED TO CALIFORNIA MINE ID NO. 91-56-0011,  
100 SOUTH HOWARD ROAD, CAMARILLO AREA, COUNTY OF VENTURA

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# JCR CONSULTING

**ENGINEERING GEOLOGY, PERCOLATION TESTING, SEPTIC SYSTEM DESIGN AND QSD/QSP**

File No.: JCR13-01132

December 3, 2016

**PACIFIC ROCK, INC.**

P.O. Box 255

Somis, CA 93066

Attn.: Mr. Tom Staben

**SUBJECT:** Updated Geologic and Geotechnical Review Report, Modification to Conditional Use Permit (CUP) for Pacific Rock Quarry, as Related to California Mine ID No. 91-56-0011, 100 South Howard Road, Camarillo Area, County of Ventura.

Dear Mr. Staben:

In accordance with your request, this updated report has been prepared to summarize the results of our review and supplemental geologic and geotechnical of the planned revisions to your current Conditional Use Permit (CUP) which include the expansion of Pacific Rock Quarry. It is our understanding, based upon our review of the revised mining plan, that it is proposed to extend the previous limits of the quarry area. The planned final cut slope gradient within the CUP boundaries has been modified to a uniform 1:1 slope ratio. The changes were proposed to correct the existing “oversteepened” slope conditions at the northerly and northeasterly sides of the quarry and for expansion onto recently acquired adjacent land parcels.

## **SCOPE OF WORK**

The scope of work for this updated report included the completion of the following tasks:

1. Review of general geologic maps and geologic information pertaining to the site and its vicinity, including:
  - a. Surface Mining and Reclamation Act of 1975, California Department of Conservation, Office of Mine Reclamation, updated January 2007.
  - b. Geologic Map of the Camarillo and Newbury Park Quadrangles, T.W. Dibblee, Jr., 1990.
  - c. Seismic Hazard Map of the Newbury Park Quadrangle, California Division of Mines and Geology, dated February 7, 2002.
  - d. Earthquake Fault Zone Map of the Newbury Park Quadrangle, California Division of Mines and Geology, May 1, 1999.



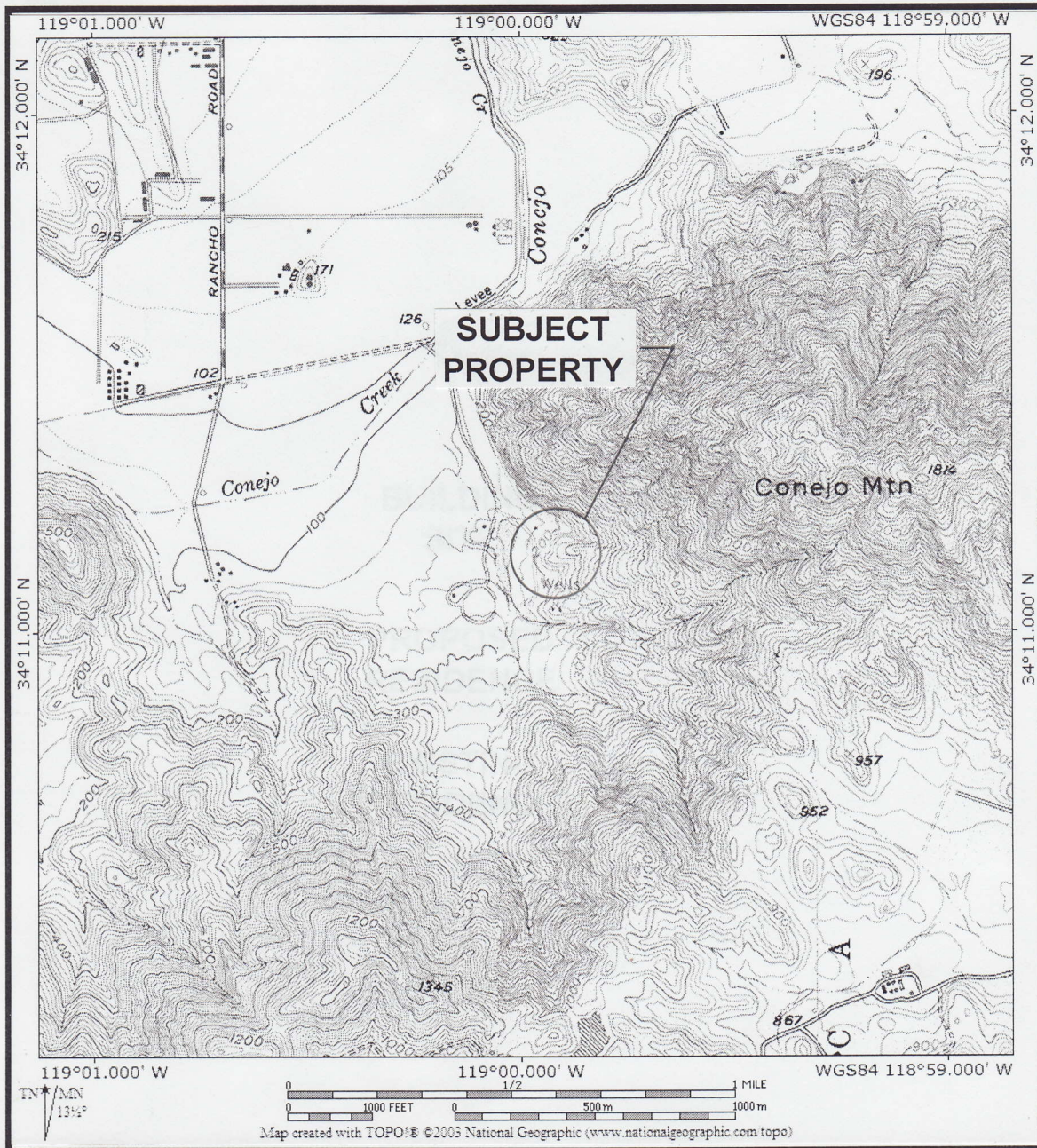
- e. Seismic Hazards Study of Ventura County, California, California Division of Mines and Geology, Open File Report 76-5-LA.
  - f. Geology and Mineral Resources Study of Southern Ventura County, California, California Division of Mines and Geology, Preliminary Report 14, 1973.
2. Review of previously prepared geologic and geotechnical reports prepared for the subject property. A complete list of references is included in Appendix III.
  3. Review of the revised Reclamation Plan Set, prepared by Sespe Consulting, Inc., not dated.
  4. Update of the Geologic Map using the current Topographic Map as a base, included as Plate 1.
  5. Preparation of four Geologic Cross-Sections to evaluate the existing geologic conditions with respect to the proposed mining excavations, included as Plate 2.
  6. Slope stability analysis of the planned slope excavations/final slope configuration.
  7. Preparation of this updated report to present the results of our analysis and our geologic and geotechnical recommendations.

The geologic information obtained from our review of the previous reports by Gold Coast GeoServices, Inc., as well as supplemental geologic information mapped by this office, have been plotted on the Geologic Map included as Plate 1 with this report. The Geologic Map uses the current Mining and Reclamation Plan by Sespe Consulting, Inc. as a base. Graphic depiction of the subsurface geology, with respect to the proposed Mining and Reclamation Plan, is shown on Geologic Cross-Sections A-A' to D-D', included as Plate 2.


#### **SITE DESCRIPTION & BACKGROUND**

The quarry is situated within a roughly east-west trending canyon located along the southwest side of Conejo Mountain at the northwestern side of the Santa Monica Mountain Range (see Site Map, Figure 1). It is our understanding that the quarry has been in existence at the current location since the 1950's. The quarry supplies rock products ranging from gravel to rip-rap. Near vertical excavations, up to approximately 100 feet in height, were established along the original northerly and easterly property lines by a previous owner. The current owner has acquired the adjacent property and now plans to extend the limits of the quarry and correct the over-steepened cut slopes.

Under the current ownership and management, the Pacific Rock quarry activities have consisted of excavation, processing and sorting of rock material. Stockpiles of product are contained in the central and western portion of the quarry.



**BASE MAP:**  
**TOPO! Los Angeles and Surrounding Areas**

  
**NORTH**  
**SCALE = AS SHOWN**

**JCR CONSULTING**

**SITE LOCATION MAP**

FILE NO.: JCR10-0413

1000 Howard Road, Camarillo

**FIGURE 1**

### **PROPOSED MODIFICATIONS TO CUP 3817**

The Reclamation Plan, prepared by Sespe Consulting, Inc., calls for the continued mining and processing of rock material for commercial sale. As shown on the Sespe plan, the ultimate configuration of the quarry will establish three large pad areas identified herein as the northwestern pad, southwestern pad and the eastern or main pad. Finish grades of approximately 190 feet, 250 feet, and 300 feet, respectively, have been proposed for the three pads. Planned mining related excavations have now been expanded to the north and south onto the recently acquired adjacent property. Excavations are proposed at 1 (horizontal) to 1 (vertical) slope ratio. The maximum slope height is approximately 600 feet along the northerly side of the quarry.

### **REGIONAL GEOLOGY**

The Pacific Rock Quarry is located within the Transverse Ranges geologic province of California. The geologic configurations of the Transverse Ranges geologic province are a direct result of lateral and compressional tectonics. The unique tectonic forces of the region are a direct result of the “big bend” in the San Andreas Fault (located in the near the Gorman area of southern California). The “bend” is a result of contact between the North American Plate and the Pacific Plate. As a result, the Transverse Ranges geologic province is experiencing compressional stresses in addition to right-lateral strike-slip motion. This stress has produced a region characterized by east/west-trending mountain ranges, valleys, geologic structures and numerous active faults which is in contrast to the typical north/northwest structural trend typically observed elsewhere in the state. Typical faulting observed within the Transverse Ranges Geomorphic Province is thrust or reverse-dip-slip faulting usually with lateral components which is attributed to the relatively high compressional forces.

### **SITE GEOLOGY**

The geologic conditions, earth materials and structure beneath the subject property have been interpreted and characterized based upon our review of published and unpublished geologic references, review of the referenced geologic and geotechnical engineering reports, and our surface observations made during the course of our investigation. It is important to note that our conclusions regarding the overall site geologic conditions involve projections of data observed in exposures that require that geologic conditions remain generally consistent between points of observation.

The Pacific Rock Quarry is located at the southwest base of Conejo Mountain, which is comprised primarily of an intrusive dacitic dome. The intrusive dacite bedrock is assigned to the middle Miocene

age Conejo Volcanics geologic formation which includes extrusive and intrusive, submarine and subaerial volcanic material.

The Conejo Volcanics bedrock exposed at the quarry consist of three distinct volcanic units: dark gray extrusive basalt (Tcvb), light gray to pinkish gray dacitic breccias (Tcvdb), and dark intrusive basaltic rocks (bi).

The dacitic breccias (Tcvdb) are comprised of unsorted angular fragments of dacite to andesite in a hard volcanic detrital matrix comprised of dacite and andesite. The breccias are hard to very hard and resistant to erosion. The dark gray to dark olive-brown extrusive basalt (Tcvb) is mapped near the central portion of the quarry and is hard to very hard and resistant to erosion. Near vertical basaltic (bi) dikes traverse the northerly portions of the quarry in a northwesterly direction. The dikes are comprised of hard to very hard and erosion resistant dark gray basalt.

### **Geologic Structure**

Based upon our review of published geologic maps, previous geologic mapping performed by Gold Coast GeoServices, and on supplemental mapping performed by this office, the dacitic breccias and extrusive basalt are typically massive or unstratified. Flow banding previously mapped in the vicinity by others has been observed in outcrops to dip at 20-25 degrees west-northwest within the dacitic breccias.

As previously described by Gold Coast, the bedrock in the quarry is moderately jointed with two primary jointing orientations. The first typically strikes N20-45E with dip angles of 55-85 degrees northwest or southeast and the second oriented with a strike of N35-70W with dip angles of 80-90 degrees southwest. The vertical dikes strike approximately N45-60W.

Geologic/geotechnical engineering analysis, performed by Gold Coast GeoServices, for the last CUP submittal (2010) was ultimately approved. During our review of the referenced reports, this office has determined that the geologic data, analysis, and conclusions previously submitted by Gold Coast GeoServices, Inc. may be, in general, applied to the currently requested modifications to the CUP. Additional slope stability analysis have been performed to verify the stability of the planned future excavations.

### **Landslides**

The Conejo Volcanics are typically highly resistant to erosion and/or slope failure due to rock hardness and lack of potential sliding surfaces. No landslides or debris flows have occurred within or adjacent to

the quarry site, and no landslides are shown to occur at or adjacent to the site on regional geologic maps by others. The landslide hazard potential from excavations at the quarry is very low based upon the findings from the previous geotechnical analysis and on the geotechnical analysis of the plans as now proposed.

### **Faulting and Seismicity**

The property is not known to be underlain by any seismically active or potentially active faults, and the property is not situated within a Fault Rupture Special Studies Zone of the State of California. The closest active fault is the Simi-Santa Rosa fault located approximately four miles north of the quarry. Several other significant onshore and offshore faults, which are capable of producing earthquakes, are located within 50 miles of the site. Earthquakes along any of the fault systems within approximately 50 miles of the site could cause moderate to strong ground shaking at the site.

Based upon our review of the California Department of Mines and Geology Seismic Hazard Zone Report for the Newbury Park Quadrangle (2002), the quarry is not located within a State designated “seismically-induced liquefaction hazard” zone due to the presence of volcanic bedrock beneath the site. The northerly side of the site of the quarry is located within or adjacent to a State designated “seismically-induced landslide hazard” zone. In the event of a significant earthquake, rockfall or rock topple are potential seismically-induced hazards at the site.

### **SLOPE STABILITY ANALYSIS**

Based on our review of the proposed CUP and Reclamation Plan prepared by Sespe Consulting, Inc., it is now proposed to expand the southern and northern limits of the quarry and lay back the over steepened slopes located near the northern and eastern edges of the original property limits. This office is in general agreement with the conclusions pertaining to site slope stability as presented by Gold Coast GeoServices, Inc. in the referenced reports. The purpose of our slope stability analysis was to evaluate the currently proposed mining excavations with respect to the site surficial and subsurface conditions. Four geologic cross-sections were evaluated.

Stability analysis was performed using the Visual Slope computer program (Version 6). The program performs a two-dimensional limit equilibrium analysis that searches for the most critical surface. Bishop’s Simplified Method was utilized to search for the most critical circular potential failure surface. A minimum of 500 surfaces were analyzed. Both static and pseudo-static conditions were analyzed for

global stability. A seismic coefficient of 0.15g was used to simulate an average horizontal force under seismic shaking.

**Shear Strength Parameters**

Shear strength parameters used in our analysis were obtained from the referenced Gold Coast GeoServices, Inc., reports and response letters of 2010 that were previously approved. As recommended by the Office of Mines and Reclamation (OMR) in the review letter dated October 21, 2010, the presence of weaker basaltic dike bedrock was recommended to be accounted for by reducing the determined shear strength of the breccia by 10% since the basaltic dike materials were found to represent approximately 10% of the rock mass. However, GCGS decided to use a 50% reduction in shear strength in order to provide an “ultraconservative” analysis. We do not concur that the 50% reduction is justified and agree with the OMR that a 10% reduction is prudent from a geotechnical engineering standpoint. We performed our slope stability analysis using both the 50% reduction and 10% reduction in shear strength for the critical cross sections (A-A and B-B). The results are tabulated below.

Cross-Section	Analysis	Shear Parameters		Location	F.S.
		Cohesion (psf)	Friction Angle (deg)		
A-A'	Static	4900.0*	36.0	Global	1.470
A-A'	Pseudo-Static	4900.0*	36.0	Global	1.120
A-A'	Static	8200.0**	36.0	Global	1.670
A-A'	Static	4900.0*	36.0	Lower	1.390
A-A'	Pseudo-Static	4900.0*	36.0	Lower	1.090
A-A'	Static	8200.0**	36.0	Lower	1.650
A-A'	Pseudo-Static	8200.0**	36.0	Lower	1.310
B-B'	Static	4900.0*	36.0	Global	1.480
B-B'	Pseudo-Static	4900.0*	36.0	Global	1.150
B-B'	Static	8200.0**	36.0	Global	1.840
B-B'	Pseudo-Static	8200.0**	36.0	Global	1.590
C-C'	Static	4900.0*	36.0	Global	2.290
C-C'	Pseudo-Static	4900.0*	36.0	Global	1.590
C-C'	Static	4900.0*	36.0	Lower	1.630
C-C'	Pseudo-Static	4900.0*	36.0	Lower	1.310
D-D'	Static	4900.0*	36.0	Global	1.810
D-D'	Pseudo-Static	4900.0*	36.0	Global	1.350
D-D'	Static	4900.0*	36.0	Lower	1.690
D-D'	Pseudo-Static	4900.0*	36.0	Lower	1.280

\*50% Shear Strength Reduction

\*\*10% Shear Strength Reduction

Based on *Cross-Section A-A'* and *B-B'*, our analyses indicated factor of safety values is less than 1.5 in static conditions using a 50% reduction in shear strength. However, all sections have factors of safety exceeding 1.5 for static conditions and 1.1 in seismic conditions for all modes of failure using the recommended 10% reduction of shear strength.

Based on our analyses, it is our finding that the currently proposed mining plan will result in finished slopes that have adequate factors of safety exceeding 1.25 for the intended use as open space using a 50% reduction in shear strengths and exceeding 1.5 using a 10% reduction in shear strengths. It is our opinion that the proposed mining plan configuration is adequate for its intended final use from a geotechnical engineering standpoint. The results of the slope stability analyses are presented with this report in Appendix II. The most critical failure surfaces determined by the slope stability analysis are shown on the corresponding computer generated print outs.

### **CONCLUSIONS AND RECOMMENDATIONS**

Based on our review of the referenced reports, as well as our updated analysis of the currently proposed modifications to the CUP 3817-3, as shown on the Reclamation Plan prepared by Sespe Consulting, Inc., it our finding that the proposed modifications are feasible from a geologic and geotechnical standpoint. The following recommendations are provided for consideration by the site owner and the design professionals:

The currently planned mining excavations of the quarry slopes are considered to be feasible from an engineering geologic and geotechnical engineering standpoint and have been determined to possess adequate calculated factors of safety against slope failure. The mining activity and slope excavations shall be periodically monitored by the engineering geologist to evaluate slope performance, stability and to address any hazardous conditions. Quarterly site inspections, depending on mining activity, are recommended. Annual reports will be prepared by the engineering geologist to provide a summary of the site conditions and observations.

The planned excavations within the mining area will be made at an overall 1:1 slope ratio. In order to facilitate the mining operations, approximately 50-foot wide benches will be excavated every 50 vertical feet as shown in the Geologic Cross Sections included on Sheet 2.

### **Site Inspections**

Based upon our analysis, the slopes in the areas where mining activities are planned have been determined to have adequate factors of safety against slope failure. It is recommended that the quarry be observed on a quarterly basis by the engineering geologist. Additionally, in the event of a sudden and/or significant change in site conditions are observed, the quarry owner/manager shall immediately notify this office to arrange for a site inspection.

### **Limitations**

This report has been prepared solely for the benefit of the Pacific Rock Quarry. The observations summarized herein are generalized and are based upon verbal information provided by the property owner and representatives of Ventura County as well as visual observations made over the course of this investigation. The scope of services did not include subsurface exploration and/or additional geotechnical analysis of bedrock strengths. The slope stability of the site was previously evaluated by other consultants and updated stability analysis presented herein has utilized previously accepted rock strength parameters.



**Remarks**

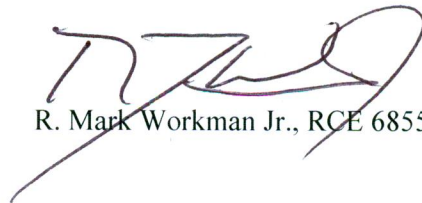
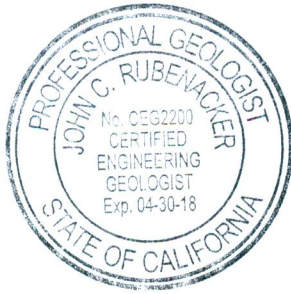
Please call this office at (805) 300-4564 if you have any questions regarding this letter/report.

Respectfully submitted,

**JCR CONSULTING**



John C. Rubenacker, CEG 2200



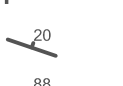
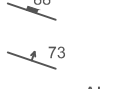



R. Mark Workman Jr., RCE 68557



**APPENDIX 1**

**GEOLOGIC MAP AND GEOTECHNICAL/GEOLOGIC CROSS-SECTION**

**GEOLOGIC LEGEND**

- Spill Fill SURFICIAL FILL (SAND, GRAVEL, COBBLES) FROM MINING OPERATIONS
- Qf ALLUVIAL FAN DEPOSITS (SILT, SAND, GRAVEL)
- Qal ALLUVIUM (SAND AND GRAVEL)
- Tcvdb CONEJO VOLCANICS (DACITIC BRECCIA)
- Tcvb CONEJO VOLCANICS (BASALTIC ROCKS)
- bi BASALT DIKE
-  STRIKE AND DIP OF FLOW BANDING
-  STRIKE AND DIP OF JOINT
-  STRIKE AND DIP OF SHEAR/FAULT
-  LINE OF GEOLOGIC CROSS SECTION
-  LINE OF GEOLOGIC CONTACT DASHED WHERE INFERRED

**LEGEND**

-  PROPERTY BOUNDARY
-  CUP
-  MINING BOUNDARY

PLATE 1

**PLOT PLAN**

100 South Howard Road, Camarillo		FILE NO.:
DATE: 11-14-16		JCR010-04123 REV.
<b>JCR CONSULTING</b>		
444 MOONDANCE STREET, THOUSAND OAKS, CA 91320 (805) 300-4064 Fax (805) 241-2802		



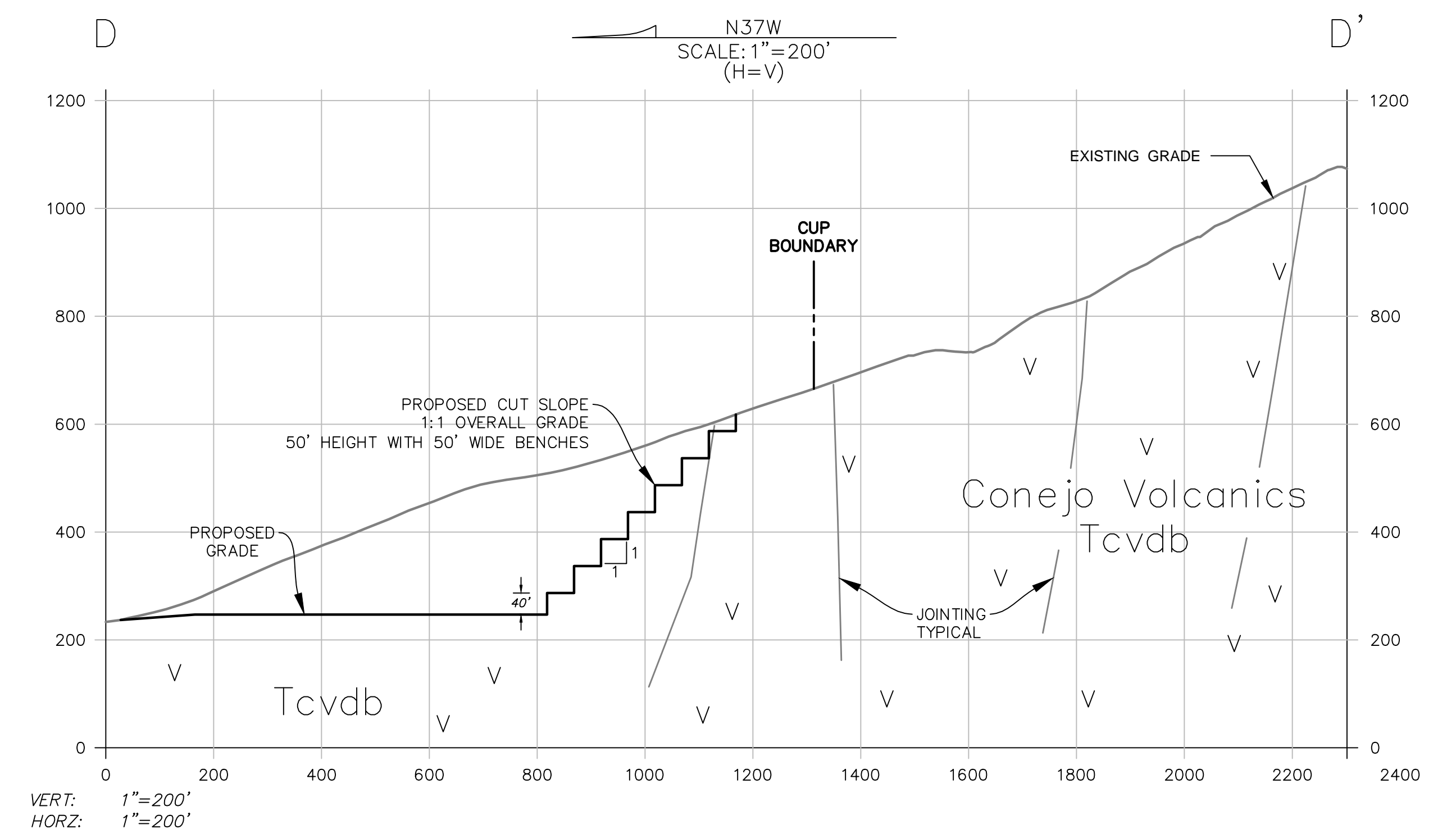
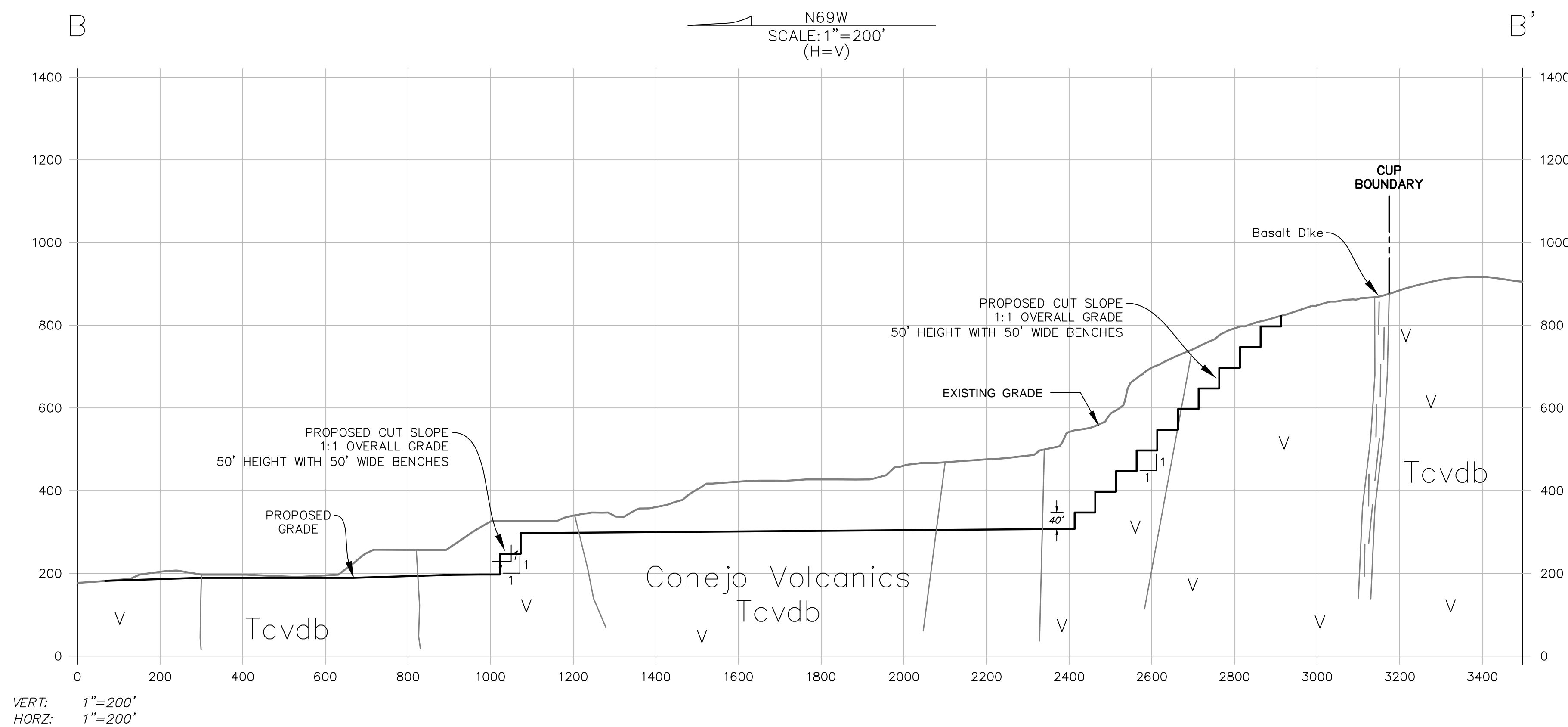
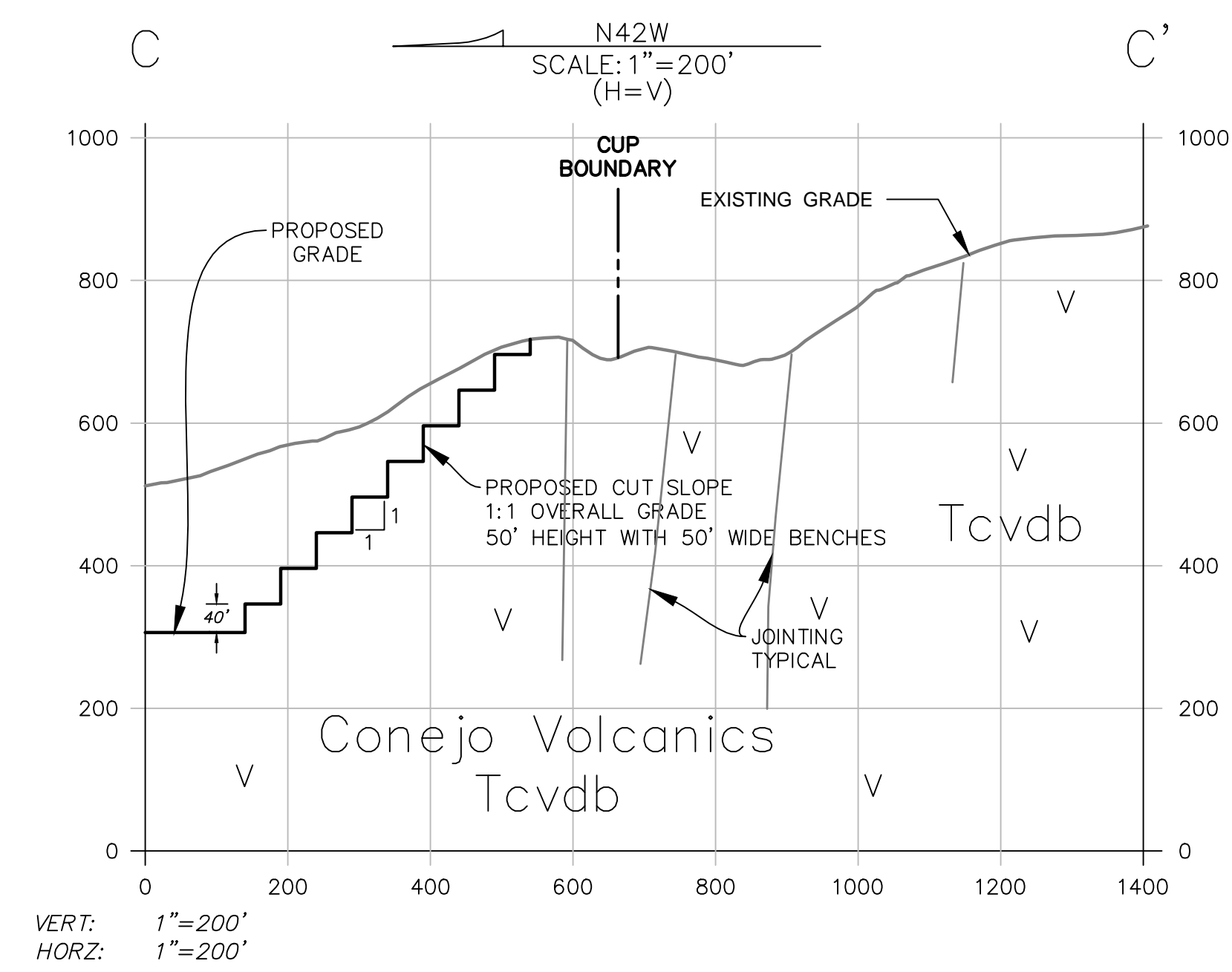
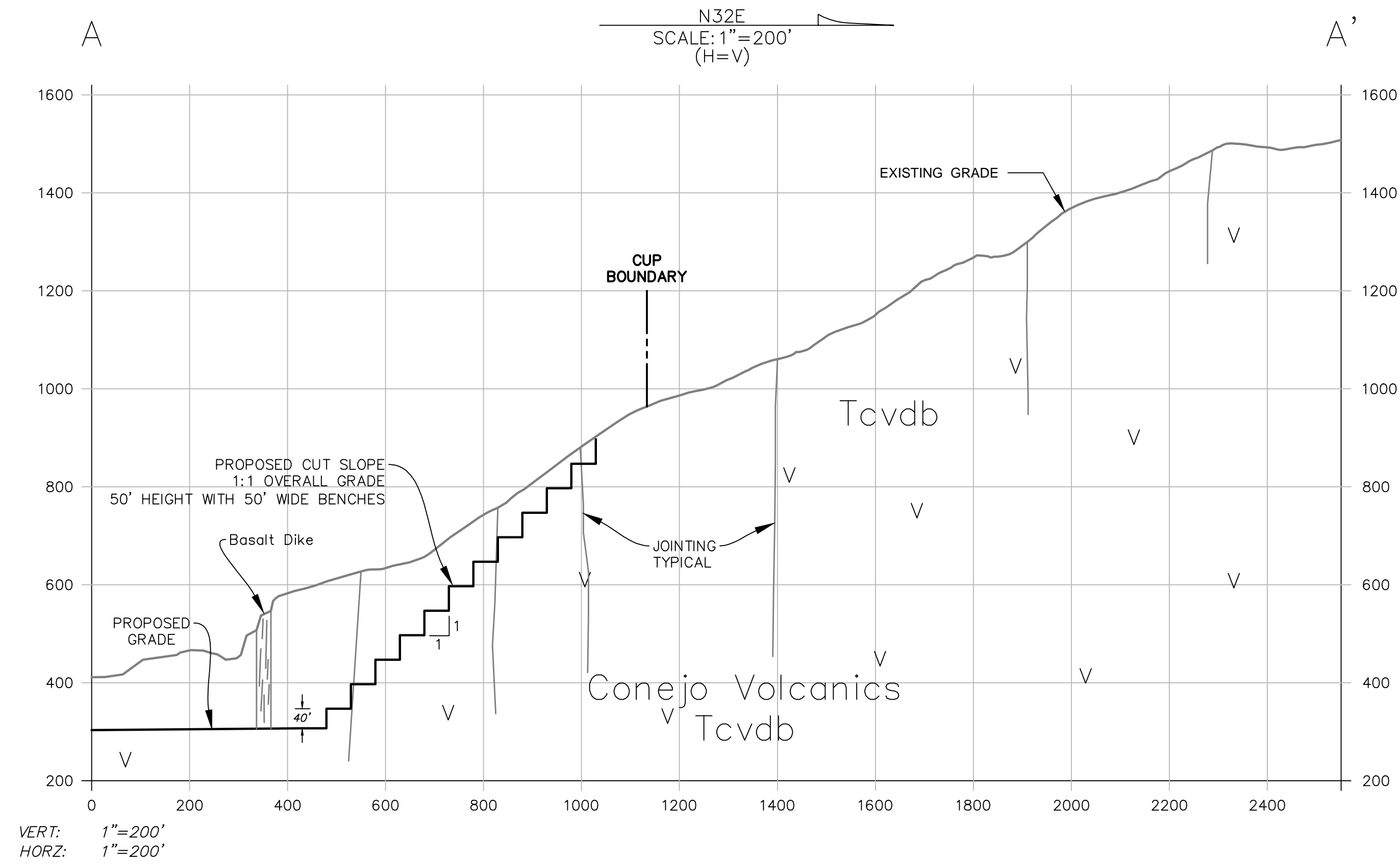
**SESPE CONSULTING, INC.**

374 Poli Street, Ste. 200 • Ventura, CA 93001  
(805) 275-1515 www.sespeconsulting.com

**PACIFIC ROCK QUARRY**  
VENTURA COUNTY, CALIFORNIA  
APN: 234-0-060-220  
100 SOUTH HOWARD ROAD  
CAMARILLO, CALIFORNIA 93012

SCALE: HORIZ: AS SHOWN  
VERT: AS SHOWN  
DRAWN BY: G. CAMUS  
CHECKED BY: ??

FIGURE NUMBER  
**1 OF 3**



<b>GEOLOGIC CROSS-SECTIONS A, B, C, and D</b>		
100 South Howard Road, Camarillo		
1" = 200'	FILE NO.:	
DATE: 11-14-16	JCR010-04123	REV.
<b>JCR CONSULTING</b>		
444 MOONDANCE STREET, THOUSAND OAKS, CA 91360 (805) 300-4564 Fax (805) 241-2502		

<h1>SESPE</h1> <h2>CONSULTING, INC.</h2> <p>374 Poli Street, Ste.200 • Ventura, CA 93001 (805) 275-1515 www.sespeconsulting.com</p>	<b>PACIFIC ROCK QUARRY</b> <b>VENTURA COUNTY, CALIFORNIA</b> APN: 234-0-060-220 100 SOUTH HOWARD ROAD CAMARILLO, CALIFORNIA 93012
	SCALE: HORIZ: AS SHOWN VERT: AS SHOWN
	DRAWN BY: G.CAMUS CHECKED BY: ??
	<b>FIGURE NUMBER</b> <h1>2 OF 3</h1>

**APPENDIX 2**  
**SLOPE STABILITY ANALYSIS**

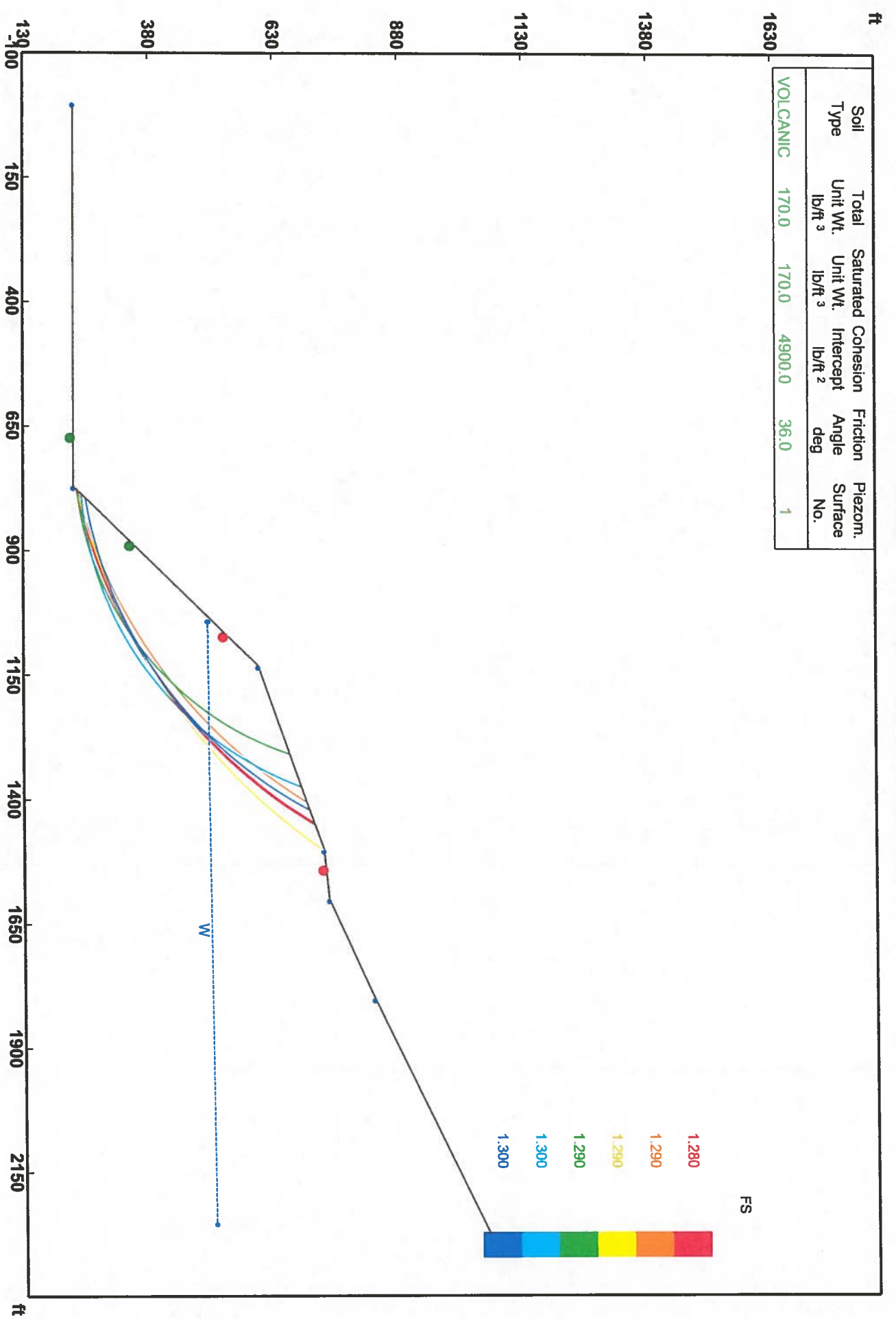
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		Cohesion (psf)	Friction Angle (deg)		
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C-C'	Pseudo-Static	4900.0*	36.0	Lower	1.310
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D-D'	Pseudo-Static	4900.0*	36.0	Global	1.350
D-D'	Static	4900.0*	36.0	Lower	1.690
D-D'	Pseudo-Static	4900.0*	36.0	Lower	1.280

\*50% Shear Strength Reduction

\*\*10% Shear Strength Reduction

# Pacific Rock Cross-Section D-D' Lower Slope Pseudo-Static

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	4900.0	36.0	1



FSmin = 1.280 Bishop Method Failure Surface F<sub>i</sub>/C Reduction = 1.0/1.0

(ASD)







**Seismic Loads**

Horizontal Acceleration	Vertical Acceleration
g	g
0.15	0.0

**Results**

**Circular Failure**

**Analysis Method: ASD-Bishop Method**

Searched From 667.69 ft To 884.62 ft

Total : 500 Surfaces Following 6 Most Critical Surfaces

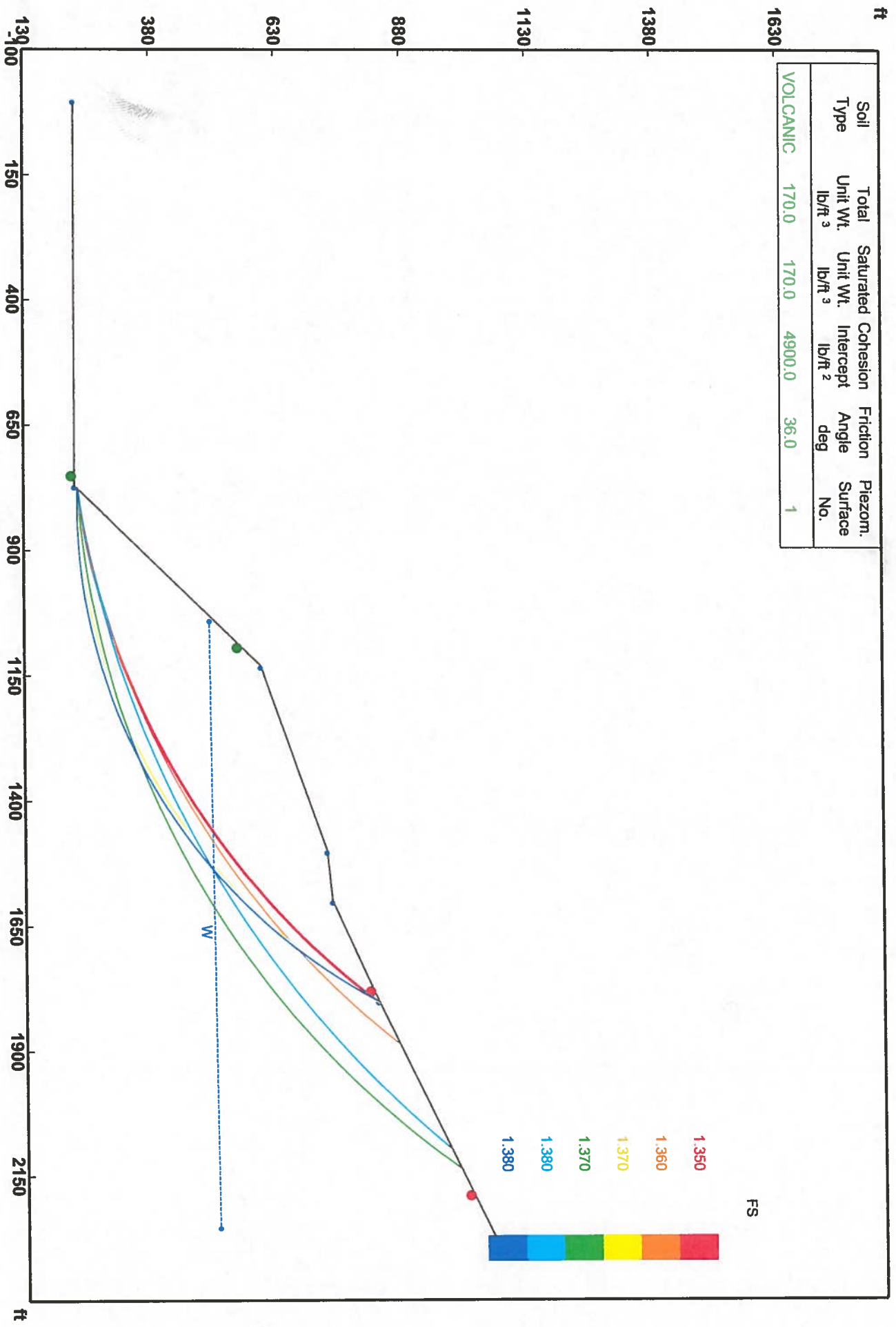
Defined By : 48 Points FS= 1.28 Drg F 8148168 lb/ft

Center X = 568.458 Y = 1246.37 Radius= 1029.549

Point	X-Coord ft	Y-Coord ft
1	778.19	238.41
2	794.7	242.69
3	811.14	247.23
4	827.51	252.05
5	843.79	257.14
6	859.98	262.5
7	876.09	268.13
8	892.1	274.02
9	908.01	280.18
10	923.81	286.6
11	939.51	293.28
12	955.09	300.22
13	970.55	307.42

# Pacific Rock Cross-Section D-D' Global Pseudo-Static

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	4900.0	36.0	1



FSmin = 1.350 Bishop Method Failure Surface F<sub>i</sub>/C Reduction = 1.0/1.0

(ASD)



**Seismic Loads**

Horizontal Acceleration g 0.15	Vertical Acceleration g 0.0
---	--------------------------------------

**Results**

**Circular Failure**

**Analysis Method: ASD-Bishop Method**

**Searched From 746.15 ft To 1089.23 ft**

**Total : 500 Surfaces Following 6 Most Critical Surfaces**

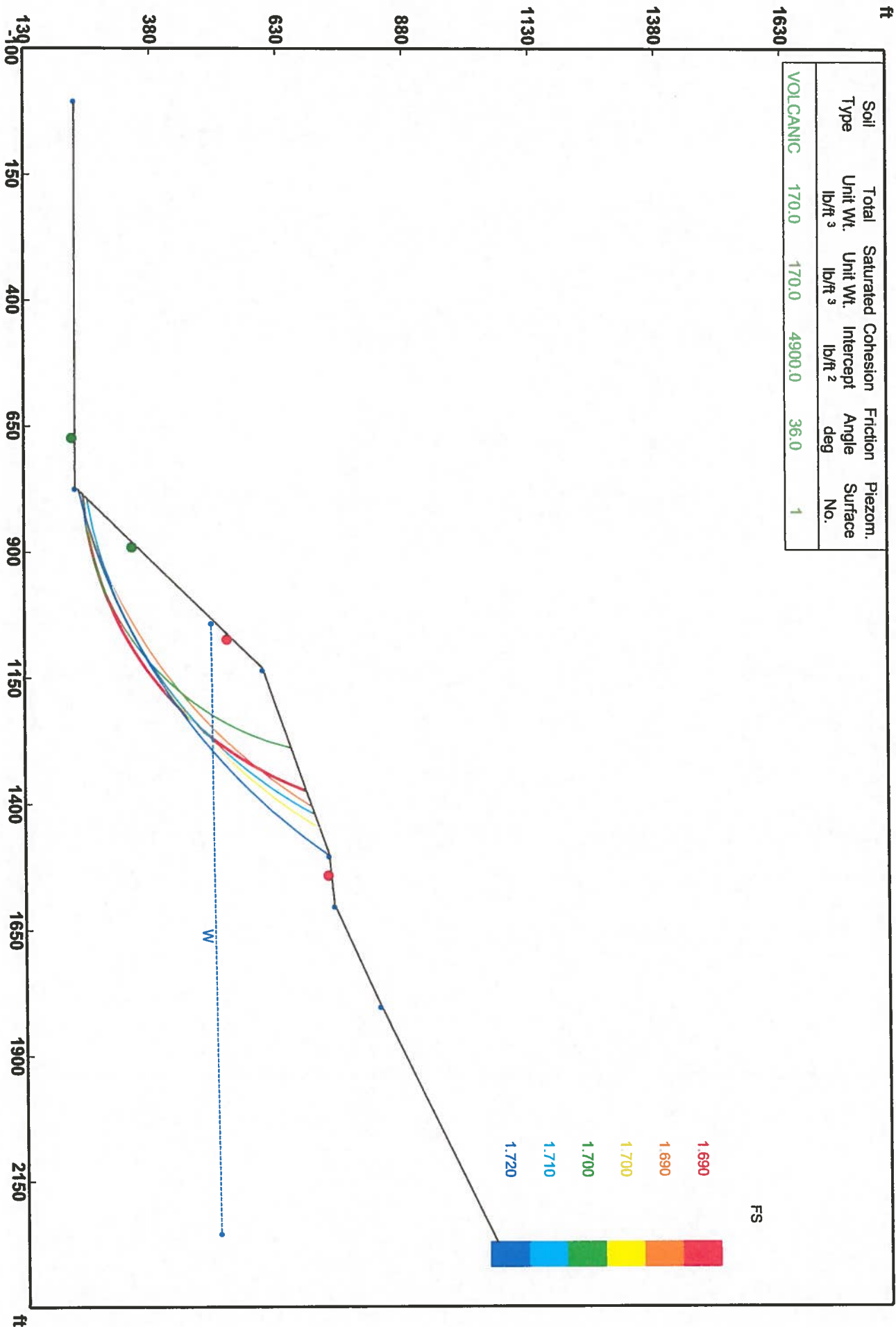
**Defined By : 48 Points FS= 1.35 Drvg F 15278350 lb/ft**

**Center X = 570.791 Y = 1780.061 Radius= 1556.978**

Point	X-Coord ft	Y-Coord ft
1	776.56	236.74
2	804.49	241.02
3	832.35	245.75
4	860.13	250.93
5	887.83	256.56
6	915.42	262.64
7	942.92	269.17
8	970.31	276.14
9	997.58	283.55
10	1024.73	291.4
11	1051.74	299.69
12	1078.62	308.41
13	1105.36	317.57

# Pacific Rock Cross-Section D-D' Lower Slope Static

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	49000.0	36.0	1



FSmin = 1.690 Bishop Method Failure Surface F<sub>i</sub>/C Reduction = 1.0/1.0

(ASD)





Circular Failure

Analysis Method: ASD-Bishop Method

Searched From 667.69 ft To 884.62 ft

Total : 500 Surfaces Following 6 Most Critical Surfaces

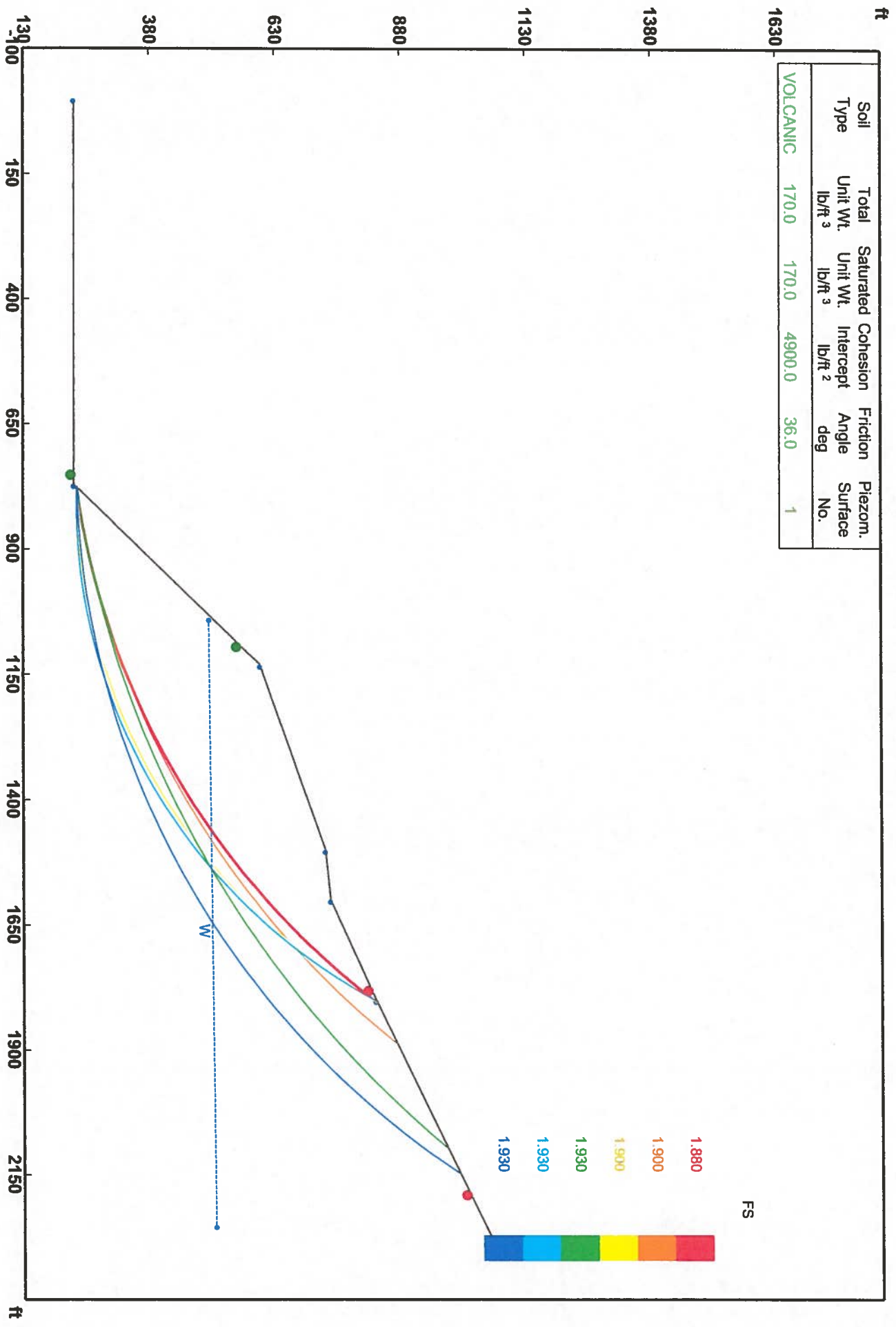
Defined By : 48 Points FS= 1.69 Drvg F 6112508 lb/ft

Center X = 738.71 Y = 922.868 Radius= 677.716

Point	X-Coord ft	Y-Coord ft
1	778.19	238.41
2	794.7	242.69
3	811.14	247.23
4	827.51	252.05
5	843.79	257.14
6	859.98	262.5
7	876.09	268.13
8	892.1	274.02
9	908.01	280.18
10	923.81	286.6
11	939.51	293.28
12	955.09	300.22
13	970.55	307.42
14	985.9	314.87
15	1001.12	322.58
16	1016.2	330.54
17	1031.16	338.75
18	1045.97	347.2
19	1060.65	355.9

# Pacific Rock Cross-Section D-D' Global Static

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	4900.0	36.0	1



**FSmin = 1.880 Bishop Method Failure Surface F/C Reduction = 1.0/1.0  
(ASD)**





Circular Failure

Analysis Method: ASD-Bishop Method

Searched From 746.15 ft To 1089.23 ft

Total : 500 Surfaces Following 6 Most Critical Surfaces

Defined By : 48 Points FS= 1.88 Drgv F 11694960 lb/ft

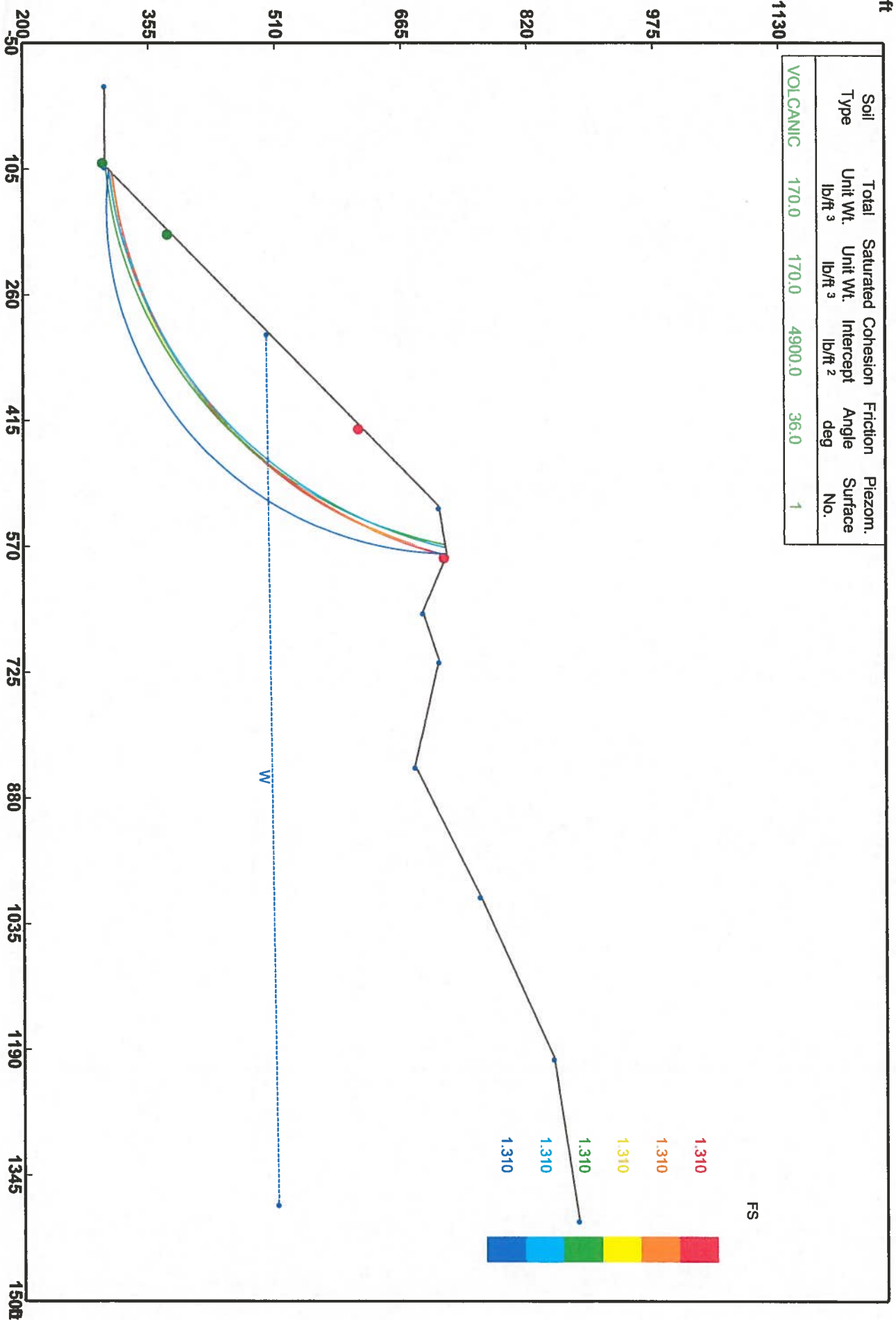
Center X = 570.791 Y = 1780.061 Radius= 1556.978

Point	X-Coord	Y-Coord
	ft	ft

1	776.56	236.74
2	804.49	241.02
3	832.35	245.75
4	860.13	250.93
5	887.83	256.56
6	915.42	262.64
7	942.92	269.17
8	970.31	276.14
9	997.58	283.55
10	1024.73	291.4
11	1051.74	299.69
12	1078.62	308.41
13	1105.36	317.57
14	1131.94	327.17
15	1158.36	337.19
16	1184.62	347.63
17	1210.71	358.5
18	1236.61	369.8
19	1262.33	381.51

# Pacific Rock Cross-Section C-C' Lower Slope Pseudo-Static

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	4900.0	36.0	1



FSmin = 1.310 Bishop Method Failure Surface F/C Reduction = 1.0/1.0

(ASD)





306.00 499.00

0.00 0.00

Seismic Loads

Horizontal Acceleration

Vertical Acceleration

g

g

0.15

0.0

Results

Circular Failure

Analysis Method: ASD-Bishop Method

Searched From 94.0 ft To 182.0 ft

Total : 500 Surfaces Following 6 Most Critical Surfaces

Defined By : 71 Points FS= 1.31 Drg F 5391877 lb/ft

Center X = 50.685 Y = 852.391 Radius= 546.19

Point X-Coord Y-Coord

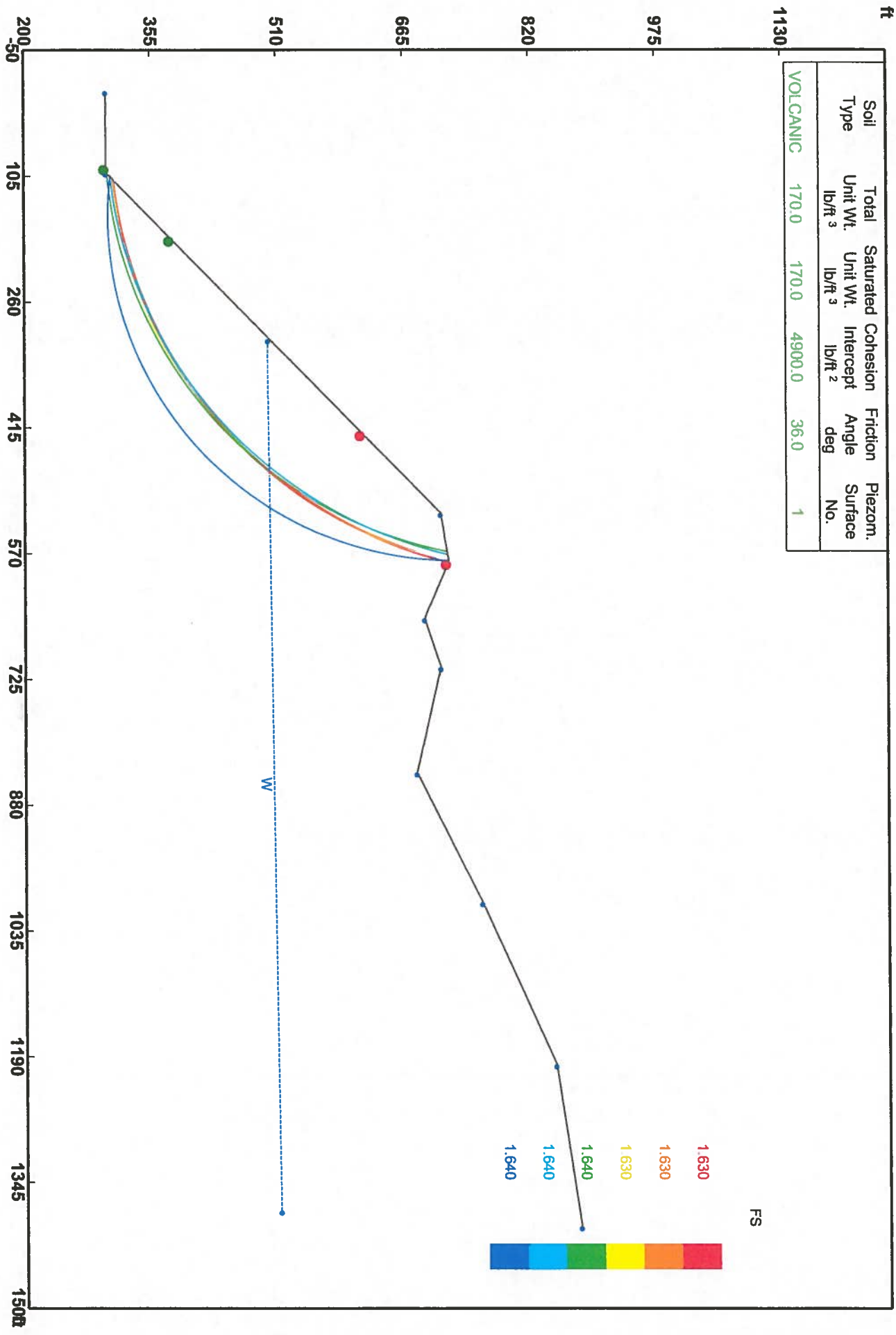
ft

ft

1	109.62	309.39
2	119.11	310.49
3	128.59	311.76
4	138.03	313.2
5	147.46	314.8
6	156.85	316.57
7	166.21	318.5
8	175.53	320.6
9	184.82	322.86
10	194.06	325.29

# Pacific Rock Cross-Section C-C' Lower Slope Static

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	4900.0	36.0	1



FSmin = 1.630 Bishop Method Failure Surface F/I/C Reduction = 1.0/1.0

(ASD)



306.00 499.00

0.00 0.00

Results

Circular Failure

Analysis Method: ASD-Bishop Method

Searched From 94.0 ft To 182.0 ft

Total : 500 Surfaces Following 6 Most Critical Surfaces

Defined By : 71 Points FS= 1.63 Drvg F 4548203 lb/ft

Center X = 50.685 Y = 852.391 Radius= 546.19

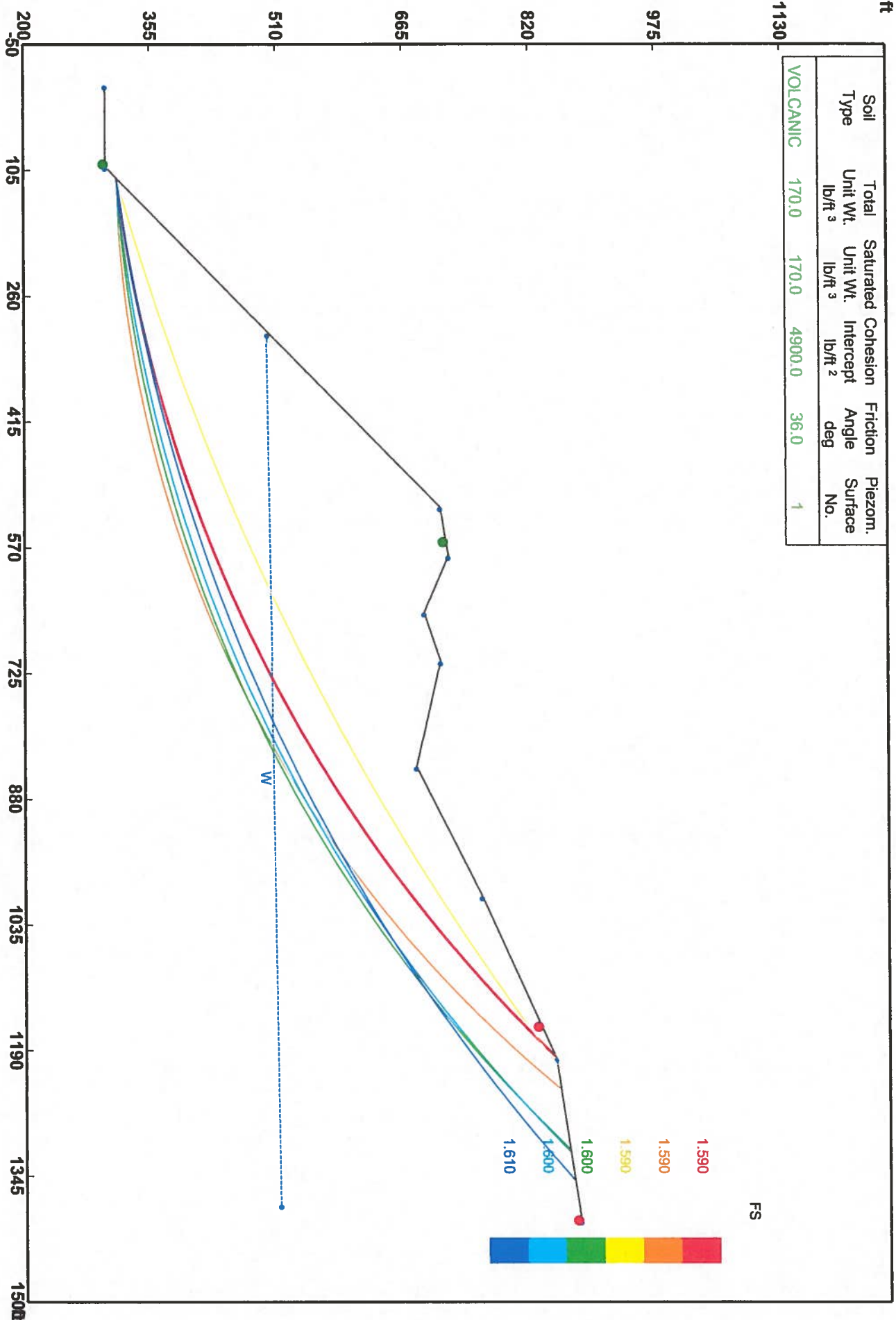
Point	X-Coord ft	Y-Coord ft
-------	---------------	---------------

1	109.62	309.39
2	119.11	310.49
3	128.59	311.76
4	138.03	313.2
5	147.46	314.8
6	156.85	316.57
7	166.21	318.5
8	175.53	320.6
9	184.82	322.86
10	194.06	325.29
11	203.26	327.87
12	212.42	330.62
13	221.52	333.53
14	230.57	336.6
15	239.57	339.83
16	248.51	343.21



# Pacific Rock Cross-Section C-C' Global Pseudo-Static

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	4900.0	36.0	1



FSmin = 1.590 Bishop Method Failure Surface Fi/C Reduction = 1.0/1.0

(ASD)



306.00                      499.00  
 0.00                              0.00

**Seismic                  Loads**

**Horizontal                                  Vertical**  
**Acceleration                              Acceleration**  
 g    g  
 0.15    0.0

**Results**

**Circular                  Failure**

**Analysis                  Method:          ASD-Bishop  
    Method**

**Searched                  From                  94.0                  ft                  To                  560.0                  ft**

**Total :                  500                  Surfaces                  Following 6          Most Critical          Surfaces**

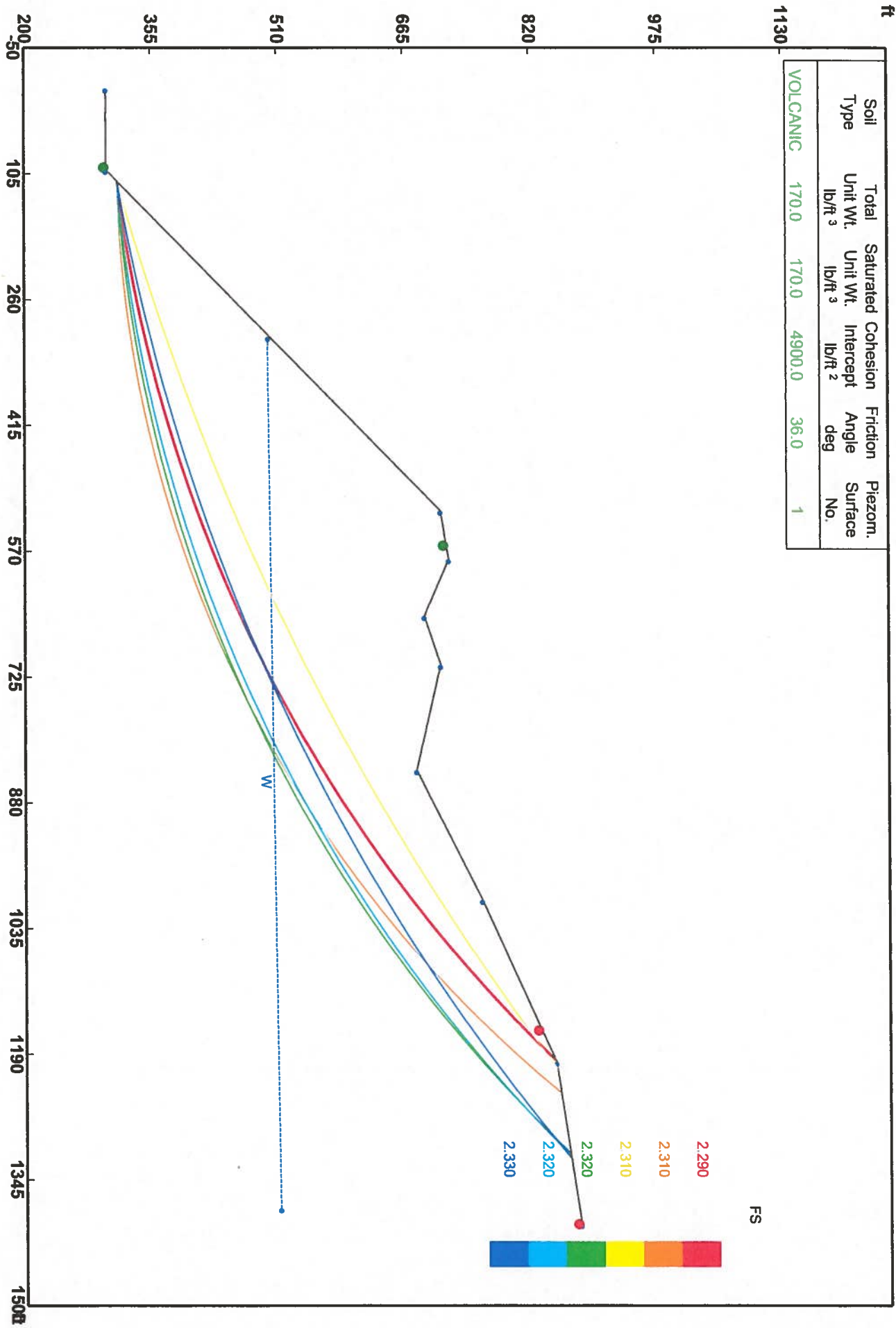
**Defined By :                  52                  Points FS=                  1.59                  Drg F                  13143380                  lb/ft**

**Center                  X =                  -101.635                  Y =                  2117.667                  Radius=                  1815.995**

Point	X-Coord ft	Y-Coord ft
1	115.0	314.64
2	140.56	315.37
3	166.11	316.53
4	191.63	318.13
5	217.12	320.17
6	242.57	322.64
7	267.98	325.54
8	293.33	328.88
9	318.62	332.65
10	343.84	336.85

# Pacific Rock Cross-Section C-C' Global Static

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	4900.0	36.0	1



FSmin = 2.290 Bishop Method Failure Surface Fi/C Reduction = 1.0/1.0

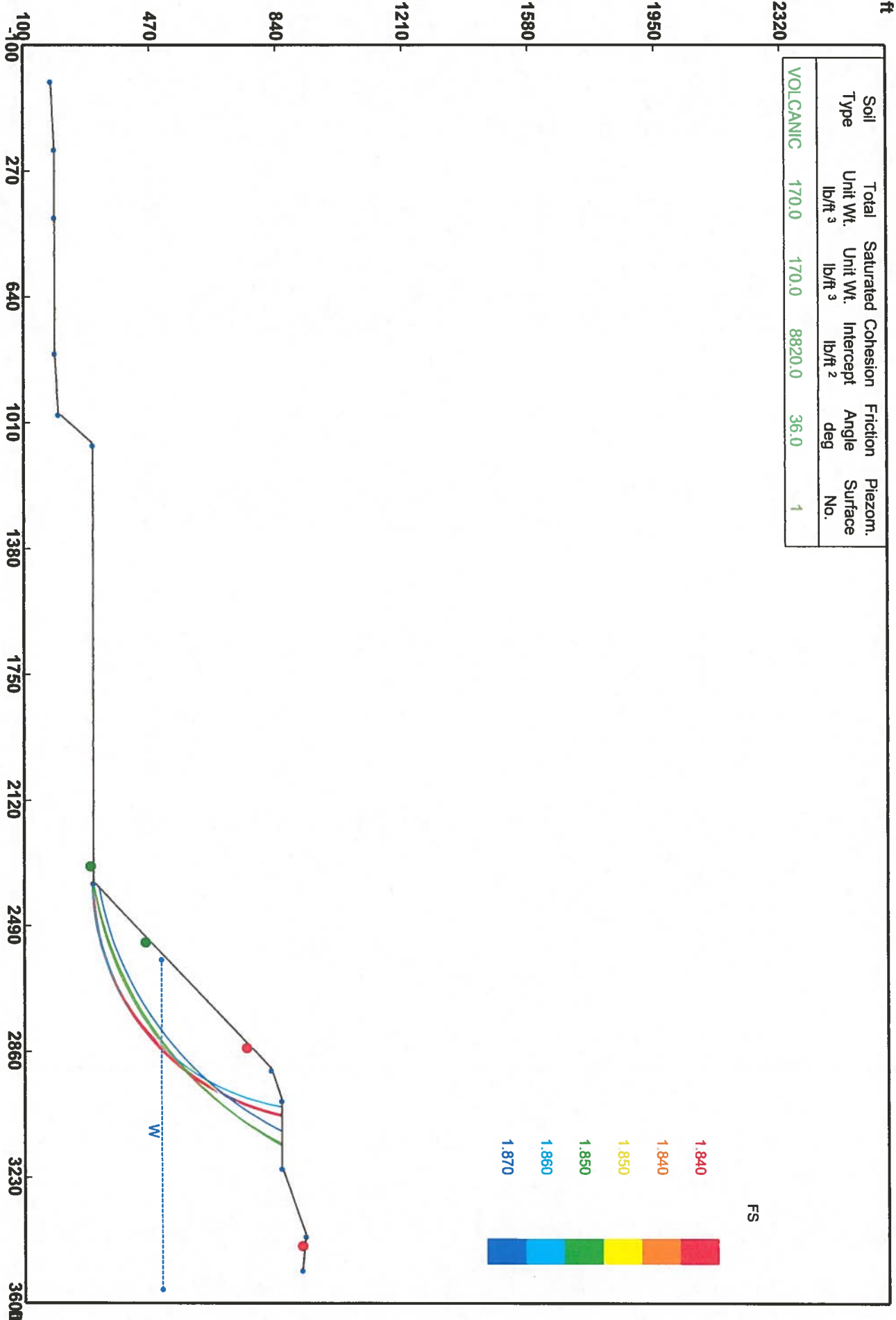
(ASD)





# Pacific Rock Cross-Section B-B' Static 10% Reduction

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	8820.0	36.0	1



FSmin = 1.840 Bishop Method Failure Surface F<sub>i</sub>/C Reduction = 1.0/1.0

(ASD)







Piezometric	Surface No.	1	Consists Of	2	Points
		X		Y	
		2583.85		499.23	
		0.00		0.00	

**Results**

**Circular Failure**

**Analysis Method:** ASD-Bishop Method

**Searched From** 2306.92 ft **To** 2530.77 ft

**Total :** 500 Surfaces **Following 6 Most Critical Surfaces**

**Defined By :** 46 Points FS= 1.84 Drvg F 10513020 lb/ft

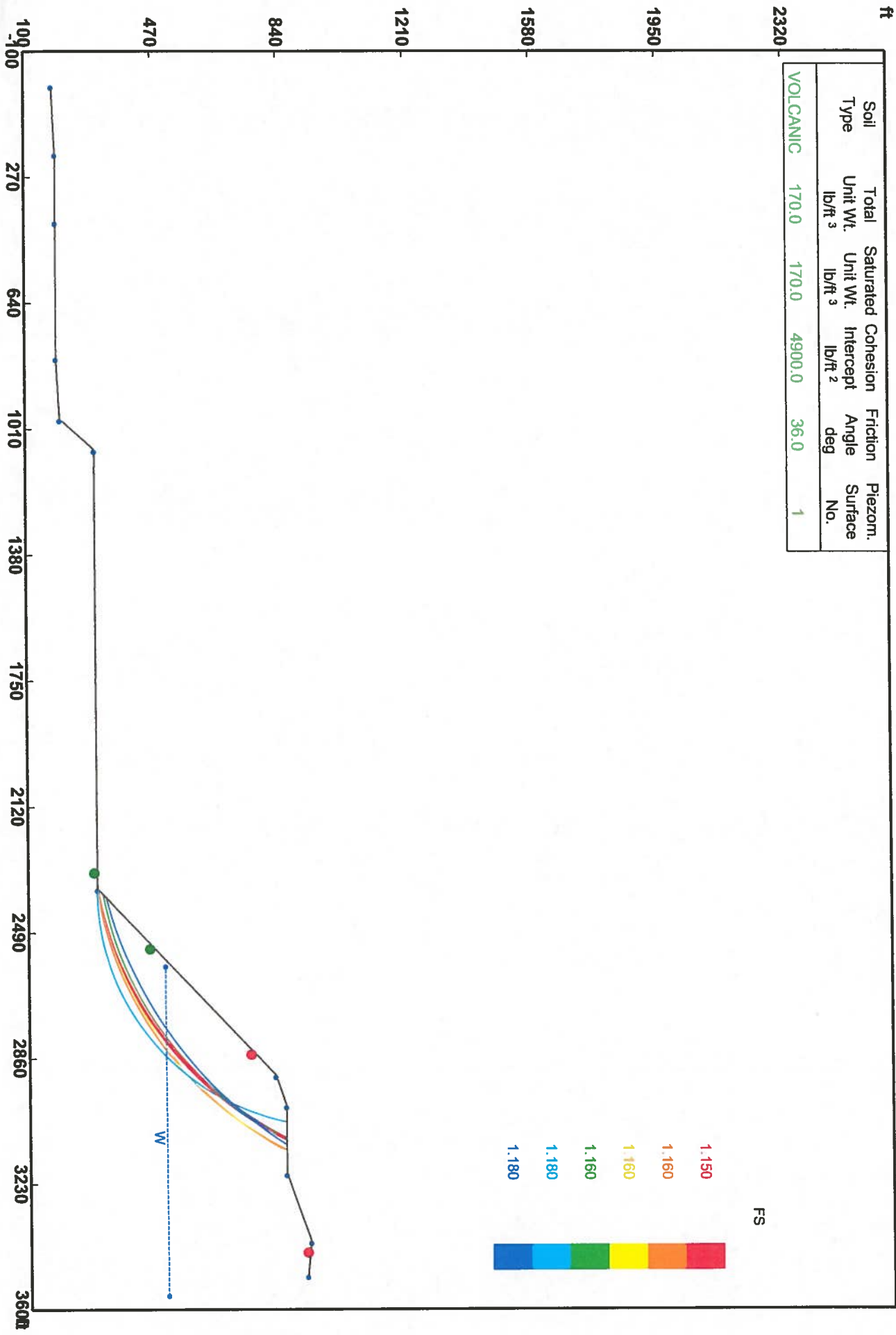
**Center X =** 2365.472 **Y =** 999.001 **Radius=** 699.023

Point	X-Coord	Y-Coord
	ft	ft
1	2360.0	300.0
2	2381.71	303.35
3	2403.34	307.16
4	2424.89	311.43
5	2446.33	316.17
6	2467.68	321.35
7	2488.91	326.99
8	2510.01	333.09
9	2530.98	339.63
10	2551.8	346.62
11	2572.47	354.05
12	2592.98	361.91
13	2613.31	370.22
14	2633.47	378.95

# Pacific Rock

## Cross-Section B-B' Pseudo-Static

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	4900.0	36.0	1



FSmin = 1.150 Bishop Method Failure Surface F1/C Reduction = 1.0/1.0

(ASD)



Piezometric	Surface No.	1	Consists Of	2	Points
		X		Y	
		2583.85		499.23	
		0.00		0.00	

Seismic	Loads		
		Horizontal	Vertical
		Acceleration	Acceleration
		g	g
		0.15	0.0

**Results**

Circular Failure

Analysis Method: ASD-Bishop Method

Searched From 2306.92 ft To 2530.77 ft

Total : 500 Surfaces Following 6 Most Critical Surfaces

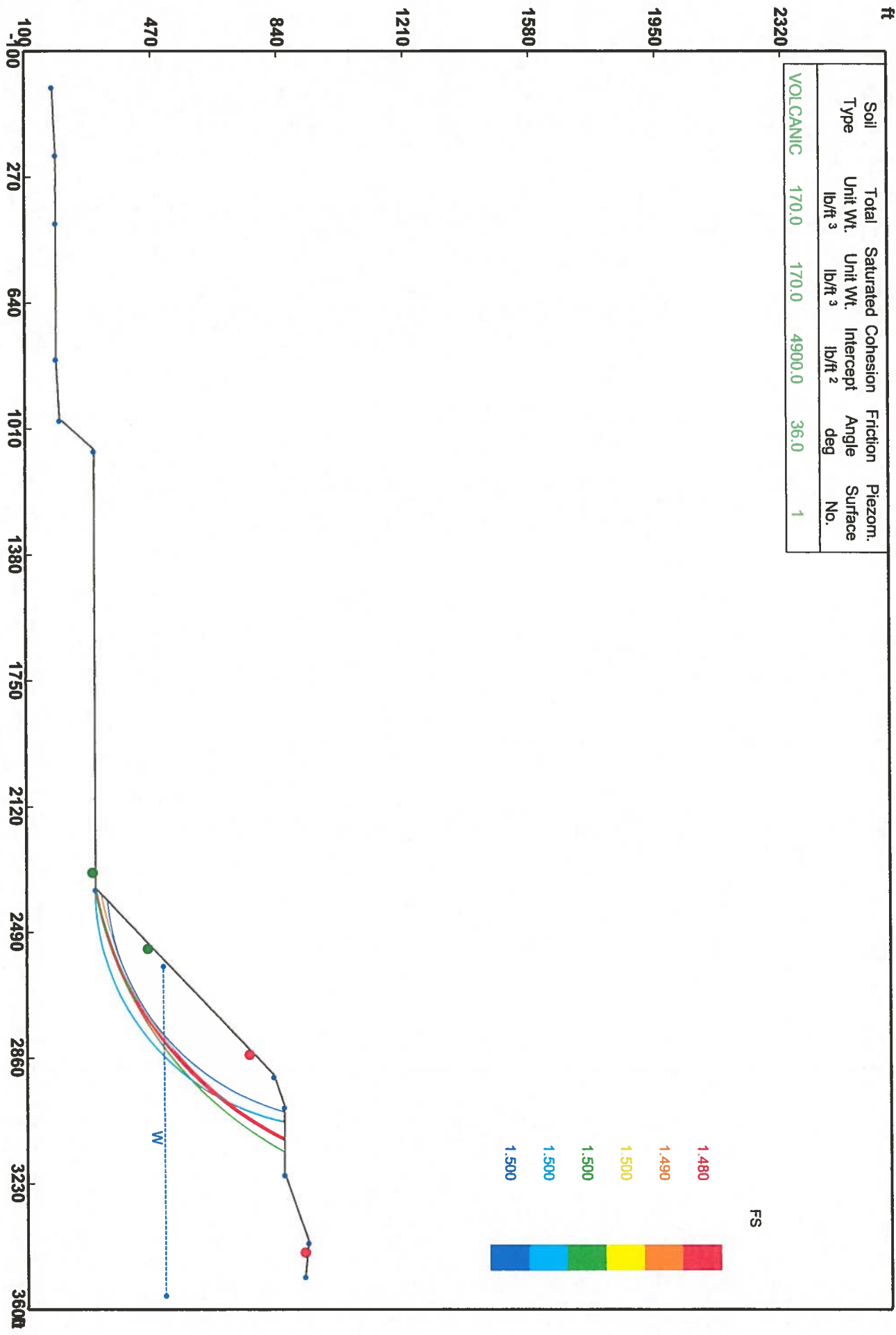
Defined By : 46 Points FS= 1.15 Drgv F 11947140 lb/ft

Center X = 2182.804 Y = 1310.66 Radius= 1026.076

Point	X-Coord	Y-Coord
	ft	ft
1	2360.0	300.0
2	2381.71	303.35
3	2403.34	307.16
4	2424.89	311.43
5	2446.33	316.17
6	2467.68	321.35
7	2488.91	326.99
8	2510.01	333.09

# Pacific Rock Cross-Section B-B' Static

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	4900.0	36.0	1



FSmin = 1.480 Bishop Method Failure Surface F1/C Reduction = 1.0/1.0

(ASD)



Piezometric	Surface No.	1	Consists Of	2	Points
		X		Y	
		2583.85		499.23	
		0.00		0.00	

**Results**

Circular Failure

Analysis Method: ASD-Bishop Method

Searched From 2306.92 ft To 2530.77 ft

Total : 500 Surfaces Following 6 Most Critical Surfaces

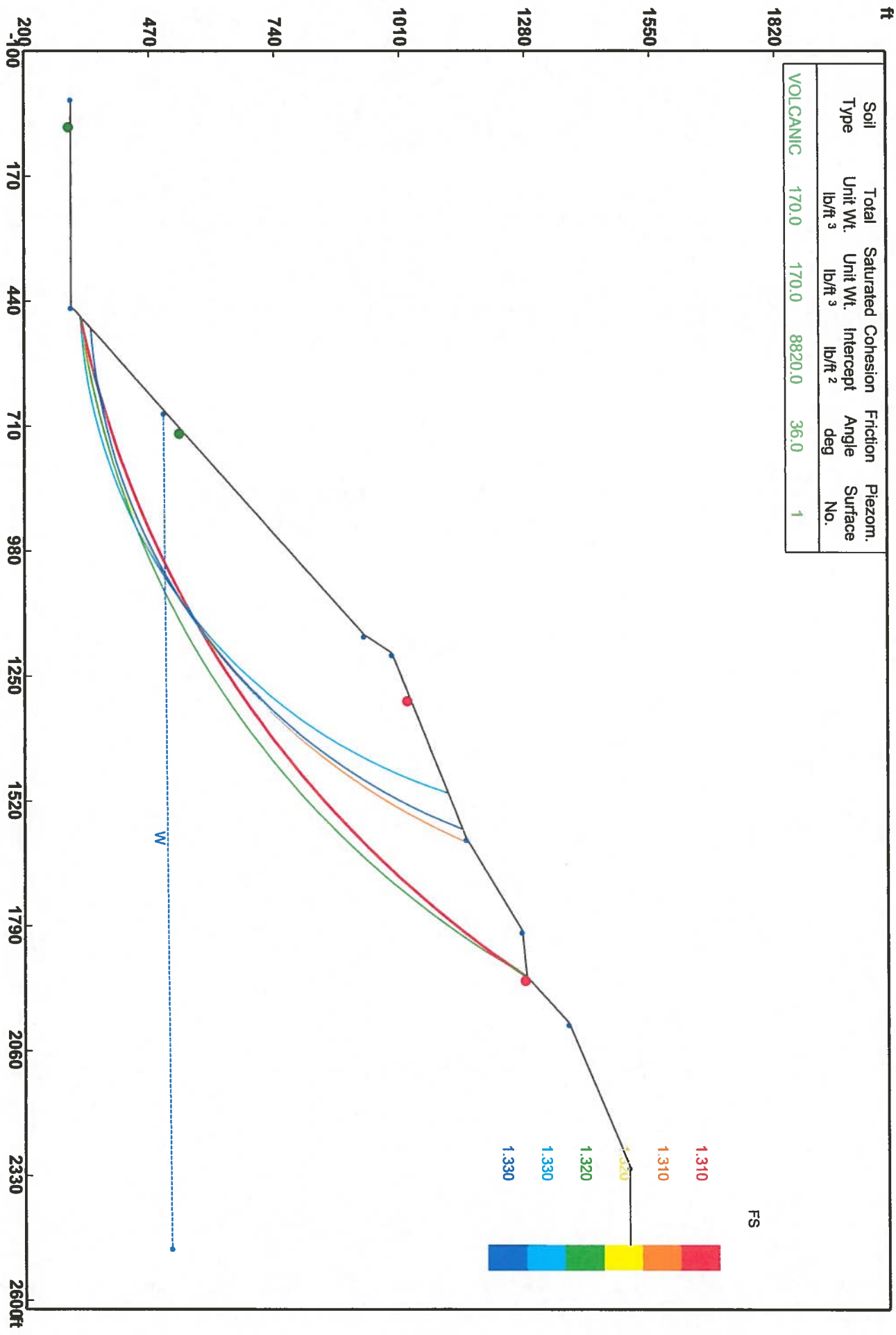
Defined By : 44 Points FS= 1.48 Drvg F 9961054 lb/ft

Center X = 2182.804 Y = 1310.66 Radius= 1026.076

Point	X-Coord	Y-Coord
	ft	ft
1	2378.97	317.94
2	2400.55	322.07
3	2422.02	326.67
4	2443.4	331.75
5	2464.65	337.29
6	2485.78	343.29
7	2506.77	349.76
8	2527.61	356.68
9	2548.3	364.06
10	2568.82	371.89
11	2589.17	380.17
12	2609.33	388.9
13	2629.29	398.06
14	2649.04	407.66

# Pacific Rock Cross-Section A-A' Pseudo-Static Lower Slope 10% Reduction

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	8820.0	36.0	1



FSmin = 1.310 Bishop Method Failure Surface Fi/C Reduction = 1.0/1.0

(ASD)





678.33                      500.00  
 0.00                              0.00

**Seismic                  Loads**

**Horizontal                                  Vertical**  
**Acceleration                              Acceleration**  
 g    g  
 0.15    0.0

**Results**

**Circular                  Failure**

**Analysis                  Method:          ASD-Bishop  
    Method**

**Searched                  From                  58.33                  ft                  To                  720.0                  ft**

**Total :                  500                  Surfaces                  Following 6                  Most Critical                  Surfaces**

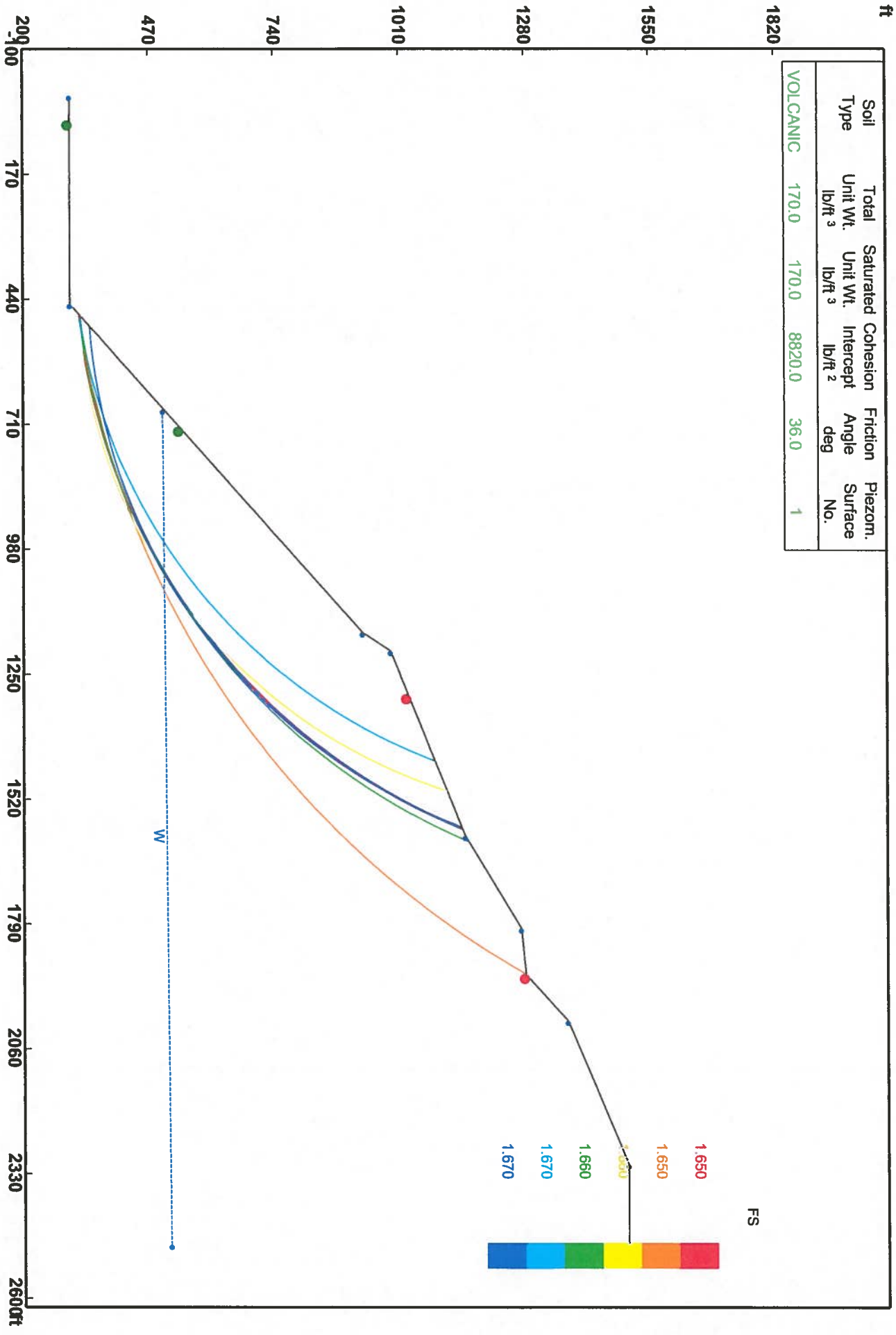
**Defined By :                  42                  Points FS=                  1.31                  Drgv F                  34402720                  lb/ft**

**Center                  X =                  14.661                  Y =                  2546.54                  Radius=                  2271.795**

Point	X-Coord ft	Y-Coord ft
1	474.55	321.78
2	510.53	325.84
3	546.39	330.83
4	582.11	336.76
5	617.66	343.62
6	653.02	351.41
7	688.17	360.12
8	723.07	369.74
9	757.71	380.27
10	792.07	391.71

# Pacific Rock Cross-Section A-A' Static Lower Slope 10% Reduction

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	8820.0	36.0	1



FSmin = 1.650 Bishop Method Failure Surface Fi/C Reduction = 1.0/1.0

(ASD)



678.33 500.00  
0.00 0.00

Results

Circular Failure

Analysis Method: ASD-Bishop Method

Searched From 58.33 ft To 720.0 ft

Total : 500 Surfaces Following 6 Most Critical Surfaces

Defined By : 51 Points FS= 1.65 Drgv F 21987320 lb/ft

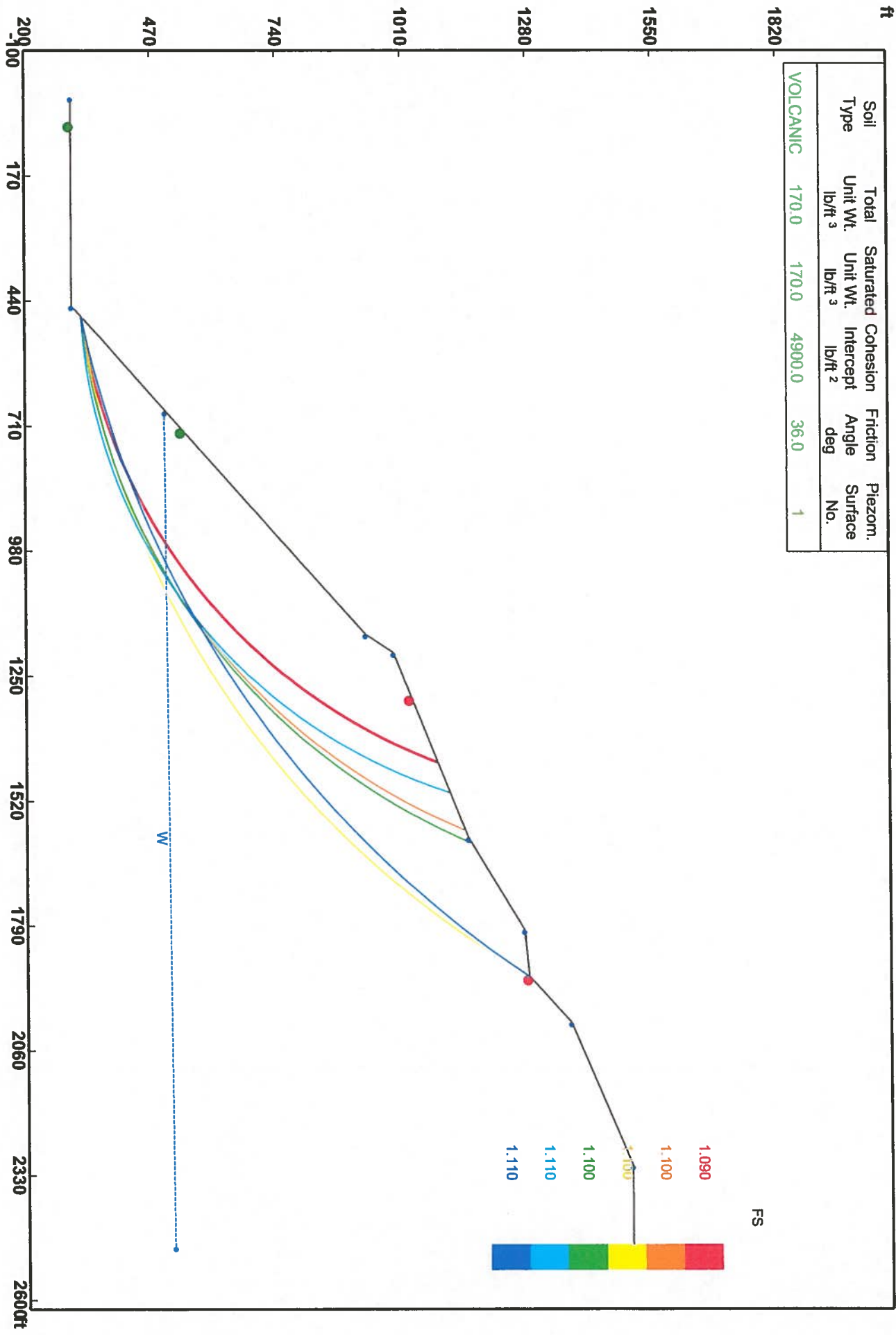
Center X = 346.956 Y = 1654.066 Radius= 1338.382

Point X-Coord Y-Coord  
ft ft

1	474.55	321.78
2	510.38	326.98
3	546.11	332.84
4	581.72	339.37
5	617.21	346.57
6	652.56	354.42
7	687.75	362.93
8	722.78	372.09
9	757.63	381.91
10	792.3	392.37
11	826.76	403.47
12	861.01	415.22
13	895.03	427.6
14	928.82	440.62
15	962.36	454.26
16	995.64	468.52

# Pacific Rock Cross-Section A-A' Pseudo-Static Lower Slope

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	4900.0	36.0	1



FSmin = 1.090 Bishop Method Failure Surface F1/C Reduction = 1.0/1.0

(ASD)



678.33 500.00

0.00 0.00

Seismic Loads

Horizontal  
Acceleration

Vertical  
Acceleration

g

g

0.15

0.0

Results

Circular Failure

Analysis Method: ASD-Bishop Method

Searched From 58.33 ft To 720.0 ft

Total : 500 Surfaces Following 6 Most Critical Surfaces

Defined By : 42 Points FS= 1.09 Drvg F 19788730 lb/ft

Center X = 312.632 Y = 1515.304 Radius= 1204.457

Point X-Coord Y-Coord

ft

ft

1 474.55 321.78

2 510.54 325.72

3 546.41 330.63

4 582.14 336.51

5 617.69 343.36

6 653.05 351.16

7 688.18 359.92

8 723.07 369.62

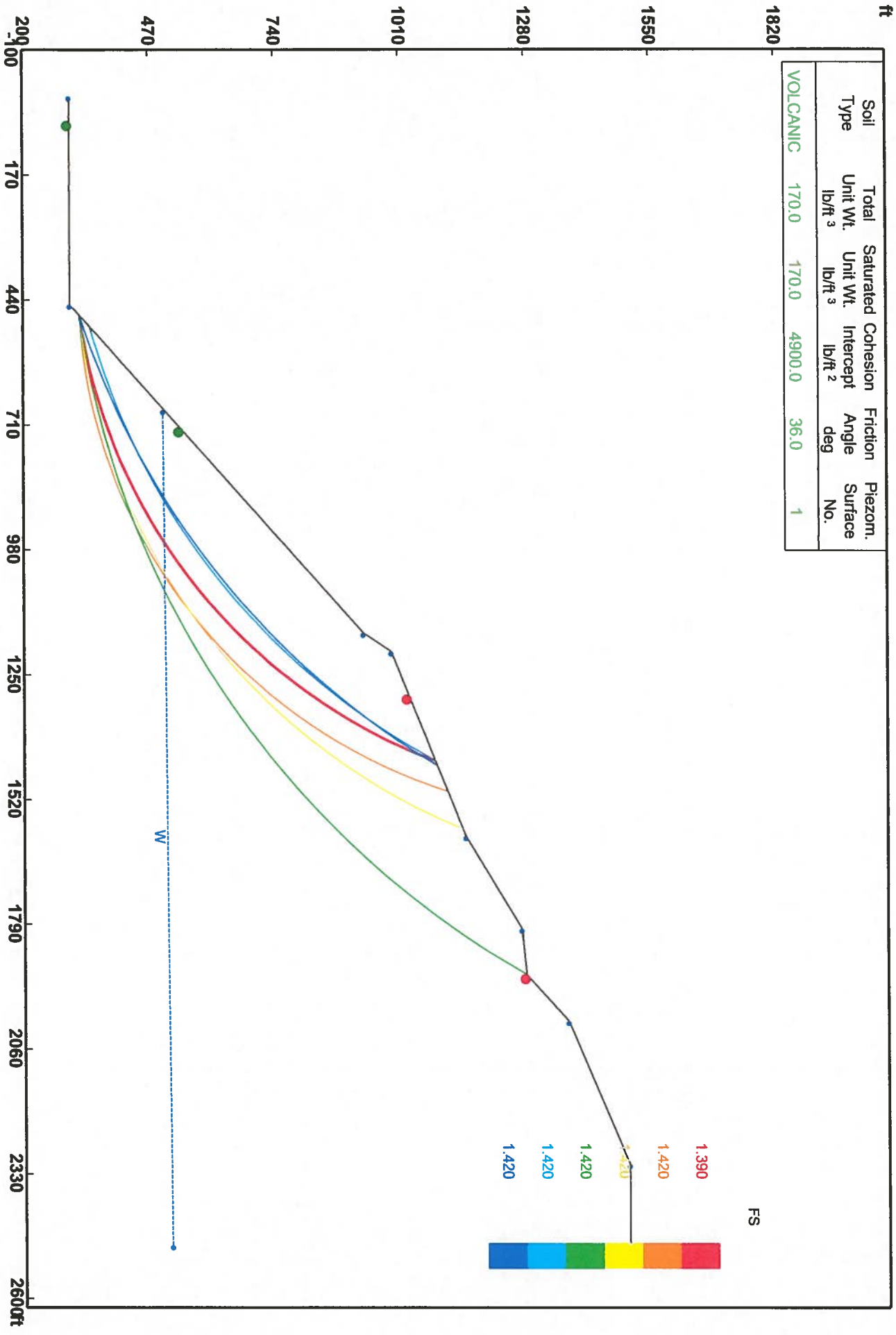
9 757.68 380.27

10 791.98 391.84



# Pacific Rock Cross-Section A-A' Static Lower Slope

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	4900.0	36.0	1



FSmin = 1.390 Bishop Method Failure Surface Fi/C Reduction = 1.0/1.0  
(ASD)



678.33 500.00  
0.00 0.00

Results

Circular Failure

Analysis Method: ASD-Bishop Method

Searched From 58.33 ft To 720.0 ft

Total : 500 Surfaces Following 6 Most Critical Surfaces

Defined By : 40 Points FS= 1.39 Drvg F 16679180 lb/ft

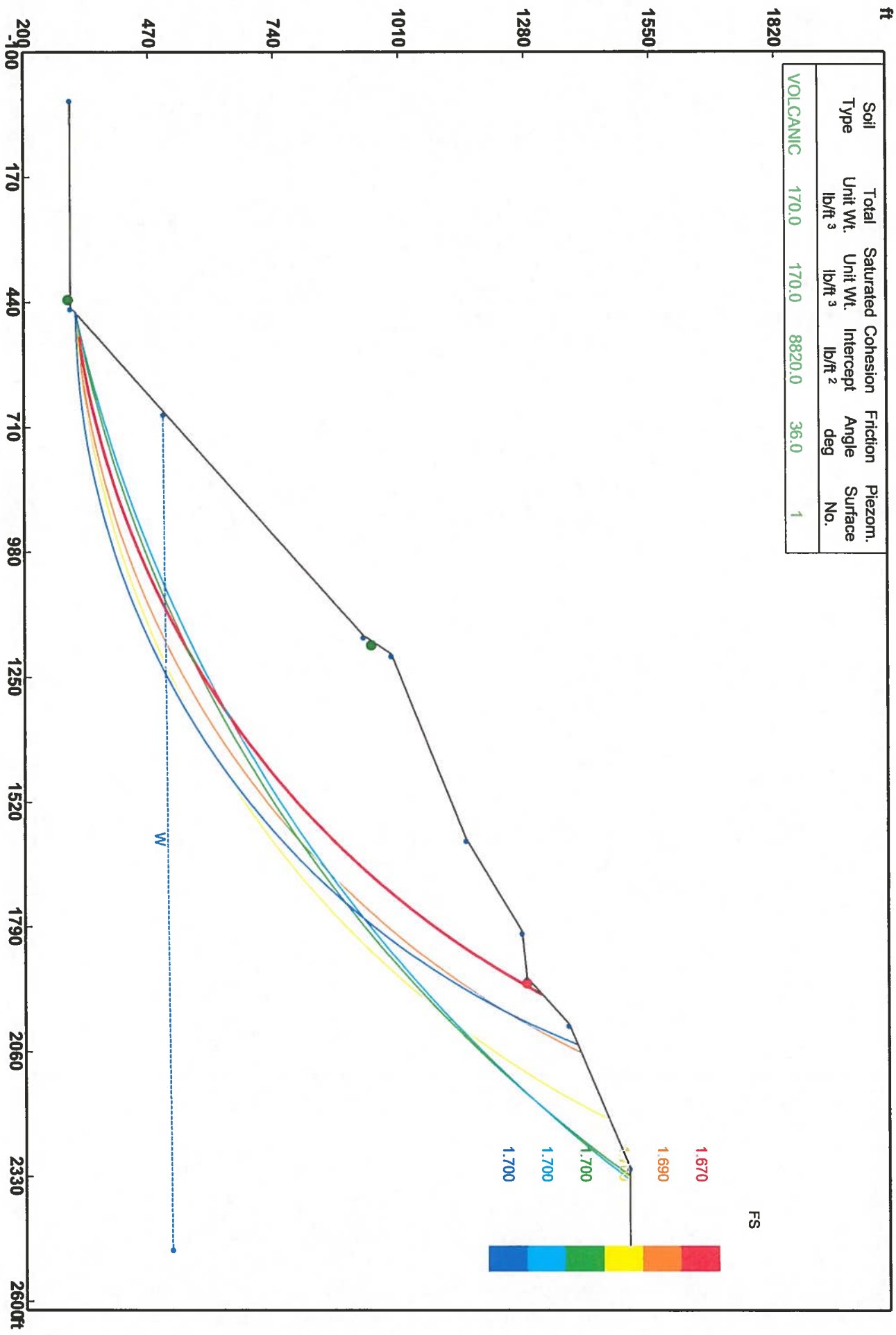
Center X = 312.632 Y = 1515.304 Radius= 1204.457

Point X-Coord Y-Coord  
ft ft

1	474.55	321.78
2	510.68	324.11
3	546.72	327.59
4	582.63	332.22
5	618.38	337.99
6	653.92	344.89
7	689.23	352.92
8	724.26	362.07
9	758.98	372.33
10	793.36	383.69
11	827.36	396.14
12	860.95	409.66
13	894.09	424.25
14	926.75	439.88
15	958.9	456.55
16	990.49	474.23

# Pacific Rock Cross-Section A-A' Static 10% Reduction

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	8820.0	36.0	1



FSmin = 1.670 Bishop Method Failure Surface Fi/C Reduction = 1.0/1.0

(ASD)

## *Visual Slope*

### 边坡稳定分析，土钉及加筋边坡设计

项目名称： Pacific Rock

Cross-Section A-A' Static 10% Reduction

User Name :      Travis                                  Calculation      Method :      ASD-Bishop Method

#### Input Data

Failure	Surface	Strength	Fi Reduc.	1	C Reduc.	1
Line #	X-Left ft	Y-Left ft	X-Right ft	Y-Right ft	Soil Name	
1	0.00	300.00	450.00	300.00	VOLCANIC	
2	450.00	300.00	1160.00	930.00	VOLCANIC	
3	1160.00	930.00	1200.00	990.00	VOLCANIC	
4	1200.00	990.00	1600.00	1150.00	VOLCANIC	
5	1600.00	1150.00	1800.00	1270.00	VOLCANIC	
6	1800.00	1270.00	1900.00	1280.00	VOLCANIC	
7	1900.00	1280.00	2000.00	1370.00	VOLCANIC	
8	2000.00	1370.00	2310.00	1500.00	VOLCANIC	
9	2310.00	1500.00	2520.00	1500.00	VOLCANIC	

#### Soil Data

Soil Name	Unsat Unit WT. lb/ft^3	Saturated Unit WT. lb/ft^3	Cohesion Intercept psf	Friction Angle (degree)	Pore Pressure psf	Pressure Constant ft	Piez. Surface
VOLCANIC	170	170	8820	36	0	0	1

1      Piezometric      Surface(s)

Unit Weight	Of Water =	62.4	lb/ft^3
Piezometric	Surface No.	1	Consists Of
		X	2      Y
			Points

678.33 500.00

0.00 0.00

Results

Circular Failure

Analysis Method: ASD-Bishop Method

Searched From 428.33 ft To 1175.0 ft

Total : 500 Surfaces Following 6 Most Critical Surfaces

Defined By : 51 Points FS= 1.67 Drg F 32606330 lb/ft

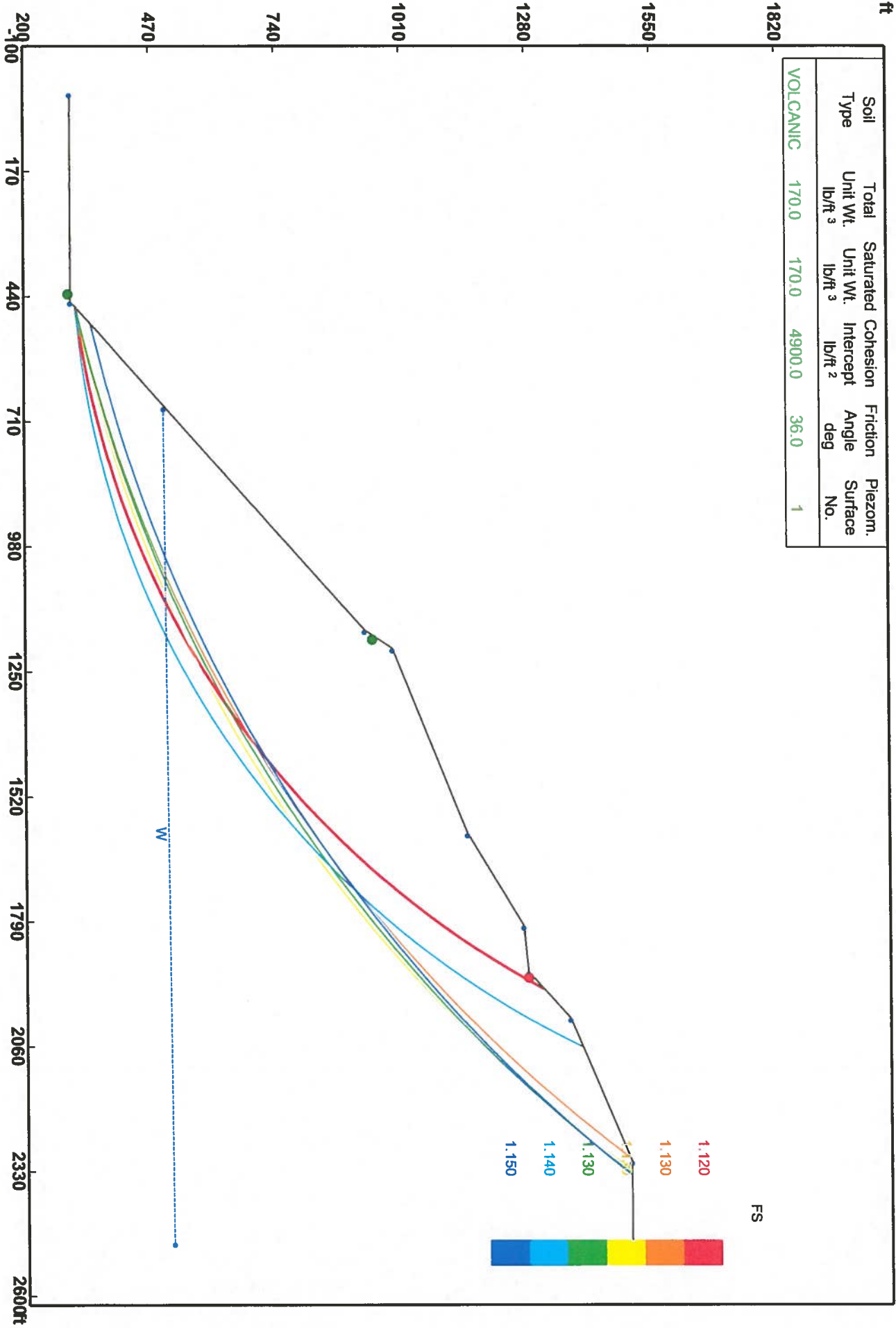
Center X = 236.08 Y = 2232.127 Radius= 1933.319

Point	X-Coord	Y-Coord
	ft	ft

1	463.83	312.27
2	504.65	315.65
3	545.38	319.88
4	586.01	324.98
5	626.52	330.95
6	666.9	337.77
7	707.13	345.44
8	747.18	353.97
9	787.04	363.34
10	826.7	373.56
11	866.13	384.62
12	905.32	396.51
13	944.24	409.23
14	982.89	422.77
15	1021.24	437.13
16	1059.27	452.3

# Pacific Rock Cross-Section A-A' Pseudo-Static

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	4900.0	36.0	1



FSmin = 1.120 Bishop Method Failure Surface Fi/C Reduction = 1.0/1.0  
(ASD)





678.33 500.00

0.00 0.00

Seismic Loads

Horizontal Acceleration

Vertical Acceleration

g

g

0.15

0.0

Results

Circular Failure

Analysis Method: ASD-Bishop Method

Searched From 428.33 ft To 1175.0 ft

Total : 500 Surfaces Following 6 Most Critical Surfaces

Defined By : 56 Points FS= 1.12 Drg F 39872490 lb/ft

Center X = 236.08 Y = 2232.127 Radius= 1933.319

Point X-Coord Y-Coord

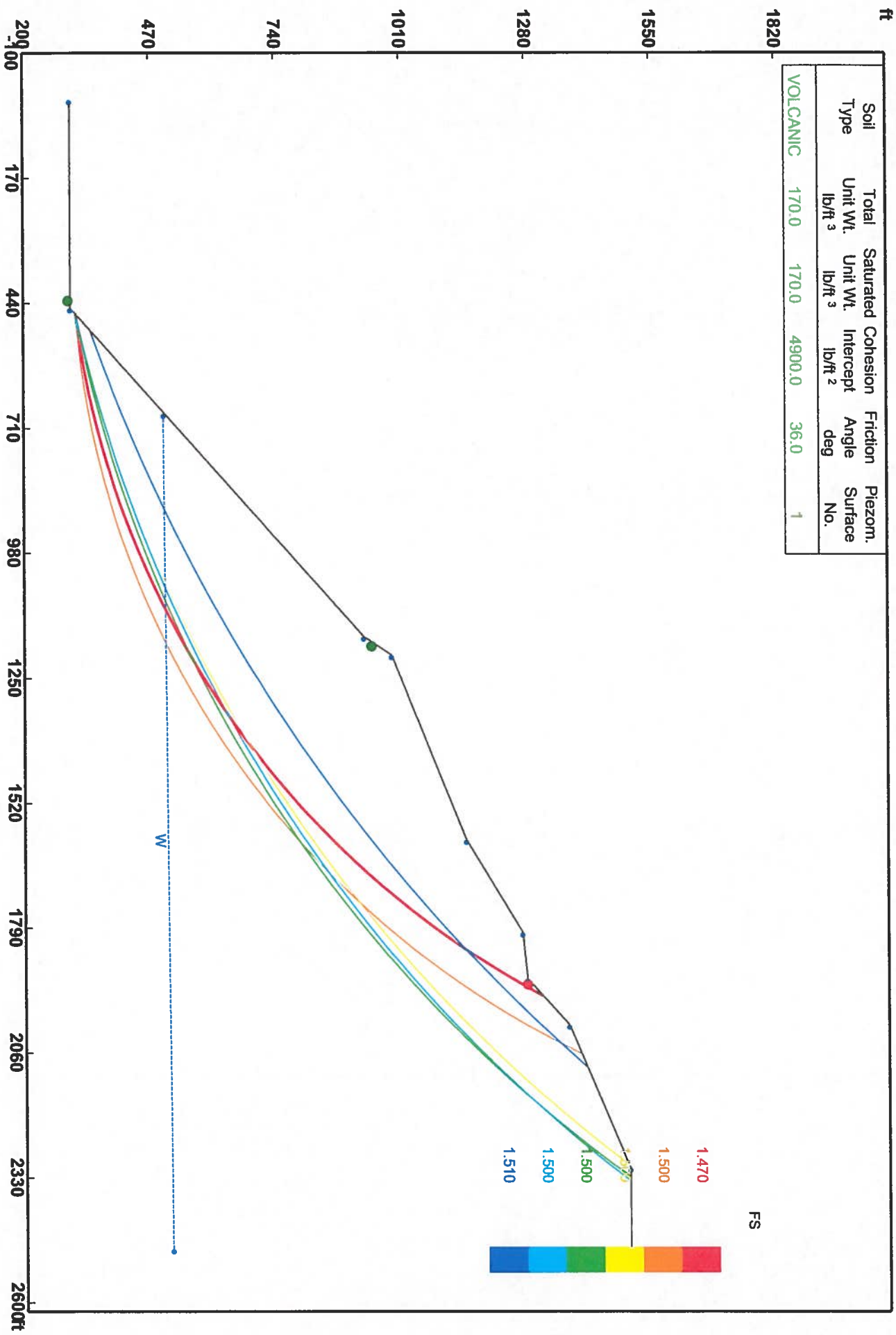
ft

ft

1	463.83	312.27
2	503.71	321.61
3	543.46	331.46
4	583.08	341.81
5	622.56	352.67
6	661.9	364.03
7	701.1	375.9
8	740.14	388.27
9	779.01	401.13
10	817.72	414.5

# Pacific Rock Cross-Section A-A' Static

Soil Type	Total Unit Wt. lb/ft <sup>3</sup>	Saturated Unit Wt. lb/ft <sup>3</sup>	Cohesion Intercept lb/ft <sup>2</sup>	Friction Angle deg	Piezom. Surface No.
VOLCANIC	170.0	170.0	4900.0	36.0	1





678.33 500.00

0.00 0.00

Results

Circular Failure

Analysis Method: ASD-Bishop Method

Searched From 428.33 ft To 1175.0 ft

Total : 500 Surfaces Following 6 Most Critical Surfaces

Defined By : 51 Points FS= 1.47 Drgv F 32606330 lb/ft

Center X = 236.08 Y = 2232.127 Radius= 1933.319

Point	X-Coord	Y-Coord
	ft	ft

1	463.83	312.27
2	504.65	315.65
3	545.38	319.88
4	586.01	324.98
5	626.52	330.95
6	666.9	337.77
7	707.13	345.44
8	747.18	353.97
9	787.04	363.34
10	826.7	373.56
11	866.13	384.62
12	905.32	396.51
13	944.24	409.23
14	982.89	422.77
15	1021.24	437.13
16	1059.27	452.3

**APPENDIX 3**

**REFERENCES**

- 1) Gold Coast GeoServices, Inc., Engineering Geologic Report, Modification to Conditional Use Permit (CUP No. 3817-3) Pacific Rock Quarry, 100 South Howard Road, Camarillo, Ventura County, California, File No. GC93-3350, January 12, 2010.
- 2) Gold Coast GeoServices, Inc., Engineering Geologic Report Analysis of Revised Reclamation Plan for Modification to Conditional Use Permit CUP 3817-3, Pacific Rock, Inc., Camarillo of Ventura, California, File No. GC93-3350, August 2, 2010.
- 3) Gold Coast GeoServices, Inc., Review to “Review of Engineering Geologic Report for Pacific Rock Quarry CA Mine ID #91-56-0011”, by Department of Conservation, Office of Mine Reclamation, for Pacific Rock, Inc., Camarillo, County of Ventura, File No. GC93-3350, dated September 28, 2010.
- 4) Department of Conservation, Office of Mine Reclamation, Compliance Amended Reclamation Plan for Pacific Rock Quarry, CA Mine ID# 91-56-0011, dated October 21, 2010.
- 5) Gold Coast GeoServices, Inc., Discussion of OMR “Geotechnical Requirements” for Pacific Rock Quarry, by Department of Conservation, Office of Mine Reclamation, File No. GC93-3350, dated October 27, 2010.
- 6) County of Ventura Public Works Agency Engineering Services Department Memorandum, Review of Compliance Reclamation Plan Amendment, CUP 3817/Pacific Rock, Inc., dated November 19, 2010.
- 7) Sespe Consulting, Inc., Site Plan, Pacific Rock Quarry, Ventura County California, not dated.

APPENDIX D-2  
CUSTOM SOIL RESOURCE REPORT FOR VENTURA AREA, CALIFORNIA-  
PACIFIC ROCK QUARRY PROPOSED CUP 2019

# Custom Soil Resource Report for Ventura Area, California

## Pacific Rock Quarry Proposed CUP 2019



# Preface

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Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist ([http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2\\_053951](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951)).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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# How Soil Surveys Are Made

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Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

## Custom Soil Resource Report

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

## Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

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The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

# Custom Soil Resource Report Soil Map



Soil Map may not be valid at this scale.

Map Scale: 1:8,830 if printed on A portrait (8.5" x 11") sheet.


0 100 200 400 600 Meters

0 400 800 1600 2400 Feet


Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84


### MAP LEGEND


**Area of Interest (AOI)**

 Area of Interest (AOI)

**Soils**







 Soil Map Unit Polygons

 Soil Map Unit Lines


 Soil Map Unit Points

**Special Point Features**






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features


**Water Features**

 Streams and Canals

**Transportation**

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

**Background**

 Aerial Photography

### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL:  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Ventura Area, California  
 Survey Area Data: Version 13, Sep 12, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Sep 29, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.



## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1159	Topdeck loam, 10 to 35 percent slopes	4.3	2.0%
CyC	Cropley clay, 2 to 9 percent slopes, warm MAAT, MLRA 19	4.8	2.3%
GtD	Gilroy-Cibo complex, 5 to 15 percent slopes	6.1	2.9%
GvF	Gilroy loam, 15 to 50 percent slopes, very rocky	21.8	10.4%
GxG	Gullied land	1.4	0.7%
HaG	Hambright very rocky loam, 15 to 75 percent slopes	26.3	12.5%
IrG	Igneous rock land	115.0	54.8%
PxG	Pits and dumps	28.9	13.8%
W	Water	1.1	0.5%
<b>Totals for Area of Interest</b>		<b>209.6</b>	<b>100.0%</b>

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a

## Custom Soil Resource Report

given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

## Ventura Area, California

### 1159—Topdeck loam, 10 to 35 percent slopes

#### Map Unit Setting

*National map unit symbol:* 2y8sv  
*Elevation:* 110 to 1,070 feet  
*Mean annual precipitation:* 15 to 17 inches  
*Mean annual air temperature:* 61 to 63 degrees F  
*Frost-free period:* 350 to 365 days  
*Farmland classification:* Farmland of local importance

#### Map Unit Composition

*Topdeck and similar soils:* 80 percent  
*Minor components:* 20 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Topdeck

##### Setting

*Landform:* Hills, mountains  
*Landform position (two-dimensional):* Backslope  
*Landform position (three-dimensional):* Mountainflank, side slope  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Parent material:* Residuum weathered from andesite or basalt

##### Typical profile

*A - 0 to 4 inches:* loam  
*Bt - 4 to 14 inches:* gravelly loam  
*R - 14 to 24 inches:* bedrock

##### Properties and qualities

*Slope:* 10 to 35 percent  
*Depth to restrictive feature:* 8 to 20 inches to lithic bedrock  
*Natural drainage class:* Well drained  
*Runoff class:* High  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to low (0.00 to 0.01 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water storage in profile:* Very low (about 2.0 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 7e  
*Land capability classification (nonirrigated):* 7e  
*Hydrologic Soil Group:* D  
*Hydric soil rating:* No

#### Minor Components

##### Gilroy

*Percent of map unit:* 8 percent

## Custom Soil Resource Report

*Landform:* Mountains, hills  
*Landform position (two-dimensional):* Backslope  
*Landform position (three-dimensional):* Mountainflank, side slope  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Hydric soil rating:* No

### **Hambright**

*Percent of map unit:* 3 percent  
*Landform:* Hills, mountains  
*Landform position (two-dimensional):* Backslope  
*Landform position (three-dimensional):* Mountainflank  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Hydric soil rating:* No

### **Cotharin**

*Percent of map unit:* 3 percent  
*Landform:* Mountains, hills  
*Landform position (two-dimensional):* Shoulder  
*Landform position (three-dimensional):* Mountainflank, side slope  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Hydric soil rating:* No

### **Cibo**

*Percent of map unit:* 3 percent  
*Landform:* Hills, mountains  
*Landform position (two-dimensional):* Backslope  
*Landform position (three-dimensional):* Tread  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Hydric soil rating:* No

### **Rock outcrop**

*Percent of map unit:* 3 percent  
*Landform:* Mountains, hills  
*Landform position (two-dimensional):* Shoulder  
*Landform position (three-dimensional):* Mountaintop, crest  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Hydric soil rating:* No

## **CyC—Cropley clay, 2 to 9 percent slopes, warm MAAT, MLRA 19**

### **Map Unit Setting**

*National map unit symbol:* 2tb9k  
*Elevation:* 20 to 3,360 feet  
*Mean annual precipitation:* 15 to 27 inches  
*Mean annual air temperature:* 60 to 65 degrees F  
*Frost-free period:* 270 to 365 days

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*Farmland classification:* Prime farmland if irrigated

### Map Unit Composition

*Cropley and similar soils:* 90 percent

*Minor components:* 10 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Cropley

#### Setting

*Landform:* Terraces, alluvial fans

*Landform position (two-dimensional):* Backslope

*Landform position (three-dimensional):* Base slope

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Alluvium derived from calcareous shale

#### Typical profile

*Ap - 0 to 3 inches:* clay

*A - 3 to 15 inches:* clay

*Bss1 - 15 to 29 inches:* clay

*Bss2 - 29 to 38 inches:* clay

*BCK1 - 38 to 49 inches:* clay

*BCK2 - 49 to 79 inches:* clay

#### Properties and qualities

*Slope:* 2 to 9 percent

*Depth to restrictive feature:* More than 80 inches

*Natural drainage class:* Well drained

*Runoff class:* Very high

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum in profile:* 15 percent

*Available water storage in profile:* Moderate (about 9.0 inches)

#### Interpretive groups

*Land capability classification (irrigated):* 2e

*Land capability classification (nonirrigated):* 4e

*Hydrologic Soil Group:* C

*Ecological site:* Coastal Terrace 14-16" p.z. (R020XD047CA), CLAYEY (1975)  
(R019XD001CA)

*Hydric soil rating:* No

### Minor Components

#### Salinas

*Percent of map unit:* 4 percent

*Landform:* Alluvial fans

*Landform position (three-dimensional):* Talf

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Hydric soil rating:* No

**Rincon**

*Percent of map unit:* 4 percent  
*Landform:* Alluvial fans, terraces  
*Landform position (three-dimensional):* Tread, talf  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Hydric soil rating:* No

**Botella**

*Percent of map unit:* 2 percent  
*Landform:* Low hills  
*Landform position (three-dimensional):* Talf  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Hydric soil rating:* No

**GtD—Gilroy-Cibo complex, 5 to 15 percent slopes**

**Map Unit Setting**

*National map unit symbol:* 2y8st  
*Elevation:* 180 to 1,200 feet  
*Mean annual precipitation:* 15 to 19 inches  
*Mean annual air temperature:* 61 to 63 degrees F  
*Frost-free period:* 350 to 365 days  
*Farmland classification:* Farmland of local importance

**Map Unit Composition**

*Gilroy and similar soils:* 55 percent  
*Cibo and similar soils:* 35 percent  
*Minor components:* 10 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Gilroy**

**Setting**

*Landform:* Hills, mountains  
*Landform position (two-dimensional):* Toeslope, backslope  
*Landform position (three-dimensional):* Mountainbase, base slope  
*Down-slope shape:* Concave  
*Across-slope shape:* Linear  
*Parent material:* Residuum weathered from igneous rock

**Typical profile**

*A - 0 to 12 inches:* loam  
*Bt - 12 to 36 inches:* clay loam  
*R - 36 to 46 inches:* bedrock

**Properties and qualities**

*Slope:* 5 to 20 percent  
*Depth to restrictive feature:* 20 to 39 inches to lithic bedrock

## Custom Soil Resource Report

*Natural drainage class:* Well drained  
*Runoff class:* Medium  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to low (0.00 to 0.01 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water storage in profile:* Moderate (about 6.5 inches)

### Interpretive groups

*Land capability classification (irrigated):* 4e  
*Land capability classification (nonirrigated):* 4e  
*Hydrologic Soil Group:* C  
*Hydric soil rating:* No

### Description of Cibo

#### Setting

*Landform:* Mountains, hills  
*Landform position (two-dimensional):* Toeslope  
*Landform position (three-dimensional):* Mountainbase, base slope  
*Down-slope shape:* Concave  
*Across-slope shape:* Linear  
*Parent material:* Residuum weathered from igneous rock

#### Typical profile

*A - 0 to 4 inches:* clay  
*Bss - 4 to 26 inches:* clay  
*Bkss - 26 to 39 inches:* clay  
*Bk - 39 to 47 inches:* clay loam  
*R - 47 to 57 inches:* bedrock

#### Properties and qualities

*Slope:* 5 to 20 percent  
*Depth to restrictive feature:* 28 to 59 inches to lithic bedrock  
*Natural drainage class:* Well drained  
*Runoff class:* Very high  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to low (0.00 to 0.01 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 4 percent  
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water storage in profile:* Moderate (about 7.2 inches)

#### Interpretive groups

*Land capability classification (irrigated):* 4e  
*Land capability classification (nonirrigated):* 4e  
*Hydrologic Soil Group:* C  
*Hydric soil rating:* No

**Minor Components**

**Topdeck**

*Percent of map unit:* 5 percent  
*Landform:* Hills, mountains  
*Landform position (two-dimensional):* Backslope  
*Landform position (three-dimensional):* Mountainflank, side slope  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Hydric soil rating:* No

**Hambright**

*Percent of map unit:* 5 percent  
*Landform:* Hills, mountains  
*Landform position (two-dimensional):* Backslope  
*Landform position (three-dimensional):* Mountainflank  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Hydric soil rating:* No

**GvF—Gilroy loam, 15 to 50 percent slopes, very rocky**

**Map Unit Setting**

*National map unit symbol:* 2xgty  
*Elevation:* 490 to 1,200 feet  
*Mean annual precipitation:* 15 to 18 inches  
*Mean annual air temperature:* 61 to 63 degrees F  
*Frost-free period:* 350 to 365 days  
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Gilroy and similar soils:* 80 percent  
*Minor components:* 20 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Gilroy**

**Setting**

*Landform:* Hills, mountains  
*Landform position (two-dimensional):* Backslope  
*Landform position (three-dimensional):* Mountainflank, side slope  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Parent material:* Residuum weathered from igneous rock

**Typical profile**

*A - 0 to 5 inches:* loam  
*Bt1 - 5 to 9 inches:* clay loam  
*Bt2 - 9 to 13 inches:* gravelly clay loam



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*Bt3 - 13 to 20 inches: gravelly clay loam*  
*R - 20 to 30 inches: bedrock*

### Properties and qualities

*Slope: 15 to 50 percent*  
*Depth to restrictive feature: 20 to 39 inches to lithic bedrock*  
*Natural drainage class: Well drained*  
*Runoff class: High*  
*Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)*  
*Depth to water table: More than 80 inches*  
*Frequency of flooding: None*  
*Frequency of ponding: None*  
*Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)*  
*Available water storage in profile: Low (about 3.2 inches)*

### Interpretive groups

*Land capability classification (irrigated): 6e*  
*Land capability classification (nonirrigated): 6e*  
*Hydrologic Soil Group: C*  
*Hydric soil rating: No*

### Minor Components

#### Rock outcrop

*Percent of map unit: 8 percent*  
*Landform: Mountains, hills*  
*Landform position (two-dimensional): Shoulder*  
*Landform position (three-dimensional): Mountaintop, crest*  
*Down-slope shape: Convex*  
*Across-slope shape: Convex*

#### Cotharin

*Percent of map unit: 3 percent*  
*Landform: Hills, mountains*  
*Landform position (two-dimensional): Shoulder*  
*Landform position (three-dimensional): Mountainflank, side slope*  
*Down-slope shape: Convex*  
*Across-slope shape: Convex*  
*Hydric soil rating: No*

#### Cibo, deep

*Percent of map unit: 3 percent*  
*Landform: Hills, mountains*  
*Landform position (two-dimensional): Footslope*  
*Landform position (three-dimensional): Mountainflank, side slope*  
*Down-slope shape: Concave*  
*Across-slope shape: Convex*  
*Hydric soil rating: No*

#### Topdeck

*Percent of map unit: 3 percent*  
*Landform: Hills, mountains*  
*Landform position (two-dimensional): Backslope*  
*Landform position (three-dimensional): Mountainflank, side slope*  
*Down-slope shape: Convex*

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*Across-slope shape:* Convex  
*Hydric soil rating:* No

### **Hambright**

*Percent of map unit:* 3 percent  
*Landform:* Mountains, hills  
*Landform position (two-dimensional):* Backslope  
*Landform position (three-dimensional):* Mountainflank  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Hydric soil rating:* No

## **GxG—Gullied land**

### **Map Unit Composition**

*Gullied land:* 85 percent  
*Minor components:* 15 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### **Description of Gullied Land**

#### **Setting**

*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Parent material:* Residuum weathered from igneous and sedimentary rock

#### **Typical profile**

*H1 - 0 to 60 inches:* variable

#### **Interpretive groups**

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 8  
*Hydric soil rating:* No

### **Minor Components**

#### **Badland**

*Percent of map unit:* 4 percent  
*Hydric soil rating:* No

#### **Balcom**

*Percent of map unit:* 4 percent  
*Hydric soil rating:* No

#### **Gaviota**

*Percent of map unit:* 4 percent  
*Hydric soil rating:* No

#### **Saugus**

*Percent of map unit:* 3 percent  
*Hydric soil rating:* No

## HaG—Hambright very rocky loam, 15 to 75 percent slopes

### Map Unit Setting

*National map unit symbol:* hc8r  
*Elevation:* 200 to 4,000 feet  
*Mean annual precipitation:* 8 to 25 inches  
*Mean annual air temperature:* 45 to 64 degrees F  
*Frost-free period:* 250 to 300 days  
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Hambright and similar soils:* 70 percent  
*Rock outcrop:* 20 percent  
*Minor components:* 10 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Hambright

#### Setting

*Landform:* Mountains  
*Landform position (two-dimensional):* Backslope  
*Landform position (three-dimensional):* Mountainflank  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Parent material:* Residuum weathered from igneous rock

#### Typical profile

*H1 - 0 to 2 inches:* loam  
*H2 - 2 to 14 inches:* very stony clay loam  
*H3 - 14 to 32 inches:* unweathered bedrock

#### Properties and qualities

*Slope:* 15 to 75 percent  
*Depth to restrictive feature:* 10 to 20 inches to lithic bedrock  
*Natural drainage class:* Well drained  
*Runoff class:* Very high  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water storage in profile:* Very low (about 1.4 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 7e  
*Hydrologic Soil Group:* D  
*Hydric soil rating:* No

### Description of Rock Outcrop

#### Typical profile

*H1 - 0 to 4 inches:* unweathered bedrock

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### Properties and qualities

*Slope:* 15 to 75 percent

*Depth to restrictive feature:* 0 inches to lithic bedrock

*Natural drainage class:* Excessively drained

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 8

*Hydric soil rating:* No

### Minor Components

#### Gilroy

*Percent of map unit:* 3 percent

*Hydric soil rating:* No

#### Igneous rockland

*Percent of map unit:* 3 percent

*Hydric soil rating:* No

#### Cibo

*Percent of map unit:* 2 percent

*Hydric soil rating:* No

#### Hambright, rocky clay loam

*Percent of map unit:* 2 percent

*Hydric soil rating:* No

## IrG—Igneous rock land

### Map Unit Setting

*National map unit symbol:* hc90

*Elevation:* 650 to 9,000 feet

*Mean annual precipitation:* 8 to 15 inches

*Mean annual air temperature:* 45 to 52 degrees F

*Frost-free period:* 110 to 180 days

*Farmland classification:* Not prime farmland

### Map Unit Composition

*Igneous rock land:* 50 percent

*Lithic xerorthents and similar soils:* 40 percent

*Minor components:* 10 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Igneous Rock Land

#### Setting

*Down-slope shape:* Concave

*Across-slope shape:* Concave

*Parent material:* Residuum weathered from igneous rock

**Typical profile**

*H1 - 0 to 10 inches: unweathered bedrock*

**Properties and qualities**

*Slope: 30 to 75 percent*

*Depth to restrictive feature: 0 inches to lithic bedrock*

*Natural drainage class: Excessively drained*

*Runoff class: Very high*

**Interpretive groups**

*Land capability classification (irrigated): None specified*

*Land capability classification (nonirrigated): 8*

*Hydric soil rating: No*

**Description of Lithic Xerorthents**

**Setting**

*Landform: Mountains*

*Landform position (two-dimensional): Backslope*

*Landform position (three-dimensional): Mountainflank*

*Parent material: Residuum weathered from igneous rock*

**Properties and qualities**

*Slope: 30 to 75 percent*

*Depth to restrictive feature: 8 to 20 inches to lithic bedrock*

*Natural drainage class: Excessively drained*

*Depth to water table: More than 80 inches*

*Frequency of flooding: None*

*Frequency of ponding: None*

**Interpretive groups**

*Land capability classification (irrigated): None specified*

*Land capability classification (nonirrigated): 7e*

*Hydric soil rating: No*

**Minor Components**

**Hambright**

*Percent of map unit: 5 percent*

*Hydric soil rating: No*

**Gullied land**

*Percent of map unit: 5 percent*

*Hydric soil rating: No*

**PxG—Pits and dumps**

**Map Unit Composition**

*Pits and dumps: 40 percent*

*Dumps: 40 percent*

*Minor components: 20 percent*

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*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Pits And Dumps

#### Typical profile

*H1 - 0 to 6 inches:* extremely gravelly coarse sand

*H2 - 6 to 60 inches:* extremely gravelly sand, extremely gravelly coarse sand, very gravelly coarse sand

*H2 - 6 to 60 inches:*

*H2 - 6 to 60 inches:*

#### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 8

*Hydric soil rating:* No

### Description of Dumps

#### Setting

*Down-slope shape:* Linear

*Across-slope shape:* Linear

#### Typical profile

*H1 - 0 to 60 inches:* variable

#### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 8

*Hydric soil rating:* No

### Minor Components

#### Sandy alluvial land

*Percent of map unit:* 5 percent

*Hydric soil rating:* No

#### Igneous rockland

*Percent of map unit:* 5 percent

*Hydric soil rating:* No

#### Sedimentary rock land

*Percent of map unit:* 5 percent

*Hydric soil rating:* No

#### Riverwash

*Percent of map unit:* 5 percent

*Hydric soil rating:* No

## W—Water

### Map Unit Composition

*Water:* 100 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

## Custom Soil Resource Report

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# Glossary

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Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the following National Soil Survey Handbook link: "[National Soil Survey Handbook](#)."

## **ABC soil**

A soil having an A, a B, and a C horizon.

## **Ablation till**

Loose, relatively permeable earthy material deposited during the downwasting of nearly static glacial ice, either contained within or accumulated on the surface of the glacier.

## **AC soil**

A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

## **Aeration, soil**

The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

## **Aggregate, soil**

Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

## **Alkali (sodic) soil**

A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

## **Alluvial cone**

A semiconical type of alluvial fan having very steep slopes. It is higher, narrower, and steeper than a fan and is composed of coarser and thicker layers of material deposited by a combination of alluvial episodes and (to a much lesser degree) landslides (debris flow). The coarsest materials tend to be concentrated at the apex of the cone.

**Alluvial fan**

A low, outspread mass of loose materials and/or rock material, commonly with gentle slopes. It is shaped like an open fan or a segment of a cone. The material was deposited by a stream at the place where it issues from a narrow mountain valley or upland valley or where a tributary stream is near or at its junction with the main stream. The fan is steepest near its apex, which points upstream, and slopes gently and convexly outward (downstream) with a gradual decrease in gradient.

**Alluvium**

Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

**Alpha,alpha-dipyridyl**

A compound that when dissolved in ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction implies reducing conditions and the likely presence of redoximorphic features.

**Animal unit month (AUM)**

The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

**Aquic conditions**

Current soil wetness characterized by saturation, reduction, and redoximorphic features.

**Argillic horizon**

A subsoil horizon characterized by an accumulation of illuvial clay.

**Arroyo**

The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in unconsolidated material. It is usually dry but can be transformed into a temporary watercourse or short-lived torrent after heavy rain within the watershed.

**Aspect**

The direction toward which a slope faces. Also called slope aspect.

**Association, soil**

A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

**Available water capacity (available moisture capacity)**

The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

*Very low:* 0 to 3

*Low:* 3 to 6

*Moderate:* 6 to 9

*High:* 9 to 12

*Very high:* More than 12

**Backslope**

The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

**Backswamp**

A flood-plain landform. Extensive, marshy or swampy, depressed areas of flood plains between natural levees and valley sides or terraces.

**Badland**

A landscape that is intricately dissected and characterized by a very fine drainage network with high drainage densities and short, steep slopes and narrow interfluves. Badlands develop on surfaces that have little or no vegetative cover overlying unconsolidated or poorly cemented materials (clays, silts, or sandstones) with, in some cases, soluble minerals, such as gypsum or halite.

**Bajada**

A broad, gently inclined alluvial piedmont slope extending from the base of a mountain range out into a basin and formed by the lateral coalescence of a series of alluvial fans. Typically, it has a broadly undulating transverse profile, parallel to the mountain front, resulting from the convexities of component fans. The term is generally restricted to constructional slopes of intermontane basins.

**Basal area**

The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

**Base saturation**

The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

**Base slope (geomorphology)**

A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

**Bedding plane**

A planar or nearly planar bedding surface that visibly separates each successive layer of stratified sediment or rock (of the same or different lithology)

from the preceding or following layer; a plane of deposition. It commonly marks a change in the circumstances of deposition and may show a parting, a color difference, a change in particle size, or various combinations of these. The term is commonly applied to any bedding surface, even one that is conspicuously bent or deformed by folding.

**Bedding system**

A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

**Bedrock**

The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

**Bedrock-controlled topography**

A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

**Bench terrace**

A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

**Bisequum**

Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

**Blowout (map symbol)**

A saucer-, cup-, or trough-shaped depression formed by wind erosion on a preexisting dune or other sand deposit, especially in an area of shifting sand or loose soil or where protective vegetation is disturbed or destroyed. The adjoining accumulation of sand derived from the depression, where recognizable, is commonly included. Blowouts are commonly small.

**Borrow pit (map symbol)**

An open excavation from which soil and underlying material have been removed, usually for construction purposes.

**Bottom land**

An informal term loosely applied to various portions of a flood plain.

**Boulders**

Rock fragments larger than 2 feet (60 centimeters) in diameter.

**Breaks**

A landscape or tract of steep, rough or broken land dissected by ravines and gullies and marking a sudden change in topography.

**Breast height**

An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

**Brush management**

Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

**Butte**

An isolated, generally flat-topped hill or mountain with relatively steep slopes and talus or precipitous cliffs and characterized by summit width that is less than the height of bounding escarpments; commonly topped by a caprock of resistant material and representing an erosion remnant carved from flat-lying rocks.

**Cable yarding**

A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

**Calcareous soil**

A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

**Caliche**

A general term for a prominent zone of secondary carbonate accumulation in surficial materials in warm, subhumid to arid areas. Caliche is formed by both geologic and pedologic processes. Finely crystalline calcium carbonate forms a nearly continuous surface-coating and void-filling medium in geologic (parent) materials. Cementation ranges from weak in nonindurated forms to very strong in indurated forms. Other minerals (e.g., carbonates, silicate, and sulfate) may occur as accessory cements. Most petrocalcic horizons and some calcic horizons are caliche.

**California bearing ratio (CBR)**

The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

**Canopy**

The leafy crown of trees or shrubs. (See Crown.)

**Canyon**

A long, deep, narrow valley with high, precipitous walls in an area of high local relief.

**Capillary water**

Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

**Catena**

A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material and under similar climatic conditions but that have different characteristics as a result of differences in relief and drainage.

**Cation**

An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

**Cation-exchange capacity**

The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

**Catsteps**

See Terracettes.

**Cement rock**

Shaly limestone used in the manufacture of cement.

**Channery soil material**

Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

**Chemical treatment**

Control of unwanted vegetation through the use of chemicals.

**Chiseling**

Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

**Cirque**

A steep-walled, semicircular or crescent-shaped, half-bowl-like recess or hollow, commonly situated at the head of a glaciated mountain valley or high on the side of a mountain. It was produced by the erosive activity of a mountain glacier. It commonly contains a small round lake (tarn).

**Clay**

As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

**Clay depletions**

See Redoximorphic features.

**Clay film**

A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

**Clay spot (map symbol)**

A spot where the surface texture is silty clay or clay in areas where the surface layer of the soils in the surrounding map unit is sandy loam, loam, silt loam, or coarser.

**Claypan**

A dense, compact subsoil layer that contains much more clay than the overlying materials, from which it is separated by a sharply defined boundary. The layer restricts the downward movement of water through the soil. A claypan is commonly hard when dry and plastic and sticky when wet.

**Climax plant community**

The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

**Coarse textured soil**

Sand or loamy sand.

**Cobble (or cobblestone)**

A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

**Cobbly soil material**

Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

**COLE (coefficient of linear extensibility)**

See Linear extensibility.

**Colluvium**

Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.



**Complex slope**

Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

**Complex, soil**

A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

**Concretions**

See Redoximorphic features.

**Conglomerate**

A coarse grained, clastic sedimentary rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

**Conservation cropping system**

Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

**Conservation tillage**

A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

**Consistence, soil**

Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

**Contour stripcropping**

Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

**Control section**

The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

**Coprogenous earth (sedimentary peat)**

A type of limnic layer composed predominantly of fecal material derived from aquatic animals.

**Corrosion (geomorphology)**

A process of erosion whereby rocks and soil are removed or worn away by natural chemical processes, especially by the solvent action of running water, but also by other reactions, such as hydrolysis, hydration, carbonation, and oxidation.

**Corrosion (soil survey interpretations)**

Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

**Cover crop**

A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

**Crop residue management**

Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

**Cropping system**

Growing crops according to a planned system of rotation and management practices.

**Cross-slope farming**

Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

**Crown**

The upper part of a tree or shrub, including the living branches and their foliage.

**Cryoturbate**

A mass of soil or other unconsolidated earthy material moved or disturbed by frost action. It is typically coarser than the underlying material.

**Cuesta**

An asymmetric ridge capped by resistant rock layers of slight or moderate dip (commonly less than 15 percent slopes); a type of homocline produced by differential erosion of interbedded resistant and weak rocks. A cuesta has a long, gentle slope on one side (dip slope) that roughly parallels the inclined beds; on the other side, it has a relatively short and steep or clifflike slope (scarp) that cuts through the tilted rocks.

**Culmination of the mean annual increment (CMAI)**

The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

**Cutbanks cave**

The walls of excavations tend to cave in or slough.

**Decreasers**

The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

**Deferred grazing**

Postponing grazing or resting grazing land for a prescribed period.

**Delta**

A body of alluvium having a surface that is fan shaped and nearly flat; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

**Dense layer**

A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

**Depression, closed (map symbol)**

A shallow, saucer-shaped area that is slightly lower on the landscape than the surrounding area and that does not have a natural outlet for surface drainage.

**Depth, soil**

Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

**Desert pavement**

A natural, residual concentration or layer of wind-polished, closely packed gravel, boulders, and other rock fragments mantling a desert surface. It forms where wind action and sheetwash have removed all smaller particles or where rock fragments have migrated upward through sediments to the surface. It typically protects the finer grained underlying material from further erosion.

**Diatomaceous earth**

A geologic deposit of fine, grayish siliceous material composed chiefly or entirely of the remains of diatoms.

**Dip slope**

A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

**Diversion (or diversion terrace)**

A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

**Divided-slope farming**

A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

**Drainage class (natural)**

Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained*. These classes are defined in the “Soil Survey Manual.”

**Drainage, surface**

Runoff, or surface flow of water, from an area.

**Drainageway**

A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that at some time move concentrated water and either do not have a defined channel or have only a small defined channel.

**Draw**

A small stream valley that generally is shallower and more open than a ravine or gulch and that has a broader bottom. The present stream channel may appear inadequate to have cut the drainageway that it occupies.

**Drift**

A general term applied to all mineral material (clay, silt, sand, gravel, and boulders) transported by a glacier and deposited directly by or from the ice or transported by running water emanating from a glacier. Drift includes unstratified material (till) that forms moraines and stratified deposits that form outwash plains, eskers, kames, varves, and glaciofluvial sediments. The term is generally applied to Pleistocene glacial deposits in areas that no longer contain glaciers.

**Drumlin**

A low, smooth, elongated oval hill, mound, or ridge of compact till that has a core of bedrock or drift. It commonly has a blunt nose facing the direction from which the ice approached and a gentler slope tapering in the other direction. The longer axis is parallel to the general direction of glacier flow. Drumlins are products of streamline (laminar) flow of glaciers, which molded the subglacial floor through a combination of erosion and deposition.

**Duff**

A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

**Dune**

A low mound, ridge, bank, or hill of loose, windblown granular material (generally sand), either barren and capable of movement from place to place or covered and stabilized with vegetation but retaining its characteristic shape.

**Earthy fill**

See Mine spoil.

**Ecological site**

An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

**Eluviation**

The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

**Endosaturation**

A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

**Eolian deposit**

Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.

**Ephemeral stream**

A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

**Episaturation**

A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

**Erosion**

The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

**Erosion (accelerated)**

Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

**Erosion (geologic)**

Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

**Erosion pavement**

A surficial lag concentration or layer of gravel and other rock fragments that remains on the soil surface after sheet or rill erosion or wind has removed the finer soil particles and that tends to protect the underlying soil from further erosion.

**Erosion surface**

A land surface shaped by the action of erosion, especially by running water.

**Escarpment**

A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

**Escarpment, bedrock (map symbol)**

A relatively continuous and steep slope or cliff, produced by erosion or faulting, that breaks the general continuity of more gently sloping land surfaces. Exposed material is hard or soft bedrock.

**Escarpment, nonbedrock (map symbol)**

A relatively continuous and steep slope or cliff, generally produced by erosion but in some places produced by faulting, that breaks the continuity of more gently sloping land surfaces. Exposed earthy material is nonsoil or very shallow soil.

**Esker**

A long, narrow, sinuous, steep-sided ridge of stratified sand and gravel deposited as the bed of a stream flowing in an ice tunnel within or below the ice (subglacial) or between ice walls on top of the ice of a wasting glacier and left

behind as high ground when the ice melted. Eskers range in length from less than a kilometer to more than 160 kilometers and in height from 3 to 30 meters.

**Extrusive rock**

Igneous rock derived from deep-seated molten matter (magma) deposited and cooled on the earth's surface.

**Fallow**

Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

**Fan remnant**

A general term for landforms that are the remaining parts of older fan landforms, such as alluvial fans, that have been either dissected or partially buried.

**Fertility, soil**

The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

**Fibric soil material (peat)**

The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

**Field moisture capacity**

The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.

**Fill slope**

A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

**Fine textured soil**

Sandy clay, silty clay, or clay.

**Firebreak**

An area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

**First bottom**

An obsolete, informal term loosely applied to the lowest flood-plain steps that are subject to regular flooding.

**Flaggy soil material**

Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

**Flagstone**

A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

**Flood plain**

The nearly level plain that borders a stream and is subject to flooding unless protected artificially.

**Flood-plain landforms**

A variety of constructional and erosional features produced by stream channel migration and flooding. Examples include backswamps, flood-plain splays, meanders, meander belts, meander scrolls, oxbow lakes, and natural levees.

**Flood-plain splay**

A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (commonly coarse grained) on the flood plain.

**Flood-plain step**

An essentially flat, terrace-like alluvial surface within a valley that is frequently covered by floodwater from the present stream; any approximately horizontal surface still actively modified by fluvial scour and/or deposition. May occur individually or as a series of steps.

**Fluvial**

Of or pertaining to rivers or streams; produced by stream or river action.

**Foothills**

A region of steeply sloping hills that fringes a mountain range or high-plateau escarpment. The hills have relief of as much as 1,000 feet (300 meters).

**Footslope**

The concave surface at the base of a hillslope. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

**Forb**

Any herbaceous plant not a grass or a sedge.



**Forest cover**

All trees and other woody plants (underbrush) covering the ground in a forest.

**Forest type**

A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

**Fragipan**

A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

**Genesis, soil**

The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

**Gilgai**

Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

**Glaciofluvial deposits**

Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur in the form of outwash plains, valley trains, deltas, kames, eskers, and kame terraces.

**Glaciolacustrine deposits**

Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are bedded or laminated.

**Gleyed soil**

Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

**Graded stripcropping**

Growing crops in strips that grade toward a protected waterway.

**Grassed waterway**

A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

**Gravel**

Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

**Gravel pit (map symbol)**

An open excavation from which soil and underlying material have been removed and used, without crushing, as a source of sand or gravel.

**Gravelly soil material**

Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

**Gravelly spot (map symbol)**

A spot where the surface layer has more than 35 percent, by volume, rock fragments that are mostly less than 3 inches in diameter in an area that has less than 15 percent rock fragments.

**Green manure crop (agronomy)**

A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

**Ground water**

Water filling all the unblocked pores of the material below the water table.

**Gully (map symbol)**

A small, steep-sided channel caused by erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage whereas a rill is of lesser depth and can be smoothed over by ordinary tillage.

**Hard bedrock**

Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

**Hard to reclaim**

Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

**Hardpan**

A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

**Head slope (geomorphology)**

A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

**Hemic soil material (mucky peat)**

Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

**High-residue crops**

Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

**Hill**

A generic term for an elevated area of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.

**Hillslope**

A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill.

**Horizon, soil**

A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

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*O horizon:* An organic layer of fresh and decaying plant residue.

*L horizon:* A layer of organic and mineral limnic materials, including coprogenous earth (sedimentary peat), diatomaceous earth, and marl.

*A horizon:* The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

*E horizon:* The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

*B horizon:* The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

*C horizon:* The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

*Cr horizon:* Soft, consolidated bedrock beneath the soil.

*R layer:* Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

*M layer:* A root-limiting subsoil layer consisting of nearly continuous, horizontally oriented, human-manufactured materials.

*W layer:* A layer of water within or beneath the soil.

### **Humus**

The well decomposed, more or less stable part of the organic matter in mineral soils.

### **Hydrologic soil groups**

Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties include depth to a seasonal high water table, the infiltration rate, and depth to a layer that significantly restricts the downward movement of water. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

### **Igneous rock**

Rock that was formed by cooling and solidification of magma and that has not been changed appreciably by weathering since its formation. Major varieties include plutonic and volcanic rock (e.g., andesite, basalt, and granite).

### **Illuviation**

The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

**Impervious soil**

A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

**Increasers**

Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

**Infiltration**

The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

**Infiltration capacity**

The maximum rate at which water can infiltrate into a soil under a given set of conditions.

**Infiltration rate**

The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

**Intake rate**

The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

*Very low:* Less than 0.2

*Low:* 0.2 to 0.4

*Moderately low:* 0.4 to 0.75

*Moderate:* 0.75 to 1.25

*Moderately high:* 1.25 to 1.75

*High:* 1.75 to 2.5

*Very high:* More than 2.5

**Interfluve**

A landform composed of the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways.

**Interfluve (geomorphology)**

A geomorphic component of hills consisting of the uppermost, comparatively level or gently sloping area of a hill; shoulders of backwearing hillslopes can narrow the upland or can merge, resulting in a strongly convex shape.

### **Intermittent stream**

A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

### **Invaders**

On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

### **Iron depletions**

See Redoximorphic features.

### **Irrigation**

Application of water to soils to assist in production of crops. Methods of irrigation are:

*Basin:* Water is applied rapidly to nearly level plains surrounded by levees or dikes.

*Border:* Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

*Controlled flooding:* Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

*Corrugation:* Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

*Drip (or trickle):* Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

*Furrow:* Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

*Sprinkler:* Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

*Subirrigation:* Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

*Wild flooding:* Water, released at high points, is allowed to flow onto an area without controlled distribution.

### **Kame**

A low mound, knob, hummock, or short irregular ridge composed of stratified sand and gravel deposited by a subglacial stream as a fan or delta at the margin of a melting glacier; by a supraglacial stream in a low place or hole on the surface of the glacier; or as a ponded deposit on the surface or at the margin of stagnant ice.

**Karst (topography)**

A kind of topography that formed in limestone, gypsum, or other soluble rocks by dissolution and that is characterized by closed depressions, sinkholes, caves, and underground drainage.

**Knoll**

A small, low, rounded hill rising above adjacent landforms.

**Ksat**

See Saturated hydraulic conductivity.

**Lacustrine deposit**

Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

**Lake plain**

A nearly level surface marking the floor of an extinct lake filled by well sorted, generally fine textured, stratified deposits, commonly containing varves.

**Lake terrace**

A narrow shelf, partly cut and partly built, produced along a lakeshore in front of a scarp line of low cliffs and later exposed when the water level falls.

**Landfill (map symbol)**

An area of accumulated waste products of human habitation, either above or below natural ground level.

**Landslide**

A general, encompassing term for most types of mass movement landforms and processes involving the downslope transport and outward deposition of soil and rock materials caused by gravitational forces; the movement may or may not involve saturated materials. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

**Large stones**

Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

**Lava flow (map symbol)**

A solidified, commonly lobate body of rock formed through lateral, surface outpouring of molten lava from a vent or fissure.

**Leaching**

The removal of soluble material from soil or other material by percolating water.

**Levee (map symbol)**

An embankment that confines or controls water, especially one built along the banks of a river to prevent overflow onto lowlands.

**Linear extensibility**

Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at  $1/3$ - or  $1/10$ -bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

**Liquid limit**

The moisture content at which the soil passes from a plastic to a liquid state.

**Loam**

Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Loess**

Material transported and deposited by wind and consisting dominantly of silt-sized particles.

**Low strength**

The soil is not strong enough to support loads.

**Low-residue crops**

Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

**Marl**

An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal proportions; formed primarily under freshwater lacustrine conditions but also formed in more saline environments.

**Marsh or swamp (map symbol)**

A water-saturated, very poorly drained area that is intermittently or permanently covered by water. Sedges, cattails, and rushes are the dominant vegetation in marshes, and trees or shrubs are the dominant vegetation in swamps. Not used in map units where the named soils are poorly drained or very poorly drained.

**Mass movement**

A generic term for the dislodgment and downslope transport of soil and rock material as a unit under direct gravitational stress.



**Masses**

See Redoximorphic features.

**Meander belt**

The zone within which migration of a meandering channel occurs; the flood-plain area included between two imaginary lines drawn tangential to the outer bends of active channel loops.

**Meander scar**

A crescent-shaped, concave or linear mark on the face of a bluff or valley wall, produced by the lateral erosion of a meandering stream that impinged upon and undercut the bluff.

**Meander scroll**

One of a series of long, parallel, close-fitting, crescent-shaped ridges and troughs formed along the inner bank of a stream meander as the channel migrated laterally down-valley and toward the outer bank.

**Mechanical treatment**

Use of mechanical equipment for seeding, brush management, and other management practices.

**Medium textured soil**

Very fine sandy loam, loam, silt loam, or silt.

**Mesa**

A broad, nearly flat topped and commonly isolated landmass bounded by steep slopes or precipitous cliffs and capped by layers of resistant, nearly horizontal rocky material. The summit width is characteristically greater than the height of the bounding escarpments.

**Metamorphic rock**

Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth's crust. Nearly all such rocks are crystalline.

**Mine or quarry (map symbol)**

An open excavation from which soil and underlying material have been removed and in which bedrock is exposed. Also denotes surface openings to underground mines.

**Mine spoil**

An accumulation of displaced earthy material, rock, or other waste material removed during mining or excavation. Also called earthy fill.

**Mineral soil**

Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

**Minimum tillage**

Only the tillage essential to crop production and prevention of soil damage.

**Miscellaneous area**

A kind of map unit that has little or no natural soil and supports little or no vegetation.

**Miscellaneous water (map symbol)**

Small, constructed bodies of water that are used for industrial, sanitary, or mining applications and that contain water most of the year.

**Moderately coarse textured soil**

Coarse sandy loam, sandy loam, or fine sandy loam.

**Moderately fine textured soil**

Clay loam, sandy clay loam, or silty clay loam.

**Mollic epipedon**

A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

**Moraine**

In terms of glacial geology, a mound, ridge, or other topographically distinct accumulation of unsorted, unstratified drift, predominantly till, deposited primarily by the direct action of glacial ice in a variety of landforms. Also, a general term for a landform composed mainly of till (except for kame moraines, which are composed mainly of stratified outwash) that has been deposited by a glacier. Some types of moraines are disintegration, end, ground, kame, lateral, recessional, and terminal.

**Morphology, soil**

The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

**Mottling, soil**

Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

**Mountain**

A generic term for an elevated area of the land surface, rising more than 1,000 feet (300 meters) above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can

occur as a single, isolated mass or in a group forming a chain or range. Mountains are formed primarily by tectonic activity and/or volcanic action but can also be formed by differential erosion.

**Muck**

Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

**Mucky peat**

See Hemic soil material.

**Mudstone**

A blocky or massive, fine grained sedimentary rock in which the proportions of clay and silt are approximately equal. Also, a general term for such material as clay, silt, claystone, siltstone, shale, and argillite and that should be used only when the amounts of clay and silt are not known or cannot be precisely identified.

**Munsell notation**

A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

**Natric horizon**

A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

**Neutral soil**

A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

**Nodules**

See Redoximorphic features.

**Nose slope (geomorphology)**

A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent. Nose slopes consist dominantly of colluvium and slope-wash sediments (for example, slope alluvium).

**Nutrient, plant**

Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

**Organic matter**

Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

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*Very low:* Less than 0.5 percent

*Low:* 0.5 to 1.0 percent

*Moderately low:* 1.0 to 2.0 percent

*Moderate:* 2.0 to 4.0 percent

*High:* 4.0 to 8.0 percent

*Very high:* More than 8.0 percent

### **Outwash**

Stratified and sorted sediments (chiefly sand and gravel) removed or “washed out” from a glacier by meltwater streams and deposited in front of or beyond the end moraine or the margin of a glacier. The coarser material is deposited nearer to the ice.

### **Outwash plain**

An extensive lowland area of coarse textured glaciofluvial material. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

### **Paleoterrace**

An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

### **Pan**

A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

### **Parent material**

The unconsolidated organic and mineral material in which soil forms.

### **Peat**

Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

### **Ped**

An individual natural soil aggregate, such as a granule, a prism, or a block.

### **Pedisediment**

A layer of sediment, eroded from the shoulder and backslope of an erosional slope, that lies on and is being (or was) transported across a gently sloping erosional surface at the foot of a receding hill or mountain slope.

### **Pedon**

The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

**Percolation**

The movement of water through the soil.

**Perennial water (map symbol)**

Small, natural or constructed lakes, ponds, or pits that contain water most of the year.

**Permafrost**

Ground, soil, or rock that remains at or below 0 degrees C for at least 2 years. It is defined on the basis of temperature and is not necessarily frozen.

**pH value**

A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

**Phase, soil**

A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

**Piping**

Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

**Pitting**

Pits caused by melting around ice. They form on the soil after plant cover is removed.

**Plastic limit**

The moisture content at which a soil changes from semisolid to plastic.

**Plasticity index**

The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

**Plateau (geomorphology)**

A comparatively flat area of great extent and elevation; specifically, an extensive land region that is considerably elevated (more than 100 meters) above the adjacent lower lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level.

**Playa**

The generally dry and nearly level lake plain that occupies the lowest parts of closed depressions, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff. Playa deposits are fine grained and may or may not have a high water table and saline conditions.

**Plinthite**

The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

**Plowpan**

A compacted layer formed in the soil directly below the plowed layer.

**Ponding**

Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

**Poorly graded**

Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

**Pore linings**

See Redoximorphic features.

**Potential native plant community**

See Climax plant community.

**Potential rooting depth (effective rooting depth)**

Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

**Prescribed burning**

Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

**Productivity, soil**

The capability of a soil for producing a specified plant or sequence of plants under specific management.

**Profile, soil**

A vertical section of the soil extending through all its horizons and into the parent material.

**Proper grazing use**

Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and

promotes the accumulation of litter and mulch necessary to conserve soil and water.

### **Rangeland**

Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

### **Reaction, soil**

A measure of acidity or alkalinity of a soil, expressed as pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

*Ultra acid:* Less than 3.5

*Extremely acid:* 3.5 to 4.4

*Very strongly acid:* 4.5 to 5.0

*Strongly acid:* 5.1 to 5.5

*Moderately acid:* 5.6 to 6.0

*Slightly acid:* 6.1 to 6.5

*Neutral:* 6.6 to 7.3

*Slightly alkaline:* 7.4 to 7.8

*Moderately alkaline:* 7.9 to 8.4

*Strongly alkaline:* 8.5 to 9.0

*Very strongly alkaline:* 9.1 and higher

### **Red beds**

Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

### **Redoximorphic concentrations**

See Redoximorphic features.

### **Redoximorphic depletions**

See Redoximorphic features.

### **Redoximorphic features**

Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

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1. Redoximorphic concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:
  - A. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; *and*
  - B. Masses, which are noncemented concentrations of substances within the soil matrix; *and*
  - C. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.
2. Redoximorphic depletions.—These are zones of low chroma (chromas less than those in the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:
  - A. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; *and*
  - B. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletans).
3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

### **Reduced matrix**

See Redoximorphic features.

### **Regolith**

All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits.

### **Relief**

The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

### **Residuum (residual soil material)**

Unconsolidated, weathered or partly weathered mineral material that accumulated as bedrock disintegrated in place.

### **Rill**

A very small, steep-sided channel resulting from erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. A rill generally is not an obstacle to wheeled vehicles and is shallow enough to be smoothed over by ordinary tillage.



**Riser**

The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.

**Road cut**

A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

**Rock fragments**

Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

**Rock outcrop (map symbol)**

An exposure of bedrock at the surface of the earth. Not used where the named soils of the surrounding map unit are shallow over bedrock or where "Rock outcrop" is a named component of the map unit.

**Root zone**

The part of the soil that can be penetrated by plant roots.

**Runoff**

The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

**Saline soil**

A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

**Saline spot (map symbol)**

An area where the surface layer has an electrical conductivity of 8 mmhos/cm more than the surface layer of the named soils in the surrounding map unit. The surface layer of the surrounding soils has an electrical conductivity of 2 mmhos/cm or less.

**Sand**

As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

**Sandstone**

Sedimentary rock containing dominantly sand-sized particles.

**Sandy spot (map symbol)**

A spot where the surface layer is loamy fine sand or coarser in areas where the surface layer of the named soils in the surrounding map unit is very fine sandy loam or finer.

**Sapric soil material (muck)**

The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

**Saturated hydraulic conductivity (Ksat)**

The ease with which pores of a saturated soil transmit water. Formally, the proportionality coefficient that expresses the relationship of the rate of water movement to hydraulic gradient in Darcy's Law, a law that describes the rate of water movement through porous media. Commonly abbreviated as "Ksat." Terms describing saturated hydraulic conductivity are:

*Very high:* 100 or more micrometers per second (14.17 or more inches per hour)

*High:* 10 to 100 micrometers per second (1.417 to 14.17 inches per hour)

*Moderately high:* 1 to 10 micrometers per second (0.1417 inch to 1.417 inches per hour)

*Moderately low:* 0.1 to 1 micrometer per second (0.01417 to 0.1417 inch per hour)

*Low:* 0.01 to 0.1 micrometer per second (0.001417 to 0.01417 inch per hour)

*Very low:* Less than 0.01 micrometer per second (less than 0.001417 inch per hour).

To convert inches per hour to micrometers per second, multiply inches per hour by 7.0572. To convert micrometers per second to inches per hour, multiply micrometers per second by 0.1417.

**Saturation**

Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

**Scarification**

The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

**Sedimentary rock**

A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

**Sequum**

A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

**Series, soil**

A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

**Severely eroded spot (map symbol)**

An area where, on the average, 75 percent or more of the original surface layer has been lost because of accelerated erosion. Not used in map units in which "severely eroded," "very severely eroded," or "gullied" is part of the map unit name.

**Shale**

Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.

**Sheet erosion**

The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

**Short, steep slope (map symbol)**

A narrow area of soil having slopes that are at least two slope classes steeper than the slope class of the surrounding map unit.

**Shoulder**

The convex, erosional surface near the top of a hillslope. A shoulder is a transition from summit to backslope.

**Shrink-swell**

The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

**Shrub-coppice dune**

A small, streamlined dune that forms around brush and clump vegetation.

**Side slope (geomorphology)**

A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.

**Silica**

A combination of silicon and oxygen. The mineral form is called quartz.

**Silica-sesquioxide ratio**

The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

**Silt**

As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

**Siltstone**

An indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay.

**Similar soils**

Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

**Sinkhole (map symbol)**

A closed, circular or elliptical depression, commonly funnel shaped, characterized by subsurface drainage and formed either by dissolution of the surface of underlying bedrock (e.g., limestone, gypsum, or salt) or by collapse of underlying caves within bedrock. Complexes of sinkholes in carbonate-rock terrain are the main components of karst topography.

**Site index**

A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

**Slickensides (pedogenic)**

Grooved, striated, and/or glossy (shiny) slip faces on structural peds, such as wedges; produced by shrink-swell processes, most commonly in soils that have a high content of expansive clays.

**Slide or slip (map symbol)**

A prominent landform scar or ridge caused by fairly recent mass movement or descent of earthy material resulting from failure of earth or rock under shear stress along one or several surfaces.

**Slope**

The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

**Slope alluvium**

Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished peds and sorting of rounded or subrounded pebbles or cobbles distinguish these materials from unsorted colluvial deposits.

**Slow refill**

The slow filling of ponds, resulting from restricted water transmission in the soil.

**Slow water movement**

Restricted downward movement of water through the soil. See Saturated hydraulic conductivity.

**Sodic (alkali) soil**

A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

**Sodic spot (map symbol)**

An area where the surface layer has a sodium adsorption ratio that is at least 10 more than that of the surface layer of the named soils in the surrounding map unit. The surface layer of the surrounding soils has a sodium adsorption ratio of 5 or less.

**Sodicity**

The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of  $\text{Na}^+$  to  $\text{Ca}^{++} + \text{Mg}^{++}$ . The degrees of sodicity and their respective ratios are:

*Slight:* Less than 13:1

*Moderate:* 13-30:1

*Strong:* More than 30:1

**Sodium adsorption ratio (SAR)**

A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

**Soft bedrock**

Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

## **Soil**

A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

## **Soil separates**

Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

*Very coarse sand:* 2.0 to 1.0

*Coarse sand:* 1.0 to 0.5

*Medium sand:* 0.5 to 0.25

*Fine sand:* 0.25 to 0.10

*Very fine sand:* 0.10 to 0.05

*Silt:* 0.05 to 0.002

*Clay:* Less than 0.002

## **Solum**

The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

## **Spoil area (map symbol)**

A pile of earthy materials, either smoothed or uneven, resulting from human activity.

## **Stone line**

In a vertical cross section, a line formed by scattered fragments or a discrete layer of angular and subangular rock fragments (commonly a gravel- or cobble-sized lag concentration) that formerly was draped across a topographic surface and was later buried by additional sediments. A stone line generally caps material that was subject to weathering, soil formation, and erosion before burial. Many stone lines seem to be buried erosion pavements, originally formed by sheet and rill erosion across the land surface.

## **Stones**

Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

## **Stony**

Refers to a soil containing stones in numbers that interfere with or prevent tillage.

**Stony spot (map symbol)**

A spot where 0.01 to 0.1 percent of the soil surface is covered by rock fragments that are more than 10 inches in diameter in areas where the surrounding soil has no surface stones.

**Strath terrace**

A type of stream terrace; formed as an erosional surface cut on bedrock and thinly mantled with stream deposits (alluvium).

**Stream terrace**

One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

**Stripcropping**

Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

**Structure, soil**

The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are:

*Platy*: Flat and laminated

*Prismatic*: Vertically elongated and having flat tops

*Columnar*: Vertically elongated and having rounded tops

*Angular blocky*: Having faces that intersect at sharp angles (planes)

*Subangular blocky*: Having subrounded and planar faces (no sharp angles)

*Granular*: Small structural units with curved or very irregular faces

Structureless soil horizons are defined as follows:

*Single grained*: Entirely noncoherent (each grain by itself), as in loose sand

*Massive*: Occurring as a coherent mass

**Stubble mulch**

Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

**Subsoil**

Technically, the B horizon; roughly, the part of the solum below plow depth.

**Subsoiling**

Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

**Substratum**

The part of the soil below the solum.

**Subsurface layer**

Any surface soil horizon (A, E, AB, or EB) below the surface layer.

**Summer fallow**

The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

**Summit**

The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

**Surface layer**

The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

**Surface soil**

The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

**Talus**

Rock fragments of any size or shape (commonly coarse and angular) derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose broken rock formed chiefly by falling, rolling, or sliding.

**Taxadjuncts**

Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

**Terminal moraine**

An end moraine that marks the farthest advance of a glacier. It typically has the form of a massive arcuate or concentric ridge, or complex of ridges, and is underlain by till and other types of drift.

**Terrace (conservation)**

An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field



generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

**Terrace (geomorphology)**

A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

**Terracettes**

Small, irregular steplike forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may be induced or enhanced by trampling of livestock, such as sheep or cattle.

**Texture, soil**

The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

**Thin layer**

Otherwise suitable soil material that is too thin for the specified use.

**Till**

Dominantly unsorted and nonstratified drift, generally unconsolidated and deposited directly by a glacier without subsequent reworking by meltwater, and consisting of a heterogeneous mixture of clay, silt, sand, gravel, stones, and boulders; rock fragments of various lithologies are embedded within a finer matrix that can range from clay to sandy loam.

**Till plain**

An extensive area of level to gently undulating soils underlain predominantly by till and bounded at the distal end by subordinate recessional or end moraines.

**Tilth, soil**

The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

**Toeslope**

The gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

**Topsoil**

The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

**Trace elements**

Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

**Tread**

The flat to gently sloping, topmost, laterally extensive slope of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.

**Tuff**

A generic term for any consolidated or cemented deposit that is 50 percent or more volcanic ash.

**Upland**

An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

**Valley fill**

The unconsolidated sediment deposited by any agent (water, wind, ice, or mass wasting) so as to fill or partly fill a valley.

**Variiegation**

Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

**Varve**

A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

**Very stony spot (map symbol)**

A spot where 0.1 to 3.0 percent of the soil surface is covered by rock fragments that are more than 10 inches in diameter in areas where the surface of the surrounding soil is covered by less than 0.01 percent stones.

**Water bars**

Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

**Weathering**

All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth's surface by atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered material.

**Well graded**

Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

**Wet spot (map symbol)**

A somewhat poorly drained to very poorly drained area that is at least two drainage classes wetter than the named soils in the surrounding map unit.

**Wilting point (or permanent wilting point)**

The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

**Windthrow**

The uprooting and tipping over of trees by the wind.