DRAFT ENVIRONMENTAL IMPACT REPORT APPENDICES

SUSCOL MOUNTAIN VINEYARDS

EROSION CONTROL PLAN APPLICATION NO. P09-00176-ECPA

MARCH 2012

LEAD AGENCY:

Napa County Conservation,
Development and Planning
1195 Third Street, Suite 210
Napa, CA 94559

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INITIAL STUDY

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INITIAL STUDY

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Introduction

The Suscol Mountain Vineyards Erosion Control Plan Application (ECPA) #P09-00176-ECPA proposes earthmoving activities on slopes greater than five percent in connection with the development of 444 net acres of vineyard within 568 gross acres disturbed on the approximately 2,123-acre property. The project site is located about two and a half miles southeast of the City of Napa in Napa County, California, within the “Cordelia, California” and “Mt. George, California” U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles (**Figure 2-2**). The project site roughly borders Skyline Wilderness Park to the north, State Highway 121 to the west, State Highway 12 to the south and the Napa County border with Solano County to the east. The project site consists primarily of undeveloped oak woodland, chaparral and grassland habitats occurring at elevations that range from approximately 150 to 1,385 feet above mean sea level (msl). The project site includes the following four Assessor’s Parcel Numbers (APNs): 045-360-006 (499 acres), 045-360-007 (550 acres), 057-020-069 (594 acres) and 057-030-004 (480 acres).

A total of 45 vineyard blocks are proposed for development within areas with slopes greater than five percent, thereby requiring an Agricultural Erosion Control Plan (ECPA) and ECPA application approval from the Napa County Conservation, Development and Planning Department pursuant to Chapter 18.108 of the Napa County Code (Conservation Regulations). Development of the project would result in the removal of 1,182 trees, which includes 272 bay, 9 buckeye, 8 hollyleaf cherry, 2 eucalyptus, 887 live oak, and 4 valley oak.

California Environmental Quality Act (CEQA) Lead Agency

The Napa County Conservation, Development and Planning Department is the CEQA Lead Agency and has prepared this Initial Study to provide agencies and the public with information about the proposed project’s potential impacts, both beneficial and adverse, on the local and regional environment. This document has been prepared in compliance with CEQA (1970, as amended) and the State CEQA *Guidelines*, California Administrative Code, Title 14, Division 6, Chapter 3 and Napa County’s Local Procedures for Implementing CEQA.

Purpose of the Proposed Project

The primary objectives of the project proposed under #P09-00176-ECPA are:

- Develop approximately 444 to 568 acres of vineyard;
- Minimize soil erosion of vineyard development and operation through vineyard design that avoids erosion-prone areas and controls erosion within the vineyard rather than capturing soil after it has been displaced;
- Protect water quality by protecting wetlands and streams to the maximum extent feasible through avoidance and the implementation of various drainage features;
- Provide opportunities for vineyard employment and economic development in Napa County;
- Farm vineyards in a sustainable manner;
- Make efficient use of water from existing and proposed water resources;
- Preserve existing Oak Woodland habitat to the greatest extent feasible;
- Preserve a majority of the holding in woodlands, riparian, and open space which has the greatest value as wildlife habitat; and
- Use recycled water to supplement water demands if it becomes available in the region and is commercially feasible to do so.

Project Setting and Zoning

The project site is located in southeastern Napa County in part of the hilly to steep mountains located in the interior Northern California Coast Range. A number of moderate west and northeastern facing slopes characterize the area. The majority of the proposed vineyard development areas are located on moderate to steep terrain with slopes ranging from six to 30 percent. Pursuant to Conservation Regulation 18.108.070(b), areas with slopes less than five percent do not require preparation of an erosion control plan for vineyard development. Under #P09-00176-ECPA, all proposed vineyard development is located in areas with slopes equal to, or greater than, five percent. Approximately 5.5 acres (less than 1% of the gross area) are located on slopes greater than 30 percent – of these subareas none are over one acre in size. Pursuant to Resolution 94-19 subareas up to one acre in size in the 30 percent to 50 percent range are subject to administrative action. Elevations onsite range from approximately 150 to 1,385 feet above msl. Soils on the property include Bale Clay Loam, 0 to 2 percent slopes (104); Clear Lake Clay, drained (116); Fagan Clay Loam, 5 to 15 (131), 15 to 30 (132) and 30 to 50 (134) percent slopes; Hambright-Rock Outcrop Complex, 2 to 30 (151) and 30 to 75 (152) percent slopes; Rock Outcrop (175); and Sobrante Loam, 30 to 50 (179) percent slopes.

Characteristic vegetation communities and associated wildlife habitats occurring within the project region are dominated by grasslands and oak woodland with smaller areas of riparian woodland, freshwater marsh, seeps and springs. Rock outcrop and a man-made pond also provide habitat onsite. Suscol Creek originates in the eastern portion of the property and flows west providing drainage for the majority of the project site. Suscol Creek is a perennial stream that receives flows from several smaller tributaries, seeps and springs located onsite. Portions of several other watersheds are located onsite, including Arroyo Creek, Cayetano Creek, Central Creek, Fagan Creek, and Sheehy Creek watersheds. All drainages on the project site eventually discharge to the Napa River. The project site also contains an approximately 25-mile network of existing roads, and one groundwater well. Four water tanks and an existing pond are also on the property. The project site is zoned as Agricultural Watershed and portions are designated as part of an Airport Compatibility Combination District. The General Plan designation is Agriculture, Watershed and Open Space (AWOS) with a portion of one parcel covered by a Mineral Resource overlay.

Summary

This Initial Study has identified potentially significant impacts associated with the development of the proposed project, as well as effects determined not to be significant. Therefore, this Initial Study supports the finding that an EIR should be prepared. For those environmental issues checked "potentially significant impact" in **Section 3**, the EIR will analyze the potential impact and recommend mitigation measures.

Section 2
Project Description

This section describes the project location, project elements, required permits and approvals, and public involvement.

Project Location

The 2,123-acre Suscol Mountain Vineyards property is located approximately two and a half miles southeast of the City of Napa in Napa County, California. Primary access for the property is provided by Anderson Road, a low-volume road located off of State Route 221. The project site (i.e., property) is situated within portions of Sections 6, 25, 29, 30, 31, 32, and 36, Township 5 North, Range 3 West, Mount Diablo Base and Meridian of the "Cordelia, California" and "Mt. George, California" U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles. **Figure 2-1** shows a regional location map of the area. **Figure 2-2** identifies the site and vicinity of Suscol Mountain Vineyards. An aerial photograph with Napa County parcels are shown in **Figure 2-3** and existing roads on the property are shown in **Figure 2-4**.

Description of Proposed Project

The Suscol Mountain Vineyards Erosion Control Plan Application (ECPA) #P09-00176-ECPA proposes vegetation removal and earthmoving activities on slopes greater than five percent in connection with the development of 444 net acres of vineyard within 568 gross acres disturbed on the approximately 2,123-acre property, comprised of a total of 45 proposed vineyard blocks within areas with slopes greater than five percent (**Figure 2-4**). Vineyard development activities include removal of brush, trees and associated vegetation in proposed vineyard areas, ripping, rock removal, cultivating the soil for planting, seeding cover crop, mulching, installing erosion control measures, trenching for irrigation pipelines, installation of trellis system and deer fence around vineyard blocks or block clusters (to minimize impact on wildlife corridors), laying out the vine rows and planting vines. An Erosion Control Plan (ECP) has been prepared for the project and the details of the plan will be discussed in the Environmental Impact Report (EIR).

There are approximately 25 miles of existing roads on the property. No additional roads are anticipated with the project; the existing roads provide access to the proposed vineyard blocks and would be maintained and surfaced with crushed rock as needed. Some roads may be improved in order to provide adequate vehicle access for construction and vineyard maintenance. In addition to road surfacing, rock generated as a result of the project would also be used to construct erosion control features, or would be stored in designated rock disposal areas onsite. One groundwater well currently exists on the property and an additional two to four wells may be developed as part of the proposed project to facilitate efficient water distribution for the project.

It is anticipated that approximately 266 acre-feet of water per year would be required for the project[1].

For the purposes of the California Environmental Quality Act (CEQA), the project under consideration is as follows:

- Earthmoving and grading activities on slopes greater than five percent associated with soil cultivation, installation and maintenance of drainage, irrigation and erosion control features, ripping, tree and brush removal, and vineyard plantings and operation on 444 net acres within 568 gross acres of disturbance;
- Installation of surface drainage pipelines to collect surface runoff at low points throughout the project area and transport it to protected outlets;
- Installation of infield drop inlets, standard drop inlets and concrete drop inlets;
- Construction of a concrete outlet structure;
- Construction of gravity outlets to act as energy dissipaters and minimize erosion;
- Installation of pipe and rock level spreaders at the ends of proposed pipelines to return concentrated flows within the pipe to sheet flow;
- Construction of infield diversion ditches;
- Construction of outsloped infield spreaders;
- Construction of a subsurface drainage pipeline;
- Construction of rock repositories/outsloped turnarounds;
- Repair existing head cutting of a drainage;
- Construction of rock berms;
- Installation of cutoff collars on all solid pipelines with slopes greater than five percent;
- Improvement and maintenance of approximately 25 miles of existing roads for year-round access to the project site, including surfacing with crushed rock as needed;
- All disturbed areas and avenues will be seeded with a permanent no-till cover crop;
- Maintenance of the erosion control measures so they function as intended, and maintenance of the measures throughout the rainy season; and
- Installation of temporary erosion control measures that may include, but are not limited to, straw wattles, waterbars, and other measures, would be constructed as needed.

Some of the rock generated will be used to construct erosion control features such as rock berms, rock repositories/outsloped turnarounds, gravity outlets and energy dissipaters. Rock will also be used to surface avenues and existing roads where needed. Rock not used

[1] Anticipated overall water use of the proposed project regardless of the number of existing or proposed groundwater wells.

immediately will be stockpiled for future use inside the proposed clearing limits. Stockpiles are expected to be less than 20 feet in height.

The proposed vineyards would be managed using the latest agricultural methods, including engineered erosion control measures, cover crop management strategies and engineered irrigation system. The Applicant also intends to certify the property through the Fish Friendly Farming program.

Several potential waters of the U.S. and seeps are located throughout the project site. The project design incorporates Napa County setbacks for all County-definitional streams pursuant to Napa County Code Section 18.108.025 as well as 25-foot setbacks from seeps.

Required Permits and Approvals

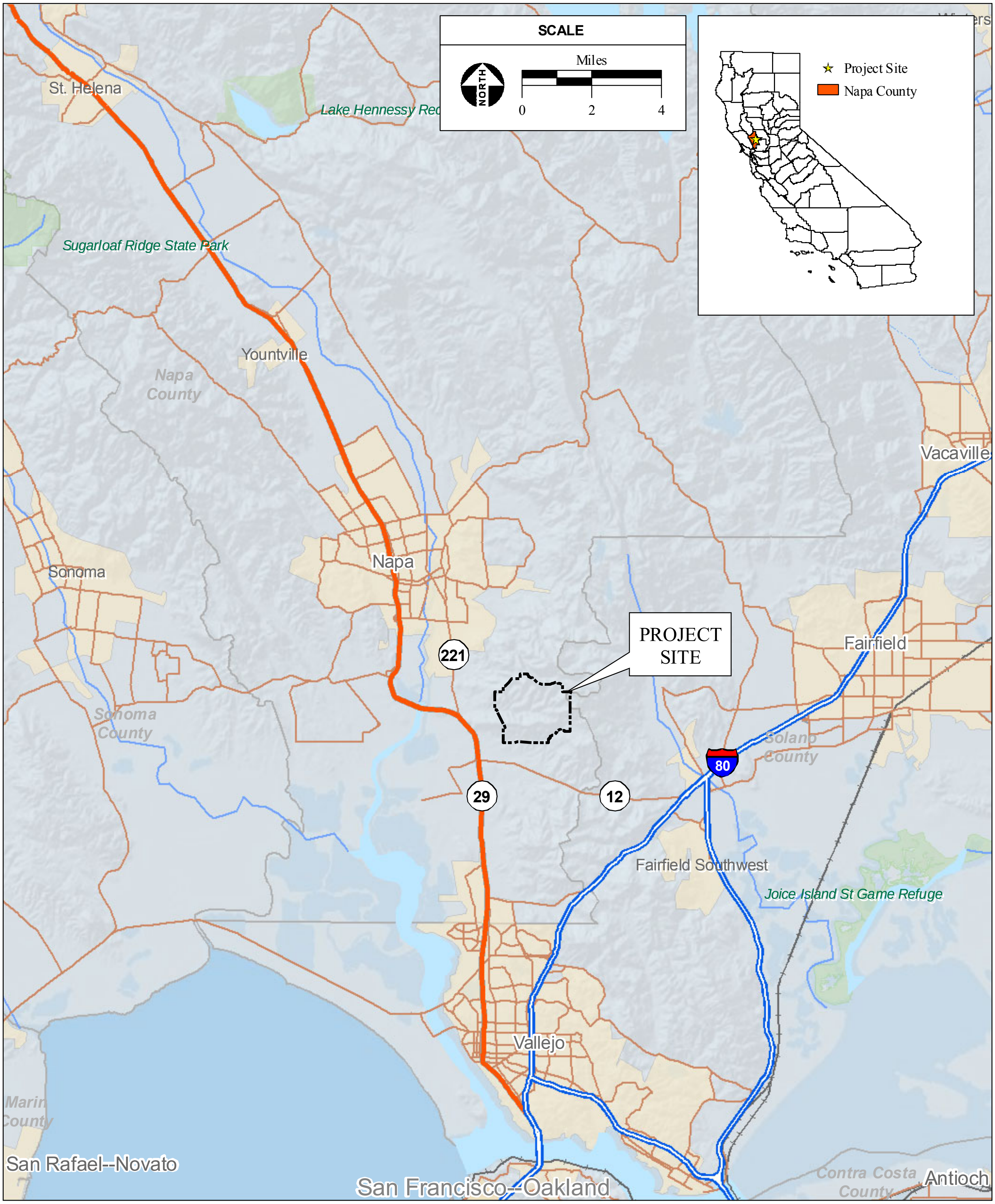
The Napa County Conservation, Development and Planning Department is the Lead Agency under CEQA with the primary authority for project approval. In addition, the following Responsible and Trustee Agencies may have jurisdiction over some or all of the proposed project:

- U.S. Army Corps of Engineers (USACE);
- U.S. Fish and Wildlife Service (USFWS);
- California Department of Fish and Game (CDFG);
- California Department of Transportation (Caltrans);
- State Water Resources Control Board, Division of Water Rights;
- Bay Area Air Quality Management District (BAAQMD); and
- San Francisco Bay Regional Water Quality Control Board, Region 2.

Public Involvement

This document, along with a Notice of Preparation prepared in accordance with Section 15082 of the CEQA *Guidelines*, is being circulated to local, state, and federal agencies, and to interested organizations and individuals that may wish to comment on the proposed project. Written comments may be submitted to the following address:

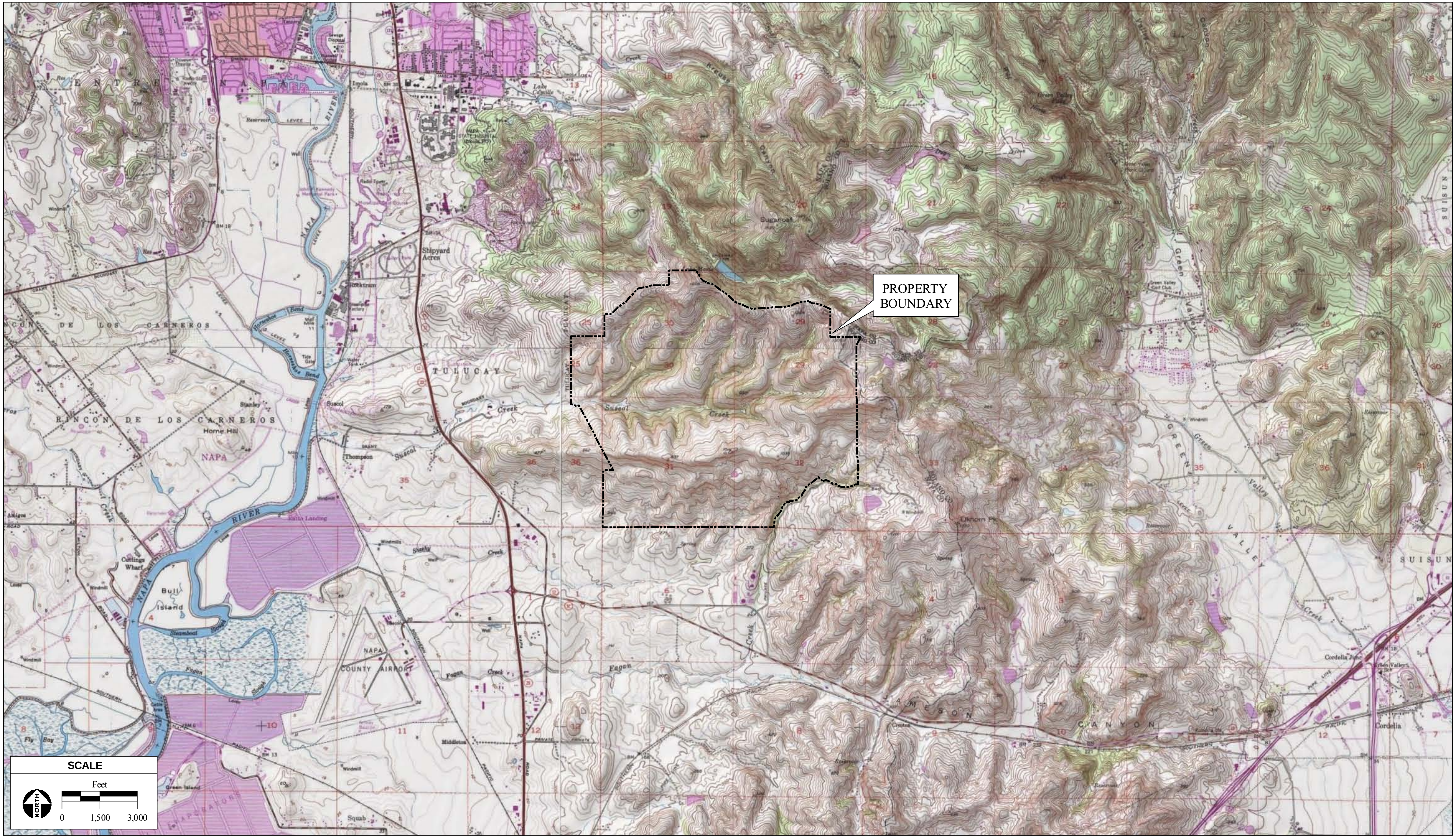
County of Napa
Conservation, Development and Planning Department
Attn: Brian Bordona, Supervising Planner
1195 Third Street, Suite 210
Napa, CA 94559
bbordona@co.napa.ca.us



SOURCE: ESRI Data, 2006; AES 2009

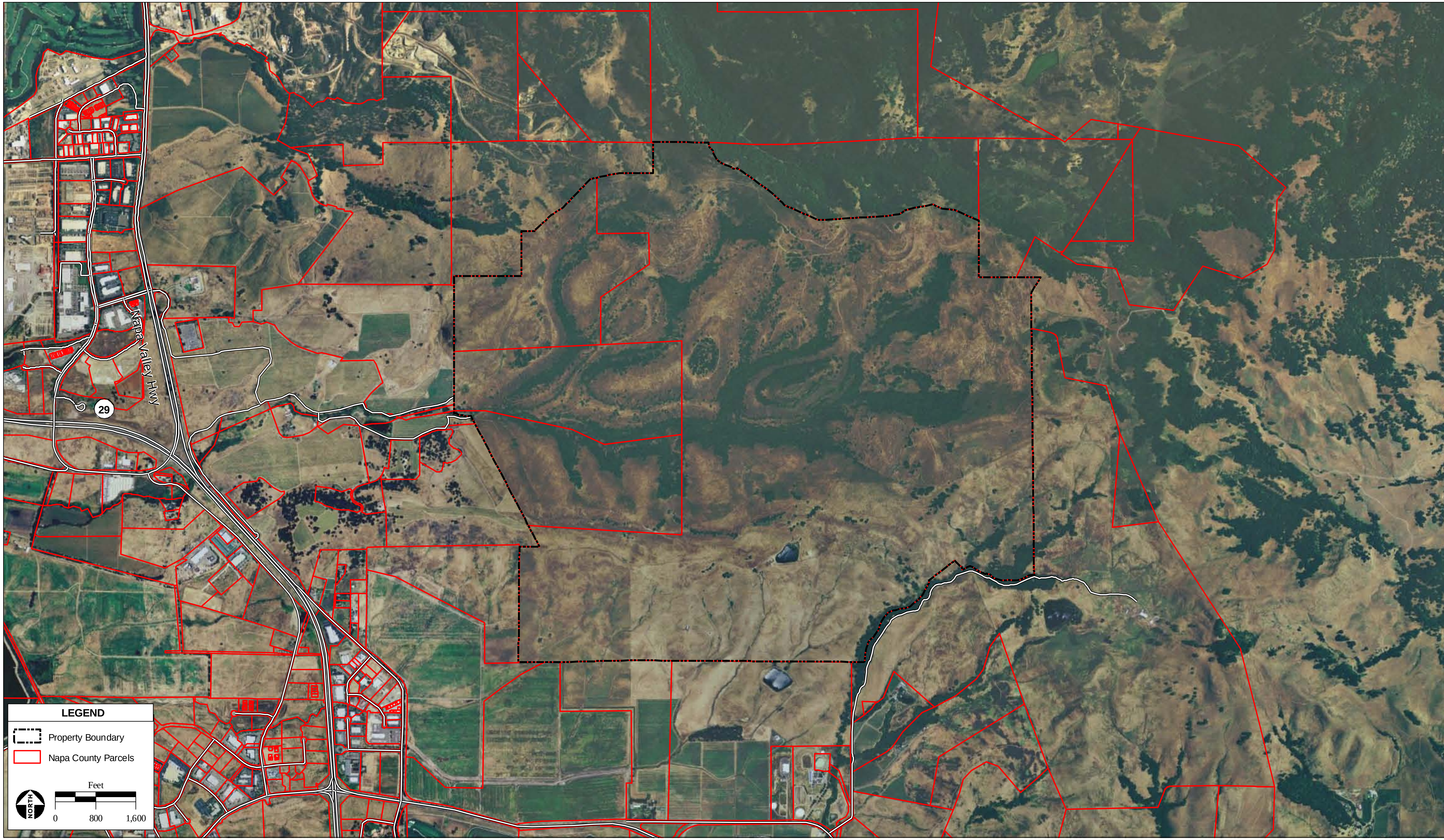
Suscol Mountain Vineyards #P09-00176-ECPA / 209538 ■

Figure 2-1
Regional Location Map



SOURCE:Sections 6, 25, 29, 30, 31, 32, and 36, Township 5 North, Range 3 West, Mount Diablo Base and Meridian of the "Cordelia, California" and "Mt. George, California" U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles; AES 2009.

Figure 2-2
Site and Vicinity



SOURCE: LandVoyage Aerial Photograph, 6/15/2005; Napa County, 2008; AES 2009.

Figure 2-3
Aerial Photograph

SOURCE: LandVoyage Aerial Photograph, 6/15/2005; Napa County, 2008; AES 2009.

Figure 2-4
Proposed Vineyard Development

Section 3
Environmental Checklist

1. **Project Title:** Suscol Mountain Vineyards Erosion Control Plan Application No. P09-00176-ECPA

2. **Lead Agency Name and Address:** County of Napa
Conservation, Development and Planning Department
1195 Third Street, Suite 210
Napa, CA 94559

3. **Contact Person and Phone Number:** Brian Bordona, Supervising Planner
(707) 259-5935
bbordona@co.napa.ca.us

4. **Project Location:** The Suscol Mountain Vineyards project site is located about two and a half miles southeast of the City of Napa in Napa County, California. The site is in Sections 6, 25, 29, 30, 31, 32, and 36, Township 5 North, Range 3 West, Mount Diablo Base and Meridian of the "Cordelia, California" and "Mt. George, California" U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles (**Figures 2-1** and **2-2**).
Assessors Parcel Numbers 045-360-006, 045-360-007, 057-020-069, and 057-030-004.

5. **Project Sponsor's Name and Address:** SPP Napa Vineyards LLC
Attn: Mark Couchman
855 Bordeaux Way, Suite 100
Napa, CA 94558

6. **General Plan Designations:** Agriculture, Watershed and Open Space (AWOS) and one parcel partially covered by a Mineral Resource overly.

7. **Zoning:** Agricultural Watershed (AW) and two parcels within an Airport Compatibility (AC) Combination District

8. **Description of Project:** The Suscol Mountain Vineyards Erosion Control Plan Application (ECPA) #P09-00176-ECPA proposes to develop approximately 444 acres of new vineyard within 568 gross acres of disturbance on a 2,123-acre property. The 568 gross acres includes vineyard avenues that would be constructed around each of the proposed vineyard

blocks. The project includes earthmoving and grading activities on slopes greater than five percent. This includes tree and shrub removal within the proposed clearing limits, ripping, rock removal, soil cultivation, seeding cover crop, mulching, trenching for irrigation and drainage pipelines, installation of a trellis system and deer fencing, laying out vine rows, planting vines and installation of erosion control measures, including a variety of drainage systems.

9. **Surrounding Land Uses and Setting:** Land uses in the vicinity of the project site include vineyards, the Syar Quarry, and Napa Sanitation District spray fields. The project site is part of the hilly to steep mountains located in the interior Northern California Coast Range in southeastern Napa County. A number of northwesterly parallel mountain ridges and intervening valleys of varying widths characterize the area. Characteristic vegetation communities occurring within the project region include annual grassland, oak savannah, oak woodland, pine-oak woodland, mixed oak, bay, riparian, madrone woodland and chaparral. Aquatic habitats on the project site include seasonal and perennial drainages, a man-made pond, seasonal wetlands, seeps and springs. The project site does not include any existing development except for a network of approximately 25 miles of dirt roads, four water tanks and an existing pond. One groundwater well currently exists on the property and two to four wells may be developed as part of the project. The majority of the project site is drained by the Suscol Creek watershed, but small portions along the northern property boundary are drained by the Cayetano Creek, Arroyo Creek and Central Creek watersheds, and portions of the project site to the south of the southern ridge are drained by Fagan Creek and Sheehy Creek watersheds. In addition, a small area in the northeastern portion of the project site is located within Solano County and drains to Green Valley Creek, but no development is proposed within this drainage.

10. **Other Public Agencies Whose Approval May Be Required:** See “Required Permits and Approvals” in **Section 2**.

Environmental Factors Potentially Affected:

The environmental factors checked below would be potentially affected by the proposed project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture Resources	☒ Air Quality
☒ Biological Resources	☒ Cultural Resources	☒ Geology and Soils
☒ Hazards and Hazardous Materials	☒ Hydrology and Water Quality	☒ Land Use and Planning
☐ Mineral Resources	☐ Noise	☐ Population and Housing
☐ Public Services	☐ Recreation	☒ Transportation and Traffic
☐ Utilities and Service Systems	☒ Mandatory Findings of Significance	

Determination:

On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☒ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT (EIR) is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An EIR is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

B. Bl

Signature

October 22, 2009

Date

Brian Bordona

Printed Name

Napa County

For

		Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
1.	**AESTHETICS.** Would the project:				
a)	Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b)	Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☒	☐
c)	Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☒	☐
d)	Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

Setting

The proposed project is located in rural Napa County. The aesthetic setting of the project area consists of moderate to steep hills, ridges, and valleys supporting open space, agricultural lands (including vineyards), and industrial uses (including a quarry).

The California Department of Transportation (Caltrans) oversees the California Scenic Highway Program, which recognizes highways that feature natural landscapes (Caltrans, 2009). The project site is located off State Route 221, which is not a state-designated scenic roadway. The southern portion of the project site is visible from State Route 12. A portion of State Route 12 in Sonoma County, from U.S. 101 to State Route 121, is designated a state scenic highway; however, the section of State Route 12 that provides views of the project site is not a state-designated scenic roadway (Caltrans, 2009).

Napa County has a Viewshed Protection Program Ordinance intended to protect the scenic quality of the County. Agricultural activities are not subject to the ordinance (Napa County, 2008). Aesthetic features along State Routes 12 and 221 include views of vineyards interspersed among both rural countryside and developed areas.

Discussion of Impacts

a, b) Portions of the project would be visible from State Routes 12 and 221, and surrounding areas. However, the project is zoned for agricultural use and vineyard is consistent with the aesthetic setting of the project area. The Kirkland Ranch lies between the southern property boundary and State Route 12 and provides extensive views of vineyard development. The Chardonnay Golf Club is located to the south across State Route 12 and also provides views of vineyard development. Vineyard development also lies between the eastern property boundary and State Route 221. Rock resulting from construction of the project that is not reused for onsite development would be stored at identified visually-isolated areas within the proposed vineyard clearing limits, located away from any public roadway or viewshed. Based on the above considerations, a less than significant impact would occur. The EIR will not discuss these issues.

c) The proposed project would result in alterations to the visual character of the project site by converting primarily grassland and oak woodland to vineyard. State Routes 12 and 221 are public roadways within the vicinity of the proposed vineyard blocks. Trees and other vegetation visible from the roads would be removed for the planting of the vineyard, altering scenic resources along the route. Numerous residences are located in proximity to the southeast corner of the project site, including several between approximately 900 and 1,500 feet from the boundary and several beyond a half mile (2,640 feet) from the boundary. Residences are also located approximately two miles to the north of the project site. The existing visual character of the area to the southeast of the project site contains vineyard development associated with the Kirkland Ranch. Although the residences to the southeast are relatively close to the project site, vineyard development resulting from the proposed project would be consistent with the existing visual character of the area and would not adversely affect nearby residents by degrading existing aesthetic conditions. Syar Quarry is located immediately north of the project site and lies between the northern boundary and residences to the north. The existing visual character in this area consists of a developed quarry and features associated with a mining operation. Again, vineyard development resulting from the proposed project would be consistent with the existing visual character of this area and would not adversely affect Syar Quarry or nearby residents. The proposed project is considered agricultural in nature, and would result in vineyard areas mixed with open space areas, including both undeveloped and tree scattered areas, and would be considered compatible with surrounding land uses. Local aesthetics would not be significantly impacted; therefore, potential impacts are considered less than significant. The EIR will not discuss this issue.

d) Proposed agricultural operations on the property would require some lighted nighttime activities. Lighting would be in the form of headlights on equipment being used at night for harvest or spraying. The proposed project would include nighttime harvest (typically from 9 P.M. to 5 A.M.) about 20 days per year, sulfur/pesticide/herbicide application (typically from 9 P.M. to 5 A.M.) about 25 days per year, and frost protection with wind machines (typically from 12 A.M. to 7 A.M.) about 15 days out of the year. The proposed project would not create a new source of substantial light or glare that would adversely affect day or nighttime views. The EIR will not discuss this issue.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
2. AGRICULTURAL RESOURCES. In determining whether impacts on agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use?	☐	☐	☐	☒

Setting

Agriculture and agricultural production are prevalent land uses in Napa County. Fertile valley and foothill areas have been identified by Napa County as areas where agriculture should continue to be the predominant land use. The Napa County General Plan provides the goal of planning for agriculture and related activities as the primary land uses in the County while concentrating urban uses within existing cities and urban areas (Goals 1 and 2) (Napa County, 2008). Napa County considers the development of urban uses outside of urbanized areas as detrimental to agriculture and the maintenance of open spaces, which are uses defined as economic and aesthetic attributes and assets of the County (Napa County, 2008).

The Agricultural Preservation and Land Use Element of the Napa County General Plan provide the following policies:

- Agriculture and related activities are the primary land uses in Napa County (Policy AG/LU-1);
- The County's planning concepts and zoning standards shall be designed to minimize conflicts arising from encroachment of urban uses into agricultural areas (Policy AG/LU-3); and
- The County will reserve agricultural lands for agricultural use including lands used for grazing, except for those lands which are shown on the Land Use Map as planned for urban development (Policy AG/LU-4).

Discussion of Impacts

a-c) The property is not mapped as Prime Farmland, Unique Farmland or Farmland of Statewide Importance under the Farmland Mapping and Monitoring Program (Department of Conservation, 2008). Farmland of Local Importance is mapped on the property, but it would not be converted to a non-agricultural use with the project. The property is also not under Williamson Act contract (Napa County, 2009). The proposed project would not convert agricultural land to non-agricultural use; therefore, no impact would occur. The EIR will not discuss these issues.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
3. AIR QUALITY. When available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☒	☐	☐	☐
b) Violate any air quality standard or contribute to an existing or projected air quality violation?	☒	☐	☐	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions, which exceed quantitative thresholds for ozone precursors)?	☒	☐	☐	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐

Setting

Situated within the southern end of the Napa Valley, the project site is located within the San Francisco Bay Air Basin, which falls under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). Air quality in the project area is influenced by local emission sources, including vehicles traveling along local roadways and agricultural operations, and by pollutant transport from upwind areas. Air pollutants of concern (POC) in relation to the proposed project include ozone (O_3), and particulate matter 10 microns in diameter or smaller (PM_{10}). POCs could be generated during land-clearing and operation of construction and maintenance equipment.

Climate change is a change in the average weather of the earth that can be measured by wind patterns, storms, precipitation and temperature. Assembly Bill 32 established the first comprehensive greenhouse gas (GHG) regulatory program in the U.S. and requires GHG emissions to be reduced to 1990 levels by 2020. The State legislature has instructed the Governor's Office of Planning and Research to update the California Environmental Quality Act (CEQA) Guidelines to address this issue and consequently, climate change will be included into the CEQA checklist in 2010. Napa County is concerned about emissions of greenhouse gases that contribute to global climate change, and will consider the proposed project in light of this issue.

Discussion of Impacts

a-c) Potentially significant air quality impacts associated with the proposed project include those resulting from short-term construction activities and from vehicle traffic during construction and operation. Construction-related emissions could include exhaust from construction equipment and fugitive dust from land clearing, earthmoving, movement of vehicles, and wind erosion of exposed soil during construction of the proposed project. During land preparation, no burning of cleared vegetation would occur. The removal of existing vegetation would eliminate a carbon monoxide (CO) uptake source; however, the proposed vineyard would provide new sources. Changes to regional emissions or CO concentrations could result during construction and operation of the proposed project, and these could be potentially significant impacts. The EIR will discuss the existing air quality conditions and global climate change, and address air quality impacts associated with the proposed project.

d, e) There are no residences located on the Suscol Mountain Vineyards property but there are scattered residences and commercial and industrial facilities located within the vicinity of the property. Numerous residences are located in proximity to the southeast corner of the project site, including several between approximately 900 and 1,500 feet from the boundary and several beyond a half mile (2,640 feet) from the boundary.

Residences are also located approximately two miles to the north of the project site. Given the existing agricultural nature of the project area, and the sustainable farming methods proposed, the proposed project is not anticipated to expose sensitive receptors to substantial pollutant concentrations or create objectionable odors affecting a substantial number of people. This impact is considered less than significant and the EIR will not discuss these issues.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
4. BIOLOGICAL RESOURCES. Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☒	☐	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish or U.S. Fish and Wildlife Service?	☒	☐	☐	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☒	☐	☐	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☒	☐	☐	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☒	☐	☐	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

Setting

Napa County is located within the Inner North Coast Range Mountains, which is a geographic subdivision of the larger California Floristic Province, and has a strong influence from the coastal environment (Hickman, 1993). The climate of the region is characterized by hot, dry summers and cool, wet winters; average precipitation is approximately 35 inches per year (Napa County, 2005). The average annual temperature for the region is highly variable, generally ranging from 45 to 90 degrees Fahrenheit. The region is in climate Zone 14 "Ocean Influenced Northern and Central California," characterized as an inland area with ocean or cold air influence.

The proposed vineyard blocks would be developed in areas dominated by grasslands and oak woodland with smaller areas of riparian woodland, freshwater marsh, and seeps and springs (LSA, 2009). The observed plant flora on the project site includes native and non-native species. The project site contains suitable habitat for several-special status plant and wildlife species. Proposed vineyard blocks are designed with the intent to avoid impacts to special-status plant species, and potential wetlands and waters of the U.S. Deer fencing would be installed, typically to encompass groups of nearby vineyard blocks with exit doors at the corners for the safe removal of trapped wildlife. The Applicant also intends to certify the property through the Fish Friendly Farming program.

Land clearing associated with #P09-00176-ECPA would result in the removal of approximately 1,182 trees. Trees to be removed include 272 bay, 9 buckeye, 8 hollyleaf cherry, 2 eucalyptus, 887 live oak and 4 valley oak.

Description of Impacts

a-e) The EIR will discuss the potential for the proposed project to adversely effect:

- Any listed species, or species identified as a candidate, sensitive, or special-status;
- Any riparian habitat or other sensitive natural community;
- Federally protected wetlands as defined by Section 404 of the Federal Clean Water Act; and
- Species that have been determined to be sensitive or of limited distribution in the Napa County General Plan (2008) and Baseline Data Report (2005).

Biological surveys of the project site were started in 2008 and will being completed in 2009. Findings of these surveys will be disclosed and discussed in the EIR. The EIR will also discuss the potential for the proposed project to interfere with the movement of any native resident or migratory fish or wildlife species or with established native resident or wildlife migratory/movement corridors. The EIR will discuss any conflict with local policies or ordinances protecting biological resources, such as the County's Conservation Regulations, the Napa County Baseline Data Report, and General Plan.

f) No Habitat Conservation Plans, Natural Community Conservation Plans, or other federal, state, or local plans are applicable to the parcels containing the project site (NCCP, 2005). No impact would occur, and the EIR will not address this issue. As noted above, the EIR will discuss the maintenance of wildlife corridors and their relationship to movement through the property and surrounding parcels.

		Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
5.	**CULTURAL RESOURCES.** Would the project:				
a)	Cause a substantial adverse change in the significance of a historical resource as identified in Section 15064.5?	☒	☐	☐	☐
b)	Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	☒	☐	☐	☐
c)	Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☒	☐	☐	☐
d)	Disturb any human remains, including those interred outside of formal cemeteries?	☒	☐	☐	☐

Setting

A historical resource under CEQA consists of "Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural engineering, scientific, economic, agricultural, educational, social, military, or cultural annals of California." Generally, a resource shall be considered by the lead agency to be 'historically significant' if the resource meets the criteria for listing on the California Register of Historic Resources (CRHR) (15064.5[a][3]).

The significance criteria for archaeological and historical sites are defined in the CRHR, and are found in the CEQA *Guidelines* (15064.5). A resource must be significant at the local, state, or national level in accordance with one or more of the following four evaluation criteria:

1. It is associated with the events that made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States;
2. It is associated with the lives of persons important to local, California, or national history;
3. It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4. It has yielded, or may be likely to yield, information important to the prehistory or history of the local area, California, or the nation.

In addition to meeting one or more of the above criteria, a resource must be at least 50 years old and must possess integrity, which is defined as “the authenticity of a historical resource’s physical identity evidenced by the survival of characteristics that existed during the resource’s period of significance” (OHP, 1992:2). To retain integrity, a resource should have its original location, design, setting, materials, workmanship, feeling, and association. Resources that are significant, meet the age requirements, and possess integrity will generally be considered eligible for listing on the CRHR.

Discussion of Impacts

a-d) The EIR will discuss any cultural resources in the project area based on a site reconnaissance visit, records search, and literature review. The EIR will discuss and analyze any potential project impacts and mitigation measures.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
6. GEOLOGY AND SOILS. Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area, or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
ii) Strong seismic ground shaking?	☐	☐	☒	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv) Landslides?	☒	☐	☐	☐
b) Result in substantial soil erosion or the loss of topsoil?	☒	☐	☐	☐
c) Be located on strata or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☒	☐	☐	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code, creating substantial risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒

Setting

The proposed project is part of the hilly to steep mountains of the California Coast Range. The landscape within the project site includes gently rolling to very steep hills and rocky cliff faces in some areas. Many rocky outcrops and surface rocks are spread over the northern two thirds of the property (LSA, 2009). Physiographic features on the project site include a distinctive ridge line that runs along the northern and northeastern boundary of the property. This ridge drops off steeply to the north into the drainage of Marie Creek. There are also steep slopes that rim portions of upper Suscol Creek watershed. Another distinctive ridge crosses the south central portion of the property, marking the southern edge of the Sonoma Volcanics. The geology on the property consists of Holocene landslide deposits along portions of the Suscol Creek drainage and outcrops of the Pliocene Sonoma Volcanics primarily in the northern and central portion of the property.

The proposed vineyard consists of 45 blocks on areas with slopes greater than five percent; approximately 5.5 acres are located on slopes greater than 30 percent slope. Elevations on the property range from 150 to 1,385 feet above mean sea level. Soils on the property include Bale Clay Loam, 0 to 2 percent slopes; Clear Lake Clay, drained; Fagan Clay Loam, 5 to 15, 15 to 30 and 30 to 50 percent slopes; Hambright-Rock Outcrop Complex, 2 to 30 and 30 to 75 percent slopes; Rock Outcrop; Sobrante Loam, 30 to 50 percent slopes; and water.

The project site is located within several subwatersheds of the Napa River watershed. The Napa River is designated by the State Water Resources Control Board (SWRCB) as impaired by sediments (SWRCB, 2009). Potential impacts to water quality in Napa River could result from sedimentation/erosion and turbidity, among other sources.

Discussion of Impacts

a-i) The project site could potentially experience strong ground shaking from a number of regional active earthquake faults, and based on historical earthquake records for the project area. The local deformation zone is bordered by two major faults: the northwest striking Green Valley fault in the east, and the northwest striking Healdsburg-Rodgers Fault in the west. Both of these faults have experienced major earthquakes in the last 100 years (WICC, 2005). The project site does not lie within an Earthquake Fault Hazard Rupture Zone designated by the Alquist-Priolo Earthquake Zoning Act. Therefore, the risk of ground rupture within the limits of the property is low. The proposed project does not include construction of any new structures (e.g., houses) that would be subject to seismic forces, thereby exposing people to seismic hazards. Therefore, the potential for the proposed project to expose people or structures to substantial adverse effects, including the risk of loss, injury, or death involving fault rupture, would be less than significant. The EIR will not discuss this issue.

a-ii) As discussed above, the project site is located in a seismically active area. However, the potential for the proposed project to expose people or structures to substantial adverse effects, including the risk of loss, injury, or death involving ground shaking, would be less than significant. The EIR will not discuss this issue.

a-iii) Liquefaction is the rapid transformation of saturated, loose, unconsolidated, non-cohesive sediment (such as sand) to a fluid-like state because of earthquake ground shaking. Soils on the project site consist of a variety of loams. According to Napa County's Geographic Information System (GIS) data (Napa County, 2000), the project site is classified as having a very low liquefaction potential, except for an acre area where Suscol Creek crosses the property boundary that is classified as having medium liquefaction potential. The potential for the proposed project to expose people or structures to substantial adverse effects, including the risk of loss, injury, or death involving liquefaction, would be less than significant. The EIR will not discuss this issue.

a-iv) Earthquake ground shaking can induce landslides, especially where unstable slopes exist because the ground shaking provides a mechanism for ground movement. Geologic and landslide mapping by the USGS and Napa County (Napa County, 2002) (**Figure 3-1**) identifies that numerous landslide features are located throughout the southern portion of the project site, including predominantly large landslide deposits, but also earthflows, headwall scarps, and a few debris flows and small landslide deposits. Several of these features are mapped as overlapping or contiguous. Proposed development located on these features include the entire area of Blocks 33, 39, 40, and 42-45, portions of Blocks 34, 36-38, and 41, and the margins of Blocks 25-27, 29-31, and 46. In addition, a small feature consisting of a large landslide deposit and headwall scarp is located in the northeastern portion of the site, partially within proposed Block 22. A few isolated debris flows are also located throughout the project site, including the margins of proposed Blocks 5, 13 and 16, and a few small landslide deposits are located in the northern portion of the project site, including in proposed Blocks 7 and 8. The potential for the proposed project to expose structures to substantial adverse effects would be less than significant. However, development of proposed blocks on landslide features could expose people to risk. The EIR will discuss this issue.

b) Implementation of #P09-00176-ECPA would involve soil disturbance activities on the project site. The existing natural vegetation would be replaced by vine rows and intervening avenues planted to a cover crop. The removal and replacement of natural vegetation with vineyards and related cover crop can influence the natural water budget and soil moisture by increasing the availability of water infiltrating through the soil, which could lead to slope instability and failures ultimately resulting in increased erosion and soil loss. In addition, the installation and maintenance of vineyards has the potential to cause excess erosion. A hydrologic study will be prepared that will determine pre- and post-project estimates of erosion, the volume and peak rate of runoff, and stream hydrographs. Sediment transport will be evaluated within the context of hydrograph outputs, erosion calculations, terrain erodibility designations, and proposed erosion control measures. If it is found that further detail is required to assess potential impacts to sedimentation, a targeted sediment assessment will be completed for identified critical watersheds. The EIR will discuss this issue.

c) Geologic and landslide mapping performed by the USGS and Napa County identified landslide deposits on the project site, as discussed above. Drainage features included in #P09-00176-ECPA would primarily be designed to prevent the concentration of runoff, but in a few locations drop inlets and subsurface pipelines would be installed to collect runoff and would potentially discharge concentrated flows. The removal of trees from land clearing activities would reduce absorption of water in cleared areas and could increase saturation of these lands. Grading has the potential to create unstable slopes. The specific project design, erosion control measures, topography, and existing landslide features will be evaluated to determine if the proposed project would increase the potential for future landsliding. According to Napa County's GIS data, the project site is classified as having very low and medium liquefaction potential, as discussed above. Installation of #P09-00176-ECPA would not increase the liquefaction potential at this site. Since liquefaction potential would not increase with the proposed project, the potential for lateral spreading and subsidence would not be expected to increase. The EIR will discuss the issues.

d) The potential for the proposed project to pose substantial risk to life or property due to expansive soils would be less than significant. The EIR will not discuss this issue.

e) No septic tanks or wastewater disposal systems are proposed as part of the proposed project; therefore, this issue will not be discussed in the EIR.

		Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
7.	**HAZARDS AND HAZARDOUS MATERIALS.** Would the project:				
a)	Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☒	☐	☐	☐
b)	Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☒	☐	☐	☐
c)	Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d)	Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e)	For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☒	☐
f)	For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g)	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
h)	Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☒	☐

Setting

The proposed vineyards would be managed using sustainable agricultural practices, which includes the use of engineered irrigation and erosion control measures, as well as permanent cover crops.

Existing chemical storage exists on a contiguous property that is also owned by the applicant for #P06-00176-ECPA. New areas for mixing and loading agricultural chemicals would be located throughout the project site and would be located once irrigation design of the vineyard blocks is complete and environmental constraints have been addressed.

Discussion of Impacts

a, b) Project construction would require the use of potentially hazardous materials, such as fuels and oil. Project operation and maintenance would require the use and storage of common vineyard related chemicals. These hazardous materials may have a potentially significant impact to the public and environment and will be discussed in the EIR.

c) The project site is not located within a quarter mile of existing or proposed school sites. The nearest schools are Carneros Elementary School located approximately four miles west of the project site and Snow Elementary School located approximately four miles northwest of the project site. No impact would occur. This issue will not be discussed in the EIR.

d) A hazardous materials database search did not identify any hazardous sites on the property, but two leaking underground storage tank (LUST) sites are located within one mile of the property (Geo Tracker, 2008). The closest site being Kaiser Napa Data Center (T10000000413) located at 2600 Napa Valley Corporate Drive, approximately 0.5 miles away, across State Route 221. This site was opened December 4, 2008 for verification monitoring. The second LUST site is Napa Pipe Corp (T0605500100) located at 1025 Kaiser Road. This site was closed on July 21, 2009 and is also identified as a cleanup site with an open remediation case as of July 1, 2002. The project site is not listed on the LUST database or the State CORTESE list and no hazardous releases have been reported within 1,500 feet of each parcel (Napa County GIS, 2003). The development of the project site would not create a significant hazard to the public or the environment. The EIR will not discuss this issue.

e, f) The closest airport, Napa County Airport, is located approximately three miles southwest from the project site. The project site contains two parcels that lie within Compatibility Zone E of the Napa County Airport Land Use Compatibility Plan (ALUP) and are zoned as Airport Compatibility (AC). This zoning designation limits the density of development to reduce the risk of damage to property or injury to persons; agriculture is a compatible use and does not need a consistency determination from the Airport Land Use Commission. The project does not propose residential use and there would not be full-time employees at the project site on a daily basis, therefore, impacts to people residing or working in the project area would be less than significant. The project site is not located in the vicinity of a private airstrip.. No impact would occur. The EIR will not discuss these issues.

g) The main evacuation routes in Napa County are State Routes 12 and 29 (Napa County, 2008). Primary access to the project site is off Anderson Road, a low-volume road located off of State Route 221 (discussed further in the Transportation and Traffic section below). Secondary access to the project site would be provided from an easement off State Route 12, though this access point would be used for emergency purposes only. If used, vehicle traffic would be light and the proposed project would not interfere with any existing emergency response plans or evacuation plans. Impact would be less than significant and the EIR will not discuss this issue.

h) The property is not adjacent to urbanized areas, nor does the project propose the construction of residences; therefore, the project would not result in an increased exposure of people or structures to significant loss or injury involving wildland fires. During installation of #P09-00176-ECPA and the operation and maintenance of the vineyard, workers would be onsite. However, vineyard development would not significantly change the existing setting making it more vulnerable to wildland fires. Therefore, the impact would be less than significant and the EIR will not address this issue.

		Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
8.	**HYDROLOGY AND WATER QUALITY.** Would the project:				
a)	Violate any water quality standards or waste discharge requirements?	☒	☐	☐	☐
b)	Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there should be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☒	☐	☐	☐
c)	Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site?	☒	☐	☐	☐
d)	Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial flooding on- or off-site?	☒	☐	☐	☐
e)	Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?	☒	☐	☐	☐
f)	Otherwise substantially degrade water quality?	☒	☐	☐	☐
g)	Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h)	Occur within a 100-year flood hazard area structure, which would impede or redirect flood flows?	☐	☐	☐	☒
i)	Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☒	☐
j)	Cause inundation of seiche, tsunami, or mudflow?	☐	☐	☐	☒

Setting

Napa County is divided into three watersheds: Napa River, Putah Creek/Lake Berryessa, and Suisun Creek. The project site is located within several subwatersheds of the Napa River watershed (**Figure 3-2**). The majority of the project site is drained by the Suscol Creek watershed, but small portions along the northern property boundary are drained by the Cayetano Creek, Arroyo Creek and Central Creek watersheds, and portions of the project site to the south of the southern ridge are drained by Fagan Creek and Sheehy Creek watersheds. In addition, a small area in the northeastern portion of the project site is located within Solano County and drains to Green Valley Creek, but no development is proposed within this drainage. The Napa River is designated by the SWRCB as impaired by sediments, nutrients, and pathogens (SWRCB, 2009). Potential impacts to water quality in Napa River could result from sedimentation/erosion, turbidity, excessive nitrogen and phosphorus, fecal matter, and other pollutants.

Suscol Creek, the primary drainage feature of the project site, is a perennial stream that originates in the eastern portion of the project site and flows westward across the middle of the project site and continues approximately 2.3 miles offsite until eventually discharging into the Napa River. Suscol Creek collects flows from surface runoff of the surrounding areas and several small tributaries extending into the northern portions of the project site. Numerous seeps and springs are located throughout the project site and are the primary permanent water source for Suscol Creek. The seeps typically exhibit little surface flow, but contain saturated soil and often support plants typical of wetlands, whereas the springs typically exhibit flowing surface water (LSA, 2009).

Irrigation water for the proposed project would be supplied by groundwater sources. A single groundwater well exists in the northwestern portion of the project site. The well is over 600 feet deep, is cement lined at approximately 61 feet and has been documented through pump tests to not affect Suscol Creek. Under the proposed project several additional groundwater wells would be developed, potentially throughout the project site. A man-made pond with a capacity of approximately 12 acre-feet (af) is located within the upper portions of the Sheehy Creek watershed between proposed Blocks 43, 44 and 45. Water stored in this pond is covered under appropriative water right Permit 20762 (Application 30247), but this water would not be utilized for the proposed project. Permit 20762 allows for the diversion to storage of 98 af between November 1 and May 1 from an Unnamed Stream tributary to Sheehy Creek thence Steamboat Slough thence the Napa River thence San Pablo Bay. Water is allowed for storage in the onsite pond (Reservoir 1) and Reservoir 2, which is located on the Kirkland Ranch property about a half mile south of Reservoir 1, immediately south of the southern boundary of the project site.

Discussion of Impacts

a-f) The proposed project has the potential to significantly impact water quality from earthmoving activities which could contribute to erosion and sedimentation, agricultural chemical applications, and potential spills associated with hazardous material transport and use. As discussed above, a hydrologic study is being prepared that will evaluate potential impacts of the proposed project to sedimentation and sediment transport, as well as evaluate potential impacts to water quality based on baseline data established by sampling throughout the project site. The proposed project also has the potential to significantly impact water supply from groundwater extraction. A groundwater assessment is being prepared for the project to analyze conditions of local groundwater resources and potential impacts of the proposed project to groundwater drawdown and local groundwater levels. Further, as a part of the hydrologic study surface flows and baseflows of the onsite streams will be monitored during the groundwater pumping tests and an assessment of potential impacts to the streams from groundwater pumping onsite will be provided. These issues will be discussed in the EIR.

g, h) The proposed project does not involve the construction of housing or other structures for human habitation. The proposed project also is not located within a 100-year floodplain and would not place people or structures at risk from flooding. These issues will not be discussed in the EIR.

i) An increase in peak flows from the project site could contribute to increased volume of streamflows in Suscol Creek and other onsite drainages, which could potentially result in flooding of drainages and/or downstream areas. Changes to peak flows (Questions a-f above) and any potential impacts associated with these changes will be discussed in the EIR.

j) Hazard from a tsunami is considered low because Napa County does not have any oceanfront land. USGS calculated that a 20-foot wave at the Golden Gate Bridge would be nonexistent by the time it reached Napa County. Napa County has the potential for a seiche due to its proximity to the San Pablo Bay, although the Napa County General Plan states that the “population areas are sufficiently elevated” to avoid inundation. The project site is located at an elevation that would not be effected by a tsunami or seiche. The proposed vineyards would be located on existing contours; no recontouring or terracing would occur that would trigger a mudflow. These issues will not be discussed in the EIR.

		Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
9.	**LAND USE AND PLANNING.** Would the project:				
a)	Physically divide an established community?	☐	☐	☐	☒
b)	Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☒	☐	☐	☐
e)	Conflict with any applicable habitat conservation plan or natural communities conservation plan?	☐	☐	☐	☒

Setting

<u>Napa County General Plan</u>

The project site lies within an area designated as Agriculture, Watershed and Open Space (AWOS) by the Napa County General Plan. The Napa County General Plan describes AWOS as follows:

> To provide areas where the predominant use is agriculturally oriented; where watershed areas, reservoirs, floodplain tributaries, geologic hazards, soil conditions and other constraints make the land relatively unstable for urban development; where urban development would adversely impact on all such uses; and where the protection of agriculture, watersheds, and floodplain tributaries from fire, pollution, and erosion is essential to the general health, safety and welfare (Napa County, 2008).

General uses of the AWOS designation provided by the General Plan consist of agriculture, processing of agricultural products, and single-family dwelling (Napa County, 2008).

The Napa County General Plan provides the following natural resource planning goals and policies (Napa County, 2008):

- The County shall identify, improve and conserve Napa County's agricultural land through the following measures:
  c) Require that existing significant vegetation be retained and incorporated into agricultural projects to reduce soil erosion and to retain wildlife habitat.
  f) Minimize pesticide and herbicide use and encourage research and use on integrated pest control methods such as cultural practices, biological control, host resistance, and other factors (Policy CON-2).
- The County shall impose conditions on discretionary projects which limit development in ecologically sensitive areas such as those adjacent to rivers or streamside areas and physically hazardous areas such as floodplains, steep slopes, high fire risk areas and geologically hazardous areas (Policy CON-6).
- Maintain and enhance the existing level of biodiversity (Goal CON-2).
- Protect the continued presence of special-status species, including special-status plants, special-status wildlife, and their habitats, and comply with all applicable state, federal or local laws or regulations (Goal CON-3).
- Conserve, protect, and improve plant, wildlife, and fishery habitats for all native species in Napa County (Goal CON-4).
- Protect connectivity and continuous habitat areas for wildlife movement (Goal CON-5).
- The County shall require that all discretionary residential, commercial, industrial, recreational, agricultural, and water development projects avoid impacts to fisheries and wildlife habitat to the maximum extent feasible. Where impacts cannot be avoided, projects shall include effective mitigation measures and management plans including provisions to:
  a) Maintain the following essentials for fish and wildlife provisions:
     1. Sufficient dissolved oxygen in the water.
     2. Adequate amounts of proper food.
     3. Adequate amounts of feeding, escape, and nesting habitat.
     4. Proper temperature through maintenance and enhancement of streamside vegetation, volume of flows, and velocity of water.

  b) Ensure that water development projects provide an adequate release flow of water to preserve fish populations.
  c) Employ supplemental planting and maintenance of grasses, shrubs, and trees of like quality and quantity to provide adequate vegetation cover to enhance water quality, minimize sedimentation and soil transport, and provide adequate shelter and food for wildlife and maintain the watersheds, especially stream side areas, in good condition.
  d) Provide protection for wildlife habitat and special-status species through buffering or other means.

e) Provide replacement habitat of like quantity and quality on- or off-site for special status species.
f) Enhance existing habitat values, particularly for special-status species, through restoration and replanting of native plant species as part of discretionary permit review and approval.
g) Require temporary or permanent buffers of adequate size (based on the requirements of the subject special-status species) to avoid nest abandonment by birds and raptors associated with construction and site development activities.
h) Demonstrate compliance with applicable provisions and regulations of recovery plans for federally listed species (Policy CON-13).

- To offset possible losses of fishery and wildlife habitat due to discretionary development projects, developers shall be responsible for mitigation when avoidance of impacts is determined to be infeasible. Such mitigation measures may include providing and permanently maintaining similar quality and quantity habitat within Napa County, enhancing existing habitat areas, or paying in-kind funds to an approved wildlife habitat improvement and acquisition fund. Replacement habitat may occur either on-site or at approved off-site locations, but preference shall be given to on-site replacement (Policy CON-14).
- The County shall require a biological resources evaluation for discretionary projects in areas identified to contain or potentially contain special-status species based upon data provided in the Baseline Data Report (BDR), California Natural Diversity Database (CNDDB), or other technical materials. This evaluation shall be conducted prior to the approval of any earthmoving activities. The County shall also encourage the development of programs to protect special-status species and disseminate updated information to state and federal resource agencies (Policy CON-16).
- Preserve and protect native grasslands, serpentine grasslands, mixed serpentine chaparral, and sensitive biotic communities and habitats of limited distribution through a variety of measures, including:

  a) Prevent removal or disturbance of sensitive natural plant communities that contain special-status plant species or provide critical habitat to special-status animal species.
  b) In other areas, avoid disturbances to or removal of sensitive natural plant communities and mitigate potentially significant impacts where avoidance is infeasible.
  c) Promote protection from overgrazing and other destructive activities.
  d) Encourage scientific study and require monitoring and active management where biotic communities and habitats of limited distribution or sensitive natural plant communities are threatened by the spread of invasive non-native species.
  e) Require no net loss of sensitive biotic communities and habitats of limited distribution through avoidance, restoration, or replacement where feasible.

Where avoidance, restoration, or replacement is not feasible, preserve like habitat at a 2:1 ratio or greater within Napa County to avoid significant cumulative loss of valuable habitats (Policy CON-17).

- To reduce impacts on habitat conservation and connectivity:

  a) In sensitive domestic water supply drainages where new development is required to retain between 40 and 60 percent of the existing vegetation on-site, the vegetation selected for retention should be in areas designed to maximize habitat value and connectivity.

  b) Outside of sensitive domestic water supply drainages, streamlined permitting procedures should be instituted for new vineyard projects that voluntarily retain valuable habitat and connectivity, including generous setbacks from streams and buffers around ecologically sensitive areas.

  c) Preservation of habitat and connectivity of adequate size, quality, and configuration to support special-status species within the project area. The size of habitat and connectivity to be preserved shall be determined based on the specifics needs of the species.

  d) The County shall require discretionary projects to retain movement corridors of adequate size and habitat quality to allow for continued wildlife use based on the needs of the species occupying the habitat.

  e) The County shall require new vineyard development to be designed to minimize the reduction of wildlife movement to the maximum extent feasible. The County shall require the removal or reconfiguration of existing wildlife exclusion fencing to reduce existing significant impacts to wildlife movement, particularly in riparian areas, where a nexus exists between the proposed project and the existing fencing.

  f) The County shall disseminate information about impacts that fencing has on wildlife movement in wild land areas of the County and encourage property owners to use permeable fencing.

  g) The County shall develop a program to improve and continually update its database of biological information, including identifying threats to wildlife habitat and barriers to wildlife movement.

  h) Support public acquisition, conservation easements, in-lieu fees where on-site mitigation is infeasible, and/or other measures to ensure long-term protection of wildlife movement areas (Policy CON-18).

- Maintain and improve Oak Woodland habitat to provide for slope stabilization, soil protection, species diversity, and wildlife habitat through the following measures:

  a) Preserve, to the maximum extent feasible, oak trees and other significant vegetation that occur near the heads of drainages or depressions to maintain diversity of vegetation type and wildlife habitat as part of agricultural projects.

b) Comply with the Oak Woodlands Preservation Act (PRC Section 21083.4) regarding oak woodland preservation to conserve the integrity and diversity of oak woodlands, and retain, to the maximum extent feasible, existing oak woodland and chaparral communities and other significant vegetation as part of residential, commercial, and industrial approvals.

c) Provide replacement or preservation of lost oak woodland and native vegetation at a 2:1 ratio when retention of existing vegetation is found to be infeasible. Removal of oak species limited in distribution shall be avoided to the maximum extent feasible.

d) Support hardwood cutting criteria that require retention of adequate stands of oak trees sufficient for wildlife, slope stabilization, soil protection, and soil production be left standing.

e) Maintain, to the maximum extent feasible, a mixture of oak species which is needed to ensure acorn production. Black, canyon, live, and brewer oaks as well as blue, white, scrub, and live oaks are common associations.

f) Encourage and support the County Agricultural Commission's enforcement of state and federal regulations concerning Sudden Oak Death and similar future threats to woodlands (Policy CON-24).

- Consistent with longstanding practice in Napa County, natural vegetation retention areas along perennial and intermittent streams shall vary in width with steepness of the terrain, the nature of the undercover, and type of soil. The design and management of natural vegetation areas shall consider habitat and water quality needs, including the needs of native fish and wildlife and flood protection where appropriate. Site-specific setbacks shall be established in coordination with Regional Water Quality Control Boards, California Department of Fish and Game, U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration National Marine Fisheries Service, and other coordinating resource agencies that identify essential stream and stream reaches necessary for the health of populations of native fisheries and other sensitive aquatic organisms within the County's watersheds. Where avoidance of impacts to riparian habitat is infeasible along stream reaches, appropriate measures will be undertaken to ensure that protection, restoration, and enhancement activities will occur within these identified stream reaches that support or could support native fisheries and other sensitive aquatic organisms to ensure a no net loss of aquatic habitat functions and values within the county's watersheds (Policy CON-26).
- The County shall enforce compliance and continued implementation of the intermittent and perennial stream setback requirements set forth in existing stream setback regulations, provide education and information regarding the importance of stream setbacks and the active management and enhancement/restoration of native vegetation within setbacks, and develop incentives to encourage greater stream

setbacks where appropriate. Incentives shall include streamlined permitting for vineyard proposals on slopes between five and 30 percent and flexibility regarding yard and road setbacks for other proposals (Policy CON-27).

- All public and private projects shall be required to avoid impacts to wetlands to the maximum extent feasible. If avoidance is not feasible, projects shall achieve no net loss of wetlands, consistent with state and federal regulations (Policy CON-30);
- Control urban and rural stormwater runoff and related non-point source pollutants, reducing to acceptable levels pollutant discharges from land based activities throughout the County (Goal CON-9).
- Prioritize the use of available groundwater for agricultural and rural residential uses rather than for urbanized areas (Goal CON-11).
- Support environmentally sustainable agricultural techniques and best management practices (BMPs) that protect surface water and groundwater quality and quantity (e.g., cover crop management, integrated pest management, and informed surface water withdrawals based upon informative real-time stream flow monitoring) (Policy CON-42 D).
- Protect the County's domestic supply drainages through vegetation preservation and protective buffers to ensure clean and reliable drinking water consistent with state regulations and guidelines. Continue implementation of current Conservation Regulations relevant to these areas, such as vegetation retention requirements, consultation with water purveyors/system owners, implementation of erosion controls to minimize water pollution, and prohibition of detrimental recreational uses (Policy CON-45).
- Proposed developments shall implement project-specific sediment and erosion control measures (e.g., erosion control plans and/or stormwater pollution prevention plans) that maintain pre-development sediment erosion conditions or at minimum comply with state water quality pollution control (i.e., Basin Plan) requirements and are protective of the County's sensitive domestic supply watersheds. Technical reports and/or erosion control plans that recommend site specific erosion control measures shall meet the requirements of the County Code and provide detailed information regarding site-specific geologic, soil and hydrologic conditions and how the proposed measure will function (Policy CON-48).
- Protect groundwater and other water supplies by requiring all discretionary project demonstrate the availability of adequate water supply prior to approval. Adequate demonstration may include evidence or calculation of groundwater availability and may be satisfied as part of compliance with County Code "fair-share" provisions and state requirements, or coordination with applicable cities and public and private water purveyors to verify water supply adequacy (Policy CON-53).
- The County shall maintain or enhance infiltration and recharge of groundwater aquifers by requiring all discretionary projects be designed (at minimum) to maintain

a site's predevelopment groundwater recharge potential, to the maximum extent feasible, by minimizing impervious surfaces and promoting recharge (e.g., via the use of water retention/detention structures, use of permeable paving materials, bio-swales, water gardens, cisterns, and other best management practices) (Policy CON-54).

- All new discretionary projects shall be evaluated to determine potential significant project-specific air quality impacts and shall be required to incorporate appropriate design, construction, and operational features to reduce emissions of criteria pollutants regulated by the state and federal governments below the applicable significance standard(s) or implement alternate and equally effective mitigation strategies consistent with BAAQMD's air quality improvement programs to reduce emissions. In addition to these policies, the County's land use policies discourage scattered development which contributes to continued dependence on the private automobile as the only means of convenient transportation. The County's land use policies also contribute to efforts to reduce air pollution (Policy CON-77).

The Agricultural Preservation and Land Use Element of the Napa County General Plan provides the following goals (Napa County, 2008):

- Preserve existing agricultural land uses and plan for agriculture and related activities as the primary land uses in Napa County.
- Support the economic viability of agriculture, including grape growing, winemaking, other types of agriculture, and supporting industries to ensure the preservation of agricultural lands.
- With cities, other government units, and the private sector, plan for commercial, industrial, residential, recreational, and public land uses in locations that are compatible with adjacent uses and agriculture.

Napa County Zoning Ordinance

The project site lies within an area zoned as an Agricultural Watershed (AW) District. The two parcels that make up the western portion of the project site are also designated as part of an AC Combination District. The Napa County Zoning Ordinance describes the intent of the AW District designation as follows:

> The AW District classification is intended to be applied in those areas of the county where the predominant use is agriculturally oriented, where watershed areas, reservoirs and floodplain tributaries are located, where development would adversely impact on all such uses, and where the protection of agriculture, watersheds and floodplain tributaries from fire, pollution and erosion is essential to the general health, safety and welfare (Napa County, 2009).

Agricultural uses are allowed within an AW district without a Use Permit.

The Napa County Zoning Ordinance describes the intent of the AC Combination District designation as follows:

> The AC Combination District classification is intended to accommodate the orderly growth and development of public-use airports, to limit physical, environmental, and operational obstructions to flight that may constitute hazards to aircraft or people on the ground, Limit the density of development so as to reduce the risks of damage to property or injury to persons in the event of an aircraft accident, to reduce the adverse effects of aircraft noise and other aircraft-related impacts on land uses that may be sensitive to excessive noise; and to avoid the construction of structures and establishment of uses that would be incompatible with the continued existence and planned expansion of a public-use airport (Napa County, 2009).

Napa County Erosion Control Plans

Erosion Control Plans are required for earthmoving activity, grading, improvement, or construction of a structure on sites of five percent slope or greater. The Napa County Conservation, Development and Planning Department administers the ordinance and grants approvals. The Napa County Resource Conservation District reviews all erosion control plans for agricultural activities proposed on slopes greater than five percent, and passes on its recommendations to the Napa County Conservation, Development and Planning Department.

Napa County Stream Setbacks

Section 18.108.025 of the Napa County Conservation Regulations states that clearing of land for new agricultural uses is required to comply with designated stream setbacks which are based on slope, unless a use permit is obtained from Napa County, or unless an exemption in Section 18.108.050 applies. Setbacks are measured from the top of the bank on both sides of the stream as it exists at the time of replanting, redevelopment, or new agricultural activity.

Napa County Slope Regulations

Section 18.108.060 of the Napa County Conservation Regulations states that no construction, improvement, grading, earthmoving activity or vegetation removal associated with the development or use of land shall take place on those parcels or portions thereof having a slope of 30 percent or greater, unless an exemption under Sections 18.108.050 or 18.108.055 apply, or unless an exception through the use permit process is granted pursuant to Section 18.108.040 and resolution 94-19.

Napa County Erosion Hazard Areas

Sections 18.108.070 and 18.108.100 of the Napa County Conservation Regulations outline requirements in erosion hazard areas, including vegetation preservation and replacement.

Discussion of Impacts

a) The proposed project would not physically divide an established community. No impact would occur. The EIR will not discuss this issue.

b) A preliminary consistency analysis will be prepared to determine if the proposed project is consistent with the General Plan and zoning designations for the property. This issue will be discussed in the EIR but the ultimate determination of consistency or inconsistency will be made by the County decision-maker. Stream setbacks are proposed consistent with Napa County stream setbacks requirements (Code Section 18.108.025), based on slope. As noted in the Biological Resources section, there are no Habitat Conservation Plans or Natural Community Conservation Plans for the property, but the EIR will discuss onsite wildlife corridors and their relationship to contiguous conservation easements. Any potential conflicts with applicable policies or regulations of the SWRCB will be discussed in the Hydrology and Water Quality section of the EIR. Any potential conflicts with applicable plans or policies of the California Department of Fish and Game, U.S. Fish and Wildlife Service, National Marine Fisheries Service, or the U.S. Army Corps of Engineers will be discussed in the Biological Resources section of the EIR. Any potential conflicts with applicable plans and policies regarding air quality will be discussed in the Air Quality section of the EIR.

c) No Habitat Conservation Plans, Natural Community Conservation Plans, or other federal, state, or local plans are applicable to the parcels (NCCP, 2005). There would be no impact; therefore, the EIR will not address this issue. As noted above, the EIR will discuss the maintenance of wildlife corridors and their relationship to movement through the property and surrounding parcels.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
10. MINERAL RESOURCES. Would the project:				
a) Result in the loss of availability of a known mineral resource classified MRZ-2 by the State Geologist that would be of value to the region and the residents of the state?	☐	☐	☒	☐
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☒	☐

Setting

Mineral resources of concern generally include metals, industrial minerals (e.g. aggregate, sand and gravel), oil and gas, and geothermal resources that would be of value to the region and residents of the state.

The Napa County General Plan identifies mineral deposit lands within the County and provides conservation policies to identify and protect these resources. These conservation measures include ensuring the long-term production of Aggregate Resource Areas identified by the State of California by recognizing mineral information classified by State geologists, assisting in the management of land use which affects areas of statewide and regional significance, and emphasizing the conservation and development of identified mineral deposits.

Discussion of Impacts

a, b) Figure 14 of the General Plan Land Use Map shows a 'Mineral Resource' overlay zone within the northern portion of the holding covering a small portion of the project area (proposed Vineyard Blocks 3, 5, 6, and 7). This designation reflects official mapping by the State Department of Mines and Geology in 1987, which designates these areas as a "Regionally Significant Construction Aggregate Resource Area" (Napa County, 2008). Development of vineyard on the property would not physically preclude future mining activities from occurring. Unlike projects involving structures or other improvements such as paved roads and sewer, water and gas lines, vines can be easily removed. The potential impact to available mineral resources is less than significant. The EIR will not discuss this issue.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
11. NOISE. Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

Setting

The Community Character Element in the Napa County General Plan states:

> The noises associated with agriculture, including agricultural processing, are considered an acceptable and necessary part of the community character of Napa County, and are not considered to be undesirable provided that normal and reasonable measures are taken to avoid significantly impacting adjacent uses. Noise from these sources shall normally be exempt from the standards contained in the Community Character Element (Policy CC-35, Napa County, 2008).

In addition, the Napa County Code (Section 2.94.020 Right to Farm-Conditions) states:

> No existing or future agricultural activity, operation or facility, or any of its appurtenances, conducted or maintained for commercial purposes in a manner consistent with proper and accepted customs and standards, as established and

> followed by similar agricultural operations in the same locality, shall be or become a nuisance, public or private, due to any changed condition in or about the county, after the same has been in operation for more than three years if it was not a nuisance at the time it began. Provided, however, that such agricultural operations must comply with all provisions of this code and further provided that the provisions of this section shall not apply whenever a nuisance results from the negligent or improper operation of any agricultural operation (Napa County, 2009).

Napa County Code (Section 8.16.090 E) states the exemptions to noise regulations:

> Agricultural operation. All mechanical devices, apparatus, or equipment associated with agricultural operations conducted on agricultural property (Napa County, 2009).

The project site is located in an agricultural area, approximately 900 to 1,500 feet northwest from the nearest residences. Additional sensitive receptors in the vicinity of the project site include Napa College and Napa State Hospital located approximately three miles to the north.

Discussion of Impacts

a-d) The proposed project would result in seasonal and temporary noise generation related to construction and maintenance activities. At the project site, construction activities would require the use of heavy equipment. Some blasting would occur for construction but only with the required permits. During operation, work would typically be conducted within the hours of 7 A.M. and 4 P.M., but would also include occasional nighttime activities including nighttime harvest (typically from 9 P.M. to 5 A.M.) about 20 days per year, sulfur/pesticide/herbicide application (typically from 9 P.M. to 5 A.M.) about 25 days per year, and frost protection with wind machines (typically from 12 A.M. to 7 A.M.) about 15 days out of the year. Numerous residences are located in proximity to the southeast corner of the project site, including several between approximately 900 and 1,500 feet from the boundary and several beyond a half mile (2,640 feet) from the boundary. Residences are also located approximately two miles to the north of the project site. Syar Quarry is located contiguous to the northern boundary of the project site and generates noise from the use of heavy construction equipment, a rock crusher, blasting, and general grading activities. Blasting can generate vibrations that have the potential to impact neighboring areas to the quarry. There is also the potential for additional noise resulting from increased vehicular, barge and rail traffic in the areas surrounding the quarry. Given the scale of the proposed project and the existing conditions in the vicinity of the project area, the proposed project would not expose sensitive receptors to excessive or substantial noise. Impacts would be less than significant. This issue will not be discussed in the EIR.

e, f) The proposed project is not located in the vicinity of a public airport and is located approximately three miles from the nearest private airstrip, or within the vicinity of an airport land use plan. The project site contains two parcels that are designated as part of an AC Combination District, but these parcels are not expected to be affected by substantial aircraft noise because they lie outside the 55 Community Noise Equivalent Level (CNEL) noise contour of the airport impact area. No impact would occur. This issue will not be discussed in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
12. POPULATION AND HOUSING. Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Setting

According to the U.S. Census Bureau, the population in Napa County in 2007 was estimated to be 132,565 (U.S. Census Bureau, 2008). Construction and operation of the proposed project would require workers. Construction activities would require approximately 30 workers for period of five months (between April 1 and October 1). Operation of the proposed project would require approximately 45 workers for the pruning season (from approximately December 20 to March 10) and approximately 80 workers for the harvesting season (from about mid-August to about mid- November). The workers are assumed to be year-round in the vicinity of the project area, since they would be required for most days of the week. Construction workers are assumed to be primarily the same workers as those who perform vineyard operations because construction would primarily occur in the low/off season when operation employees are typically either unemployed or underemployed.

Discussion of Impacts

a) The proposed project does not involve the construction of new homes or businesses. Existing roads will be used during construction and project operation activities. The proposed project would not induce substantial population growth either directly or indirectly. The EIR will not discuss this issue, either as an individual impact or cumulatively.

b, c) Numerous residences are located in proximity to the southeast corner of the project site, including several between approximately 900 and 1,500 feet from the boundary and several beyond a half mile (2,640 feet) from the boundary. Residences are also located approximately two miles to the north of the project site. No residences or people would be displaced by the proposed project; therefore, there is no impact. The EIR will not discuss this issue.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
13. PUBLIC SERVICES. Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of these public services:				
i) Fire protection?	☐	☐	☐	☒
ii) Police protection?	☐	☐	☐	☒
iii) Schools?	☐	☐	☐	☒
iv) Parks?	☐	☐	☐	☒
v) Other public facilities?	☐	☐	☐	☒

Setting

Public services include fire and police protection, schools, parks, and other public facilities. The project area is located within unincorporated Napa County and the Napa County Sheriff's Department provides law enforcement services for this area. The Napa County Fire

Department and the California Department of Forestry (CDF) provide fire protection services. Napa Valley Unified School District operates schools in the area.

Discussion of Impacts

a) As discussed in the Population and Housing section above, the proposed project would not result in substantial growth in the area that would require additional public services. The proposed project would not adversely impact the County's ability to provide fire and police protection, or impact the maintenance of schools, parks, or other public facilities. No impact to public services would occur. The EIR will not discuss these issues either as individual impacts or cumulatively.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
14. RECREATION. Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☒	☐
b) Include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?	☐	☐	☒	☐

Setting

The proposed project is located in Napa County in an area characterized primarily by open space, agricultural, residential and industrial land uses. Several commercial properties are located directly to the west of the State Route 221/Anderson Road entrance. Syar Quarry, located immediately to the northwest of the project site, is a mining operation with several other industrial properties located to the north of the quarry entrance. Skyline Wilderness Park is located immediately to the north of the project site: abutting the park along the northern property line of APN 045-360-007. This area is typified by a ridgeline running generally contiguous with the property line between Skyline Wilderness Park and the project site. Skyline Park trails in this area are between 500 and +1,200 feet from the project site. This recreational area is subleased to the Skyline Park Citizens Association by the County of Napa who leases it from the state (Napa County, 2005). Skyline Wilderness Park is available for camping, hiking, horseback riding, bicycling, picnicking, nature study, fishing, archery and disc golf. Figures

ROS-4 and ROS-5 of the Napa County General Plan Recreation and Open Space Element identifies a potential north south trial corridor in the proximity of the northern boundary of the project site.

Discussion of Impacts

a, b) The proposed project would not result in substantial population growth or the associated increased use of recreational facilities, and does not include the construction or expansion of recreational facilities. No impact would occur.

Implementation of the proposed project and ongoing vineyard operations are temporary and seasonal in nature; therefore, not resulting in permanent long-term increases in noise and air quality impacts to Skyline Wilderness Park. Additionally, due to the topography in this area the proposed project would be buffered/screened from the trails located in this area. Implementation and ongoing operations of the proposed project would not preclude future location of a trail corridor within the holding. The proposed project would not adversely impact recreational opportunities or prohibit the maintenance of existing recreational opportunities. Impacts would be less than significant. The EIR will not discuss this issue.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
15. TRANSPORTATION AND TRAFFIC. Would the project:				
a) Cause an increase in traffic, which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections)?	☒	☐	☐	☐
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?	☒	☐	☐	☐
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
e) Result in inadequate emergency access?	☐	☐	☒	☐
f) Result in inadequate parking capacity?	☐	☐	☒	☐
g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	☐	☐	☒	☐

Setting

Primary access to the project site is located off State Route 221 (Napa Vallejo Highway); a secondary access would be off of State Route 12 (Jameson Canyon Road). State Route 221 is a divided four lane expressway, with two lanes running in each direction that serves as an alternate to the nearby Route 29 into Napa from the south. State Route 12 runs in an east-west direction and is located south of the southern boundary of the project site. It connects with State Route 221 to the southwest of the project site.

The project site is accessed from the western boundary by Anderson Road, off of State Highway 221. A private road with an existing recorded easement through two neighboring properties provides access from Anderson Road to the western border of the project site immediately north of Suscol Creek. An existing recorded easement from Kirkland Ranch Road off State Route 12 would provide secondary access to the southern portion of the project site.

Discussion of Impacts

a, b) Primary access to the project site would be provided from Anderson Road off of State Highway 221. The proposed project would generate vehicle trips during vineyard development that would be temporary in nature, and vehicle trips during the vineyard operation that would be seasonal in nature. Construction activities would cause an increase in vehicles, such as worker cars and trucks carrying equipment. Operation of the vineyard would include vehicle trips generated by laborers, as well as truck trips during harvest carrying grapes to area wineries. The most labor-intensive and highest traffic-generating period for the vineyard would occur during the harvest/crush season, typically from August through October. Approximately 80 workers would be needed at the project site during peak season (harvest). The EIR will discuss the potential for the proposed project to cause traffic and level of service impacts on surrounding roads.

c) The project site contains two parcels that are designated as part of an AC Combination District, but these parcels are not expected to be affected by substantial aircraft noise because they lie outside the 55 CNEL noise contour of the airport impact area. The proposed project would not affect air traffic patterns since the project site does not intrude into air space. The EIR will not discuss potential impacts to air traffic patterns.

d) The proposed project would not increase hazards due to a design feature or incompatible uses. The EIR will not discuss this issue.

e-g) The proposed project would not impede emergency access and the project site has adequate areas for parking. The project would not conflict with adopted policies supporting alternative transportation. The EIR will not discuss these issues.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
16. UTILITIES AND SERVICE SYSTEMS. Would the project:				
a) Exceed water treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
b) Require or result in the construction of new water treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
c) Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☒	☐
e) Result in a determination by the water treatment provider, which serves or may serve the project, that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☒	☐
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒

Setting

The project site is not served by public water or wastewater services. Residences in the project area rely on private wells or private water systems for domestic water supply and private septic systems for wastewater treatment. The closest landfill is the Clover Flat Landfill located on Silverado Trail near Calistoga in Napa County, approximately twenty miles north of the project site.

Discussion of Impacts

a, b) The proposed project would not exceed water treatment requirements or result in the construction of new water or wastewater treatment facilities. No impact would occur. The EIR will not discuss this issue.

c) The construction of drainage features proposed with the project are intended to minimize disturbance to the stream channel, banks, and surrounding areas to the greatest extent feasible. This issue will be addressed in the Hydrology and Water Quality section of the EIR.

d) The proposed project would rely on groundwater to irrigate the proposed vineyard areas. Groundwater would originate from an existing well on the property and additional proposed wells that would be developed throughout the project site. Impacts to the groundwater supply and surface flows will be discussed in the Hydrology and Water Quality section of the EIR. The proposed project would not require additional water supplies, such as connection to public water supply. A less than significant impact would occur. The EIR will not address this issue.

e) The proposed project does not require a wastewater system. No impact would occur. The EIR will not address this issue.

f) Onsite workers would generate a minimum amount of construction waste and solid waste; however, a less than significant impact is expected to the landfill capacity in the area. During land preparation, no burning of cleared vegetation would occur. The EIR will not address these issues.

g) The proposed project would not conflict with any statutes or regulations related to solid waste. No impact would occur. The EIR will not discuss this issue.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
17. MANDATORY FINDINGS OF SIGNIFICANCE.				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☒	☐	☐	☐
b) Does the project have impacts that are individually limited, but cumulative considerable? ("Cumulative considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☒	☐	☐	☐
c) Does the project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐

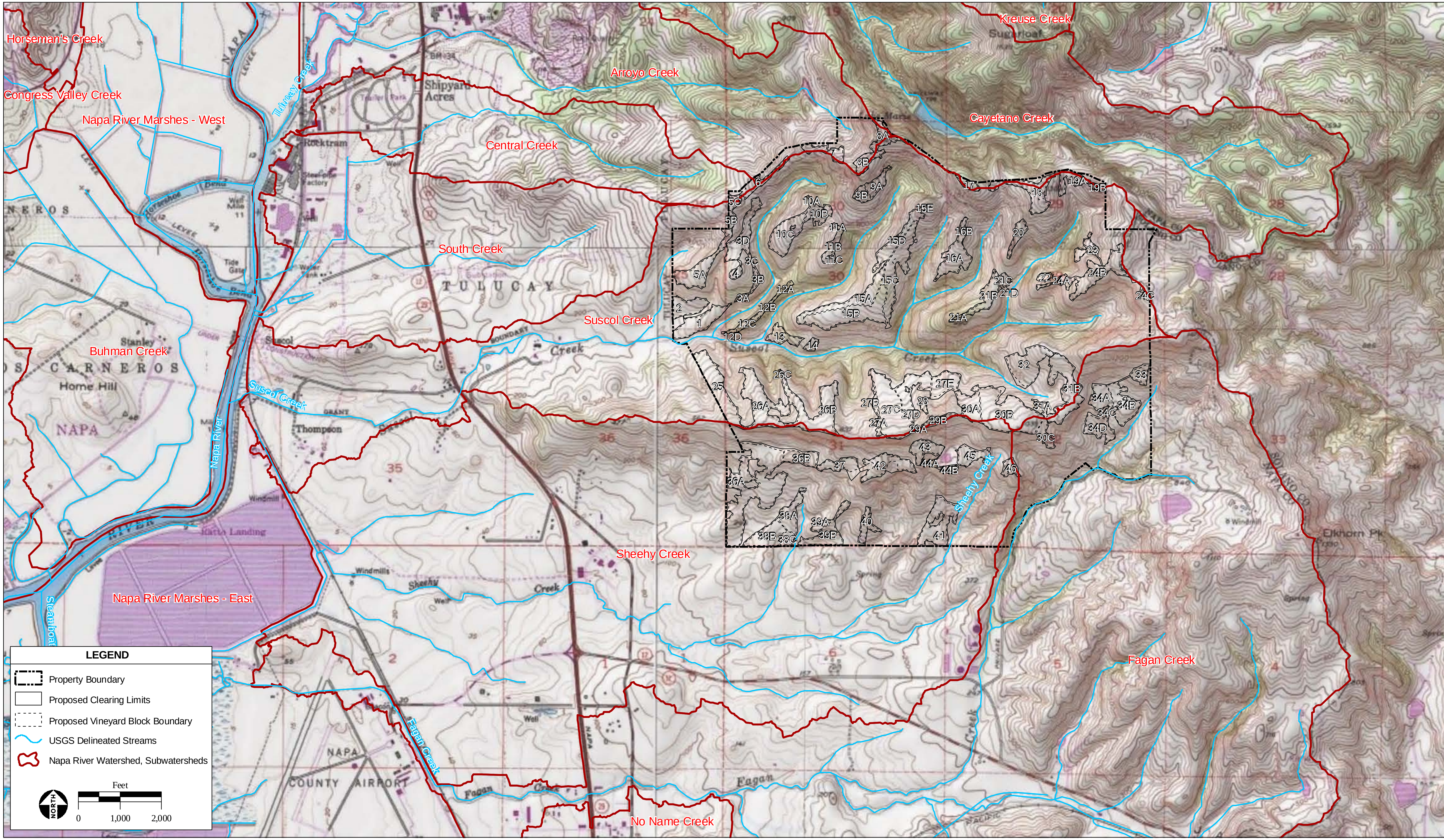
Discussion of Impacts

a, c) The EIR will discuss project impacts to the environment or human beings and provide mitigation measures if the impacts are significant.

b) The EIR will discuss the cumulative impacts resulting from the project in combination with any past projects, current projects and reasonably foreseeable projects in the project area.

SOURCE: Napa County, 2002; Napa County, 2008; AES 2009.

Figure 3-1
Landslide Features



SOURCE: Napa County, 2008; AES 2009.

Suscol Mountain Vineyards #P09-00176-ECPA / 209538

Figure 3-2
Watersheds

Section 4
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2009102079

Conservation, Development and Planning

1195 Third Street, Suite 210
Napa, CA 94559
www.co.napa.ca.us

Main: (707) 253-4417
Fax: (707) 253-4336

Hillary Gitelman
Director

A Tradition of Stewardship
A Commitment to Service

RECEIVED
OCT 23 2009
2:20
STATE CLEARING HOUSE

To: State Clearinghouse
1400 Tenth Street
Sacramento, CA 95814

From: Brian Bordona, Supervising Planner
Napa County Conservation, Development
and Planning Department
1195 Third Street, Suite 210
Napa, CA 94559

Subject: Notice of Preparation of a Draft Environmental Impact Report
Suscol Mountain Vineyards #P09-00176-ECPA

The County of Napa is the Lead Agency preparing an Environmental Impact Report (EIR) for the project identified below. We need to know the views of your agency as to the scope and content of the environmental information, which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIR prepared by our agency when considering your permit or other approval for the project.

An Initial Study has been prepared and is attached to this Notice of Preparation.

Project Location: The project site is located about two and a half miles southeast of the City of Napa in Napa County, California (see **Figure 1**). The project is located within the Arroyo Creek, Cayetano Creek, Central Creek, Fagan Creek, Sheehy Creek and Suscol Creek watersheds. Assessors Parcel Numbers 045-360-006, 045-360-007, 057-020-069, and 057-030-004.

General Plan/Zoning Designations: Agriculture, Watershed and Open Space (AW-OS)/Agricultural Watershed (AW); portion of one parcel (045-360-006) is covered by a General Plan Mineral Resource overlay, and two parcels (045-360-006 and 057-020-069) are within an Airport Compatibility (AC) Combination District

Project Description: **Summary** – The Suscol Mountain Vineyards Erosion Control Plan (ECP) #P09-00176-ECPA proposes vegetation removal and earthmoving activities on slopes greater than five percent in connection with proposed vineyard development, which includes 444 net acres of vineyard within 568 gross acres disturbed on the approximately 2,123 acre property.

The project under consideration also includes the following activities:

- Earthmoving and grading activities on slopes greater than five percent associated with soil cultivation, installation and maintenance of drainage, irrigation and erosion control features, ripping, tree and brush removal, and vineyard plantings and operation on 444 net acres within 568 gross acres of disturbance;
- Installation of surface drainage pipelines to collect surface runoff at low points throughout the project area and transport it to protected outlets;
- Installation of infield drop inlets, standard drop inlets and concrete drop inlets;
- Construction of a concrete outlet structure;
- Construction of gravity outlets to act as energy dissipaters and minimize erosion;
- Installation of pipe and rock level spreaders at the ends of proposed pipelines to return concentrated flows within the

pipe to sheet flow;

- Construction of infield diversion ditches;
- Construction of outsloped infield spreaders;
- Construction of a subsurface drainage pipeline;
- Construction of rock repositories/outsloped turnarounds;
- Repair existing head cutting of a drainage;
- Construction of rock berms;
- Installation of cutoff collars on all solid pipelines with slopes greater than 5 percent;
- Improvement and maintenance of approximately 25 miles of existing roads for year-round access to the project site. Roads will be surfaced with crushed rock as needed;
- All disturbed areas and avenues will be seeded with a permanent no-till cover crop.
- Maintenance of the erosion control measures so they function as intended, and maintenance of the measures throughout the rainy season; and
- Installation of temporary erosion control measures that may include, but are not limited to, straw wattles, waterbars, and other measures, would be constructed as needed.
- Some of the rock generated will be used to construct erosion control features such as rock berms, rock repositories/outsloped turnarounds, gravity outlets and energy dissipaters. Rock will also be used to surface avenues and existing roads where needed. Rock not used immediately will be stockpiled for future use inside the proposed clearing limits. Stockpiles are expected to be less than 20 feet in height.

In order for your comments to be considered, please submit your written comments no later than 4:45 pm on November 24, 2009 to:

Brian Bordona, Supervising Planner
Napa County Conservation, Development and Planning Department
1195 Third Street, Suite 210
Napa, CA 94559
bbordona@co.napa.ca.us

Reviewing Agencies Checklist

Lead Agency:
Napa County, Conservation, Development and Planning Department:
1195 Third Street, Suite 210
Napa, CA 94559
Contact: Brain Bordona, Supervising Planner

Consulting Firm:
Analytical Environmental Services (AES)
1801 7th Street, Suite 100
Sacramento, CA 95811
Contact: Jennifer Aranda

Resources Agency

____	Boating & Waterways
____	Coastal Commission
____	Coastal Conservancy
____	Colorado River Board
_X_	Department of Conservation
_X_	Fish & Game – Bay Delta Region, North Central Region
_X_	California Department of Forestry & Fire Protection
_X_	Office of Historic Preservation
____	Parks & Recreation
____	Reclamation
____	SF Bay Conservation & Development Commission
____	Water Resources (DWR)

Business, Transportation & Housing

____	Aeronautics
____	California Highway Patrol
_X_	CALTRANS District # 4
____	Dept of Transportation Planning (HQ)
____	Housing & Community Development
_X_	Department of Food & Agriculture

State & Consumer Services

____	General Services
____	OLA (Schools)
____	Other
____	Pacific Bell
_X_	United States Army Corp of Engineers
____	Napa Valley School District
_X_	Regional Conservation District
_X_	Pacific, Gas & Electric
____	Postal Service
_X_	U.S. Fish and Wildlife Service
_X_	National Oceanic and Atmospheric Administration

Environmental Affairs

_X_	Air Resources Board (BAAQMD)
____	APCD/AQMD
____	California Waste Management Board
____	SWRCB: Clean Water Grants
____	SWRCB: Delta Unit
_X_	SWRCB: Water Quality
_X_	SWRCB: Water Rights
_X_	Regional WQCB – Region #2 San Francisco
____	Regional WQCB – Region #5 Central Valley

Youth & Adult Corrections

____	Corrections

Independent Commissions & Offices

____	Energy Commission
_X_	Native American Heritage Commission
____	Public Utilities Commission
____	Santa Monica Mountains Conservancy
____	State Lands Commission
____	Tahoe Regional Planning Agency

Health & Welfare

____	Health Services

Checklist Key
S = Document sent by Lead Agency
X = Document sent by SCH
+ = Suggested Distribution

Public Review Period

Starting Date: October 26, 2009

Ending Date: November 24, 2009

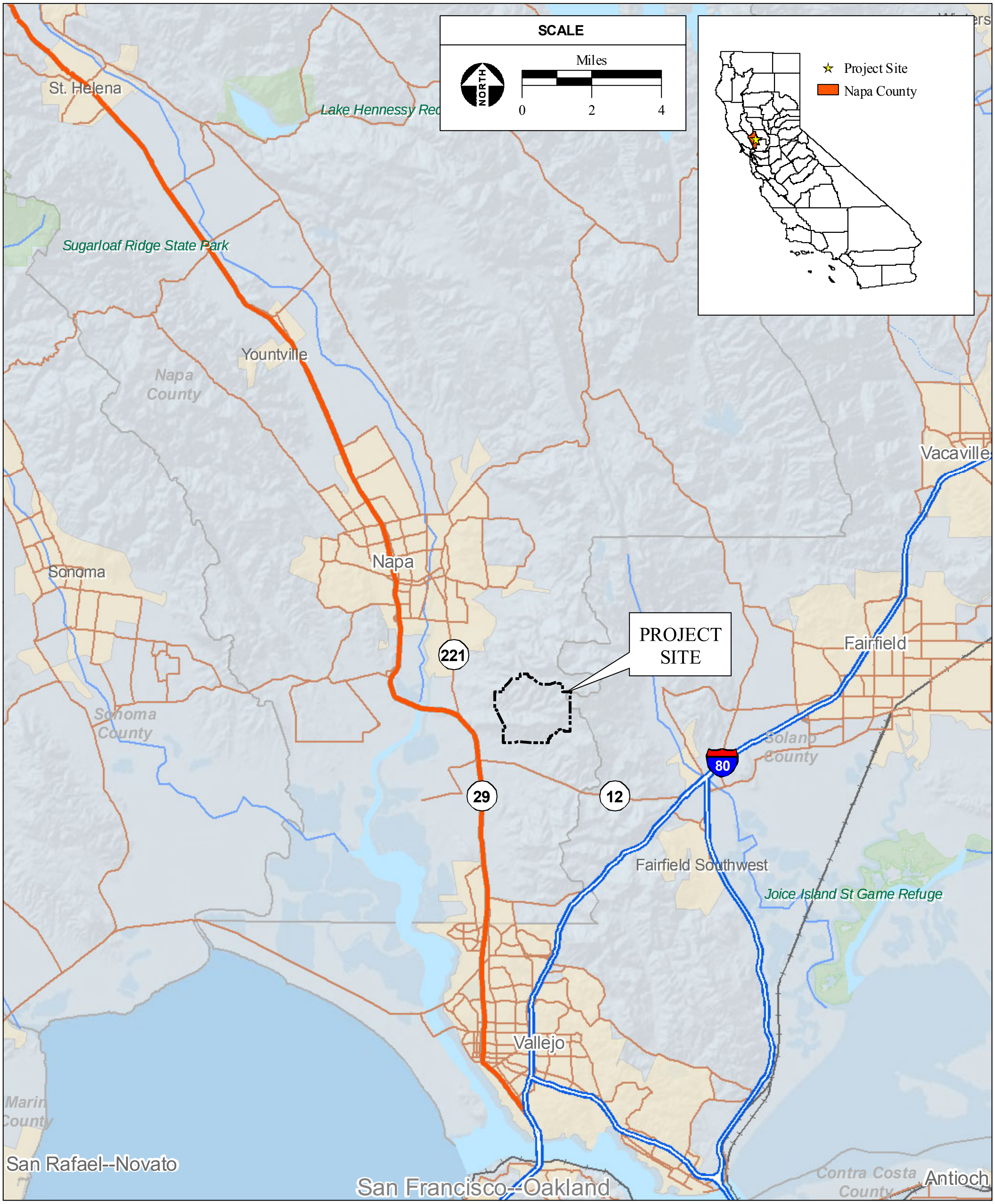
Signature: B. B.

Date: Oct. 22, 2009

For SCH Use Only:
Date Received: ____
Date Review Starts: ____
Date to Agencies: ____
Date to SCH: ____
Clearance Date: ____

Applicant(s):

Silverado Premium Properties Napa Vineyards LLC
855 Bordeaux Way, Suite 100
Napa, CA 94558



SOURCE: ESRI Data, 2006; AES 2009

Suscol Mountain Vineyards #P09-00176-ECPA / 209538 ■

Figure 2-1
Regional Location Map

BAY AREA
RIDGE TRAIL
COUNCIL

RECEIVED

NOV 2 4 2009

NAPA CO. CONSERVATION
DEVELOPMENT & PLANNING DEPT.

24 November 2009

Mr. Brian Bordona
Napa County Conservation,
Development and Planning
1195 Third St., Ste 210
Napa, CA 94559

RE: **Notice of Preparation of a Draft Environmental Impact Report for the Suscol Mountain Vineyards Erosion Control Plan Application**

Dear Mr. Bordona,

I am writing to provide input on the scope and content of the Draft Environmental Impact Report for the Suscol Mountain Vineyards Erosion Control Plan Application #P09-00176-ECPA on behalf of the Bay Area Ridge Trail Council (Ridge Trail Council). We appreciate this opportunity to provide input regarding the proposed project in connection with the Bay Area Ridge Trail (Ridge Trail) in Napa County. To begin with, we appreciate the Initial Study finding that the proposed project would not preclude a future trail corridor within the property.

The Ridge Trail Council is a 501(c)(3) non-profit organization dedicated to completing the Ridge Trail, a continuous public trail on the ridgelines surrounding the San Francisco Bay. As planned, the Ridge Trail will connect open spaces and parklands in the nine Bay Area counties on a 550-mile trail for hikers, equestrians, mountain bicyclists, trail runners, and outdoor enthusiasts of all ages, abilities and incomes. Today over 320 miles are dedicated and we are working to connect up the rest. In Napa County, about 15.5 miles are complete and another 45 miles are being planned. Support for the Ridge Trail comes from a wide range of federal, state, regional and local public agencies, private landowners and community organizations, including many hundreds of volunteers helping to build and maintain sections of the Ridge Trail.

The Bay Area Ridge Trail is formally recognized in a number of adopted plans and policies. The Napa County General Plan calls for the completing the Ridge Trail through Napa County. Policy ROS-15 states "Implement sections of the proposed Bay Area Ridge Trail with the ultimate objective of a continuous regional trail." The General Plan specifically includes Figure ROS-5, "San Francisco Bay Trail and Bay Area Ridge Trail Existing and Proposed Routes," which illustrates the Ridge Trail's proposed alignment in close proximity to the proposed Suscol Mountain Vineyards project area (see attachment, "Napa GP Ridge Trail map ROS 5 map"). Moreover, the Ridge Trail is also referenced in the Napa County Park and Open Space Master Plan, which recommends developing trail access along Napa County's ridges as well as the primary goal of providing opportunities for outdoor recreation (see attachment, "Napa OSD MP map_north").

While the Suscol Mountain Vineyards property is not shown on the maps as being directly on the proposed Ridge Trail alignment, it is within the wider conceptual Ridge Trail corridor. The corridor is designed to take advantage of landowner cooperation on lands in close proximity that fit the geographic Ridge Trail criteria – on ridgelines with views of San Francisco Bay that offer connections between existing and/or proposed Ridge Trail segments. Earlier this year, we met on site with the property owner and had a good preliminary discussion about the possibility of including a future Ridge Trail segment on his property. We were given permission to do some preliminary trail alignment analysis and, based on our initial assessment, we are confident that a trail route compatible with the proposed vineyard development could be found.

Additionally, the parcels that comprise this project have the potential to provide a continuous trail connection between two points – Skyline Wilderness Park, where there is a 4.5 mile dedicated Ridge Trail segment, and Highway 12 in Jameson Canyon where we have proposed Ridge Trail segments which would continue on into Solano County. This is a unique opportunity and we look forward to further discussions and collaboration with the owners as well as with Skyline Park Association, adjacent property owners, Napa open space and recreation planners and trail enthusiasts to create a continuous trail that is compatible with existing and proposed land uses on the property, including the proposed vineyard project.

Generally speaking, a continuous trail corridor also advances goals related to habitat and wildlife corridors. In the Conservation Element – Open Space Conservation Goals and Policies of the Napa County General Plan, Policy CON-1 states, "The County will preserve land for greenbelts, forest, recreation, flood control, adequate water supply, air quality improvement, habitat for fish, wildlife and wildlife movement, native vegetation, and natural beauty." As you consider possible mitigations for the project, please review them in the context of finding opportunities to maximize public objectives for open space, recreation, and habitat protection. Perhaps establishing a public trail easement within or adjacent to the subject project area might be an appropriate mitigation measure, and acceptable to the landowner.

On behalf of the Ridge Trail Council and our numerous supporters, we appreciate the opportunity to provide input. We would be happy to discuss or provide any additional information related to the Ridge Trail. Please do not hesitate to contact me to discuss any aspect of our remarks as they relate to this proposed project.

Sincerely,

Janet McBride

Janet McBride, Executive Director

Attachments: Napa GP Ridge Trail map ROS-5
Napa OSD MP map_north.pdf

CC: Mark Couchman, Suscol Mountain Vineyards
John Woodbury, General Manager, Napa County Parks and Open Space District

Bay Area Ridge Trail
Current and Potential Future Alignment
for Napa County

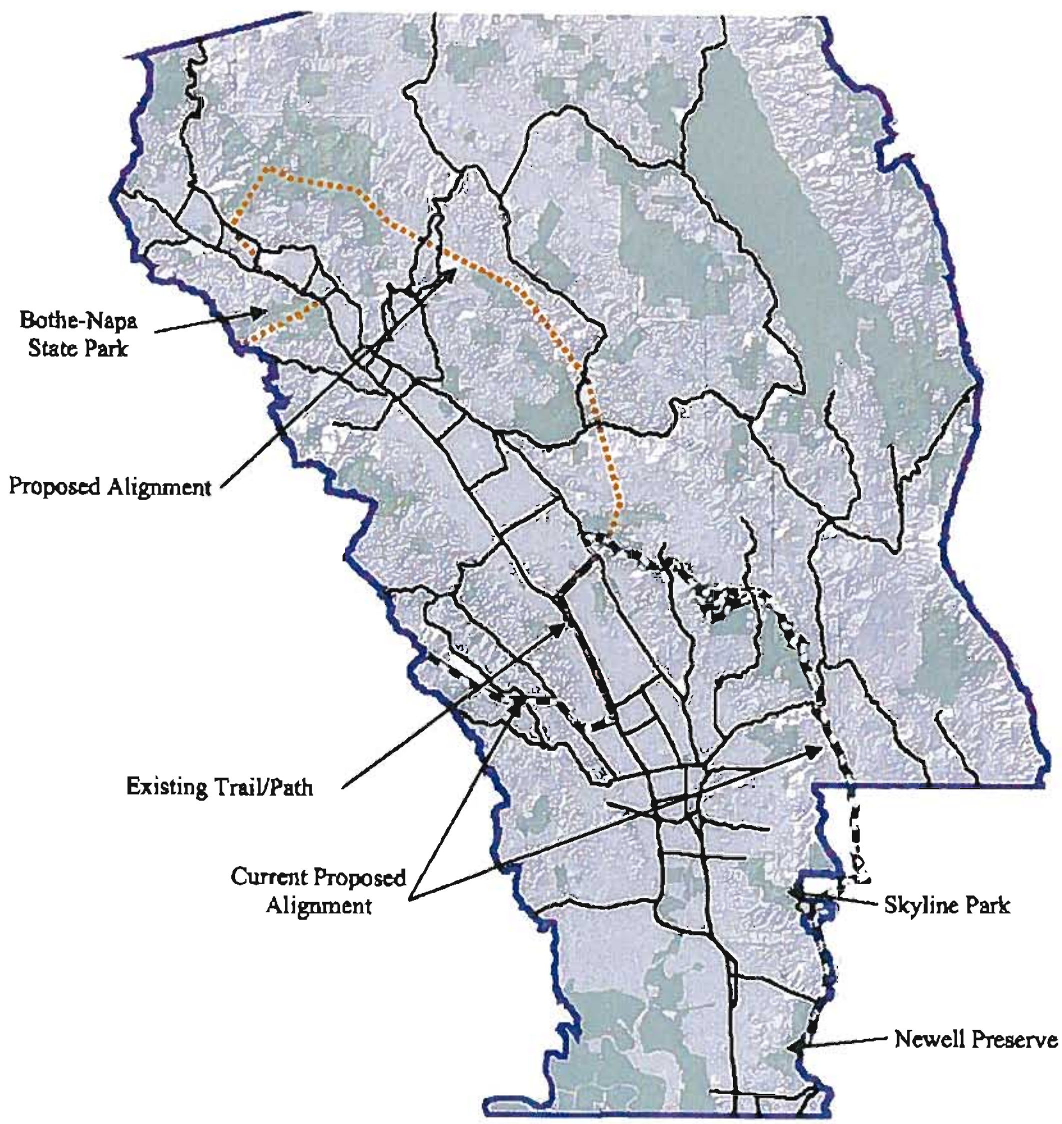
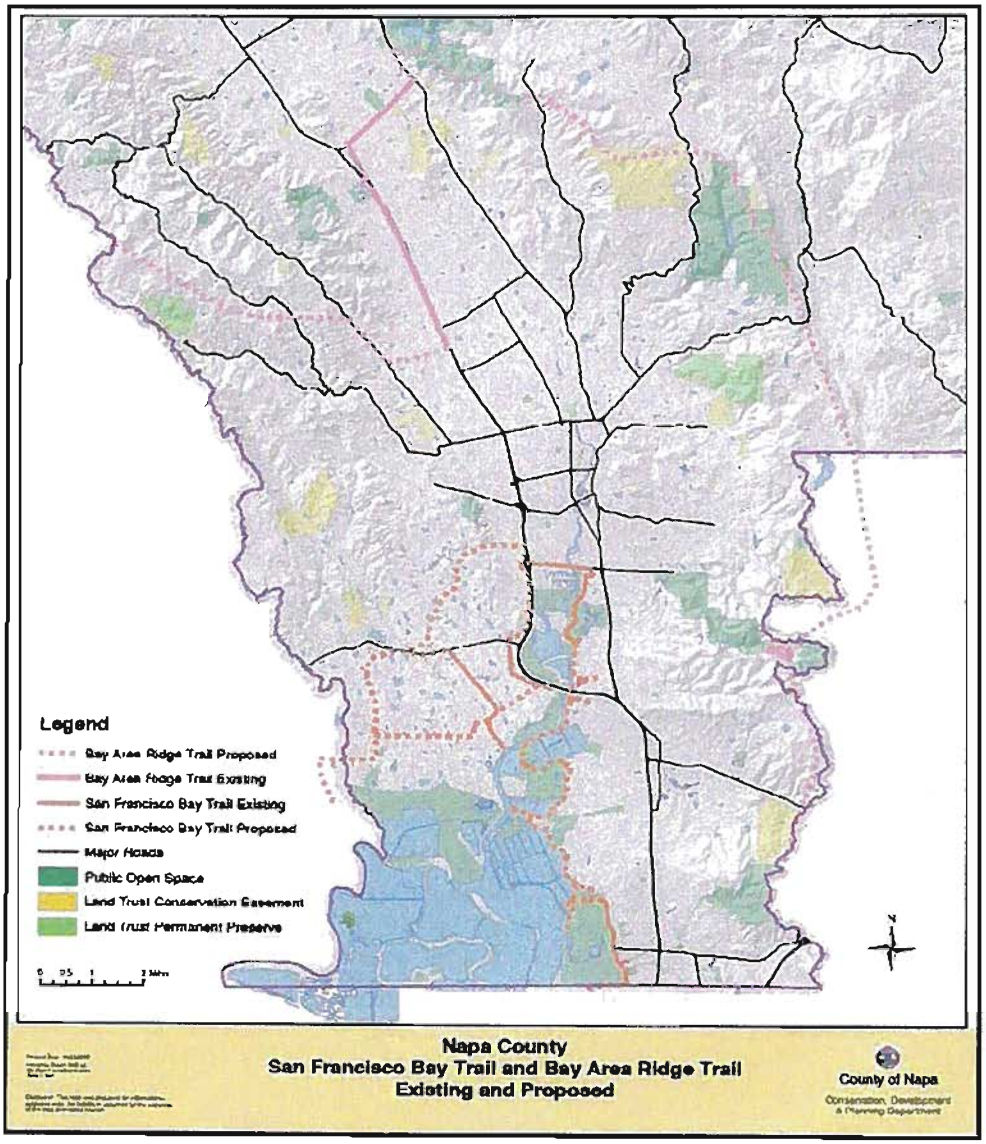


Figure ROS-5: San Francisco Bay Trail and Bay Area Ridge Trail Existing and Proposed Routes



Attachment 1

State of California -TheNatural Resources Agency
DEPARTMENT OF FISH AND GAME
Bay Delta Region
Post Office Box 47
Yountville, California 94599
(707) 944-5500
www.dfg.ca.gov

ARNOLD SCHWARZENEGGER, Governor
JOHN MCCAMMAN, Acting Director

November 23, 2009

Mr. Brian Bordona
Napa County
Conservation, Development and Planning Department
1195 Third Street, Suite 210
Napa, CA 94559

RECEIVED
NOV 25 2009
NAPA CO. CONSERVATION
DEVELOPMENT & PLANNING DEPT.

Dear Mr. Bordona:

Subject: Suscol Mountain Vineyards, Vineyard Conversion Agricultural Erosion Control Plan #P09-00176-ECPA, SCH #2009102079, Napa County

The Department of Fish and Game (DFG) has reviewed the documents provided for the subject project, and we have the following comments.

Please provide a complete assessment (including but not limited to type, quantity and locations) of the habitats, flora and fauna within and adjacent to the project area, including endangered, threatened, and locally unique species and sensitive habitats. The assessment should include the reasonably foreseeable direct and indirect changes (temporary and permanent) that may occur with implementation of the project. Rare, threatened and endangered species to be addressed should include all those which meet the California Environmental Quality Act (CEQA) definition (see CEQA Guidelines, Section 15380). DFG recommended survey and monitoring protocols and guidelines are available at http://dfg.ca.gov/wildlife/nongame/survey_monitor.html.

Please be advised that a California Endangered Species Act (CESA) Permit must be obtained if the project has the potential to result in take of species of plants or animals listed under CESA, either during construction or over the life of the project. Issuance of a CESA Permit is subject to CEQA documentation; therefore, the CEQA document must specify impacts, mitigation measures, and a mitigation monitoring and reporting program. If the project will impact CESA listed species, early consultation is encouraged, as significant modification to the project and mitigation measures may be required in order to obtain a CESA Permit.

For any activity that will divert or obstruct the natural flow, or change the bed, channel, or bank (which may include associated riparian resources) of a river or stream, or use material from a streambed, DFG may require a Lake and Streambed Alteration Agreement (LSAA), pursuant to Section 1600 et seq. of the Fish and Game Code, with the applicant. Issuance of an LSAA is subject to CEQA. DFG, as a responsible agency under CEQA, will consider the CEQA document for the project. The CEQA document should fully identify the potential impacts to the stream or riparian resources and provide adequate avoidance, mitigation, monitoring and reporting commitments for completion of the agreement. To obtain information about the LSAA notification process, please access our website at http://www.dfg.ca.gov/habcon/1600/; or to request a notification package, contact the Lake and Streambed Alteration Program at (707) 944-5520.

If you have any questions, please contact Ms. Corinne Gray, Environmental Scientist, at (707) 944-5526; or Mr. Greg Martinelli, Water Conservation Supervisor, at (707) 944-5570.

Sincerely,

For

Charles Armor
Regional Manager
Bay Delta Region

cc: State Clearinghouse

DEPARTMENT OF TRANSPORTATION
111 GRAND AVENUE
P. O. BOX 23660
OAKLAND, CA 94623-0660
PHONE (510) 622-5491
FAX (510) 286-5559
TTY 711

Flex your power!
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November 24, 2009

NAPVar002
NAP-221-0.623
SCH# 2009102079

Mr. Brian Bordona
Napa County Conservation, Development
and Planning Department
1195 Third Street, Suite 210
Napa, CA 94559

Dear Mr. Bordona:

SUSCOL MOUNTAIN VINEYARDS – NOTICE OF PREPARATION

Thank you for including the California Department of Transportation (Department) in the environmental review process for the Suscol Mountain Vineyards project. The following comments are based on the Notice of Preparation (NOP). As the lead agency, the County of Napa is responsible for all project mitigation, including any needed improvements to states. The project's fair share contribution, financing, scheduling, implementation responsibilities and lead agency monitoring should be fully discussed for all proposed mitigation measures. This information should also be presented in the Mitigation Monitoring and Reporting Plan of the environmental document. Required roadway improvements should be completed prior to issuance of the Certificate of Occupancy. Since an encroachment permit is required for work in the state right of way (ROW), and the Department will not issue a permit until our concerns are adequately addressed, we strongly recommend that the County work with both the applicant and the Department to ensure that our concerns are resolved during the environmental review process, and in any case prior to submittal of a permit application. Further comments will be provided during the encroachment permit process; see the end of this letter for more information regarding encroachment permits.

Traffic Impact Analysis
Please include the information detailed below in the Traffic Impact Analysis (TIS) to ensure that project-related impacts to state roadway facilities are thoroughly assessed. We encourage the County to coordinate preparation of the study with our office, and we would appreciate the opportunity to review the scope of work. The Department's *"Guide for the Preparation of Traffic Impact Studies"* should be reviewed prior to initiating any traffic analysis for the project; it is available at the following website:

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NAPA CO. CONSERVATION
DEVELOPMENT & PLANNING DEPT.

http://www.dot.ca.gov/hq/traffops/developserv/operationalsystems/reports/tisguide.pdf

The TIS should include:

1. Vicinity map, regional location map, and a site plan clearly showing project access in relation to nearby state roadways. Ingress and egress for all project components should be clearly identified. The state ROW should be clearly identified.

2. The maps should also include project driveways, local roads and intersections, parking, and transit facilities.

3. Project-related trip generation, distribution, and assignment. The assumptions and methodologies used to develop this information should be detailed in the study, and should be supported with appropriate documentation.

3. Average Daily Traffic, AM and PM peak hour volumes and levels of service (LOS) on all significantly affected roadways, including crossroads and controlled intersections for existing, existing plus project, cumulative and cumulative plus project scenarios. Calculation of cumulative traffic volumes should consider all traffic-generating developments, both existing and future, that would affect study area roadways and intersections. *The analysis should clearly identify the project's contribution to area traffic and degradation to existing and cumulative levels of service. Lastly, the Department's LOS threshold, which is the transition between LOS C and D, and is explained in detail in the Guide for Traffic Studies, should be applied to all state facilities.*

5. Schematic illustration of traffic conditions including the project site and study area roadways, trip distribution percentages and volumes as well as intersection geometrics, i.e., lane configurations, for the scenarios described above.

6. The project site building potential as identified in the General Plan. The project's consistency with both the Circulation Element of the General Plan the Napa County Transportation and County Agency.

7. *Mitigation should be identified for any roadway mainline section or intersection with insufficient capacity to maintain an acceptable LOS with the addition of project-related and/or cumulative traffic.* The project's fair share contribution, financing, scheduling, implementation responsibilities and lead agency monitoring should also be fully discussed for all proposed mitigation measures.

Please forward at least one hard copy and one CD of the environmental document, along with the TIS, including Technical Appendices, complete plan set (full size), and staff report to the following address as soon as they are available: Sandra Finegan, Associate Transportation Planner, Community Planning Office, Mail Station 10D, California DOT, District 4, P.O. Box 23660, Oakland, CA 94623-0660.

Encroachment Permit
Please be advised that work that encroaches onto the state ROW requires an encroachment permit that is issued by the Department. To apply, a completed encroachment permit

application, environmental documentation, and five (5) sets of plans, clearly indicating state ROW, must be submitted to: Office of Permits, California DOT, District 4, P.O. Box 23660, Oakland, CA 94623-0660. Traffic-related mitigation measures will be incorporated into the construction plans during the encroachment permit process. See the following website link for more information: http://www.dot.ca.gov/hq/traffops/developserv/permits/.

Please feel free to call or email Sandra Finegan of my staff at (510) 622-1644 or sandra_finegan@dot.ca.gov with any questions regarding this letter.

Sincerely,

LISA CARBONI
District Branch Chief
Local Development – Intergovernmental Review

c: State Clearinghouse

E.D.E.N.
Earth Defense for the Environment Now

1370 Trancas West PMB-614, Napa, Ca. 94559, 707-255-7434 Fax. 259-1097
www.edennapa.org

Mission Statement: To conserve, protect and defend earth's deep ecology and biodiversity for a sustainable future and high quality of life for all. We will accomplish this through education, advocacy and science.

Napa County
Conservation, Development & Planning Department
Attn: Brian Bordona, Supervising Planner
1195 Third Street, Suite 210
Napa, CA 94559

November 23, 2009

**Re: Suscol Mountain Vineyard Erosion Control Plan #P09-00176,
Notice of Preparation of Draft Environmental Impact Report Comments**

1. **#2, General Description, Page EC-1:** A total of 1182 trees will be removed by the project. A. Under CEQA provisions neither retaining on-site oak woodlands nor planting oaks are valid CO2 biological emission mitigation measures. Residual on-site oaks can never biologically mitigate for carbon emissions resulting from the woodlands sequestration capacity that is permanently destroyed. Planting oak seedlings is of negligible CO2 mitigation value under Assembly Bill 32 (2020/2050) reduction targets. This absence of value and timeliness are why oak woodlands on-site retention or the planting of oaks do nothing to proportionally mitigate project woodland carbon biological emissions. ...California has designated CO2 emissions a grave human health risk. Consequently, local jurisdictions cannot invoke overriding considerations in determining proportional mitigation for carbon biological emissions due to oak woodlands conversion to non-forest use. It would be an abuse of discretion to declare an inadequately mitigated oak woodland conversion a public benefit when in fact woodland conversion represents a demonstrable public health hazard. The conversion of oak woodlands to non-forest use requires analysis and proportional mitigation for carbon biological emissions. B. The 2007 Intergovernmental Panel on Climate Change declared that loss of forest was contributing to Global Warming. What is the numerical amount of carbon dioxide that has been emitted

by the cutting and/or burning of trees and disturbance of soils? How will the loss be offset to affect a net balance or a net gain? What is the numeric loss of carbon sequestering that the pre project conditions provided compared to the post project conditions?

2. **#3, Natural and Man Made Features, Page EC-2:** Does the man-made reservoir have a permit by the Regional Water Quality Control Board? Is it located on stream or off steam? If so as a condition of this permit the reservoir should be relocated off stream to re-establish natural flow dynamics and sediment flows.
3. **#4, Location and Source of Water, page EC-2:** The County's Fair Use Thresholds Are Not Appropriate Criteria of Significance for Groundwater Impacts. The County's "fair use" thresholds are set forth in the County Planning Department's *Water Availability Analysis: Policy Report* dated August 2003, a copy of which is attached as Exhibit 7. This document describes the procedure for obtaining a groundwater permit and establishes "thresholds" for use of groundwater in each basin. If a new water use is below this threshold, the County assumes that the use will not have a significant adverse effect on the aquifer. In the area where this project is located, the threshold is deemed to be 1 acre foot per acre per year for each acre of land overlying the aquifer and 0.5 acre feet per acre per year for each acre of land overlying the gradient up-slope of the aquifer (i.e., hillside area). Since the property consists of hillside land, the County's assumed "threshold" for the property is 0.3 acre feet per acre per year times 568 acres, or 170.4 acre feet per year. This threshold is not an appropriate criterion for determining whether the project's impacts on groundwater are significant for several reasons. First, it is not based on any actual data relating to the availability or use of groundwater in the area. A 1991 staff report to the Board of Supervisors notes that no "extensive groundwater studies" have been conducted in many areas of the County. Second, the County's threshold does not take into account the fact that many previous owners may be using more than their "threshold" amount of water. As a result, later owners may not be able to use their "threshold" amount, or as in this case, any amount of groundwater, without causing or exacerbating existing significant effects. The DEIR should present information on the actual use of groundwater by other property owners in the area. Third, existing groundwater supplies in the Millike/Sarco/Tulocay water basin is already being depleted despite the County Fair Use Thresholds, yet the County assumes, without any empirical foundation, that groundwater extraction and recharge are in balance. The April 7, 1999 Memorandum from Napa County Planning Department to the Planning Commission regarding a General Plan Amendment relating to groundwater use and the proposed Napa County groundwater ordinance states: "The 1991 study also develops short and long-term projections of water needs among users and regions in Napa County using these figures to balance water needs and supplies for the period 1990 through 2020. The results of this balance reveal substantial long-term inadequacies in supply throughout the county's subareas, although admittedly at present some areas have a short-term surplus." From this study it is reasonable to conclude that as the county's water needs increase in the future, increases in agricultural and rural uses are likely to eliminate any existing groundwater surplus. In sum, the "thresholds" are not based on any empirical analysis of actual groundwater supply or availability.
4. **#5, Soil Types/Soil Series Identified, page EC-2: A.** The Soscol Mountain Vineyard Conversion project has the potential to change the composition of the

sediment delivered to the Napa River system. Shifting the mean diameter of the sediment produced on the parcel to a finer caliber would potentially decrease the permeability of streambed gravel beds which would adversely impact salmon and steelhead habitat. This is especially important since salmon and steelhead are listed species. Typically, sediment control measures are good at capturing coarse sediment but often do not capture all of the finer sediment. Will the project change the sediment characteristics?

5. **# 6, Critical Areas...Serious Erosion Potential or Problems, Page EC-3:** States, "Gilpin Geosciences, Inc. is currently preparing a geologic evaluation of the project which will be submitted upon completion." We ask, completion of what?
6. **#7, Erosion Calculations, Page EC-3 and Appendix C:** PPI Engineering use the Universal Soil Loss Equation to determine sediment flows from Bale Clay Loam, Clear Lake Clay, 134 Fagan Clay Loam, Hambright Rock Outcrop Complex, Rock Outcrop, and Sobrante soil types. Some soils types are named for their rock characteristics. What T values will be given to any of the soils that have their rocks removed? Do these T values allow for the removal of rock which is an integral part of the soil structures?
7. **Figures:** A. No stream map is provided for public review. B. No wildlife corridor map is provided for public review.
8. **Figure 3, Deer Fence Map: A.** It should be stated that the deer fencing should be located only around the vineyard blocks to allow for use, habitat, and wildlife passage and use throughout the property. B. Existing fencing bridges Block 1 and 25 and Blocks 25 and 36 blocks the wildlife corridor. A mitigation is not valid if an existing condition prevents it from being a viable mitigation. The existing fencing between the Blocks should be removed to provide a valid mitigation. C. Wildlife is being excluded from a large grassland area that is fenced off between Blocks 36, 37, 38, 39, 40, 42, 43, 44, 45, and 46. The individual Blocks should be fenced, not entire areas as well as availability to the reservoir to allow for wildlife use, habitat, and for feeding. D. We note that a knoll and a grouping of trees adjacent to Blocks 28 and 29 that is now used by wildlife is also being fenced off. Wildlife should have terrestrial access to the site. E. The upland area and trees and grasslands surrounded by Blocks 30, 31, and 32 should also not be fenced off to allow for wildlife use, habitat, and for feeding.
9. **Figure 4, Rock Disposal Areas:** Will the rock that is to be ripped and removed from the soil be crushed and returned to the fields to prevent sediment transportation or merely dumped forming permanent piles of rocks such as many other vineyard projects? Any temporary rock storage areas should be located in the vineyard panting areas to ensure that the rocks will be used on site.

EDEN

John Stephens
Advisory Chair
707-251-0106

Friends of the Napa River

68 -B Coombs Street, Napa, CA 94559
Phone 707-254-8520
www.friendsofthenapariver.org
info@friendsofthenapariver.org

November 24, 2009

County of Napa Conservation, Development & Planning Department
Attn. Brian Bordona
1195 Third Street
Napa CA 94559
By email: bbordona@co.napa.ca.us

Notice of Preparation of a Draft Environmental Impact Report (DEIR)
Suscol Mountain Vineyards #P09-00176-ECPA

Project Description:

The Suscol Mountain Vineyards Erosion Control Plan (ECP) #P09-00176-ECPA proposes vegetation removal and earthmoving activities on slopes greater than five percent in connection with proposed vineyard development, which includes 444 net acres of vineyard within 568 gross acres disturbed on the approximately 2,123 acre property.

FONR Comments:

Friends of the Napa River (FONR) welcomes the opportunity to review and comment on this Notice of Preparation. We would like to make sure that the following items are addressed in the DEIR:

1. Will the vineyards employ sustainable farming practices?
2. What will be the effects on listed and sensitive species, including CNPS listed plants, Audubon-watch listed birds, and California Protected Species?
3. What will be the effect on Suscol Creek, a known steelhead stream?
4. Will the project be eligible for Certification as Fish-friendly Farming?
5. There should be clear justification for any oak tree removal or removal of other significant trees.
6. Riparian corridors should be maintained, and related setbacks to prevent Pierce's disease should be planned accordingly and clearly shown.

7. Will there be unfenced wildlife corridors for existing fauna?

8. As much as possible the project should minimize the use of infrastructure (e.g., self-contained solar-operated gates).

9. The EIR should include discussion on cumulative effects including:

    a. Aesthetics
    b. Erosion
    c. Water Quality

10. The EIR should address traffic effects including:

    a. Effect on the Syar Industries, both their existing operations and the proposed project expansion.
    b. Effect on the proposed Napa Pipe Project.

Respectfully,
Bernhard Krevet,
President
Friends of the Napa River

(signed)

Roger Hartwell
Advisory Board Member
Friends of the Napa River

Barrella, Donald

From: Bordona, Brian

Sent: Tuesday, November 24, 2009 3:31 PM

To: Barrella, Donald

Subject: FW: GULP scoping comments on Suscol Mountain Vineyards Erosion Control Plan Application No. P09-00176-ECPA

From: susanne von rosenberg [mailto:susanne@gaiainc.com]
Sent: Tuesday, November 24, 2009 3:08 PM
To: Bordona, Brian
Cc: RAGularte@aol.com; gerrigorney@sbcglobal.net; hurley-a@sbcglobal.net; bkimmell@earthlink.net; clhammond2216@sbcglobal.net; CKelly4754@aol.com; Crsimpkinsaia@aol.com; dglaros-mccallum@nvusd.k12.ca.us; eldon@thefiddle.com; fred.swingle@sbcglobal.net; gbennetts@sbcglobal.net; hisehouse@aol.com; gonzalo.mwinc@sbcglobal.net; hrparsley@vom.com; jcsnapa@comcast.net; john@mcjunkinphoto.com; ranchhand22@hotmail.com; KMiller@mmblaw.com; mike@michaelwolfvineyardservices.com; mike_lucas@sbcglobal.net; Rshefrae@aol.com; rszion@yahoo.com; eltisher@gmail.com; itstracies@yahoo.com; tracy@meteorvineyard.com; susan@jobstation.com
Subject: GULP scoping comments on Suscol Mountain Vineyards Erosion Control Plan Application No. P09-00176-ECPA

Dear Brian,
GULP has reviewed the Initial Study for the Suscol Mountain Vineyards Erosion Control Plan (Application No. P09-00176-ECPA) to develop 444 acres of vineyard, requiring the disturbance of over 500 acres of wild lands. The Initial Study states that the project would require an estimated 266 acre-feet/year of groundwater. It is unclear whether this quantity includes both irrigation and frost protection water needs, or just irrigation needs. The application indicates that the vineyards would use the latest agricultural methods, and intends to certify through the fish-friendly farming program. Although the applicant has clearly made an effort to reduce some of the impacts that would be associated with a project of this magnitude, the proposed use of groundwater for irrigation when recycled water is available in close proximity to the site (the spray fields used by Napa Sanitation District are located in the immediate vicinity of the proposed project) reveals a severe lack of commitment to true environmental stewardship. The Initial Study indicates that the project area contains various seeps and springs. Withdrawal of large quantities of groundwater may result in a loss of some of these rare and important habitat features. The EIR must consider an alternative that will rely on recycled water for all or the majority of the water needs for the project. Under CEQA, the project proponent is required to evaluate alternatives that would reduce or eliminate some impacts associated with the project. Furthermore, under State policy, use of potable water for agricultural purposes (groundwater in this area would almost certainly qualify as potable water) is not considered a reasonable use of water if recycled water is available. If the EIR fails to address an alternate water supply that is readily available, it will have failed to perform an adequate analysis of alternatives. The EIR must also fully evaluate the cumulative effects of groundwater withdrawal throughout the various drainages, including Suscol and Marie Creeks. We look forward to seeing the draft EIR.

Please contact me if you have any questions.

Cordially,
Susanne von Rosenberg
Acting President, GULP Committee

Susanne von Rosenberg, P.E.
Principal

GAIA Consulting, Inc.
2168 Penny Lane
Napa, Ca 94559
(707) 253-9456
(707) 253-9673 (fax)
(510) 774-9085 (cell)

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
(916) 657-5390 - Fax

November 17, 2009

Brian Bordona
Napa County
1195 Third Street, Room 210
Napa, CA 94559

RE: SCH#2009102079 Suscol Mountain Vineyards Erosion Control Plan #P09-00176-ECPA; Napa County

Dear Mr. Bordona:

The Native American Heritage Commission (NAHC) has reviewed the Notice of Preparation (NOP) referenced above. The California Environmental Quality Act (CEQA) states that any project that causes a substantial adverse change in the significance of an historical resource, which includes archeological resources, is a significant effect requiring the preparation of an EIR (CEQA Guidelines 15064(b)). To comply with this provision the lead agency is required to assess whether the project will have an adverse impact on historical resources within the area of project effect (APE), and if so to mitigate that effect. To adequately assess and mitigate project-related impacts to archaeological resources, the NAHC recommends the following actions:

- ✓ Contact the appropriate regional archaeological Information Center for a record search. The record search will determine:
  - If a part or all of the area of project effect (APE) has been previously surveyed for cultural resources.
  - If any known cultural resources have already been recorded on or adjacent to the APE.
  - If the probability is low, moderate, or high that cultural resources are located in the APE.
  - If a survey is required to determine whether previously unrecorded cultural resources are present.
- ✓ If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
  - The final report containing site forms, site significance, and mitigation measurers should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure.
  - The final written report should be submitted within 3 months after work has been completed to the appropriate regional archaeological Information Center.
- ✓ Contact the Native American Heritage Commission for:
  - A Sacred Lands File Check. **USGS 7.5 minute quadrangle name, township, range and section required.**
  - A list of appropriate Native American contacts for consultation concerning the project site and to assist in the mitigation measures. **Native American Contacts List attached.**
- ✓ Lack of surface evidence of archeological resources does not preclude their subsurface existence.
  - Lead agencies should include in their mitigation plan provisions for the identification and evaluation of accidentally discovered archeological resources, per California Environmental Quality Act (CEQA) §15064.5(f). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American, with knowledge in cultural resources, should monitor all ground-disturbing activities.
  - Lead agencies should include in their mitigation plan provisions for the disposition of recovered artifacts, in consultation with culturally affiliated Native Americans.
  - Lead agencies should include provisions for discovery of Native American human remains in their mitigation plan. Health and Safety Code §7050.5, CEQA §15064.5(e), and Public Resources Code §5097.98 mandates the process to be followed in the event of an accidental discovery of any human remains in a location other than a dedicated cemetery.

Sincerely,

Katy Sanchez

Katy Sanchez
Program Analyst
(916) 653-4040

RECEIVED
NOV 20 2009
NAPA CO. CONSERVATION DEVELOPMENT & PLANNING DEPT.

CC: State Clearinghouse

Native American Contact
Napa County
November 16, 2009

The Federated Indians of Graton Rancheria
Gene Buvelot
6400 Redwood Drive, Ste
Rohnert Park, CA 94928
coastmiwok@aol.com
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(415) 259-7819 Cell
Coast Miwok
Southern Pomo

Mishewal-Wappo Tribe of Alexander Valley
Earl Couey, Cultural Resources Manager
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Santa Rosa, CA 95402
ecouey.1@netzero.net
707-478-7895
Wappo

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Pomo
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Wappo

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707-566-2291 - fax
Coast Miwok
Southern Pomo

Mishewal-Wappo Tribe of Alexander Valley
Scott Gabaldon, Chairperson
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Middletown, CA 95461
scottg@mishewalwappo.
707-494-9159
Wappo

Suscol Intertribal Council
Charlie Toledo
PO Box 5386
Napa, CA 94581
suscol@i-cafe.net
707 256-3561
707 256-0815 Fax

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed SCH# 2009102079 Suscol Mountain Vineyards Erosion Control Plan #P09-00176-ECPA; Napa County.

NAPA COUNTY
SIERRA
CLUB

P.O. Box 644, Napa, CA 94559-0644

November 24, 2009

RECEIVED
NOV 2 4 2009
NAPA CO. CONSERVATION DEVELOPMENT & PLANNING DEPT

Brian Bordona, Supervising Planner
1195 Third St., Suite 210
Napa, CA 94559

Re: Suscol Mountain Vineyards #P09-00176-ECPA

The DEIR should contain a discussion and quantitative analysis of:

1. 1990 GHG emissions and Carbon sequestration
2. Releases of Methane and Nitrous Oxide from soil ripping
3. Loss of Carbon sequestration from tree removal
4. Emissions related to planting and infrastructure installation
5. Emissions related to ongoing vineyard Operations and Maintenance
6. A projection of 2020 GHG emissions and Carbon sequestration
7. Mitigation measures for Oak Woodland loss (please see the Forest Protection Protocol of the California Air Resources Board).

The DEIR should also discuss the effects of Groundwater use on Suscol Creek. Suscol Creek should have a stream gage installed to monitor stream flow for the life of the project.

Thank you,

Tyler York, Political Chair

Recycled Paper

Barrella, Donald

From: SECGREEN@aol.com
Sent: Wednesday, October 28, 2009 2:56 PM
To: Bordona, Brian
Cc: Barrella, Donald
Subject: Minor mistake

Hi Brian,
At page 3-21, the next to last sentence in Setting, the route of Sheehy Creek is incorrect. Historically, Sheehy did empty into Steamboat Slough. However, 1940 aerial photos reveal that a levee had cut off that outfall. Sheehy outfalls to the Napa River directly through 4 gate valves at Ratto's Landing, or, at about the center of the north side of the treatment ponds.
Thanks, Tyler

APPENDIX B

EROSION CONTROL PLAN AND
EROSION CONTROL PLAN APPLICATION

SPP NAPA VINEYARDS LLC
SUSCOL MOUNTAIN VINEYARDS

EROSION CONTROL PLAN
REVISED AUGUST 2010
ORIGINAL SUBMITTAL APRIL 2009

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SPP NAPA VINEYARDS LLC

SUSCOL MOUNTAIN VINEYARDS

EROSION CONTROL PLAN

REGISTERED PROFESSIONAL ENGINEER
JAMES R. BUSHEY
No. 49931
Exp. 9-30-10
CIVIL
STATE OF CALIFORNIA

REVISED
AUGUST 2010
ORIGINAL SUBMITTAL APRIL 2009

PREPARED BY:

PPI ENGINEERING
2931 SOLANO AVENUE
NAPA, CALIFORNIA 94558
(707) 253-1806

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Revised August 2010

SPP NAPA VINEYARDS LLC
SUSCOL MOUNTAIN VINEYARDS

EROSION CONTROL PLAN

NARRATIVE

1. The nature and purpose of the land disturbing activity and the amount of grading involved.

The Owners, SPP Napa Vineyards LLC, plan to plant approximately 438 acres of new vineyard within 560 acres of cleared land. The property, a portion of the former Kirkland Ranch, is located in southeastern Napa County. Please see Figure 1 in Appendix A for a location map. The property includes four parcels. Figure 2 shows the parcel configuration. Parcel 1 (045-360-008) consists of 163.31 acres; Parcel 2 (045-360-010, 045-360-011) consists of 167.59 acres; Parcel 3 (057-020-076) consists of 161.81 acres; and Parcel 4 (045-360-009, 057-020-077, 057-030-012) consists of 1630.71 acres, for a total of 2123.42 acres per the Napa County Assessors Office.

Land disturbing activities to be accomplished include removing trees and shrubs within the proposed clearing limits, ripping, rock removal, cultivating the soil for planting, seeding cover crop, mulching, trenching for irrigation and drainage pipelines, installation of trellis system and deer fence, laying out the vine rows, planting vines, and installing erosion control measures.

2. General description of existing site conditions, including topography, vegetation and soils.

The site is located in the Arroyo Creek, Cayetano Creek, Central Creek, Fagan Creek, Sheehy Creek, and Suscol Creek watersheds. The elevations in the proposed vineyard areas range from approximately 150 to 1385 feet above mean sea level. The property lies on the USGS Cordelia and Mt. George Quadrangle maps. Ground slopes within the proposed vineyard areas range between 5 and 35 percent. See Appendix D for the slope calculations in individual vineyard blocks. There are small pockets of areas with slopes over 30% in or near the following blocks: 2, 7, 8, 9, 10, 15, 20, avenue between 23 & 24, 23, 24, 30, 32, 34, 36, 37, 39, 41, 42, and 43.

Existing vegetation consists of annual grasses and forbs mixed with shrubs and trees. A total of 1182 trees will be removed as a result of this project. Trees to be removed include 272 bay, 9 buckeye, 8 hollyleaf cherry, 2 eucalyptus, 887 live oak and 4 valley oak. Please see Appendix E for an inventory of trees proposed for removal.

Please see *Biological Survey Reports for the Suscol Kirkland Property* completed by LSA Associates, Inc.

There are no structures on the property. Please see the July 6, 2007 memorandum from LSA Associates, Inc. *A Cultural Resources Constraints Analysis for the Silverado Suscol Project, Near*

Napa, Napa County, California for a discussion of the cultural resources in the vicinity of the project. Also see *Cultural Resources Study, Suscol Mountain Vineyards Erosion Control Plan Project* prepared by Analytical Environmental Services.

Numerous site visits of the property were performed by PPI Engineering personnel during 2008, 2009 and 2010. Photographs of existing site conditions can be found in Appendix B.

3. Natural and man-made features onsite including streams, lakes, reservoirs, roads, drainage, and other areas that may be affected by the proposed activity.

Suscol Creek originates in several springs and unnamed tributaries in the eastern section of the property and runs west across the property. A short section of unnamed tributary flows from the southeastern area of the property into another unnamed tributary that runs along the southeastern property boundary to form Fagan Creek. The blue-line streams on the property are shown on Sheets 2 through 9. The numerous tributaries on the property that meet the Napa County definition of a stream have the appropriate setbacks, determined by slope as outlined in Napa County Conservation Regulation 18.108.025, on Sheets 2 through 9.

There is one man-made reservoir on the property.

LSA Associates, Inc. is preparing a preliminary inventory of wetlands for the property. Areas identified as of the date of printing are shown on the Plan.

There is an existing network of approximately 25 miles of ranch roads throughout the property. The existing road network is sufficient for access to proposed vineyard blocks. The existing roads shall be maintained and surfaced with crushed rock as needed. Please see Figure 6 in Appendix A for the roads which will be used as primary access to the vineyard blocks.

4. Location and source of water for irrigation or other uses.

The proposed water source will be groundwater from existing and proposed wells.

Please see *Hydrogeologic Assessment and Report of Pumping Test for Proposed Suscol Mountain Vineyard Project, Napa County, CA* prepared by Richard C. Slade & Associates

5. Soil types/soil series identified in the Soil Conservation Service (SCS) Napa County Soil Survey.

The USDA – SCS Napa County Soil Survey maps the soils within the project boundary as: Bale Clay Loam, 0-2% slopes; Clear Lake Clay, drained; Fagan Clay Loam, 5-15%, 15-30%, and 30-50%; Hambright-Rock Outcrop Complex, 2-30% and 30-75%; Rock Outcrop; Sobrante Loam, 30-50%; and Water. See Sheets 2 through 9 for location of the soil types as mapped by the USDA.

Rock is expected to be generated as a result of this project. Proposed rock disposal areas are shown on Figure 4 in Appendix A. Some of the rock generated will be used to construct erosion control features such as rock berms and gravity outlets. In many locations rock will be used for rock-filled avenues that will help retain sediment as well as disperse runoff from vineyard blocks (see Detail 3, Sheet 10 and Special Provisions Section 10 for specifications). Rock-filled avenues shall be located as shown on Sheets 2-9 and at the downslope edge of vineyard blocks as determined by the Engineer in the field at the time of construction. The toe of the rock avenue fill slope shall not extend past the proposed clearing limits. Because of the nature of the rock-filled avenues, the proposed block boundary location is conceptual and not exact. Rock not used immediately will be stockpiled for future use inside the proposed clearing limits. Stockpiles are expected to be less than 20 feet in height. Rock may be crushed and used on the existing roads where needed. There will be no export of material from the site. Staging areas shall be located inside of proposed clearing limits. Temporary rock stockpiles shall also be located inside of proposed clearing limits.

6. Critical areas, if any, within the development site that have serious erosion potential or problems.

Please see *Engineering Geologic Evaluation, Suscol Mountain Vineyards, Napa-Vallejo Road and Highway 12, Napa, California* prepared by Gilpin Geosciences, Inc

7. Erosion calculations

The Universal Soil Loss Equation (USLE) spreadsheets for this project are in Appendix C.

8. Proposed erosion control methods including:

a) All drainage systems and facilities, walls, cribbing or other erosion protection devices to be constructed with, or as a part of the proposed work.

A variety of drainage systems will be utilized for erosion control in this project. Rock berms will be used to ensure offsite water remains dispersed and flows across proposed vineyards in sheet flow. At one location an existing rock fence will be maintained to continue its function of runoff dispersal. In other locations diversion ditches will direct runoff to standard and concrete drop inlets. Drainage pipelines and a rock-lined swale will be used to direct runoff to desired locations. Level spreaders, gravity outlets, and rock aprons will be used at pipe outlets to disperse water and prevent concentrated flow from forming and developing gullies. In some locations undisturbed filter strips will be used. Straw wattles will be installed. Please see Sheets 2 through 9 for locations of the above erosion control items. Please see the Detail sheets 10 through 13 and the Special Provisions for details on the erosion control items. Several different types of drop inlets will be used throughout the project as shown on the Plans and Detail sheets. The Project Engineer may substitute one type for another type during construction based on field conditions providing both types have the same capacity.

The final pass with disking equipment shall be performed across slopes to prevent channeling water downhill the first winter after development.

Additional temporary erosion control measures shall be installed as needed.

b) Proposed vegetative erosion control measures including location, type and quantity of seed, mulch, fertilizer and irrigation, timing and methods of planting, mulching and maintenance of plant material and slopes until a specified percentage of plant coverage is uniformly established.

A permanent non-tilled cover crop strategy will be utilized within the proposed vineyard development area. The cover crop will be generated by seeding with the following seed mix: Blando Brome (27.5 lbs/ac.), Zorro Fescue (2.5 lbs/ac.), and Crimson Clover (20 lbs/ac.). Straw mulch will be applied at 3,000 pounds per acre to all disturbed areas. The permanent cover crop will be managed each year such that any areas that have less than the percent vegetative cover specified below will be reseeded and mulched until adequate coverage is achieved.

70% cover in the following blocks: 1, 2, 3A, 3B, 3C, 3D, 4, 5A, 5B, 5C, 6, 8A, 8B, 10A, 10B, 11A, 11B, 11C, 12A, 12B, 12C, 12D, 13, 14, 15A, 15E, 16A, 16B, 17, 18, 19B, 21A, 21B, 21D, 22, 23, 24C, 25, 26A, 26B, 26C, 27A, 27B, 27D, 27E, 28, 29A, 29B, 31A, 34C, 36A, 36B, 36C, 36D, 36E, 37, 38A, 38B, 38C, 39A, 42, 43, 44A, 44B, 45, 46

75% cover in the following blocks: 7, 9A, 9B, 10C, 15B, 15C, 15D, 19A, 20, 21C, 24A, 24B, 27C, 30A, 30B, 30C, 31B, 34A, 34B, 34D, 40, 41

80% cover in the following blocks: 32, 33, 39B

The Owner has the option of using a dwarf barley (or a pre-approved alternative) cover crop in the first 3 years to aid with vineyard establishment. If this option is used, seed shall be applied at a rate of 120 pounds per acre if broadcast seeded or at a rate of 60 pounds per acre if drilled. The cover crop within the vineyard may be disked each spring after April 1 for the first 3 years. Each year the owner chooses to disk, the disked area shall be straw mulched at a rate of 3,000 lbs/acre prior to October 15. The permanent seed mix will be seeded prior to October 15 of the fourth (or earlier) year.

Fertilizer shall be applied as necessary by vineyard management personnel.

Vineyard avenues shall be seeded and mulched to establish a 70% vegetative cover prior to October 15. Avenues having less than 70% cover prior to the rainy season shall be straw mulched each year.

In blocks requiring 75% and 80% vegetative cover, contact herbicides only will be strip sprayed in the vinerows each year for weed management. Contact herbicides shall be applied in spring (no earlier than February 15th) to ensure adequate vegetative cover in the spray strips for the remainder of the rainy season. The width of the spray strip shall be no wider than 1.5'. No strip spraying shall be performed in the following blocks: 3A, 3B, 3C, 9A, 9B, 13, 14, and 39B.

Row spacing in the vineyard blocks will be 6 or 7 feet, however in areas where cross-slope exceeds 15% the owner shall increase the row spacing to 9 feet to ensure there is adequate room for equipment.

The owner has the freedom to further subdivide vineyard blocks within the footprint of the proposed vineyard blocks shown on Sheets 2 through 9 for irrigation and viticulture purposes. The proposed vinerow directions shall not be altered without an approved modification from Napa County.

Irrigation pipelines shall generally be located within roadways, vineyards and vineyard avenues. Where they are not located within these areas, disturbed ground shall be seeded and mulched in accordance with this ECP. Regardless of pipeline location, pipeline trenches located on ground slopes greater than 15% shall be backfilled using imported or select native granular material to a depth of 6 inches above the pipelines such that voids do not form below haunches of pipe. Backfill shall be wheel rolled or otherwise compacted to reduce settlement. Final grading over trenches shall be mounded and water-barred such that water is directed away from trenches. No trees larger than 5" DBH will be removed for location of irrigation pipelines.

Irrigation Plans shall include additional pipeline erosion control measures in critical areas such as where natural topography concentrates surface flows or on steeper ground slopes. Additional measures may include increased compaction requirements and testing and/or the installation of concrete cutoff collars in these critical areas. Erosion control measures to be implemented as part of the irrigation system installation shall be specified by a licensed Civil Engineer and Plans shall be made available to Napa County prior to commencing construction.

As stated in the Napa County Protocol for Re-Planting/Renewal of Approved Non-Tilled Vineyard Cover Crops dated April 12, 2004, when it becomes necessary, either by routine or emergency, to re-establish or renew vineyard cover crop the following measures should be followed:

- Seek professional consultation, including soil nutrient analysis, to determine the reasons for the original cover crop's failure. Adjust soil fertility, irrigation and seed selection accordingly.
- When tillage is necessary, alternate rows should be tilled, seeded, and straw-mulched to effectively accomplish the re-establishment/renewal process over a two-year period.
- Tillage and re-seeding should be conducted in the following manner:
- In year 1, till to prepare seed bed and sow desired cover crop in every other row ("the evens"), leaving the alternate rows ("the odds") untilled and mowed only.
- Mulch all tilled rows having an up and down hill (perpendicular to contour) row direction with 4,000 lbs./acre of loose straw, or approved equivalent, after seeding.
- Tilled rows with cross-slope (parallel to contour) row direction and slope gradients less than 15% may not require straw mulch.
- In year 2, till to prepare seed bed and sow desired cover crop in "odd" rows.
- In year 2, leave "even" rows untilled and mowed only.

- Mulch rows tilled in year 2 as specified above.
- Put all re-establishment measures in place by October 1.
- In year 3, return all rows to non-tilled culture.

9. Stormwater stabilization measures, if the development of the site will result in increased peak rates of runoff that may cause flooding or channel degradation downstream.

Please see *Hydrologic assessment of proposed vineyard conversion, Suscol Mountain Vineyard, Napa County, California* prepared by Balance Hydrologics, Inc

10. An implementation schedule showing the following:

a) The proposed clearing, grading, and/or construction schedule.

DATE	DESCRIPTION
April 1	Commence clearing and tillage operations.
October 1	Erosion control measures installed.
October 15	Seed and mulch all disturbed areas.

b) The proposed schedule for winterizing the site (generally by October 15 of each year the permit is in effect.)

The site shall be winterized and all necessary erosion control measures described in the Erosion Control Plan shall be installed by October 15.

c) The proposed schedule of installation of all interim erosion and sediment control measures, including the stage of completion of such devices at the end of the grading season (generally October 15) of each year the permit will be in effect.

See Item 10a).

d) The schedule for installation of permanent erosion and sediment control devices where required.

See Item 10a).

11. The estimated cost of implementation of the erosion and sediment control measures.

Typical costs for installing erosion control measures as described in this plan range from $5,000 to $20,000 per acre.

SPP NAPA VINEYARDS LLC

SUSCOL MOUNTAIN VINEYARDS

EROSION CONTROL PLAN

S T A N D A R D P R O V I S I O N S

SECTION 1 - SCOPE OF WORK

These specifications cover the construction of the erosion control system for approximately 438 acres of vineyard to be developed by SPP Napa Vineyards LLC.

The drawings numbered 10810901C, Sheets 1 through 13 and these Specifications describe in detail the construction of the complete erosion control system. Requests for further information or clarification of the work to be done can be made to Jim Bushey at the Napa office of PPI Engineering, phone (707) 253-1806.

All costs for the complete construction of the erosion control system must be included in the bid items, since no other payment will be made outside of the bid items. This includes all costs for moving onto and off of the job site, all equipment, tools, materials, labor, fuel, taxes, and incidentals for furnishing and installing the erosion control system.

Surveying adequate for construction will be provided by the Owner, at the Owner's expense. The Contractor will be responsible for preserving construction survey stakes and markers for the duration of their intended use. Any restaking costs or additional survey work requested by the Contractor shall be deducted from the final payment to the Contractor. The Owner does not guarantee that the project being bid will be awarded. The Owner also reserves the right to change the quantities of actual work performed as needed with payment made according to the new quantities at the unit price bid.

SECTION 2 - AUTHORITY OF OWNER AND ENGINEER

The property is owned by SPP Napa Vineyards LLC and their appointed representative shall have the final say in the event of a dispute with the Contractor.

The Owner shall appoint PPI Engineering (PPI) as the Engineer to perform periodic review of the work. PPI Engineering shall report any unsatisfactory work to the Owner. The Contractor shall be responsible for any engineering fees or repair costs associated with bringing the unsatisfactory work into compliance with the Plans and Specifications.

SECTION 3 - CHANGES IN WORK

Materials and the manner of performance of the work performed in this contract shall be according to the Plans and Specifications. Modifications to the Plans or Specifications shall be agreed upon in writing by the Contractor, Owner, and Engineer before the work in question is performed. Materials and construction methods shall be as specified on the Plans and Specifications. The burden of proof that a given material or method constitutes an equivalent to the one specified will rest with the Contractor.

SECTION 4 - UTILITIES

At least two working days prior to beginning any excavation on the project, the Contractor shall contact Underground Service Alert (USA) at 1-800-642-2444 and request field location of all existing utilities.

Certain facilities at the site are existing. The Contractor shall be careful to avoid damaging existing facilities and shall notify the Owner immediately if any damage does occur. The cost of repairing any damage shall be the sole responsibility of the Contractor.

SECTION 5 - PROSECUTION OF THE WORK

Unless otherwise provided, the contract time shall commence upon issuance of a Notice to Proceed by the Owner. The work shall start within ten days thereafter and be diligently prosecuted to completion within the time specified in the Contractor's bid. If weather conditions prevent completion of the project within the specified amount of time, the Owner may extend the completion date of the project.

SECTION 6 - RESPONSIBILITIES OF THE CONTRACTOR

The Contractor agrees that in accordance with generally accepted construction practices, Contractor will be required to assume sole and complete responsibility for job site conditions during the course of construction of the project, including the safety of all persons and property. This requirement shall be made to apply continuously and not be limited to normal working hours. Contractor further agrees to defend, indemnify and hold design professional harmless from any and all liability, real or alleged, in connection with the performance of the work on this project, excepting liability arising from the sole negligence of design professional.

The Contractor shall be responsible for controlling dust and mud generated from construction activities. The Contractor shall not allow dust or mud to obstruct vehicular traffic on County roads or State Highways. The Contractor shall be responsible for cleaning all vehicles prior to leaving the site as required by the California Highway Patrol. The Contractor, at his own expense, shall provide adequate dust control and prevention of mud tracking on roads, and take other preventative measures as directed by the Owner.

The Contractor shall be responsible for following all safety laws that may be applicable. Of particular concern are the trench safety regulations issued by CAL-OSHA. The Contractor alone shall be responsible for the safety of his equipment and methods and for any damage or injury which may result from their failure, improper construction, maintenance, or operation.

The Contractor shall be responsible for installing necessary sediment retention measures to keep sediment from leaving the site if construction activities continue beyond October 1.

The Contractor shall keep the work site clean and free of rubbish and debris throughout the project. Materials and equipment shall be removed from the site as soon as they are no longer necessary or the project is completed.

The Contractor shall also be responsible for ensuring that all permits which are necessary for construction have been obtained and that copies of these permits are maintained onsite at all times.

The Contractor shall, at his own expense, furnish all necessary light, power, pumps, and water necessary for the work.

SECTION 7 - MEASUREMENT AND PAYMENT

Payment shall be made at the unit prices bid according to the actual quantities installed. Measurement of the final quantities shall be the responsibility of the Owner's Engineer.

The Engineer shall periodically observe the project during construction and upon completion of the project any unfinished or unacceptable work observed will be brought to the Contractor's attention verbally and in writing. Final payment will be made upon satisfactory completion of all work items required by these Plans and Specifications.

SECTION 8 - GUARANTEE

In addition to the guarantees from suppliers, the Contractor shall guarantee the work he performs for a period of two years. Any repairs needed to the system within two years of completion due to faulty workmanship or materials shall be promptly repaired at no expense to the Owner. Any costs incurred by the Owner and/or Engineer within two years of completion due to rubbish or debris placed in a trench or other excavation shall be paid by the Contractor.

Unless otherwise provided in writing, payment by the Owner to the Contractor for installation of this system shall constitute acceptance of all provisions in this document by the Contractor.

SPP NAPA VINEYARDS LLC

SUSCOL MOUNTAIN VINEYARDS

EROSION CONTROL PLAN

S P E C I A L P R O V I S I O N S

SECTION 1 - SURFACE DRAINAGE PIPELINES

1.1 GENERAL:

Surface drainage pipelines shall be installed to collect surface runoff at low points throughout the project area and transport it to protected outlets, as shown on the Details.

1.2 MATERIALS:

Surface drainage pipelines shall be constructed of solid corrugated polyethylene pipe (CPP) as shown on the Plans. Corrugated plastic pipe for use as surface drainage pipelines shall meet the standards of ASTM F667 and AASHTO M294, as applicable. Bent or damaged pipe shall not be used in the drainage system and shall be removed from the job site.

Pipe connections shall be made with fittings manufactured by the same manufacturer who made the pipe. All connections shall be securely fastened and the resulting connection shall not have gaps greater than 1/8 inch wide.

Gravel envelope bedding material may be volcanic rock. It shall be free of organic matter, clay, or other material, which could decrease its hydraulic conductivity with time. One hundred percent of the material must pass the 1-1/2" clear square openings. Ninety to one hundred percent must pass through the 3/4" clear square openings. At least 50% must pass through the 3/8" clear square openings. No more than 15% may pass the #20 U.S. Standard Sieve. At least 8% must pass the #60 U.S. Standard Sieve. No more than 3% may pass the #200 U.S. Standard Sieve.

Gravel envelope material may also be a blend of clean hard sand and gravel. It shall be free of organic matter, clay, or other material that would decrease its hydraulic conductivity with time. The material shall be well graded. The coefficient of uniformity (D60/D10) must be greater than 4, and the coefficient of curvature ((D30^2/(D10 x D60)) must be between 1 and 3. One hundred percent must pass the 1/2" clear square openings. No more than 5% may pass the #100 U.S. Standard Sieve. An example of this material would be 80% 3/8 crushed rock and 20% washed concrete sand.

Alternative bedding material may be approved by the Engineer. A sample and sieve analysis of the proposed material must be submitted to the Engineer at least 2 days prior to delivering material to the job site.

It will be the responsibility of the Contractor to remove and dispose of all envelope material not used on the project.

1.3 INSTALLATION:

The Contractor may use a trencher, or drainage plow with vertical soil displacement or backhoe/excavator for the excavation and placement of the surface drainage pipe as dictated by soil conditions. The operator shall be skillful in laying the tubing. Grade control may be established by visual control with grade stakes set no more than 100 feet apart or by laser control with grade stakes set no more than 200 feet apart.

Construction staking shall be provided by the Owner's Engineer. The slope, alignment, and depth of placement of the tubing shall be as shown on the Plans and as staked in the field. A minimum cover of 4.0 feet must be provided, unless otherwise staked in the field by Engineer.

A gradual variation of no more than 0.1 foot from grade will be allowed where slopes are 2% or less. Where slopes are greater than 2%, a gradual variation of no more than 0.2 foot from grade will be allowed. No reverse grade will be allowed. A gradual variation of no more than 1 foot from design alignment is allowed.

Stretching of the tubing should be avoided during installation. No more than 10% stretch will be allowed.

Cobbles and rocks may be present on the project site. The Contractor shall take necessary actions to work around the cobbles and rocks at his own expense.

1.4 BEDDING AND BACKFILL:

Surface drainage piping shall be backfilled with approved gravel envelope material. The trench bottom shall be continuous, firm, relatively smooth, and free of rocks or other objects larger than 1 inch. Bedding shall be provided around the pipe and shall be compacted to 90% in the haunching area.

Rocks or clods shall not be allowed to fall upon or otherwise strike the pipe during any phase of construction. No rocks larger than 6" may be placed within 12" of the pipe.

Final backfill shall be placed and spread in approximately uniform layers to fill the trench completely. Rolling equipment or heavy tampers shall not be used to consolidate backfill.

Where pipe is installed under all-weather roads, backfill shall be Class II Aggregate Base compacted to 90% per ASTM D-1557. Road surface shall be regraded or paved as necessary to match original conditions.

SECTION 2 - CUTOFF COLLARS

2.1 GENERAL:

Cutoff collars shall be installed on all solid pipelines with slopes greater than 5%, as shown in Detail 7, Sheet 10. Spacing between collars shall be as specified in the table below or as staked in the field by the Engineer.

Ground Slope (%)	Spacing (Feet)
0-5	None Required
6-15	200
16 and greater	100

2.2 MATERIALS:

Cutoff collars shall be constructed of Portland Cement Concrete, 3000-psi minimum compressive strength.

The envelope material shall be the same as that specified in Section 1, subsection 1.2, gravel envelope.

2.3 INSTALLATION:

Cutoff collars shall extend a minimum of 1.0 foot into native, undisturbed material on the sides and bottom of the trench and extend 1.5 feet above the top of the pipe. Cutoff collars shall be a minimum of 8 inches thick. A watertight seal shall be formed between the cutoff wall and the pipeline. The wall of the collar shall be poured against undisturbed soil. Backfill shall be placed around wall and hand compacted to ensure no voids are present.

The Contractor shall perforate the pipe with 1/8-inch diameter holes a minimum of 3 feet upstream of the cutoff collar to allow water to infiltrate back into the drainline. This perforated section shall be backfilled with approved envelope material. Gravel envelope shall be a minimum of 3 inches thick on all sides of the pipe.

The Contractor shall take precautions to ensure that concrete does not flow through perforations in amounts that would cause any reduction in flow capacity of pipe.

SECTION 3 – STANDARD DROP INLETS

3.1 GENERAL:

Drop inlets shall be furnished and installed by the Contractor in the locations shown on the plans and as staked in the field by the Engineer, according to Detail 2, Sheet 12. The dimensions of the riser and connector pipeline shall be as shown on the Details. A grate shall be installed over the top of each drop inlet.

3.2 MATERIALS:

Drop inlet risers shall be galvanized, 14 gauge corrugated metal pipe (CMP) of the diameter shown on the Plans and/or Specifications.

Grates shall be Agri Drain Bar Guard or approved equal.

Concrete for the bottom of the inlet shall be Portland Cement concrete, 3000psi minimum compressive strength.

3.3 INSTALLATION:

Standard Drop inlets shall be constructed as shown on the detail sheet and as staked in the field by the Engineer. Connector pipes shall be mortared in place to form a watertight seal. Backfill around the inlet shall be compacted sufficiently by hand or water-jetted such that excessive settlement does not occur.

SECTION 4 – INFIELD DROP INLETS

4.1 GENERAL:

Drop inlets shall be furnished and installed by the Contractor in the locations shown on the plans and as staked in the field by the Engineer, according to Detail 3, Sheet 12. The dimensions of the riser and connector pipeline shall be as shown on the Details. A grate shall be installed over the top of each drop inlet.

4.2 MATERIALS:

Drop inlet risers shall be corrugated polyethylene pipe (CPP) pipe of the diameter shown on the Plans and/or Specifications.

Grates shall be Agri Drain Bar Guard or equal.

The risers shall be connected to the main line with a tee and 4 galvanized hex-head sheet metal screws no longer than 1 inch.

4.3 INSTALLATION:

Infield Drop inlets shall be constructed as shown on the detail sheet and as staked in the field by the Engineer. Connector pipes shall be mortared in place to form a watertight seal. Backfill around the inlet shall be compacted sufficiently by hand or water-jetted such that excessive settlement does not occur.

SECTION 5 – CONCRETE DROP INLETS

5.1 GENERAL:

Concrete drop inlets shall be furnished and installed at the locations shown on the Site Plan and as staked in the field by the Engineer. Concrete drop inlets shall be constructed as shown on Detail 1, Sheet 12 and as described in these Specifications.

5.2 MATERIALS:

Concrete drop inlets shall be Central Precast product or equivalent. Inlets shall be constructed of a precast, reinforced concrete box with drive grate. Box and grate shall be H-20 traffic rated.

Drop inlets shall be placed on an aggregate base pad consisting of Cal Trans Class II Aggregate Base. Connector pipes shall be single-wall solid corrugated polyethylene pipe conforming to Section 1 of these specifications.

Wire mesh for the debris shield shall be ¼” x ¼” galvanized hardware cloth or an engineer approved alternative.

5.3 INSTALLATION:

Upon completion of the excavation for the drop inlet, a 6-inch thick pad of Class II Aggregate Base shall be placed on the bottom of the excavation. Aggregate base shall be compacted to 90% relative compaction.

The drop inlet shall be placed plumb and level and square with any adjacent fence or avenue. The lip of the inlet shall conform to the natural grade elevation or as directed in the field by the Engineer. Pipe connections and all other openings shall be grouted to form a watertight seal. Backfill around the inlet shall be water jetted or otherwise placed and compacted to prevent excess settlement of backfill.

A debris shield shall be constructed to prevent loose debris and sediment from clogging the drop inlet grate. The shield shall be constructed as shown on the Details. The shield shall be installed between the inlet grate and the concrete drop inlet frame. The wire mesh shall extend approximately 2 inches above the top of the inlet grate.

SECTION 6 - GRAVITY OUTLET

6.1 GENERAL:

A gravity outlet will be constructed as an energy dissipater to minimize erosion down stream at the locations shown on the Site Plan. The gravity outlet shall be installed and constructed as directed in the field by the engineer and as shown on Detail 2, Sheet 10.

6.2 MATERIALS:

The gravity outlet shall be constructed of Corrugated Polyethylene Pipe (CPP) as described in these specifications. The outlet shall be of the same diameter as the pipeline. Rip-rap shall be field stone conforming to the size specification shown on the detail. Rodent guards shall be manufactured by Agri Drain Corporation of Adair, Iowa or approved alternate.

6.3 INSTALLATION:

The gravity outlet shall be installed at the locations shown on the Plan and as staked in the field by the Engineer. Rip-rap shall be placed at the outlet of the pipe to protect the bank from erosion. The rodent guard shall be installed at the end of the pipe per the manufacturer's specifications.

SECTION 7 – PIPE LEVEL SPREADER

7.1 GENERAL:

Pipe Level Spreaders will be installed at the ends of the proposed pipelines as shown on the Site Plan and Detail 4, Sheet 10. The level spreaders will be installed on the contour to return concentrated flows within the pipe to sheet flow. The length of the spreader shall be as shown on the chart on the detail.

7.2 MATERIALS:

Dual wall corrugated polyethylene pipe (CPP) will be used for the spreaders. The ends of the pipe will be capped with fittings from the same manufacturer as the pipe.

7.3 INSTALLATION:

A 2 inch deep trench will be excavated on the contour to help keep the pipe level. 3/4-inch crushed rock will be spread in the trench to aid in the leveling process and to secure the pipe.

End caps will be fastened to the ends of the pipe and secured with screws and a 2 foot long section of #6 rebar or tee posts as shown on the detail.

12 inch slots will be cut into the dual wall pipe 12 inches apart along the entire length of each pipe. The slots will be cut such that they are level and at the same elevation to assure water flows out of the pipe uniformly. Tee posts shall be installed as shown on the detail and the pipe securely fastened to the posts with wire or an alternate method approved by the Engineer.

SECTION 8 – PIPE 34-5 GRAVITY OUTLET

8.1 GENERAL:

A gravity outlet structure will be constructed at the end of the pipe run 34-5 in Block 34 as shown on the plans, in Detail 1, Sheet 10, and as staked in the field by the engineer. This structure will be used to dissipate energy and prevent erosion.

8.2 MATERIALS:

Rip-rap shall conform to Cal-Trans Class Light. The rip-rap may be on-site fieldstone. Rodent screen shall be Agri-Drain or equal. Filter fabric shall be Mirafi 140-N or equal.

8.3 INSTALLATION:

A rock apron shall be constructed from the end of the pipe downslope to the bottom of the topographic depression. The apron shall be a minimum of 10 feet wide and shall conform to original grade. The footprint of the apron shall be excavated to a depth of at least 12 inches and lined with filter fabric. Rock shall be placed in the excavation up to the elevation of the original ground surface. Spoils from excavation of the apron shall be used as needed to increase cover on the pipe. Where cover is less than 2 feet, the pipe shall be protected from vehicle traffic using tee posts or other approved method.

SECTION 9 - IN-FIELD DIVERSION

9.1 GENERAL:

An in-field diversion shall be constructed in Blocks 32 and 34D at the locations shown on the Site Plan as shown on Detail 4, Sheet 11.

9.2 MATERIALS & INSTALLATION:

The diversion shall be constructed of native material. Organic matter shall be thoroughly incorporated prior to construction.

The diversion shall be staked by the Owner's Engineer on a grade of 4%. Material for construction of the fill portion of the diversion shall be generated by removing a thin wedge of soil on both the uphill and downhill sides of the diversion and compacting it in place as shown on the detail. This wedge will typically be a few inches thick at the extreme uphill and downhill ends and increase to approximately 8 - 10 inches near the fill. Length of the wedge will typically be about 20 feet both uphill and downhill. These typical dimensions may need to be adjusted to ensure the proper amount of fill is available for construction of the diversion. Longer lengths and shallower depths may be required to ensure farming equipment can safely drive over the diversion without damage.

Fill material should be moisture conditioned and compacted using wheeled equipment or other means as approved by the Engineer. In the event water is not available, the diversion may be "overbuilt" to allow for settlement over the winter. In this case installation of trellis system must be delayed until after April 1 of the following year to allow the diversion to be re-shaped as necessary following settlement.

SECTION 10 – ROCK REPOSITORY/OUTSLOPED TURNAROUND

10.1 GENERAL:

Rock repositories/outsloped turnarounds will be constructed along the field edges from excess fieldstone as staked in the field by the engineer and as shown on the plans and Detail 3, Sheet 10. Additional locations to those shown on Sheets 2 through 9 will be determined in the field by the Engineer during construction.

10.2 MATERIALS AND INSTALLATION:

Field rock generated by ripping and/or blasting within the vineyard areas shall be used to construct outsloped avenues at the edges of certain vineyard areas. Vegetation shall be thoroughly incorporated and a bench cut as shown on the details. Rock shall be placed and shaped using a bulldozer, with smaller rock placed last (on top of the avenue) to the extent possible. The toe of the fill slope shall not extend past the clearing limits.

SECTION 11 – HEADCUT & GULLY REPAIR

11.1 GENERAL:

Headcutting and formation of an eroded gully occurs below the proposed pipeline in Block 41. To prevent further headcutting and/or downcutting the contractor will repair these cuts as shown on the details and as staked in the field by the engineer.

11.2 MATERIALS AND INSTALLATION:

Headcutting and formation of an eroded gully has occurred below the proposed pipeline location in Block 41. To repair this gully and prevent further downcutting rock shall be placed in the gully up to the headcut shown on Detail 5, Sheet 10 and as staked in the field by the engineer. Rock shall be 2" - 12" diameter fieldstone generated on the project site.

SECTION 12 - DIVERSION DITCH

12.1 GENERAL:

Vineyard avenues along the uphill side of certain blocks will be constructed with a diversion ditch along the uphill side to collect upslope runoff and direct it to a stable outlet or drop inlet.

12.2 MATERIALS & INSTALLATION:

The ditch shall be cut into native material. Side slopes of the ditches shall be 2:1 (Horizontal:Vertical) as shown on Detail 5, Sheet 11. The ditch shall be a minimum of 18 inches deep and shall be lined with 4 to 8 inch diameter angular rock. A non-woven filter fabric (Mirafi 140N or equal) shall be placed between the ground surface and the rock. The rocks shall be keyed into the sides of the ditch such that they do not obstruct or reduce the cross section of the channel. The ditch will outlet to a Drop Inlet or rock energy dissipator.

SECTION 13 - ROCK BERM AND ROCK LINED SWALE

13.1 GENERAL:

A rock berm will be placed above Block 3D to direct high flows to a rock-lined swale.

13.2 MATERIALS AND INSTALLATION:

Both the Rock Berm and Rock Lined Swale shall be constructed of field stone generated by ripping the vineyard area. The Berm shall be a minimum of 2 feet high and a maximum of 10 feet high with 2:1 side slopes as shown on Detail 4, Sheet 12. The Rock Lined Swale shall be shaped as necessary to substantially conform to the cross section shown in Detail 5, Sheet 12 and lined with 3 inch to 6 inch diameter field stone.

SECTION 14 – OUTSLOPED INFIELD LEVEL SPREADER

14.1 GENERAL:

Outsloped infield level spreaders shall be constructed in Blocks 27C and 27D and as shown in Detail 7, Sheet 11. The level spreaders will be constructed on the contour to prevent surface flows through the vineyard areas from becoming concentrated.

14.1 CONSTRUCTION:

The outsloped infield level spreaders shall be constructed using a bulldozer. The level spreaders will be constructed on the contour following ripping, rock removal and smoothing of the field. The level spreaders shall be constructed as shown in Detail 7, Sheet 11. Soil for fill material shall be moisture conditioned as necessary and compacted as directed by the Engineer using only the buldozer tracks to prevent over-compaction. Cut and fill slopes shall be seeded in the same manner as the vineyard.

SECTION 15 - PERFORATED SUBSURFACE DRAINS

15.1 MATERIALS:

Corrugated plastic pipe for use as drain tubing shall meet the standards of SCS 606 Specifications. In addition, all four and six inch diameter tubing shall meet the standards of ASTM F405, and all tubing eight inches and larger shall meet the standards of ASTM F667. All perforations in the tubing shall be free of tag ends.

Bent or damaged tubing shall not be used in the drainage system and shall be removed from the job site.

Pipe connections shall be made with fittings manufactured by the same manufacturer who made the pipe. All connections shall be securely fastened and the resulting connection shall not have gaps greater than 1/4 inch wide.

15.2 GRAVEL ENVELOPE:

Two materials are permissible for use as an envelope material.

Gravel envelope material may be volcanic rock. It shall be free of organic matter, clay, or other material which could decrease it's hydraulic conductivity with time. One hundred percent of the material must pass the 1-1/2" clear square openings. Ninety to one hundred percent must pass through the 3/4" clear square openings. At least 50% must pass through the 3/8" clear square openings. No more than 15% may pass the #20 U.S. Standard Sieve. At least 8% must pass the #60 U.S. Standard Sieve. No more than 3% may pass the #200 U.S. Standard Sieve.

Gravel envelope material may also be a blend of clean hard sand and gravel. It shall be free of organic matter, clay, or other material that would decrease its hydraulic conductivity with time. The material shall be well graded. The coefficient of uniformity (D60/D10) must be greater than 4, and the coefficient of curvature ((D30^2/(D10 x D60)) must be between 1 and 3. One hundred percent must pass the 1/2" clear square openings. No more than 5% may pass the #100 U.S. Standard Sieve. An example of this material would be 80% 3/8 crushed rock and 20% washed concrete sand.

For perforated drains, the envelope must be at least 3 inches thick on the sides and below the tubing and shall extend above the tubing to the depth specified in the tubing schedule. The loader operator shall avoid scooping up soil or other debris with the envelope material while loading the hopper on the trencher or plow and while placing the envelope material in trenches excavated by backhoe.

It will be the responsibility of the Contractor to remove and dispose of all envelope material not used on the project.

A sample of the proposed gravel envelope material shall be provided to the Engineer for approval. Any material moved onto the job site which is deemed unacceptable by the Engineer shall be promptly removed from the site at no cost to the owner.

15.3 TRENCHING AND TUBING PLACEMENT:

The Contractor may use a trencher, or drainage plow with vertical soil displacement, or backhoe/excavator for the placement of the tubing as dictated by soil conditions. The operator shall be skillful in laying the tubing. Grade control may be established by visual control with grade stakes set no more than 100 feet apart, or by laser control with grade stakes set no more than 200 feet apart.

Construction staking shall be provided by the Owner's Engineer. The slope, alignment, and depth of placement of the tubing shall be as shown on the Plans and as staked in the field.

A gradual variation of no more than 0.1 foot from grade will be allowed where slopes are 2% or less. Where slopes are greater than 2%, a gradual variation of no more than 0.2 foot from grade will be allowed. No reverse grade will be allowed. A gradual variation of no more than 1 foot from design alignment is allowed.

Rocks or clods shall not be allowed to fall upon or otherwise strike the tubing during any phase of construction.

Stretching of the tubing should be avoided during installation. No more than 10% stretch will be allowed.

SECTION 16 - TEMPORARY MEASURES

16.1 GENERAL:

Temporary erosion control measures shall be constructed by the Owner. These measures will include straw wattles, waterbars, and other practices as needed. The measures shall be constructed in conformance with the detail drawings and maintained in a functional condition throughout the rainy season.

SECTION 17 - MAINTENANCE

17.1 GENERAL:

The erosion control measures described in these specifications and shown on the plans and details require regular maintenance in order to function as intended. Vineyard management personnel shall assure that the erosion control measures are monitored throughout the rainy season each year and necessary repairs and/or maintenance are performed immediately. Maintenance operations shall include, but not be limited to the following activities.

17.2 DROP INLETS:

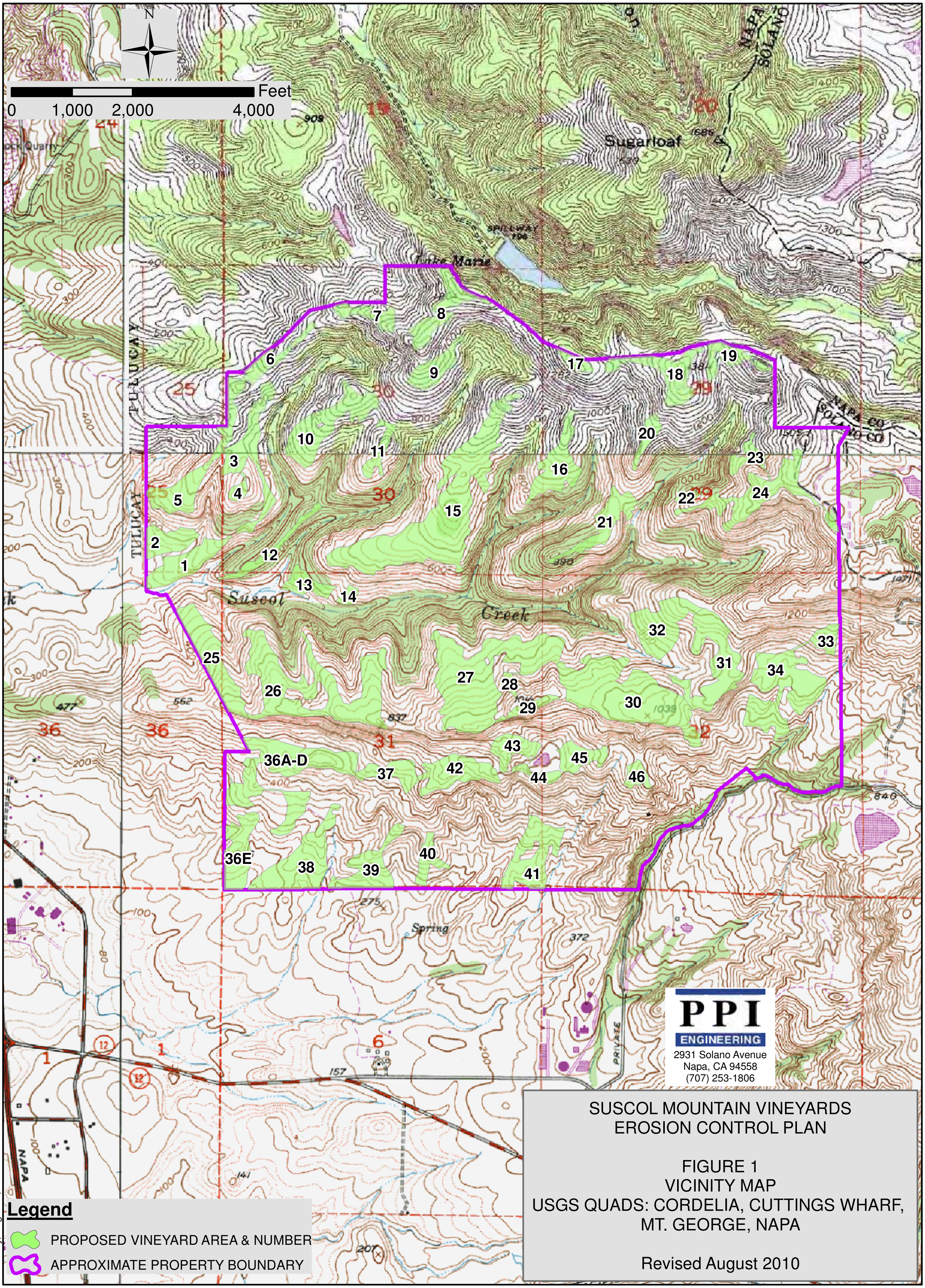
All of the drop inlets are designed with trash grates. Debris shall be removed from the trash grates after each storm event or as necessary to assure a clear flow path for water entering the drop inlet. Damaged trash grates shall be repaired immediately in order to assure that unacceptable quantities of debris do not enter the storm drainage piping system.

17.3 IN-FIELD DIVERSION:

The diversion shall be maintained to the extent possible throughout the year. The diversion shall be inspected annually prior to the rainy season in order to ensure that no major damage has occurred. The diversion shall be cleaned of debris and repaired annually such that there is a minimum flow depth of 1.0 foot.

APPENDIX A

SUPPORTING FIGURES

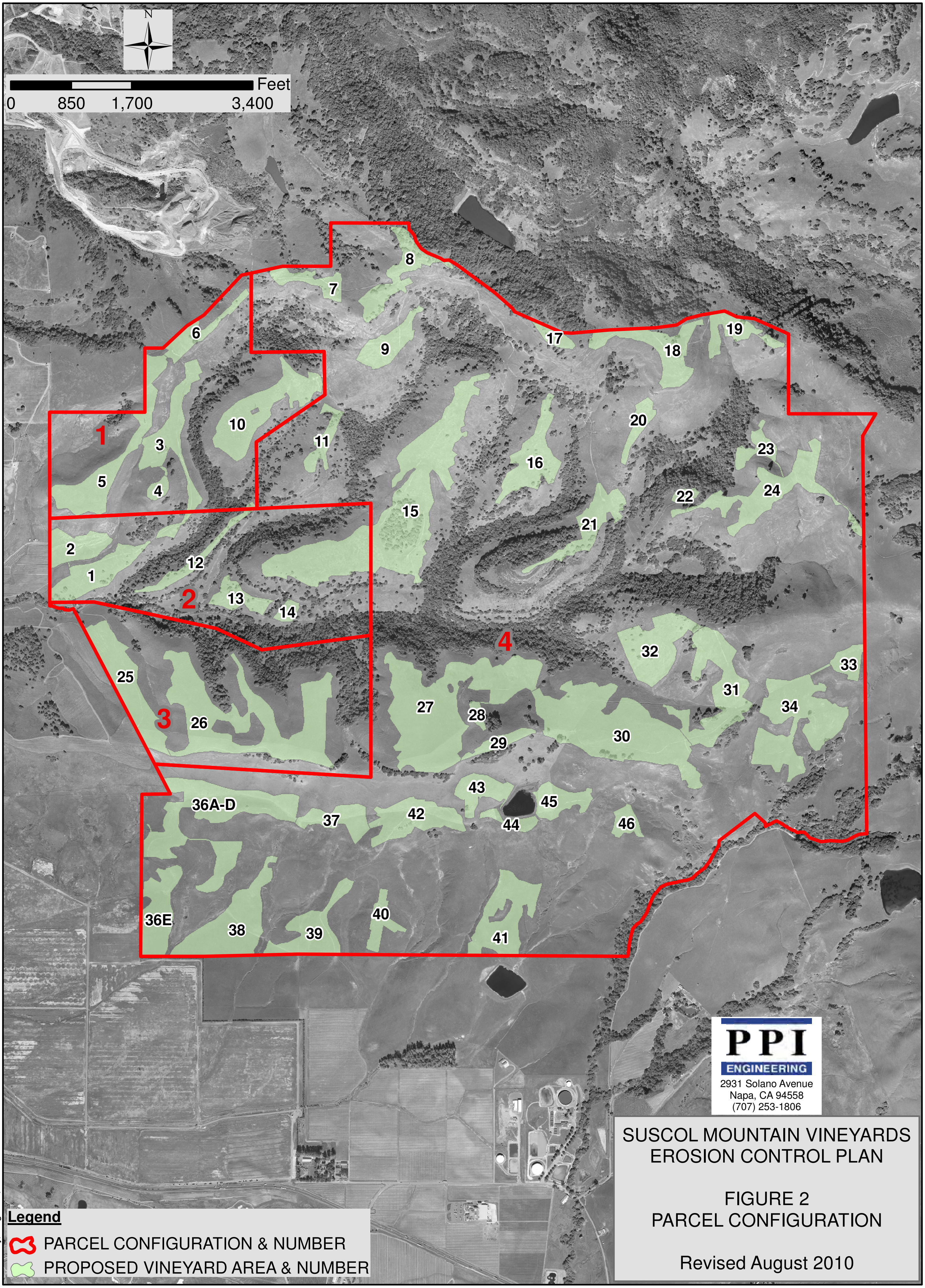


SUSCOL MOUNTAIN VINEYARDS
EROSION CONTROL PLAN

FIGURE 1
VICINITY MAP
USGS QUADS: CORDELIA, CUTTINGS WHARF, MT. GEORGE, NAPA

Revised August 2010

Tuesday, August 3, 2010 12:14:01 PM R:\SPPSMV\IMAGES\MAPS IN ECP\REVISED ECP C DRAWING MAPS\FIG 1 VICINITY MAP revised 8-10.mxd



Tuesday, August 3, 2010 12:17:10 PM R:\SPPSMV\IMAGES\MAPS IN ECP\REVISED ECP C DRAWING MAPS\FIG 2 APN revised 8-10.mxd

PPI
ENGINEERING
2931 Solano Avenue
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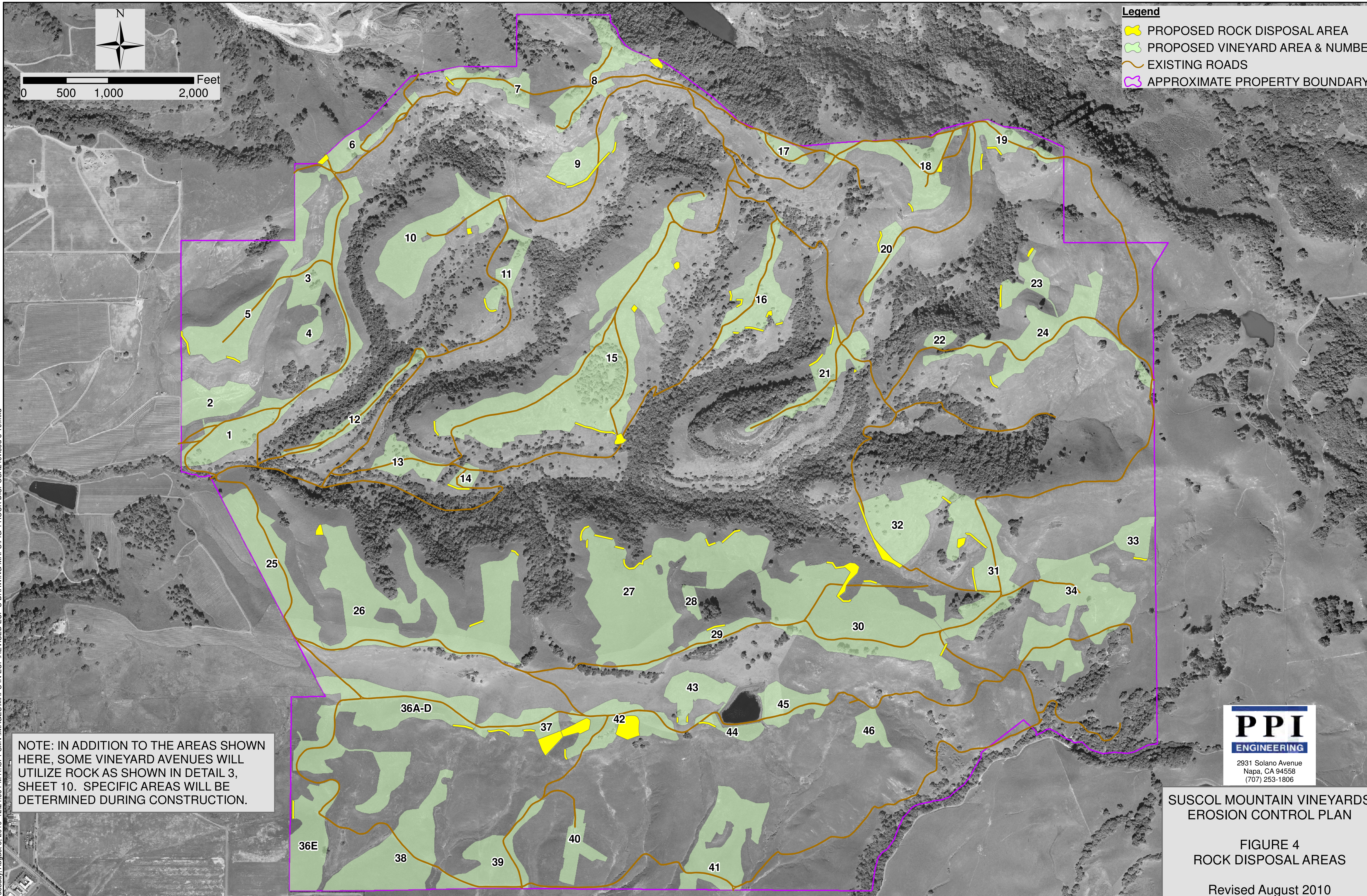
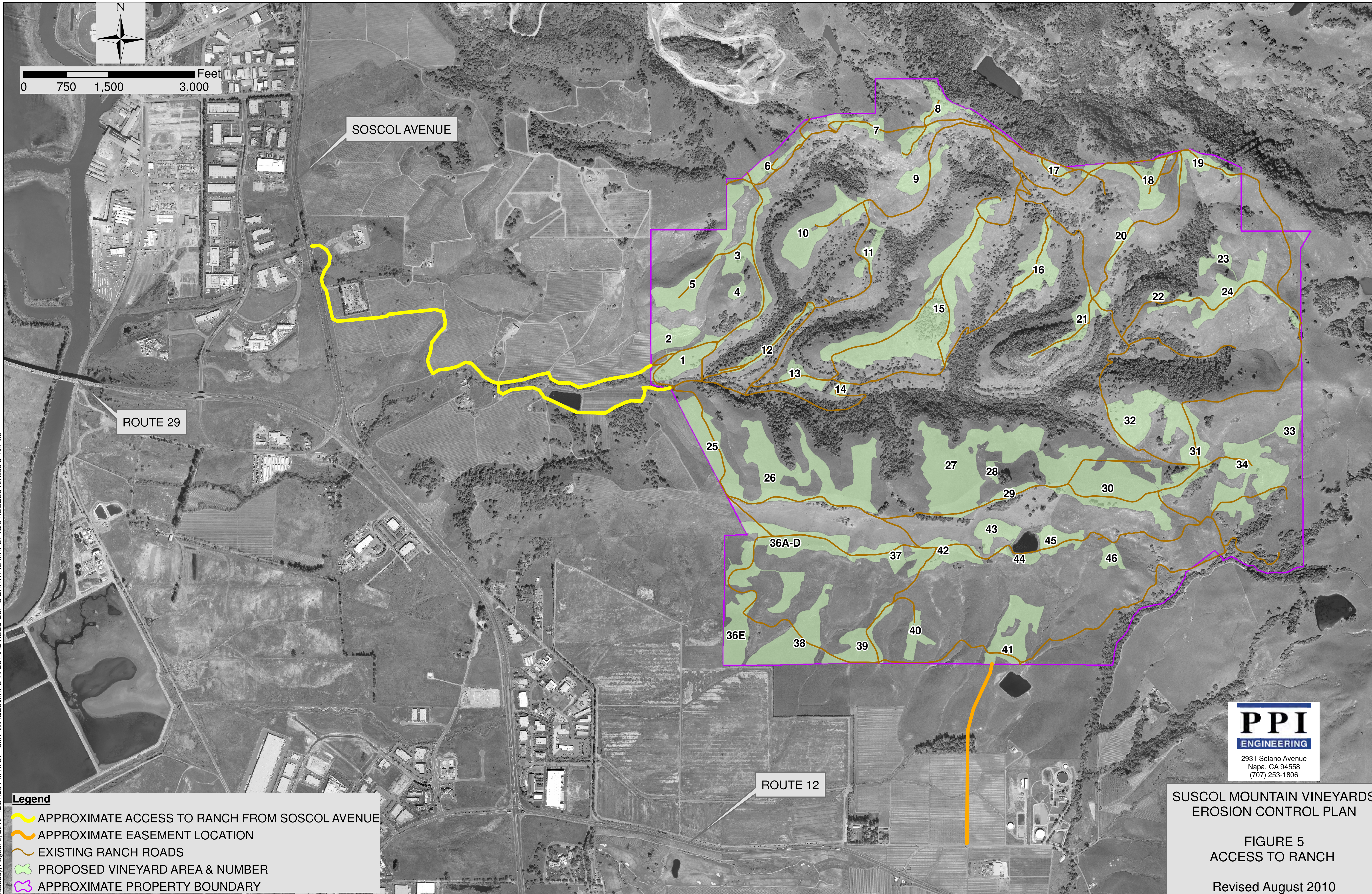
SUSCOL MOUNTAIN VINEYARDS
EROSION CONTROL PLAN

FIGURE 3
DEER FENCE MAP

Revised August 2010



Tuesday, August 3, 2010 12:24:06 PM R:\SPPSMV\IMAGES\MAPS IN ECP\REVISED ECP C DRAWING MAPS\FIG 4 ROCK DISPOSAL revised 8-10.mxd



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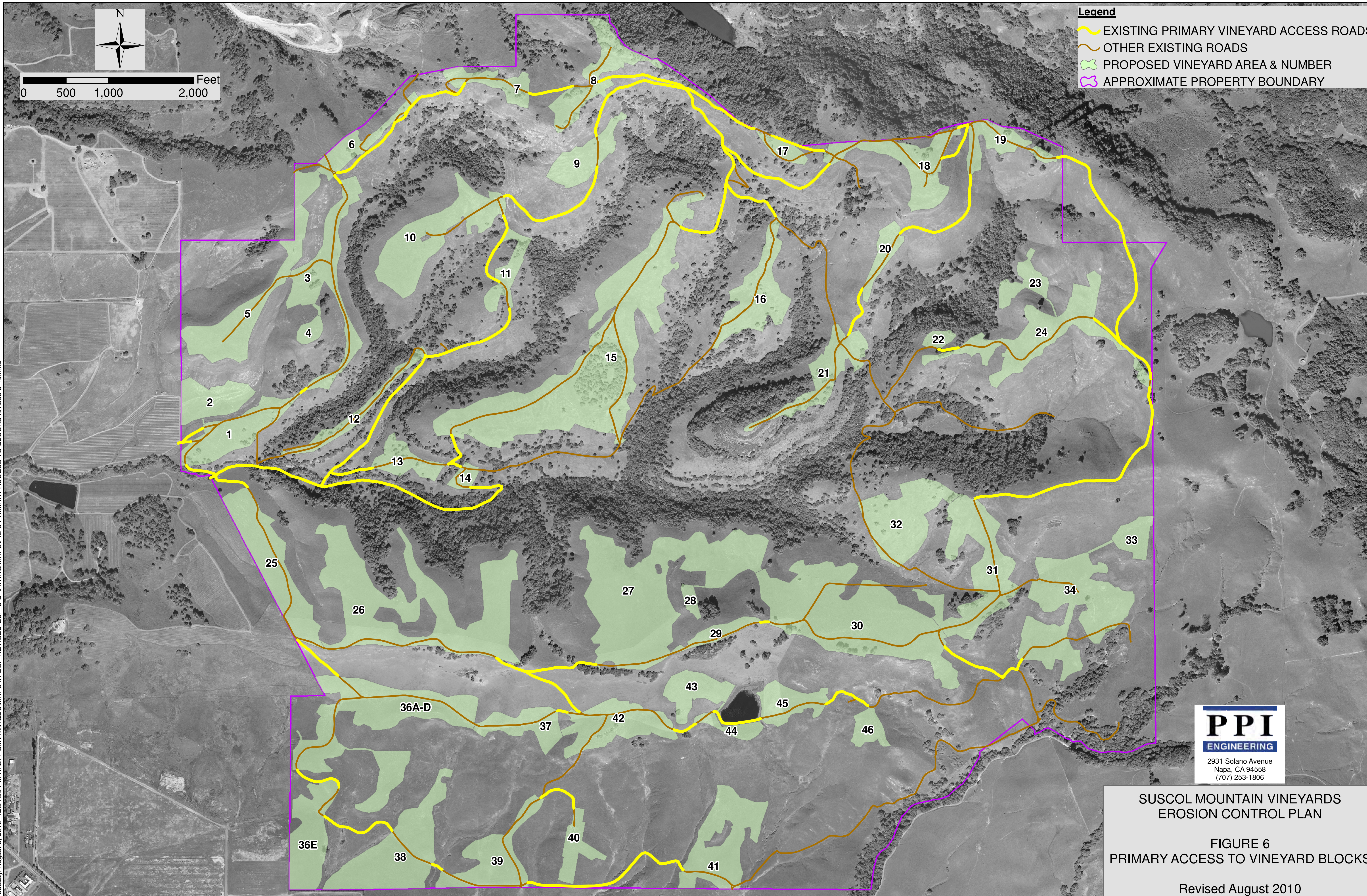

Tuesday, August 3, 2010 12:34:55 PM R:\SPPS\MV\IMAGES\MAPS IN ECP\REVISED ECP C DRAWING MAPS\FIG 6 PRIMARY ACCESS TO VINEYARD BLOCKS revised 8-10.mxd

APPENDIX B

PHOTOGRAPHIC DOCUMENTATION

10/14/09

PHOTO 1

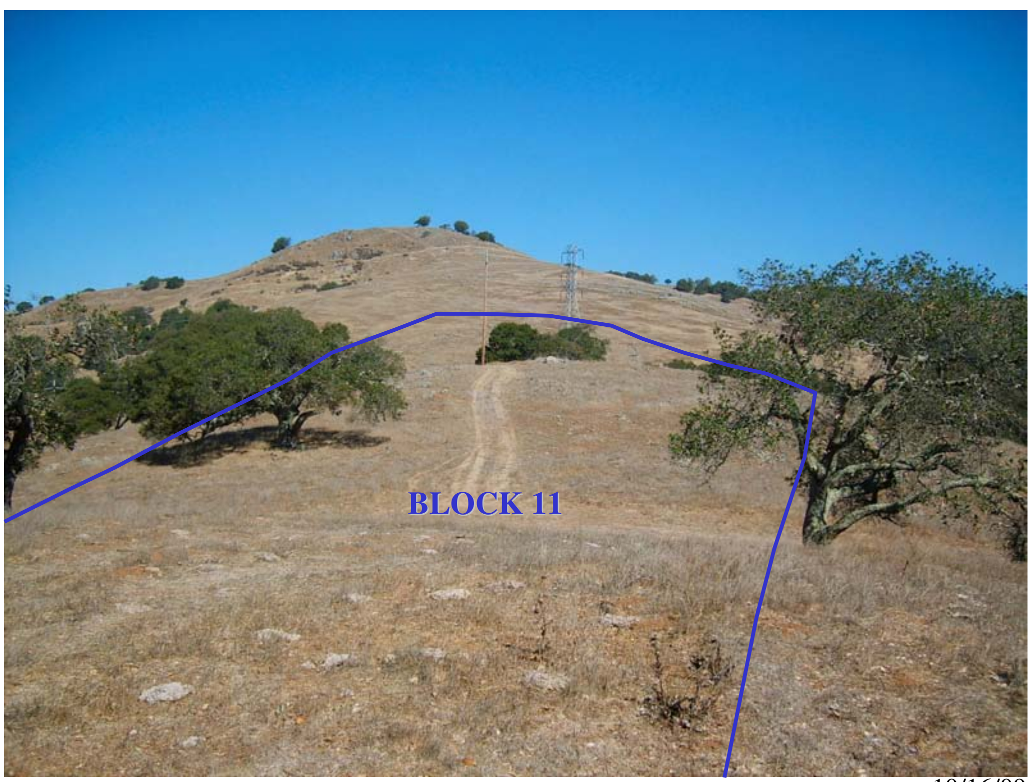

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PHOTO 2

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PHOTO 6

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PHOTO 7

10/2/08

PHOTO 8

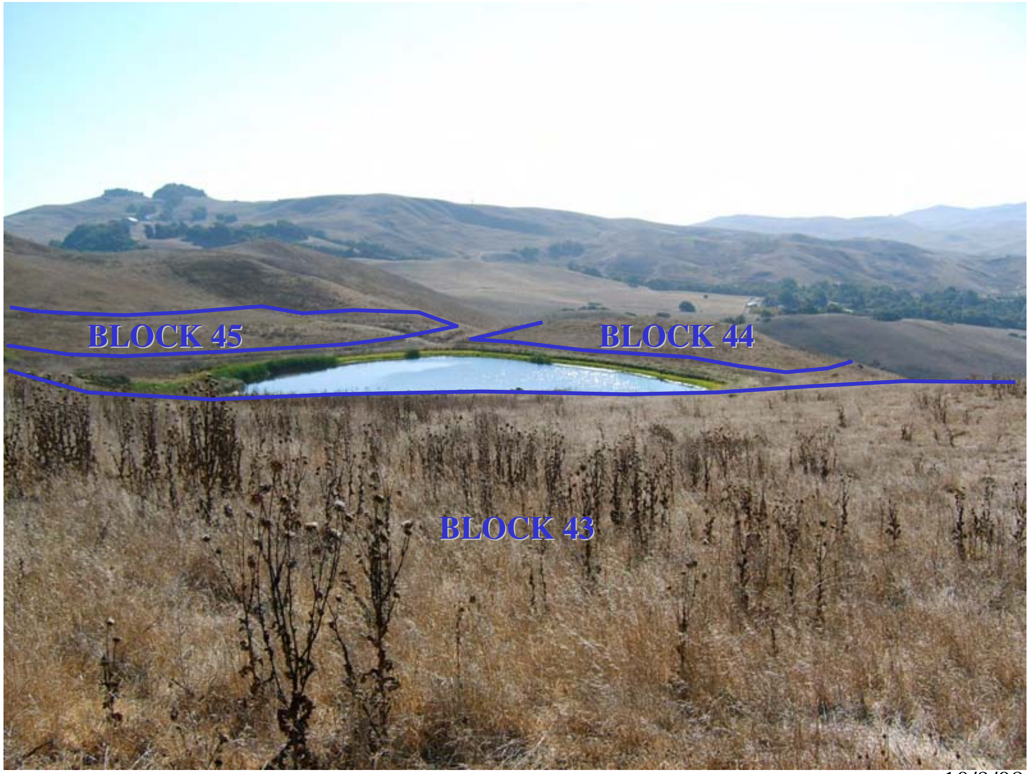

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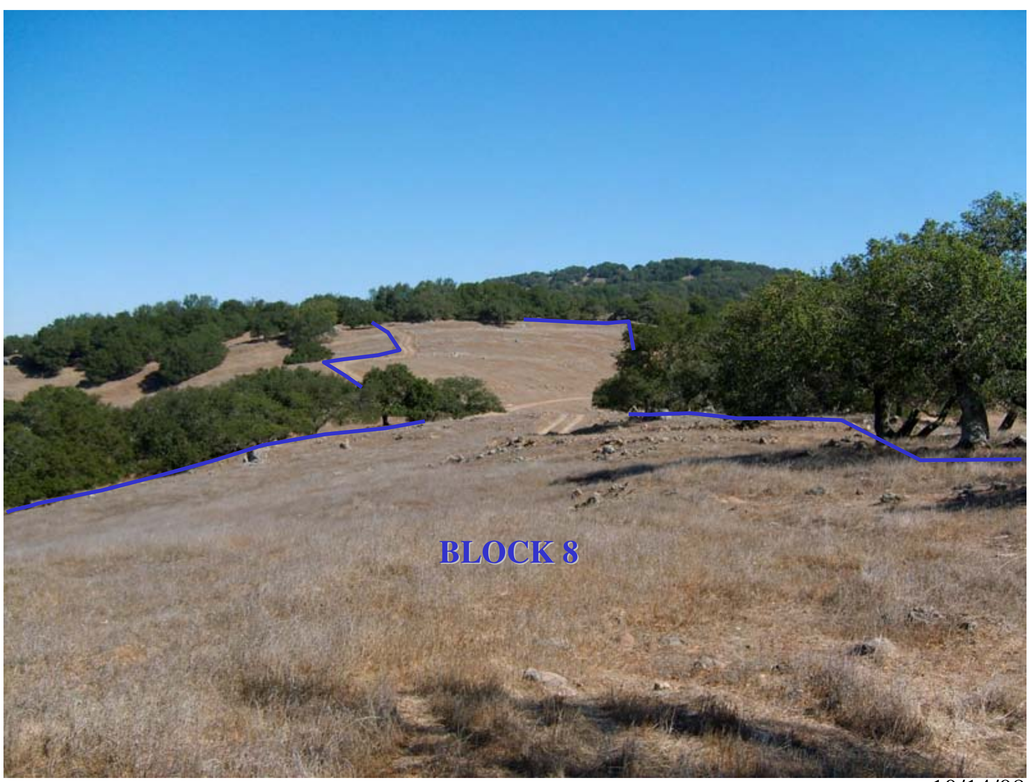
PHOTO 9



10/14/08

PHOTO 10

APPENDIX C

USLE CALCULATIONS

Suscol Mountain Vineyards
Percent Vegetative Cover and USLE "R" Value, by Block

Block	soil(s)	USLE R value	% cover crop
1	152	45	70
2	104, 152	45	70
3A	152	45	70
3B	152	45	70
3C	152	45	70
3D	152	45	70
4	152	45	70
5A	152	45	70
5B	152	45	70
5C	152	45	70
6	152	45	70
7	152	60	75
8A	152, 179	60	70
8B	152	60	70
9A	152	65	75
9B	152	60	75
10A	152	50	70
10B	152	50	70
10C	152	50	75
11A	152	60	70
11B	152	60	70
11C	152	60	70
12A	152	50	70
12B	152	50	70
12C	152	50	70
12D	152	50	70
13	152, 175	50	70
14	175 (assume 152)	50	70
15A	152	60	70
15B	152	60	75
15C	152	65	75
15D	152	65	75
15E	152	65	70
16A	152	65	70
16B	152	65	70
17	152	65	70
18	152	75	70
19A	152	75	75
19B	152	75	70
20	152	75	75
21A	152	65	70
21B	152, 175	75	70
21C	152	75	75
21D	152	75	70
22	152	75	70
23	152	75	70
24A	152	75	75
24B	152	75	75
24C	152	75	70

Block	soil(s)	USLE R value	% cover crop
25	152	45	70
26A	152	50	70
26B	152	60	70
26C	152	50	70
27A	152	60	70
27B	152	60	70
27C	152	60	70
27D	152	60	70
27E	152	65	70
28	152	65	70
29A	152	60	70
29B	152	65	70
30A	152	65	75
30B	152	65	75
30C	152	65	75
31A	152	75	70
31B	152	75	75
32	152	75	80
33	134	75	80
34A	134	75	75
34B	134	75	75
34C	131, 134	75	70
34D	131, 134	75	75
36A	151, 152	50	70
36B	151, 152	50	70
36C	151	50	70
36D	151	50	70
36E	151, 131	50	70
37	151, 152	60	70
38A	151, 131	50	70
38B	131	50	70
38C	116, 131, 151	50	70
39A	132	50	70
39B	116, 132	60	80
40	132, 134	60	75
41	134	65	75
42	152	60	70
43	152	60	70
44A	152	65	70
44B	134, 152	65	70
45	134, 152	65	70
46	134	65	70

<u>SOILS</u>
104: BALE CLAY LOAM
116: CLEAR LAKE CLAY
131, 134: FAGAN CLAY LOAM
152: HAMBRIGHT ROCK OUTCROP COMPLEX
175: ROCK OUTCROP

PPI Engineering

Napa County

Maximum Length of Slope

for a soil loss tolerance of 7 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 6/17/09

Cover Type: PERMANENT COVER CROP

Soil Unit No. (100-182)--- 104 -K= 0.28

Soil Name BALE -R= 45

-T= 5

Percent Cover		60%			70%		
		C= 0.070 P= 1.0	C= 0.070 P= 0.60	C= 0.070 P= 0.50	C= 0.046 P= 1.0	C= 0.046 P= 0.60	C= 0.046 P= 0.50
	2	21,064,297	115,622,420	212,314,316	85,378,211	468,643,009	860,556,454
	4	175,709	630,109	993,959	501,931	1,799,973	2,839,351
	6	13,966	38,793	55,863	32,340	89,834	129,360
	8	6,431	17,864	25,724	14,892	41,367	59,569
	10	3,431	9,530	13,724	7,945	22,069	31,780
	12	2,076	5,768	8,305	4,808	13,356	19,232
P	14	1,362	3,782	5,447	3,153	8,759	12,612
E	16	947	2,632	3,790	2,194	6,094	8,775
R	18	690	1,916	2,759	1,597	4,437	6,390
C	20	521	1,447	2,083	1,206	3,350	4,824
E	22	405	1,125	1,620	938	2,605	3,751
N	24	323	896	1,291	747	2,076	2,989
T	26	263	729	1,050	608	1,689	2,432
	28	217	604	870	504	1,399	2,015
S	30	183	508	732	424	1,177	1,695
L	32	156	433	624	361	1,004	1,445
O	34	135	374	539	312	866	1,248
P	36	118	326	470	272	756	1,089
E	38	104	288	414	240	666	959
	40	92	256	368	213	592	852
	42	82	229	330	191	530	764
	44	74	207	298	172	479	689
	46	68	188	270	157	435	626
	48	62	172	247	143	397	572
	50	57	158	227	131	365	526

NOTES:

C=Cover and Management Factor

P=Practice Factor

PPI Engineering

Napa County

Maximum Length of Slope

for a soil loss tolerance of 7 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 6/17/09

Cover Type: PERMANENT COVER CROP

Soil Unit No. (100-182)--- 116 -K= 0.24

Soil Name CLEAR LAKE -R= 50

-T= 5

Percent Cover		60%			70%		
		C= 0.070 P= 1.0	C= 0.070 P= 0.60	C= 0.070 P= 0.50	C= 0.046 P= 1.0	C= 0.046 P= 0.60	C= 0.046 P= 0.50
	2	24,784,370	136,041,992	249,810,222	100,456,485	551,408,009	1,012,535,578
	4	198,503	711,850	1,122,902	567,045	2,033,477	3,207,689
	6	15,397	42,770	61,588	35,655	99,041	142,620
	8	7,090	19,695	28,361	16,419	45,607	65,675
	10	3,783	10,507	15,130	8,759	24,331	35,037
	12	2,289	6,359	9,156	5,301	14,725	21,204
P	14	1,501	4,170	6,005	3,476	9,656	13,905
E	16	1,044	2,901	4,178	2,419	6,719	9,675
R	18	761	2,113	3,042	1,761	4,892	7,045
C	20	574	1,595	2,297	1,330	3,693	5,319
E	22	446	1,240	1,786	1,034	2,872	4,136
N	24	356	988	1,423	824	2,289	3,296
T	26	289	804	1,158	670	1,862	2,681
	28	240	666	959	555	1,542	2,221
S	30	202	560	807	467	1,298	1,868
L	32	172	478	688	398	1,107	1,593
O	34	148	412	594	344	955	1,375
P	36	130	360	518	300	833	1,200
E	38	114	317	457	264	734	1,057
	40	101	282	406	235	653	940
	42	91	252	364	210	585	842
	44	82	228	328	190	528	760
	46	75	207	298	173	479	690
	48	68	189	272	158	438	631
	50	63	174	250	145	403	580

NOTES:

C=Cover and Management Factor

P=Practice Factor

PPI Engineering

Napa County

Maximum Length of Slope

for a soil loss tolerance of 7 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 6/17/09

Cover Type: PERMANENT COVER CROP

Soil Unit No. (100-182)--- 116 -K= 0.24

Soil Name CLEAR LAKE -R= 60

-T= 5

Percent Cover		75%			80%		
		C= 0.034 P= 1.0	C= 0.034 P= 0.60	C= 0.034 P= 0.50	C= 0.022 P= 1.0	C= 0.022 P= 0.60	C= 0.022 P= 0.50
	2	149,843,083	822,492,206	1,510,320,141	639,474,929	3,510,092,933	6,445,488,500
	4	765,352	2,744,627	4,329,487	2,272,490	8,149,368	12,855,147
	6	45,323	125,896	181,290	108,250	300,694	432,999
	8	20,871	57,974	83,482	49,848	138,466	199,391
	10	11,134	30,929	44,537	26,594	73,871	106,375
	12	6,738	18,717	26,953	16,094	44,705	64,375
P	14	4,419	12,275	17,676	10,554	29,317	42,217
E	16	3,075	8,540	12,298	7,343	20,398	29,373
R	18	2,239	6,219	8,955	5,347	14,853	21,388
C	20	1,690	4,695	6,761	4,037	11,214	16,148
E	22	1,314	3,651	5,257	3,139	8,719	12,556
N	24	1,047	2,909	4,189	2,501	6,948	10,006
T	26	852	2,367	3,409	2,035	5,653	8,141
	28	706	1,961	2,823	1,686	4,683	6,743
S	30	594	1,649	2,375	1,418	3,939	5,673
L	32	506	1,407	2,026	1,209	3,360	4,838
O	34	437	1,214	1,748	1,044	2,900	4,176
P	36	381	1,059	1,526	911	2,530	3,644
E	38	336	933	1,344	803	2,229	3,210
	40	299	830	1,195	713	1,981	2,853
	42	268	743	1,070	639	1,775	2,556
	44	241	671	966	577	1,602	2,307
	46	219	609	877	524	1,455	2,096
	48	200	557	802	479	1,330	1,915
	50	184	512	737	440	1,223	1,761

NOTES:

C=Cover and Management Factor

P=Practice Factor

PPI Engineering

Napa County

Maximum Length of Slope

for a soil loss tolerance of 5 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 6/17/09

Cover Type: PERMANENT COVER CROP

Soil Unit No. (100-182)--- 131 & 132 & 134 -K= 0.28

Soil Name FAGAN -R= 50

-T= 3

Percent Cover		60%			70%		
		C= 0.070 P= 1.0	C= 0.070 P= 0.60	C= 0.070 P= 0.50	C= 0.046 P= 1.0	C= 0.046 P= 0.60	C= 0.046 P= 0.50
	2	4,829,800	26,510,888	48,681,225	19,576,239	107,454,439	197,315,674
	4	58,221	208,786	329,348	166,315	596,420	940,817
	6	5,772	16,032	23,086	13,365	37,125	53,460
	8	2,658	7,383	10,631	6,154	17,096	24,618
	10	1,418	3,939	5,672	3,283	9,120	13,134
	12	858	2,384	3,432	1,987	5,519	7,948
P	14	563	1,563	2,251	1,303	3,620	5,212
E	16	392	1,088	1,566	907	2,518	3,627
R	18	285	792	1,140	660	1,834	2,641
C	20	215	598	861	498	1,384	1,994
E	22	167	465	669	388	1,077	1,550
N	24	133	370	533	309	858	1,235
T	26	109	301	434	251	698	1,005
	28	90	250	360	208	578	833
S	30	76	210	302	175	486	700
L	32	64	179	258	149	415	597
O	34	56	155	223	129	358	516
P	36	49	135	194	112	312	450
E	38	43	119	171	99	275	396
	40	38	106	152	88	245	352
	42	34	95	136	79	219	316
	44	31	85	123	71	198	285
	46	28	78	112	65	180	259
	48	26	71	102	59	164	236
	50	23	65	94	54	151	217

NOTES:

C=Cover and Management Factor

P=Practice Factor

PPI Engineering

Napa County

Maximum Length of Slope

for a soil loss tolerance of 5 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 6/17/09

Cover Type: PERMANENT COVER CROP

Soil Unit No. (100-182)--- 131 & 132 & 134 -K= 0.28

Soil Name FAGAN -R= 60

-T= 3

Percent Cover		75%			80%		
		C= 0.034 P= 1.0	C= 0.034 P= 0.60	C= 0.034 P= 0.50	C= 0.022 P= 1.0	C= 0.022 P= 0.60	C= 0.022 P= 0.50
	2	29,200,346	160,281,384	294,320,360	124,616,289	684,021,744	1,256,050,586
	4	224,478	805,001	1,269,841	666,523	2,390,214	3,770,422
	6	16,989	47,191	67,956	40,577	112,713	162,307
	8	7,823	21,731	31,293	18,685	51,903	74,740
	10	4,174	11,593	16,695	9,968	27,690	39,874
	12	2,526	7,016	10,103	6,033	16,757	24,131
P	14	1,656	4,601	6,626	3,956	10,989	15,825
E	16	1,152	3,201	4,610	2,753	7,646	11,010
R	18	839	2,331	3,357	2,004	5,568	8,017
C	20	634	1,760	2,534	1,513	4,203	6,053
E	22	493	1,368	1,971	1,177	3,268	4,706
N	24	393	1,090	1,570	938	2,605	3,751
T	26	319	887	1,278	763	2,119	3,052
	28	265	735	1,058	632	1,755	2,528
S	30	223	618	890	532	1,477	2,126
L	32	190	527	759	453	1,259	1,813
O	34	164	455	655	391	1,087	1,565
P	36	143	397	572	341	948	1,366
E	38	126	350	504	301	836	1,203
	40	112	311	448	267	743	1,069
	42	100	279	401	240	665	958
	44	91	251	362	216	600	865
	46	82	228	329	196	545	785
	48	75	209	301	179	499	718
	50	69	192	276	165	458	660

NOTES:

C=Cover and Management Factor

P=Practice Factor

PPI Engineering

Napa County
Maximum Length of Slope
for a soil loss tolerance of 5 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 6/17/09

Cover Type: PERMANENT COVER CROP
Soil Unit No. (100-182)--- 131 & 132 & 134 -K= 0.28
Soil Name FAGAN -R= 65
-T= 3

Percent Cover		60%			70%		
		C= 0.070 P= 1.0	C= 0.070 P= 0.60	C= 0.070 P= 0.50	C= 0.046 P= 1.0	C= 0.046 P= 0.60	C= 0.046 P= 0.50
	2	2,014,273	11,056,393	20,302,555	8,164,291	44,813,985	82,290,706
	4	30,215	108,354	170,921	86,312	309,524	488,255
	6	3,415	9,486	13,660	7,908	21,968	31,633
	8	1,573	4,368	6,290	3,642	10,116	14,567
	10	839	2,331	3,356	1,943	5,397	7,771
	12	508	1,410	2,031	1,176	3,266	4,703
P	14	333	925	1,332	771	2,142	3,084
E	16	232	644	927	536	1,490	2,146
R	18	169	469	675	391	1,085	1,563
C	20	127	354	509	295	819	1,180
E	22	99	275	396	229	637	917
N	24	79	219	316	183	508	731
T	26	64	178	257	149	413	595
	28	53	148	213	123	342	493
S	30	45	124	179	104	288	414
L	32	38	106	153	88	245	353
O	34	33	91	132	76	212	305
P	36	29	80	115	67	185	266
E	38	25	70	101	59	163	235
	40	23	63	90	52	145	208
	42	20	56	81	47	130	187
	44	18	51	73	42	117	169
	46	17	46	66	38	106	153
	48	15	42	60	35	97	140
	50	14	39	56	32	89	129

NOTES:
C=Cover and Management Factor
P=Practice Factor

PPI Engineering

Napa County

Maximum Length of Slope

for a soil loss tolerance of 5 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 6/17/09

Cover Type: PERMANENT COVER CROP

Soil Unit No. (100-182)--- 131 & 132 & 134 -K= 0.28

Soil Name FAGAN -R= 65

-T= 3

Percent Cover	75%			80%		
	C= 0.034 P= 1.0	C= 0.034 P= 0.60	C= 0.034 P= 0.50	C= 0.022 P= 1.0	C= 0.022 P= 0.60	C= 0.022 P= 0.50
2	22,362,194	122,746,612	225,396,275	95,433,586	523,837,199	961,908,049
4	183,768	659,009	1,039,547	545,644	1,956,733	3,086,631
6	14,476	40,210	57,903	34,574	96,040	138,297
8	6,666	18,516	26,664	15,921	44,225	63,684
10	3,556	9,878	14,225	8,494	23,594	33,975
12	2,152	5,978	8,609	5,140	14,278	20,561
P 14	1,411	3,920	5,645	3,371	9,364	13,484
E 16	982	2,728	3,928	2,345	6,515	9,382
R 18	715	1,986	2,860	1,708	4,744	6,831
C 20	540	1,500	2,159	1,289	3,582	5,157
E 22	420	1,166	1,679	1,003	2,785	4,010
N 24	335	929	1,338	799	2,219	3,196
T 26	272	756	1,089	650	1,806	2,600
28	225	626	902	538	1,496	2,154
S 30	190	527	759	453	1,258	1,812
L 32	162	449	647	386	1,073	1,545
O 34	140	388	558	333	926	1,334
P 36	122	338	487	291	808	1,164
E 38	107	298	429	256	712	1,025
40	95	265	382	228	633	911
42	85	237	342	204	567	816
44	77	214	308	184	512	737
46	70	195	280	167	465	669
48	64	178	256	153	425	612
50	59	163	235	141	390	562

NOTES:

C=Cover and Management Factor

P=Practice Factor

PPI Engineering

Napa County

Maximum Length of Slope

for a soil loss tolerance of 5 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 10/14/08

Cover Type: PERMANENT COVER CROP
Soil Unit No. (100-182)--- 131 & 132 & 134 -K= 0.28
Soil Name FAGAN -R= 75
-T= 3

Percent Cover		60%			70%		
		C= 0.070 P= 1.0	C= 0.070 P= 0.60	C= 0.070 P= 0.50	C= 0.046 P= 1.0	C= 0.046 P= 0.60	C= 0.046 P= 0.50
	2	1,250,141	6,862,052	12,600,600	5,067,094	27,813,400	51,072,993
	4	21,128	75,766	119,516	60,353	216,433	341,411
	6	2,565	7,125	10,260	5,940	16,500	23,760
	8	1,181	3,281	4,725	2,735	7,598	10,941
	10	630	1,750	2,521	1,459	4,054	5,837
	12	381	1,059	1,525	883	2,453	3,532
P	14	250	695	1,000	579	1,609	2,317
E	16	174	483	696	403	1,119	1,612
R	18	127	352	507	293	815	1,174
C	20	96	266	383	222	615	886
E	22	74	207	298	172	478	689
N	24	59	165	237	137	381	549
T	26	48	134	193	112	310	447
	28	40	111	160	93	257	370
S	30	34	93	134	78	216	311
L	32	29	80	115	66	184	265
O	34	25	69	99	57	159	229
P	36	22	60	86	50	139	200
E	38	19	53	76	44	122	176
	40	17	47	68	39	109	157
	42	15	42	61	35	97	140
	44	14	38	55	32	88	127
	46	12	34	50	29	80	115
	48	11	32	45	26	73	105
	50	10	29	42	24	67	97

NOTES:
C=Cover and Management Factor
P=Practice Factor

PPI Engineering

Napa County

Maximum Length of Slope

for a soil loss tolerance of 5 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 10/14/08

Cover Type: PERMANENT COVER CROP

Soil Unit No. (100-182)--- 131 & 132 & 134 -K= 0.28

Soil Name FAGAN -R= 75

-T= 3

Percent Cover		75%			80%		
		C= 0.034 P= 1.0	C= 0.034 P= 0.60	C= 0.034 P= 0.50	C= 0.022 P= 1.0	C= 0.022 P= 0.60	C= 0.022 P= 0.50
	2	13,878,897	76,181,590	139,890,188	59,230,004	325,114,885	596,999,650
	4	128,499	460,809	726,899	381,540	1,368,239	2,158,316
	6	10,873	30,202	43,492	25,969	72,137	103,877
	8	5,007	13,908	20,027	11,958	33,218	47,834
	10	2,671	7,420	10,685	6,380	17,722	25,519
	12	1,616	4,490	6,466	3,861	10,725	15,444
P	14	1,060	2,945	4,240	2,532	7,033	10,128
E	16	738	2,049	2,950	1,762	4,893	7,047
R	18	537	1,492	2,148	1,283	3,563	5,131
C	20	405	1,126	1,622	968	2,690	3,874
E	22	315	876	1,261	753	2,092	3,012
N	24	251	698	1,005	600	1,667	2,400
T	26	204	568	818	488	1,356	1,953
	28	169	470	677	404	1,123	1,618
S	30	142	396	570	340	945	1,361
L	32	121	337	486	290	806	1,161
O	34	105	291	419	250	696	1,002
P	36	91	254	366	219	607	874
E	38	81	224	322	193	535	770
	40	72	199	287	171	475	684
	42	64	178	257	153	426	613
	44	58	161	232	138	384	553
	46	53	146	210	126	349	503
	48	48	134	192	115	319	459
	50	44	123	177	106	293	422

NOTES:

C=Cover and Management Factor

P=Practice Factor

PPI Engineering

Napa County

Maximum Length of Slope

for a soil loss tolerance of 3 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 6/17/09

Cover Type: PERMANENT COVER CROP

Soil Unit No. (100-182)--- 151 & 152 -K= 0.15

Soil Name HAMBRIGHT-ROCK OUTCROP -R= 45

-T= 1

Percent Cover		60%			70%		
		C= 0.070 P= 1.0	C= 0.070 P= 0.60	C= 0.070 P= 0.50	C= 0.046 P= 1.0	C= 0.046 P= 0.60	C= 0.046 P= 0.50
	2	10,011,840	54,955,227	100,912,793	40,580,183	222,745,577	409,021,665
	4	100,582	360,695	568,975	287,322	1,030,365	1,625,339
	6	8,938	24,828	35,752	20,698	57,493	82,791
	8	4,116	11,433	16,463	9,531	26,475	38,124
	10	2,196	6,099	8,783	5,085	14,124	20,339
	12	1,329	3,691	5,315	3,077	8,548	12,309
P	14	871	2,421	3,486	2,018	5,606	8,072
E	16	606	1,684	2,425	1,404	3,900	5,616
R	18	441	1,226	1,766	1,022	2,840	4,089
C	20	333	926	1,333	772	2,144	3,087
E	22	259	720	1,037	600	1,667	2,401
N	24	207	574	826	478	1,329	1,913
T	26	168	467	672	389	1,081	1,557
	28	139	387	557	322	895	1,289
S	30	117	325	468	271	753	1,085
L	32	100	277	399	231	642	925
O	34	86	239	345	200	554	798
P	36	75	209	301	174	484	697
E	38	66	184	265	153	426	614
	40	59	164	236	136	379	546
	42	53	147	211	122	339	489
	44	48	132	190	110	306	441
	46	43	120	173	100	278	401
	48	40	110	158	92	254	366
	50	36	101	145	84	234	337

NOTES:

C=Cover and Management Factor

P=Practice Factor

PPI Engineering

Napa County

Maximum Length of Slope

for a soil loss tolerance of 3 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 6/17/09

Cover Type: PERMANENT COVER CROP

Soil Unit No. (100-182)--- 151 & 152 -K= 0.15

Soil Name HAMBRIGHT-ROCK OUTCROP -R= 50

-T= 1

Percent Cover		60%			70%		
		C= 0.070 P= 1.0	C= 0.070 P= 0.60	C= 0.070 P= 0.50	C= 0.046 P= 1.0	C= 0.046 P= 0.60	C= 0.046 P= 0.50
	2	7,046,754	38,679,797	71,026,663	28,562,037	156,777,694	287,886,630
	4	77,290	277,170	437,220	220,788	791,767	1,248,965
	6	7,240	20,111	28,959	16,765	46,570	67,060
	8	3,334	9,261	13,335	7,720	21,445	30,880
	10	1,779	4,941	7,114	4,119	11,441	16,475
	12	1,076	2,990	4,305	2,493	6,924	9,970
P	14	706	1,961	2,823	1,635	4,540	6,538
E	16	491	1,364	1,964	1,137	3,159	4,549
R	18	358	993	1,430	828	2,300	3,312
C	20	270	750	1,080	625	1,737	2,501
E	22	210	583	840	486	1,350	1,945
N	24	167	465	669	387	1,076	1,550
T	26	136	378	544	315	876	1,261
	28	113	313	451	261	725	1,044
S	30	95	263	379	220	610	879
L	32	81	225	324	187	520	749
O	34	70	194	279	162	449	647
P	36	61	169	244	141	392	564
E	38	54	149	215	124	345	497
	40	48	133	191	110	307	442
	42	43	119	171	99	275	396
	44	39	107	154	89	248	357
	46	35	97	140	81	225	325
	48	32	89	128	74	206	297
	50	29	82	118	68	189	273

NOTES:

C=Cover and Management Factor

P=Practice Factor

PPI Engineering

Napa County

Maximum Length of Slope

for a soil loss tolerance of 3 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 6/17/09

Cover Type: PERMANENT COVER CROP

Soil Unit No. (100-182)--- 151 & 152 -K= 0.15

Soil Name HAMBRIGHT-ROCK OUTCROP -R= 50

-T= 1

Percent Cover		75%			80%		
		C= 0.034 P= 1.0	C= 0.034 P= 0.60	C= 0.034 P= 0.50	C= 0.022 P= 1.0	C= 0.022 P= 0.60	C= 0.022 P= 0.50
	2	78,232,125	429,417,973	788,528,584	333,865,812	1,832,597,298	3,365,148,740
	4	470,081	1,685,755	2,659,179	1,395,768	5,005,357	7,895,655
	6	30,688	85,244	122,751	73,295	203,598	293,181
	8	14,131	39,254	56,525	33,752	93,754	135,006
	10	7,539	20,942	30,156	18,006	50,018	72,026
	12	4,562	12,673	18,250	10,897	30,269	43,588
P	14	2,992	8,311	11,968	7,146	19,851	28,585
E	16	2,082	5,783	8,327	4,972	13,811	19,888
R	18	1,516	4,211	6,063	3,620	10,057	14,482
C	20	1,144	3,179	4,578	2,733	7,593	10,933
E	22	890	2,472	3,559	2,125	5,904	8,501
N	24	709	1,970	2,837	1,694	4,705	6,775
T	26	577	1,603	2,308	1,378	3,828	5,512
	28	478	1,328	1,912	1,141	3,171	4,566
S	30	402	1,117	1,608	960	2,667	3,841
L	32	343	952	1,371	819	2,275	3,276
O	34	296	822	1,184	707	1,964	2,827
P	36	258	717	1,033	617	1,713	2,467
E	38	228	632	910	543	1,509	2,174
	40	202	562	809	483	1,342	1,932
	42	181	503	725	433	1,202	1,731
	44	163	454	654	390	1,085	1,562
	46	149	413	594	355	985	1,419
	48	136	377	543	324	901	1,297
	50	125	347	499	298	828	1,192

NOTES:

C=Cover and Management Factor

P=Practice Factor

PPI Engineering

Napa County

Maximum Length of Slope

for a soil loss tolerance of 3 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 6/17/09

Cover Type: PERMANENT COVER CROP

Soil Unit No. (100-182)--- 151 & 152 -K= 0.15

Soil Name HAMBRIGHT-ROCK OUTCROP -R= 60

-T= 1

Percent Cover		60%			70%		
		C= 0.070 P= 1.0	C= 0.070 P= 0.60	C= 0.070 P= 0.50	C= 0.046 P= 1.0	C= 0.046 P= 0.60	C= 0.046 P= 0.50
	2	3,837,531	21,064,297	38,679,797	15,554,353	85,378,211	156,777,694
	4	48,997	175,709	277,170	139,966	501,931	791,767
	6	5,028	13,966	20,111	11,642	32,340	46,570
	8	2,315	6,431	9,261	5,361	14,892	21,445
	10	1,235	3,431	4,941	2,860	7,945	11,441
	12	747	2,076	2,990	1,731	4,808	6,924
P	14	490	1,362	1,961	1,135	3,153	4,540
E	16	341	947	1,364	790	2,194	3,159
R	18	248	690	993	575	1,597	2,300
C	20	187	521	750	434	1,206	1,737
E	22	146	405	583	338	938	1,350
N	24	116	323	465	269	747	1,076
T	26	95	263	378	219	608	876
	28	78	217	313	181	504	725
S	30	66	183	263	153	424	610
L	32	56	156	225	130	361	520
O	34	48	135	194	112	312	449
P	36	42	118	169	98	272	392
E	38	37	104	149	86	240	345
	40	33	92	133	77	213	307
	42	30	82	119	69	191	275
	44	27	74	107	62	172	248
	46	24	68	97	56	157	225
	48	22	62	89	51	143	206
	50	20	57	82	47	131	189

NOTES:

C=Cover and Management Factor

P=Practice Factor

PPI Engineering

Napa County

Maximum Length of Slope

for a soil loss tolerance of 3 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 6/17/09

Cover Type: PERMANENT COVER CROP

Soil Unit No. (100-182)--- 151 & 152 -K= 0.15

Soil Name HAMBRIGHT-ROCK OUTCROP -R= 60

-T= 1

Percent Cover	75%			80%		
	C= 0.034 P= 1.0	C= 0.034 P= 0.60	C= 0.034 P= 0.50	C= 0.022 P= 1.0	C= 0.022 P= 0.60	C= 0.022 P= 0.50
2	42,603,757	233,853,027	429,417,973	181,817,100	997,998,340	1,832,597,298
4	298,002	1,068,664	1,685,755	884,830	3,173,087	5,005,357
6	21,311	59,197	85,244	50,900	141,388	203,598
8	9,813	27,259	39,254	23,439	65,107	93,754
10	5,235	14,543	20,942	12,504	34,735	50,018
12	3,168	8,801	12,673	7,567	21,020	30,269
P 14	2,078	5,772	8,311	4,963	13,785	19,851
E 16	1,446	4,016	5,783	3,453	9,591	13,811
R 18	1,053	2,924	4,211	2,514	6,984	10,057
C 20	795	2,208	3,179	1,898	5,273	7,593
E 22	618	1,717	2,472	1,476	4,100	5,904
N 24	492	1,368	1,970	1,176	3,267	4,705
T 26	401	1,113	1,603	957	2,658	3,828
28	332	922	1,328	793	2,202	3,171
S 30	279	776	1,117	667	1,852	2,667
L 32	238	661	952	569	1,580	2,275
O 34	206	571	822	491	1,364	1,964
P 36	179	498	717	428	1,190	1,713
E 38	158	439	632	377	1,048	1,509
40	140	390	562	335	932	1,342
42	126	349	503	300	835	1,202
44	114	315	454	271	753	1,085
46	103	286	413	246	684	985
48	94	262	377	225	625	901
50	87	241	347	207	575	828

NOTES:

C=Cover and Management Factor

P=Practice Factor

PPI Engineering

Napa County

Maximum Length of Slope

for a soil loss tolerance of 3 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 6/17/09

Cover Type: PERMANENT COVER CROP

Soil Unit No. (100-182)--- 151 & 152 -K= 0.15

Soil Name HAMBRIGHT-ROCK OUTCROP -R= 65

-T= 1

Percent Cover		60%			70%		
		C= 0.070 P= 1.0	C= 0.070 P= 0.60	C= 0.070 P= 0.50	C= 0.046 P= 1.0	C= 0.046 P= 0.60	C= 0.046 P= 0.50
	2	2,938,856	16,131,449	29,621,743	11,911,827	65,384,300	120,063,418
	4	40,111	143,843	226,904	114,582	410,903	648,174
	6	4,284	11,900	17,136	9,920	27,556	39,681
	8	1,973	5,480	7,891	4,568	12,689	18,272
	10	1,052	2,923	4,210	2,437	6,770	9,748
	12	637	1,769	2,548	1,475	4,097	5,899
P	14	418	1,160	1,671	967	2,687	3,869
E	16	291	807	1,162	673	1,869	2,692
R	18	212	588	846	490	1,361	1,960
C	20	160	444	639	370	1,028	1,480
E	22	124	345	497	288	799	1,151
N	24	99	275	396	229	637	917
T	26	81	224	322	187	518	746
	28	67	185	267	154	429	618
S	30	56	156	224	130	361	520
L	32	48	133	191	111	308	443
O	34	41	115	165	96	266	383
P	36	36	100	144	83	232	334
E	38	32	88	127	74	204	294
	40	28	78	113	65	182	261
	42	25	70	101	59	163	234
	44	23	63	91	53	147	211
	46	21	58	83	48	133	192
	48	19	53	76	44	122	176
	50	17	48	70	40	112	161

NOTES:

C=Cover and Management Factor

P=Practice Factor

PPI Engineering

Napa County

Maximum Length of Slope

for a soil loss tolerance of 3 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 6/17/09

Cover Type: PERMANENT COVER CROP

Soil Unit No. (100-182)--- 151 & 152 -K= 0.15

Soil Name HAMBRIGHT-ROCK OUTCROP -R= 65

-T= 1

Percent Cover		75%			80%		
		C= 0.034 P= 1.0	C= 0.034 P= 0.60	C= 0.034 P= 0.50	C= 0.022 P= 1.0	C= 0.022 P= 0.60	C= 0.022 P= 0.50
	2	32,626,789	179,089,211	328,856,664	139,239,083	764,286,604	1,403,438,772
	4	243,958	874,855	1,380,032	724,361	2,597,626	4,097,602
	6	18,158	50,440	72,634	43,370	120,472	173,480
	8	8,362	23,227	33,447	19,971	55,476	79,885
	10	4,461	12,392	17,844	10,655	29,596	42,619
	12	2,700	7,499	10,799	6,448	17,911	25,792
P	14	1,770	4,918	7,082	4,229	11,746	16,914
E	16	1,232	3,422	4,927	2,942	8,172	11,768
R	18	897	2,492	3,588	2,142	5,951	8,569
C	20	677	1,881	2,709	1,617	4,493	6,469
E	22	527	1,463	2,106	1,258	3,493	5,030
N	24	420	1,166	1,678	1,002	2,784	4,009
T	26	341	948	1,366	815	2,265	3,262
	28	283	786	1,131	675	1,876	2,702
S	30	238	661	952	568	1,578	2,273
L	32	203	564	812	485	1,346	1,938
O	34	175	486	700	418	1,162	1,673
P	36	153	424	611	365	1,014	1,460
E	38	135	374	538	322	893	1,286
	40	120	332	479	286	794	1,143
	42	107	298	429	256	711	1,024
	44	97	269	387	231	642	924
	46	88	244	352	210	583	840
	48	80	223	321	192	533	767
	50	74	205	295	176	490	705

NOTES:

C=Cover and Management Factor

P=Practice Factor

PPI Engineering

Napa County
Maximum Length of Slope
for a soil loss tolerance of 3 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 10/14/08

Cover Type: PERMANENT COVER CROP
Soil Unit No. (100-182)--- 151 & 152 -K= 0.15
Soil Name HAMBRIGHT-ROCK OUTCROP -R= 75
-T= 1

Percent Cover		60%			70%		
		C= 0.070 P= 1.0	C= 0.070 P= 0.60	C= 0.070 P= 0.50	C= 0.046 P= 1.0	C= 0.046 P= 0.60	C= 0.046 P= 0.50
	2	1,823,975	10,011,840	18,384,471	7,392,969	40,580,183	74,516,289
	4	28,048	100,582	158,662	80,121	287,322	453,234
	6	3,218	8,938	12,871	7,451	20,698	29,805
	8	1,482	4,116	5,927	3,431	9,531	13,725
	10	790	2,196	3,162	1,831	5,085	7,322
	12	478	1,329	1,914	1,108	3,077	4,431
P	14	314	871	1,255	726	2,018	2,906
E	16	218	606	873	505	1,404	2,022
R	18	159	441	636	368	1,022	1,472
C	20	120	333	480	278	772	1,111
E	22	93	259	373	216	600	864
N	24	74	207	297	172	478	689
T	26	60	168	242	140	389	560
	28	50	139	200	116	322	464
S	30	42	117	169	98	271	390
L	32	36	100	144	83	231	333
O	34	31	86	124	72	200	287
P	36	27	75	108	63	174	251
E	38	24	66	95	55	153	221
	40	21	59	85	49	136	196
	42	19	53	76	44	122	176
	44	17	48	69	40	110	159
	46	16	43	62	36	100	144
	48	14	40	57	33	92	132
	50	13	36	52	30	84	121

NOTES:
C=Cover and Management Factor
P=Practice Factor

PPI Engineering

Napa County

Maximum Length of Slope

for a soil loss tolerance of 3 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 10/14/08

Cover Type: PERMANENT COVER CROP
Soil Unit No. (100-182)--- 151 & 152 -K= 0.15
Soil Name HAMBRIGHT-ROCK OUTCROP -R= 75
-T= 1

Percent Cover		75%			80%		
		C= 0.034 P= 1.0	C= 0.034 P= 0.60	C= 0.034 P= 0.50	C= 0.022 P= 1.0	C= 0.022 P= 0.60	C= 0.022 P= 0.50
	2	20,249,525	111,150,121	204,101,955	86,417,495	474,347,663	871,031,755
	4	170,586	611,739	964,982	506,507	1,816,381	2,865,233
	6	13,639	37,886	54,556	32,576	90,488	130,303
	8	6,281	17,446	25,122	15,001	41,669	60,003
	10	3,351	9,307	13,403	8,003	22,230	32,011
	12	2,028	5,633	8,111	4,843	13,453	19,372
P	14	1,330	3,694	5,319	3,176	8,822	12,704
E	16	925	2,570	3,701	2,210	6,138	8,839
R	18	674	1,871	2,695	1,609	4,470	6,436
C	20	509	1,413	2,035	1,215	3,375	4,859
E	22	395	1,099	1,582	945	2,624	3,778
N	24	315	875	1,261	753	2,091	3,011
T	26	256	712	1,026	612	1,701	2,450
	28	212	590	850	507	1,409	2,029
S	30	179	496	715	427	1,186	1,707
L	32	152	423	610	364	1,011	1,456
O	34	132	365	526	314	873	1,257
P	36	115	319	459	274	761	1,096
E	38	101	281	404	242	671	966
	40	90	250	359	215	596	859
	42	81	224	322	192	534	769
	44	73	202	291	174	482	694
	46	66	183	264	158	438	631
	48	60	168	241	144	400	576
	50	55	154	222	132	368	530

NOTES:
C=Cover and Management Factor
P=Practice Factor

PPI Engineering

Napa County

Maximum Length of Slope

for a soil loss tolerance of 4 tons per acre.

NAME: SUSCOL MOUNTAIN VNYRD DATE: 6/17/09

Cover Type: PERMANENT COVER CROP
Soil Unit No. (100-182)--- 179 -K= 0.32
Soil Name SOBRANTE -R= 60
-T= 2

Percent Cover		60%			70%		
		C= 0.070 P= 1.0	C= 0.070 P= 0.60	C= 0.070 P= 0.50	C= 0.046 P= 1.0	C= 0.046 P= 0.60	C= 0.046 P= 0.50
	2	801,037	4,396,911	8,073,929	3,246,779	17,821,645	32,725,404
	4	15,131	54,262	85,595	43,224	155,004	244,510
	6	1,964	5,455	7,856	4,548	12,633	18,191
	8	904	2,512	3,617	2,094	5,817	8,377
	10	482	1,340	1,930	1,117	3,104	4,469
	12	292	811	1,168	676	1,878	2,705
P	14	191	532	766	443	1,232	1,774
E	16	133	370	533	309	857	1,234
R	18	97	269	388	225	624	899
C	20	73	203	293	170	471	678
E	22	57	158	228	132	366	527
N	24	45	126	182	105	292	420
T	26	37	103	148	86	238	342
	28	31	85	122	71	197	283
S	30	26	71	103	60	166	238
L	32	22	61	88	51	141	203
O	34	19	53	76	44	122	175
P	36	17	46	66	38	106	153
E	38	15	40	58	34	94	135
	40	13	36	52	30	83	120
	42	12	32	46	27	75	107
	44	10	29	42	24	67	97
	46	10	26	38	22	61	88
	48	9	24	35	20	56	80
	50	8	22	32	18	51	74

NOTES:
C=Cover and Management Factor
P=Practice Factor

APPENDIX D

SLOPE CALCULATIONS

SUSCOL MOUNTAIN VINEYARDS

AVERAGE SLOPE OF PROPOSED VINEYARD BLOCKS

BLOCK	SLOPE 1, %	SLOPE 2, %	AVERAGE SLOPE, %
1	9%	15%	12%
2	19%	21%	20%
3A	21%	20%	21%
3B	15%	14%	14%
3C	20%	20%	20%
3D	13%	23%	18%
4	12%	10%	11%
5A	13%	17%	15%
5B	18%	23%	20%
5C	12%	11%	12%
6	17%	15%	16%
7	23%	23%	23%
8A	15%	16%	16%
8B	20%	24%	22%
9A	26%	23%	25%
9B	26%	25%	25%
10A	20%	24%	22%
10B	22%	19%	21%
10C	18%	21%	19%
11A	15%	15%	15%
11B	15%	18%	17%
11C	21%	21%	21%
12A	20%	8%	14%
12B	11%	20%	15%
12C	22%	9%	15%
12D	21%	21%	21%
13	21%	23%	22%
14	19%	23%	21%
15A	18%	22%	20%
15B	12%	16%	14%
15C	17%	23%	20%
15D	15%	23%	19%
15E	17%	17%	17%
16A	22%	21%	22%
16B	23%	15%	19%
17	12%	11%	11%
18	18%	19%	18%
19A	23%	21%	22%
19B	15%	14%	15%
20	22%	10%	16%
21A	18%	13%	15%
21B	16%	19%	17%
21C	26%	21%	23%
21D	22%	22%	22%
22	14%	17%	16%
23	22%	21%	21%

SUSCOL MOUNTAIN VINEYARDS
AVERAGE SLOPE OF PROPOSED VINEYARD BLOCKS

BLOCK	SLOPE 1, %	SLOPE 2, %	AVERAGE SLOPE, %
24A	21%	23%	22%
24B	27%	17%	22%
24C	14%	13%	14%
25	16%	21%	19%
26A	19%	18%	18%
26B	16%	16%	16%
26C	20%	20%	20%
27A	21%	18%	20%
27B	22%	23%	22%
27C	12%	14%	13%
27D	17%	16%	17%
27E	16%	14%	15%
28	21%	21%	21%
29A	21%	21%	21%
29B	19%	18%	18%
30A	21%	18%	19%
30B	19%	20%	20%
31A	15%	16%	16%
31B	16%	20%	18%
32	25%	24%	25%
33	19%	21%	20%
34A	14%	15%	14%
34B	17%	22%	20%
34C	18%	19%	19%
34D	17%	22%	20%
36A	14%	26%	20%
36B	18%	20%	19%
36C	13%	18%	16%
36D	18%	22%	20%
36E	25%	18%	22%
37	19%	18%	18%
38A	16%	12%	14%
38B	9%	12%	10%
38C	14%	11%	12%
39A	17%	11%	14%
39B	23%	17%	20%
40	24%	23%	24%
41	20%	17%	19%
42	14%	14%	14%
43	16%	17%	17%
44A	10%	12%	11%
44B	16%	10%	13%
45	16%	18%	17%
46	16%	18%	17%

APPENDIX E

TREE REMOVAL INFORMATION

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
1	1	LIVE OAK	15													
1	2	LIVE OAK	19													
1	3	LIVE OAK	21													
1	4	LIVE OAK	42													
1	5	LIVE OAK	17													
1	6	LIVE OAK	25													
1	7	BAY	18	20	20	17										
1	8	LIVE OAK	11													
1	9	BUCKEYE	15													
1	10	BUCKEYE	14													
1	11	BAY	10	6	8	10	9	7								
1	12	BUCKEYE	10													
1	13	BAY	15	16												
1	14	BAY	13	10	14	11	12	11	10	9	11	11	8	10	9	11
1	15	LIVE OAK	47													
1	16	VALLEY OAK	24													
1	17	LIVE OAK	27													
1	18	LIVE OAK	22													
1	19	BAY	15	8	30	15	14	10	11							
1	20	LIVE OAK	16													
1	21	LIVE OAK	8	15												
1	22	LIVE OAK	10													
1	23	LIVE OAK	10	15	12											
1	24	BAY	8	7	6	6	6	6								
1	25	LIVE OAK	8													
1	26	BUCKEYE	12													
1	27	LIVE OAK	6													
1	28	BAY	14	12	12	7	11	10	16	14	10	12	12			
1	29	LIVE OAK	14	10	13											
1	30	LIVE OAK	23													
1	31	LIVE OAK	13													
1	32	LIVE OAK	18													
1	33	LIVE OAK	25													
3	34	LIVE OAK	14	11												
3	35	LIVE OAK	38	24												
3	36	LIVE OAK	18	27	20	23										
3	37	LIVE OAK	22	16												
3	38	LIVE OAK	27													
3	39	LIVE OAK	19													
3	40	LIVE OAK	23													
3	41	LIVE OAK	13													
3	42	LIVE OAK	12													
3	43	LIVE OAK	20													
3	44	LIVE OAK	12	17	8											
3	45	LIVE OAK	20	23												
3	46	LIVE OAK	15													
3	47	BAY	18	16	16	16	15	10	12							
3	48	BAY	12	10												
3	49	BAY	12	12	6	10	8									
3	50	BAY	12													
3	51	BUCKEYE	19	15	15											
3	52	BUCKEYE	16													
3	53	BUCKEYE	15													
3	54	BAY	13	12												
3	55	BAY	9	8												
3	56	BAY	8													
3	57	BAY	13	10	8	11										
3	58	BAY	18	16	12	12	10									
3	59	BAY	12													

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
3	60	BAY	17	16												
3	61	BAY	12	8	7	14	8	12	12	7	10	6	8	10	9	10
3	62	HOLLYLEAF CHERRY	10	8												
3	63	HOLLYLEAF CHERRY	10													
3	64	BAY	15	9	11	11	9	14	9	8	8	14	8	15	8	
3	65	BAY	15													
3	66	BUCKEYE	17	13												
3	67	BAY	21	16	19	22	14	18	17							
6	68	BAY	18	12	17	14	10	14	16	18	12	10	15	15		
6	69	BAY	19	16	14	18	14	20	18	16	18					
6	70	LIVE OAK	8	7												
6	71	LIVE OAK	7													
6	72	LIVE OAK	17	17												
6	73	LIVE OAK	17													
6	74	BAY	15	12	11											
6	75	BAY	13	5	5	7										
6	76	BAY	11	9	9	9	6	6	10							
7	77	LIVE OAK	10	9	10											
7	78	LIVE OAK	17													
7	79	LIVE OAK	26													
7	80	LIVE OAK	17	16	17	16										
7	81	LIVE OAK	10	12												
7	82	LIVE OAK	16	12	13											
7	83	LIVE OAK	12	10	13											
7	84	LIVE OAK	18	12												
7	85	LIVE OAK	8	10	8											
7	86	LIVE OAK	15													
7	87	LIVE OAK	18													
7	88	LIVE OAK	9	6												
7	89	VALLEY OAK	35	15	21											
7	90	LIVE OAK	29	14												
7	91	LIVE OAK	24													
7	92	LIVE OAK	14	12												
7	93	LIVE OAK	17													
7	94	LIVE OAK	17	15												
8	95	LIVE OAK	13	15												
8	96	LIVE OAK	14													
8	97	LIVE OAK	19													
8	98	LIVE OAK	19													
8	99	BAY	10													
8	100	LIVE OAK	25													
8	101	LIVE OAK	15	13	8	7	10	8	11	10						
8	102	BAY	13	10	10	7										
8	103	BAY	16	11	11	10	14	9	10							
8	104	LIVE OAK	14	14	12											
8	105	LIVE OAK	21													
8	106	LIVE OAK	10													
8	107	BAY	10	8												
8	108	BAY	24	6	6	5	6									
8	109	LIVE OAK	19	18	14											
8	110	LIVE OAK	19													
8	111	BAY	14													
8	112	BAY	22	7	7											
8	113	BAY	18													
8	114	BAY	8													
8	115	BAY	8													
8	116	BAY	6													

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
8	117	BAY	7													
8	118	LIVE OAK	21	19	17	15	19	15	16	8						
8	119	LIVE OAK	19													
8	120	LIVE OAK	20													
8	121	BAY	12	8												
8	122	LIVE OAK	22													
8	123	LIVE OAK	24	15	17											
8	124	LIVE OAK	28													
8	125	BAY	14													
8	126	BAY	6													
8	127	LIVE OAK	25													
8	128	LIVE OAK	10	10	10											
8	129	LIVE OAK	17													
8	130	LIVE OAK	13	9												
8	131	BAY	16	8	7											
8	132	LIVE OAK	16													
8	133	LIVE OAK	14													
8	134	BAY	11													
8	135	LIVE OAK	7													
8	136	BAY	7	7												
8	137	LIVE OAK	10													
8	138	LIVE OAK	8													
8	139	BAY	8	6												
8	140	LIVE OAK	11													
8	141	BAY	8													
8	142	LIVE OAK	11													
8	143	LIVE OAK	10													
8	144	LIVE OAK	10	7												
8	145	BAY	8													
8	146	LIVE OAK	14													
8	147	LIVE OAK	12													
8	148	LIVE OAK	8	6												
8	149	LIVE OAK	14													
8	150	LIVE OAK	13													
8	151	LIVE OAK	10													
8	152	BAY	7	6	6											
8	153	LIVE OAK	13													
8	154	LIVE OAK	11													
8	155	LIVE OAK	14													
8	156	LIVE OAK	12													
8	157	BAY	13	10	9											
8	158	BAY	9	10	8	7	6	6								
8	159	BAY	9													
8	160	BAY	7	9	8	9	9	8	7							
8	161	BAY	7													
8	162	BAY	10													
8	163	BAY	10	8	8	6	7									
8	164	BAY	11	13												
8	165	LIVE OAK	15	15	15											
8	166	LIVE OAK	16													
8	167	LIVE OAK	13	11	10	14										
8	168	LIVE OAK	14													
8	169	BAY	11	10												
8	170	BAY	11													
8	171	BAY	9	15	16	15	12									
8	172	LIVE OAK	15	12	14	10										
8	173	BAY	10	8	8											
8	174	BAY	8													
8	175	BAY	10	8												

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
8	176	BAY	15	9												
8	177	BAY	34													
8	178	LIVE OAK	16	14												
8	179	BAY	9													
8	180	BAY	7	8	6											
8	181	LIVE OAK	10													
8	182	LIVE OAK	16													
8	183	LIVE OAK	22	12												
8	184	LIVE OAK	11	9	8											
8	185	LIVE OAK	23	16												
8	186	BAY	13	8	9	9	6	12	8	13						
8	187	LIVE OAK	34													
8	188	LIVE OAK	22	15	21	23										
8	189	BAY	7	6												
8	190	LIVE OAK	39													
8	191	LIVE OAK	13	13												
8	192	LIVE OAK	16	21												
8	193	LIVE OAK	21	22	14	16	15									
8	194	LIVE OAK	15													
8	195	LIVE OAK	18	11												
8	196	LIVE OAK	13													
8	197	LIVE OAK	13													
8	198	LIVE OAK	25													
8	199	LIVE OAK	22	19												
8	200	LIVE OAK	16	13												
8	201	LIVE OAK	21	21												
8	202	LIVE OAK	34													
8	203	LIVE OAK	10													
8	204	LIVE OAK	37													
8	205	LIVE OAK	13													
8	206	LIVE OAK	19													
8	207	LIVE OAK	14													
8	208	LIVE OAK	18													
8	209	BAY	21													
8	210	LIVE OAK	15	16												
8	211	LIVE OAK	10													
8	212	LIVE OAK	23													
8	213	LIVE OAK	14													
8	214	LIVE OAK	16	14												
8	215	BAY	13													
8	216	LIVE OAK	13	12												
8	217	LIVE OAK	17	15												
8	218	LIVE OAK	14	13	14	9	11	14								
8	219	BAY	14													
8	220	LIVE OAK	22													
8	221	LIVE OAK	10													
8	222	LIVE OAK	13													
8	223	LIVE OAK	13	12												
8	224	LIVE OAK	16													
8	225	LIVE OAK	11													
8	226	BAY	13													
8	227	LIVE OAK	14	18	13											
8	228	BAY	12	12	12											
8	229	LIVE OAK	12	12												
8	230	BAY	7	6	6	6										
8	231	BAY	11													
8	232	LIVE OAK	11	10	9											
8	233	LIVE OAK	8	7												
8	234	LIVE OAK	25													

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
8	235	LIVE OAK	25													
8	236	LIVE OAK	12	10												
8	237	LIVE OAK	16	15	11											
8	238	LIVE OAK	22	24												
8	239	LIVE OAK	23													
8	240	LIVE OAK	25													
8	241	LIVE OAK	15													
8	242	LIVE OAK	16													
8	243	LIVE OAK	21	14												
8	244	LIVE OAK	22													
8	245	LIVE OAK	19	13												
8	246	LIVE OAK	25	23												
8	247	LIVE OAK	19													
8	248	LIVE OAK	24													
8	249	LIVE OAK	22	18	8											
8	250	LIVE OAK	51													
8	251	LIVE OAK	11	12	9	10										
8	252	LIVE OAK	16	15	9	8										
8	253	LIVE OAK	14	15												
8	254	BAY	18	22												
8	255	LIVE OAK	22													
8	256	LIVE OAK	17													
8	257	LIVE OAK	20													
8	258	LIVE OAK	25													
8	259	LIVE OAK	17													
8	260	LIVE OAK	13	8												
8	261	BAY	9													
8	262	LIVE OAK	18													
8	263	LIVE OAK	11													
8	264	LIVE OAK	17	11												
8	265	LIVE OAK	15													
8	266	LIVE OAK	13													
8	267	LIVE OAK	15													
8	268	LIVE OAK	13													
8	269	LIVE OAK	17													
8	270	LIVE OAK	7													
8	271	LIVE OAK	19													
8	272	LIVE OAK	28													
8	273	LIVE OAK	9													
8	274	LIVE OAK	19													
8	275	LIVE OAK	19													
8	276	LIVE OAK	16													
8	277	LIVE OAK	15													
8	278	BAY	17													
8	279	LIVE OAK	12													
8	280	LIVE OAK	16	14												
8	281	HOLLYLEAF CHERRY	10													
8	282	BAY	8	8	8	7										
8	283	BAY	10	8												
8	284	BAY	7													
8	285	HOLLYLEAF CHERRY	9	8	7											
8	286	BAY	12	11												
8	287	LIVE OAK	11	9												
8	288	LIVE OAK	12	8												
8	289	BAY	15	7	8	9	6	10								
8	290	LIVE OAK	12	9												
8	291	LIVE OAK	18													

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
8	292	LIVE OAK	16	11	9											
9	293	VALLEY OAK	20													
9	294	LIVE OAK	33	26												
9	295	LIVE OAK	22	19												
9	296	LIVE OAK	29													
10	297	LIVE OAK	18	14												
11	298	LIVE OAK	16													
11	299	LIVE OAK	17	8												
11	300	LIVE OAK	24													
11	301	LIVE OAK	21	16												
11	302	LIVE OAK	14	14	12											
11	303	LIVE OAK	9													
11	304	LIVE OAK	15	14	12											
11	305	LIVE OAK	22													
11	306	LIVE OAK	31	27												
11	307	LIVE OAK	37													
11	308	LIVE OAK	30													
11	309	LIVE OAK	31													
11	310	LIVE OAK	23													
11	311	LIVE OAK	20													
11	312	LIVE OAK	10													
11	313	LIVE OAK	17	16												
11	314	LIVE OAK	20													
11	315	LIVE OAK	21													
11	316	LIVE OAK	20	20												
11	317	LIVE OAK	21													
11	318	LIVE OAK	14	8												
11	319	LIVE OAK	18													
11	320	BAY	20													
11	321	LIVE OAK	21													
11	322	LIVE OAK	17													
11	323	LIVE OAK	20													
11	324	LIVE OAK	16													
11	325	LIVE OAK	20													
11	326	LIVE OAK	17	12												
11	327	LIVE OAK	15													
11	328	LIVE OAK	12													
11	329	LIVE OAK	20	18												
11	330	LIVE OAK	15	15												
11	331	LIVE OAK	30													
11	332	LIVE OAK	18	17												
11	333	LIVE OAK	23													
11	334	LIVE OAK	21													
11	335	LIVE OAK	16													
11	336	LIVE OAK	18	15												
11	337	LIVE OAK	16	17												
11	338	LIVE OAK	20													
11	339	LIVE OAK	16													
12	340	LIVE OAK	18													
12	341	LIVE OAK	24													
12	342	LIVE OAK	16													
12	343	LIVE OAK	19													
12	344	LIVE OAK	15													
12	345	LIVE OAK	24													
12	346	LIVE OAK	7													
12	347	BAY	22	8	17	20										
12	348	LIVE OAK	25													
12	349	LIVE OAK	11													
12	350	LIVE OAK	14	14	14											

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
12	351	LIVE OAK	17													
12	352	LIVE OAK	12													
12	353	LIVE OAK	22													
12	354	LIVE OAK	18													
12	355	LIVE OAK	13													
12	356	LIVE OAK	15													
12	357	LIVE OAK	16													
12	358	LIVE OAK	17													
12	359	LIVE OAK	20	19												
12	360	LIVE OAK	21													
12	361	LIVE OAK	22													
12	362	LIVE OAK	27													
12	363	LIVE OAK	19													
12	364	LIVE OAK	26													
12	365	LIVE OAK	19	17												
12	366	LIVE OAK	16													
12	367	LIVE OAK	18	18												
12	368	LIVE OAK	16													
12	369	LIVE OAK	16													
12	370	LIVE OAK	17	16												
12	371	LIVE OAK	25													
12	372	LIVE OAK	11													
12	373	LIVE OAK	18													
12	374	LIVE OAK	17	11												
12	375	LIVE OAK	26													
12	376	LIVE OAK	20													
12	377	LIVE OAK	27													
12	378	LIVE OAK	13													
12	379	LIVE OAK	15													
12	380	LIVE OAK	31													
12	381	LIVE OAK	16	16												
12	382	LIVE OAK	26													
12	383	BUCKEYE	7	7	6											
12	384	LIVE OAK	21	20	20											
12	385	LIVE OAK	18	16	12											
12	386	LIVE OAK	14	14	14											
12	387	LIVE OAK	16													
12	388	LIVE OAK	20													
12	389	LIVE OAK	24													
12	390	LIVE OAK	18													
12	391	LIVE OAK	26													
12	392	LIVE OAK	17													
12	393	LIVE OAK	15													
12	394	LIVE OAK	14	11												
12	395	LIVE OAK	17	11												
12	396	LIVE OAK	10													
12	397	LIVE OAK	23													
12	398	LIVE OAK	18	10												
12	399	LIVE OAK	12													
12	400	LIVE OAK	20													
12	401	LIVE OAK	14													
12	402	LIVE OAK	19	18	17											
12	403	LIVE OAK	15													
12	404	LIVE OAK	14													
12	405	LIVE OAK	14													
12	406	BAY	17													
12	407	LIVE OAK	26	24												
12	408	LIVE OAK	18	18	12											
12	409	LIVE OAK	22	21	17											

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
12	410	LIVE OAK	15	15												
12	411	LIVE OAK	15	15												
12	412	HOLLYLEAF CHERRY	8													
12	413	HOLLYLEAF CHERRY	9	8	7											
12	414	LIVE OAK	16													
12	415	LIVE OAK	14													
12	416	LIVE OAK	13													
12	417	LIVE OAK	13	13												
12	418	LIVE OAK	15													
12	419	LIVE OAK	25													
12	420	LIVE OAK	24													
12	421	LIVE OAK	16													
12	422	BAY	43													
12	423	LIVE OAK	17	17												
12	424	HOLLYLEAF CHERRY	7													
12	425	LIVE OAK	16	15	6	11	11	9	8	8	9	9				
12	426	LIVE OAK	22	20	20											
13	427	LIVE OAK	15	14	9											
13	428	LIVE OAK	16	15	14											
13	429	LIVE OAK	19	17												
13	430	LIVE OAK	18													
13	431	LIVE OAK	12	10	8	9	9	12	12							
13	432	LIVE OAK	22													
13	433	LIVE OAK	14													
13	434	LIVE OAK	14													
13	435	LIVE OAK	26													
13	436	LIVE OAK	19													
13	437	LIVE OAK	13													
13	438	LIVE OAK	14													
13	439	LIVE OAK	20													
13	440	LIVE OAK	19	17												
13	441	LIVE OAK	22	19												
13	442	VALLEY OAK	20	13												
13	443	LIVE OAK	25													
13	444	LIVE OAK	16													
13	445	LIVE OAK	20	13	12	8										
13	446	LIVE OAK	21													
13	447	LIVE OAK	15	11												
13	448	LIVE OAK	20	17												
13	449	LIVE OAK	20													
13	450	LIVE OAK	11	9	8	8	9									
13	451	LIVE OAK	15	12												
13	452	LIVE OAK	14	11	9											
13	453	LIVE OAK	13	13	13	13										
13	454	LIVE OAK	22	18												
13	455	LIVE OAK	15	9												
13	456	HOLLYLEAF CHERRY	10	10												
13	457	LIVE OAK	26													
13	458	LIVE OAK	14													
14	459	LIVE OAK	31													
14	460	LIVE OAK	28													
14	461	LIVE OAK	20													
14	462	LIVE OAK	18													
14	463	LIVE OAK	17													
14	464	LIVE OAK	20													

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
14	465	LIVE OAK	17	16	15											
14	466	LIVE OAK	16													
15	467	LIVE OAK	22													
15	468	LIVE OAK	17													
15	469	LIVE OAK	16													
15	470	LIVE OAK	24													
15	471	LIVE OAK	24	24												
15	472	LIVE OAK	14	15	13											
15	473	LIVE OAK	31													
15	474	LIVE OAK	19													
15	475	LIVE OAK	22	18												
15	476	LIVE OAK	28	20												
15	477	LIVE OAK	15	9												
15	478	LIVE OAK	12													
15	479	LIVE OAK	39													
15	480	LIVE OAK	19													
15	481	LIVE OAK	11													
15	482	LIVE OAK	6													
15	483	LIVE OAK	13													
15	484	LIVE OAK	20													
15	485	LIVE OAK	17													
15	486	LIVE OAK	13													
15	487	LIVE OAK	15													
15	488	LIVE OAK	16													
15	489	LIVE OAK	17													
15	490	LIVE OAK	12													
15	491	LIVE OAK	14	14	9											
15	492	LIVE OAK	24	22	22	22										
15	493	LIVE OAK	28	22												
15	494	LIVE OAK	32													
15	495	LIVE OAK	18	16												
15	496	LIVE OAK	23													
15	497	LIVE OAK	17													
15	498	LIVE OAK	22	20	9											
15	499	LIVE OAK	20													
15	500	LIVE OAK	28													
15	501	LIVE OAK	29													
15	502	LIVE OAK	16													
15	503	LIVE OAK	29													
15	504	LIVE OAK	54													
15	505	LIVE OAK	22													
15	506	LIVE OAK	23													
15	507	LIVE OAK	23													
15	508	LIVE OAK	29													
15	509	LIVE OAK	16	15												
15	510	LIVE OAK	15	7												
15	511	LIVE OAK	22													
15	512	LIVE OAK	15													
15	513	LIVE OAK	31													
15	514	LIVE OAK	27	27												
15	515	LIVE OAK	25	14												
15	516	LIVE OAK	19													
15	517	LIVE OAK	40													
15	518	LIVE OAK	20													
15	519	LIVE OAK	41													
15	520	LIVE OAK	25													
15	521	LIVE OAK	16													
15	522	LIVE OAK	23	14												
15	523	LIVE OAK	13	8	10	10	19									

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
15	524	LIVE OAK	17	21	18											
15	525	LIVE OAK	13													
15	526	LIVE OAK	22													
15	527	LIVE OAK	18													
15	528	LIVE OAK	13	12												
15	529	LIVE OAK	14													
15	530	LIVE OAK	16													
15	531	LIVE OAK	16													
15	532	LIVE OAK	14	10												
15	533	LIVE OAK	10	22												
15	534	LIVE OAK	10													
15	535	LIVE OAK	10													
15	536	LIVE OAK	21													
15	537	LIVE OAK	19													
15	538	LIVE OAK	16													
15	539	LIVE OAK	9													
15	540	LIVE OAK	9													
15	541	LIVE OAK	12													
15	542	LIVE OAK	8													
15	543	LIVE OAK	6													
15	544	LIVE OAK	28													
15	545	LIVE OAK	26													
15	546	LIVE OAK	19													
15	547	LIVE OAK	8													
15	548	LIVE OAK	26													
15	549	LIVE OAK	16	16	8											
15	550	LIVE OAK	19	22	6											
15	551	LIVE OAK	14													
15	552	LIVE OAK	21	14												
15	553	LIVE OAK	14													
15	554	LIVE OAK	8													
15	555	LIVE OAK	15													
15	556	LIVE OAK	6													
15	557	LIVE OAK	16													
15	558	LIVE OAK	13	11	14											
15	559	LIVE OAK	13													
15	560	LIVE OAK	15													
15	561	LIVE OAK	25													
15	562	LIVE OAK	14	22												
15	563	LIVE OAK	14													
15	564	LIVE OAK	26													
15	565	LIVE OAK	19													
15	566	LIVE OAK	20													
15	567	LIVE OAK	16													
15	568	LIVE OAK	22													
15	569	LIVE OAK	23													
15	570	LIVE OAK	11													
15	571	LIVE OAK	16	20	13											
15	572	LIVE OAK	27													
15	573	LIVE OAK	8													
15	574	LIVE OAK	29													
15	575	LIVE OAK	12													
15	576	LIVE OAK	13													
15	577	LIVE OAK	16													
15	578	LIVE OAK	14	7												
15	579	LIVE OAK	28													
15	580	LIVE OAK	19													
15	581	LIVE OAK	37													
15	582	LIVE OAK	12	16												

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
15	583	LIVE OAK	19													
15	584	LIVE OAK	16	14												
15	585	LIVE OAK	24													
15	586	LIVE OAK	25													
15	587	LIVE OAK	30													
15	588	LIVE OAK	17													
15	589	LIVE OAK	18													
15	590	LIVE OAK	20													
15	591	LIVE OAK	17													
15	592	LIVE OAK	18													
15	593	LIVE OAK	20													
15	594	LIVE OAK	22													
15	595	LIVE OAK	16	11												
15	596	LIVE OAK	28													
15	597	LIVE OAK	22													
15	598	LIVE OAK	23													
15	599	LIVE OAK	8													
15	600	LIVE OAK	30													
15	601	LIVE OAK	22													
15	602	LIVE OAK	10													
15	603	LIVE OAK	11	9												
15	604	LIVE OAK	9													
15	605	LIVE OAK	24													
15	606	LIVE OAK	13													
15	607	LIVE OAK	17													
15	608	LIVE OAK	10													
15	609	LIVE OAK	12													
15	610	LIVE OAK	14													
15	611	LIVE OAK	19	14	18											
15	612	LIVE OAK	11	20												
15	613	LIVE OAK	25													
15	614	LIVE OAK	9													
15	615	LIVE OAK	13													
15	616	LIVE OAK	9													
15	617	LIVE OAK	19													
15	618	LIVE OAK	18	10	10											
15	619	LIVE OAK	31													
15	620	LIVE OAK	18													
15	621	LIVE OAK	18	25												
15	622	LIVE OAK	30													
15	623	LIVE OAK	39													
15	624	LIVE OAK	29													
15	625	LIVE OAK	13	14												
15	626	LIVE OAK	26													
15	627	LIVE OAK	17													
15	628	LIVE OAK	28	12												
15	629	LIVE OAK	14													
15	630	LIVE OAK	21													
15	631	BAY	10													
15	632	LIVE OAK	17													
15	633	LIVE OAK	15													
15	634	LIVE OAK	8	6												
15	635	LIVE OAK	14													
15	636	LIVE OAK	9													
15	637	BAY	22													
15	638	LIVE OAK	15	18												
15	639	LIVE OAK	16													
15	640	LIVE OAK	13													
15	641	LIVE OAK	14													

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
15	642	LIVE OAK	14													
15	643	LIVE OAK	25													
15	644	LIVE OAK	16													
15	645	LIVE OAK	20													
15	646	LIVE OAK	26													
15	647	LIVE OAK	26													
15	648	LIVE OAK	44													
15	649	LIVE OAK	44													
15	650	LIVE OAK	25													
15	651	LIVE OAK	16	24	18											
15	652	LIVE OAK	21													
15	653	LIVE OAK	22													
15	654	BAY	23	19												
15	655	LIVE OAK	25													
15	656	LIVE OAK	12													
15	657	LIVE OAK	15													
15	658	LIVE OAK	20	31												
15	659	LIVE OAK	24													
15	660	LIVE OAK	21													
15	661	LIVE OAK	16													
15	662	LIVE OAK	20													
15	663	LIVE OAK	13													
15	664	LIVE OAK	18													
15	665	LIVE OAK	34	12												
15	666	LIVE OAK	8	10	12	13	13									
15	667	LIVE OAK	13	10	23											
15	668	LIVE OAK	22													
15	669	LIVE OAK	11	14	12											
15	670	LIVE OAK	17													
15	671	LIVE OAK	16	12	20											
15	672	LIVE OAK	12	19												
15	673	LIVE OAK	7	7	19											
15	674	LIVE OAK	27													
15	675	LIVE OAK	9	12												
15	676	LIVE OAK	21													
15	677	LIVE OAK	14													
15	678	LIVE OAK	28													
15	679	LIVE OAK	11	7	10											
15	680	LIVE OAK	41													
15	681	LIVE OAK	26													
15	682	LIVE OAK	12	13	11											
15	683	LIVE OAK	11	10	9											
15	684	LIVE OAK	13	11												
15	685	LIVE OAK	32													
15	686	LIVE OAK	31													
15	687	LIVE OAK	9	9												
15	688	LIVE OAK	15													
15	689	LIVE OAK	22	23												
15	690	LIVE OAK	20													
15	691	LIVE OAK	28													
15	692	LIVE OAK	19	14												
15	693	LIVE OAK	19													
15	694	LIVE OAK	13	12												
15	695	LIVE OAK	12	10												
15	696	LIVE OAK	9	16												
15	697	LIVE OAK	17													
15	698	LIVE OAK	14													
15	699	LIVE OAK	15	17												
15	701	LIVE OAK	12													

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
15	702	LIVE OAK	19	14												
15	703	LIVE OAK	30													
15	704	LIVE OAK	8	7	9											
15	705	LIVE OAK	26													
15	706	LIVE OAK	34													
15	707	LIVE OAK	22	14												
15	708	LIVE OAK	16													
15	709	LIVE OAK	15													
15	710	LIVE OAK	23	15												
15	711	LIVE OAK	17													
15	712	LIVE OAK	19													
15	713	LIVE OAK	23													
15	714	LIVE OAK	26													
15	715	LIVE OAK	31	19												
15	716	LIVE OAK	39													
15	717	LIVE OAK	26													
15	718	LIVE OAK	20													
15	719	LIVE OAK	15													
15	720	LIVE OAK	23													
15	721	LIVE OAK	17													
15	722	LIVE OAK	8													
15	723	LIVE OAK	18													
15	724	LIVE OAK	10													
15	725	LIVE OAK	10													
15	726	LIVE OAK	17	17	8	11										
15	727	LIVE OAK	9													
15	728	LIVE OAK	11	10												
15	729	LIVE OAK	12													
15	730	BAY	27													
15	731	LIVE OAK	9													
15	732	LIVE OAK	16	20												
15	733	LIVE OAK	19													
15	734	LIVE OAK	14	10												
15	735	LIVE OAK	12													
15	736	LIVE OAK	8													
15	737	LIVE OAK	17													
15	738	LIVE OAK	15													
15	739	LIVE OAK	13													
15	740	LIVE OAK	13													
15	741	LIVE OAK	17	11												
15	742	LIVE OAK	22													
15	743	LIVE OAK	14	14												
15	744	LIVE OAK	21													
15	745	LIVE OAK	17	15												
15	746	LIVE OAK	14													
15	747	LIVE OAK	16													
15	748	LIVE OAK	27													
15	749	LIVE OAK	17	11	22	12										
15	750	LIVE OAK	16													
15	751	LIVE OAK	14	18	14	10										
15	752	LIVE OAK	24	18												
15	753	LIVE OAK	28													
15	754	LIVE OAK	36													
15	755	LIVE OAK	25													
15	756	LIVE OAK	26													
15	757	LIVE OAK	45													
15	758	LIVE OAK	34	14												
15	759	LIVE OAK	20	16												
15	760	LIVE OAK	41													

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
15	761	LIVE OAK	8													
15	762	LIVE OAK	35													
16	763	LIVE OAK	21													
16	764	LIVE OAK	15	13												
16	765	LIVE OAK	22	13												
16	766	LIVE OAK	23													
16	767	LIVE OAK	21													
16	768	LIVE OAK	18													
16	769	LIVE OAK	22	8	8											
16	770	LIVE OAK	41													
16	771	LIVE OAK	7	9												
16	772	LIVE OAK	19	18												
16	773	LIVE OAK	24													
16	774	LIVE OAK	27													
16	775	LIVE OAK	24													
16	776	LIVE OAK	20													
16	777	LIVE OAK	38													
16	778	LIVE OAK	22													
16	778	LIVE OAK	26													
16	779	LIVE OAK	15	15												
16	780	LIVE OAK	16	13												
16	781	LIVE OAK	10	11												
16	782	LIVE OAK	14	7												
16	783	LIVE OAK	18													
16	784	LIVE OAK	17	16												
16	785	LIVE OAK	14													
16	786	LIVE OAK	14	12	12											
16	787	LIVE OAK	13													
16	788	LIVE OAK	18													
16	789	LIVE OAK	14													
16	790	LIVE OAK	14													
16	791	LIVE OAK	13	17												
16	792	LIVE OAK	15													
16	793	LIVE OAK	20													
16	794	LIVE OAK	12	18	15											
16	795	LIVE OAK	12	11												
16	796	LIVE OAK	13	15												
16	797	LIVE OAK	17	15												
16	798	LIVE OAK	15	25												
16	799	LIVE OAK	29													
16	800	LIVE OAK	14	17												
16	944	LIVE OAK	8	10	11											
16	945	LIVE OAK	16	10	13											
16	946	LIVE OAK	15													
16	947	LIVE OAK	17													
16	948	LIVE OAK	12	13	14											
16	949	LIVE OAK	21													
16	950	LIVE OAK	23													
16	951	LIVE OAK	6	12												
16	951	LIVE OAK	19	9												
16	952	LIVE OAK	19	6												
16	953	LIVE OAK	31													
16	954	LIVE OAK	23													
16	955	LIVE OAK	6	11												
16	956	LIVE OAK	13													
16	957	LIVE OAK	10	8												
17	801	BAY	16													
17	802	LIVE OAK	16													
17	803	LIVE OAK	33													

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
17	804	LIVE OAK	19													
17	805	LIVE OAK	13													
17	806	LIVE OAK	11													
17	807	LIVE OAK	21	21	19	17										
17	808	LIVE OAK	34													
17	809	LIVE OAK	26													
17	810	LIVE OAK	10													
17	811	LIVE OAK	17													
18	812	LIVE OAK	37	30												
18	813	LIVE OAK	28	26												
18	814	LIVE OAK	23													
18	815	LIVE OAK	21													
18	816	LIVE OAK	17	16	16											
18	817	LIVE OAK	37	29												
18	818	LIVE OAK	25	20												
18	819	LIVE OAK	12	9												
18	820	LIVE OAK	33													
18	821	LIVE OAK	10	8	8											
18	822	LIVE OAK	12	9	8											
19	823	BAY	31	21	22											
19	824	LIVE OAK	20	21	12											
19	825	BAY	77	69												
19	826	BAY	23	25	8	9	12	16								
19	827	BAY	20	12												
19	828	LIVE OAK	17													
19	829	LIVE OAK	23													
19	830	LIVE OAK	33													
19	831	LIVE OAK	28													
19	832	BAY	18	15	17	19	8	22	20							
19	833	BAY	12	9												
19	834	BAY	15	11	10	9	8									
19	835	BAY	60													
19	836	BAY	33													
19	837	BAY	54	26	18	17										
19	838	BAY	18	9	9	8	12	14	16 8	9 9						
19	839	BAY	17	12	7											
19	840	BAY	13	17	18	14	9	9	8	7						
21	958	LIVE OAK	22													
21	959	LIVE OAK	23													
21	960	LIVE OAK	12													
21	961	LIVE OAK	10	17	17											
21	962	LIVE OAK	12	9												
21	963	LIVE OAK	19	13	22											
21	964	LIVE OAK	11	9	5											
21	965	LIVE OAK	33													
21	966	LIVE OAK	22													
21	967	LIVE OAK	34													
21	968	LIVE OAK	18	17	11	9	14									
21	969	LIVE OAK	13													
21	970	LIVE OAK	10													
21	971	LIVE OAK	12													
21	972	LIVE OAK	18													
21	973	LIVE OAK	12													
21	974	LIVE OAK	8													
21	975	LIVE OAK	19													
21	976	LIVE OAK	24	14												
21	977	LIVE OAK	38	20												
21	978	LIVE OAK	46													
21	979	LIVE OAK	12	16	8											

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
21	980	BAY	12	10	8	11	12									
21	981	LIVE OAK	16													
21	982	LIVE OAK	21													
21	983	LIVE OAK	19													
21	984	LIVE OAK	22													
21	985	LIVE OAK	30	23												
21	986	LIVE OAK	42													
21	987	LIVE OAK	12	14												
21	988	LIVE OAK	51													
21	989	LIVE OAK	18													
21	990	LIVE OAK	37													
21	991	LIVE OAK	18	21	20	11										
21	992	LIVE OAK	56													
21	993	LIVE OAK	22	16												
21	994	LIVE OAK	20													
21	995	LIVE OAK	18													
21	996	LIVE OAK	22													
21	997	LIVE OAK	23													
21	998	LIVE OAK	20													
21	999	LIVE OAK	16													
21	1000	LIVE OAK	27													
21	1001	LIVE OAK	31													
21	1002	LIVE OAK	16													
21	1003	LIVE OAK	15													
21	1004	LIVE OAK	36													
21	1005	LIVE OAK	20													
21	1006	LIVE OAK	20													
21	1007	LIVE OAK	13	10	7	7	8									
21	1008	LIVE OAK	9	10												
21	1009	BAY	13	11	12	11										
21	1010	BAY	14													
21	1011	LIVE OAK	22													
21	1012	LIVE OAK	24	11	13											
21	1013	LIVE OAK	15	9	19	16										
21	1014	LIVE OAK	37													
21	1015	LIVE OAK	15													
21	1016	LIVE OAK	32													
21	1017	LIVE OAK	20													
21	1018	LIVE OAK	36													
21	1019	LIVE OAK	43													
21	1020	LIVE OAK	21													
21	1021	LIVE OAK	21													
21	1022	LIVE OAK	13													
21	1023	LIVE OAK	35													
22	1196	LIVE OAK	17													
22	1197	LIVE OAK	26	28	18	18	13	16	23							
22	1198	LIVE OAK	29													
22	1199	LIVE OAK	24													
22	1200	LIVE OAK	20	16	21	28										
22	1201	LIVE OAK	17													
22	1202	LIVE OAK	33													
22	1203	LIVE OAK	17	8												
22	1204	LIVE OAK	30													
22	1205	LIVE OAK	35													
22	1206	LIVE OAK	29													
23	1024	BAY	9	15	8	12	13									
23	1025	LIVE OAK	21													
23	1026	LIVE OAK	20													
23	1027	LIVE OAK	11	16												

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
23	1028	LIVE OAK	14													
23	1029	LIVE OAK	14													
23	1030	LIVE OAK	15													
23	1031	BAY	54													
24	841	BAY	18	17	9	9	14	12								
24	842	BAY	42													
24	843	LIVE OAK	20													
24	844	BAY	14	15												
24	845	BAY	13													
24	846	BAY	16	15	12	4										
24	847	BAY	14	12	11	13	10	8	15	8 12						
24	848	BAY	11													
24	849	BAY	13													
24	850	BAY	15	10	8	16										
24	851	BAY	19	18	15	18	10	20								
24	852	BAY	19													
24	853	LIVE OAK	19													
24	854	BAY	20													
24	855	BAY	13													
24	856	BAY	38													
24	857	BAY	32	15	12											
24	858	BAY	8	13	15											
24	859	BAY	21	9	10	8										
24	860	BAY	20	9												
24	861	BAY	12													
24	862	BAY	16													
24	1207	BAY	7	10	18	14	79									
24	1208	BAY	8													
24	1209	LIVE OAK	30													
24	1210	LIVE OAK	16													
24	1211	LIVE OAK	20													
24	1212	LIVE OAK	18	23												
24	1213	LIVE OAK	8													
24	1214	LIVE OAK	10	10	7											
24	1215	BAY	20													
24	1216	LIVE OAK	6	7	8											
24	1217	LIVE OAK	9	6												
24	1218	LIVE OAK	25													
24	1219	LIVE OAK	15	19												
24	1220	LIVE OAK	21													
24	1221	LIVE OAK	17	10												
24	1222	LIVE OAK	10													
24	1223	LIVE OAK	18													
24	1224	BAY	14													
24	1225	LIVE OAK	39													
24	1226	BAY	13	16	11											
24	1227	BAY	7													
24	1228	BAY	8	6												
24	1229	BAY	7	8	6											
24	1230	LIVE OAK	37	10	24											
24	1231	BAY	13	11	8	10	10	13	13							
24	1232	BAY	6	5												
24	1233	BAY	5													
24	1234	BAY	7													
24	1235	BAY	6													
24	1236	BAY	7													
24	1237	BAY	11													
24	1238	BAY	11													
24	1239	BAY	12	11												

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
24	1240	BAY	8	8												
24	1241	BAY	13	6												
24	1242	BAY	7													
24	1243	BAY	7	6	5											
24	1244	BAY	6	7												
24	1245	BAY	8	13	12	12	11									
24	1246	BAY	8	6												
24	1247	BAY	14	21	5											
27	1193	BAY	15													
27	1194	LIVE OAK	6	27												
27	1195	LIVE OAK	17	6												
28	1188	LIVE OAK	53													
28	1189	LIVE OAK	45													
28	1190	LIVE OAK	53													
28	1191	LIVE OAK	45													
28	1192	LIVE OAK	31													
30	1152	BAY	41													
30	1153	LIVE OAK	40													
30	1154	BAY	19													
30	1155	BAY	35	15	51											
30	1156	BAY	14	17	29	14	16	14	33							
30	1157	BAY	22													
30	1158	BAY	43													
30	1159	BAY	24	6	10	15	13									
30	1160	BAY	29	13	13	12	11	18	7	7	13	9				
30	1161	BAY	10	14	10	12	29									
30	1162	BAY	8	9	8											
30	1163	BAY	61													
30	1164	BAY	6	32												
30	1165	BAY	15	20												
30	1166	BAY	21													
30	1167	BAY	11	17												
30	1168	BAY	7	13	12											
30	1169	BAY	7	17	6	9	14									
30	1170	BAY	19													
30	1171	BAY	14	11												
30	1172	BAY	10													
30	1173	BAY	14	13	10	14	22	12	28	22	12					
30	1174	BAY	41													
30	1175	BAY	30													
30	1176	BAY	57	10	6	11										
30	1177	BAY	23													
30	1178	BAY	18													
30	1179	BAY	20													
30	1180	BAY	9													
30	1181	LIVE OAK	19													
30	1182	BAY	44													
30	1183	BAY	25													
30	1184	BAY	9	27												
30	1185	BAY	78	47												
30	1186	LIVE OAK	47													
30	1187	BAY	8	13												
31	1032	LIVE OAK	35													
31	1033	LIVE OAK	28													
31	1034	LIVE OAK	30													
31	1049	LIVE OAK	27													
31	1054	BAY	11	13												
31	1055	LIVE OAK	12	11												
31	1056	LIVE OAK	14	10												

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
31	1057	LIVE OAK	15													
31	1058	LIVE OAK	9	9	7	10	7									
31	1059	LIVE OAK	15	10												
31	1060	LIVE OAK	15	13												
31	1061	BAY	18													
31	1062	BAY	21													
31	1063	BAY	10	5												
31	1064	BAY	14	7	11	12	9	8	10	13						
31	1065	BAY	12	11	6	14										
31	1066	BAY	13	10	7	7	6	9								
31	1067	BAY	10													
31	1068	BAY	5	8	8	10										
31	1069	BAY	10													
31	1070	BAY	9	8												
31	1071	BAY	13	13												
31	1072	BAY	7	6	9	8	6									
31	1073	BAY	10	10	8											
31	1074	BAY	9	9	8	9	9	7								
31	1107	BAY	48													
31	1108	BAY	57													
31	1109	BAY	34	6	8	18	6	17								
31	1110	BAY	22													
31	1111	BAY	23	25												
31	1112	BAY	28	19												
31	1113	BAY	54	52												
31	1114	BAY	43	10												
31	1115	BAY	10	11												
31	1116	LIVE OAK	36													
31	1117	BAY	27	14	31	36										
31	1118	LIVE OAK	33													
31	1119	BAY	39													
31	1120	LIVE OAK	18													
31	1121	LIVE OAK	12	21	14	11										
31	1122	LIVE OAK	36													
31	1123	BAY	66													
31	1124	LIVE OAK	19													
31	1125	LIVE OAK	8	19												
31	1126	BAY	13	13	16	7										
31	1127	BAY	19	8	12											
31	1128	BAY	8	15	9	17	10	16	16	16 22						
31	1129	BAY	27	49												
31	1130	BAY	19	24	29	15										
31	1131	BAY	10	8												
31	1132	BAY	9	8	8											
31	1133	BAY	16													
31	1134	BAY	9	8	11	11										
31	1135	BAY	23	10	20	13	20	11								
31	1136	BAY	60													
31	1137	BAY	24													
31	1138	BAY	29													
31	1139	BAY	12	13												
31	1140	BAY	8	24	9											
31	1141	BAY	19	17												
31	1142	BAY	18	20	12	8										
31	1143	BAY	28													
31	1144	BAY	16													
31	1145	BAY	9													
31	1146	BAY	19													
31	1147	BAY	9													

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
31	1148	BAY	9	22												
31	1149	BAY	16	23	13											
31	1150	BAY	32	20	16											
31	1151	BAY	6	18	18	16										
32	1035	BAY	9	13												
32	1036	BAY	11	8	7	9	6	10								
32	1037	BAY	5	8												
32	1038	BAY	5													
32	1039	BAY	8													
32	1040	BAY	5													
32	1041	BAY	14	9												
32	1042	BAY	8	13												
32	1043	BAY	16	7	12	9										
32	1044	BAY	8													
32	1045	BAY	9													
32	1046	BAY	6	8												
32	1047	BAY	9	16												
32	1048	BAY	7	12												
32	1050	BAY	6	7												
32	1051	BAY	9	12	6	9										
32	1052	LIVE OAK	13													
32	1053	LIVE OAK	19	17												
32	1075	LIVE OAK	15													
32	1076	LIVE OAK	9	8												
32	1077	LIVE OAK	13													
32	1078	LIVE OAK	10													
32	1079	LIVE OAK	11	6												
32	1080	LIVE OAK	9													
32	1081	LIVE OAK	10													
32	1082	BAY	12													
32	1083	LIVE OAK	12	12												
32	1084	BAY	6	5												
32	1085	BAY	15													
32	1086	BAY	6													
32	1087	BAY	6	6												
32	1088	BAY	7													
32	1089	BAY	6													
32	1090	BAY	8													
32	1091	BAY	5													
32	1092	BAY	5													
32	1093	LIVE OAK	16													
32	1094	LIVE OAK	9													
32	1095	LIVE OAK	8													
32	1096	LIVE OAK	16	17	17											
32	1097	LIVE OAK	10													
32	1098	LIVE OAK	28													
32	1099	LIVE OAK	9	13	18											
32	1100	LIVE OAK	28													
32	1101	LIVE OAK	32													
32	1102	LIVE OAK	31	34												
32	1103	LIVE OAK	36													
32	1104	LIVE OAK	15	19												
32	1105	LIVE OAK	19													
32	1106	LIVE OAK	25	14												
34	877	LIVE OAK	46	30												
34	878	LIVE OAK	22													
36	874	LIVE OAK	40	13												
36	875	EUCALYPTUS	82													
36	876	EUCALYPTUS	63													

SUSCOL MOUNTAIN VINEYARDS
TREE REMOVAL INFORMATION

BLOCK	TREE #	SPECIES	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)	DBH (IN)
42	863	BAY	31	18												
42	864	BAY	17													
42	865	LIVE OAK	23													
42	866	LIVE OAK	27													
42	867	LIVE OAK	10													
42	868	LIVE OAK	40													
42	869	BAY	7													
42	870	LIVE OAK	47													
42	871	LIVE OAK	25													
43	872	LIVE OAK	52													
43	873	LIVE OAK	38													

Erosion Control Plan Design Drawings
on file at Napa County Conservation,
Development and Planning Department

Napa County
CONSERVATION, DEVELOPMENT & PLANNING COMMISSION

1195 Third Street, Room 210, Napa, California 94559
(707) 253-4416

BASIC APPLICATION FOR EROSION CONTROL PLAN REVIEW

FOR OFFICE USE ONLY

SUBMITTAL DATE: ____________

FILE #: ____________ APN #: ____________ USGS QUAD: ____________

[ ] STRUCTURAL [ ] AGRICULTURAL TOWNSHIP/RANGE: ____________

REQUEST: ____________

PROJECT TYPE: Agriculture: New ____ Vineyard Replant (Process I: ____ II: ____) Other: ____________

Non-Agriculture: Structure ____ Driveway ____ Road ____ Reservoir ____ Other ____________

PERCENT SLOPE: Cropland: ____ Structure: ____ Pad: ____ Driveway: ____ Road: ____

OTHER PERMITS: Grading Permit ____ Use Permit: ____ Variance: ____ Septic System Permit: ____ Groundwater Permit: ____

REVIEW AGENCIES: CDPD: X County Consultant: ____ OR RCD: ____

FINAL APPROVAL: CDPD: X Date: ____________

TO BE COMPLETED BY APPLICANT
(Please type or print legibly)

Applicant's Name: SPP Napa Vineyards LLC

Telephone #: (707) 253-1776 **Fax #:** (707) 253-0135 **E-Mail:** ____________

Mailing Address: 855 Bordeaux Way Suite 100 (No Street) Napa (City) CA (State) 94558 (Zip)

Status of Applicant's Interest in Property: Owner

Property Owner's Name: SPP Napa Vineyards LLC

Telephone #: (707) 253-1776 **Fax #:** (707) 253-0135 **E-Mail:** ____________

Mailing Address: 855 Bordeaux Way Suite 100 (No Street) Napa (City) CA (State) 94558 (Zip)

Site Address/Location: ____ (No) ____ (Street) Napa (City)

Assessor's Parcel #: see next page **Existing Parcel Size:** 2123 acres **Development Area Size:** 579 acres

Slope Range: 5 % to 35 % **Total Acreage ≥ 30%:** 5.5 acres **Estimated Total Amount of Cut & Fill:** 0 cubic yards

Land or Aerial Survey Prepared By Michael W. Brooks & Associates, Inc. and Airmaps, Inc. **Date:** July 1, 2008

(**NOTE**: Contour map/survey is required for all development areas with an estimated slope of 15% or greater and for all road/driveway projects. Contour map must include all areas within 100' of the cut and fill edges. Percent slope shall be calculated and presented as whole numbers.)

Source(s) of Water: existing and proposed wells

Related Permits Filed: ☐ Water Rights ☐ Groundwater ☐ Well ☐ Sewage Disposal ☐ Use Permit/Variance? ☐ Timber Harvest ☐ Stream Alteration ☐ Others: ____________

I hereby certify that all the information contained in this application, including but not limited to, this application form, the supplemental information sheets, site plan, plot plan, cross sections/elevations, is complete and accurate to the best of my knowledge. I hereby authorize such investigations including access to County Assessor's Records as are deemed necessary by the County Planning Division for evaluation of this application and preparation of reports related thereto, including the right of access to the property involved.

[signature] 4-22-09 [signature] 4-22-09
Signature of Applicant *Date* *Signature of Property Owner* *Date*

TO BE COMPLETED BY CONSERVATION, DEVELOPMENT AND PLANNING DEPARTMENT

$ ________ ________ ________ ________
Estimated Fee *Receipt Number:* *Received By* *Date*

EROSION CONTROL PLAN SUPPLEMENTAL INFORMATION

Project/Construction Phasing Information

1. Project Description: APN: 045-360-006 & -007, 057-020-069, 057-030-004
   To develop 455 acres of new vineyard

   Parcel size: 2123 acres Total land area disturbed: 579 acres
   Agriculture: NEW plant acres: 455 Replant acres: 0
   Structures: ☐ residence ☐ building ☐ driveway ☐ road ☐ other ________
2. Project Phases: ☒ one ☐ two or ☐ ________
3. Anticipated date to start construction (month/year): April 1, 2011
4. Estimated date of completion of each phase: Phase 1: 10-1-11
   Phase 2: ________
   Phase __: ________
5. Total construction time estimated: 5 months
6. Work scheduled between Oct. 1 and Apr. 1? ☐Yes ☒No **OR**
   between Sept. 1 and Apr. 1? ☐Yes ☐No (municipal watershed)
7. Winterization measures in the Erosion Control Plan See ECP Narrative
8. Is a grading permit, a well permit, or a sewage disposal permit required? ☐Yes ☒No
   If yes has the Napa Co ☐ Public Works and/or ☐ Environmental Management Departs. been notified? ☐Yes ☐No

Slope Information

9. Earth moving, grading or land clearing on slope(s) of: 5 % to 35 %
10. Total acreage with slopes greater than or equal to 30%: 5.5 acres
11. Contour mapping source: Michael W. Brooks & Associates, Inc. and Airmaps, Inc.

Water Deficient Area, Watershed Area, & Water Rights Diversion Permits

12. Water-deficient area: ☐Yes *(applicant must contact Co Env Mgmt Dept)* ☒No
13. Sub-Watershed Name: Arroyo Creek, Cayetano Creek, Central Creek, Fagan Creek, Sheehy Creek, and Suscol Creek
    Municipal Reservoir Watershed: ☐Yes ☒No
    If yes: ☐ Bell Canyon ☐ Kimball ☐ Milliken ☐ Lake Hennessey ☐ Rector
14. Have any other erosion control plans effecting this parcel been approved since 1991? ☐Yes ☒No
15. Coverage information (required for projects in any watershed): **N/A**
    (a) Existing acres of tree canopy cover per parcel: ________ acres
    Proposed acres of canopy cover to be removed: ________ acres
    Percent of canopy cover to be retained per parcel: ________%
    (b) Existing acres of shrub, brush, grass without tree canopy per parcel: ________ acres
    Proposed acres of shrub, brush, grass cover to be removed: ________ acres
    Percent of shrubs, brush, grass to be retained per parcel: ________%
16. Is there a Water Rights permit associated with the project or parcel? ☐Yes ☒No
    a) Copy of permit from the State Dept of Water Resources attached? ☐Yes ☐No **OR**
    b) Date application for necessary permit submitted to this board: ________
    c) Copy of associated CEQA document attached? ☐Yes ☐No acre/feet ______

Streams, Watercourses, & Streambed Alteration Agreements

17. All streams and watercourses in vicinity of project area(s) shown and the required setback(s) indicated with the distance and slope? ☒Yes ☐No
18. Is there a State Dept of Fish & Game Streambed Alteration (1603) Permit associated with the project or parcel? ☐Yes ☒No
    (a) Copy of State Dept of Fish & Game Permit attached? ☐Yes **OR**
    (b) Date application for necessary permit submitted to this agency: ______________________
    (c) Copy of CEQA document prepared attached? ☐Yes ☐No

Environmental Setting

19. Is any portion of the project located on or within 500' of a landslide? ☒Yes ☐No
    Cite source:____ Napa County Sensitivity Maps
20. Is any portion of the project located in the vicinity of rare/endangered species, species of special concern (plant, animal), wetland (type), riparian habitat, critical habitat, etc.? ☒Yes ☐No
    If yes, list:___ See report
    Cite source/reference(s): ______________________
    Specific study prepared: _ *Biological Survey Report for the Suscol Kirkland Property* by___ LSA Associates, Inc._ date:__ March 12, 2009
21. Is any portion of the project located on or within 500' of an archeological or historic site? ☒Yes ☐No
    Cite source:______________________
    Specific study prepared: _ *A Cultural Resources Constraints Analysis for the Silverado Suscol Project, Near Napa, Napa County, California* _ by_ LSA Associates, Inc. _ date:__ July 6, 2007

Grading Information

22. Are any new roads/driveways associated with the project? ☐Yes ☒No
23. Are any new vineyard avenues associated with the project? ☒Yes ☐No
24. Will the project involve any recontouring of the land? ☐Yes ☒No
25. Will there be any excavation or fill deeper than 12 inches? ☐Yes ☒No
26. Total cubic yards of cut & fill: _ 0__________
    Cubic yards of cut: ______________ fill:______________
    Spoils location: on-site______________________ off-site______________________
27. Has a grading permit been filed with the Co Public Works Dept? ☐Yes ☒No
28. Will the project involve repair of a landslide? ☐Yes ☒No
    Location________________ Size ______ Report ______________________

TIMBER HARVEST/TIMBER CONVERSION PERMITS

29. Is there a Timber Harvest or Conversion permit associated with the project/parcel? ☐Yes ☒No
    Number of Acres: ______________
    a) Copy of State Dept of Forestry Permit attached? ☐Yes **OR**
    b) Date application for necessary permit submitted to this agency: ______________________
    c) Copy of associated CEQA document attached? ☐Yes ☐No
    d) Date other County erosion control plan(s) submitted if different than the application date for this plan:
    ____
30. Is there a Timberland Conversion Exception associated with the project or parcel? ☐Yes ☒No

INDEMNIFICATION AGREEMENT

Pursuant to Chapter 1.30 of the Napa County Code, as part of the application for a discretionary land use project approval for the project identified below, Applicant agrees to defend, indemnify, release and hold harmless Napa County, its agents, officers, attorneys, employees, departments, boards and commissions (hereafter collectively "County") from any claim, action or proceeding (hereafter collectively "proceeding") brought against County, the purpose of which is to attack, set aside, void or annul the discretionary project approval of the County, or an action relating to this project required by any such proceeding to be taken to comply with the California Environmental Quality Act by County, or both. This indemnification shall include, but not be limited to damages awarded against the County, if any, and cost of suit, attorneys' fees, and other liabilities and expenses incurred in connection with such proceeding that relate to this discretionary approval or an action related to this project taken to comply with CEQA whether incurred by the Applicant, the County, and/or the parties initiating or bringing such proceeding. Applicant further agrees to indemnify the County for all of County's costs, attorneys' fees, and damages, which the County incurs in enforcing this indemnification agreement.

Applicant further agrees, as a condition of project approval, to defend, indemnify and hold harmless the County for all costs incurred in additional investigation of or study of, or for supplementing, redrafting, revising, or amending any document (such as an EIR, negative declaration, specific plan, or general plan amendment) if made necessary by said proceeding and if the Applicant desires to pursue securing approvals which are conditioned on the approval of such documents.

In the event any such proceeding is brought, County shall promptly notify the Applicant of the proceeding, and County shall cooperate fully in the defense. If County fails to promptly notify the Applicant of the proceeding, or if County fails to cooperate fully in the defense, the Applicant shall not thereafter be responsible to defend, indemnify, or hold harmless the County. The County shall retain the right to participate in the defense of the proceeding if it bears its own attorneys' fees and costs, and defends the action in good faith. The Applicant shall not be required to pay or perform any settlement unless the settlement is approved by the Applicant.

[signature]	[signature]
Applicant	Property Owner (if other than Applicant)
4-22-09	
Date	Project Identification

SUPPLEMENTAL ENVIRONMENTAL INFORMATION (ECP)

To be provided by Property Owner: SPP NAPA VINEYARDS, LLC

Attach response sheets to this page.

A. GENERAL INFORMATION

#1-8 - SEE ECP Narrative

1. Name, address, telephone number of property owner.
2. Address of project.
3. APN.
4. Name, Address and telephone number of person to be contacted concerning this project, if different than owner.
5. Indicate type or number of the permit application for the project to which this form pertains.
6. List and describe any other related permits and/or other public approvals required for this project or parcel, including those required by city, regional, state and federal agencies.
7. Existing zoning district.
8. Proposed use of entire site and/or parcel. List and describe any other projects or improvements with site locations anticipated within the next several years (1-3-5 years).

B. PROJECT DESCRIPTION

#9-14 SEE ECP Narrative

9. Parcel(s) size(s), acres per parcel.
10. Project(s) size(s), acres per project.
11. Attach plans.
12. Proposed scheduling.
13. Anticipated incremental or phased development.
14. If the project involves Napa County grading permit, use permit, variance or rezoning application, state this and indicate clearly why the application is required.

Discuss and check yes the following items which are applicable to your project or its effects (attach additional sheets)

	YES	NO	
15.	☐	☑	Change in existing features of any watercourses, wetlands, tidelands, beaches, hills or alteration of ground contours.
16.	☐	☑	Change in scenic views or vistas from existing residential areas or public lands or roads.
17.	☐	☑	Change in the pattern, scale or character of general area of project.
18.	☐	☑	Change in bay, lake, stream or ground water quality or quantity, or alteration of existing drainage patterns.
19.	☑	☐	Site on filled land or on slopes of 5% or more.
20.	☐	☑	Substantial change in demand for Napa County services (police, fire, water, sewage, etc.)
21.	☐	☑	Relationship to a larger project or series of projects.

C. ENVIRONMENTAL SETTING

22. Describe the project site as it exists before the project, including information on topography, soil stability, plants and animals, wetlands (types), riparian habitat and any cultural, historical or scenic aspects. Describe any/all existing structures on the site, and the use of the structures. Attach photographs of the site, could include current aerial photo.

23. Describe the surrounding properties (approximately ¼ mile radius form parcel boundary), including information on plants and animals and any cultural, historical or scenic aspects. Indicate the type of land use (agriculture, residential, commercial, etc.), intensity of land use (vineyards, winery, one-family, multi-family, industry, etc.), and scale of development (acres, height, setback, yard, etc.). Attach photographs of the vicinity, could include current aerial photo.

D. CERTIFICATION

I hereby certify that the statements furnished responding to the above and in the attached sheets present the data and information required for this initial evaluation to the best of my ability, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief.

4/24/09

Date

Signature of Property Owner

Attachment D

Phase I Water Availability Analysis

File #:__ __-__ __ __ Owner: SPP Napa Vineyards LLC Parcel #: 045-360-006 & -007, 057-020-069, 057-030-004

This form is intended to help those who must prepare a Phase I Water Availability Analysis. **The Department will not accept an analysis that is not on this form.**

Background: A Phase I Water Availability Analysis is done in order to determine what changes in water use will occur on a property as a result of the a conversion. Staff uses this information to determine whether the project may have a detrimental effect on groundwater levels. If it may, additional information will be required. You will be advised if additional information is needed.

Persons Qualified To Prepare: Any person that can provide the needed information

Procedure:

Step 1: *Prepare and attach to this form an 8-1/2"x11" site plan of your parcel(s) with the locations of all structures, gardens, vineyards, etc in which well water will be used shown*

Step 2: *Determine the allowable groundwater use allotment for your parcel(s).*

Total size of parcel(s)	2123	acre(s)
Multiply by parcel location factor	x 0.5	acre-foot per acre per year (see back)
Allowable groundwater allotment	= 1062	acre-foot per year

Step 3: *Determine the estimated water use for all vineyards on your parcel(s) currently and after the planned conversion; actual water usage figures may be substituted for the current usage estimate (please indicate if this is done). Estimate future use for both the vineyard establishment period and thereafter*

Current Usage:

Number of *planted* acres	0	acres
Multiply by number of vines/acre	x ______	vines per acre
Multiply by gallons/vine/year	x ______	gallons of water per vine per year
Divide by 325,821 gallons/af	= 0	af of water per yr used for vineyard irrigation

Future Usage:

Number of *planted* acres	455	acres
Multiply by number of vines/acre	x ______	vines per acre
Multiply by gallons/vine/year	x ______	gallons of water per vine per year (long-term)
	______	gallons of water per vine per year (establish)
Divide by 325,821 gallons/af	= 273	af of water per yr used (vineyard long-term)
	273	af of water per yr used (vineyard establish)

Step 4: *Using the guidelines on the next page, actual water usage figures, and/or detailed water use projections, tabulate the existing and projected future water usage on the parcel(s) in acre-foot per year (af/yr) {1 af = 325,821 gallons}.*

Existing Usage:		Future Usage:	
Residential	______ af/yr	Residential	______ af/yr
Farm Labor Dwelling	______ af/yr	Farm Labor Dwelling	______ af/yr
Winery	______ af/yr	Winery	______ af/yr
Commercial	______ af/yr	Commercial	______ af/yr
Vineyard(long-term)	______ af/yr	Vineyard(long-term)	273 af/yr

" (establish)	______	af/yr	" (establish)	273	af/yr
Other Agriculture	______	af/yr	Other Agriculture	______	af/yr
Landscaping	______	af/yr	Landscaping	______	af/yr
Other Usage	______	af/yr	Other Usage	______	af/yr
TOTAL	0	af/yr	TOTAL	273	af/yr

STEP 5: *Attach all supporting information that may be significant to this analysis including but not limited to all water use calculations for the various uses listed*

Parcel Location Factors

The allowable allotment of water is based on the location of your parcel. Valley floor areas include all locations on the floor of the Napa Valley and Carneros Basin except for groundwater deficient areas. Groundwater deficient areas are areas that have been determined by the Department of Public Works as having a history of problems with groundwater. All other areas are classified as Mountain Areas. Public Works can assist you in determining your classification.

Parcel Location Factors	
Valley Floor	1.0 acre foot per acre per year
Mountain Areas	0.5 acre foot per acre per year
Groundwater Deficient Area (MST)	0.3 acre foot per acre per year

Guidelines For Estimating Water Usage:

Residential:	
Single Family Residence	0.5 acre-foot per year
Farm Labor Dwelling	1.0 acre-foot per year (6 people)
Second Unit	0.4 acre-foot per year
Guest Cottage	0.1 acre-foot per year
Winery:	
Process Water	2.15 acre-foot per 100,000 gal. of wine
Domestic and Landscaping	0.50 acre-foot per 100,000 gal. of wine
Commercial:	
Office Space	0.01 acre-foot per employee per year
Warehouse	0.05 acre-foot per employee per year
Agricultural:	
Vineyards	
Irrigation only	0.2 to 0.5 acre-foot per acre per year
Heat Protection	0.25 acre foot per acre per year
Frost Protection	0.25 acre foot per acre per year
Irrigated Pasture	4.0 acre-foot per acre per year
Orchards	4.0 acre-foot per acre per year
Livestock (sheep or cows)	0.01 acre-foot per acre per year
Landscaping:	
Landscaping	1.5 acre-foot per acre per year

The 0.6 acf/ac/year number was supplied by the Owner.

Proposed water use: 455 ac * 0.6 acf/ac/year = 273 acf/year

Attachment A

SUPPLEMENTAL PROJECT INFORMATION

File #: Owner: SPP Napa Vineyards LLC Parcel #: 045-360-006 & -007, 057-020-069, 057-030-004

Vineyard Development Area Specifics

1. **Size of Area Disturbed:**	579	acres
2. **Size of Vineyard:**	455	acres
3. **Acres of Vines:**	455	acres
4. **Slopes of Area Disturbed:**	5 % to 35 %	
5. **Amount of Total Acreage Equal to or Above 30% Slope:**	5.5	acres
6. **Total Number of Trees Removed**	1247	trees
a) natives	1245	trees
b) non-natives	2	trees

Vineyard Development Schedule

1. **Pre-Planting Stage:**
   (i.e. land clearing, ripping, installation of drainage system., vineyard staking, installation of irrigation system., installation and maintenance of permanent and temporary erosion control measures, planting of cover crop, straw mulching)
   Start Date: April 1 End Date: October 1 Duration: 183 days
   Temporary Cover Crop Planted x Yes ____ No
2. **Planting Stage:**
   (i.e planting of vines, seeding permanent cover crop, apply straw mulch, maintenance of erosion control measures)
   Start Date: 4/1/2010 End Date: 8/31/2015 Duration: 5 years
3. **Operational Stage:**
   (maintenance and adjustment as needed of permanent erosion control practices, implementation of annual vineyard and erosion control measures, commencement of annual harvests)
   Start Date: April 1

Vineyard Operations Information

1. **Farming Equipment:**
   - x Track-laying — Percent of Use 50 %
   - x Rubber-tired — Percent of Use 35 %
   - x ATV — Percent of Use 10 %
   - x Hand/Manual — Percent of Use 5 %
   - ____ Other (describe) ____ — Percent of Use ____ %
2. **Annual Pruning:**
   Time of Year: Dec. 20 - March 10 Number of days: 50 to 60(rain?) Number of Workers: 45
3. **Annual Sulfuring:**
   Time of Year: May-June Estimated applications/year: 5
4. **Weed Control:**

	Under Vines	***Between Rows***
Type of control	Herbicide	Mow and Disc until vineyard is level and smooth, then mow
Method of application	Strip spray-ground equipment	Track and rubber tractor mounted flail and/or rotary mowers or offset dis
Months:	Dec-Jan---July	March-June
Applications/year:	2	Mow-2X to 3X year (rain dependent)
Number of Workers:	4	4

5. **Harvest (Crush):**
   Length 20 days Number of Workers: 80

6. **Frost Protection Method(s)**

	Hours of Operation	Frequency (times/year)
____ Return-stack heaters		
____ Sprinklers		
____ Misters		
__3__ Wind Machines	night-as needed	15
____ Late Pruning		
____ Other ____________		

7. **Rodent Protection Method(s):**

x Rodenticides
____ Traps
____ Fencing
____ Raptors
__x__ Other ____ raptor and owl purches and boxes

8. **Bird Protection Method(s):**

	Time of Year (months)	Time of Day	Duration of Use (days per year)
__x__ Netting	July-Oct		90
__x__ Bird Cannons	Aug-Oct	6am to 6pm	90
__x__ Visual Distracters *(Mylar strips, etc)*	July-Oct		
__x__ Raptor Perches	July-Oct		
__x__ Other _Hand held bird scare guns	July-Oct	6am to 6pm	90

9. **Proposed Nighttime Activities:**

	Time of Night	Duration of Use (days per year)
__x__ Harvest	9pm to 5am	20
_x_ Sulphur Application	9pm to 5am	15
__x__ Pesticide/Herbicide Application	9pm to 5am	10
____ Other ____________		

10. **Irrigation Methods**

____ Sprinklers __x__ Drip System ____ Other ____________

11. **Other Proposed Activities:**

____

Traffic Characteristics Information

1. **Estimated size of grape trucks/truck & trailers to be used:** 10 and 24 tons
2. **Estimated number of truck trips per day:** during Crush: __6___ annually: ___170___
3. **Estimated number of farmworkers/vehicle:** __4__ Crush __2__ Pruning
4. **Lunch provided on-site for farmworkers:** ____ Yes _x__ No
5. **Proposed primary access:** _______see maps
6. **Proposed secondary access, if any:** _____see maps

Itemized Fertilizer and Pesticide Information

	Application Method (broadcast, spray, drip system, etc)	Application Amount (per acre)	Number of Applications per Year.	Annual Amount Used (per acre)	Total Annual Amount Used Overall.
1. Fertilizers					
3–18–18	drip	15 gallons	1	15 gallons	6849
6--10–10	drip	15 gallons	1	15 gallons	6849
0--0–30	drip	15 gallons	1	15 gallons	6849

2. Mildewcides

sulfur dust	tractor/ground	15lbs/ac,	5	75	34245
sulfur wettable	tractor/ground	3lbs/ac	2	6	2740
copper	tractor/ground	2pts/ac	2	4	1826
synthetic	tractor/ground	4oz/ac	4	16	7306
3. Herbicides					
Round Up	tractor/ground	2qt/ac	2	4	1826
Chateau	tractor/ground	16oz/ac	1	16	7306
Goal	tractor/ground	1 qt/ac	1	1	457

4. Rodenticides

5. Other Chemicals

Pesticides as required,
using current IPM standards as
published by the Statewide Integrated Pest Management
Program

6. Proposed Storage, Mixing/Handling and Safety Measures:

Type of onsite chemical storage facility in use or proposed:

Exsisting chemical storage exsists on contigous property, New mixing and loading areas located thoughout project, locations TBD with irrigation design and when identified enviromental constraints have been properly studied.

Location of current or potential area(s) used for the mixing agricultural chemicals and the description of the facilities present thereat:

Same as above

Location of current or proposed area designated for the cleaning and washing of chemical application equipment:

same as above

Water Source and Usage Information

Use Attachment D to calculate information requested

1. Current and/or Proposed Water Supply Source(s):

Agricultural Water Source(s):	***Percent of Total Agricultural Use:***
X Well	100 %
___ Spring	___%
___ Stream or Creek	___%
___ Reservoir(s)	___%
___ Other ______	___%
	100%

Residential and Non-Agricultural Water Source(s):	***Percent of Total Resid & Non-Ag***
___ Well	___%
___ Spring	___%
___ Stream or Creek	___%
___ Other ______	___%
	100%

2. Current and Future/Proposed Water Usage *(acre-foot per year = AF/yr):*

	Current Usage:	***Future Usage:***
Vineyard & other Agricultural. Uses:	0 AF/yr	273 AF/yr

Residential/Domestic Uses: ______ AF/yr ______ AF/yr
Other Uses: ______ AF/yr ______ AF/yr
Total Usage: 0 AF/yr 273 AF/yr

3. Allowable Groundwater Allotment: 1062 AF/yr

Rock/Spoils/Debris Disposal Information

1. Use/Disposal of Rock Generated (brought to the surface during the vineyard preparation ripping and raking process):

Proposed Use/Disposal Method:	*Percent of Total*	*Location*	
X Road Base (crushed to aggregate size)	40 %	X on-site	____ off-site
____ "Rock Mulch" (crushed to fist size and returned to fields)	____ %	____ on-site	____ off-site
____ Decorative Rock	____ %	____ on-site	____ off-site
____ Fill (buried)	____ %	____ on-site	____ off-site
X Stacked In Pile	50 %	X on-site	____ off-site
X Other erosion control measures	10 %	X on-site	____ off-site

2. Estimated Amount of Cut & Fill: 0 cubic yards (total)
____ cubic yards (cut) ____ cubic yards(fill)

3. If rock/spoils material is to be disposed of off-site, where, what for and how much:

Location of Disposal Site	*Use of Material*	*Quantity*
N/A		____ cubic yards
		____ cubic yards
		____ cubic yards

4. Debris Disposal (Location & Method):
____ On-site ____ X Off-site Licensed facility

Related Permits

1. Please indicate any other related or required permits associated with the proposed conversion plan:

County:
Grading: Yes ____ No X
Building: Yes ____ No X
Structural ECP: Yes ____ No X
Sewage Disposal: Yes ____ No X
Groundwater/Well Permit: Yes ____ No X
Use Permit: Yes ____ No X
Variance: Yes ____ No X
Other Not Listed: ____

State Dept of Forestry:
Timber Harvest Plan: Yes ____ No X
Timber Conversion Exemption: Yes ____ No X
Timber Conversion Permit: Yes ____ No X ____ acres
____ acres

State Dept of Fish & Game:
Streambed Alteration Permit: Yes ____ No X

State Division of Water Rights:
Appropriate Water Rights Permit: Yes ____ No X

State Environmental Protection Agency:
Chemical Application Permit(s): Yes ____ No X

Other State & Federal Permits *(please list)*:

2. Consultation with, or letter of agreement from:

Regional Water Quality Control Brd:	Yes ____	No X
National Marine Fisheries Service/NOAA:	Yes ____	No X
Army Corps of Engineers:	Yes ____	No X
U.S. Fish and Wildlife Service:	Yes ____	No X

SUSCOL MOUNTAIN VINEYARDS, LLC

April 5, 2011

Don Barrella
County of Napa
Conservation, Development and Planning
1195 Third Street
Napa, CA 94559

SUBJECT: SUSCOL MOUNTAIN ECP

Dear Don:

We have prepared the enclosed materials in response to questions that have arisen regarding the Suscol Mountain Vineyard Erosion Control Plan and have compiled several graphics to accompany our responses in these key areas. The information provided below has been prepared by the applicant, in consultation with PPI Engineering and Richard Slade and Associates. The information in this letter provides more detail on the Erosion Control Plan, but does not change the proposed project in any respect.

Vineyard Development Phasing Plan

The County has asked for more information regarding the intended schedule for vineyard construction. We understand that this information was requested to demonstrate that all necessary road maintenance could be adequately provided as vineyard construction progresses and to show the timing for future well construction in terms of planned vineyard development. We have prepared a plan showing three distinct phases of vineyard development, identified as Phase I, II and III, refer to Exhibit I, enclosed.

Phase I includes Blocks 1, 2, and 25-30
Phase II includes Blocks 3-16 and 36-39, 42 and 43
Phase III includes Blocks 17-24, 31-34, 40, 41, and 44-46

Long Term Vineyard Road Management Plan

The property has an extensive network of existing ranch roads that have been utilized for many years as a part of the cattle grazing operation. All primary vineyard roads will be on this existing road network and no new vineyard roads are required. However, not all existing roads are necessary for vineyard operations. An exhibit was provided with the Erosion Control Plan that identified the primary year round vineyard access roads. In addition, the enclosed Road Maintenance Plan (Exhibit II) has been developed to specifically identify the maintenance and management plan for all roads, both primary vineyard roads and all remaining roads that are a part of cattle grazing operations. Clearly the primary roads will handle the vast majority of the vineyard traffic; however the secondary roads have significant value for fire and emergency access and shall also be inspected and managed annually.

Exhibit II has been prepared to show both the primary year round vineyard access roads and the emergency roads. Although the majority of the existing road network does not require any improvement, there are some areas where gravel will be placed on specific sections of the primary year

855 BORDEAUX WAY, SUITE 100,
NAPA, CA 94558
Phone (707) 253-1776 Fax (707) 253-0135

round vineyard access roads in concert with Phase I and prior to all Phase II and III development activities. The gravels will be harvested on site by crushing rocks from vineyard block areas into ¾ minus and 3" minus materials. All gravel will be generated with the early ground preparation of vineyard development. The following schedule describes the way that the phasing and road maintenance will be coordinated:

<u>North side of Suscol Creek</u>
The crushed rock materials generated from Blocks 1 and 2 will be adequate for all road maintenance for all Phase I and II blocks on the north side of Suscol Creek.

Blocks 8 and 9 (Phase II) will generate adequate rock for all road maintenance for all Phase III blocks on the north side of Suscol Creek.

<u>South side of Suscol Creek</u>
Rock will be generated within Blocks 26 and 27 for all Phase I and II blocks on the south side of Suscol Creek.

Rock will be generated within Block 30 for all Phase III blocks on the south side of Suscol Creek.

This schedule will assure that the rock necessary for road management is always generated in advance of all vineyard development activities and also assures that rock will not need to be transported from the north side of the project to the south side. Crushed rock for the maintenance of the project road system will be stock piled within vineyard footprints and designated rock disposal sites in the erosion control plan.

The following section describes the road maintenance requirements for each road type as shown on Exhibit II.

Road Type 1: These roads are primary year round vineyard access roads where existing road base is native rock and contains less than 6" of top soil. For this road type, 3/4" minus material will be applied to a depth that keeps the road bed at grade with the surrounding natural grade. This material will be applied prior to vineyard development. No concentration of water by crowning or ditching will be used or has been used in the past. Roads will be maintained to retain the current and/or improve the native grade and sheet flow conditions.

Road Type 2: These roads are primary year round vineyard access roads where the existing roads traverse top soil with depths greater that 6". For this road type, a course crushed rock material (3" minus) will be used on the first application of crushed rock, prior to vineyard development. Future applications of crushed rock for maintenance will use ¾" crushed rock material. The same practices of retaining native grade and not concentrating water will be deployed in these sections of the existing road system as described in Road Type I.

Road Type 3: Existing roads that are not a part of the primary year round vineyard access plan are considered secondary roads. This class of road will be restricted to two uses. The first is for the access of vineyard blocks by the irrigation operator only. The irrigation operator shall only utilize a low ground pressure ATV type of vehicle. The second use is for fire suppression and access by emergency and fire professionals only. These limited use roads will be inspected each year prior to the rainy season. Annual management shall include the removal of large debris, such as fallen trees or large limbs from the road surface and seeding (mix- 50% creeping red fescue, 30% perennial rye and 20% hard fescue, rate 3 lbs per 1000 square feet) and straw applications on all road sections that have top soil to depths greater than 6". In addition, crushed rock and straw wattles shall be installed in areas where seed and straw alone do not provide adequate cover.

Culverts: The current road system has numerous culverts that have existed for many years. The vineyard development does not require any change in the current culvert system. All culverts will be inspected annually prior to the rainy season and maintained to assure the continuance of their current operational status. Maintenance shall include removal of large debris that could cause blockage and placement of additional rock as needed. Periodic inspections will continue throughout the winter storm season.

Well Construction

There is currently one well within the project area. The Hydrogeologic Assessment (Slade, July 2010) recommended that three additional irrigation-supply water wells be constructed to ultimately service the entire project. The location of the existing well and the three proposed wells are shown on Exhibit III. This July 2010 report included a detailed assessment of testing conducted on the existing well and also described the theoretical water level draw-down interference based on both the data collected and analytical modeling.

Phase I as shown on Exhibit I (blocks in yellow) includes 130 vine acres. The current water supply from the existing well will fully support the water demand for this 130 acre planting. The existing well has been tested and its potential impacts were evaluated in the Slade report (July 2010). The pumping test conducted in this well was at a rate of approximately 250 gpm. The 130 acres in this first phase of vineyard development can be supported by pumping the existing well at 200 gpm at 50% operational use.

Phase II (blocks in green) includes 187 vine acres. Future wells B and C mentioned in the 2010 Slade report (and shown on Exhibit III) shall be constructed for water supply for these vine acres. Wells B and C are at appropriate elevations to provide the irrigation supply needed for the Phase II area. The Slade report has described the theoretical water level draw-down for interference that could result from these wells. Slade shall provide a detailed list of well testing criteria under separate cover that will be completed after construction of these two wells. These two wells are to be constructed and tested prior to vineyard development within the Phase II area. The same vine water demand, pumping volume (200 gpm x two wells) and rate (50%) of use calculations were applied as in Phase I.

Phase III (blocks in orange) includes 112 vine acres. Water supply for this phase will be provided by the "Well A" as described in the 2010 Slade report (and shown on Exhibit III). The same water-use assumptions used above were also applied to this phase of the vineyard development. The same testing criteria will be utilized on Well A prior to vineyard development within Phase III.

It is important to note that in the 2010 Slade report, it was estimated that within the entire project area approximately 1060 gpm (at a 50% operational basis for 16 weeks) of ground water extraction could be available from multiple onsite wells. The above three phased vineyard development plan shows an overall combined pumping rate of about 800 gpm would be needed from all future onsite wells.

The applicant shall not proceed with vineyard development within the Phase II and III areas until the well testing criteria have been satisfied. Phases II and III may begin prior to completion of Phase I; however they will not begin until the water supply criteria have been satisfied.

Primary Irrigation Plan

Due to the size of the property and locations of the wells, the County has also asked for clarification regarding the primary irrigation supply system to service the project area. Exhibit III, enclosed, shows the primary irrigation supply network. All primary irrigation lines and pump stations will be located within vineyard blocks or along the year round vineyard roads (described above) and will not result in any additional ground clearing. Please note that the detailed irrigation within the vineyard block areas is not shown and will not be completed until vineyard construction. The groundwater resources for the irrigation system are based on one existing groundwater well (Well 1) and three proposed water-supply wells (A, B and C, described above). The design of the irrigation system shall be based upon the tested pumping rates mentioned above, but shall not exceed 1060 gallons per minute at 50% operation of the well field per day. We have utilized a conservative estimate of 0.6 acre-feet/acre of water demand on an annual basis. This represents a 20% increase to the general industry standard of 0 .5 acre-feet/acre for annual vineyard use in Napa Valley.

The proposed 438 vine acre total water demand was used in this preliminary design along with a higher than industry water use rate. The water supply from the existing well and the three proposed wells will meet the total 438 vine acre demand without storage. Several booster pumps will be installed. The enclosed plan shows the primary irrigation lines and booster pump locations.

Well 1 (existing) and Wells B and C (proposed) will be linked with the primary irrigation lines as shown on the Primary Irrigation Supply Line, Exhibit III. Three booster pumps will be located within the proposed vineyard footprint areas. One creek crossing is required to transport water from the wells to points south of Suscol Creek. Water line crossings shall be constructed without any construction or impact within the bed and bank of the creek (common vineyard irrigation design). Pipe sizing size for the project does not exceed 8" in diameter and size is graduated downward as needed. Well A does not need to be linked to the system that services Phases I and II.

Green House Gas Analysis

The following questions were asked by AES as a part of development of the GHG analysis for the Suscol Mountain Vineyard ECP Draft EIR. Answers are provided by the applicant.

1. Yearly electricity usage in kilowatt per year.
   No electric service is required.

2. Will any habitat restoration take place, if so how many acres?
   Until completion of the project mitigation measures, it is not clear how many acres of habitat restoration will be done. Examples of habitat restoration that will take place with

implementation of mitigation measures are described in the LSA Biological Assessment (Aug., 2010) and are summarized below:

- Grassland management in non-vineyard areas
- Avoidance and replacement of oak woodland habitat. The project as designed only includes 6% of the existing oak woodland habitat on the property within the project area, preserving 94%. The Biological Assessment stated that approximately one quarter of the Suscol Mountain property support oak woodland (492.6 acres of 2,111.2 acres). The project includes tree removal on 29.6 acres of oak woodland habitat (6% of the total). The Biological Assessment recommends an additional avoidance of 9 acres in specific high value areas and 2:1 replacement of the remaining 20.6 acres.
- Native grass restoration (purple needle grass)
- Enhancement of preserved streamside daisy habitat
- Setbacks established from all seeps and wetlands
- Avoidance of 1,015 acres of wild oats grassland
- Enhancement of riparian and aquatic habitat as a part of a riparian restoration plan associated with construction of a bridge prior to use of the existing stream crossing for vineyard construction or operations.

3. What kind of composting program, if any will the vineyard operation establish?

   The vineyard is pruned annually, and prunings are mulched in place. Other than pruning, there is no green or brown waste generated in a vineyard that could be compostable. Typically, grape pumice (the by product of grapes after crushing and pressing the fruit) is composted. Grape pumice is generated at the winery and there is no winery operation onsite.

4. What percentage of vineyard waste will be diverted from area landfills?

   There is no vineyard waste that is typically delivered to a landfill. Again, pumice, a by product after grape processing at a winery is typically composted, not delivered to a landfill. The applicant would consider accepting composted materials generated at a winery to be used onsite in order to divert this product from delivery to a landfill. Many Napa County vineyards are currently coordinating with winery owners to accomplish this.

5. Will water conservation methods be implemented, if so what kinds?

   Soil moisture sensors will be installed in each vineyard block. One telemetric weather station will be installed that will provide real time weather conditions 24/7. This data will be used to establish the irrigation demand schedule.

6. Will the project proponent use alternative fuels in their agricultural equipment?

   No alternative fuels are planned at this time.

7. Will onsite housing or carpooling be available for seasonal and/or permanent vineyard workers?

   No housing onsite is planned. Although it is common practice for vineyard workers to carpool, the vineyard operator will not establish a required carpooling program.

We hope this information addresses the remaining questions that the County has raised and that this information is presented in a format that can be easily incorporated into the project review. We look forward to moving this project forward. If you need any additional information, please contact either Pete Opatz a (707) 261-8710 or Beth Painter at (707) 261-8719. Thank you for your continued assistance with this project.

Sincerely,

Beth Painter

Pete Opatz

Beth Painter

Enclosures

Exhibit I

Exhibit II

Exhibit III

Cc: Mark Couchman
Rob Anglin
Jim Bushey
Richard Slade

APPENDIX C

EMISSIONS ESTIMATES

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Urbemis 2007 Version 9.2.4

Combined Summer Emissions Reports (Pounds/Day)

File Name: C:\Documents and Settings\equinn\Application Data\Urbemis\Version9a\Projects\Suscol\Suscol12, 13, 14.urb924

Project Name: Suscol Mountain - Proposed Project

Project Location: Bay Area Air District

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

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Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2012 TOTALS (lbs/day unmitigated)	11.03	60.97	182.42	0.17	35.86	2.73	38.60	7.62	2.48	10.10	24,420.09
2012 TOTALS (lbs/day mitigated)	11.03	53.16	182.42	0.17	11.29	1.58	12.87	2.49	1.42	3.91	24,420.09
2013 TOTALS (lbs/day unmitigated)	10.19	56.00	169.40	0.17	46.86	2.52	49.38	9.92	2.28	12.20	24,430.45
2013 TOTALS (lbs/day mitigated)	10.19	48.82	169.40	0.17	14.56	1.47	16.04	3.17	1.32	4.49	24,430.45
2014 TOTALS (lbs/day unmitigated)	9.43	50.29	157.32	0.17	50.86	2.25	53.11	10.75	2.03	12.79	24,439.70
2014 TOTALS (lbs/day mitigated)	9.43	43.85	157.32	0.17	15.75	1.34	17.09	3.42	1.20	4.62	24,439.70

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.12	0.02	1.55	0.00	0.01	0.01	2.81

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	6.84	2.00	20.14	0.02	3.90	0.74	2,169.23

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	6.96	2.02	21.69	0.02	3.91	0.75	2,172.04

Construction Unmitigated Detail Report:

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CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
Time Slice 4/2/2012-8/30/2012 Active Days: 130	11.03	60.97	182.42	0.17	35.86	2.73	38.60	7.62	2.48	10.10	24,420.09
Building 04/01/2012-08/30/2012	6.40	19.53	163.95	0.17	0.85	1.10	1.94	0.31	0.98	1.28	18,335.40
Building Off Road Diesel	1.87	10.77	6.40	0.00	0.00	0.67	0.67	0.00	0.62	0.62	1,226.16
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	4.53	8.76	157.55	0.17	0.85	0.42	1.27	0.31	0.36	0.66	17,109.24
Mass Grading 04/01/2012-08/30/2012	4.63	41.44	18.46	0.00	35.01	1.64	36.65	7.31	1.51	8.82	6,084.69
Mass Grading Dust	0.00	0.00	0.00	0.00	35.00	0.00	35.00	7.31	0.00	7.31	0.00
Mass Grading Off Road Diesel	4.56	41.29	15.89	0.00	0.00	1.63	1.63	0.00	1.50	1.50	5,804.63
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.07	0.14	2.58	0.00	0.01	0.01	0.02	0.01	0.01	0.01	280.05
Time Slice 4/1/2013-8/30/2013 Active Days: 131	10.19	56.00	169.40	0.17	46.86	2.52	49.38	9.92	2.28	12.20	24,430.45
Building 04/01/2013-08/30/2013	5.81	17.98	151.42	0.17	0.85	1.02	1.87	0.31	0.91	1.22	18,345.59
Building Off Road Diesel	1.71	10.02	6.27	0.00	0.00	0.60	0.60	0.00	0.55	0.55	1,226.16
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	4.09	7.96	145.14	0.17	0.85	0.42	1.27	0.31	0.36	0.66	17,119.43
Mass Grading 04/01/2013-08/30/2013	4.38	38.02	17.98	0.00	46.01	1.49	47.51	9.61	1.37	10.99	6,084.85
Mass Grading Dust	0.00	0.00	0.00	0.00	46.00	0.00	46.00	9.61	0.00	9.61	0.00
Mass Grading Off Road Diesel	4.31	37.89	15.60	0.00	0.00	1.49	1.49	0.00	1.37	1.37	5,804.63
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.07	0.13	2.38	0.00	0.01	0.01	0.02	0.01	0.01	0.01	280.22

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Time Slice 4/1/2014-8/30/2014 Active Days: 131	9.43	50.29	157.32	0.17	50.86	2.25	53.11	10.75	2.03	12.79	24,439.70
Building 04/01/2014-08/30/2014	5.28	16.47	139.83	0.17	0.85	0.95	1.80	0.31	0.84	1.15	18,354.70
Building Off Road Diesel	1.58	9.22	6.15	0.00	0.00	0.53	0.53	0.00	0.49	0.49	1,226.16
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	3.70	7.25	133.68	0.17	0.85	0.42	1.27	0.31	0.36	0.66	17,128.54
Mass Grading 04/01/2014-08/30/2014	4.14	33.83	17.49	0.00	50.01	1.29	51.31	10.45	1.19	11.64	6,085.00
Mass Grading Dust	0.00	0.00	0.00	0.00	50.00	0.00	50.00	10.44	0.00	10.44	0.00
Mass Grading Off Road Diesel	4.08	33.71	15.30	0.00	0.00	1.29	1.29	0.00	1.18	1.18	5,804.63
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.06	0.12	2.19	0.00	0.01	0.01	0.02	0.01	0.01	0.01	280.37

Phase Assumptions

Phase: Mass Grading 4/1/2012 - 8/30/2012 - Default Fine Site Grading Description

Total Acres Disturbed: 157

Maximum Daily Acreage Disturbed: 1.75

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Bore/Drill Rigs (291 hp) operating at a 0.75 load factor for 7 hours per day

1 Excavators (168 hp) operating at a 0.57 load factor for 7 hours per day

1 Off Highway Trucks (479 hp) operating at a 0.57 load factor for 7 hours per day

1 Other Equipment (190 hp) operating at a 0.62 load factor for 7 hours per day

1 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 7 hours per day

1 Other Material Handling Equipment (191 hp) operating at a 0.59 load factor for 7 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 7 hours per day

Phase: Mass Grading 4/1/2013 - 8/30/2013 - Type Your Description Here

Total Acres Disturbed: 254

Maximum Daily Acreage Disturbed: 2.3

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Bore/Drill Rigs (291 hp) operating at a 0.75 load factor for 7 hours per day

1 Excavators (168 hp) operating at a 0.57 load factor for 7 hours per day

1 Off Highway Trucks (479 hp) operating at a 0.57 load factor for 7 hours per day

1 Other Equipment (190 hp) operating at a 0.62 load factor for 7 hours per day

1 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 7 hours per day

1 Other Material Handling Equipment (191 hp) operating at a 0.59 load factor for 7 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 7 hours per day

Phase: Mass Grading 4/1/2014 - 8/30/2014 - Type Your Description Here

Total Acres Disturbed: 150

Maximum Daily Acreage Disturbed: 2.5

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Bore/Drill Rigs (291 hp) operating at a 0.75 load factor for 7 hours per day

1 Excavators (168 hp) operating at a 0.57 load factor for 7 hours per day

1 Off Highway Trucks (479 hp) operating at a 0.57 load factor for 7 hours per day

1 Other Equipment (190 hp) operating at a 0.62 load factor for 7 hours per day

1 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 7 hours per day

1 Other Material Handling Equipment (191 hp) operating at a 0.59 load factor for 7 hours per day

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1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 7 hours per day

Phase: Building Construction 4/1/2012 - 8/30/2012 - Type Your Description Here

Off-Road Equipment:

1 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Building Construction 4/1/2013 - 8/30/2013 - Type Your Description Here

Off-Road Equipment:

1 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Building Construction 4/1/2014 - 8/30/2014 - Type Your Description Here

Off-Road Equipment:

1 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Construction Mitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Mitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

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Time Slice 4/2/2012-8/30/2012 Active Days: 130	11.03	53.16	182.42	0.17	11.29	1.58	12.87	2.49	1.42	3.91	24,420.09
Building 04/01/2012-08/30/2012	6.40	17.92	163.95	0.17	0.85	0.76	1.61	0.31	0.67	0.97	18,335.40
Building Off Road Diesel	1.87	9.16	6.40	0.00	0.00	0.34	0.34	0.00	0.31	0.31	1,226.16
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	4.53	8.76	157.55	0.17	0.85	0.42	1.27	0.31	0.36	0.66	17,109.24
Mass Grading 04/01/2012-08/30/2012	4.63	35.24	18.46	0.00	10.44	0.82	11.26	2.18	0.76	2.94	6,084.69
Mass Grading Dust	0.00	0.00	0.00	0.00	10.42	0.00	10.42	2.18	0.00	2.18	0.00
Mass Grading Off Road Diesel	4.56	35.10	15.89	0.00	0.00	0.82	0.82	0.00	0.75	0.75	5,804.63
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.07	0.14	2.58	0.00	0.01	0.01	0.02	0.01	0.01	0.01	280.05
Time Slice 4/1/2013-8/30/2013 Active Days: 131	10.19	48.82	169.40	0.17	14.56	1.47	16.04	3.17	1.32	4.49	24,430.45
Building 04/01/2013-08/30/2013	5.81	16.48	151.42	0.17	0.85	0.72	1.57	0.31	0.63	0.94	18,345.59
Building Off Road Diesel	1.71	8.52	6.27	0.00	0.00	0.30	0.30	0.00	0.28	0.28	1,226.16
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	4.09	7.96	145.14	0.17	0.85	0.42	1.27	0.31	0.36	0.66	17,119.43
Mass Grading 04/01/2013-08/30/2013	4.38	32.34	17.98	0.00	13.71	0.75	14.46	2.87	0.69	3.56	6,084.85
Mass Grading Dust	0.00	0.00	0.00	0.00	13.70	0.00	13.70	2.86	0.00	2.86	0.00
Mass Grading Off Road Diesel	4.31	32.21	15.60	0.00	0.00	0.74	0.74	0.00	0.68	0.68	5,804.63
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.07	0.13	2.38	0.00	0.01	0.01	0.02	0.01	0.01	0.01	280.22

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Time Slice 4/1/2014-8/30/2014 Active Days: 131	9.43	43.85	157.32	0.17	15.75	1.34	17.09	3.42	1.20	4.62	24,439.70
Building 04/01/2014-08/30/2014	5.28	15.08	139.83	0.17	0.85	0.69	1.54	0.31	0.60	0.91	18,354.70
Building Off Road Diesel	1.58	7.84	6.15	0.00	0.00	0.27	0.27	0.00	0.24	0.24	1,226.16
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	3.70	7.25	133.68	0.17	0.85	0.42	1.27	0.31	0.36	0.66	17,128.54
Mass Grading 04/01/2014-08/30/2014	4.14	28.77	17.49	0.00	14.90	0.65	15.55	3.11	0.60	3.71	6,085.00
Mass Grading Dust	0.00	0.00	0.00	0.00	14.89	0.00	14.89	3.11	0.00	3.11	0.00
Mass Grading Off Road Diesel	4.08	28.65	15.30	0.00	0.00	0.64	0.64	0.00	0.59	0.59	5,804.63
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.06	0.12	2.19	0.00	0.01	0.01	0.02	0.01	0.01	0.01	280.37

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Mass Grading 4/1/2012 - 8/30/2012 - Default Fine Site Grading Description

For Soil Stablizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Tractors/Loaders/Backhoes, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Water Trucks, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Excavators, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Off Highway Trucks, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

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For Other Equipment, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Bore/Drill Rigs, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Other General Industrial Equipment, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Other Material Handling Equipment, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

The following mitigation measures apply to Phase: Mass Grading 4/1/2013 - 8/30/2013 - Type Your Description Here

For Soil Stablizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Tractors/Loaders/Backhoes, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Water Trucks, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Bore/Drill Rigs, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Excavators, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Other Equipment, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Other General Industrial Equipment, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Other Material Handling Equipment, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Off Highway Trucks, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

The following mitigation measures apply to Phase: Mass Grading 4/1/2014 - 8/30/2014 - Type Your Description Here

For Soil Stablizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Bore/Drill Rigs, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Excavators, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Other Equipment, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Other General Industrial Equipment, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Other Material Handling Equipment, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Tractors/Loaders/Backhoes, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Water Trucks, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Off Highway Trucks, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

The following mitigation measures apply to Phase: Building Construction 4/1/2012 - 8/30/2012 - Type Your Description Here

For Forklifts, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Tractors/Loaders/Backhoes, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Water Trucks, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Generator Sets, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

The following mitigation measures apply to Phase: Building Construction 4/1/2013 - 8/30/2013 - Type Your Description Here

For Forklifts, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Tractors/Loaders/Backhoes, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Water Trucks, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Generator Sets, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

The following mitigation measures apply to Phase: Building Construction 4/1/2014 - 8/30/2014 - Type Your Description Here

For Forklifts, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Tractors/Loaders/Backhoes, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Water Trucks, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

For Generator Sets, the Use Aqueous Diesel Fuel mitigation reduces emissions by:

NOX: 15% PM10: 50% PM25: 50%

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Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas							
Hearth							
Landscape	0.12	0.02	1.55	0.00	0.01	0.01	2.81
Consumer Products							
Architectural Coatings							
TOTALS (lbs/day, unmitigated)	0.12	0.02	1.55	0.00	0.01	0.01	2.81

Area Source Changes to Defaults

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Vineyard	6.84	2.00	20.14	0.02	3.90	0.74	2,169.23
TOTALS (lbs/day, unmitigated)	6.84	2.00	20.14	0.02	3.90	0.74	2,169.23

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2012 Temperature (F): 85 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

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Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Vineyard		0.27	acres	561.00	151.47	2,272.05
					151.47	2,272.05

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	53.8	0.7	99.1	0.2
Light Truck < 3750 lbs	12.8	1.6	95.3	3.1
Light Truck 3751-5750 lbs	19.8	0.5	99.5	0.0
Med Truck 5751-8500 lbs	6.6	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.9	0.0	77.8	22.2
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.0	0.0	20.0	80.0
Heavy-Heavy Truck 33,001-60,000 lbs	0.4	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	3.2	59.4	40.6	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.6	0.0	83.3	16.7

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4

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Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Rural Trip Length (miles)	15.0	15.0	15.0	15.0	15.0	15.0
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Vineyard				2.0	1.0	97.0

Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Home-based work rural trip length changed from 16.8 miles to 15 miles

Home-based shop rural trip length changed from 7.1 miles to 15 miles

Home-based other rural trip length changed from 7.9 miles to 15 miles

Commercial-based commute rural trip length changed from 14.7 miles to 15 miles

Commercial-based non-work rural trip length changed from 6.6 miles to 15 miles

Commercial-based customer rural trip length changed from 6.6 miles to 15 miles

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Urbemis 2007 Version 9.2.4

Summary Report for Annual Emissions (Tons/Year)

File Name: C:\Documents and Settings\equinn\Application Data\Urbemis\Version9a\Projects\Suscol\Suscol12, 13, 14.urb924

Project Name: Suscol Mountain - Proposed Project

Project Location: Bay Area Air District

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2012 TOTALS (tons/year unmitigated)	0.72	3.96	11.86	0.01	2.33	0.18	2.51	0.50	0.16	0.66	1,587.31
2012 TOTALS (tons/year mitigated)	0.72	3.46	11.86	0.01	0.73	0.10	0.84	0.16	0.09	0.25	1,587.31
Percent Reduction	0.00	12.81	0.00	0.00	68.53	42.15	66.66	67.35	42.71	61.30	0.00
2013 TOTALS (tons/year unmitigated)	0.67	3.67	11.10	0.01	3.07	0.16	3.23	0.65	0.15	0.80	1,600.19
2013 TOTALS (tons/year mitigated)	0.67	3.20	11.10	0.01	0.95	0.10	1.05	0.21	0.09	0.29	1,600.19
Percent Reduction	0.00	12.83	0.00	0.00	68.93	41.47	67.53	68.02	42.08	63.16	0.00
2014 TOTALS (tons/year unmitigated)	0.62	3.29	10.30	0.01	3.33	0.15	3.48	0.70	0.13	0.84	1,600.80
2014 TOTALS (tons/year mitigated)	0.62	2.87	10.30	0.01	1.03	0.09	1.12	0.22	0.08	0.30	1,600.80
Percent Reduction	0.00	12.80	0.00	0.00	69.03	40.41	67.82	68.19	41.10	63.88	0.00

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AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.01	0.00	0.14	0.00	0.00	0.00	0.25

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.94	0.42	3.70	0.00	0.71	0.14	377.71

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.95	0.42	3.84	0.00	0.71	0.14	377.96

APPENDIX D

BIOLOGICAL RESOURCES REPORT

BIOLOGICAL SURVEY REPORT

FOR THE

SUSCOL MOUNTAIN VINEYARD PROPERTY

NAPA COUNTY, CALIFORNIA

LSA

August 17, 2010

BIOLOGICAL SURVEY REPORT

FOR THE

SUSCOL MOUNTAIN VINEYARD PROPERTY

NAPA COUNTY, CALIFORNIA

Submitted to:

Silverado Premium Properties
855 Bordeaux Way, Suite 100
Napa, California 94558

Prepared by:

LSA Associates, Inc.
157 Park Place
Point Richmond, California 94801
(510) 236-6810

LSA Project No. BAG0801

August 17, 2010

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1.0 INTRODUCTION

This report provides the results of biological surveys of the approximately 2,123-acre Suscol Mountain Vineyard property, Napa County, California. The Suscol Mountain Vineyard property is referred to in this report as the project site. LSA conducted biological surveys on the project site with an emphasis on the identification of the vegetation communities and associated wildlife habitats, wetlands, plants, and vertebrate animals. The purpose of the surveys was to provide an overview of the existing biological conditions on the project site and a detailed assessment of special-status species, wetlands, and sensitive habitats.

1.1 LOCATION

The property is located in southeastern Napa County north of State Highway 12 and east of State Highway 29. A small portion of the property also extends into western Solano County (Figure 1). Access to the property is via Anderson Road off of State Highway 29 and then by unnamed vineyard service roads.

The project site is situated in portions of Sections 29, 30, 31, and 32 Township 5 North, Range 3 West and sections 25 and 36 Township 5 North, Range 4 West of the Mount Diablo Base and Meridian on the USGS 7.5 minute Mount George and Cordelia quadrangles (Figure 2).

1.2 OVERVIEW OF EXISTING CONDITIONS

1.2.1 Regional

The property is situated near the southern terminus of the low rugged mountains flanking the eastern edge of the Napa Valley. The region to the north, east, and south of the property is relatively undeveloped and supports an extensive landscape of ranchland, grasslands, woodland, and chaparral. Rocky outcrops and cliffs are also prominent landscape features of the regional area. The area adjacent to the western boundary has been largely converted to vineyards, but also includes patches of oak woodland and the riparian corridor along Suscol Creek. Skyline Wilderness Park is adjacent to the northern boundary of the project site. Numerous constructed ponds (including Lake Marie in Skyline Wilderness Park) are present in the regional landscape. The Napa Valley floor is about one to one-half mile west of the property and Green Valley (Solano County) is about two miles to the east.

The Napa County Baseline Data Report (NCCDPD, 2005) identifies 13 evaluation areas within the County that are based on physiographic features and jurisdictional areas. These evaluation areas are used to facilitate regional planning and the analysis of biological resources. The northern two thirds of the project site is situated within the Eastern Mountains Evaluation Area and the southern third is within the Jameson and American Canyons Evaluation Area. The boundary (on the project site) between these two evaluation areas is a prominent ridge line referred to in this report as Suscol Ridge (see Physiography and Geology section of this report).

LSA

FIGURE 1

N

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SOURCE: ©2006 DeLORME. STREET ATLAS USA®2006.

Suscol Mountain Vineyard Property
Napa County, California

Regional Location

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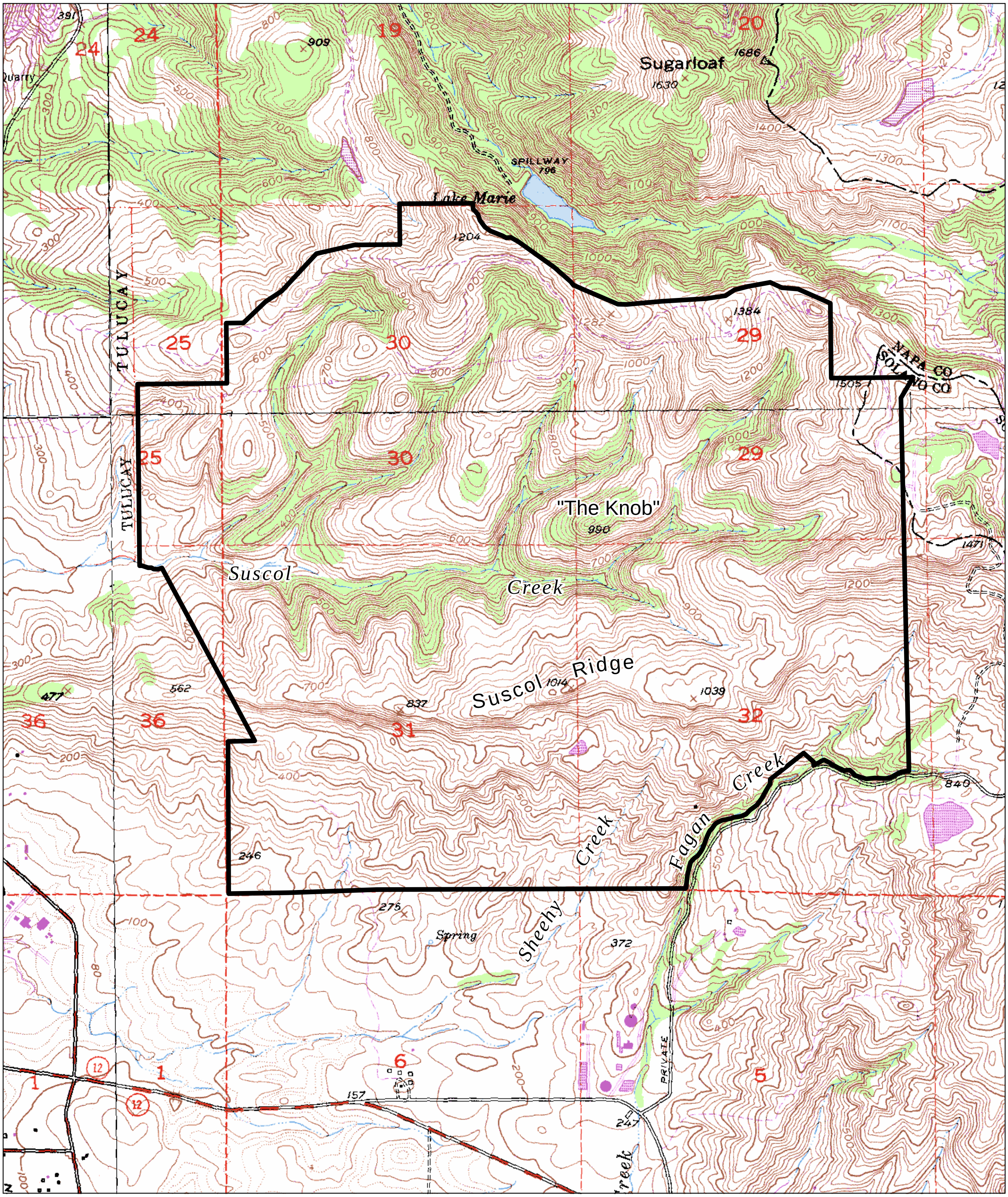


LSA

Project Site Boundary

0 1,000 2,000
FEET

FIGURE 2

Suscol Mountain Vineyards
Napa County, California

Project Site Location

Source: USGS 7.5' Topographic quadrangles: *Napa, Calif.* 1980; *Mt. George, Calif.* 1968; *Cordelia, Calif.* 1980; *Cuttings Wharf, Calif.* 1981

I:\BAG0801\GIS\Maps\BioSurveyReport\Figure2_Project Site Location.mxd (8/17/2010)

1.2.2 Current and Historical Land Use

The project site has been and is currently being used to graze cattle. There are no buildings on the site; constructed features include several dry stone walls, a water storage pond, a network of dirt roads providing access for ranching activities, and the towers of an electrical transmission line that traverses the project site. Dirt roads cross Suscol Creek via fords in the open area near the western boundary of the property and just upstream of the confluence of the two upper most forks in the creek. Four metal tanks in the southern portion of the project site provide water storage for agricultural purposes on the property to the south.

1.2.3 Physiography and Geology

The terrain within the project site is varied and ranges from gently rolling to very steep hills with rocky cliff faces in some areas. Numerous rocky outcrops and scattered surface rocks are present in the northern two thirds of the site.

Distinctive physiographic features on the project site include a prominent ridge line (referred to in this report as the northern ridge) that runs along the northern and northeastern boundary of the site (Figure 2). This ridge drops off steeply to the north into the drainage of Marie Creek. There are also very steep slopes that rim portions of upper Suscol Creek watershed. Another ridge (referred to as Suscol Ridge) with a very steep southern slope traverses the south central portion of the property (Figure 2). This ridge marks the southern edge of the Sonoma Volcanics (see below). Elevations on the property range from approximately 140 feet above mean sea level in the southwest corner of the property to over 1505 feet in its northeastern corner. Another prominent physiographic feature on the site is a steep rocky hill or knob with a rocky south-facing cliff face in the center of the property (north of Suscol Creek); this feature is referred to in this report as the " knob" (Figure 2).

The soils on the site are: Bale clay loam 0 to 2 percent slopes; Clear Lake clay, drained; Fagan clay loam 5 to 15 percent slopes; Fagan clay loam 15 to 30 percent slopes; Fagan clay loam 30 to 50 percent slopes; Hambright-Rock outcrop complex 2 to 30 percent slopes; Hambright-Rock outcrop complex 30 to 75 percent slopes; Rock outcrop; and Sobrante loam 30 to 50 percent slopes (Lambert and Kashiwagi 1978).

The geology on the property consists of Holocene landslide deposits along portions of the Suscol Creek drainage and extensive outcrops of the Pliocene Sonoma Volcanics primarily in the northern and central portion of the property. The Eocene marine Markley Sandstone is the dominant formation in the southern portion of the property; this formation also outcrops along portions of the Suscol Creek bed (Wagner and Bortugno 1982; Slone 2006). Expositors of the Sonoma Volcanics include rocky cliff faces and other massive outcrops as well as areas with exposed bedrock and scattered small rocks and boulders.

1.2.4 Hydrology

The project site includes the entire upper watershed of Suscol Creek, a tributary of the Napa River. The northern fringe of the property drains to Marie Creek and the area south of Suscol Ridge drains to Fagan and Sheehy Creeks; all these drainages are tributaries of the Napa River. The small portion of the property within Solano County drains to Green Valley Creek (Figure 2), tributary to Suisun Bay.

There are numerous springs and seeps on the property (Figure 3). Most of the springs contained clear flowing water; seeps were indicated by the presence of moist soil. Most of the springs and seep contained surface water or moist soil throughout the year.

A constructed water storage pond is located in the south central part of the property (Figure 3). This pond is a perennial water body that is fed by springs just up-slope of the pond; it is not located within a prominent drainage. The water in the pond is generally very clear and there is an abundance of submerged aquatic vegetation.

1.3 METHODS

Prior to conducting fieldwork, LSA reviewed the vegetation communities mapped within and adjacent to the project site according to the *Napa County Vegetation Map* (Thorn et al., 2004). Our initial vegetation classification on the project site was based on Thorn et al. (2004) with modifications according to our field work. In 2010, we revised the vegetation classification on the project site to reflect the updated vegetation classification for California in *A Manual of California Vegetation* Second Edition (Sawyer et al., 2009). We also reviewed the Napa County Baseline Data Report (NCCDPD, 2005) for biological information on and in the vicinity of the property. We produced a list of special-status plant and animal species that could occur on the project site based on records in the *California Natural Diversity Data Base* (CNDDB) (CDFG 2010), the California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Plants of California* (7th edition) (electronic version) (CNPS, 2009), and LSA's knowledge of special-status species in Napa and Solano Counties.

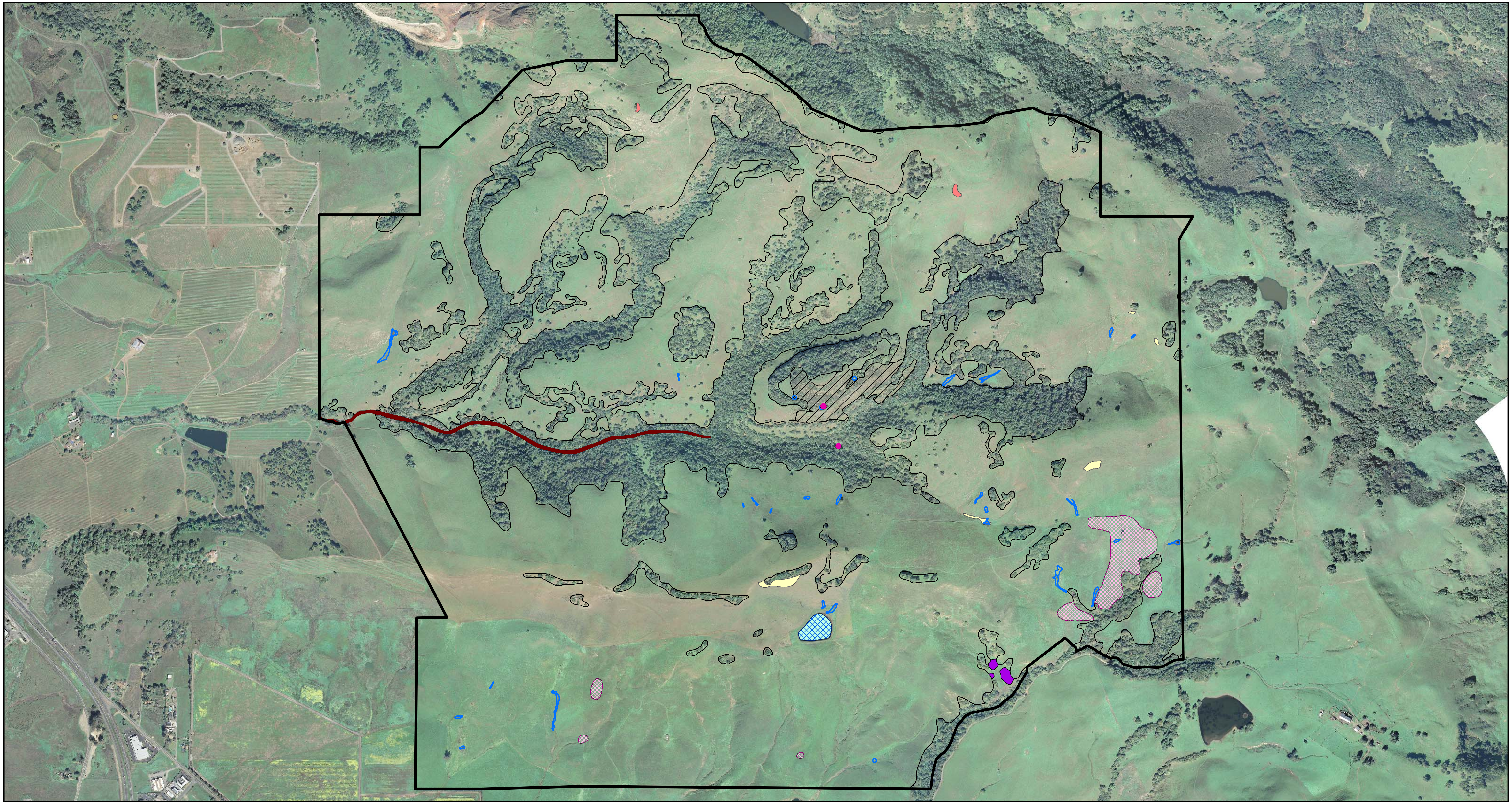
1.3.1 Field Surveys

LSA biologists Richard Nichols, Eric Lichtwardt, and Sophie Gilbert and LSA botanists Tim Milliken, Michele Lee, and Zoya Akulova-Barlow conducted biological surveys on the project site during 2007, 2008, and 2009. The dates, personnel, and focus of the surveys are summarized in Table A.

During surveys the property was walked on foot and representative areas of all the vegetation communities and wildlife habitats were examined. Field observations were recorded in field notebooks and on maps and/or aerial photographs of the property; binoculars (10 x 40 power) were used to aid in the identification of wildlife and to survey inaccessible habitats (e.g., cliff faces).

Vegetation communities on the project site were characterized according to the dominant species present and amount of cover of the uppermost canopy layer. We mapped vegetation communities in the field on an aerial photograph of the project site (Figure 3). Areas where native grasses were observed and mapped in 2008 were visually inspected in 2009 to estimate their areal extent. Areas with more than approximately 5 percent cover of native grasses were mapped as native grasslands.

Plant species were identified in the field or voucher specimens were collected and keyed out later in the lab. Because the purpose of the floristic surveys was to determine impacts, they were focused on areas within vineyard block clearing limits and proposed erosion control treatments.



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Project Site Boundary	California Sagebrush Scrub
Proposed Clearing Limit	Chamise Chaparral
Erosion Control Feature	Barberry
Coast Live Oak Woodland/ California Bay Forest	White Alder Grove
Wild Oats Grassland	Arroyo Willow Thicket
Purple Needle Grass Grassland	Pond
	Seep/Spring (Potential Wetland)
	Western Azalea Patch

FIGURE 3

Suscol Mountain Vineyards

Vegetation, Habitats, and
Proposed Vineyard Blocks

SOURCE: Aerial Imagery from Napa County (2007).

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Table A: Surveys dates, personnel, and focus

Survey Date	Personnel	Focus
June 27, 2007	Nichols and Lichtwardt	Preliminary biological reconnaissance, recorded wildlife species, tree species, vegetation communities, and associated wildlife habitats.
May 14 and 15, 2008	Nichols, Lichtwardt, Milliken and Akulova-Barlow	Botany, rare plants, wildlife, and vegetation and habitat mapping.
July 18, 2008	Lichtwardt and Akulova-Barlow	Botany, rare plants, and wildlife.
July 31, 2008	Lichtwardt and Gilbert	Dusk and night wildlife surveys focusing on California red-legged frogs along Suscol Creek and the pond.
August 7, 2008	Lichtwardt and Gilbert	Dusk and night wildlife surveys focusing on California red-legged frogs along Suscol Creek and the pond.
March 10, 2009	Lichtwardt	Wildlife, nesting birds, and foraging raptors.
March 17 and 31, 2009	Lichtwardt, Milliken, and Lee	Botany, rare plants, wildlife, and nesting and foraging raptors.
April 17 and 20, 2009	Milliken and Lee	Botany and rare plants.
May 7, 2009	Nichols and Lichtwardt	Wildlife, nesting birds, and foraging raptors.
May 12, 2009	Lichtwardt and Akulova-Barlow	Botany, rare plants, wildlife, nesting birds, and raptor foraging
June 10, 2009	Nichols, Lichtwardt, and Milliken	Botany, rare plants, wildlife, and nesting and foraging raptors.
July 8, 2009	Lichtwardt	Wildlife and well test creek monitoring.
July 23	Lichtwardt and Milliken	Botany, rare plants, and wildlife
September 15, 2009	Nichols and Milliken	Botany and rare plants
October 8, 2009	Lichtwardt	Wetlands and wildlife.

1.3.2 Nomenclature

The scientific and vernacular nomenclature for the plant species used in this report are from the following standard sources: Hickman (1993); California Native Plant Society (CNPS) on-line inventory of rare and endangered plants (http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi); and Beidleman and Kozloff (2003). On going research in plant systematics and taxonomy has resulted in many new names for California plant taxa since the publication of Hickman (1993). The new names will be published in the forthcoming second edition of the Jepson Manual. Many of these new plant names are listed on the Jepson Interchange website (http://ucjeps.berkeley.edu/interchange.html) of the Jepson Herbaria and are used in this report. The scientific nomenclature for non-vascular plant names follow: Norris and Shevock (2004), and Doyle and Stotler (2006). For most moss, liverwort, and hornwort species, no common name is given because these organisms generally lack commonly accepted vernacular names. The scientific and vernacular nomenclature for lichen names follow: Esslinger (2009), and Brodo, Sharnoff and Sharnoff (2001). Vegetation classification follows (Sawyer et al., 2009).

The sources for the scientific and vernacular nomenclature of animal species are: fishes, Nelson et al. (2004); amphibians and reptiles, in general we follow Crother (2008), but embrace the recommendations of Pauly et al. (2009), and for kingsnakes, Pyron and Burbrink (2009); birds, American Ornithologist's Union (1998) and supplements through the fifty-first, American Ornithologist's Union (2010), bird subspecies names follow Shuford and Gardali (2008); and mammals, Baker et al. (2003) and Reid (2006) and recent literature. For animals, subspecies names are used only when a specific subspecies is considered a special-status species by the California Department of Fish and Game (CDFG) or the United States Fish and Wildlife Service (USFWS).

2.0 REGULATORY CONTEXT

This section provides a summary of federal, State laws, and/or local regulations that apply to the biological resources that occur on the project site.

2.1 APPLICABLE FEDERAL LAWS AND REGULATIONS

2.1.1 Endangered Species Act (ESA)

The United States Fish and Wildlife Service (USFWS) has jurisdiction over species that are formally listed as threatened or endangered under the federal ESA. The ESA protects listed wildlife species from harm or "take." The term "take" is broadly defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." An activity is defined as a "take" even if it is unintentional or accidental. An endangered plant or wildlife species is one that is considered in danger of becoming extinct throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered within the foreseeable future. In addition to endangered and threatened species, which are legally protected under the federal ESA, the USFWS has a list of proposed and candidate species. Proposed species are those for which a proposed rule to list them as endangered or threatened has been published in the Federal Record. A candidate species is one for which the USFWS currently has enough information to support a proposal to list it as a threatened or endangered species. These latter species are not afforded legal protection under the federal ESA. Nonetheless, project-related impacts to federally-listed, proposed, and candidate species or their habitats are considered "significant" under *CEQA Guidelines* (discussed below).

Critical habitat is defined under the ESA as specific geographic areas within a listed species range that contain features considered essential for the conservation of the listed species. Designated critical habitat for a given species may not necessarily be currently occupied by that species if it is within the historic range of the species and supports habitat deemed by the USFWS to be important for the recovery of the species. Critical habitat designation applies only to federal actions or actions funded or permitted by federal agencies. If a federal action or an action allowed by federal funding or a federal permit has the potential to adversely affect critical habitat for a listed species, the responsible federal agency is required to consult with the USFWS or National Marine Fisheries Service (NMFS).

2.1.2 Clean Water Act

The U.S. Army Corps Engineers (Corps) is responsible under Section 404 of the Clean Water Act to regulate the discharge of fill material into waters of the United States. Waters of the United States and their lateral limits are defined in 33 CFR Part 328.3(a) and include streams that are tributaries to navigable waters and their adjacent wetlands. The lateral limits of jurisdiction for a non-tidal stream are measured at the line of the Ordinary High Water Mark (OHWM) (33 CFR Part 328.3(e)) or the limit of adjacent wetlands (33 CFR Part 328.3(b)). Any permanent extension of the limits of an existing water of the United States, whether natural or man-made, results in a similar extension of Corps jurisdiction (33 CFR Part 328.5).

Waters of the United States fall into two broad categories, wetlands and other waters. Wetlands include marshes, wet meadows, seep areas, floodplains, basins, and other areas experiencing extended seasonal soil saturation. Seasonally or intermittently inundated features, such as seasonal pools, ephemeral streams, and tidal marshes, are categorized as wetlands if they have hydric soils and support wetland plant communities. For wetlands to be under the jurisdiction of the Clean Water Act they must have hydrophytic vegetation, hydric soils, and wetland hydrology.

Seasonally inundated water bodies or watercourses that do not exhibit wetland characteristics are classified as other waters of the United States. Other waters include unvegetated water bodies and watercourses such as rivers, streams, lakes, springs, ponds, coastal waters, and estuaries.

Waters and wetlands that cannot trace a continuous hydrological connection to a navigable water of the United States are not tributary to waters of the United States. These are termed "isolated waters or wetlands." Isolated wetlands or other waters are jurisdictional when their destruction or degradation can affect interstate or foreign commerce (33 CFR Part 328.3(a)). The Corps may or may not take jurisdiction over isolated wetlands depending on circumstances.

In general, a Corps permit must be obtained before placing fill or grading in jurisdictional wetlands or other waters of the United States. The Corps will be required to consult with the USFWS and/or NMFS under Section 7 of the ESA if the action subject to Clean Water Act permitting could result in take of federally-listed species.

2.1.3 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (16 USC 703) prohibits the taking, hunting, killing, selling, purchasing, etc. of migratory birds, parts of migratory birds, or their eggs and nests. In addition, it contains a clause that prohibits baiting or poisoning of these birds. As used in this act, the term "take" is defined as meaning, "to pursue, hunt, shoot, capture, collect, kill, or attempt to pursue, hunt, shoot, capture, collect, or kill, unless the context otherwise requires." Most of the native bird species that occur in the region of the project site are covered by this act.

2.2 APPLICABLE STATE AND LOCAL LAWS AND REGULATIONS

2.2.1 California Endangered Species Act

The CDFG has jurisdiction over State-listed threatened, rare (plants only), and endangered plant and animal species under the California Endangered Species Act. In addition, its provisions protect species proposed for listing under the State Act.

2.2.2 California Fully Protected and Protected Species

California fully protected and protected species may not be taken or possessed without a permit from the Fish and Game Commission and/or the CDFG. These permits do not allow "incidental take" and are more restrictive than the take allowed under Section 2081 for the California Endangered Species Act. Information on fully protected species can be found in the Fish and Game Code (birds at Section 3511, mammals at Section 4700, reptiles and amphibians at Section 5050, and fish at Section 5515).

Information on protected (as opposed to fully protected) amphibians can be found in Chapter 5, Section 41; protected (as opposed to fully protected) reptiles at Chapter 5, Section 42.

2.2.3 California Environmental Quality Act

The California Environmental Quality Act (CEQA) applies to "projects" that are proposed to be undertaken or those requiring approval by State or local government agencies. Projects are defined actions that have the potential to have physical impact on the environment. Under Section 15380 of CEQA, a species not included on any formal list "shall nevertheless be considered rare or endangered if the species can be shown by a local agency to meet the criteria" for listing. With sufficient documentation, a species could be shown to meet the definition of rare or endangered under CEQA and be considered a "de facto" endangered species. The CDFG maintains a list of species of special concern, defined as species that appear to be vulnerable to extinction because of declining populations, limited ranges, and/or continuing threats. Species of special concern are not afforded legal protection under the California Endangered Species Act but impacts to these species are typically considered significant under CEQA.

2.2.4 Section 401 Water Quality Certification

Pursuant to Section 401 of the federal Clean Water Act, projects that require a permit from the Corps under Section 404 must also obtain Water Quality Certification from the California Regional Water Quality Control Board (RWQCB). This regulatory program is administered by one of nine Regional Boards depending on project location. The RWQCB has adopted a policy requiring mitigation for any unavoidable loss of wetland, streambed, or other State jurisdictional waters.

2.2.5 California Fish and Game Code

Sections 3503, 3503.5, and 3513. The CDFG Code (cited sections) protects the nests and eggs of most birds, including raptors (Falconiformes and Strigiformes) and the bird species protected under the Migratory Bird Treaty Act.

Section 1600. The CDFG also administers the issuance of Streambed Alteration Agreements under Fish and Game Code Section 1600. Streambed Alteration Agreements are required when project activities would substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated as such by CDFG.

2.2.6 California Department of Fish and Game

The CDFG also maintains lists of "species of special concern." These species are broadly defined as plants and animals that are of concern to CDFG because of population declines and restricted distributions, and/or they are associated with habitats that are declining in California. The California Native Plant Society, in conjunction with the CDFG, maintains lists of special-status plants for California (see Section 4.2.1). Lists of special animals are maintained by the CDFG (CDFG, 2009) and are defined by the CDFG as "*a species, subspecies, or distinct population of an animal native to California that meet one or more of the following (not necessarily mutually exclusive) criteria:*

- *Is extirpated from the State or, in the case of birds, its primary seasonal or breeding role;*
- *Is listed as Federally-,but not State-, threatened or endangered; meets the State definition of threatened or endangered but has not formerly been listed;*
- *Is experiencing, or formerly experienced, serious (noncyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it as State threatened or endangered status;*
- *Has naturally small population exhibiting high susceptibility to risk from any factor(s) that, if realized, could lead to declines that would qualify it for State threatened or endangered status. (Comrack et al., 2008)*

The species of special concern category is a CDFG administrative designation; it does not carry any legal status. Project-related impacts to species of special concern are considered " significant" under *CEQA Guidelines* and projects with unavoidable significant impacts to special concern species must provide mitigation.

2.3 NAPA COUNTY

Napa County General Plan (2008). The Napa County General Plan contains the following policies relevant to the biological issues on the project site:

General Plan Policy CON-2: Maintain or enhance the existing level of biodiversity, encouraging its enhancement where appropriate.

General Plan Policy CON-3: Protect the continued presence of state and federally protected rare, threatened and endangered species and their habitat.

General Plan Policy CON-4: Conserve, protect, and improve plant, wildlife, and fishery habitat for all native species.

General Plan Policy CON-5: Protect connectivity and continuous habitat areas for wildlife movement.

General Plan Policy CON-13: Residential, commercial, industrial and recreational projects, wineries and new vineyards, and water development projects shall avoid impacts to fisheries and wildlife habitat to the maximum extent feasible. Where impacts cannot be avoided, projects shall include effective management plans.

This policy goes on to specify several provisions to conserve wildlife habitat including supplemental planting, habitat replacement, habitat enhancement, and developer responsibility for mitigation planning and implementation under agency oversight.

General Plan Policy CON-14: To offset possible losses of fishery and wildlife habitat due to discretionary development projects, developers shall be responsible for mitigation when avoidance of impacts is determined to be infeasible. Such mitigation measures may include providing and permanently maintaining similar quality and quantity habitat within Napa County, enhancing existing habitat areas, or paying in-kind funds to an approved wildlife habitat improvement and acquisition fund. Replacement habitat may occur either on-site or at approved off-site locations, but preference shall be given to on-site replacement.

General Plan Policy CON-16: The County shall require a biological resources evaluation for discretionary projects in areas identified to contain or potentially contain special-status species based upon data provided in the Baseline Data Report (BDR), California Natural Diversity Database (CNDDB), or other technical materials. This evaluation shall be conducted prior to the approval of any earthmoving activities. The County shall also encourage the development of programs to protect special-status species and disseminate updated information to state and federal resource agencies.

General Plan Policy CON-17: Preserve and protect native grasslands, serpentine grasslands, mixed serpentine chaparral, and other sensitive biotic communities and habitats of limited distribution. The County, in its discretion, shall require mitigation that results in the following standards:

a) Prevent removal or disturbance of sensitive natural plant communities that contain special-status plant species or provide critical habitat to special-status animal species.

b) In other areas, avoid disturbances to or removal of sensitive natural plant communities and mitigate potentially significant impacts where avoidance is infeasible.

c) Promote protection from overgrazing and other destructive activities.

d) Encourage scientific study and require monitoring and active management where biotic communities and habitats of limited distribution or sensitive natural plant communities are threatened by the spread of invasive non-native species.

e) Require no net loss of sensitive biotic communities and habitats of limited distribution through avoidance, restoration, or replacement where feasible. Where avoidance, restoration, or replacement is not feasible, preserve like habitat at a 2:1 ratio or greater within Napa County to avoid significant cumulative loss of valuable habitats.

General Plan Policy CON-18: To reduce impacts on habitat conservation and connectivity:

a) In sensitive domestic water supply drainages where new development is required to retain between 40 and 60 percent of the existing vegetation on-site, the vegetation selected for retention should be in areas designed to maximize habitat value and connectivity.

b) Outside of sensitive domestic water supply drainages, streamlined permitting procedures should be instituted for new vineyard projects that voluntarily retain valuable habitat and connectivity, including generous setbacks from streams and buffers around ecologically sensitive areas.

c) Preservation of habitat and connectivity of adequate size, quality, and configuration to support special-status species should be required within the project site. The size of habitat and connectivity to be preserved shall be determined based on the specific needs of the species.

d) The County shall require discretionary projects to retain movement corridors of adequate size and habitat quality to allow for continued wildlife use based on the needs of the species occupying the habitat.

e) The County shall require new vineyard development to be designed to minimize the reduction of wildlife movement to the maximum extent feasible. The County shall require the removal or reconfiguration of existing wildlife exclusion fencing to reduce existing significant impacts to wildlife movement, particularly in riparian areas, where a nexus exists between the proposed project and the existing fencing.

f) The County shall disseminate information about impacts that fencing has on wildlife movement in wild land areas of the County and encourage property owners to use permeable fencing.

g) The County shall develop a program to improve and continually update its database of biological information, including identifying threats to wildlife habitat and barriers to wildlife movement.

h) Support public acquisition, conservation easements, in-lieu fees where on-site mitigation is infeasible, and/or other measures to ensure long-term protection of wildlife movement areas.

<u>General Plan Policy CON-19:</u> The County shall encourage the preservation of critical habitat areas and habitat connectivity through the use of conservation easements or other methods as well as through continued implementation of the Napa County Conservation Regulations associated with vegetation retention and setbacks from waterways.

<u>General Plan Policy CON-24:</u> Maintain and improve oak woodland habitat to provide for slope stabilization, soil protection, species diversity, and wildlife habitat through the following measures:

a) Preserve, to the maximum extent feasible, oak trees and other significant vegetation that occur near the heads of drainages or depressions to maintain diversity of vegetation type and wildlife habitat as part of agricultural projects.

b) Comply with the Oak Woodlands Preservation Act (PRC Section 21083.4) regarding oak woodland preservation to conserve the integrity and diversity of oak woodlands, and retain, to the maximum extent feasible, existing oak woodland and chaparral communities and other significant vegetation as part of residential, commercial, and industrial approvals.

c) Provide replacement or preservation of lost oak woodland and native vegetation at a 2:1 ratio when retention of existing vegetation is found to be infeasible. Removal of oak species limited in distribution shall be avoided to the maximum extent feasible.

d) Support hardwood cutting criteria that require retention of adequate stands of oak trees sufficient for wildlife, slope stabilization, soil protection, and soil production be left standing.

e) Maintain, to the maximum extent feasible, a mixture of oak species which is needed to ensure acorn production. Black, canyon, live, and brewer oaks as well as blue, white, scrub, and live oaks are common associations.

f) Encourage and support the County Agricultural Commission's enforcement of state and federal regulations concerning Sudden Oak Death and similar future threats to woodlands.

General Plan Policy CON-26: Consistent with longstanding practice in Napa County, natural vegetation retention areas along perennial and intermittent streams shall vary in width with steepness of the terrain, the nature of the undercover, and type of soil. The design and management of natural vegetation areas shall consider habitat and water quality needs, including the needs of native fish and wildlife and flood protection where appropriate. Site-specific setbacks shall be established in coordination with Regional Water Quality Control Boards, California Department of Fish and Game, U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration National Marine Fisheries Service, and other coordinating resource agencies that identify essential stream and stream reaches necessary for the health of populations of native fisheries and other sensitive aquatic organisms within the County's watersheds.

Where avoidance of impacts to riparian habitat is infeasible along stream reaches, appropriate measures will be undertaken to ensure that protection, restoration, and enhancement activities will occur within these identified stream reaches that support or could support native fisheries and other sensitive aquatic organisms to ensure a no net loss of aquatic habitat functions and values within the county's watersheds.

General Plan Policy CON-27: The County shall enforce compliance and continued implementation of the intermittent and perennial stream setback requirements set forth in existing stream setback regulations, provide education and information regarding the importance of stream setbacks and the active management and enhancement/restoration of native vegetation within setbacks, and develop incentives to encourage greater stream setbacks where appropriate.

Incentives shall include streamlined permitting for vineyard proposals on slopes between 5 and 30 percent and flexibility regarding yard and road setbacks for other proposals.

General Plan Policy CON-28: To offset possible additional losses of riparian woodland due to discretionary development projects and conversions, developers shall provide and maintain similar quality and quantity of replacement habitat or in-kind funds to an approved wildlife habitat improvement and acquisition fund in Napa County. While on-site replacement, wherever possible, is preferred, replacement habitat may be either on-site or off-site as approved by the County.

General Plan Policy CON-30: All public and private projects shall be required to avoid impacts to wetlands to the maximum extent feasible. If avoidance is not feasible, projects shall achieve no net loss of wetlands, consistent with State and federal regulations.

Napa County Code. The Napa County Municipal Code contains an ordinance relevant to the biological resources of the project site.

Conservation Regulations (County Code Chapter 18.108): Napa County Conservation Regulations (County Code Chapter 18.108) address protection of the County's streams and waterways. It requires setbacks from streams (width depends on slope) from development and may require revegetation within the setbacks on a case-by-case basis. The project is in compliance with this ordinance because habitat restoration and installation of stream crossings, recreational roads, and non-motorized trails are permitted uses within stream setbacks.

2.4 NON-GOVERNMENTAL ORGANIZATIONS

2.4.1 California Native Plant Society

The California Native Plant Society (CNPS), a non-governmental conservation organization, has developed lists of special-status plant species considered to be rare, threatened, or endangered in California (CNPS 2001). Vascular plants included on these lists are defined as follows:

- List 1A Plants considered extinct.
- List 1B Plants that are rare, threatened, or endangered in California and elsewhere.
- List 2 Plants that are rare, threatened, or endangered in California, but more common elsewhere.
- List 3 Plants about which more information is needed - review list.
- List 4 Plants of limited distribution - watch list.

CNPS List 1 and 2 species are generally considered under CEQA because they meet CEQA's definition of " rare or endangered." Impacts to List 3 and 4 species are generally not considered significant under CEQA unless local jurisdictions (e.g., Napa County) request that they be addressed or specific information on their status and/or distribution supports their consideration for a given project..

3.0 BIOLOGICAL RESOURCES

3.1 FLORA AND FAUNA

The observed vascular flora on the project site includes: 299 species (plus one presumed hybrid oak) of vascular plants. The observed vascular plant flora is composed of 204 native (68%) and 95 non-native (32%) species (Appendix A). Thirty-three species of non-vascular plants (25 mosses, 7 liverworts, and 1 hornwort) and 10 lichens were also observed on the project site (Appendix A). Other plant species and lichens may also be present, but were not observed due to their naturally low numbers or other factors.

The observed vertebrate fauna on the project site includes 136 species: two species of native fish, two species of non-native fish, six species of amphibians, one turtle, seven species of squamates (lizards and snakes), 100 species of birds, and 18 species of mammals (Appendix A). There are undoubtedly a number of other species of vertebrates (particularly amphibians, reptiles, migratory birds, and small mammals) that occur on the project site that were not observed during the surveys due to their secretive behavior, natural low numbers, infrequent or transient occurrence on the property, or other factors. A vast number of arthropods and other non-vertebrate animals are also expected to occur on the property, but these groups were beyond the scope of the field surveys due to time constraints and the significant challenges associated with identification of most taxa in these groups.

3.2 VEGETATION COMMUNITIES/HABITATS

The vegetation communities and associated wildlife habitats on the project site are dominated by oak woodlands and grasslands with smaller areas of riparian woodland, willows, freshwater marsh, and seeps and springs. Habitats that are not defined on the basis of dominant plant species such as ponds or rock outcrops are also present. The vegetation communities present on the project site were characterized and named according to *A Manual of California Vegetation* Second Edition (Sawyer et al., 2009). The classification presented in the *Manual* is based on the National Vegetation Classification Hierarchy. The lowest level of the hierarchy, the Alliance (Level 7) is the focus here. Alliances have both a common and scientific name, in the discussion below the common name of the alliance appears first and the scientific follows in parentheses. Alliances are defined and named by the dominant species, however, many alliances exhibit variation in subdominant species composition and structure. In the *Manual*, these variations in species composition and structure are termed associations. Each alliance has at least one association, but many alliances have multiple association (e.g., *Quercus agrifolia* Woodland Alliance). In the discussion below, we identify associations whenever possible. The *Manual* also identifies semi-natural stands; these are vegetation types dominated by non-native species that have become naturalized in California. In addition, the *Manual* includes provisional alliances; alliances where sufficient data are available to propose the vegetation type, but more research is needed to verify the alliances status in California vegetation.

Some habitats discussed below are not based on vegetation cover though they may support vegetation, examples include rock outcrops and ponds.

3.2.1 Wild Oats Grassland (*Avena* (*barbata, fatua*) Semi-Natural Stands)

This vegetation type is dominated by non-native annual grasses and occupies many areas that were historically dominated by native grasses and forbs. Wild oats grassland covers approximately 1,543 acres of the project site (Appendix B, Photos B1-B4 and B9-B10). The dominant plant species observed in this community include slender wild oats (*Avena barbata*), ripgut brome (*Bromus diandrus*), Italian ryegrass (*Lolium multiflorum*), and soft chess (*Bromus hordeaceus*). Other grass species such as hare barley (*Hordeum murinum* ssp. *leporinum*) are also locally abundant on the project site. Scattered individuals or patches of native grasses such as purple needlegrass *(Nassella pulchra)* and creeping wildrye (*Leymus triticoides*) are also present in some areas. Non-native forbs include filaree (*Erodium botrys*), rose clover (*Trifolium hirtum*), Italian thistle (*Carduus pycnocephalus*), yellow star thistle (*Centaurea solstitialis*), and milk thistle (*Silybum marianum*). Non-native forbs such as black mustard (*Brassica nigra*) also form large monotypic patches in some areas. Native forbs such as Menzies' fiddleneck (*Amsinckia menziesii* var. *menziesii*), harvest brodiaea (*Brodiaea elegans*), sky lupine (*Lupinus nanus*), mule's ears (*Wyethia glabra*), gold nuggets (*Calochortus luteus*), common popcorn flower (*Plagiobothrys nothofulvus*), and others grow sparsely among non-native grasses.

Though wild oats grassland is dominated by different plant species (i.e., non-native species) than native grasslands, large, relatively undisturbed expanses of this vegetation (such as those present on the project site) can support a diversity of wildlife species that were historically associated with native California grassland alliances. The only small mammals typical of grasslands that was detected during the field visit were the Botta's pocket gopher (*Thomomys bottae*) and deer mouse (*Peromyscus maniculatus*). Other species of small mammals known from the area and likely to occur, include the ornate shrew (*Sorex ornatus*), California vole (*Microtus californicus*), and western harvest mouse (*Reithrodontomys megalotis*). Larger mammals that use grasslands include the black-tailed jackrabbit (*Lepus californicus*), and mule deer (*Odocoileus hemionus*), both observed on the project site.

The rolling hills and grassland on the site appear to provide suitable habitat for the California ground squirrel (*Spermophilus beecheyi*), but only one individual was observed along the dry stonewall in the western portion of the site. Perhaps the shallow soils and bed rock close to the surface limit their ability to dig burrows. The burrow systems of this mammal provide important retreats for a wide variety of native wildlife including such special-status species as the California red-legged frog (*Rana draytonii*) and burrowing owl (*Athene cunicularia*).

The pallid bat (*Antrozous pallidus*), which feeds primarily on large terrestrial arthropods in open habitats, is likely to be present on the site and forage in the grassland. Predators that forage for small mammals in grasslands and have been observed on the project site include the white-tailed kite (*Elanus leucurus*), northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), barn owl (*Tyto alba*), and coyote (*Canis latrans*). The golden eagle (*Aquila chrysaetos*) nests in southeast Napa County, both north and south of the project site, (Berner et al., 2003). This large raptor has been observed soaring over the site during several field surveys.

Reptiles observed in the wild oats grassland include western skink (*Plestiodon skiltonianus*)[1], western fence lizard (*Sceloporus occidentalis*), southern alligator lizard (*Elgaria multicarinata*), California kingsnake (*Lampropeltis californiae*), gopher snake (*Pituophis catenifer*), and western rattlesnake (*Crotalus oreganus*). The western fence lizard is abundant on rocks and outcrops in this habitat. These reptile species are also expected to occupy open oak woodlands on the project site. The sharp-tailed snake (*Contia tenuis*) is expected to occur in the on-site grasslands under rocks and near woodland edges under fallen tree limbs and bark.

During the winter and spring, when the grasslands are still green, great egrets (*Ardea alba*) and great blue herons (*Ardea herodias*), more typically associated with wetland habitats, can often be seen hunting voles and gophers in grasslands. Both of these species can be expected to occur on the site.

Songbirds typically associated with grasslands in the area include the savannah sparrow *(Passerculus sandwichensis)* and western meadowlark *(Sturnella neglecta)*. The grasshopper sparrow *(Ammodramus savannarum)* also nests at scattered localities in Bay Area grasslands and likely nests on the site as singing males were observed during the first spring field survey in June 2007 and multiple times during the spring of 2009. Western bluebirds *(Sialia mexicana)* were also observed on the project site. This species nests in tree cavities and forages over grasslands and other open habitats.

Another grassland bird present on the project site is the lark sparrow (*Chondestes grammacus*); these large sparrows favor grasslands adjacent to woodlands which provide nesting habitat. Several species of swallows were also observed foraging over the grasslands (Appendix A). The loggerhead shrike (*Lanius ludovicianus*), a songbird that forages for large insects and small vertebrates in open habitats, was also observed in the on-site grasslands. This special-status bird nests in trees and shrubs adjacent to grasslands and other open habitats and likely nests on or adjacent to the project site.

In summary, the wild oats grassland on the project site is expected to support a diverse wildlife community typical of the grasslands in the Bay Area and the site appears to be a regionally important parcel of grasslands in southern Napa County.

3.2.2 Purple Needle Grass Grassland (*Nassella pulchra* Herbaceous Alliance)

During the field surveys, patches of grasslands containing a major component of native grass species (more than 5 percent cover) such as purple needlegrass, meadow barley (*Hordeum brachyantherum*), and creeping wildrye were mapped as a separate plant community. These areas are mostly dominated by purple needle grass (*Nassella pulchra*) and are designated as purple needle grass grassland (Figure 3) and cover approximately 25 acres of the property. The largest stand of this alliance is in Vineyard Block 34, and it supports about 5 percent cover each of purple needle grass and creeping wildrye. Creeping wildrye is the dominant native perennial grass in some of the more level areas of the project site with heavy clay soils, similar to sites in the Central Valley; an alliance of this vegetation has not been identified (Sawyer et al., 2009).

This community is a remnant of the original native perennial grasslands that covered the hills and valleys throughout the central coast, Bay Area, and north coast of California. Non-native annual

[1] This species was formerly placed in the genus *Eumeces* (Stebbins 2003), but recent taxonomic work has resulted in all North American members of this genus being reallocated to *Plestiodon* (see Crother 2008).

grasses, introduced from the Mediterranean region, have displaced native grasses and forbs since European settlement in the early 19th century. The introduction of these highly competitive annuals combined with historic continuous heavy livestock grazing, prolonged periods of drought, and tillage for dry farming resulted in a type conversion from native perennial grasslands to non-native semi-natural grasslands throughout California including the hills in Napa County (Burcham 1956; Heady et al., 1992; Stromberg and Griffin 1996). Additional areas of former native grasslands have been displaced by coyote brush scrub because of lack of disturbance from fire and livestock grazing. In the absence of fire and grazing, grasslands in the Bay area tend to succeed to coyote brush scrub (Edwards 1990; McBride and Heady 1968). On some sites succession proceeds without disturbance from native grasslands to coyote brush scrub to coastal scrub and eventually (after 50 years or more) to oak-bay forest (McBride 1974). Accordingly, grasslands tend to be more common in areas that support active livestock operations.

It is often difficult to separate the existing remnants of native grasslands from semi-natural grassland because of the patchiness and small size of some native grass stands. In addition, even the most intact stands of native grasslands support an element of non-native grasses, and there is no recognized standard for the amount of native cover required to designate native grasslands from annual grassland. Accordingly, not all areas of native grassland were mapped separately, only the largest and most distinct that supported more than 5 percent cover of native grasses. The 5 percent cover criteria is arbitrary and not officially designated for native grassland definition. It was selected for this study because that level of native coverage was easily discernable in the field. Native grassland alliances are considered sensitive by the CDFG (CDFG 2003) and is protected under County General Plan policies.

Wildlife associated with native grassland would include the same species discussed above under California annual grassland.

3.2.3 Coast Live Oak Woodland (*Quercus agrifolia* Woodland Alliance) and California Bay Forest (*Umbellularia californica* Forest Alliance)

Coast live oak woodland and California bay forest are discussed together because on the project site these two alliances form a complex mosaic and they intergrade in many areas along the Suscol Creek drainage. Coast live oak woodland on the project site varies from dense closed canopy stands on north-facing slopes and along drainages to open stands with no overlap in individual tree canopies on south-facing slopes. Isolated oaks are also scattered in open grassland. Approximately 522.4 acres of coast live oak woodland/California bay forest is present on the project site (Appendix B, Photos B1-B5, and B10).

The dominant tree of the coast oak live oak woodland is coast live oak (*Quercus agrifolia*), but in areas along Suscol Creek, this alliance forms an association with California bay (*Umbellularia californica*). California bay is particularly common on north-facing slopes and in some areas form almost monotypic stands of California bay forest. California buckeye (*Aesculus californica*) occurs as scattered individuals on the edges of the coast live oak woodland along the drainages. Valley oak (*Quercus lobata*), black oak (*Quercus kelloggii*), and Oregon oak (*Quercus garryana*) occur in small numbers in coast live oak woodland in the canyon bottom along Suscol Creek. Scattered individual valley oaks are present in other areas as well.

Understory shrubs include: snowberry (*Symphoricarpos albus* var. *laevigatus*), creeping snowberry (*Symphoricarpos mollis*), California coffeeberry (*Frangula californica*), honeysuckle (*Lonicera hispidula*), thimbleberry (*Rubus parviflorum*), and wood rose (*Rosa gymnocarpa*). A stand of western azalea (*Rhododendron occidentale*) is also present within the coast live oak woodland along Suscol Creek in the central portion of the project site. Also present in this same area is a stand of American dogwood (*Cornus sericea*). Herbaceous species present in the understory include bugle hedge nettle (*Stachys ajugoides*), broad leaf aster (*Aster radulinus*), herb-Robert geranium (*Geranium robertianum*), and others. Bryophytes such as redshank moss (*Ceratodon purpureus*) and feather moss (*Kindbergia praelonga*) grow on tree trunks and shaded soils in the oak woodland. Lace lichen (*Ramalina menziesii*), often mistaken for Spanish moss, hangs from the branches of oak trees.

A small stand of California scrub oak (*Quercus berberidifolia*) forms an association with coast live oaks on the north slope of the prominent rocky knob in the north central portion of the property (north of Suscol Creek). There is also a small cluster of unusual oaks in this area that appear to be hybrids of coast live oak and black oak.

Coast live oak woodland provide habitat for many wildlife species. Examples include: red-shouldered hawk (*Buteo lineatus*), acorn woodpecker (*Melanerpes formicivorus*), Nuttall's woodpecker (*Picoides nuttallii*), Hutton's vireo (*Vireo huttoni*), western scrub jay (*Aphelocoma californica*), oak titmouse (*Baeolophus inornatus*), white-breasted nuthatch (*Sitta carolinensis*), and dusky-footed woodrat (*Neotoma fuscipes*). Mid-sized to large mammals such as mule deer and coyote use this habitat for shelter and foraging. Areas of ground disturbance from foraging feral pigs (wild boar) (*Sus scrofa*) were evident in several areas in the oak woodland and in grassland adjacent to oak woodland.

California slender salamanders (*Batrachoseps attenuatus*) were common under fallen logs and bark during the March 10, 2009 field surveys. Species of amphibians and reptiles that were not found during the field surveys due to dry surface conditions or cool temperatures, but that commonly occur in oak woodlands and are expected on the project site include the arboreal salamander (*Aneides lugubris*), ensatina (*Ensatina eschscholtzii*), and ring-neck snake (*Diadophis punctatus*).

3.2.4 White Alder Groves (*Alnus rhombifolia* Forest Alliance)

A narrow strip (approximately 4.7 acres) of this alliance occurs along the middle to lower portion of Suscol Creek (Appendix B, Photo B8). Most of the trees are restricted to the immediate vicinity of the creek with some growing in the water and others forming overhanging root tangles. Many of the alders in this woodland are large trees (approximately 50 to 60 feet high) that form a closed canopy over the creek in many places; however, along one stretch of the creek almost all the trees are dead. White alder woodland blends with coast live oak woodland along its upland edge. Arroyo willow (*Salix lasiolepis*) and red willow (*S. laevigatus*) are also sparse components of the white alder woodland on the project site. The understory in this habitat is relatively open, but in some areas where the canopy is broken there are dense stands of non-native Himalayan blackberry (*Rubus discolor*) and stinging nettle (*Urtica dioica*).

White alder woodland provides nesting habitat for a wide variety of birds associated with riparian woodlands such as Pacific-slope flycatcher (*Empidonax difficilis*), warbling vireo (*Vireo gilvus*), and black-headed grosbeak (*Pheucticus melanocephalus*), all of which are expected to nest on the property. The closed canopy provides deep shade over the creek during the hot summer months and increases the aquatic habitat value for native fish, such as steelhead/rainbow trout (*Oncorhynchus mykiss*), and amphibians.

3.2.5 Arroyo Willow Thickets (*Salix lasiolepis* Scrubland Alliance)

A small patch (approximately 0.9 acre) of arroyo willow thicket dominated by arroyo willow is present on the bench north of Fagan Creek; approximately 25 feet above the creek channel (Figure 3). This willow woodland contains trees 25 to 30 feet high and forms a dense canopy with little understory. This patch of willow woodland appears to be associated with an area of high groundwater or a seep, but surface water was not observed. There are also several shrubby arroyo willows that occur with the western azalea patches at seeps on the south slope of the knob (see western azalea patches section).

Willow dominated woodlands provide nesting habitat for a variety of bird species associated with riparian habitats such as the song sparrow (*Melospiza melodia*), but the patch present on the bench above Fagan Creek appears to be too small in area to support nesting of special-status species such as the yellow warbler (*Dendroica petechia*) or yellow-breasted chat (*Icteria virens*) which are closely associated with willow woodland as nesting habitat.

3.2.6 Chamise Chaparral (*Adenostoma fasciculatum* Scrubland Alliance)

Chamise (*Adenostoma fasciculatum*) is a widely distributed shrub in chaparral communities in California. Associated species in the chaparral on the project site include spiny redberry (*Rhamnus crocea*), coffee fern (*Pellaea truncata*), climbing bedstraw (*Galium porrigens*), and others. A patch (approximately 15.8 acres) of chaparral occurs on the south-facing slope of the knob (Figure 3); other small and scattered patches of chamise (too small to be mapped) are also present on the project site (Appendix B, Photos B2, B5, and B6).

Wildlife associated with chamise chaparral includes a diversity of reptiles, birds, and mammals that favor dry shrub dominated habitats. Few of these species are restricted to chamise chaparral. Examples observed on the project site include western fence lizard, common poorwill (*Phalaenoptilus nuttalli*), ash-throated flycatcher (*Myiarchus cinerascens*), bushtit (*Psaltriparus minimus*), Bewick's wren (*Thryomanes bewickii*), wrentit (*Chamaea fasciata*), spotted towhee (*Pipilo maculatus*), Lazuli bunting (*Passerina amoena*), and lesser goldfinch (*Carduelis psaltria*). Various species of small mammals occur in this habitat, but are generally more difficult to observe than diurnal reptiles and birds. Species likely to occur include desert cottontail (*Sylvilagus audubonii*) and piñyon mouse (*Peromyscus truei*). Mid-sized to large mammals such as coyote, bobcat (*Lynx rufus*), cougar (*Puma concolor*), and mule deer, all known from the project site, also forage in this habitat.

3.2.7 California Sagebrush Scrub (*Artemisia californica* Scrubland Alliance) and Barberry (Not in Sawyer et al., 2009)

Scattered patches (approximately 0.3 acre total) of California sagebrush scrub occur on dry south-facing slopes and in association with chamise in some areas (Figure 3). Bush monkey flower (*Mimulus aurantiacus*) and deerweed (*Lotus scoparius*) are also associated with patches of California sagebrush in the study area (Appendix B, Photos B3, and B9). Other small patches of California sagebrush, too small to be mapped, are scattered on rocky south-facing slopes on the project site.

Isolated patches (approximately 0.3 acre total) of scrub dominated by California barberry (*Berberis pinnata*) occur in the northern portion of the site (Figure 3); another isolated patch of barberry is present just east of the eastern property boundary on the hill slope above Fagan Creek. Poison oak (*Toxicodendron diversilobum*), morning glory (*Calystegia occidentalis* ssp. *occidentalis*) and a single large blue elderberry (*Sambucus nigra*) also are present in the stand of barberry in the northeast portion of the site.

Many of the same wildlife species that occur in chaparral and grassland were observed in or are expected to occur in stands of California sagebrush and barberry.

3.2.8 Western Azalea Patches (*Rhododendron occidental* Provisional Shrubland Alliance)

This provisional alliance occurs as a small stand at a seep on the south side of the knob and at one location in the Suscol Creek drainage. The stand at the seep on the knob is associated with shrubby arroyo willows on a rocky cliff face. Western azalea is a deciduous shrub noted for its large showy flowers. Wildlife associated with this vegetation includes many of the same species found in arroyo willow thickets, the chamise chaparral, and California sagebrush scrub.

3.2.9 Eucalyptus and Other Non-Native Trees

Several large isolated blue gum (*Eucalyptus globulus*) trees occur in the southeastern corner of the site and a single Lombardy poplar (*Populus nigra* ‘ Italica’) is present at a seep in the same area. A hedgerow of horsetail trees (*Casuarina equisetifolia*) fringes the southern project site boundary, just south of the fence line. Although these trees are non-native they provide habitat for some species of birds. Various species of raptors likely use the blue gum as a perch site and loggerhead shrikes could use the horsetail trees as nest sites.

3.2.10 Rock Outcrops

The rock outcrops on the property support some weedy vegetation, but numerous native plant species are present as well (Appendix B, Photos B4, B6, and B10). Native species observed in rock outcrops include sand pygmyweed (*Crassula connata*), canyon dudleya (*Dudleya cymosa*), winecup fairyfan (*Clarkia purpurea* ssp. *quadrivulnera*), soap plant (*Chlorogalum pomeridianum*), California poppy (*Eschscholzia californica*), goldback fern (*Pentagramma triangularis*), California goldfields (*Lasthenia* californica), and others. During the July survey, California fuchsia (*Epilobium canum*), streamside daisy (*Erigeron biolettii*), and rosin weed (*Calycadenia truncata*) were found blooming in this habitat. Mosses such as grimmia (*Grimmia* spp.) and lichens such as cladonia (*Cladonia* sp.), scale lichen (*Psora* sp.), and petaled rock tripe (*Umbellicaris polyphylla*) grow on rocks in the outcrops.

Rocky cliff faces and large outcrops on the south-facing slopes also support shrubs such as California sagebrush, bush monkey flower, and poison oak. Seeps on the cliff face of the prominent knob in the central portion of the project site support patches of willows and western azaleas.

Rocky cliffs and outcrops provide foraging habitat and shelter for many species of wildlife. Deeper crevices provide potential roosts for bats, such as the pallid bat. Various species of snakes, including the North American racer (*Coluber constrictor*) and western rattlesnake (*Crotalus oreganus*), forage around rocky areas and shelter in crevices.

The dry stone walls that are located along the northern boundary and western portion of the project site, though human constructed, provide valuable habitat for many animals, including many species of lizards and snakes, and California ground squirrel (*Spermophilus beecheyi*).

3.2.11 Wetlands

Seeps and springs. Seeps and springs, associated with the Sonoma Volcanics, are present in many areas of the property (Figure 3) and are the primary permanent water source for Suscol Creek. The springs and seeps on the project site total approximately 0.8 acre in area (Appendix B, Photo B9). In addition to those mapped on Figure 3, a number of seeps and springs (not mapped) are located along cliff faces under the dense tree canopy along Suscol Creek. Seeps tend to exhibit little surface flow, but contain saturated soil and often support plants typical of wetlands. In contrast, springs tend to have flowing surface water.

The vegetation of seeps and springs is dominated by common rush (*Juncus effusus*), Baltic rush (*Juncus balticus*), pennyroyal (*Mentha pulegium*), and Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*). Other plant species include water speedwell (*Veronica anagallis-aquatica*), mannagrass (*Glyceria leptostachya*), water cress (*Rorippa nasturtium-aquaticum*), common monkey flower (*Mimulus guttatus*), tinker's penny (*Hypericum anagalloides*), nutsedge (*Cyperus eragrostis*), and bentgrasses (*Agrostis exarata* and *A. viridis*). The cliff face seeps and springs in the heavily shaded areas along Suscol Creek support thick growths of liverworts, mosses, and ferns, and flowering plants such as scarlet monkey flower (*Mimulus cardinalis*). Patches of arroyo willow are also associated with some springs and seeps. Mosses such as fissidens (*Fissidens limbatus*) and funaria (*Funaria* sp.) grow on moist soils and rocks in seeps and springs along with the liverwort (*Aneuria pinguis*) and hornworts (*Anthoceros* sp.).

Seeps and springs are a water source for a wide variety of wildlife species during the dry season. California red-legged frogs (*Rana draytonii*)[2] and various other amphibian species use seeps and springs as refugia during the non-breeding season.

Ponds. The man-made pond (approximately 2.5 acres) in the study area supports several aquatic plant species including coontail (*Ceratophyllum demersum*) and duckweed (*Lemna minor*). The edges of the ponds are dominated by California bulrush (*Scirpus californicus*), narrowleaf cattail (*Typha angustifolia*), broadleaf cattail (*Typha latifolia*), and common rush (*Juncus effusus*).

This pond is likely used by a variety of wildlife species when water is present. Red-winged blackbirds *(Agelaius phoeniceus)* were observed here during the 2006 survey and are likely to nest in the bulrush and cattail stands. Water birds observed at the pond include gadwall (*Anus strepera*), mallard (*Anus*

[2] The California red-legged frog was formerly considered a subspecies of *Rana aurora* (Stebbins 2003), but is now recognized as a distinct species (see Crother 2008; Shaffer et al. 2004).

platyrhynchos), double-crested cormorant (*Phalacrocorax auritus*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), and American coot (*Fulica americana*).

The pond also provides potential breeding and foraging habitat for the California red-legged frog, Sierran treefrog *(Pseudacris sierra)*[3] and other native amphibians. However, the presence of American bullfrog (*Rana catesbeiana*)[4], western mosquitofish (*Gambusia affinis*), and largemouth bass (*Micropterus salmoides*), all non-native predatory species, greatly reduces the suitability of this pond for native aquatic species. A single western pond turtle (*Actinemys marmorata*) was observed at the pond during the October 8, 2009 field survey. The air space above the pond provides foraging habitat for birds such as barn swallow (*Hirundo rustica*), cliff swallow (*Petrochelidon pyrrhonota*), and myotis bats (all observed foraging over the pond during the surveys).

Streams. Suscol Creek is the primary stream draining the property; it is perennial and fed by springs (Appendix B, Photos B7-B8). The stream bed ranges from coarse gravel to rock rubble and bedrock and undercut banks are present in some areas. Flows vary from relatively high velocity riffles and runs to still pools. There are numerous pools, some over 1.5 feet deep. Relatively little aquatic vegetation is present in the creek, but during late summer several of the pools were almost completely covered with duckweed (*Lemna miner*). Fagan Creek is also perennial and fed mainly by springs. This stream is similar to Suscol Creek in its physical characteristics, but appears to be more intermittent with areas of under gravel flow in the dry season.

Suscol Creek provides high quality aquatic habitat for native fish and amphibians; steelhead/rainbow trout, California roach (*Lavinia symmetricus*), and rough-skinned newts (*Taricha granulosa*) were observed in the pools. Steelhead/rainbow trout occur in the deeper pools and runs from the western edge of the property upstream to the second road crossing and they are present in the larger perennial branches of the creek as well. Western toads (*Bufo boreas*)[5] were observed breeding in the pool just upstream of the first road crossing in the spring of 2009. California newt (*T. torosa*) larvae were observed in pools in Fagan Creek during October 2008, but no fish were seen in this drainage.

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[3] This treefrog was formerly known as the Pacific treefrog *(Pseudacris regilla)*, but a recent taxonomic study split this species into multiple new species; the populations in the central California and the Bay Area are now named the Sierran treefrog *(P. sierra)* (see Crother 2008).

[4] Crother (2008) places the American bullfrog in the genus *Lithobates*, but we follow the recommendations of Pauly et al. (2009) in retaining this species in the genus *Rana* (subgenus *Aquarana*).

[5] Crother (2008) places the western toad in the genus *Anaxyrus*, but we follow the recommendations of Pauly et al. (2009) in retaining this species in the genus *Bufo* and the subgenus *Anaxyrus*.

4.0 SPECIAL-STATUS SPECIES

Special-status species includes species, subspecies or distinctive populations of plants and animals that are of conservation concern. These species, subspecies or distinctive populations may be listed at the federal or State level or may be considered species of special concern by the State. Species of special concern, unlike federal and State-listed endangered and threatened species, have no legal status but are tracked by the CNDDB and are generally considered in CEQA documents. Plants on the CNPS List 1A, List 1B, and List 2 are also usually considered in CEQA documents. Napa County considers list 3 and 4 plants in the environmental analysis of projects.

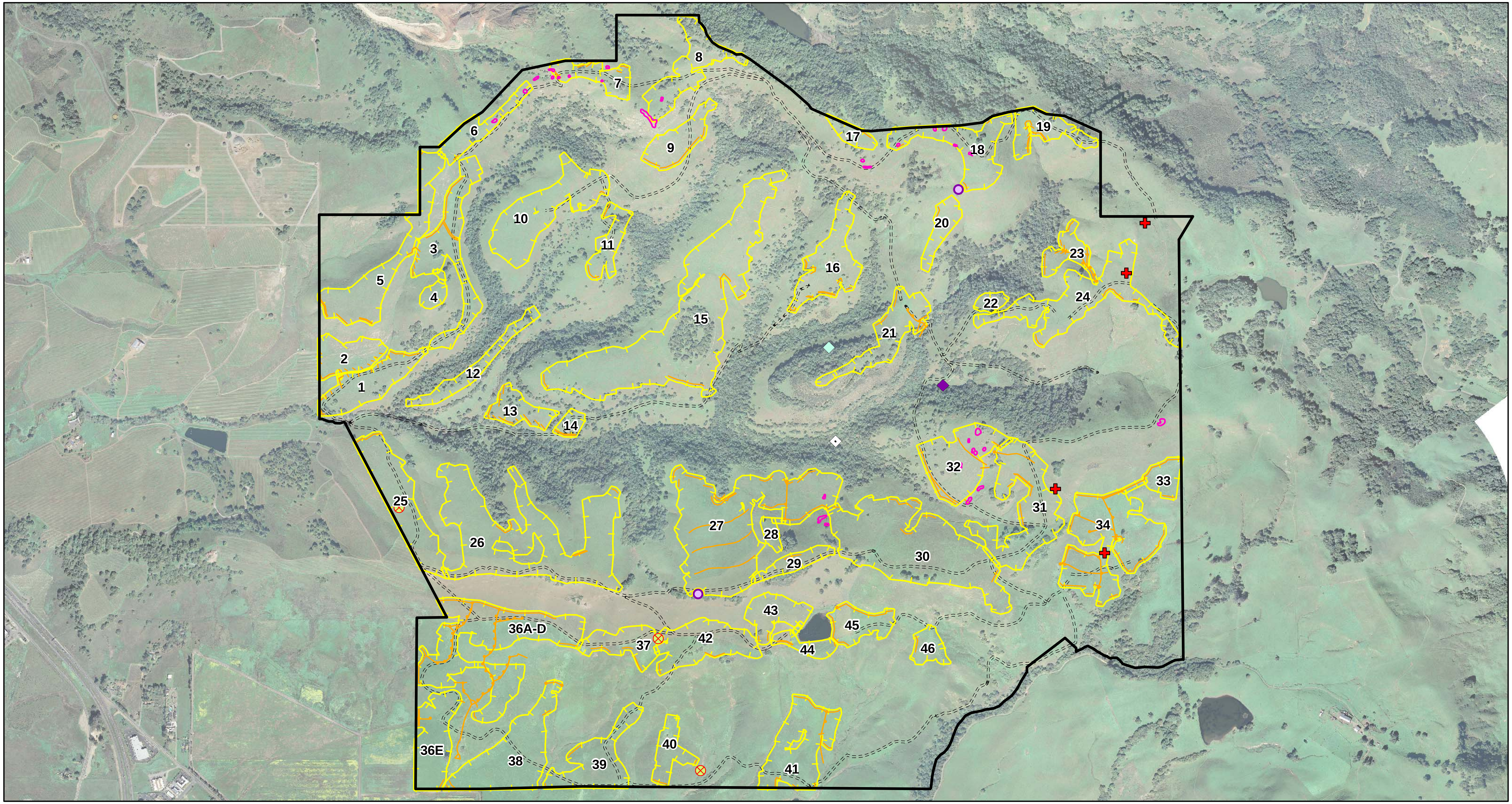
The special status species evaluated for the Suscol Mountain Vineyard project site include those for which there are CNDDB or other records within southern Napa County or adjacent Solano County. This area includes the undeveloped lands west of the Napa River estuary and east of Green Valley (Solano County) (Figure 4). Special-status species known to occur regionally or with habitat requirements that indicate potential occurrence on the project site are also addressed, even though there may be no local records. Special-status species restricted to tidal, salt and brackish marsh, or other primarily aquatic habitats in the Napa River estuary or Suisun Marsh are not addressed in this report because these habitats are not found on or adjacent to the site. Special-status plants and animals evaluated for the project site are listed in Tables B and C, respectively. The locations of special-status species observed on the project site are shown on Figure 4, with the exception of two special-status hawks which were observed soaring/flying over the site and could not be precisely mapped.

4.1 SPECIAL-STATUS PLANTS

Many of the special status plants known from southern Napa and adjacent Solano counties are associated with salt marsh, which does not occur on or adjacent to the project site. Special-status species with such restricted habitats are not expected to be on the project site, and not addressed here. Vegetation communities follow Sawyer et al. (2009). The vegetation types in the habitat column of the special-status plant table (Table B) do not correspond to the vegetation names in the *Manual* because CNPS has not yet updated this information for rare plants on its website (http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi).

4.1.1 Bryophytes

Bryophytes (commonly known as moss and liverworts) can occur on all habitat and substrate types present on site. Although distributions are not well known for special-status bryophytes, and the record search for plants did not reveal any extant occurrence of them within a ten-mile radius of the site, one record for slender silver moss (*Anomobryum julaceum*, CNPS List 1.B) occurs approximately 28 air miles northwest in the Mark West Springs quadrangle near Santa Rosa in Sonoma County. Because the habitat associations of this moss (seasonally exposed moist soil of road banks in grasslands and woodlands) are present on the site, surveys and collections for bryophytes were conducted. Suitable habitat for special-status bryophytes such as moist banks of road cuts,



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SOURCE: Aerial Imagery from Napa County (2007).

Project Site Boundary
Proposed Clearing Limit
Erosion Control Feature
Roads

Blue Elderberry (Potential Valley Elderberry Longhorn Beetle Habitat)
Grasshopper Sparrow (Singing Male)
Loggerhead Shrike

Streamside Daisy
American Dogwood
Hybrid Oaks
Yampa species

FIGURE 4

Suscol Mountain Vineyards

Special-status Species, Locally Rare Species, and Hybrid Oaks

I:\BAG0801\GIS\Maps\BioSurveyReport\2010\Figure4_SpecialStatusSpecies.mxd (8/18/2010)

Table B: Special-Status Plant Species Evaluated for the Suscol Mountain Vineyard Property, Napa County, California

Species	Status* (Federal/State/ CNPS)	Habitat/Blooming Period	Discussion
Amorpha californica var. *napensis* Napa false indigo	--/--/List 1B	Annual grasslands, openings in broadleaf upland forest, chaparral, and cismontane woodland; 150-2000 meters elevation. Blooms April to July.	Suitable habitat appears to be present, but this species was not found during plant surveys.
Astragalus claranus Clara Hunt's milk-vetch	FE/ST/List 1B	Openings in chaparral, Cismontane woodland, valley and foot hill grassland in serpentine or rocky clay or volcanic soils; 75-275 meters elevation. Blooms March to May.	Clara Hunt's milk-vetch is known from five occurrences in Napa and Sonoma Counties where it grows on thin rocky clay soils derived from volcanic material or serpentine. It is found in openings of grasslands, manzanita chaparral, and blue oak woodland. It is associated with purple needlegrass, *Brodiaea*, California poppy, and *Gilia*. It was not found during plant surveys.
Balsamorhiza macrolepis var. *macrolepis* Big-scale balsamroot	--/--/List 1B	Thin rocky soil, grassy hillsides; foothill woodland, chaparral; sometimes on serpentine; 35-1000 meters elevation. Blooms April to May.	Suitable habitat for this species occurs on the project site and there are CNDDB occurrence records about 2 miles to the east. This plant favors thin rocky soils and often occurs in grasslands. Suitable habitat is present for big-scale balsamroot in various places in the grassland near rocky outcrops on slopes. This is a conspicuous species with large showy flowers, but it was not found during the plant surveys.
Brodiaea californica var. *leptandra* Narrow-anthered brodiaea	--/--/List 1B	Rocky volcanic soil, grassy hillsides; foothill woodland, chaparral. Blooms May to July.	This species occurs in sunny sites with rocky volcanic soils, often on creek sides, and in wooded or brushy areas. Narrow-anthered California brodiaea can be distinguished from the more common harvest brodiaea (*Brodiaea elegans* ssp. *elegans*) by checking the staminode character traits. Narrow-anthered California brodiaea has pale lilac to white flowers, and with a stem greater than 50 centimeters tall. Although there is a suitable habitat for this species on the site, Narrow-anthered California brodiaea was not observed during the 2008 or 2009 surveys.
California macrophylla Round-leaved filaree	--/--/ List 1B	Cismontane woodland, valley and foothill grasslands; 15-1200 meters elevation. Blooms March to May.	Suitable habitat appears to be present, but this species was not found during plant surveys.
Calochortus pulchellus Mount Diablo fairy-lantern	--/--/List 1B	Openings in wooded and brushy slopes/chaparral, coastal scrub, riparian woodland, and associated grasslands; 200-800 meters elevation. Blooms April to June.	There are no CNDDB records of this species from Napa County, but there is a record less than 3.5 miles east of the project area in Solano County. Many records are reported outside of this species known range, some as far north as Humboldt County. These observations are probably misidentified and are most likely *C. amabilis*. Mount Diablo fairy-lantern was not found on the project site during the 2008 or 2009 spring surveys although they were conducted when it would have been flowering and identifiable.
Calycadenia micrantha Small flowered calycadenia	--/--/List 1B	Chaparral, volcanic meadows and seeps, valley and foothill grassland/roadsides, rocky talus, scree, sometimes in serpentine and sparsely vegetated areas; 5-1500 meters elevation. Blooms June to September.	*Calycadenia micrantha* is closely related to *C. truncata* and is found in the North Coast Range from Trinity County to Lake, Colusa, and Napa Counties. Not found during plant surveys.
Ceanothus purpureus	--/--/List 1B	Chaparral and woodland on rocky volcanic soils; 120-	This late winter and spring blooming shrub has recorded occurrences on rocky

Species	Status* (Federal/State/ CNPS)	Habitat/Blooming Period	Discussion
Holly-leafed ceanothus		640 meters elevation. Blooms February to June.	volcanic soils within one mile north of the project site. The presence of similar soils on the project site supports the potential occurrence of this species. This species was not found, nor was any other species of *Ceanothus*, during two years of plant surveys.
Centromadia parryi ssp. *parryi* Pappose tarplant	--/--/List 1B	Vernally mesic areas in grasslands, meadows and seeps, coastal salt marsh, often on alkaline sites; 2-420 meters elevation. Blooms May to November.	This species favors clay and alkaline soils in annual grasslands, chaparral, meadows, and around seeps. Most of the soils on the project site are shallow and rocky, with the exception of the area south of Suscol Ridge where clay soils and scattered seeps are present. There are records for this plant approximately 4.75 miles southeast of the project site. The pappose tarplant could occur in this area, but it was not found during two years of plant surveys that coincided with its flowering period
Cornus sercia American dogwood	--/--/-- Locally rare in Napa County	Edges of wetlands and riparian areas.	American dogwood is a facultative wetland plant that requires discussion based upon its listing in the Napa County Baseline Data Report as a locally rare species. This species was observed in areas of the site that will not be developed (Figure 4).
Downingia pusila Dwarf downingia	--/--/List 2	This species occurs in vernal pools, swales, and in depressions in valley and foothill grasslands. Blooms from Mach to May.	No suitable vernal pool or swale habitat occurs on the site. This species was not found on the project site during the 2008 or 2009 surveys.
Erigeron biolettii Streamside daisy	--/--/List 3	Dry slopes, North Coast coniferous forest, broadleaved upland cismontane woodland, rocks and ledges along rivers; 30 -1100 meters elevation. Blooms June to September.	Streamside daisy is known from 27 occurrences in 14 different USGS quadrangles and seven counties (Calflora, 2009). The common name is somewhat of a misnomer because it is often in dry, rocky areas distant from any streams or rivers. This species was found on the project site in small scattered patches along dry, rocky ridgelines and slopes where the soil is shallow and non-native grass cover sparse. Individual plants were not counted; polygons were drawn on the field map to delineate populations (Figure 4). The total area of the delineated polygons is approximately 1.6 acres. It is difficult to describe the density of individual plants within streamside daisy populations on the site. Cover of individual plants can vary from low to high because of their clonal growth habit (sprouting from rhizomes) and affinity to a variety of rocky soil types. In deep, rocky soils, the plants may have very high cover, while in shallow, rocky soils cover is low due to the limited growing between small cracks and openings.
Erigeron greenei Greene's narrow-leaved daisy	--/--/List 1B	Generally in chaparral or open woods; Ponderosa or Jeffrey pine, Douglas fir, usually over serpentine, sometimes on rocky alluvium and volcanic substrates; 75 to 1060 meters elevation. Blooms: May to September.	Suitable habitat is not present on site. Species not found during plant surveys.
Eriogonum truncatum	--/--/List 1B	Dry, exposed clay or sandy substrates in chaparral,	*Eriogonum truncatum* was presumed extinct until it was re-discovered on Mount

Species	Status* (Federal/State/ CNPS)	Habitat/Blooming Period	Discussion
Mt. Diablo buckwheat		coastal scrub, and grassland; 100-600 meters elevation. Blooms: April to September (sometimes November to December).	Diablo in 2005. It is known only from only one extant location and seven historical collections, most made in the Marsh Creek and Mt. Diablo areas of Contra Costa County. Although chaparral habitat is on the site, this species was not found during plant surveys.
Fritillaria liliacea Fragrant fritillary	--/--/List 1B	Grassland, coastal scrub, and coastal prairie, often on serpentine and usually in clay soils but various soil types are reported; 3-410 meters elevation. Blooms February to April.	This species prefers deep clay soils; due to the presence of shallow rocky soils over most of the project site potential habitat for this species appears to be limited. There are no CNDDB records within 10 miles of the site. The potential habitat on present on the project site has been severely degraded due to the combination of heavy grazing and the plant's palatability to cattle. Fragrant fritillary was not found during two years of surveys during its flowering period.
Harmonia nutans Nodding harmonia	--/--/List 4	Chaparral, cismontane woodland, rocky soils, and volcanic substrates; 75-975 meters elevation. Blooms April to June.	*Harmonia nutans* occurs in the southern North Coast Ranges and northern San Francisco Bay area. This plant favors thin rocky or gravelly volcanic soils in cismontane woodlands and in chaparral. Suitable habitat is present for nodding harmonia in various places in the grassland near rocky outcrops on slopes, but this species was not found during the two years of spring plant surveys when it would have been flowering and highly visible.
Hesperolinon breweri Brewer's western flax	--/--/List 1B	Cismontane woodland, grasslands, and chaparral, often in rocky serpentine soil; 30-885 meters elevation. Blooms May to July.	This species has a strong affinity to serpentine soils, yet it has been observed in rocky areas without serpentine. This species was not found during plant surveys.
Hesperolinon serpentinum Napa western flax	--/--/List 1B	Mostly found in serpentine chaparral; 50-800 meters elevation. Blooms May to July.	This species has a strong affinity to serpentine soils. No serpentine soils are present on site. This species was not found during plant surveys.
Juglans hindsii Northern California black walnut	--/--/List 1B	Deep alluvial soil in riparian forest and riparian woodland; few extant native stands remain, but widely naturalized; 0 to 395 meters elevation. Blooms April to May.	*Juglans hindsii* has been widely used as a rootstock for grafting *J. regia* and has been planted extensively in many parts of California for this purpose. It is now naturalized in many areas where it apparently did not occur before the introduction of commercial walnut growing. This species was not found during floristic surveys.
Lasthenia conjugens Contra Costa goldfields	FE/--/List 1B	Valley and foothill grasslands, vernal pools, and cismontane woodland; low depressions in open grassy areas; 0-470 meters elevation. Blooms March to June.	This plant historically occurred in the counties surrounding San Francisco Bay and along the coast, from Santa Barbara County to Mendocino County (CNPS, 2009). Many historical occurrences are considered extirpated. Contra Costa goldfields is currently known from about 20 presumed extant populations with the largest number being concentrated in the Fairfield-Suisun area in Solano County. A population of this endangered plant is present about 0.75 mile west of the project site (CDFG, 2009a), so a special effort was made during the botanical surveys to determine if it was present on the project site, or if the site supported suitable habitat for its occurrence. Another record is about 2.2 miles to the west of the project site on the west side of the Napa River, but this site has been converted to agricultural

Species	Status* (Federal/State/ CNPS)	Habitat/Blooming Period	Discussion
			development and the Contra Costa goldfields may no longer occur here (CDFG, 2009). Contra Costa goldfields grow in vernal pools, swales, and other depressions in open grassland and woodland communities, often in alkaline soils. It blooms from March through June, depending on environmental conditions (CDFG 2009; CNPS, 2009). Suitable vernal pool or similar habitats do not occur on the project site, and Contra Costa goldfields was not found on the project site during the two years of plant surveys.
Leptosiphon acicularis Bristly leptosiphon	--/--/List 4	Broadleaved upland forest, open or partially shaded slopes; 170-1500 meters elevation. Blooms March to June.	Suitable habitat appears to be present, but this species was not found during plant surveys.
Leptosiphon jepsonii Jepson's leptosiphon	--/--/1B	Chaparral, cismontane woodland; 100 to 500 meters elevation. Blooms March to May.	Suitable habitat appears to be present, but this species was not found during plant surveys.
Leptosiphon latisectus Broad-lobed leptosiphon	--/--/List 4	Chaparral, cismontane woodland, coastal prairie, valley and foothill grassland, grassy areas in woodlands and chaparral; 55-1500 meter elevation s. Blooms March to May.	Suitable habitat appears to be present, but this species was not found during plant surveys.
Lilium rubescens Chaparral lily	--/--/List 4	Chaparral, cismontane woodland; 100 to 500 meters elevation. Blooms April to August.	This plant occurs in dry soils in chaparral. Suitable habitat is present for chaparral lily in various places in the grassland near rocky outcrops on slopes, but this species was not found during the two years of spring plant surveys.
Limnanthes vinculans Sebastopol meadowfoam	--/--/1B	This species occurs in vernal pools, seeps, and mesic valley and foothill grasslands. Blooms April to May.	Douglas' meadowfoam (*Limnanthes douglasii* ssp. *rosea*) was observed on the site. Sebastopol meadowfoam can be distinguished from the more common Douglas' meadowfoam by checking the leaf character traits. Sebastopol meadowfoam has 3 to 5 leaflets that are entire, and Douglas' meadowfoam leaf has 5 to 13 leaflets that are often toothed or lobed. Although there is suitable habitat for this species on the site, Sebastopol meadowfoam was not observed during the 2008 or 2009 surveys.
Micropus amphibolus Mount Diablo cottonweed	--/--/List 3	Broadleafed upland forest, Chaparral, Cismontane woodland, Valley and foothill grassland/rocky; 50-800 meters elevation. Blooms March to May.	*Micropus amphibolus* is known northern Coast Ranges. It is superficially similar to and often confused with *M. californicus.* This species was not found during plant surveys.
Lomatium repostum Napa lomatium	--/--/List 4	This species favors serpentine soils in chaparral, and cismontane pine/oak woodland. Blooms March to June.	The CNDDB shows no records of Napa Lomatium within 10 miles of the site, and there are no serpentine soils on the Suscol Mountain project site. It was not found during two years of surveys during that period.
Monardella villosa ssp. *globosa* Robust monardella	--/--/ List 1B	Openings in broadleaved upland forest, chaparral, cismontane woodland, coastal scrub, and valley and foothill grassland; 100-915 meters elevation. Blooms June to July (sometimes August).	This species occurs in areas with soil and vegetation types similar to those found on the project site (rocky slopes, ephemeral drainages, and oak woodlands). Robust monardella can be distinguished from the more common coyote mint (*Monardella villosa* ssp. *villosa*) by plant height, leaf length, outer flower bract size, and size of the flower head. Robust monardella has wooly, glandular hairy leaves, leaf-like

Species	Status* (Federal/State/ CNPS)	Habitat/Blooming Period	Discussion
			floral bracts enclosing a large head of pink or purple flowers, and with a stem greater than 50 centimeters tall. Although there is a suitable habitat for this species on the site, robust monardella was not observed during the 2008 or 2009 surveys.
Monardella viridis ssp. *viridis* Green monardella	--/--/List 4	Oak woodland, chaparral, cismontane woodland, and open rocky slopes; 300-1000 meters elevation. Blooms June to September.	Green monardella can be distinguished from *Monardella villosa*, and *Monardella hypoleuca* by leaf, middle flower bract, and corolla color character traits. Green monardella has thin, non-glandular hairy leaves, papery to leathery floral bracts, and a lavender rose or purple corolla. Green monardella was not observed during the 2008 or 2009 surveys.
Navarretia leucocephala ssp. *bakeri* Baker's navarretia	--/--/ List 1B	This species occurs in vernal pools, and mesic valley and foothill grasslands, in lower mountain conifer forest, cismontane woodland, and meadows and seep communities. Blooms from April to July.	Vernal pool and suitable meadow habitat for this species was not observed at the site, therefore there is a low likelihood for its occurrence on the site. Baker's navarretia was not observed during the 2008 or 2009 surveys.
Navarretia sinistra ssp. pinnatisecta Pinnate-leaved navarretia	--/--/List 4	Open, chaparral or forest, serpentine or red volcanic soil; 300-2200 meters elevation. Blooms to June to August.	This species has a strong affinity to serpentine soils. No serpentine soils are present on site. This species was not found during plant surveys.
Perideridia gaidneri ssp. *gairdneri* Gairdner's yampah	--/--/List 4	Broadleafed upland forest, chaparral, coastal prairie, valley and foothill grassland, vernal pools and vernally mesic areas; 0-65 meters elevation. Blooms June to October.	Gairdener's yampa is a facultative wetland plant with no recorded observations in CNDDB. The closest occurrence is attributed to a Jepson Herbarium collection (#JEPS104486) from approximately 7 miles north of site in rhyolite soils at edge of woods in a flat opening that is wet in winter, Leoma Lakes area of Wild Horse Valley Ranch, 418 meters elevation. A species of *Perideridia* was observed on the site near a seep adjacent to Suscol Creek (Figure 4), but was not identified to species due to the lack of flowers. This individual was likely Gairdener's yampa.
Rhynchospora californica California beaked-rush	--/--/List 1B	Bogs and fens, meadows and seeps, freshwater seeps, open marshy areas, and lower montane coniferous forest; 45 to 1000 meters elevation. Blooms May to July.	Suitable habitat appears to be present, but this species was not found during plant surveys.
Ribes victoris Victor's gooseberry	--/--/List 4	Broadleaved upland forest, chaparral, in wooded slopes in shaded canyons; 100 to 750 meters elevation. Blooms March to April.	Suitable habitat appears to be present, but this species was not found during plant surveys.
Sisyrinchium californicum California golden eye grass	--/--/-- Locally rare in Napa County	Wetlands. Blooms March to June.	California golden eye grass is an obligate wetland plant that requires discussion based upon its " locally-rare" status in Napa County (NCBDR, 2005). Blue eye grass (*Sisyrinchium bellum*) was observed in non-wetland grasslands on the site. California golden eye grass differs from blue eye grass from its bright yellow flower color and its high affinity to wetlands. Although there is suitable habitat (wetlands) for this species on the site, California golden eye grass was not observed during appropriately timed surveys in 2008 and 2009.

Species	Status* (Federal/State/ CNPS)	Habitat/Blooming Period	Discussion
Trichostema ruygtii Napa bluecurls	--/--/List 1B	Cismontane woodland, chaparral, valley and foothill grassland, vernal pools, and lower montane coniferous forest, often in sunny areas; 30-60 meters elevation. Blooms: June-October.	Napa bluecurls is known from 19 localities in Napa County (Lewis, 2006). This species occurs in open sunny areas associated with the soil and vegetation types similar to those found at the site (thin clay, rocky slopes, oak woodlands, and grasslands). Napa bluecurls can be distinguished from the more common vinegar weed (*T lanceolatum*) by a smaller flower and notably shorter stamens. Both species have been observed in Napa County but occupy somewhat different habitats. Surveys for Napa bluecurls were conducted during blooming period, and although there is suitable habitat for this species on the site, this species was not observed in or near the proposed vineyard blocks during the 2008 or 2009 surveys.
Trifolium amoenum Two-fork clover	FE/--/1B	Valley and foothill grassland, and coastal bluff scrub. Sometimes on serpentine. Blooms April-June.	This species is very rare and was believed to be extinct until it was rediscovered in the 1993 in Sonoma County (CNPS, 2008). In 1996 another population (about 200 individual plants) was discovered on private land in Marin County which is currently the only known viable population. The closest occurrence is an old record from Napa Junction about 3 miles southwest of the project site and the plant is no longer present at this location. Even if this plant did historically occur on the project site it would be unlikely to be present now as clovers are highly palatable to livestock and the project site has a history of heavy cattle grazing. It was not found during plant surveys.
Triteleia lugens Dark-mouthed triteleia	--/--/List 4	Broadleaved upland forest, chaparral, and lower montane coniferous forest; 100-1000 elevation meters. Blooms April to June.	Suitable habitat appears to be present, but this species was not found during plant surveys.
Viburnum ellipticum Oval-leaved viburnum	--/--/List 2	Chaparral, cismontane woodland and lower montane coniferous forest; 215-1400 meters elevation. Blooms May-June.	*Viburnum ellipticum* is known to occur in Skyline Park north of the site, however, this species was not found during plant surveys.

FE Federally Endangered
FT Federally Threatened
SR State Rare
ST State Threatened
1A CA Native Plant Society (CNPS) List 1A (presumed extinct in CA)
1B CNPS List 1B (rare or endangered in California and elsewhere)
2 CNPS List 2 (rare or endangered in CA, more common elsewhere)
3 CNPS List 3 (plants for which we need more information – Review list)
4 CNPS List 4 (plants of limited distribution – Watch list)

Table C: Special-Status Wildlife Species Evaluated for the Suscol Mountain Vineyard Property, Napa County, California

Species	Status* Federal/ State	Habitat	Discussion
Syncaris pacifica California freshwater shrimp	E/SE	Creeks with pools (12-36 inches deep) and undercut banks with exposed live root tangles.	This species occurs in Huichica Creek in the hills on the west side of the lower Napa Valley (about 6 miles due east of where Suscol Creek exits the property). Suscol Creek appears to supports suitable habitat, but there are no known records of occurrence. The abundance of steelhead/rainbow trout in the creek may reduce the suitability of the habitat for this species due to predation pressure.
Speyeria callippe callippe Callippe silverspot	FT/--	Grassland, typically along ridgelines; depends on extensive patches of its host plant, Johnny-jump-up (*Viola pedunculata*)	The host plant is present on property, however, only scattered individuals of Johnny-jump-up were observed in the non-native grassland. There are no CNDDB records of this butterfly from Napa County, but the Callippe silverspot is known from the Cordelia Hills in Solano County, about 6 to 7 miles southeast of the project site. Based on the observation that the host plant is relatively uncommon on the project site and does not form large patches, it is unlikely that the Callippe silverspot occurs.
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	FT/--	Riparian habitats in the Central Valley and Inner Coast Ranges that contain stands of blue elderberry (*Sambucus nigra*), the host plant.	The project site is on the extreme western edge of the valley elderberry longhorn beetles range. Only two isolated blue elderberry shrubs (Figure 4) were found on the project site. These shrubs were searched for the distinctive exist holes left by the emerging beetle, but none were found.
Oncorhynchus mykiss irideus Steelhead; Central California coast ESU.	FT/--	For spawning and rearing headwater streams with cold water, deep pools and runs, gravel (1-13 cm) beds for spawning.	Steelhead/rainbow trout are common in Suscol Creek within the project site and occur in pools and runs from the western edge of the property upstream to above the road crossing in the upper watershed. Young fish are expected to move downstream during fall and winter rains, but resident individuals may also be present. Suscol Creek has been designated as Critical Habitat for steelhead-Central Coast ESU (NOAA, 2005).
Rana draytonii California red-legged frog	FT/SSC	Ponds and streams, generally with areas of still water 20 or more inches deep.	Potential aquatic and upland habitat is present on the property in the pond and along the Suscol Creek drainage and associated springs. The presence of American bullfrogs along the lower creek (near the road crossing) and in the pond, however, reduces the potential of occurrence of California red-legged frogs in these areas. This frog was not observed on the project site.
Rana boylii Foothill yellow-legged frog	--/SSC	Occurs along streams in areas with clear flowing water and sunny banks. Requires slow flowing pools or backwaters for egg laying and tadpole rearing.	The sunny stretches of the lower creek with clear flowing water provide potential habitat, but foothill yellow-legged frogs were not observed in these areas during multiple surveys under weather conditions suitable for their activity. Much of the creek bed is in deep shade within dense closed canopy woodland, which is not optimal habitat for this frog. This species does not appear to occur on the project site.
Actinemys marmorata Western pond turtle	--/SSC	Ponds and streams, with deep water (generally 2 feet or greater) and adjacent terrestrial habitat (up to 280 meters from aquatic habitat) with vegetation and leaf litter (over wintering) and open ground (nest sites).	Single individuals of this species were seen in the on-site pond and in the pond just west of the project site. There is also a CNDDB record at a pond about one-eighth of a mile from the southeast corner of the property. Though Suscol Creek is generally too shallow to provide good habitat for this western pond turtle they may occasionally

Species	Status* Federal/ State	Habitat	Discussion
			occur in the deeper pools with exposure to the sun and may use the creek as a dispersal corridor.
Elanus leucurus (nesting) White-tailed kite	--/FP	Trees and shrubs in grasslands, pasturelands and savannahs.	This species could potentially nest on the site in the trees along the drainages or in adjacent areas.
Circus cyaneus (nesting) Northern harrier	--/SSC	Grasslands with sufficient cover of tall grasses to conceal a nest, open grassy scrublands, and mashes.	An adult male was observed on the site on May 7 and a female was seen on July 8, 2009, which could indicate local breeding; however, the male individual could also have been a migrant. This species could potentially nest in the open grassland on the site or in adjacent areas. Much of the grassland on the site is relatively sparse or occurs on steep slopes, reducing the suitability of the site as breeding habitat for this hawk.
Buteo swainsoni (nesting) Swainson's hawk	--/ST	Occurs in open habitats with scattered large trees for nesting, forages primarily over flat agricultural lands, pastures, and ranch country.	In central California, Swainson's hawk nests primarily east of Napa County in the Sacramento-San Joaquin Delta and Central Valley, but there is a record about one and a half miles west of the property in the lower Napa Valley (CNDDB, 2008). An individual was observed about 0.25 mile west of the project site in 2008 and several individuals, including adult and juvenile birds were observed in the southern portion of the site (south of Suscol Ridge) during the 2009 surveys. The Swainson's hawk is a long range migrant and most individuals spend the winter in open grasslands in Argentina; however a small number of individuals winter in the Delta area.
Asio otus Long-eared owl	--/SSC	This owl prefers dense closed canopy woodlands for roosting and nesting and forages over open habitats.	There is only one confirmed nesting record of this secretive owl in Napa County (Berner et al., 2003); the property supports extensive areas of suitable breeding habitat (dense closed canopy oak woodland adjacent to open grasslands) where this species could nest, but no nest sites were found.
Athene cunicularia Burrowing owl	--/SSC	Grassland/pastureland; with ground squirrel burrows for shelter and nest sites.	California ground squirrel burrows are an important habitat element for burrowing owls in the Bay Area. California ground squirrels appear to be rare on the project site; only one has been observed during the field surveys and other burrows or underground retreats suitable for burrowing owls were not found on the property. Based on these observations it appears that nesting or wintering is unlikely. There are records within one mile of the property.
Contopus cooperi Olive-sided flycatcher	--/SSC	Prefers tall coniferous trees for nesting and foraging, but will also use tall blue gum trees. Forages for aerial insects from tall perches. Neotropical migrant.	This long distance migrant is known to nest in Napa County (Berner et al., 2003; Shuford and Gardali, 2008), but suitable nesting habitat is not present on the project site. This species is likely to occur on the project site occasionally as a migrant during spring and fall.
Lanius ludovicianus Loggerhead shrike	--/SSC	Open country for foraging; dense shrubs for nesting.	The shrubby growth, woodland edge, and hedgerow of horsetail trees along the southwestern edge of the site provide potential breeding habitat for shrikes and the adjacent open grassland provides foraging habitat. This predatory songbird was not observed during the 2008 field surveys, but 4 to 5 were seen on or adjacent to the project site during 2009.

Species	Status* Federal/ State	Habitat	Discussion
Progne subis Purple martin	--/SSC	In northwest California this species generally nests in abandoned woodpecker holes in tall coniferous trees and forages for aerial insects over forest, open country, and water. It is also known to nest in holes in utility poles. Long distance neotropical migrants.	Purple martins are known to nest in northern Napa County (Berner et al., 2003), but there are no nesting records near the project site. The lack of tall coniferous trees may limit the potential for nesting martins on the project site. This large conspicuous swallow was not observed on the site during the field surveys.
Geothlypis trichas sinnosa San Francisco common yellowthroat	--/SSC	Nests in freshwater marshes and riparian thickets around the San Francisco Bay Area.	The cattail stands around the pond provides suitable nesting habitat for yellowthroats, but none were observed during the field surveys. Migrants of other subspecies may occur occasionally in suitable habitat on the project site.
Ammodramus savannarum Grasshopper sparrow	--/SSC	Extensive areas of native and non-native grasslands, often with scattered shrubs.	This migratory sparrow breeds at scattered localities supporting suitable habitat around the Bay Area. Their populations appear to fluctuate from year to year, they may be absent at a suitable nesting site one year and appear the next. Singing males of this species were observed on the property during the 2007 and 2009 field surveys in suitable nesting habitat.
Dendroica petechia Yellow warbler	--/SSC	Nests in riparian woodlands dominated by willows and/or cottonwoods; also, in northern California, Oregon ash/willow woodland provide good nesting habitat. This species occurs in a variety of other vegetation communities during migration.	The yellow warbler is a migratory species that is wide-spread in California, but has declined locally due to the loss of its riparian breeding habitat and in some areas the increasing abundance of brown-headed cowbirds (*Molothrus ater*), a brood parasite that lays its eggs in other species nests, including yellow warblers. This species nests suitable habitat at scattered location in Napa County (Berner et al., 2003). Suitable nesting habitat is limited on the project site and yellow warblers were not observed during spring in the alder woodland along Suscol Creek. This warbler has a distinctive song that was not heard during spring surveys when yellow warblers, if nesting on the site, would have been readily detected. A single migrant female was observed on the site on October 8, 2009.
Icteria virens Yellow-breasted chat	--/SSC	Nests in riparian woodlands and thickets with a dense understory and open canopy.	The yellow-breasted chat is an uncommon nesting species in Napa County with recent records restricted to scattered patches of suitable habitat along the Napa River (Berner et al., 2003). There is no suitable nesting habitat on the project site.
Agelaius tricolor Tricolor blackbird	--/SSC	Nests and forages in freshwater marsh and dense tall weedy growth.	The stands of cattails and bulrush in the pond provide suitable breeding habitat, but tricolored blackbirds were not observed during the field surveys. Flocks may forage in the grazed grasslands during the winter.
Antrozous pallidus Pallid bat	--/SSC	Roosts in rock crevices, under bridges, cavities and hollows in trees, and buildings; may use occupied buildings as night roosts. Feeds primarily on terrestrial arthropods in wide variety of open habitat.	Likely to occur on the project site: foraging in open areas and along woodland/grassland edges. Rock outcrops, cliffs, and large oaks (with hollows and cavities) likely provide suitable night, day, and/or maternity roost habitat.
Corynorhinus townsendii Townsend's big-eared bat	--/SSC	Variety of habitat types from humid coastal forests to arid interior valleys. Uses old buildings, mine	There do not appear to be any suitable maternity, day, or winter roosts for Townsend's big-eared bat on the project site. This species may forage along the riparian corridors

Species	Status* Federal/ State	Habitat	Discussion
		tunnels, and caves as maternity and day roosts. Winter roost generally located in mine tunnels or caves.	and around the oak woodlands on the project site, if suitable roosts are located nearby.
Lasiurus blossevillii Western red bat	--/SSC	Generally occurs in arid regions along riparian corridors and in wooded canyons. This species is solitary (i.e., does not form roosting or maternity colonies) and roosts among the foliage of trees.	The western red bat may occur on the project site. This species would be most likely to be found along Suscol Creek or other riparian corridors.
Taxidea taxus American badger	--/SSC	Occurs in ranch lands, prairie, open valleys, deserts, and woodland edge, with good populations of prey species (small mammals) and deep soils suitable for constructing burrows. Generally occurs in undeveloped areas.	Due to the extensive grasslands and the relatively low level of human activity the project site appears to provide suitable habitat for this mammal, however, no burrows or other sign indicating the presence of badgers was observed during the field surveys. The apparent scarcity or absence of California ground squirrels (an important prey item) and the shallow rocky soils on the project site may reduce the habitat suitability for badgers. USDA Wildlife Services Specialist Eddie Goymerac, who has extensive experience on the project site and in surrounding areas, informed LSA that he had occasionally seen badgers on the site, but his last observations occurred about 20 years ago. The best potential habitat appears to be the grasslands south of Suscol Ridge where soils are deeper. LSA's field surveys and other available information suggest that badgers are absent from the project site or are very rare transients.

[a] The California red-legged frog was formerly considered a subspecies of the northern red-legged frog *(R. aurora)*, but recent taxonomic research has documented that it is a distinct species (see Crother 2008). The California red-legged frog, however, is still listed by the USFWS as *R. a. draytonii*.

* Status: FT = federally listed as threatened; ST = State listed as threatened; FP = California fully protected; SSC = California species of special concern; WL = CDFG Watch List for birds (see Shuford and Gardali 2008)

drainages and seeps, grasslands, rock outcrops, and trees were sampled. The identification of bryophytes collected from the site was verified by Dan Norris of U.C. Jepson Herbarium. No special-status bryophytes were found on the site during the two years of plant surveys.

4.1.2 Lichens

Lichens are "plants" that grow in association with most habitat and substrate types present on site. Although the record search for plants did not reveal any occurrence of special-status lichens within a ten-mile radius of the site, a further radius search shows two special status lichen species occurring in coastal Sonoma County: whiteworm lichen (*Thamnolia vermicularis*), and Methusela's beard lichen (*Usnea longissima*). The physiographic and climatic requirements of these two species do not occur on the project site: Sonoma County populations of whiteworm lichen only occur on windswept slopes close to sea level and Methusela's beard lichen is generally known from coastal coniferous rain forests (Brodo 2001). The surveys included observations and collection of voucher specimens from moist banks of road cuts and drainages, seeps, grasslands, rock outcrops, and trees. No special-status lichens were found during the two years of plant surveys

4.1.3 Big-Scale Balsamroot

Big-scale balsamroot (*Balsamorhiza macrolepis* var. *macrolepis*) is a CNPS List 1B species. This plant favors thin rocky soils and often occurs in grasslands. Suitable habitat is present for big-scale balsamroot in various places in the wild oats grassland near rocky outcrops on slopes, but this species was not found during the two years of spring plant surveys during its flowering period.

4.1.4 Narrow-Anthered California Brodiaea

Narrow-anthered California (*Brodiaea californica* var. *leptandra*) is a CNPS List 1B. This species occurs in sunny sites with rocky volcanic soils, often on creek sides, and in wooded or brushy areas. Narrow-anthered California brodiaea can be distinguished from the more common harvest brodiaea (*Brodiaea elegans* ssp. *elegans*) by checking the staminode character traits. Narrow-anthered California brodiaea has pale lilac to white flowers, and with a stem greater than 50 centimeters tall. Although there is a suitable habitat for this species on the site, narrow-anthered California brodiaea was not observed during the 2008 or 2009 surveys.

4.1.5 Mount Diablo Fairy-Lantern

Mount Diablo fairy-lantern (*Calochortus pulchellus*) is a CNPS List 1B species. This spring blooming perennial species occurs in chaparral, riparian woodland, and grassland. There are no CNDDB records of this species from Napa County, but there is a record less than 3.5 miles east of the project site in Solano County. This record occurs on Hambright loam soils. As noted previously, the dominant soils in the project area are mapped as Hambright-Rock outcrop complex (from which Hambright loam soils are derived), but there are likely to be pockets of Hambright loam present as well. Many records for this plant are reported outside of this species known range, some as far north as Humboldt County. These observations are probably misidentified and are most likely *Calochortus* *amabilis*. Mount Diablo fairy-lantern was not found on the project site during spring surveys conducted in 2008 and 2009 during the blooming period of this species.

4.1.6 Holly-Leafed Ceanothus

Holly-leafed ceanothus (*Ceanothus purpureus*) is a CNPS List 1B species. This late winter and spring blooming shrub occurs on rocky volcanic soils and there is a record within one mile north of the project site. The presence of similar soils on the project site supports the potential occurrence of this species, but it was not found during two years of plant surveys conducted during the blooming period of this species.

4.1.7 Pappose Tarplant

The pappose tarplant (*Centromadia parryi* ssp. *parryi*) is a CNPS List 2 species. This annual plant blooms in the summer and fall and favors clay soils in grasslands, chaparral, meadows, and around seeps. Most of the soils on the project site are shallow and rocky, with the exception of the area south of Suscol Ridge where clay soils and scattered seeps are present. The pappose tarplant could occur in this area, but it was not found during two years of plant surveys conducted within its flowering period.

4.1.8 American Dogwood

American dogwood (*Cornus sercia*) grows in riparian habitat along moist stream banks. This small tree is not considered a rare species by CNPS, but Napa County considers it a locally-rare plant in the County (NCCDPD 2005). A small patch of American dogwood is present along Suscol Creek (Figure 4). This area is outside proposed vineyard areas.

4.1.9 Dwarf Downingia

Dwarf downingia (*Downingia pusila*) is a CNPS List 2 species. This annual spring blooming species occurs in vernal pools, swales, and other depressions in open grasslands. Suitable vernal pool or swale habitat for dwarf downingia is not present on the site and this species was not found on the project site during the 2008 or 2009 surveys.

4.1.10 Streamside Daisy

Streamside daisy (*Erigeron biolettii*) is a CNPS List 3 species. List 3 species are those for which CNPS needs more information to determine if they are rare or endangered. Streamside daisy is known from 27 occurrences in 14 different USGS quadrangles and seven counties (Calflora 2009). The common name is somewhat of a misnomer because it often occurs in dry, rocky areas distant from any streams or rivers. This species was found on the project site in small scattered patches along dry rocky ridgelines and slopes where the soil is shallow and non-native grass cover sparse. Individual plants were not counted; polygons were drawn on the field map to delineate populations (Figure 4). The total area of the delineated polygons is approximately 1.6 acres. It was difficult to determine the density of individual plants in the streamside daisy populations on the site because this species can occur as clones sprouting from rhizomes. Cover of individual plants varied from relatively low to high within the same patch. In deeper soils the plants may have very high cover, while in shallow rocky soils cover is low due to the limited space between small cracks and openings.

4.1.11 Fragrant Fritillary

The fragrant fritillary (*Fritillaria liliacea*) is a CNPS List 1B species. This species occurs in coastal scrub and grassland on heavy soils. Fragrant fritillary is a perennial (with a bulb) that blooms from February to April. There are no CNDDB records within 10 miles of the site. Potential habitat on the project site has been severely degraded by heavy grazing and invasive non-native grasses. In addition, this plant is palatable to cattle. It was not found during two years of surveys during its flowering period.

4.1.12 Nodding Harmonia

Nodding harmonia (*Harmonia nutans*) is a CNPS List 4 species that flowers from March through May. This plant favors thin rocky or gravelly volcanic soils in cismontane woodlands and in chaparral. Suitable habitat is present for nodding harmonia in various places in the grassland near rocky outcrops on slopes, but this species was not found during the two years of spring plant surveys when it would have been flowering and highly visible.

4.1.13 Contra Costa Goldfields

Contra Costa goldfields (*Lasthenia conjugens*) is listed as a federal endangered species. This plant historically occurred in the counties surrounding San Francisco Bay and along the coast, from Santa Barbara County to Mendocino County (CNPS 2009). Many historical occurrences are considered extirpated. Contra Costa goldfields is currently known from about 20 presumed extant populations with the largest number being concentrated in the Fairfield-Suisun area in Solano County. A population of this endangered plant is present about 0.75 mile west of the project site (CDFG 2009a), so a special effort was made during the botanical surveys to determine if it was present on the project site, or if the site supported suitable habitat for its occurrence. Another record is about 2.2 miles to the west of the project site on the west side of the Napa River, but this site has been converted to agricultural development and the Contra Costa goldfields may no longer occur here (CDFG 2009). Contra Costa goldfields grow in vernal pools, swales, and other depressions in open grassland and woodland communities, often in alkaline soils. It blooms from March through June, depending on environmental conditions (CDFG 2009; CNPS 2009). Suitable vernal pool or similar habitats do not occur on the project site, and Contra Costa goldfields was not found on the project site during the tow years of plant surveys.

4.1.14 Chaparral Lily

Chaparral lily (*Lilium rubescens*) is a CNPS List 4 species that flowers from June through July. This plant occurs in dry soils in chaparral. Suitable habitat is present for chaparral lily in various places in the grassland near rocky outcrops on slopes, but it was not found during two years of surveys during its flowering period.

4.1.15 Sebastopol Meadowfoam

Sebastopol meadowfoam (*Limnanthes vinculans*) is a CNPS List 1B. This species occurs in vernal pools, seeps, and mesic grasslands. Sebastopol meadowfoam is an annual that blooms from April to May. A related species, Douglas' meadowfoam (*Limnanthes douglasii* ssp. *rosea*), was observed on the site. Sebastopol meadowfoam can be distinguished from the more common Douglas' meadowfoam by leaf morphology. Sebastopol meadowfoam has three to five leaflets that are entire, and Douglas' meadowfoam leaf has five to 13 leaflets that are often toothed or lobed. Although there appears to be suitable habitat for this species on the site (seeps and mesic grassland), Sebastopol meadowfoam was not observed during the 2008 or 2009 surveys.

4.1.16 Napa Lomatium

Napa lomatium (*Lomatium repostum*) is a CNPS List 4 species. There are no CNDDB records within 10 miles of the site. This spring blooming species favors serpentine soils in chaparral, and pine/oak woodland. There are no serpentine soils on the project site and this species was not found during two years of surveys conducted during its blooming period.

4.1.17 Robust Monardella

Robust monardella (*Monardella villosa* ssp. *globosa*) is a CNPS List 1B species belonging to the *M. villosa* subspecies complex. Robust monardella occurs in vegetation types similar to those found on the project site (e.g., rocky slopes, ephemeral drainages, and coast live oak woodlands). Robust monardella can be distinguished from the more common coyote mint (*Monardella villosa* ssp. *villosa*) by plant height, leaf length, outer flower bract size, and size of the flower head. Robust monardella has wooly, glandular hairy leaves, leaf-like floral bracts enclosing a large head of pink or purple flowers, and with a stem greater than 50 centimeters tall. Although there is a suitable habitat for this species on the site, robust monardella was not observed during the 2008 or 2009 surveys.

4.1.18 Green Monardella

Green monardella (*Monardella viridis* ssp. *viridis*) is a CNPS List 4 species that is generally found growing in chaparral, foothill woodland, mixed evergreen forest. Green monardella can be distinguished from *Monardella villosa* and *M. hypoleuca* by leaf, middle flower bract, and corolla color character traits. Green monardella has thin, non-glandular hairy leaves, papery to leathery floral bracts, and a lavender rose or purple corolla. Green monardella was not observed on the project site during the 2008 or 2009 surveys.

4.1.19 Baker' s Navarretia

Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*) is a CNPS List 1B species. This annual spring and summer blooming species occurs in vernal pools and wet meadows in lower montane conifer forests, and cismontane woodlands. Vernal pool and suitable meadow habitat for this species was not observed at the site, therefore there is a low likelihood for its occurrence. Baker's navarretia was not observed during the 2008 or 2009 surveys.

4.1.20 Gairdener' s Yampa

Gairdener's yampa (*Perideridia gairdeneri* ssp. *gairdeneri*) is a CNPS List 4, and a facultative wetland plant with no recorded observations in the CNDDB. The closest occurrence is attributed to a Jepson Herbarium collection (#JEPS104486) from approximately 7 miles north of site in the Leoma Lakes area of Wild Horse Valley Ranch at 418 meters elevation. The location is on rhyolite soils and the plants were found at the edge of woods in a flat opening that is wet in winter. An unidentified species of *Perideridia* was observed on the project site in a wet area along Suscol Creek (Figure 4). It was not possible to verify the species of *Perideridia* on the project site due to the lack of flowers, but based on the habitat it is likely Gairdener's yampa.

4.1.21 California Golden Eye Grass

California golden eye grass (*Sisyrinchium californicum*) is an obligate wetland plant that is designated as " locally rare" in Napa County (NCBDR 2005). Blue eye grass (*Sisyrinchium bellum*) was observed in wild oats grasslands on the site. California golden eye grass differs from blue eye grass from its bright yellow flower color and its high affinity to wetlands. Although there is suitable habitat (wet swales and seeps) for this species on the site, California golden eye grass was not observed during appropriately timed surveys in 2008 and 2009.

4.1.22 Napa Bluecurls

Napa bluecurls (*Trichostema ruygtii*) is a CNPS List 1B species known from 19 localities in Napa County (Lewis 2006). This species occurs in open sunny areas associated with the soil and vegetation types similar to those found at the site (thin clay, rocky slopes, coast oak woodlands, and grasslands). Napa bluecurls can be distinguished from the more common vinegar weed (*T. lanceolatum*) by a smaller flower and notably shorter stamens. Surveys for Napa bluecurls were conducted during the blooming period of this species, and although suitable habitat is present on the project site it was not observed during the 2008 or 2009 surveys.

4.1.23 Two-Fork Clover

Two-fork clover (*Trifolium amoenum*) is a federally listed endangered species and a CNPS List 1B species. This plant (also known as the showy Indian clover) was believed to be extinct until it was rediscovered in 1993 in Sonoma County. A single plant was found, but subsequent surveys at the discovery site failed to locate plants in following years. In 1996 another population (about 200 individual plants) was discovered on private land in Marin County which is currently the only known viable population. Two-fork clover is an annual species that blooms from April to June. It was not found during two years of surveys coinciding with its blooming period.

4.2 SPECIAL-STATUS WILDLIFE

4.2.1 Valley Elderberry Longhorn Beetle

The valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) is a large distinctive species that is closely associated with stands of blue elderberry (*Sambucus nigra*). Blue elderberry is the obligate host plant for the larvae of this beetle. The historical range of the valley elderberry longhorn beetle is the Central Valley and surrounding foothills of California. The distinctive exit holes left by the newly emerging adults are generally found in trunks or branches that are 14.7 to 66.15 centimeters in circumference (5 to 20 centimeters in diameter) (Kellner 1986, 1992) or at least 2.5 centimeters or greater in diameter at ground level (USFWS 1999b), and in branches less than 1 meter off the ground (Collinge et al., 2001). The closest known occurrence of the valley elderberry longhorn beetle to the project site is along Putah Creek in Napa and Solano County and in the Green Valley area of Fairfield. Two blue elderberry shrubs with stems larger than 2.5 centimeters in diameter occur on the project site (Figure 4). Although no exit holes were found in either of these shrubs, they would still be considered as suitable habitat for the valley elderberry longhorn beetle.

4.2.1 California Freshwater Shrimp

California freshwater shrimp (*Syncaris pacifica*) are year-round residents of low elevation (less than 380 feet) perennial creeks with a low gradient (generally less than one percent). This crustacean occurs only in Marin, Sonoma, and Napa counties and is a federal and State listed endangered species.

Suitable habitat for California freshwater shrimp includes creeks that are 12-36 inches deep, with exposed live roots of trees, such as alder (*Alnus* sp.), and willow (*Salix* sp.), along completely submerged undercut banks (horizontal depth greater than 6 inches), with overhanging vegetation and vines. During the winter, shrimp are found beneath the undercut banks among the fine roots or overhanging vegetation. These areas provide shelter from high water velocities. During the summer, shrimp may become restricted to deeper pools as the creeks begin to dry. These pools also generally have overhanging vegetation on which the shrimp forage for fine particulate matter. Shrimp are not typically found in creek reaches with boulder and bedrock bottoms.

California freshwater shrimp are likely prey for a wide variety of predaceous and opportunist vertebrates and invertebrates including California roach, three-spine stickleback *(Gasterosteus aculeatus),* steelhead/rainbow trout, western pond turtle *(Actinemys marmorata*), newts *(Taricha* sp.*),* water scorpions (*Ranatra* spp.), predaceous diving beetles, dragonfly, and damselfly nymphs. Introduced fish species such as green sunfish *(Lepomis cyanellus),* carp *(Cyprinus carpio),* and western mosquitofish also prey on this species.

The California freshwater shrimp is currently known from sixteen to seventeen stream segments in Sonoma, Marin, and Napa counties (Martin and Wicksten 2004; USFWS 1998). In Napa County, freshwater shrimp are known to occur in segments of the upper Napa River and its tributary, Garnett Creek, north of the town of Calistoga and in Huichica Creek, west of the Napa River drainage. There are no known records from Sheehy, Fagan, or Suscol creeks.

With the exception of Garnet Creek (about 30 miles north of the property), there are no records of freshwater shrimp from areas east of the Napa River. The closest known locality to the subject property is along lower Huichica Creek, approximately 6 miles due east of the western property boundary (Serpa 1992; CDFG 2008).

Martin and Wicksten (2004) point out that nearly everyone who has worked with California freshwater shrimp have noted their vulnerability to habitat degradation and introduced aquatic predators. The reach of Suscol Creek on the subject property is above the elevation where California freshwater shrimp have generally been found. Clear pools with undercut banks and live root tangles are present, but the substrate is largely rock rubble or bedrock. Even though some habitat elements for California freshwater shrimp are present in the reach of Suscol Creek on the property, the occurrence of robust populations of native predators (e.g., California roach and steelhead/rainbow trout), a rocky stream substrate and elevation appear to limit the possibility of California freshwater shrimp being present.

4.2.2 Steelhead; Central California Coast ESU

The Central California Coast evolutionary significant unit (ESU) of steelhead (*Oncorhynchus mykiss irideus*) is federally-listed as a threatened species. Suscol Creek is a known steelhead stream (Leidy et al., 2005; Dewberry 2008) and is designated as Critical Habitat for Central Coast ESU steelhead (NOAA 2005). The section of creek on the project site provides high quality spawning and rearing habitat. During the field surveys, numerous individuals (ranging in size from approximately 2 to 8 inches) were observed in the deeper pools and runs along the creek. No steelhead/rainbow trout were observed in Fagan Creek and the portion of Sheehy Creek on the project site does not provide suitable habitat for fish.

The steelhead is an anadromous species and the population that occurs in Suscol Creek migrates between the creek headwaters, where mature fish spawn and the juvenile fish develop, and the Pacific Ocean via the San Francisco Estuary. Migratory adult steelhead would be expected in the creek between mid-December and late April (depending on seasonal rainfall events) and juvenile steelhead would be expected to be present during the entire year depending on their age class. There may also be resident rainbow trout present in the creek. Resident rainbow trout are genetically identical to sea-run steelhead in their home stream, but do not migrate.

Steelhead require specific stream conditions for migration, spawning, and rearing of eggs and young fish. Important factors associated with suitable stream conditions include water temperature, velocity, and depth, gravel substrate, and water quality. Riparian vegetation providing shaded aquatic areas is an important habitat feature for maintaining the cooler water temperatures needed to sustain steelhead, especially in lower elevation areas such as Suscol Creek. Generally, temperatures exceeding 77 degrees Fahrenheit are considered lethal for rearing juvenile steelhead. Overhanging streamside vegetation also provides cover that protects juvenile fish from terrestrial predators such as herons and kingfishers. High water temperatures, low surface flow of water, and low levels of dissolved oxygen can be detrimental to steelhead populations. In addition, reduced input of spawning substrate (i.e., gravel and cobbles) during flood events, due to upstream dams or other barriers, can result in the degradation of spawning sites.

4.2.3 California Red-Legged Frog

The California red-legged frog (*Rana draytonii*) is a federal-listed threatened species and as a California species of special concern. This amphibian has declined in or disappeared from large portions of its former range in California (Stebbins 2003). However, it is still relatively common in the Bay Area (USFWS 2002), including portions of southwestern Solano County and adjacent Napa County. There are numerous records of California red-legged frogs in the hills along the Interstate

80/American Canyon corridor (approximately 3.5 to 4 miles south and southeast of the project site) (CNDDB 2008). A recent record (CNDDB occurrence #896) is located a little over 3 miles south of the project site just south of Napa Junction and east of State Highway 29. The closest known occurrences north of the project site are located about 12 miles to the north-northeast in the Putah Creek watershed (CNDDB occurrences #401 and 739). Whether California red-legged frogs occur in the intervening areas is unknown, but a reasonable assumption (based on the relatively undeveloped landscape in these areas) is that suitable habitat is present. The lack of records in these areas is probably at least partially due to the presence of large parcels of private land that have not been surveyed for frogs. The southeastern corner of the project site (Fagan Creek and adjacent upper slopes of the southeastern corner of the Suscol Creek drainage) is within designated Critical Habitat for California red-legged frog (Jamison Canyon Critical Habitat Unit: SOL-2) (USFWS 2010).

The California red-legged frog occurs in aquatic habitats such as creeks, ponds, and marshes. An important habitat element is the presence of cover in the form of dense emergent aquatic vegetation such as cattails or bulrushes (*Scirpus* sp.), over-hanging terrestrial vegetation, exposed tree roots, and undercut banks. The California red-legged frog also occurs in ponds with little aquatic vegetation or bank side cover such as stock ponds.

These frogs breed primarily in ponds or deep slow flowing pools in streams. Water depth at most breeding sites is generally at least 20 inches deep, but California red-legged frogs sometimes breed successfully in pools as shallow as 10 inches (Fellers 2005). In the Mediterranean climate of California, with its long summer dry season, many aquatic habitats are seasonal, ponding during the winter rainy period and drying completely by late summer. California red-legged frogs are well adapted to this climate regime and often breed in seasonal water bodies. Seasonal water bodies, however, must persist for the entire development period of the eggs and tadpoles. California red-legged frog eggs generally hatch in six to 14 days and the tadpoles transform in 3.5 to 7 months, but over-wintering in tadpoles is known to occur (Fellers 2005).

When seasonal water bodies dry, these frogs move to moist refugia in non-breeding habitats such as blackberry or willow thickets, seeps, and rodent burrows; if California red-legged frogs occur on the project site, the seeps and springs would likely be important habitat for them. Non-breeding upland habitat, including movement corridors between refugia and aquatic breeding habitat, are thus important habitat elements.

Many of the pools along Suscol Creek are less than 20 inches deep and do not provide optimal breeding habitat for California red-legged frogs, but there are several pools that provide suitable breeding habitat. Several American bullfrogs were observed along Suscol Creek near the western road crossing; the pond in the south central portion of the project site also supports a population of bullfrogs. The occurrence of this non-native amphibian reduces the likelihood of California red-legged frogs being present in the aquatic habitats on the project site, but does not rule out their presence. In addition, the presence of western mosquito fish and largemouth bass (reported to occur by the land owners) reduces the suitability of the pond as California red-legged frog habitat.

As noted above, night surveys for the California red-legged frog were conducted on July 31 and August 7, 2008 along Suscol Creek and at the pond. Field conditions during the surveys were ideal for observation of frogs with temperatures in the mid 60s degrees Fahrenheit and little or no wind, however, no California red-legged frogs were observed during these surveys.

4.2.4 Foothill Yellow-Legged Frog

The foothill yellow-legged frog (*Rana boylii*) is a California species of special concern. This frog occurs along open sunny stream courses with riffles and pools and favors clear pools with a slow current, backwaters, or off-channel pools for egg laying and rearing of tadpoles. There are numerous records of this frog from Napa County (Jennings and Hayes 1994), but to the best of our knowledge there are no records in the Suscol Creek drainage. Nonetheless, Suscol Creek provides some suitable habitat for this frog, but much of the creek is within a closed canopy forest that may be too shady to provide optimal habitat. During the field surveys, particular attention was focused on the creek and the observation of amphibians, but foothill yellow-legged frogs were not found.

4.2.5 Western Pond Turtle

The Western pond turtle (*Actinemys marmorata*) is a California species of special concern. These turtles generally prefer deep (greater than 2 feet) quiet pools along streams, but they also occur in ponds including constructed ranch ponds. Important habitat features include basking sites and suitable aquatic hiding areas such as undercut banks, logs, rocks, aquatic vegetation, and/or mud and leaf-litter. Western pond turtles occupy permanent and intermittent ponds and creeks (Ernst and Lovich, 2009) and an important element of suitable habitat is the presence of upland nesting and overwintering/estivation areas adjacent to aquatic habitat. These turtles have been documented to move 8 to 280 meters (average 49.7 meters) overland to terrestrial sites (Ernst and Lovich 2009). Turtles in living in ponds tend to overwinter in aquatic habitat, while turtles inhabiting streams apparently winter mainly in terrestrial habitats (Ernst and Lovich 2009). This may be due to the fact that within the western pond turtle’s range, many streams experience flash flows during winter storms that can wash turtles downstream.

This species was observed in the agricultural pond west of the project site and in the on-site pond. There is also a CNDDB record for a pond about one-eighth of a mile from the southeast corner of the property. The pools in Suscol Creek are generally too shallow to provide optimal habitat for western pond turtles and none were observed in the creek, but dispersing individuals could occasionally occur and turtles could use the creek corridor for dispersal.

4.2.6 Swainson’ s Hawk

The Swainson’s hawk (*Buteo swainsoni*) is a highly migratory raptor that nests over a vast area of western North America and winters in the pampas of Argentina. A small number of individuals also winter in the Sacramento-San Joaquin Delta region of California. Swainson’s hawks nesting in the Central Valley may also winter or linger during migration in northwest Mexico (Wheeler 2003). There have been significant declines in Swainson’s hawk numbers in California from historic population levels and this species is now a State listed threatened species.

The bulk of the remaining population of nesting Swainson’s hawks in California occur in the Central Valley region, but these hawks have recently been recorded nesting in the lower Napa Valley along Suscol Creek approximately one and a half miles west of the project site (CNDDB 2008, Rogers et al. 2008).

Swainson's hawks in California typically forage over agricultural fields, pastures, and grasslands; they favor irrigated fields and pastures in the Delta and Sacramento and San Joaquin valleys. During the nesting season, they feed primarily on a variety of small mammals, birds, and reptiles, but during migration and winter, they feed primarily on large insects (England et al., 1997).

An adult Swainson's hawk was observed near the pond along the access road (approximately 0.25 mile west the project site) on July 31, 2008. Soaring individuals were observed over the southern portion of the project site (south of Suscol Ridge) in 2009 on May 5 (2 adults), July 8 (2 adults, 1 juvenile), and on September 10 (1 adult). In addition, a pair of Swainson's hawk (a light and a dark morph) and a juvenile were frequently observed perched in trees in the riparian woodland along Suscol Creek, approximately one mile west of the project site, and perched on telephone poles along east side of the Napa-Vallejo Highway. Based on these observations it is likely that a nest site is located in this off-site area in the riparian woodland along the creek. The pair observed south of Suscol Ridge consisted of two light morph birds. The closest suitable nesting habitat for this pair would likely be large trees in the area west Highway 12/29.

4.2.7 Other Nesting and Wintering Raptors

Other raptor species that LSA has observed on the project site or could potentially occur on the project site are discussed in this section.

The northern harrier (*Circus cyaneus*) is a California bird species of special concern (Shuford and Gardali, 2008). Both male and female northern harriers were observed on the property during the field surveys, May 7 and July 8, 2009 respectively. These observations were not mapped because the birds were soaring over a wide area; the male was seen flying over the grasslands in the eastern portion of the project site and the female was seen soaring over the southwest corner of the site. These observations coincide with the breeding season of this species (the male observation could have also been a migrating individual). Northern harriers could nest on the project site, although most grasslands on the site are relatively sparse or occur on steep terrain that does not provide enough cover for suitable nesting habitat. The closest known documented nesting area is near the Napa County Airport (Berner et al., 2003).

The burrowing owl could occur as a transient species, but the apparent lack or rarity of underground retreats such as California ground squirrel burrows would limit the suitability of the project site as breeding or wintering habitat for this species.

The long-eared owl (*Asio otus*), another California bird species of special concern (Shuford and Gardali 2008), could occur on the project site as a nesting and/or wintering species. The long-eared owl is secretive and not easily detected, its status in the Bay Area is not well known. There is only one confirmed nesting record of this owl in Napa County (Berner et al., 2003). The property supports extensive areas of suitable breeding habitat (dense, closed canopy oak woodland adjacent to open grasslands).

The sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperii*), and golden eagle were formerly considered California species of special concern, but recent assessments of their populations indicate that their numbers are stable and they are now on a list of taxa to watch (Shuford and Gardali 2008). All these species are known to nest in southern Napa County; golden eagles were observed on the property during the October 2, 2008 and March 10, 2009 field surveys, and a Cooper's hawk was also seen on March 10, 2009. The sharp-shinned hawk is likely to occur as well, but primarily as a migrant and/or winter visitor. The white-tailed kite (*Elanus leucurus*), a California fully protected species, was observed during the surveys and is also a potential nester on the project site.

In addition to nesting raptors, several species have the potential to occur as winter visitors on the site, including golden eagle and ferruginous hawk (*Buteo regalis*). The ferruginous hawk, as noted above for the golden eagle, was formerly considered a species of special concern in California, but due to apparent stable populations, this hawk are now on the list of birds to watch and is not of any immediate conservation concern in the State (Shuford and Gardali 2008).

4.2.8 Nesting Songbirds

Several species of songbirds considered California bird species of special concern could nest on the project site. The focus of concern for these species is on their nesting sites and territories.

The loggerhead shrike prefers open habitat with adjacent shrubs or small trees for nesting. The trees and shrubs along the edges of the drainages are potential nesting areas for this species and the adjacent wild oats grasslands provide foraging habitat. The best nesting areas on the project site are isolated shrubs and trees in the area south of Suscol Ridge. Potential nesting habitat is also provided by the narrow hedgerow of horsetail trees that fringe the southern boundary of the project site just east of the southwestern corner. The loggerhead shrike is a wide-spread breeder in California although there has been a statewide decline in numbers. Nesting has been documented in the vicinity of the project site (Berner et al., 2003). Four to 5 individuals were observed in the south western portion of the site during the 2009 nesting season. Nests were not found during the field surveys, but local nesting pairs apparently forage in the on-site grasslands.

Grasshopper sparrows (*Ammodramus savannarum*) are rare breeders in Napa County: four singing males, observed in Jamison Canyon in 1998, were the first record of this species in the County and the one confirmed nesting record was in the hills in the southwestern portion of the County (Berner et al., 2003).

A single singing male was observed in the eastern portion of the project site during the initial field survey on June 27, 2007. Grasshopper sparrows were not observed during the 2008 field surveys, but a minimum of four singing males were observed during the spring of 2009 (Figure 4). Breeding was not confirmed, but the grassland where the birds were observed appears to be suitable nesting habitat. There are few shrubs in the area where the birds were seen, but scattered small rock outcrops, just higher than the grass cover, provide suitable singing perches. Grasshopper sparrow populations are well known to fluctuate between years and the species may be present in a given area one year and absent the next (Shuford and Gardali 2008). Much remains to be learned about the movement patterns, distribution, and breeding status of this sparrow in the Bay Area.

The olive-sided flycatcher (*Contopus cooperi*) and purple martin (*Progne subis*) are both long distance neotropical migrants (both winter in South America) that nest in Napa County (Berner et al., 2003). These species prefer tall coniferous trees as nesting sites, but the olive-sided flycatcher will also use tall blue gums for nesting and foraging perches and martins will occasionally use woodpecker holes in utility poles. The project site does not provide suitable nesting habitat for these two species, but they may occur as transients during migration.

The San Francisco common yellowthroat (*Geothlypis trichas sinnosa*) and the tricolored blackbird (*Agelaius tricolor*) nest in marshes and moist weedy growth; both species occur in Napa County. The small area of freshwater marsh in the on-site pond provides potential breeding habitat for the yellowthroat, but this species was not observed during the field surveys. Tricolored blackbirds generally nest in large colonies in extensive areas of suitable habitat and the on-site marsh is likely too small in area to support a nesting colony of this species.

4.2.9 Bats

A number of species of bats are expected to occur on the property. Myotis bats were observed foraging along Suscol Creek and over the pond during the night surveys. Due to the lack of abandoned buildings, other structures, or mines, bat roosts on the project site are likely restricted to cavities and hollows in large oaks or other trees. A shallow cave in a cliff face on the south-facing slope above Suscol Creek showed signs of bat use in the form of droppings on the floor. This cave appears to be occasionally used as a night roost, but is too shallow and exposed to provide a suitable day, maternity, or winter roost site. Crevices in rocky cliffs in the project area also are expected to provide potential roosting habitat for some species of bats, e.g., the pallid bat.

Special-status bat species (all California species of special concern) that could occur on the project site include the pallid bat, Townsend's big-eared bat (*Corynorhinus townsendii*), and western red bat (*Lasiurus blossevillii*). The extensive areas of open oak woodland with many large mature trees with cavities and hollows and rocky outcrops and cliffs are expected to provide potential night, day, and/or maternity roosts for pallid bats. The open grasslands and woodlands on the project site provide an abundance of suitable foraging habitat for the pallid bat.

Townsend's big-eared bat favor open semi-dark roosting sites such as caves, mines, and old buildings; as noted above these features are absent from the project site and it is unlikely that maternity, day or winter roosts are present. This bat may forage around woodland edges and along riparian corridors on the project site, if suitable roosting habitat is located nearby. Dispersing individuals could also occasionally roost on the site in large tree cavities. The western red bat (*Lasiurus blossevillii*) roosts among the foliage of trees and favors riparian corridors as foraging areas. This beautiful reddish-orange bat could be present, but can be difficult to detect due to its solitary roosting habits.

5.0 WETLANDS AND SPECIAL HABITAT FEATURES

5.1 WETLANDS

A formal delineation of the wetlands/waters of the United States has not been conducted on the project site, but wetlands and waters under the jurisdiction of the Corps, RWQCB, and the CDFG are present. Wetlands/waters of the United States on the project site are Suscol, Fagan, and Sheehy creeks and their tributaries and the various seeps and springs. These areas support high-quality wetlands and aquatic habitat as indicated by the presence of good populations of native fish, but many areas have been degraded by past heavy yearlong grazing. Nonetheless, there are excellent opportunities for habitat restoration and enhancement along the portion of Suscol Creek on the project site. The portion of Fagan Creek on the project site also supports high quality wetland habitats, but as with Suscol Creek, some areas of the creek have been degraded by cattle grazing and trampling.

5.2 WILDLIFE MOVEMENT CORRIDORS

Natural habitats in the Bay Area (and most of the developed world) have been fragmented and isolated by urban and agricultural development. For various reasons, isolated tracks of natural habitat tend to lose biodiversity over time unless they are connected to other areas of natural habitat. These areas of connection are generally referred to as wildlife corridors (Hilty et al., 2006). In addition, ridges, canyons, and other prominent liner features in the natural landscape are often used by larger wildlife species such as ungulates and carnivores as movement corridors within large tracks of natural habitat. Identifying and assessing the importance of a particular large track of land (such as the project site) for regional wildlife movement is a challenge that requires extensive field work, analysis of landscape patterns, and theoretical concerns. This type of analysis is beyond the scope of this study, but general statements concerning the wildlife movement can be made based on our field survey and available biodiversity information (NCCDPD 2005).

The project site has not been identified as part of a major regional movement corridor (NCCDPD, 2005). Nonetheless, the ridges and stream drainages are expected to be used by a wide variety of resident wildlife whose home ranges are small enough to be contained within the project site. The project site is large and undeveloped enough to support full home ranges of at least some individual mid-sized and large mammal species such as northern raccoons (*Procyon lotor*), gray fox (*Urocyon cinereoargenteus*), bobcat, coyote, and mule deer. The project site is also known to be used by cougars for movement and foraging (Eddie Goymerac, pers. com October 22, 2009), and individual coyotes and mule deer from neighboring areas also probably use the project area as a movement corridor. In addition, the aquatic habitats and associated riparian vegetation along Suscol Creek provide an important movement corridor for steelhead as they move upstream in during winter spawning runs and for smolt dispersing downstream to marine habitats.

Habitat fragmentation and edge effects are important concepts concerning wildlife corridors and regional biodiversity. Fragmentation occurs when human land use changes breakup large blocks of natural habitat into isolated fragments or patches which often leads to reduced biodiversity in the isolated areas of habitat (Hilty et al., 2006). Habitat edges occur when one habitat gives way to another different habitat type. Habitat edges can be abrupt such as the edge between the coast live oak woodland and the adjacent wild oats grassland in many parts of the project site (Appendix B: Photo B2). In other areas, habitats grade into one another or break up into a mosaic as two distinct habitat types transition from one to another (Appendix B: Photo B5). Habitat edges are often areas of high species richness because of the multiple microhabitats that are often present along edges. In contrast some species require large blocks of a specific habitat and tend to avoid habitat edges. As habitats become more and more fragmented by human land use changes habitat patches become smaller and edge effects become more prominent. In such situations, small habitat patches tend to loose species that avoid edges.

The Suscol Mountain project site is dominated by open grassland habitat with relatively narrow corridors and parches of coast live oak woodland/California bay forest. Therefore, habitat edge between these two distinct vegetation types is extensive on the project site. Vineyard development will be restricted to areas within the grassland and the onsite woodland and its grassland edges will be remain largely intact. However, onsite grassland will be fragmented by the proposed vineyards, which may lead to reduced diversity in species that require large tracks of this habitat such as grasshopper sparrows.

6.0 IMPACTS AND MITIGATION MEASURES

This section presents a discussion of the potential impacts to biological resources that will or could result from the implementation of the proposed project. Impacts on vegetation and habitat types are quantified by acreage in Table D compared to acreages avoided outside of vineyard blocks. Mitigation measures are recommended to reduce potential impacts to a less-than-significant level.

Table D: Vegetation and Habitat Impacts (Acres)

Vegetation Type	Within Vineyard Blocks	Outside Vineyard Blocks	Grand Total
Barberry	0.00	0.38	**0.38**
Wild Oats Grassland	527.80	1,014.23	**1,543.22**
California Sagebrush Scrub	0.00	1.72	**1.72**
Chamise Chaparral	0.26	15.56	**15.82**
Coast Live Oak Woodland/California Bay Forest	29.77	492.64	**522.40**
Streamside Daisy Habitat	0.61	0.96	**1.57**
Purple Needle Grass Grassland	9.47	7.37	**16.84**
Seep/Spring	0.09	2.03	**2.12**
Pond	0.00	2.59	**2.59**
White Alder Groves	0.00	4.78	**4.78**
Arroyo Willow Thickets	0.00	0.97	**0.97**
Grand Total	**567.99**	**1,543.25**	**2,111.24**

6.1 SIGNIFICANCE CRITERIA

Implementation of the project would have a significant impact on biological resources if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or listed as rare, threatened, or endangered by the California Department of Fish and Game or U.S. Fish and Wildlife Service.
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Game (CDFG) or U.S. Fish and Wildlife Service (USFWS).

- Have a substantial adverse effect on federally and State protected wetlands as defined by Section 404 of the Clean Water Act through direct removal, filling, hydrological interruption, or other means.
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan.
- Result in a substantial conversion of oak woodlands.

6.2 LESS THAN SIGNIFICANT IMPACTS

Impact BIO-1: The proposed project will result in the loss of approximately 0.3 acre of chamise chaparral. Approximately 15.8 acres chamise chaparral is present on the project site, of which only about 0.3 acres(0.02%) will be removed. Chamise chaparral is a relatively common shrub type in Napa County (Thorn et al., 2004) and is not the primary habitat for any special-status species. Because most of the chamise chaparral on the project site (15.77 acres) will be protected in the preserved area, the loss of 0.3 acres is considered less than significant.

Mitigation Measure BIO-2: No mitigation is necessary.

Impact BIO-2: The proposed project could affect a federally-listed endangered species, valley elderberry longhorn beetle. Two blue elderberry shrubs occur on the property. Both of these shrubs provide suitable habitat for the federally-listed valley elderberry longhorn beetle (USFWS 1999). These shrubs were examined for beetle exit holes, but none were found, indicating that they are not occupied by the VELB. Nevertheless, the vineyard blocks were designed to avoid these shrubs and provide a 100-foot buffer around them in accordance with USFWS (1999) guidelines, so impacts are considered less than significant.

Mitigation Measure BIO-3: No mitigation is necessary.

6.3 POTENTIALLY SIGNIFICANT IMPACTS

Impact BIO-3: The proposed project will result in the loss of approximately 527.8 acres of wild oats grassland. Conversion of wild oats grassland that supports scattered individual native grass plants and patches of native grasses is potentially in conflict with Napa County Policy CON-17 for preserving and protecting native grasslands. Because native grasses are not dominant in this plant community, and comprise less than five percent of the cover, it does not meet the definition of native grasslands as protected by County policy. However, impacts to patches of native grasses and forbs that are components of wild oats grasslands, impacts to special-status wildlife species associated with wild oats grasslands, and fragmentation of wild oats grassland are considered significant.

<u>Mitigation Measure BIO-5 Grassland Mitigation:</u> Impacts to grasslands and associated wildlife values will be reduced to less than significant levels by a combination of 1) avoidance of wild oats grasslands with native components, and 2) management of preserved grasslands to further enhance habitat values.

Avoidance. Impacts to grasslands have been avoided and minimized because more than 1,015 acres of wild oats grassland (66% of the total) will be preserved outside of the vineyard blocks. This would result in the preservation of large intact blocks of grasslands on the site.

Grassland Management. Wild oats grasslands on the site outside of vineyard blocks shall be managed to enhance habitat values and reduce high intensity wildfire risks. A Resource Management Plan for this area should be prepared by a State-licensed Certified Rangeland Manager (CRM) in compliance with the Title 14 of the California Code of Regulations and shall include livestock grazing as a major component. A recently published guide for resource managers in coastal California (Bush 2006) and other sources cite beneficial impacts of livestock grazing for fire hazard management, forage production, native grassland restoration, weed management, and wildlife management. Livestock exclusion tends to convert grasslands to a dominance of tall non-native annual grasses such as soft chess, ripgut brome, and wild oats (Heady 1988; Huntsinger et al., 2007). Annual ryegrass commonly becomes a problem when not grazed, building up particularly thick thatch (dead plant material) layers. This grass is also becoming more abundant in grassland habitats subject to excessive nitrogen deposition associated with air pollution plumes near highways and downwind of urban and industrial areas (Fenn et al., 2003; Weiss 1999). These tall, fast growing grasses shade out native grasses and forbs (wildflowers) with thatch (litter accumulation from previous years) and residual dry matter (RDM-current years dead growth)). Grazing or other removal of plant material reduces the accumulation of RDM in the dry season, and increases nutrient recycling. Opening up the herbaceous canopy increases light penetration and limited disruption of the soil surface by ungulate hoofs allows for good soil-seed contact which in turn increases seed germination and seedling establishment. Appropriately-timed grazing or other methods of vegetation removal such as mowing, cutting, or burning can also be used to promote increases in native perennial grass and forb populations and to reduce the proportions of the non-native annual grasses (Menke 1992).

Grassland management shall be included in an RMP that incorporates performance standards as follows. Performance criteria for enhancement of grassland resource values are shown in parentheses:

- Management goals. (Goals shall include habitat enhancement criteria such as increased native grass cover, native plant diversity, and wildlife values.)
- Range improvements such as existing and proposed fences and water sources. (Additional water sources and fencing shall be installed for more even distribution of grazing use and to lessen impacts on wetlands and riparian habitats.)
- Kind and class of livestock.
- Livestock carrying capacity and stocking rate. (A stocking rate that results in light to moderate use levels shall be specified to promote habitat values.)
- Residual dry matter levels (RDM) related to slope. (Minimum RDM levels consistent with light to moderate use levels shall be attained. This equates to an average of about 700 pounds per acre on gentle slopes to 1,000 pounds per acre on steeper slopes in an average rainfall year.)

- Season of use. (Seasonal grazing from the winter to spring or early summer shall be specified to minimize grazing impacts on wetlands, riparian habitats and oak woodlands which are most intense in the dry season.)
- Special management pastures and limitations. (Pastures may be configured to allow for special management of native grasses or other desirable plants, riparian habitats, wetlands, and oak woodlands.)
- Invasive plant control programs. (While it is not feasible to eliminate invasive plants on such a large area, they shall be reduced in density and cover in grassland management areas.)
- Monitoring program and frequency. (Long-term monitoring shall be based on low-intensity, periodic observations by the landowner and livestock operator to ensure management objectives are being attained.)
- Supplemental feeding standards that will reduce undesirable livestock concentrations in sensitive areas. (Feeding locations shall be distant from water and should be moved periodically to prevent overuse in the supplement vicinity.)

Impact BIO-4: The proposed project will result in the loss of approximately 29.8 acres of coast live oak woodland. Agricultural projects are generally exempt from the California Oak Woodlands Conservation Act of 2001 (Senate Bill 1334, CEQA Statute 21083.4.),[6] but the loss of 29.8 acres of coast live oak woodland conflicts with the Napa County Code Section 18.108.100, General Plan Goals CON-2 and CON-6, and Policy CON-24. This would be considered a significant impact, unless mitigated.

The County policies cited above generally require protection and no net loss of oak woodland habitats through a combination of avoidance, minimization, preservation, and restoration. The vineyard project was designed to avoid and minimize impacts to oak woodlands. According to the tree removal information in the Erosion Control Plan (ECP), the proposed vineyard development would remove 1,247 trees on 29.8 acres, the majority consisting of coast live oak, followed by California bay, and a few valley oaks. The total number of trees that would be preserved is not known, but 492.6 acres of coast live oak woodland or 94 percent of the total on the project site would be preserved. This area of land would be likely to support tens of thousands of oak trees. To put this impact in perspective, about one quarter of the Suscol Mountain property supports oak woodland (492.6 acres of 2,111.2 acres). Of that total, about 6 percent (29.8 acres) would be removed for vineyard development. The oak woodlands with the highest biological value, those occurring on moist north-facing slopes and those associated with riparian corridors and drainages, would be avoided entirely. Although impacts are thus minimized with the loss of only 6 percent of the oak woodlands on the site, impacts would still be considered significant because they would be inconsistent with Policy CON-24 which requires mitigation for losses of oak woodlands at a 2:1 ratio. Under this policy, Napa County requires mitigation in the form of preservation of oak woodlands, additional avoidance or minimization measures, or enhancement through replanting and/or management.

Mitigation Measure BIO-4: The applicant shall be responsible for reducing impacts on oak woodlands to less than significant levels though a combination of additional avoidance, preservation, and enhancement consistent with Napa County General Plan Policy CON-24. Specifically, mitigation for

[6] " The conversion of oak woodlands on agricultural land used to produce or process plant and animal products for commercial purposes is exempt from mitigation."

the loss of 29.8 acres of the 522.4 acres of oak woodland on the project site shall be accomplished by a combination of 1) avoidance of additional high value oak woodlands of limited distribution within the project area and 2) restoration and enhancement of preserved oak woodlands as part of a comprehensive Resource Management Plan (RMP) for preserved habitats on the property.

Avoidance. As discussed above, the project avoids impacts to 492.6 acres of the highest value oak woodlands, or about 94 percent of the total. However, impacts could be further reduced by avoiding additional areas of high value oak woodland which would be designated as oak management areas (Figure 5). Additional avoidance measures would preserve and manage high value oak woodlands that occur on ridgetops, which are limited in the project vicinity. These ridgetop woodlands are in a topographical position to provide optimum perching and roosting habitat for raptors. In addition, they provide moist conditions in the dry season by intercepting fog, which drips from leaves to the ground. This adds to species diversity by providing unique conditions for plants and animals that require summer moisture. Prior to approval, the ECP shall be modified to avoid 9.0 acres of ridgetop woodlands in Vineyard Blocks 21, 24, 26, 27, 29, 30, and 31 and incorporate them into an oak management area (Figure 5). In addition, several large specimen trees shall be retained and protected within the vineyard blocks. Two coast live oaks with trunk diameters at breast height (dbh) of 40 inches and one valley oak (a species with limited distribution in the vicinity) with a dbh of 24 inches located within Vineyard Block 1 should be retained. Vineyard can be located outside the existing drip line of these trees.

Enhancement and Management. Unavoidable direct impacts to oak woodlands shall be mitigated through onsite enhancement and management at a 2:1 ratio. Oak woodland management areas totaling at least 41.6 acres (assuming avoidance of 9.0 acres) shall be designated by the applicant for planting and other enhancement activities under direction of a Registered Professional Forester or Certified Rangeland Manager in compliance with Title 14 of the California Code of Regulations. A long-term RMP for the preserved habitats shall include provisions for planting trees (especially coast live oak and valley oak) and promoting natural oak regeneration through grazing management, browse protection, erosion control, and fire management with monitoring to determine achievement of performance criteria. Factors limiting coast live oak regeneration are many, complex, and interactive. Most notable among these are rainfall, competition with non-native grasses and weeds, and herbivory by small mammals (Tyler et al., 2002). Livestock browsing damage to green seedlings and saplings may be a significant factor in oak mortality, especially in the dry season (Wildland Solutions 2005). Accordingly, the RMP should allow for prescribed livestock grazing in the woodland areas to avoid heavy use and provide rest from grazing during the dry season while reducing the density and production of non-native annual vegetation by properly managed livestock grazing. Browse protection in the form of caging or fencing shall be implemented if monitoring determines it is necessary.

Impact BIO-5: The proposed project would result in the loss of approximately 9.5 acres of native grassland. Native grasslands are considered sensitive biological resources because little of the original native California grassland remains in low elevation areas of California, including the project site. Native grassland is considered a sensitive plant community by the CDFG (CDFG 2003) and is protected under County General Plan policies. The project would remove 9.5 acres of native grassland habitat (areas with more than 5 percent cover of native grasses), which is 60% of the 16.9 acres of native grassland on the property. The location of impacted native grassland is within and adjacent to Block 34. This would be considered a significant impact unless mitigated.

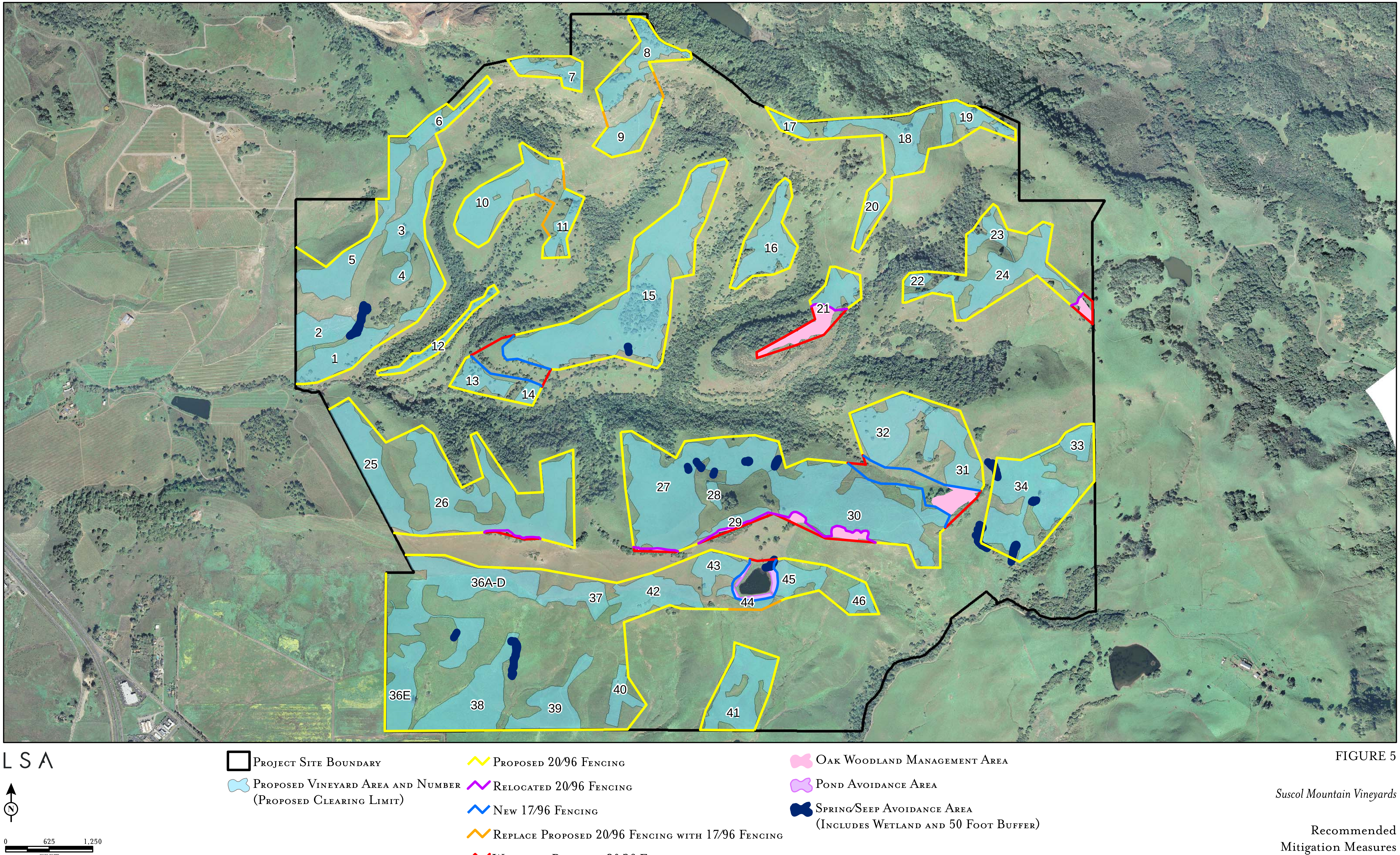

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FIGURE 5

Suscol Mountain Vineyards

Recommended Mitigation Measures

SOURCE: Aerial Imagery from Napa County (2007).
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Mitigation Measure BIO-5 Purple Needle Grass Grassland Mitigation: Impacts to purple needle grass grasslands will be reduced to less than significant levels by a combination of 1) avoidance of high value stands of this vegetation (5 percent or greater relative cover) and wild oats grasslands with native components, 2) management of preserved grasslands to further enhance habitat values and 3) restoration of native grassland by planting and maintenance.

Avoidance. In addition to avoidance of 7.4 acres of purple needle grass grassland outside the proposed vineyard areas (with more than 5 percent native grass cover), the project avoids impacts to 1,015.4 acres of wild oats grassland. Much of this area includes scattered individuals and patches of native grasses. This would result in the preservation of several acres of purple needle grass grasslands on the site.

Grassland Management. As discussed above, the purple needle grass grassland that will be avoided as well as patches of native grasses and forbs that are components of the 1,015 acres of non-native grasslands preserved outside of vineyard blocks will be enhanced by implementation of the grassland RMP (see Mitigation Measure 3).

Restoration. Native grasses, primarily creeping wildrye (in moist grasslands) and purple needlegrass, occur sparingly in patches throughout the property (Figure 5). The grazing regimes outlined in the RMP would promote the growth of native grasses, as the timing of grazing would allow for the production of seed from native grasses and a reduction in seed produced by non-native species. The density of stands of these grasses shall be assessed by a CRM, who shall recommend seeding or plug planting on a site-specific basis, especially in barren areas where weeds have been controlled or erosion treatments installed. Guidelines for successful native grassland restoration are available from the California Native Grassland Association (Ongoing Restoration Workshops, CNGA 2006-2010).

Native grass restoration shall require a minimum of 2:1 replacement for the loss of purple needle grass grassland within vineyard Block 34. For native grassland restoration to be successful, it is imperative that site preparation be conducted to control competing vegetation (especially non-native annual grasses), diminish their soil seed bank, and prepare a good seed or planting bed. This requires initial treatment using irrigation or rainfall to germinate non-native seed. This is followed by tillage or herbicide application, preferably on a repeated basis to kill the emerging non-native annuals before the seed ripens, thus depleting the soil seed bank. This process is known as " grow and kill." It should be followed by seeding and/or planting of plugs with native grass species appropriate to site conditions. The plant list shall include purple needlegrass (*Nasella pulchra*) which is the most common native bunchgrass on the site.

Impact BIO-6: The proposed project would result in the loss of approximately 0.6 acre of special-status plant habitat. Approximately 0.6 acre of streamside daisy (*Erigeron biolettii*) would be removed for vineyard construction, which amounts to 30 percent of the total (1.6 acres) mapped on the project site. This probably underestimates the amount that would be preserved on the site because much of the potential habitat (rock outcrops) for this species is on inaccessible cliffs or terraces outside of the proposed vineyard blocks that would not have been visible to the botanical surveyors. This species is known from fourteen USGS quadrangles in seven counties (Humboldt, Mendocino, Lake, Sonoma, Marin, Napa, and Solano). Based on recent observations listed in Calflora (2009), several of those occurrences are in parks or open spaces where they are protected: Mt. Burdell Open Space (Marin County), Skyline Wilderness Park (Napa County), Sugarloaf Ridge State Park (Sonoma

County), and Hood Mountain Regional Park (Sonoma County). Based on a recent siting by LSA botanist Clint Kellner, this species also occurs in Rockville Hills Regional Park (Solano County). In addition, suitable habitat for this species (rock outcrops) is plentiful on private land in the eastern Napa Hills that would not likely be developed because of restrictive zoning, steepness and inaccessibility. Nonetheless, because of the uncertainty regarding the level of impact compared to avoidance, this impact would be considered potentially significant unless mitigated.

Mitigation Measure BIO-6: Impacts to special-status plant habitat shall be reduced to less-than-significant levels and result in high quality mitigation through enhancement. Enhancement of preserved streamside daisy habitat shall be prescribed and implemented in the RMP and could include invasive non-native plant control and a seed collection and out-planting program to increase the plant's density where it occurs and to introduce it to suitable rock outcrop habitat where it is currently absent. Streamside daisy grows from horizontal underground roots that spread and produce above ground rosettes in a form of asexual reproduction or cloning. Plants with these characteristics are generally easy to grow from rootstocks for planting.

Impact BIO-7: The proposed project could result in the loss or degradation of approximately 13 seeps/springs that would likely be considered jurisdictional wetlands and would potentially provide California red-legged frog (CRLF) non-breeding aquatic habitat. Conversion or degradation of wetland habitats resulting from vineyard development would conflict with federal and State policies requiring avoidance and minimization and would be inconsistent with County plan policy CON-30 requiring no net loss of wetland habitat. Loss or degradation of seeps and springs would also impact non-breeding aquatic habitat that could provide hydration and refugia for CRLF during dry summers. The ECP was designed to avoid potential wetland habitat associated with seeps on the project site with a minimum of 50-foot buffers from vineyard block boundaries. Although the applicant's intent was to avoid all wetlands with a 50-foot buffer from vineyard blocks, the ECP was prepared before all wetlands had been ground-truthed and mapped. As a result, thirteen such wetland areas have been mapped that are within 50-feet of vineyard block boundaries. Approximately 2.03 acres (96%) of seep habitat would be avoided outside of the vineyard blocks, compared to 0.09 acres (4%) that would be directly impacted. Nevertheless, because there would be a net loss of wetland habitat extent and values, this impact would be considered significant unless mitigated.

Mitigation Measure BIO-7: Prior to construction, a delineation will be completed to confirm that vineyard blocks are set back 50-feet from all wetlands. Vineyard blocks will be adjusted as necessary to maintain the 50-foot buffer. The wetlands shall be protected with construction fences and monitored by a biologist periodically to ensure that construction personnel and equipment avoid the wetlands. Plugs of native perennial grasses will be planted where feasible within the 50-foot wetland buffers. These measures and implementation of long-term grazing management as prescribed in the RMP (see Mitigation Measure BIO-5) will result in enhancement of seeps by minimizing livestock trampling and grazing damage and further reduce impacts to less than significant levels.

Impact BIO-8: Conversion of wild oats grassland for proposed vineyards could result in impacts to potential grasshopper sparrow nesting habitat. The observation of singing male grasshopper sparrows in the on-site wild oats grasslands indicates that potential nesting habitat for this special-status species is present and conversion of grasslands to vineyards in the eastern portion of the project site (Figure 4) could result in impacts to potential nesting habitat for this sparrow. Grasshopper sparrow nesting populations tend to vary widely from year to year and this species may be present in a given area of suitable nest habitat one year and absent the next. This impact would be considered significant unless mitigated.

Mitigation Measure BIO-8**:** Avoidance of approximately 1,015 acres of wild oats grassland, including large areas in the eastern portion of the site, combined with grassland management under the RMP as required by Mitigation Measure BIO-5 will also enhance large areas of potential grasshopper sparrow nesting habitat. The provision for purple needle grass grassland restoration in Mitigation Measure BIO-5 will also enhance grasshopper sparrow habitat by planting purple needle grass and other bunchgrasses. Areas of low vegetative cover between bunchgrasses provide habitat for grasshopper sparrows to forage on ground dwelling insects (Kelsey 2010). The grassland management elements of the RMP also would benefit grasshopper sparrow nesting habitat through different intensities and timing of livestock grazing (Shuford and Gardali 2008). The RMP will thereby implement measures to maintain or enhance the current habitat quality of large blocks of grassland in the eastern portion of the project site. This will ensure the continued existence of grasshopper sparrow nesting habitat on the project site. Avoidance of most of the grasslands, and implementation of the RMP would therefore reduce impacts to grasshopper sparrow foraging and nesting habitat to a less than significant level.

Impact BIO-9: Conversion of wild oats grassland for proposed vineyards could result in impacts to Swainson' s hawk foraging habitat. Swainson's hawks have been observed soaring over the stand of wild oats grassland on the project site and in areas adjacent to the site. Wild oats grassland is potential foraging habitat for this species that could be impacted by the loss of approximately 527.8 acres of this vegetation. Swainson's hawks do not generally forage in vineyards. This would be considered a significant impact unless mitigated.

Mitigation Measure BIO-9: Our earlier analysis of Swainson's hawk mitigation was based on a draft CDFG staff report regarding mitigation measures for this species (CDFG 1994), however, the CDFG is currently in the process of developing new mitigation guidelines for this raptor and no longer bases mitigation requirements on this report. The CDFG now prefers to address mitigation for Swainson's hawk on a project by project basis. Approximately 1,014.2 acres of wild oats and purple needle grass grassland, including enhancement measures, will be incorporated into the RMP as required by Mitigation Measure BIO-5. These mitigation measures for the loss of 527.8 acres of potential Swainson's hawk foraging habitat on the project site is consistent with mitigation measures for this species in the draft, Solano County Multispecies Habitat Conservation Plan (SCWA 2009), a document the CDFG and USFWS have participated in preparing.

The mitigation measures outline above will ensure the continued existence of a healthy grassland community on the project site. The prescription in the RMP for moderate levels of grazing in active pastures, and no grazing in exclusions and rested pastures will provide for structural diversity, with patches of short, tall, and intermediate vegetation heights and varied cover levels. Grassland structural diversity provides benefits for Swainson's hawks and a wide variety of other raptors and grassland birds (Kelsey 2010). Avoidance of most of the grasslands, and enhancement of grassland habitat through implementation of the RMP would therefore reduce impacts to Swainson's hawk foraging habitat to a less than significant level.

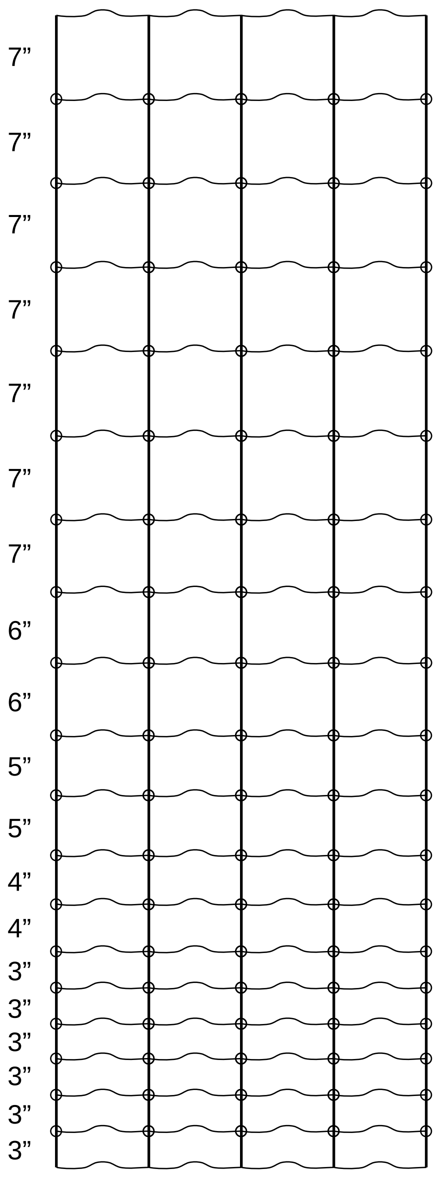
Impact BIO-10: Conversion of non-native grassland for proposed vineyards could result in impacts to other raptor and loggerhead shrike foraging habitat. In addition to the Swainson's hawk, a number of species of raptors that forage in grasslands in Napa County, including white-tailed kite, northern harrier, red-tailed hawk, golden eagle, American kestrel, and loggerhead shrike have been observed on the project site. These species could be impacted by the loss of approximately 527.8 acres of non-native grassland. This would be considered significant impact unless mitigated.

<u>Mitigation Measure BIO-10:</u> Mitigation measure **BIO-9** will reduce impacts to other raptor and shrike foraging habitat to a less than significant level.

Impact BIO-11: Construction of the proposed project, including deer fences around vineyard blocks, could create barriers to local wildlife movements and conflict with General Plan Policy CON-18. Various species of wildlife frequently move through their home ranges along stream courses, canyons, ridges, dirt roads, trails, or other linear landscape features. Aquatic animals such as the western pond turtle also move overland to nesting and overwintering sites and could be adversely affected by deer fences. Suscol Creek and its major tributaries and associated riparian habitat are likely the most important local wildlife movement corridors on the project site, particularly during the summer and fall when surface water is limited. Suscol Creek itself also provides an aquatic movement corridor for steelhead during the high flows when fish are moving into or out of the watershed. Other drainages such as Fagan Creek and Sheehy Creek and their major tributaries would also provide important local wildlife movement corridors. Prominent ridgelines (especially those that support oak woodland cover) would also be important wildlife movement corridors. Although the project would not create barriers to wildlife or fish movement along the creeks, wildlife movements along some ridges and between aquatic and important upland habitat could be constrained by proposed deer fencing around vineyard blocks. This would be considered significant unless mitigated.

<u>Mitigation Measure BIO-11:</u> Prior to approval, the deer fence alignments in the ECP shall be altered as indicated in Figure 5 to facilitate access to the pond from adjacent upland habitat for western pond turtle and other animals (Vineyard Blocks 43, 44, and 45). The deer fence modifications shown in Figure 5 should also be incorporated in the ECP to facilitate wildlife movement along Suscol Ridge (Vineyard Blocks 26, 27, 29, and 30), between Suscol Creek and ridgetop woodlands to the east (between Vineyard Blocks 30 and 31/32), along ridgetop woodlands on the eastern project boundary (near Vineyard Block 24), and between Suscol Creek and its northwestern tributary (between Vineyard Blocks 13/14 and 15).

In other areas important for wildlife movement, the ECP shall be modified prior to approval to specify fencing with larger ground-level openings (6-inch square minimum) to allow for the free movement of small animals. Vineyard fencing designated as "17/96" with 6-inch square openings at ground level (Figure 6) shall be substituted for standard "20/96" fencing with 3-inch high openings at ground level at key wildlife movement locations shown in Figure 5. This would reduce potential negative affects of the proposed deer fences on movement of smaller animals while effectively excluding deer, wild pigs, and cattle from vineyards. However, the 6-inch square fence openings at ground level could impede movements of adult pond turtles. Pond turtle occurrence on the project site is limited to the pond between Vineyard Blocks 43 and 45, where one turtle was observed. The gap in fencing proposed in this mitigation measure between those blocks would allow for pond turtle movement to the north. To enhance movement of adult turtles in other directions from the pond, the 6-inch openings will be clipped in key locations designated by qualified biologists to provide 12 x 6



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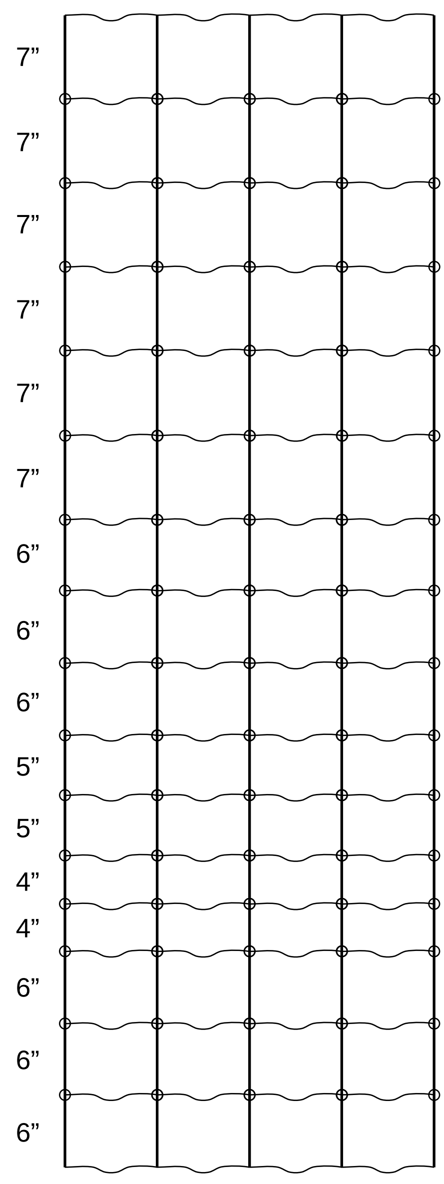

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FIGURE 6

Suscol Mountain Vineyard Property
Napa County, California

Vineyard Fencing Types

inch wide openings at ground level, an adequate size to allow passage of adult turtles. These measures would reduce impacts on wildlife movement to a less than significant impact.

Impact BIO-12: Clearing and ripping for vineyard blocks and associated construction traffic at primary access road fords could result in impacts to aquatic habitat in Suscol Creek including steelhead/rainbow trout and steelhead critical habitat and potential California red-legged frog and western pond turtle aquatic habitat through increased erosion and sedimentation. Increases in vehicular use of the fords from traffic associated with vineyard operations could also result in impacts to aquatic and special-status species habitat in Suscol Creek from erosion and sedimentation. Steelhead/rainbow trout occur throughout the perennial upper watershed of Suscol Creek. Many of the proposed vineyard blocks are located in this watershed and could contribute to increased sediment loads in the surface runoff from these areas directly into Suscol Creek and/or its tributaries. In addition, increased traffic on the project site during vineyard construction and operations will likely accelerate erosion and sedimentation at unstabilized fords across Suscol Creek. There are three such fords on the primary access roads (Figure 5 in the ECP). Increased sedimentation in the creek would reduce water quality and adversely affect steelhead/rainbow trout spawning habitat by filling in gravel beds with fine sediment, making them unsuitable for egg development. Increased sedimentation could also impact aquatic insect larva such as mayflies and caddisflies which are an important prey for young steelhead and resident rainbow trout. Sedimentation could also impact potential habitat for California red-legged frog and western pond turtle and would impact general aquatic and riparian habitat values throughout the property. This would be considered a significant impact unless mitigated.

<u>Mitigation Measure BIO-12a:</u> The crossing that requires construction of a new bridge (refer to mitigation measure HYDRO-2a) shall not be used for vineyard construction or operations until it has been replaced with a bridge that spans the creek above the ordinary high water. Prior to issuance of grading permits for bridge construction, the project applicant shall obtain all required authorization from agencies with jurisdiction over the construction of the bridge and implement pollution control and endangered species protection conditions required by those agencies. Such agencies may include, but are not limited to, the United States Army Corps of Engineers, the California Department of Fish and Game, the San Francisco Bay Regional Water Quality Control Board, the U.S. Fish and Wildlife Service (USFWS), and the National Oceanic and Atmospheric Administration (NOAA) Fisheries Service. The other two crossings shall not be used for vineyard construction or intensive vineyard operational traffic, but may be used as occasional fords for ATV traffic associated with less intensive vineyard operations (irrigation inspections).

<u>Mitigation Measure BIO-12b:</u> In addition to replacing the existing ford of the western Suscol Creek crossing with a bridge, riparian and aquatic habitat shall be further enhanced by implementing a riparian restoration plan. The plan shall include measures to repair existing erosion at the crossing and stabilize the site using native plantings and bio-engineering. Stream enhancement measures shall also include removal of invasive Himalaya blackberry, planting of willow and other native riparian species, and realignment of Suscol Creek into its original, natural channel. Aquatic habitat and associated listed species will be further enhanced by implementation of the RMP, which will prescribe fencing to exclude livestock grazing from Suscol Creek and its major tributaries so that existing trampling damage and erosion can be repaired and riparian habitat restored.

Mitigation Measure BIO-12c: Activities associated with stream restoration (bank repair, channel realignment, and revegetation) may result in discharges of fill into wetlands and other waters of the U.S. and State. Verification for inclusion under a Nationwide Section 404 permit (#27 for wetland and riparian restoration and creation activities) shall be obtained from the Corps of Engineers for these activities. Section 401 water quality certification and Section 1602 Streambed Alteration Agreement shall also be obtained for these activities. Incorporation and implementation of detailed mitigation measures as outlined above and in BMP's specified in the ECP and permit conditions, as approved by the Corps, RWQCB, USFWS, NOAA, and DFG shall be implemented.

Impact BIO-13: Development of vineyard blocks 43, 44, and 45 could impact upland nesting habitat for the western pond turtle. Western pond turtles are present in the pond partially surrounded by vineyard blocks 43, 44, and 45. These turtles nest in terrestrial locations adjacent to their aquatic habitat and can travel over 1,300 feet from their aquatic habitat to nesting sites (Ernst and Lovich, 2009), though they generally nest much closer to their aquatic habitat. A study in Lake County (Bettelheim et al., 2006) reported that nests were concentrated within about 20 to 50 feet from the high-water mark. Western pond turtles also use terrestrial refugia for overwintering, however, turtles living in ponds tend to winter within aquatic habitat while those in streams which are subject to flash flows during the winter tend to use terrestrial sites. Ground disturbance associated with construction of vineyard blocks 43, 44, and 45 could destroy western pond turtle nests and nesting habitat and disrupt nesting behavior. These impacts would be significant unless mitigated.

Mitigation Measure BIO-13: Prior to approval, the ECP shall be modified to avoid a setback from Vineyard Blocks 43, 44, and 45 for a minimum of 100 feet from the high water mark of the on-site pond (Figure 5). The area within the 100-foot setback (1.0 acre), combined with the undeveloped land north of the pond, will protect potential nesting habitat for western pond turtles in the pond. This measure will reduce impacts to western pond turtles to a less than significant level.

Impact BIO-14: Clearing vegetation for the proposed vineyards could result in impacts to nesting birds protected under the federal migratory bird treaty act and the California Fish and Game Code. Development of the proposed vineyards would result in the removal of trees, grassland and other vegetation that could be used by nesting birds, including loggerhead shrike. A number of species of native birds that occur on the project site nest in oaks and grassland and could use these habitats within proposed vineyard blocks as nest sites. If vegetation is removed during the nesting season, (March 1 to August 31) impacts to nesting birds could occur. Impacts to nesting birds could violate the Migratory Bird Treaty Act and California Fish and Game Code and are considered significant unless mitigated.

Mitigation Measure BIO-14: If vegetation removal is scheduled between March 1 and August 31, a qualified biologist shall conduct a nest survey of the area where vegetation is to be removed within two weeks of the scheduled removal. If an active nest is found, a 25 to 50 foot buffer (depending on the nesting species and habitat) shall be established around the nest site and a qualified biologist will monitor the nest at periodic intervals until the young have fledged or it has been determined that the nest has failed. After the monitoring biologist has determined that the nest site is inactive, clearing of vegetation and/or other construction activity can commence in the former buffer area. If a raptor species is found nesting within a proposed construction area, a 100 to 200-foot buffer, depending on species, shall be established and maintained around the nest site until the monitoring biologist has determined that the young have fledged or the nest has failed.

Impact BIO-15: Clearing vegetation for the proposed vineyards could result in impacts to bat maternity roosts. Maternity colonies of pallid bats or other bat species could be present in large deep cavities in oaks or other large trees and could be adversely impacted during tree removal. Roosting western red bats would likely not be impacted by tree removal due to the large amount of suitable roosting habitat that will be protected on the project site. Individual western red bats roosting in trees during tree removal will likely fly away and seek alternative roost sites when disturbed. Impacts to western red bats from tree removal would be less than significant, but impacts to maternity colonies of pallid bats or other cavity roosting bats would be significant unless mitigated.

Mitigation Measure BIO-15: If tree removal is scheduled during the pallid bat maternity season (April to August), trees scheduled to be removed shall be surveyed for the potential presence of maternity roots within two weeks of the scheduled removal. Trees with suitable cavities for potential maternity colonies will be closely examined for the presence of bats and a qualified biologist will conduct a dusk/evening emergence survey to determine if a given cavity is occupied. If it is determined that a given cavity supports bats, a minimum 25-foot buffer marked with orange construction fencing, will be established around the tree. The tree will not be removed until after August 31 when most bats would have likely dispersed away from their maternity colonies. The 25-foot buffer is suggested as a minimum, if bat roosts are found in trees within or near the clearing limits, an appropriate buffer will be established and left undisturbed. Buffer widths will be determined in coordination with DFG on a site specific basis.

Impact BIO-16: Clearing of vegetation and grading for vineyard block could impact American badger dens. Extensive field work on the project site during 2008 and 2009 did not provide any evidence of American badgers on the project site. As noted above, USDA Wildlife Services Specialist Eddie Goymerac told LSA that he had seen a badger on the project site many years ago, but has not seen one in over 20 years. Due to the rocky substrate and very shallow soils over most of the site, suitable habitat for badger dens is limited; however, this wide-ranging carnivore has occurred on the project site in the past and there is some possibility that it could occur again. If located within proposed vineyard blocks, an active badger den could be impacted during clearing and grading activities. Impacts to an active den would be considered a significant impact unless mitigated.

Mitigation Measure BIO-16: Within two weeks of scheduled clearing and/or grading of a given vineyard block, the area and a 250-foot surrounding buffer should be surveyed by a qualified biologist for badger dens. In the unlikely event that an active American badger den is found, the biologist should consult with the CDFG to determine if clearing and grading within the vineyard block is likely to adversely affect the den. If the den is occupied by an individual other than a female with young, the CDFG should be contacted to determine if live trapping and relocation is an option. If it is determined that the den is occupied by a female with young, the area within 250 feet of the den may have to be avoided until the young have matured and dispersed from their natal den.

Impact BIO-17: Conversion of grassland and oak woodland to vineyard could impact California red-legged frog (CRLF) by removing upland habitat and creating barriers to dispersal. Although CRLF were not found during surveys for this project, their occurrence cannot be ruled out. According to USFWS (2008), upland habitats associated with riparian and aquatic habitat are essential to maintain CRLF populations by providing food, shelter, and dispersal areas. CRLF often disperse from their breeding habitat to forage and seek suitable upland habitat if aquatic habitat is not available. Adult CRLF have been known to disperse through uplands during all seasons of the year. Most sites in uplands can also provide summer habitat when streams of ponds dry up. Although vineyards are not considered as barriers to CRLF movement, deer fencing with small 3-inch tall spaces at ground level could restrict their dispersal. Losses of CRLF upland habitat and creation of dispersal barriers from project construction would be considered significant impacts.

Mitigation Measure BIO-17: Avoidance and enhancement of upland oak woodland (Mitigation Measure BIO-4) and grassland habitat (Mitigation Measure BIO-5), and vineyard setbacks from the pond (Mitigation Measure BIO-12) would reduce project impacts resulting from losses of CRLF upland habitat. Replacement of 3-inch tall spaced 20/96 deer fencing with 6-inch tall spaced 17/96 fencing at key locations (Mitigation Measure BIO-10) would minimize barriers to CRLF dispersal movements. Implementation of these mitigation measures would reduce impacts to less than significant levels.

7.0 REPORT PREPARATION

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APPENDIX A

SPECIES OBSERVED

VASCULAR PLANT SPECIES OBSERVED ON THE SUSCOL MOUNTAIN VINEYARD PROJECT SITE, NAPA COUNTY, CALIFORNIA

LSA biologists observed the following 299 species (plus one presumed hybrid oak) of plants on Suscol Mountain Vineyard Property. The observed flora is composed of 204 native (68%) and 95 non-native (32%) species. Plants not identified to species lacked either flowers, fruits, or other diagnostic structures at the time of the field surveys and could not be positively identified to species. Taxonomy is based on the *Jepson Manual: Higher Plants of California* and updates on the Jepson Interchange website: http://ucjeps.berkeley.edu/interchange.html.

Scientific Name	Common Name	Native Status
Ferns and Fern Allies		
Blechnaceae	**Deer Fern Family**	
Woodwardia fimbriata	Giant chain fern	yes
Dryopteridaceae	**Wood Fern Family**	
Dryopteris arguta	California wood fern	yes
Polystichum munitum	Western sword fern	yes
Equisetaceae	**Horsetail Family**	
Equisetum arvense	Common horsetail	yes
Equisetum telmateia var. *braunii*	Giant horsetail	yes
Polypodiaceae	**Polypody Family**	
Polypodium californicum	California polypody	yes
Pteridaceae	**Brake Family**	
Adiantum aleuticum	Five-fingered fern	yes
Adiantum jordanii	California maidenhair fern	yes
Cheilanthes sp.	Lip fern	yes
Pellaea truncata	Coffee fern	yes
Pentagramma triangularis	Goldback fern	yes
Pteridium aquilinum	Western bracken fern	yes
Selaginellaceae	**Spike-Moss Family**	
Selaginaella wallacei	Wallace's spike-moss	yes
Woodsiaceae	**Cliff Fern Family**	
Athyrium filix-femina	Lady's fern	yes
Flowering Plants: Dicots		
Aceraceae	**Maple Family**	
Acer macrophyllum	Big-leaf maple	yes
Adoxaceae	**Elderberry Family**	
Sambucus mexicana	Blue elderberry	yes
Amaranthaceae	**Amaranth Family**	
Amaranthus albus	Tumbleweed	no
Anacardiaceae	**Sumac or Cashew Family**	
Toxicodendron diversilobum	Poison oak	yes

Scientific Name	Common Name	Native Status
Apiaceae	**Carrot Family**	
Anthriscus caucalis	Bur-chervil	no
Foeniculum vulgare	Fennel	no
Lomatium utriculatum	Spring-gold	yes
Osmorhiza chilensis	Mountain sweet-cicely	yes
Perideridia sp.	Yampa	yes
Sanicula bipinnatifida	Purple sanicle	yes
Sanicula crassicaulis	Pacific sanicle	yes
Torilis arvensis	Spreading hedge-parsley	no
Asclepiadaceae	**Milkweed Family**	
Asclepias fascicularis	Narrowleaf milkweed	yes
Asteraceae	**Sunflower family**	
Achillea millefolium	Yarrow	yes
Achyrachaena mollis	Blow-wives	yes
Anthemis cotula	Mayweed	no
Artemisia californica	California sagebrush	yes
Artemisia douglasiana	Mugwort	yes
Aster radulinus	Broad leaf aster	yes
Baccharis pilularis	Coyote brush	yes
Calycadenia truncata	Oregon western rosin weed	yes
Carduus pycnocephalus	Italian thistle	no
Centaurea calcitrapa	Purple star thistle	no
Centaurea melitensis	Maltese star thistle	no
Centaurea solstitialis	Yellow star thistle	no
Chamomilla suaveolens	Pineapple weed	no
Cirsium vulgare	Bull thistle	no
Conyza canadensis	Horseweed	yes
Erigeron biolettii	Streamside daisy	yes
Filago gallica	Narrowleaf cottonrose	yes
Gnaphalium luteo-album	Weedy cudweed	no
Gnaphalium palustre	Lowland cudweed	yes
Hemizonia congesta ssp. *luzulifolia*	Hayfield tarweed	yes
Hesperevax sparsiflora var. *sparsiflora*	Few-flowered evax	yes
Heterotheca grandiflora	Telegraph weed	yes
Hypochaeris glabra	Smooth cat's ears	no
Hypochaeris radicata	Rough cat's ears	no
Lactuca saligna	Willowleaf lettuce	no
Lactuca serriola	Prickly lettuce	no
Lagophylla ramosissima ssp. *ramosissma*	Branched lagophylla	yes
Lasthenia californica	California goldfields	yes
Madia anomala	Tarweed	yes
Madia sativa	Coast tarweed	yes
Micropus californicus	Wooly rose	yes

Scientific Name	Common Name	Native Status
Helminthotheca echioides (Picris echioides)	Bristly ox-tongue	no
Psilocarphus tennellus var. *tenellus*	Wooly marbles	yes
Senecio vulgaris	Common groundsel	no
Silybum marianum	Milk thistle	no
Solidago californica	California goldenrod	yes
Soliva sessilis	South American soliva	yes
Sonchus oleraceus	Common sowthistle	no
Stephanomeria virgata ssp. *pleurocarpa*	Wand wirelettuce	yes
Taraxacum officinale	Dandelion	no
Wyethia angustifolia	California compass plant	yes
Wyethia glabra	Mule’s ears	yes
Xanthium spinosum	Spiny cocklebur	yes
Xanthium strumarium	Cocklebur	yes
Berberidaceae	**Barberry Family**	
Berberis pinnata	California barberry	yes
Betulaceae	**Birch Family**	
Alnus rhombifolia	White alder	yes
Cornus sericea	American dogwood	yes
Boraginaceae	**Borage Family**	
Amsinskia menziesii var. *menziesii*	Menzies’ fiddleneck	yes
Cynoglossum grande	Hound’s-tongue	yes
Plagiobothrys nothofulvus	Common popcorn flower	yes
Brassicaceae	**Mustard Family**	
Brassica nigra	Black mustard	no
Capsella bursa-pastoris	Shepherd’s purse	no
Cardamine californica	Milkmaids	yes
Cardamine oligosperma	Bittercress	yes
Coronopus didymus	Lesser wortcress	no
Lepidium nitidum	Peppergrass	yes
Rorippa nasturtium-aquaticum	Water cress	yes
Sisymbrium officinale	Hedge mustard	no
Callitrichaceae	**Water-Starwort Family**	
Callitriche sp.	Water-starwort	yes
Caprifoliaceae	**Honeysuckle Family**	
Lonicera hispidula var. *vacillans*	Honeysuckle	yes
Symphoricarpos albus var. *laevigatus*	Common snowberry	yes
Symphoricarpos mollis	Creeping snowberry	yes
Caryophyllaceae	**Pink Family**	
Petrorhagia dubia	Hairypink	no
Cerastium glomeratum	Mouse ear chickweed	no
Polycarpon tetraphyllum	Four-leaved allseed	no
Silene gallica	Windmill pinks	no
Spergularia rubra	Red sandspurry	no

Scientific Name	Common Name	Native Status
Stellaria media	Common chickweed	no
Ceratophyllaceae	**Hornwort Family**	
Ceratophyllum demersum	Coontail	yes
Chenopodiaceae	**Goosefoot Family**	
Chenopodium ambrosioides	Mexican tea	no
Chenopodium multifidum	Cutleaf goosefoot	no
Convolvulaceae	**Morning-Glory Family**	
Calystegia occidentalis ssp. *occidentalis*	Morning glory	yes
Convolvulus arvensis	Bindweed	no
Crassulaceae	**Stonecrop Family**	
Crassula connata	Sand pygmyweed	yes
Dudleya cymosa	Canyon dudleya	yes
Parvisedum pumilum	Dwarf stonecrop	yes
Cucurbitaceae	**Gourd family**	
Marah fabaceus	Wild cucumber	yes
Ericaceae	**Heath family**	
Arbutus menziesii	Madrone	yes
Rhododendron occidentale	Western azalea	yes
Euphorbiaceae	**Spurge Family**	
Croton setigerus (Eremocarpus setigerus)	Turkey mullein	yes
Fabaceae	**Legume Family**	
Astragalus gambelianus	Gambel's dwarf milkvetch	yes
Hoita macrostachya	Leather root	yes
Lathyrus vestitus var. *vestitus*	Pacific pea	yes
Lotus corniculatus	Birdsfoot trefoil	no
Lotus humistratus	Hill lotus	yes
Lotus scoparius	Common deerweed	yes
Lupinus albifrons var. *albifrons*	Silver bush lupine	yes
Lupinus bicolor	Miniature lupine	yes
Lupinus nanus	Sky lupine	yes
Lupinus obtusilobus	Bluntlobe lupine	yes
Medicago orbicularis	Blackdisk medick	no
Medicago polymorpha	California burclover	no
Rupertia physodes	Rupert's scurf pea	yes
Trifolium bifidum	Notchleaf clover	yes
Trifolium depauperatum var. *depauperatum*	Cowbag clover	yes
Trifolium dubium	Little hop clover	no
Trifolium glomeratum	Clustered clover	no
Trifolium gracilentum	Pinpoint clover	yes
Trifolium hirtum	Rose clover	no
Trifolium incarnatum	Crimson clover	no
Trifolium microcephalum	Small-headed clover	yes
Trifolium microdon	Thimble clover	yes

Scientific Name	Common Name	Native Status
Trifolium oliganthum	Few-flowered clover	yes
Trifolium repens	White clover	no
Trifolium striatum	Striped clover	no
Trifolium subterraneum	Subterraneum clover	no
Trifolium variegatum	White-tipped clover	yes
Trifolium willdenovii	Tomcat clover	yes
Vicia sativa ssp. *sativa*	Common vetch	no
Fagaceae	**Oak Family**	
Quercus agrifolia	Coast live oak	yes
Quercus berberidifolia	California scrub oak	yes
Quercus garryana	Oregon oak	yes
Quercus kellogii	Black oak	yes
Quercus lobata	Valley oak	yes
Quercus sp.	Hybrid oak	yes
Gentianaceae	**Gentian Family**	
Centaurium muehlenbergii	Muhlenberg's centaury	yes
Geraniaceae	**Geranium Family**	
Erodium botrys	Long beaked filaree	no
Erodium cicutarium	Redstem filaree	no
Geranium molle	Dove’s foot geranium	no
Geranium robertianum	Herb-Robert	no
Erodium moschatum	White-stem filaree	no
Geranium dissectum	Cutleaf geranium	no
Grossulariaceae	**Gooseberry Family**	
Ribes californicum	Hillside gooseberry	yes
Ribes laxiflorum	Trailing black currant	yes
Ribes sanguineum var. *glutinosum*	Red flowered currant	yes
Hippocastanaceae	**Buckeye Family**	
Aesculus californicus	California buckeye	yes
Hydrophyllaceae	**Waterleaf Family**	
Nemophila heterophylla	White nemophila	yes
Nemophila menziesii var. *menziesii*	Baby blue-eyes	yes
Phacelia ramosissima	Branching phacelia	yes
Hypericaceae		
Hypericum anagalloides	Tinker’s penny	yes
Lamiaceae	**Mint Family**	
Marrubium vulgare	White horehound	no
Mentha pulegium	Pennyroyal	no
Monardella villosa ssp. *villosa*	Coyote-mint	yes
Stachys ajugoides	Bugle hedgenettle	yes
Trichostemma lanceolatum	Vinegar weed	yes
Lauraceae	**Laurel Family**	
Umbellularia californica	California bay	yes

Scientific Name	Common Name	Native Status
Limnanthaceae	**Meadowfoam Family**	
Limnanthes douglasii ssp. *douglasii*	Douglas meadowfoam	yes
Lythraceae	**Loosestrife Family**	
Lythrum hyssopifolium	Loosestrife	no
Myrtaceae	**Myrtle Family**	
Eucalyptus globulus	Blue gum	no
Oleaceae	**Olive Family**	
Fraxinus latifolia	Oregon ash	yes
Onagraceae	**Evening Primrose Family**	
Clarkia purpurea ssp. *quadrivulnera*	Winecup fairyfan	yes
Epilobium brachycarpum	Annual fireweed	yes
Epilobium canum	California fuchsia	yes
Epilobium ciliatum	Willowherb	yes
Orobanchaceae	**Broom-Rape Family**	
Bellardia trixago	Bellardia	no
Castilleja attenuata	Valley tassels	yes
Castilleja exserta ssp. *exserta*	Purple owl's clover	yes
Castillja foliolosa	Indian paintbrush	yes
Oxalidaceae	**Oxalis Family**	
Oxalis corniculata	Woodsorrel	no
Papaveraceae	**Poppy Family**	
Eschscholzia californica	California poppy	yes
Phymeaceae	**Lopseed Family**	
Mimulus aurantiacus	Bush monkey flower	yes
Mimulus cardinalis	Scarlet monkey flower	yes
Mimulus guttatus	Common monkey flower	yes
Plantaginaceae	**Plantain Family**	
Collinsia heterophylla	Chinese houses	yes
Penstemon heterophyllus var. *heterophyllus*	Foothill beardtounge	yes
Plantago erecta	Foothill plantain	yes
Plantago lanceolata	English plantain	no
Plantago major	Common plantain	no
Veronica anagallis-aquatica	Water speedwell	no
Polemoniaceae	**Phlox Family**	
Gilia tricolor	Tricolor gilia	yes
Navarretia squarrosa	Skunkweed	yes
Polygonaceae	**Buckwheat Family**	
Eriogonum nudum var. *nudum*	Naked buckwheat	yes
Eriogonum nudum var. *oblongifolium*	Oblong-leaved buckwheat	yes
Polygonum arenastrum	Common knotweed	no
Polygonum bolanderi	Bolander's knotweed	yes
Polygonum lapathifolium	Willow weed	yes
Pterostegia drymarioides	Woodland pterostegia	yes

Scientific Name	Common Name	Native Status
Rumex acetosella	Sheep sorrel	no
Rumex crispus	Curly dock	no
Rumex pulcher	Dock	no
Portulacaceae	**Purslane Family**	
Calandrinia ciliata	Red maids	yes
Claytonia perfoliata	Miner's lettuce	yes
Lewisia rediviva	Bitter root	yes
Montia fontana	Water chickweed	yes
Primulaceae	**Primrose family**	
Anagallis arvensis	Scarlet pimpernel	no
Trientalis latifolia	Pacific starflower	yes
Ranunculaceae	**Buttercup Family**	
Ranunculus muricatus	Prickly-fruited buttercup	no
Delphinium variegatum	Royal larkspur	yes
Ranunculus californicus	California buttercup	yes
Rhamnaceae	**Buckthorn Family**	
Frangula californica	California coffeberry	yes
Rhamnus crocea	Spiny redberry	yes
Rosaceae	**Rose Family**	
Adenostoma fasciculatum	Chamise	yes
Aphanes occidentalis	Lady's mantle	yes
Cercocarpus betuloides	Mountain mahogany	yes
Fragaria vesca	Wild strawberry	yes
Heteromeles arbutifolia	Toyon	yes
Holodiscus discolor	Oceanspray	yes
Prunus ilicifolia	Hollyleaf cherry	yes
Prunus virginiana ssp. *demissa*	Western choke cherry	yes
Rosa gymnocarpa	Wood rose	yes
Rosa pisocarpa	Cluster rose	yes
Rubus discolor	Himalayan blackberry	no
Rubus parviflorus	Thimbleberry	yes
Rubus ursinus	California blackberry	yes
Rubiaceae	**Madder Family**	
Galium aparine	Goose-grass	yes
Galium murale	Yellow wall bedstraw	no
Galium porrigens	Climbing bedstraw	yes
Salicaceae	**Willow family**	
Populus nigra ' Italica'	Lombardy poplar	no
Salix laevigata	Red willow	yes
Salix lasiolepis	Arroyo willow	yes
Saxifragaceae	**Saxifrage Family**	
Heuchera micrantha	Alumroot	yes
Lithophragma affine	Woodland star	yes

Scientific Name	Common Name	Native Status
Saxifraga californica	California saxifrage	yes
Scrophulariaceae	**Figwort Family**	
Scrophularia californica ssp. *californica*	California figwort	yes
Solanaceae	**Nightshade Family**	
Solanum americanum	Smallflowered nightshade	yes
Ulmaceae	**Elm Family**	
Ulmus parvifolia	Chinese elm	no
Urticaceae	**Nettle family**	
Urtica dioica	Stinging nettle	yes
Urtica urens	Dwarf nettle	no
Valerianaceae	**Valerian Family**	
Plectritis macrocera	Long horn plectritis	yes
Violaceae	**Violet Family**	
Viola pedunculata	Johnny jump-up	yes
Flowering Plants: Monocots		
Cyperaceae	**Sedge Family**	
Carex dudleyi	Dudley’s sedge	yes
Carex lenticularis	Lakeshore sedge	yes
Cyperus bipartitus	Sender flatsedge	yes
Cyperus eragrostis	Nutsedge	yes
Scirpus californicus	California bulrush	yes
Iridaceae	**Iris family**	
Sisyrinchium bellum	Blue-eyed grass	yes
Junaceae	**Rush Family**	
Juncus balticus	Baltic rush	yes
Juncus bufonius	Toad rush	yes
Juncus effusus	Common rush	yes
Juncus patens	Spreading rush	yes
Juncus phaeocephalus var. *paniculatus*	Brownhead rush	yes
Juncus xiphioides	Iris-leaved rush	yes
Luzula comosa	Common wood rush	yes
Juncaginaceae	**Arrow-Grass family**	
Eleocharis macrostachya	Spikerush	yes
Lemnaceae	**Duckweed Family**	
Lemna minor	Duckweed	yes
Liliaceae	**Lily Family**	
Brodiaea elegans	Harvest brodiaea	yes
Calochortus luteus	Gold nuggets	yes
Chlorogalum pomeridianum	Soap plant	yes
Dichelostemma congestum	Ookow	yes
Dichelostemma volubile	Twinging snakelily	yes
Disporum hookeri	Fairy bells	yes
Fritillaria affinis	Mission bells	yes

Scientific Name	Common Name	Native Status
Trillium albidum	Sweet trillium	yes
Triteleia hyacynthina	White brodiaea	yes
Triteleia laxa	Ithuriel's spear	yes
Smilacina racemosa	False Solomon seal	yes
Poaceae	**Grass Family**	
Agrostis exarata	Spike bentgrass	yes
Agrostis viridis	Whorled bentgrass	no
Aira caryophyllea	Silver hairgrass	no
Avena barbata	Slender wildoat	no
Brachypodium distachyon	False brome	no
Briza minor	Little quakinggrass	no
Bromus alopecuros	Weedy brome	no
Bromus diandrus	Ripgut brome	no
Bromus hordeaceus	Soft chess	no
Bromus madritensis	Madrid brome	no
Bromus tectorum	Cheatgrass	no
Cynocurus echiatus	Hedgehog dogtail	no
Cynodon dactylon	Bermuda grass	no
Cynosurus echinatus	Hedgehog dogtail	no
Distichlis spicata	Saltgrass	yes
Echinochloa crus-galli	Barnyard grass	no
Gastridium ventricosum	Nit grass	no
Glyceria leptostachya	Mannagrass	yes
Hordeum brachyantherum	Meadow barley	yes
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	no
Hordeum murinum ssp. *leporinum*	Hare barley	no
Koeleria macrantha	Prairie junegrass	yes
Lamarckia aurea	Goldentop grass	no
Leymus triticoides	Creeping wildrye	yes
Lolium multiflorum	Itaian ryegrass	no
Melica californica	California melicgrass	yes
Melica imperfecta	Small-flower melicgrass	yes
Nassella pulchra	Purple needle grass	yes
Poa annua	Annual bluegrass	no
Poa secunda ssp. *secunda*	One-sided bluegrass	yes
Polypogon australis	Chilean rabbitfoot grass	no
Polypogon monspeliensis	Rabbitfoot grass	no
Vulpia bromoides	Brome fescue	no
Vulpia myuros	Foxtail fescue	no
Typhaceae	**Cattail Family**	
Typha angustifolia	Narrowleaf cattail	yes
Typha latifolia	Broadleaf cattail	yes

NON-VASCULAR PLANT AND LICHEN SPECIES OBSERVED ON THE SUSCOL MOUNTAIN VINEYARD PROJECT SITE, NAPA COUNTY, CALIFORNIA

LSA biologists observed the following 43 species of non-vascular plants (25 mosses, 7 liverworts, and 1 hornwort) and 10 lichens on the Suscol Mountain Vineyard project site. No common names are given for moss, liverwort, and hornwort species because these organisms generally lack commonly accepted vernacular names.

Scientific Name	Native Status
Mosses	
Alsia californica	yes
Anacolia menziesii	yes
Antitrichia californica	yes
Bryum lisae	yes
Ceratodon purpureus	yes
Claopodium whippleanum	yes
Didymodon revolutus	yes
Ephemerum serratum	yes
Fissidens crispus	yes
Fissidens limbatus	yes
Funaria sp.	yes
Grimmia laevigata	yes
Grimmia Montana	yes
Homalothecium nuttallii	yes
Isothecium cristatum	yes
Kindbergia praelonga	yes
Orthotrichum norissii	yes
Orthotrichum papillosum Hampe	yes
Orthotrichum sp.	yes
Porotrichum bigelovii	yes
Pseudobraunia californica	yes
Pterogonium gracile	yes
Racomitrium sp.	yes
Scleropodium touretii	yes
Tortula muralis	yes
Liverworts and Hornworts	
Aneuria pinguis	yes
Anthoceros sp.	yes
Asterella bolandei	yes
Cryptomitrium tenerum	yes
Lophozia sp.	yes
Porella cordaeana	yes
Riccia sp.	yes
Targionia hypophylla	yes

Scientific Name	**Common Name**	**Native Status**
Lichens		
Caloplaca citrina	Mealy firedot lichen	yes
Cladonia sp.	Cup lichen	yes
Evernia prunastri	Oakmoss lichen	yes
Flavoparmelia sp.	Greenshield lichen	yes
Heterodermia sp.	Fringe lichen	yes
Psora sp.	Scale lichen	yes
Ramalina menziesii	Lace lichen	yes
Teloschistes flavicans	Powdered orange bush lichen	yes
Umbillicaria polyphylla	Petaled rock tripe lichen	yes
Xanthoparmelia mexicana	Salted rock-shield lichen	yes

ANIMAL SPECIES OBSERVED ON OR IN THE VICINITY OF THE SUSCOL MOUNTAIN VINEYARD PROPERTY, NAPA COUNTY

LSA biologists observed or detected the sign (e.g., tracks, scat, nests, burrows etc.) of the following vertebrate animal (wildlife) species on Suscol Mountain Vineyard Property. Additional species observed on the project site during 2009 by United States Department of Agriculture (USDA) Wildlife Services Specialist Eddy Goymerac are indicated by +.

Common Name	Scientific Name	Presumed Seasonal Occurrence/Nesting Codes[i]
Fish		
Steelhead/Rainbow trout	*Oncorhynchus mykiss*	R
California roach	*Lavinia symmetricus*	R
Largemouth bass*	*Micropterus salmoides*	R
Western Mosquitofish*	*Gambusia affinis*	R
Amphibians		
California slender salamander	*Batrachoseps attenuatus*	R
Rough-skinned newt	*Taricha granulosa*	R
California newt	*Taricha torosa*	R
Western toad	*Bufo* (*Anaxyrus*) *boreas*	R
American bullfrog*	*Rana* (*Aquarana*) *catesbeiana*	R
Sierran treefrog	*Pseudacris sierra*	R
Turtles, Lizards, and Snakes		
Western pond turtle	*Actinemys marmorata*	R
Western fence lizard	*Sceloporus occidentalis*	R
Southern alligator lizard	*Elgaria multicarinata*	R
Western skink	*Plestiodon skiltonianus*	R
California kingsnake	*Lampropeltis californiae*	R
Gopher snake	*Pituophis catenifer*	R
Aquatic gartersnake	*Thamnophis atratus*	R
Western rattlesnake	*Crotalus oreganus*	R
Birds		
Canada goose	*Branta canadensis*	R/fo
Gadwall	*Anus strepera*	R
Mallard	*Anus platyrhynchos*	R
Wild turkey*	*Meleagris gallopavo*	R
California quail	*Callipepla californica*	R
American white pelican	*Pelecanus erythrorhynchos*	W/fo
Double-crested cormorant	*Phalacrocorax auritus*	R/T
Great blue heron	*Ardea herodias*	R
Great egret	*Ardea alba*	R
Turkey vulture	*Cathartes aura*	R
Osprey	*Pandion haliaetus*	S/T/fo
White-tailed kite	*Elanus leucurus*	R
Northern harrier	*Circus cyaneus*	R/W

Common Name	Scientific Name	Presumed Seasonal Occurrence/Nesting Codes[i]
Cooper's hawk	*Accipiter cooperii*	R
Red-shouldered hawk	*Buteo lineatus*	R
Swainson's hawk	*Buteo swainsoni*	S
Red-tailed hawk	*Buteo jamaicensis*	R
Golden eagle	*Aquila chrysaetos*	R
American kestrel	*Falco sparverius*	R
Peregrine falcon	*Falco peregrinus*	R/T
American coot	*Fulica americana*	R/W/T
Killdeer	*Charadrius vociferous*	R
Rock pigeon*	*Columba livia*	T
Band-tailed pigeon	*Patagioenas fasciata*	R
Mourning dove	*Zenaida macroura*	R
Barn owl	*Tyto alba*	R
Great horned owl	*Bubo virginianus*	R
Common poorwill	*Phalaenoptilus nuttalli*	R
White-throated swift	*Aeronautes saxatalis*	R
Anna's hummingbird	*Calypte anna*	R
Belted kingfisher	*Megaceryle alcyon*	R
Acorn woodpecker	*Melanerpes formicivorus*	R
Nuttall's woodpecker	*Picoides nuttallii*	R
Hairy woodpecker	*Picoides villosus*	R
Pileated woodpecker	*Dryocopus pileatus*	R
Northern flicker	*Colaptes auratus*	R
Western wood-pewee	*Contopus sordidulus*	S
Pacific-slope flycatcher	*Empidonax difficilis*	S
Black phoebe	*Sayornis nigricans*	R
Say's phoebe	*Sayornis saya*	W
Ash-throated flycatcher	*Myiarchus cinerascens*	S
Western kingbird	*Tyrannus verticalis*	S
Loggerhead shrike	*Lanius ludovicianus*	R
Cassin's vireo	*Vireo cassinii*	T
Hutton's vireo	*Vireo huttoni*	R
Warbling vireo	*Vireo gilvus*	S
Steller's jay	*Cyanocitta stelleri*	R
Western scrub jay	*Aphelocoma californica*	R
American crow	*Corvus brachyrhynchos*	R
Common raven	*Corvus corax*	R
Horned lark	*Eremophila alpestris*	R/W
Violet-green swallow	*Tachycineta thalassina*	S
Cliff swallow	*Petrochelidon pyrrhonota*	S
Barn swallow	*Hirundo rustica*	S
Chestnut-backed chickadee	*Poecile rufescens*	R
Oak titmouse	*Baeolophus inornatus*	R

Common Name	Scientific Name	Presumed Seasonal Occurrence/Nesting Codes[i]
Bushtit	*Psaltriparus minimus*	R
Brown creeper	*Certhia americana*	R
White-breasted Nuthatch	*Sitta carolinensis*	R
Rock wren	*Salpinctes obsoletus*	R/M
Bewick's wren	*Thryomanes bewickii*	R
House wren	*Troglodytes aedon*	S
Pacific wren	*Troglodytes pacificus*	W
Ruby-crowned kinglet	*Regulus calendula*	W
Western Bluebird	*Sialia mexicana*	R
Swainson's thrush	*Catharus ustulatus*	S
Hermit thrush	*Catharus guttatus*	W
American robin	*Turdus migratorius*	RW
Wrentit	*Chamaea fasciata*	R
Northern mockingbird	*Mimus polyglottos*	R
European starling*	*Sturnus vulgaris*	R
Cedar waxwing	*Bombycilla cedrorum*	M/W
Orange-crowned warbler	*Oreothlypis celata*	M/S
Yellow warbler	*Dendroica petechia*	M
Yellow-rumped warbler	*Dendroica coronata*	W
Townsend's warbler	*Dendroica townsendi*	T
Wilson's warbler	*Wilsonia pusilla*	T
Green-tailed towhee	*Pipilo chlorurus*	M (rare)
Spotted towhee	*Pipilo maculatus*	R
California towhee	*Melozone crissalis*	R
Rufous-crowned sparrow	*Aimophila ruficeps*	R
Lark sparrow	*Chondestes grammacus*	R
Savannah sparrow	*Passerculus sandwichensis*	W
Grasshopper sparrow	*Ammodramus savannarum*	S
Fox sparrow	*Passerella iliaca*	W
Song sparrow	*Melospiza melodia*	RW
Lincoln's sparrow	*Melospiza lincolnii*	M/W
White-crowned sparrow	*Zonotrichia leucophrys*	W
Golden-crowned sparrow	*Zonotrichia atricapilla*	W
Dark-eyed junco	*Junco hyemalis*	R
Blue grosbeak	*Passerina caerulea*	S
Lazuli bunting	*Passerina amoena*	S
Red-winged blackbird	*Agelaius phoeniceus*	SW
Western meadowlark	*Sturnella neglecta*	RW
Brewer's blackbird	*Euphagus cyanocephalus*	R
Bullock's oriole	*Icterus bullockii*	S
House finch	*Carpodacus mexicanus*	R
Pine siskin	*Spinus pinus*	W/M
Lesser goldfinch	*Spinus psaltria*	R

Common Name	Scientific Name	Presumed Seasonal Occurrence/Nesting Codes[i]
American goldfinch	*Spinus tristis*	R
Mammals		
Virginia opossum*	*Didelphis virginiana*	R
Broad-footed mole	*Scapanus latimanus*	R
Myotis bat	*Myotis* sp.	R
Black-tailed jackrabbit	*Lepus californicus*	R
California ground squirrel	*Spermophilus beecheyi*	R
Western gray squirrel	*Sciurus griseus*	R
Botta's pocket gopher	*Thomomys bottae*	R
Deer mouse	*Peromyscus maniculatus*	R
Dusky-footed woodrat	*Neotoma fuscipes*	R
California vole	*Microtus californicus*	R
Coyote	*Canis latrans*	R
Gray fox+	*Urocyon cinereoargenteus*	R
Northern raccoon	*Procyon lotor*	R/T
Striped skunk	*Mephitis mephitis*	R
Cougar+	*Puma concolor*	R/T
Bobcat	*Lynx rufus*	R
Feral pig* (wild boar)	*Sus scrofa*	R
Mule deer	*Odocoileus hemionus*	R

[i] The codes refer to the species presumed seasonal occurrence on the site and probable breeding/nesting status (breeding was not confirmed in most cases).

M = Migrant: Occurs in the project area for brief periods during migration, primarily during the spring and fall months.
R = Year-round resident: resident/expected to nest/breed in the project area or in the vicinity.
S = Spring/summer resident: May nest in the project area or in the vicinity.
T = Transient: May occur in the project area sporadically, but unlikely to nest or occur regularly.
W = Winter visitor: Regularly present during winter; does not nest locally.
F = Fly over.
* = Non-native species.

APPENDIX B

PROJECT SITE PHOTOS

B1: Wild oats grassland with coast live oak woodland in background. Summer 2009.

B2: Wild oats grassland, coast live oak woodland, and chamise chaparral; view to the south to the north side of the knob. Summer 2009.

L S A

Suscol Mountain Vineyards

Site Photographs

B3: Wild oats grassland, coast live oak woodland, and California sagebrush scrub/chamise chaparral in background; view to the north to the south side of the knob. Spring 2009.

B4: Wild oats grassland, coast live oak woodland, and rock outcrops; view to the west with the Suscol Creek riparian corridor in the left center, San Pablo Bay in background. Spring 2009.

LSA

Suscol Mountain Vineyards

Site Photographs

B5: Chamise chaparral and coast live oak woodland, south side of the knob. Summer 2009.

B6: Rock outcrop in chamise chaparral with California sagebrush. Summer 2009.

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Suscol Mountain Vineyards

Site Photographs

B7: Suscol Creek with coast live oak woodland in background; steelhead/rainbow trout habitat. Summer 2009.

B8: Suscol Creek and understory of white alder grove; steelhead/rainbow trout and California roach habitat. Summer 2009.

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B9: Wild oats grassland with seep in mid foreground and patch of California sagebrush scrub in left background. Spring 2009.

B10: Dry stone wall in wild oats grassland with coast live oak, off-site vineyard in right background. Summer 2009.

APPENDIX E

SPECIAL STATUS SPECIES SEARCHES AND SPECIAL STATUS SPECIES TABLE

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1	Accipiter cooperii Cooper's hawk	ABNKC12040			G5	S3	
2	Agelaius tricolor tricolored blackbird	ABPBXB0020			G2G3	S2	SC
3	Antrozous pallidus pallid bat	AMACC10010			G5	S3	SC
4	Aquila chrysaetos golden eagle	ABNKC22010			G5	S3	
5	Ardea alba great egret	ABNGA04040			G5	S4	
6	Ardea herodias great blue heron	ABNGA04010			G5	S4	
7	Asio flammeus short-eared owl	ABNSB13040			G5	S3	SC
8	Astragalus tener var. tener alkali milk-vetch	PDFAB0F8R1			G1T1	S1.1	1B.2
9	Athene cunicularia burrowing owl	ABNSB10010			G4	S2	SC
10	Atriplex joaquiniana San Joaquin spearscale	PDCHE041F3			G2	S2	1B.2
11	Balsamorhiza macrolepis var. macrolepis big-scale balsamroot	PDAST11061			G3G4T2	S2.2	1B.2
12	Blepharizonia plumosa big tarplant	PDAST1C011			G1	S1	1B.1
13	Branchinecta lynchi vernal pool fairy shrimp	ICBRA03030	Threatened		G3	S2S3	
14	Brodiaea californica var. leptandra narrow-anthered California brodiaea	PMLIL0C022			G4?T2T3	S2S3.2	1B.2
15	Buteo regalis ferruginous hawk	ABNKC19120			G4	S3S4	
16	Buteo swainsoni Swainson's hawk	ABNKC19070		Threatened	G5	S2	
17	Calasellus californicus An isopod	ICMAL34010			G2	S2	
18	Calochortus pulchellus Mt. Diablo fairy-lantern	PMLIL0D160			G2	S2.1	1B.2
19	Calycadenia micrantha small-flowered calycadenia	PDAST1P0C0			G2G3	S2S3.2	1B.2
20	Castilleja affinis ssp. neglecta Tiburon paintbrush	PDSCR0D013	Endangered	Threatened	G4G5T1	S1.2	1B.2
21	Ceanothus purpureus holly-leaved ceanothus	PDRHA04160			G2	S2.2	1B.2
22	Centromadia parryi ssp. congdonii Congdon's tarplant	PDAST4R0P1			G4T3	S3.2	1B.2
23	Centromadia parryi ssp. parryi pappose tarplant	PDAST4R0P2			G4T2	S2.2	1B.2

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
24	Charadrius alexandrinus nivosus western snowy plover	ABNNB03031	Threatened		G4T3	S2	SC
25	Cicuta maculata var. bolanderi Bolander's water-hemlock	PDAPI0M051			G5T3T4	S2	2.1
26	Circus cyaneus northern harrier	ABNKC11010			G5	S3	SC
27	Cirsium hydrophilum var. hydrophilum Suisun thistle	PDAST2E1G1	Endangered		G1T1	S1.1	1B.1
28	Coastal Brackish Marsh	CTT52200CA			G2	S2.1	
29	Cordylanthus mollis ssp. mollis soft bird's-beak	PDSCR0J0D2	Endangered	Rare	G2T1	S1.1	1B.2
30	Cryptantha clevelandii var. dissita serpentine cryptantha	PDBOR0A0H2			G5T1	S1.1	1B.1
31	Danaus plexippus monarch butterfly	IILEPP2010			G5	S3	
32	Desmocerus californicus dimorphus valley elderberry longhorn beetle	IICOL48011	Threatened		G3T2	S2	
33	Dirca occidentalis western leatherwood	PDTHY03010			G2G3	S2S3	1B.2
34	Downingia pusilla dwarf downingia	PDCAM060C0			G3	S3.1	2.2
35	Elanus leucurus white-tailed kite	ABNKC06010			G5	S3	
36	Emys marmorata western pond turtle	ARAAD02030			G3G4	S3	SC
37	Erigeron greenei Greene's narrow-leaved daisy	PDAST3M5G0			G2	S2	1B.2
38	Eriogonum truncatum Mt. Diablo buckwheat	PDPGN085Z0			G1	S1.1	1B.1
39	Falco peregrinus anatum American peregrine falcon	ABNKD06071	Delisted	unknown code...	G4T3	S2	
40	Fritillaria liliacea fragrant fritillary	PMLIL0V0C0			G2	S2.2	1B.2
41	Geothlypis trichas sinuosa saltmarsh common yellowthroat	ABPBX1201A			G5T2	S2	SC
42	Haliaeetus leucocephalus bald eagle	ABNKC10010	Delisted	Endangered	G5	S2	
43	Helianthella castanea Diablo helianthella	PDAST4M020			G3	S3.2	1B.2
44	Helminthoglypta nickliniana bridgesi Bridges' coast range shoulderband	IMGASC2362			G2T1	S1	
45	Hesperolinon bicarpellatum two-carpellate western flax	PDLIN01020			G2	S2.2	1B.2
46	Hesperolinon breweri Brewer's western flax	PDLIN01030			G2	S2.2	1B.2

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
47	Hesperolinon sp. nov. "serpentinum" Napa western flax	PDLIN010D0			G2	S2.1	1B.1
48	Hydroprogne caspia Caspian tern	ABNNM08020			G5	S4	
49	Hypomesus transpacificus Delta smelt	AFCHB01040	Threatened	Endangered	G1	S1	
50	Icteria virens yellow-breasted chat	ABPBX24010			G5	S3	SC
51	Juglans hindsii Northern California black walnut	PDJUG02040			G1	S1.1	1B.1
52	Lasiurus blossevillii western red bat	AMACC05060			G5	S3?	SC
53	Lasiurus cinereus hoary bat	AMACC05030			G5	S4?	
54	Lasthenia conjugens Contra Costa goldfields	PDAST5L040	Endangered		G1	S1.1	1B.1
55	Laterallus jamaicensis coturniculus California black rail	ABNME03041		Threatened	G4T1	S1	
56	Lathyrus jepsonii var. jepsonii Delta tule pea	PDFAB250D2			G5T2	S2.2	1B.2
57	Legenere limosa legenere	PDCAM0C010			G2	S2.2	1B.1
58	Lilaeopsis masonii Mason's lilaeopsis	PDAPI19030		Rare	G3	S3.1	1B.1
59	Limnanthes vinculans Sebastopol meadowfoam	PDLIM02090	Endangered	Endangered	G2	S2.1	1B.1
60	Linderiella occidentalis California linderiella	ICBRA06010			G3	S2S3	
61	Masticophis lateralis euryxanthus Alameda whipsnake	ARADB21031	Threatened	Threatened	G4T2	S2	
62	Melospiza melodia maxillaris Suisun song sparrow	ABPBXA301K			G5T2	S2	SC
63	Melospiza melodia samuelis San Pablo song sparrow	ABPBXA301W			G5T2?	S2?	SC
64	Monardella villosa ssp. globosa robust monardella	PDLAM180P7			G5T2	S2.2	1B.2
65	Navarretia leucocephala ssp. bakeri Baker's navarretia	PDPLM0C0E1			G4T2	S2.1	1B.1
66	Navarretia leucocephala ssp. pauciflora few-flowered navarretia	PDPLM0C0E4	Endangered	Threatened	G4T1	S1.1	1B.1
67	Northern Claypan Vernal Pool	CTT44120CA			G1	S1.1	
68	Northern Coastal Salt Marsh	CTT52110CA			G3	S3.2	
69	Northern Vernal Pool	CTT44100CA			G2	S2.1	
70	Nyctinomops macrotis big free-tailed bat	AMACD04020			G5	S2	SC

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
71	Oncorhynchus mykiss irideus steelhead - central California coast DPS	AFCHA0209G	Threatened		G5T2Q	S2	
72	Pandion haliaetus osprey	ABNKC01010			G5	S3	
73	Penstemon newberryi var. sonomensis Sonoma beardtongue	PDSCR1L483			G4T1	S1.3	1B.3
74	Phalacrocorax auritus double-crested cormorant	ABNFD01020			G5	S3	
75	Pogonichthys macrolepidotus Sacramento splittail	AFCJB34020			G2	S2	SC
76	Polygonum marinense Marin knotweed	PDPGN0L1C0			G1Q	S1.1	3.1
77	Rallus longirostris obsoletus California clapper rail	ABNME05016	Endangered	Endangered	G5T1	S1	
78	Rana boylii foothill yellow-legged frog	AAABH01050			G3	S2S3	SC
79	Rana draytonii California red-legged frog	AAABH01022	Threatened		G4T2T3	S2S3	SC
80	Reithrodontomys raviventris salt-marsh harvest mouse	AMAFF02040	Endangered	Endangered	G1G2	S1S2	
81	Rhynchospora californica California beaked-rush	PMCYP0N060			G1	S1.1	1B.1
82	Saldula usingeri Wilbur Springs shorebug	IIHEM07010			G1	S1	
83	Senecio aphanactis chaparral ragwort	PDAST8H060			G3?	S1.2	2.2
84	Serpentine Bunchgrass	CTT42130CA			G2	S2.2	
85	Sidalcea hickmanii ssp. napensis Napa checkerbloom	PDMAL110A6			G1	S1	1B.1
86	Sorex ornatus sinuosus Suisun shrew	AMABA01103			G5T1	S1	SC
87	Streptanthus breweri var. hesperidis green jewel-flower	PDBRA2G092			G5T2	S2.2	1B.2
88	Stuckenia filiformis slender-leaved pondweed	PMPOT03090			G5	S1S2	2.2
89	Symphyotrichum lentum Suisun Marsh aster	PDASTE8470			G2	S2	1B.2
90	Syncaris pacifica California freshwater shrimp	ICMAL27010	Endangered	Endangered	G1	S1	
91	Taxidea taxus American badger	AMAJF04010			G5	S4	SC
92	Trichostema ruygtii Napa bluecurls	PDLAM220H0			G2	S2	1B.2
93	Trifolium amoenum showy rancheria clover	PDFAB40040	Endangered		G1	S1.1	1B.1

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
94	Trifolium hydrophilum saline clover	PDFAB400R5			G2?	S2.2?	1B.2
95	Viburnum ellipticum oval-leaved viburnum	PDCPR07080			G5	S2.3	2.3
96	Xanthocephalus xanthocephalus yellow-headed blackbird	ABPBXB3010			G5	S3S4	SC

CNPS Inventory of Rare and Endangered Plants

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ECOLOGICAL REPORT

scientific	family	life form	blooming	communities	elevation	CNPS
Astragalus tener var. tener	Fabaceae	annual herb	Mar-Jun	•Playas (Plyas) •Valley and foothill grassland (VFGrs) (adobe clay) •Vernal pools (VnPls)/alkaline	1 - 60 meters	List 1B.2
Atriplex joaquiniana	Chenopodiaceae	annual herb	Apr-Oct	•Chenopod scrub (ChScr) •Meadows and seeps (Medws) •Playas (Plyas) •Valley and foothill grassland (VFGrs)/alkaline	1 - 835 meters	List 1B.2
Atriplex persistens	Chenopodiaceae	annual herb	Jun-Oct	•Vernal pools (VnPls)(alkaline)	10 - 115 meters	List 1B.2
Balsamorhiza macrolepis var. macrolepis	Asteraceae	perennial herb	Mar-Jun	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)/sometimes serpentinite	90 - 1555 meters	List 1B.2
Blepharizonia plumosa	Asteraceae	annual herb	Jul-Oct	•Valley and foothill grassland (VFGrs)	30 - 505 meters	List 1B.1
Brodiaea californica var. leptandra	Liliaceae	perennial bulbiferous herb	May-Jul	•Broadleafed upland forest (BUFrs) •Chaparral (Chprl) •Cismontane woodland (CmWld) •Lower montane coniferous forest (LCFrs) •Valley and foothill grassland (VFGrs)/volcanic	110 - 915 meters	List 1B.2
Calochortus pulchellus	Liliaceae	perennial bulbiferous herb	Apr-Jun	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Riparian woodland (RpWld) •Valley and foothill grassland (VFGrs)	30 - 840 meters	List 1B.2
Castilleja affinis ssp. neglecta	Scrophulariaceae	perennial herb hemiparasitic	Apr-Jun	•Valley and foothill grassland (VFGrs) (serpentinite)	60 - 400 meters	List 1B.2
Ceanothus purpureus	Rhamnaceae	perennial evergreen shrub	Feb-Jun	•Chaparral (Chprl) •Cismontane woodland (CmWld)/volcanic, rocky	120 - 640 meters	List 1B.2
Centromadia parryi ssp. congdonii	Asteraceae	annual herb	May-Oct (Nov) Months in	•Valley and foothill grassland (VFGrs) (alkaline)	1 - 230 meters	List 1B.2

			parentheses are uncommon.			
Centromadia parryi ssp. parryi	Asteraceae	annual herb	May-Nov	•Chaparral (Chprl) •Coastal prairie (CoPrr) •Meadows and seeps (Medws) •Marshes and swamps (MshSw) (coastal salt) •Valley and foothill grassland (VFGrs) (vernally mesic)/often alkaline	2 - 420 meters	List 1B.2
Cicuta maculata var. bolanderi	Apiaceae	perennial herb	Jul-Sep	•Marshes and swamps (MshSw) Coastal, fresh or brackish water	0 - 200 meters	List 2.1
Cirsium hydrophilum var. hydrophilum	Asteraceae	perennial herb	Jun-Sep	•Marshes and swamps (MshSw) (salt)	0 - 1 meters	List 1B.1
Cordylanthus mollis ssp. mollis	Scrophulariaceae	annual herb hemiparasitic	Jul-Nov	•Marshes and swamps (MshSw) (coastal salt)	0 - 3 meters	List 1B.2
Dirca occidentalis	Thymelaeaceae	perennial deciduous shrub	Jan-Mar (Apr) Months in parentheses are uncommon.	•Broadleafed upland forest (BUFrs) •Closed-cone coniferous forest (CCFrs) •Chaparral (Chprl) •Cismontane woodland (CmWld) •North Coast coniferous forest (NCFrs) •Riparian forest (RpFrs) •Riparian woodland (RpWld)/mesic	50 - 395 meters	List 1B.2
Downingia pusilla	Campanulaceae	annual herb	Mar-May	•Valley and foothill grassland (VFGrs) (mesic) •Vernal pools (VnPls)	1 - 445 meters	List 2.2
Erigeron biolettii	Asteraceae	perennial herb	Jun-Oct	•Broadleafed upland forest (BUFrs) •Cismontane woodland (CmWld) •North Coast coniferous forest (NCFrs)/rocky, mesic	30 - 1100 meters	List 3
Erigeron greenei	Asteraceae	perennial herb	May-Sep	•Chaparral (Chprl) (serpentinite or volcanic)	80 - 1005 meters	List 1B.2
Eriogonum luteolum var. caninum	Polygonaceae	annual herb	May-Sep	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Coastal prairie (CoPrr) •Valley and foothill grassland (VFGrs)/serpentinite, sandy to gravelly	0 - 700 meters	List 1B.2

Eriogonum truncatum	Polygonaceae	annual herb	Apr-Sep (Nov-Dec) Months in parentheses are uncommon.	•Chaparral (Chprl) •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)/sandy	3 - 350 meters	List 1B.1
Fritillaria liliacea	Liliaceae	perennial bulbiferous herb	Feb-Apr	•Cismontane woodland (CmWld) •Coastal prairie (CoPrr) •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)/often serpentinite	3 - 410 meters	List 1B.2
Gilia capitata ssp. **tomentosa**	Polemoniaceae	annual herb	May-Jul	•Coastal bluff scrub (CBScr)(rocky, outcrops)	15 - 155 meters	List 1B.1
Helianthella castanea	Asteraceae	perennial herb	Mar-Jun	•Broadleafed upland forest (BUFrs) •Chaparral (Chprl) •Cismontane woodland (CmWld) •Coastal scrub (CoScr) •Riparian woodland (RpWld) •Valley and foothill grassland (VFGrs)	60 - 1300 meters	List 1B.2
Hesperolinon breweri	Linaceae	annual herb	May-Jul	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)/usually serpentinite	30 - 900 meters	List 1B.2
Hesperolinon serpentinum	Linaceae	annual herb	May-Jul	•Chaparral (Chprl) (serpentinite)	50 - 800 meters	List 1B.1
Holocarpha macradenia	Asteraceae	annual herb	Jun-Oct	•Coastal prairie (CoPrr) •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)/often clay, sandy	10 - 220 meters	List 1B.1
Juglans hindsii	Juglandaceae	perennial deciduous tree	Apr-May	•Riparian forest (RpFrs) •Riparian woodland (RpWld)	0 - 440 meters	List 1B.1
Lasthenia conjugens	Asteraceae	annual herb	Mar-Jun	•Cismontane woodland (CmWld) •Playas (Plyas) (alkaline) •Valley and foothill grassland (VFGrs) •Vernal pools (VnPls)/mesic	0 - 470 meters	List 1B.1
Lathyrus jepsonii var. **jepsonii**	Fabaceae	perennial herb	May-Jul (Sep) Months in parentheses	•Marshes and swamps (MshSw) (freshwater and brackish)	0 - 4 meters	List 1B.2

			are uncommon.			
Legenere limosa	Campanulaceae	annual herb	Apr-Jun	•Vernal pools (VnPls)	1 - 880 meters	List 1B.1
Leptosiphon jepsonii	Polemoniaceae	annual herb	Mar-May	•Chaparral (Chprl) •Cismontane woodland (CmWld)/usually volcanic	100 - 500 meters	List 1B.2
Lessingia hololeuca	Asteraceae	annual herb	Jun-Oct	•Broadleafed upland forest (BUFrs) •Coastal scrub (CoScr) •Lower montane coniferous forest (LCFrs) •Valley and foothill grassland (VFGrs)/clay, serpentinite	15 - 305 meters	List 3
Lilaeopsis masonii	Apiaceae	perennial rhizomatous herb	Apr-Nov	•Marshes and swamps (MshSw) (brackish or freshwater) •Riparian scrub (RpScr)	0 - 10 meters	List 1B.1
Micropus amphibolus	Asteraceae	annual herb	Mar-May	•Broadleafed upland forest (BUFrs) •Chaparral (Chprl) •Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)/rocky	45 - 825 meters	List 3.2
Monardella villosa ssp. **globosa**	Lamiaceae	perennial rhizomatous herb	Jun-Jul (Aug) Months in parentheses are uncommon.	•Broadleafed upland forest (BUFrs) (openings) •Chaparral (Chprl) (openings) •Cismontane woodland (CmWld) •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)	100 - 915 meters	List 1B.2
Polygonum marinense	Polygonaceae	annual herb	(Apr)May-Aug(Oct) Months in parentheses are uncommon.	•Marshes and swamps (MshSw) (coastal salt or brackish)	0 - 10 meters	List 3.1
Potamogeton filiformis	Potamogetonaceae	perennial rhizomatous herb aquatic	May-Jul	•Marshes and swamps (MshSw) (assorted shallow freshwater)	300 - 2150 meters	List 2.2
Rhynchospora californica	Cyperaceae	perennial rhizomatous herb	May-Jul	•Bogs and fens (BgFns) •Lower montane coniferous forest (LCFrs) •Meadows and seeps (Medws) (seeps) •Marshes and	45 - 1010 meters	List 1B.1

				swamps (MshSw) (freshwater)		
Senecio aphanactis	Asteraceae	annual herb	Jan-Apr	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Coastal scrub (CoScr)/sometimes alkaline	15 - 800 meters	List 2.2
Sidalcea hickmanii ssp. **napensis**	Malvaceae	perennial herb	Apr-Jun	•Chaparral (Chprl)/rhyolitic	415 - 610 meters	List 1B.1
Sidalcea hickmanii ssp. **viridis**	Malvaceae	perennial herb	May-Jun	•Chaparral (Chprl) (serpentinite)	50 - 430 meters	List 1B.3
Symphyotrichum lentum	Asteraceae	perennial rhizomatous herb	May-Nov	•Marshes and swamps (MshSw) (brackish and freshwater)	0 - 3 meters	List 1B.2
Trichostema ruygtii	Lamiaceae	annual herb	Jun-Oct	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Lower montane coniferous forest (LCFrs) •Valley and foothill grassland (VFGrs) •Vernal pools (VnPls)	30 - 680 meters	List 1B.2
Trifolium amoenum	Fabaceae	annual herb	Apr-Jun	•Coastal bluff scrub (CBScr) •Valley and foothill grassland (VFGrs) (sometimes serpentinite)	5 - 415 meters	List 1B.1
Trifolium depauperatum var. **hydrophilum**	Fabaceae	annual herb	Apr-Jun	•Marshes and swamps (MshSw) •Valley and foothill grassland (VFGrs) (mesic, alkaline) •Vernal pools (VnPls)	0 - 300 meters	List 1B.2
Viburnum ellipticum	Adoxaceae	perennial deciduous shrub	May-Jun	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Lower montane coniferous forest (LCFrs)	215 - 1400 meters	List 2.3

CNPS Inventory of Rare and Endangered Plants

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ECOLOGICAL REPORT

scientific	family	life form	blooming	communities	elevation	CNPS
Astragalus tener var. tener	Fabaceae	annual herb	Mar-Jun	•Playas (Plyas) •Valley and foothill grassland (VFGrs) (adobe clay) •Vernal pools (VnPls)/alkaline	1 - 60 meters	List 1B.2
Atriplex joaquiniana	Chenopodiaceae	annual herb	Apr-Oct	•Chenopod scrub (ChScr) •Meadows and seeps (Medws) •Playas (Plyas) •Valley and foothill grassland (VFGrs)/alkaline	1 - 835 meters	List 1B.2
Atriplex persistens	Chenopodiaceae	annual herb	Jun-Oct	•Vernal pools (VnPls) (alkaline)	10 - 115 meters	List 1B.2
Balsamorhiza macrolepis var. macrolepis	Asteraceae	perennial herb	Mar-Jun	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)/sometimes serpentinite	90 - 1555 meters	List 1B.2
Blepharizonia plumosa	Asteraceae	annual herb	Jul-Oct	•Valley and foothill grassland (VFGrs)	30 - 505 meters	List 1B.1
Brodiaea californica var. leptandra	Liliaceae	perennial bulbiferous herb	May-Jul	•Broadleafed upland forest (BUFrs) •Chaparral (Chprl) •Cismontane woodland (CmWld) •Lower montane coniferous forest (LCFrs) •Valley and foothill grassland (VFGrs)/volcanic	110 - 915 meters	List 1B.2
Calochortus pulchellus	Liliaceae	perennial bulbiferous herb	Apr-Jun	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Riparian woodland (RpWld) •Valley and foothill grassland (VFGrs)	30 - 840 meters	List 1B.2
Calycadenia micrantha	Asteraceae	annual herb	Jun-Sep	•Chaparral (Chprl) •Meadows and seeps (Medws)(volcanic) •Valley and foothill grassland (VFGrs)/ roadsides, rocky, talus, scree, sometimes serpentinite, sparsely vegetated areas	5 - 1500 meters	List 1B.2

Castilleja affinis ssp. neglecta	Scrophulariaceae	perennial herb hemiparasitic	Apr-Jun	•Valley and foothill grassland (VFGrs) (serpentinite)	60 - 400 meters	List 1B.2
Ceanothus purpureus	Rhamnaceae	perennial evergreen shrub	Feb-Jun	•Chaparral (Chprl) •Cismontane woodland (CmWld)/volcanic, rocky	120 - 640 meters	List 1B.2
Centromadia parryi ssp. congdonii	Asteraceae	annual herb	May-Oct (Nov) Months in parentheses are uncommon.	•Valley and foothill grassland (VFGrs) (alkaline)	1 - 230 meters	List 1B.2
Centromadia parryi ssp. parryi	Asteraceae	annual herb	May-Nov	•Chaparral (Chprl) •Coastal prairie (CoPrr) •Meadows and seeps (Medws) •Marshes and swamps (MshSw) (coastal salt) •Valley and foothill grassland (VFGrs) (vernally mesic)/often alkaline	2 - 420 meters	List 1B.2
Cicuta maculata var. bolanderi	Apiaceae	perennial herb	Jul-Sep	•Marshes and swamps (MshSw) Coastal, fresh or brackish water	0 - 200 meters	List 2.1
Cirsium hydrophilum var. hydrophilum	Asteraceae	perennial herb	Jun-Sep	•Marshes and swamps (MshSw) (salt)	0 - 1 meters	List 1B.1
Cordylanthus mollis ssp. mollis	Scrophulariaceae	annual herb hemiparasitic	Jul-Nov	•Marshes and swamps (MshSw) (coastal salt)	0 - 3 meters	List 1B.2
Cryptantha clevelandii var. dissita	Boraginaceae	annual herb	Apr-Jun	•Chaparral (Chprl) (serpentinite)	395 - 580 meters	List 1B.1
Dirca occidentalis	Thymelaeaceae	perennial deciduous shrub	Jan-Mar (Apr) Months in parentheses are uncommon.	•Broadleafed upland forest (BUFrs) •Closed-cone coniferous forest (CCFrs) •Chaparral (Chprl) •Cismontane woodland (CmWld) •North Coast coniferous forest (NCFrs) •Riparian forest (RpFrs) •Riparian woodland (RpWld)/mesic	50 - 395 meters	List 1B.2
Downingia pusilla	Campanulaceae	annual herb	Mar-May	•Valley and foothill grassland (VFGrs) (mesic) •Vernal pools (VnPls)	1 - 445 meters	List 2.2
Erigeron biolettii	Asteraceae	perennial herb	Jun-Oct	•Broadleafed upland forest (BUFrs) •Cismontane woodland (CmWld) •North Coast coniferous forest (NCFrs)/rocky, mesic	30 - 1100 meters	List 3

Erigeron greenei	Asteraceae	perennial herb	May-Sep	•Chaparral (Chprl) (serpentinite or volcanic)	80 - 1005 meters	List 1B.2
Eriogonum luteolum var. caninum	Polygonaceae	annual herb	May-Sep	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Coastal prairie (CoPrr) •Valley and foothill grassland (VFGrs)/serpentinite, sandy to gravelly	0 - 700 meters	List 1B.2
Eriogonum truncatum	Polygonaceae	annual herb	Apr-Sep (Nov-Dec) Months in parentheses are uncommon.	•Chaparral (Chprl) •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)/sandy	3 - 350 meters	List 1B.1
Fritillaria liliacea	Liliaceae	perennial bulbiferous herb	Feb-Apr	•Cismontane woodland (CmWld) •Coastal prairie (CoPrr) •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)/often serpentinite	3 - 410 meters	List 1B.2
Gilia capitata ssp. tomentosa	Polemoniaceae	annual herb	May-Jul	•Coastal bluff scrub (CBScr)(rocky, outcrops)	15 - 155 meters	List 1B.1
Helianthella castanea	Asteraceae	perennial herb	Mar-Jun	•Broadleafed upland forest (BUFrs) •Chaparral (Chprl) •Cismontane woodland (CmWld) •Coastal scrub (CoScr) •Riparian woodland (RpWld) •Valley and foothill grassland (VFGrs)	60 - 1300 meters	List 1B.2
Hesperolinon bicarpellatum	Linaceae	annual herb	May-Jul	•Chaparral (Chprl) (serpentinite)	60 - 1005 meters	List 1B.2
Hesperolinon breweri	Linaceae	annual herb	May-Jul	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)/usually serpentinite	30 - 900 meters	List 1B.2
Hesperolinon serpentinum	Linaceae	annual herb	May-Jul	•Chaparral (Chprl) (serpentinite)	50 - 800 meters	List 1B.1
Holocarpha macradenia	Asteraceae	annual herb	Jun-Oct	•Coastal prairie (CoPrr) •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)/often clay, sandy	10 - 220 meters	List 1B.1

Juglans hindsii	Juglandaceae	perennial deciduous tree	Apr-May	•Riparian forest (RpFrs) •Riparian woodland (RpWld)	0 - 440 meters	List 1B.1
Lasthenia conjugens	Asteraceae	annual herb	Mar-Jun	•Cismontane woodland (CmWld) •Playas (Plyas) (alkaline) •Valley and foothill grassland (VFGrs) •Vernal pools (VnPls)/mesic	0 - 470 meters	List 1B.1
Lathyrus jepsonii var. jepsonii	Fabaceae	perennial herb	May-Jul (Sep) Months in parentheses are uncommon.	•Marshes and swamps (MshSw) (freshwater and brackish)	0 - 4 meters	List 1B.2
Legenere limosa	Campanulaceae	annual herb	Apr-Jun	•Vernal pools (VnPls)	1 - 880 meters	List 1B.1
Leptosiphon jepsonii	Polemoniaceae	annual herb	Mar-May	•Chaparral (Chprl) •Cismontane woodland (CmWld)/usually volcanic	100 - 500 meters	List 1B.2
Lessingia hololeuca	Asteraceae	annual herb	Jun-Oct	•Broadleafed upland forest (BUFrs) •Coastal scrub (CoScr) •Lower montane coniferous forest (LCFrs) •Valley and foothill grassland (VFGrs)/clay, serpentinite	15 - 305 meters	List 3
Lilaeopsis masonii	Apiaceae	perennial rhizomatous herb	Apr-Nov	•Marshes and swamps (MshSw) (brackish or freshwater) •Riparian scrub (RpScr)	0 - 10 meters	List 1B.1
Limnanthes vinculans	Limnanthaceae	annual herb	(Mar)Apr-May Months in parentheses are uncommon.	•Meadows and seeps (Medws) •Valley and foothill grassland (VFGrs) •Vernal pools (VnPls)/vernally mesic	15 - 305 meters	List 1B.1
Micropus amphibolus	Asteraceae	annual herb	Mar-May	•Broadleafed upland forest (BUFrs) •Chaparral (Chprl) •Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)/rocky	45 - 825 meters	List 3.2
Monardella villosa ssp. globosa	Lamiaceae	perennial rhizomatous herb	Jun-Jul (Aug) Months in parentheses are uncommon.	•Broadleafed upland forest (BUFrs) (openings) •Chaparral (Chprl) (openings) •Cismontane woodland (CmWld) •Coastal scrub (CoScr)	100 - 915 meters	List 1B.2

				•Valley and foothill grassland (VFGrs)		
Navarretia leucocephala ssp. pauciflora	Polemoniaceae	annual herb	May-Jun	•Vernal pools (VnPls) (volcanic ash flow)	400 - 855 meters	List 1B.1
Penstemon newberryi var. sonomensis	Scrophulariaceae	perennial herb	Apr-Aug	•Chaparral (Chprl) (rocky)	700 - 1370 meters	List 1B.3
Polygonum marinense	Polygonaceae	annual herb	(Apr)May-Aug(Oct) Months in parentheses are uncommon.	•Marshes and swamps (MshSw) (coastal salt or brackish)	0 - 10 meters	List 3.1
Potamogeton filiformis	Potamogetonaceae	perennial rhizomatous herb aquatic	May-Jul	•Marshes and swamps (MshSw) (assorted shallow freshwater)	300 - 2150 meters	List 2.2
Rhynchospora californica	Cyperaceae	perennial rhizomatous herb	May-Jul	•Bogs and fens (BgFns) •Lower montane coniferous forest (LCFrs) •Meadows and seeps (Medws)(seeps) •Marshes and swamps (MshSw) (freshwater)	45 - 1010 meters	List 1B.1
Senecio aphanactis	Asteraceae	annual herb	Jan-Apr	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Coastal scrub (CoScr)/sometimes alkaline	15 - 800 meters	List 2.2
Sidalcea hickmanii ssp. napensis	Malvaceae	perennial herb	Apr-Jun	•Chaparral (Chprl)/rhyolitic	415 - 610 meters	List 1B.1
Sidalcea hickmanii ssp. viridis	Malvaceae	perennial herb	May-Jun	•Chaparral (Chprl) (serpentinite)	50 - 430 meters	List 1B.3
Streptanthus breweri var. hesperidis	Brassicaceae	annual herb	May-Jul	•Chaparral (Chprl) (openings) •Cismontane woodland (CmWld)/serpentinite, rocky	130 - 760 meters	List 1B.2
Symphyotrichum lentum	Asteraceae	perennial rhizomatous herb	May-Nov	•Marshes and swamps (MshSw) (brackish and freshwater)	0 - 3 meters	List 1B.2
Trichostema ruygtii	Lamiaceae	annual herb	Jun-Oct	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Lower montane coniferous forest (LCFrs) •Valley and foothill grassland (VFGrs) •Vernal pools (VnPls)	30 - 680 meters	List 1B.2
Trifolium amoenum	Fabaceae	annual herb	Apr-Jun	•Coastal bluff scrub (CBScr) •Valley and foothill grassland (VFGrs) (sometimes serpentinite)	5 - 415 meters	List 1B.1

Trifolium depauperatum var. hydrophilum	Fabaceae	annual herb	Apr-Jun	•Marshes and swamps (MshSw) •Valley and foothill grassland (VFGrs) (mesic, alkaline) •Vernal pools (VnPls)	0 - 300 meters	List 1B.2
Viburnum ellipticum	Adoxaceae	perennial deciduous shrub	May-Jun	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Lower montane coniferous forest (LCFrs)	215 - 1400 meters	List 2.3

U.S. Fish & Wildlife Service
Sacramento Fish & Wildlife Office
Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 101015034226

Database Last Updated: April 29, 2010

Quad Lists

Listed Species

Invertebrates

Branchinecta conservatio
- Conservancy fairy shrimp (E)

Branchinecta lynchi
- Critical habitat, vernal pool fairy shrimp (X)
- vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus
- valley elderberry longhorn beetle (T)

Elaphrus viridis
- delta green ground beetle (T)

Lepidurus packardi
- Critical habitat, vernal pool tadpole shrimp (X)
- vernal pool tadpole shrimp (E)

Speyeria callippe callippe
- callippe silverspot butterfly (E)

Syncaris pacifica
- California freshwater shrimp (E)

Fish

Acipenser medirostris
- green sturgeon (T) (NMFS)

Eucyclogobius newberryi
- tidewater goby (E)

Hypomesus transpacificus
- Critical habitat, delta smelt (X)
- delta smelt (T)

Oncorhynchus kisutch
- coho salmon - central CA coast (E) (NMFS)

Oncorhynchus mykiss
- Central California Coastal steelhead (T) (NMFS)
- Central Valley steelhead (T) (NMFS)
- Critical habitat, Central California coastal steelhead (X) (NMFS)
- Critical habitat, Central Valley steelhead (X) (NMFS)

Oncorhynchus tshawytscha

Central Valley spring-run chinook salmon (T) (NMFS)
Critical habitat, winter-run chinook salmon (X) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense
California tiger salamander, central population (T)

Rana draytonii
California red-legged frog (T)
Critical habitat, California red-legged frog (X)

Reptiles

Masticophis lateralis euryxanthus
Alameda whipsnake [=striped racer] (T)
Critical habitat, Alameda whipsnake (X)

Thamnophis gigas
giant garter snake (T)

Birds

Charadrius alexandrinus nivosus
western snowy plover (T)

Pelecanus occidentalis californicus
California brown pelican (E)

Rallus longirostris obsoletus
California clapper rail (E)

Sternula antillarum (=Sterna, =albifrons) browni
California least tern (E)

Strix occidentalis caurina
northern spotted owl (T)

Mammals

Reithrodontomys raviventris
salt marsh harvest mouse (E)

Plants

Castilleja affinis ssp. neglecta
Tiburon paintbrush (E)

Cirsium hydrophilum var. hydrophilum
Suisun thistle (E)

Cordylanthus mollis ssp. mollis
soft bird's-beak (E)

Lasthenia conjugens
Contra Costa goldfields (E)
Critical habitat, Contra Costa goldfields (X)

Navarretia leucocephala ssp. pauciflora
few-flowered navarretia (E)

Proposed Species

Amphibians

Rana draytonii
Critical habitat, California red-legged frog (PX)

Plants

Cirsium hydrophilum var. hydrophilum
Critical habitat, Suisun thistle (PX)

Cordylanthus mollis ssp. mollis
Critical habitat, soft bird's-beak (PX)

Quads Containing Listed, Proposed or Candidate Species:

FAIRFIELD SOUTH (482A)
CORDELIA (482B)
BENICIA (482C)
VINE HILL (482D)
CUTTINGS WHARF (483A)
MARE ISLAND (483D)
MT. VACA (499A)
CAPELL VALLEY (499B)
MT. GEORGE (499C)
FAIRFIELD NORTH (499D)
YOUNTVILLE (500A)
NAPA (500D)

County Lists

Napa County

Listed Species

Invertebrates

Branchinecta conservatio
Conservancy fairy shrimp (E)

Branchinecta lynchi
Critical habitat, vernal pool fairy shrimp (X)
vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus
valley elderberry longhorn beetle (T)

Speyeria callippe callippe
callippe silverspot butterfly (E)

Speyeria zerene myrtleae
Myrtle's silverspot butterfly (E)

Syncaris pacifica
California freshwater shrimp (E)

Fish

Acipenser medirostris
green sturgeon (T) (NMFS)

Eucyclogobius newberryi
tidewater goby (E)

Hypomesus transpacificus
delta smelt (T)

Oncorhynchus kisutch
coho salmon - central CA coast (E) (NMFS)
Critical habitat, coho salmon - central CA coast (X) (NMFS)

Oncorhynchus mykiss
Central California Coastal steelhead (T) (NMFS)
Critical habitat, Central California coastal steelhead (X) (NMFS)

Oncorhynchus tshawytscha
Central Valley spring-run chinook salmon (T) (NMFS)
Critical habitat, winter-run chinook salmon (X) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense
California tiger salamander, central population (T)

Rana draytonii
California red-legged frog (T)
Critical habitat, California red-legged frog (X)

Reptiles

Thamnophis gigas
giant garter snake (T)

Birds

Charadrius alexandrinus nivosus
western snowy plover (T)

Pelecanus occidentalis californicus
California brown pelican (E)

Rallus longirostris obsoletus
California clapper rail (E)

Sternula antillarum (=Sterna, =albifrons) browni
California least tern (E)

Strix occidentalis caurina

northern spotted owl (T)

Mammals

Reithrodontomys raviventris

salt marsh harvest mouse (E)

Plants

Astragalus clarianus

Clara Hunt's milk-vetch (E)

Castilleja affinis ssp. neglecta

Tiburon paintbrush (E)

Cordylanthus mollis ssp. mollis

soft bird's-beak (E)

Lasthenia conjugens

Contra Costa goldfields (E)

Critical habitat, Contra Costa goldfields (X)

Navarretia leucocephala ssp. pauciflora

few-flowered navarretia (E)

Plagiobothrys strictus

Calistoga allocarya (popcorn-flower) (E)

Poa napensis

Napa bluegrass (E)

Proposed Species

Amphibians

Rana draytonii

Critical habitat, California red-legged frog (PX)

Plants

Cordylanthus mollis ssp. mollis

Critical habitat, soft bird's-beak (PX)

Key:

(E) *Endangered* - Listed as being in danger of extinction.

(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.

(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.

(NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service.

Consult with them directly about these species.

Critical Habitat - Area essential to the conservation of a species.

(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.

(C) *Candidate* - Candidate to become a proposed species.

(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.

(X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. See our Protocol and Recovery Permits pages.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

> Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.

  During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

  Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our Map Room page.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. More info

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be January 13, 2011.

SUSCOL MOUNTAIN VINEYARDS

REGIONALLY OCCURRING SPECIAL-STATUS SPECIES

Scientific Name **Common name**	**Federal/ State/ CNPS**	**Distribution**	**Habitat Requirements**	**Period of Identification**	**Potential to Occur in the STUDY Area**
PLANTS					
Amorpha californica var. *napensis* Napa false indigo	--/--/1B.2	Monterey, Marin, Napa, and Sonoma counties.	Broad-leaf upland forest (openings), chaparral, and cismontane woodland. Elevations 120-2,000 meters.	April-July	Yes. The forest and woodland openings provide suitable habitat for this species.
Astragalus tener var. *tener* Alkali milk-vetch	--/--/1B.2	Known to occur in Alameda, Contra Costa (*), Merced, Monterey (*), Napa, San Benito (*), Santa Clara (*), San Francisco (*), San Joaquin (*), Solano, Sonoma (*), Stanislaus (*), and Yolo counties.	Playas, Valley and foothill grassland (adobe clay), and vernal pools/alkaline. Elevations 1-60 meters.	March-June	No. There is no suitable habitat or soils onsite.
Astragalus claranus Clara Hunt's milk-vetch	FE/CT/1B.1	Napa and Sonoma counties.	Openings in chaparral, cismontane woodland, valley and foot hill grassland in serpentine or rocky clay or volcanic soils. Elevations 75-275 meters.	March-May	Yes. The woodland openings and grasslands provide suitable habitat for this species.
Atriplex joaquiniana San Joaquin spearscale	--/--/1B.2	Known to occur in Alameda, Contra Costa, Colusa, Fresno, Glenn, Merced, Monterey, Napa, San Benito, Santa Clara (*), San Joaquin (*), San Luis Obispo (uncertain), Solano, Tulare (uncertain), and Yolo counties.	Chenopod scrub, meadows and seeps, playas, and valley and foothill grassland/ alkaline. Elevations 1-835 meters.	April-October	No. There is no suitable habitat or soils onsite.
Atriplex persistens Vernal pool smallscale	--/--/1B.2	Glenn, Madera, Merced, Solano, Stanislaus (*), and Tulare counties.	Vernal pools/ alkaline. Elevations 10-115 meters.	June-October	No. There is no suitable habitat onsite.
Balsamorhiza macrolepis var. *macrolepis* Big-scale balsamroot	--/--/1B.2	Alameda, Butte, Colusa, Lake, Mariposa, Napa, Placer, Santa Clara, Solano, Sonoma, and Tehama counties.	Chaparral, cismontane woodland, valley and foothill grassland/ sometimes serpentinite. Elevations 90-1,555 meters.	March-June	Yes. The woodlands and grasslands onsite provide suitable habitat.
Blepharizonia plumosa Big tarplant	--/--/1B	Known to occur in Alameda, Contra Costa, San Benito, San Joaquin, San Luis Obispo, Solano(*), and Solano counties.	Valley and foothill grassland. Elevations 30-505 meters.	July-October	No. The site is out of the historical geographic range of this species.
Brodiaea californica var. *leptandra* Narrow-anthered California brodiaea	--/--/1B.2	Lake, Napa and Sonoma counties.	Broadleaf upland forest, chaparral valley and foothill grassland, and lower montane coniferous forest; rocky volcanic soil. Elevations 110-915 meters.	May-July	Yes. The woodlands and grasslands onsite provide suitable habitat.
California macrophylla Round-leaved filaree	--/--/1B.1	Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kings, Lake, Lassen, Merced, Monterey, Napa, San Benito, Santa Clara, San Joaquin, San Luis Obispo, San Mateo, Solano, Sonoma, Stanislaus, Tehama, Yolo counties, and counties in southern California.	Cismontane woodland and Valley and foothill grassland/clay soils. Elevations 15-1,200 meters.	March-May	Yes. The woodlands and grasslands onsite provide suitable habitat.

Scientific Name **Common name**	**Federal/ State/ CNPS**	**Distribution**	**Habitat Requirements**	**Period of Identification**	**Potential to Occur in the STUDY Area**
Calochortus pulchellus Mt. Diablo fairy lantern	--/--/1B.1	Extant in Alameda, Contra Costa and Solano counties, but historically was also found in Napa, Lake, Humboldt, Santa Clara and Yolo counties.	Cismontane woodland, riparian woodland, valley and foothill grassland, and chaparral. Elevations 30 to 840 meters.	April-June	Yes. The woodlands and grasslands onsite provide suitable habitat.
Castilleja affinis ssp. *neglecta* Tiburon Indian paintbrush	FE/CT/1B	Marin, Napa, and Santa Clara counties.	Valley and foothill grassland (serpentinite). Elevations 60-400 meters.	April-June	No. There are no serpentinite soils onsite.
Calycadenia micrantha Small-flowered calycadenia	--/--/1B.2	Colusa, Lake, Monterey, Napa, and Trinity counties.	Chaparral, meadows and seeps, valley and foothill grassland/ roadsides, rocky talus scree, sometimes serpentine and sparsely vegetated areas. Elevations from 5-1,500 meters.	June-September	Yes. The seeps and springs within grasslands onsite provide suitable habitat.
Ceanothus purpureus Hollyleaf ceanothus	--/--/1B.2	Napa, Solano and Sonoma counties.	Chaparral and cismontane woodlands often with volcanic or rocky soils. Elevations 120-640 meters.	February-June	Yes. The woodlands and grasslands onsite provide suitable habitat.
Centromadia parryi ssp. *congdonii* Congdon's tarplant	--/--/1B	Alameda, Contra Costa, Monterey, Santa Clara, Santa Cruz, San Luis Obispo, San Mateo, and Solano counties.	Found in valley and foothill grasslands (alkaline). Elevations 1-230 meters.	May-October (November)	No. There are no suitable soils and the site is out of the historical geographic range of this species.
Centromadia parryi ssp. *parryi* Pappose tarplant	--/--/1B.2	Butte, Colusa, Glenn, Lake, Napa, San Mateo, Solano, and Sonoma counties.	Vernally mesic areas in grasslands, meadows and seeps, coastal salt marsh; often on alkaline sites. Elevations 2-420 meters.	May-November	Yes. The springs and seeps in the grasslands provide suitable habitat.
Cicuta maculata var. *bolanderi* Bolander's water hemlock	--/--/2.1	Contra Costa, Los Angeles (*), Marin, Sacramento, Santa Barbara (*), San Luis Obispo (*), and Solano counties; Arizona, New Mexico, and Washington.	Coastal marshes and swamps in fresh or brackish water. Elevations 0-200 meters.	July-September	No. There is no suitable habitat onsite.
Cirsium hydrophilum var. *hydrophilum* Suisun thistle	--/--/1B	Marin County.	Salt marshes and swamps. Elevations 0-1 meters.	May-August	No. There is no suitable habitat onsite and the site is outside the geographical and elevation range of this species.
Cordylanthus mollis ssp. *mollis* soft bird's-beak	FE/CR/1B	Contra Costa, Marin (*), Napa, Sacramento (*), Solano, and Sonoma (*) counties.	Marshes and swamps (coastal salt). Elevations 0-3 meters.	July-November	No. There is no suitable habitat onsite and the site is outside the geographical and elevation range of this species.
Cryptantha clevlandii var. *dissita* Serpentinite cryptantha	--/--/1B.1	Known to occur in Lake, Mendocino, Napa, and Sonoma counties.	Chaparral on serpentinite soils. Elevations 395-580 meters.	April-June	No. Suitable habitat for this species does not occur within the project site. The project site is outside the elevation range.
Cornus sericea American dogwood	--/--/LR in Napa County	California Floristic Province; western and eastern North America.	Wetland edges and riparian areas.	Year-round	Yes. The moist woodlands near seeps, springs and drainages provide suitable habitat onsite.

Scientific Name **Common name**	**Federal/ State/ CNPS**	**Distribution**	**Habitat Requirements**	**Period of Identification**	**Potential to Occur in the STUDY Area**
Dirca occidentalis Western leatherwood	--/--/1B	Known to occur in Alameda, Contra Costa, Marin, Santa Clara, San Mateo, and Sonoma counties.	Broadleafed upland forest, closed-cone coniferous forest, chaparral, cismontane woodland, North Coast coniferous forest, riparian forest and woodland/ mesic. Elevations 50-395 meters.	January-March (April)	No. The site is out of the historical geographical range of this species.
Downingia pusilla Dwarf downingia	--/--/2.2	Fresno, Merced, Napa, Placer, Sacramento, San Joaquin, Solano, Sonoma, Stanislaus, Tehama, and Yuba counties. Also occurs in South America.	Valley and foothill grassland (mesic) and vernal pools. Elevations 1-445 meters.	March-May	Marginal; suitable vernal pool or swale habitat is lacking.
Erigeron biolettii Biolett's erigeron; streamside daisy	--/--/3.1	Humboldt, Mendocino, Marin, Napa, Solano and Sonoma.	Broadleaf upland forest, cismontane woodland, and North Coast coniferous forest in rocky, mesic areas. Elevations from 30-1,100 meters.	June-September	Yes. The rocky, thin-soil areas within woodland openings provide suitable habitat onsite.
Erigeron greenei (syn: *E. angustatus*) Narrow-leaved daisy	--/--/1B.2	Napa, Sonoma, and Lake counties.	Chaparral or open woodlands (serpentinite or volcanic). Elevations 75-1,060 meters.	May-September	Yes. The open woodlands provide suitable habitat onsite.
Eriogonum luteolum var. *caninum* Tiburon buckwheat	--/--/1B.2	Known to occur in Alameda, Colusa, Lake, Marin, Napa, Santa Clara, San Mateo, Solano, and Sonoma (*) counties.	Chaparral, coastal Prairie, and Valley and foothill grassland/ serpentinite. Elevations 0-700 meters.	May-September	No. There are no serpentinite soils onsite.
Eriogonum truncatum Mt Diablo buckwheat	--/--/1B.1	Alameda, Contra Costa, Marin and Sonoma (*?) counties.	Dry, exposed clay or sandy substrates in chaparral, coastal scrub, and grassland. Elevations 3-350 meters.	April-September (November-December)	No. The site is out of the historical geographical range of this species and the potential habitat is only marginal.
Fritillaria liliacea Fragrant fritallary	--/--/1B.2	Alameda, Contra Costa, Monterey, Marin, San Benito, Santa Clara, San Francisco, San Mateo, Solano, and Sonoma counties.	Grassland, coastal scrub, and coastal prairie, often on serpentine and usually in clay soils but various soil types are reported. Elevations 3-410 meters.	February-April	Yes. The grassland onsite provides suitable habitat.
Gilia capitata ssp. *tomentosa* Bluehead gilia	--/--/1B.1	Marin and Sonoma (*) counties.	Coastal bluff scrub (rocky outcrops). Elevations 15-155 meters.	May-July	No. The site is outside the historical geographical range of this species.
Harmonia nutans Nodding harmonia	--/--/4	Lake, Napa, Sonoma, and Yolo counties.	Chaparral, cismontane woodland, rocky soils, and volcanic substrates. Elevations from 75-975 meters.	March-May	Yes. The woodlands and rocky volcanic soils onsite provide suitable habitat.
Helianthella castanea Diablo helianthella	--/--/1B.2	Alameda, Contra Costa, Marin (*), San Diego, San Francisco (*), and San Mateo counties.	Broadleaved upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, and valley and foothill grassland. Elevations 60-1300 meters.	March-June	No. The site is out of the historical geographical range of this species.
Hesperolinon bicarpellatum Two-carpellate western flax	--/--/1B.2	Lake, Napa, and Sonoma counties.	Found in serpentine soils in chaparral. Elevations 60- 1,005.	May-July	No. There are no serpentinite soils onsite.
Hesperolinon breweri Brewer's western flax	--/--/1B	Napa, Solano, and Contra Costa counties.	Found in chaparral, cismontane woodland and valley and foothill grassland (usually in serpentine soil). Elevations 30-900 meters.	May-July	Marginal. While chaparral, woodland and grassland habitats appear suitable, there are no serpentinite soils onsite.

Scientific Name Common name	Federal/ State/ CNPS	Distribution	Habitat Requirements	Period of Identification	Potential to Occur in the STUDY Area
Hesperolinon serpentinum Napa western flax	--/--/1B	Alameda, Lake, Napa, and Stanislaus counties.	Found in chaparral (serpentinite). Elevations 50-800 meters.	May-July	Marginal. While chaparral habitat appears suitable, there are no serpentinite soils onsite
Holocarpha macradenia Santa Cruz tarplant	FT/CE/1B	Alameda (*), Contra Costa (*), Monterey, Marin (*), and Santa Cruz counties.	Coastal prairie, Coastal scrub, and Valley and foothill grassland/often clay, sandy. Elevations 10-220 meters.	June-October	No. The site is outside the historical geographical range of this species.
Juglans hindsii Northern California black walnut	--/--/1B.1	Alameda, Butte, Contra Costa, Lake (?), Napa, Sacramento (*), Solano (*), Sonoma and Yolo (*) counties.	Riparian forest and riparian woodland. Elevations from 0-440 meters.	April-May	Yes. The riparian habitat onsite provides suitable habitat.
Lasthenia conjugens Contra Costa goldfields	FE/--/1B.1	Alameda, Contra Costa, Mendocino (*), Monterey, Marin, Napa, Santa Barbara (*), Santa Clara (*), and Sonoma counties.	Cismontane woodland, playas (alkaline), valley and foothill grassland and vernal pools/mesic. Elevations 0-470 meters.	March-June	Marginal. The seeps and springs may provide suitable vernally mesic areas, however the soils are not alkaline onsite.
Lathyrus jepsonii var. *jepsonii* Delta tule pea	--/--/1B.2	Contra Costa, Solano, Sacramento, Napa, Sonoma, and San Joaquin counties.	Marshes and swamps (freshwater and brackish). Elevations 0-4 meters.	May – July (September)	No. The site is outside the historical and elevation range of this species.
Legenere limosa Legenere	--/--/1B.1	Alameda, Lake, Napa, Placer, Sacramento, Santa Clara, Shasta, San Joaquin, San Mateo, Solano, Sonoma, Stanislaus Tehama, and Yuba counties.	Annual herb found in vernal pools. Elevations 1-880 meters.	April-June	No. There are no vernal pools onsite.
Lessingia hololeuca Woolly-headed lessingia	--/--/3	Alameda, Monterey, Marin, Napa, Santa Clara, San Mateo, Solano, Sonoma, and Yolo counties.	Broadleafed upland forest, Coastal scrub, Lower montane coniferous forest, and Valley and foothill grassland/clay, serpentinite. Elevations 15-305 meters.	June-October	No. There are no serpentinite soils onsite.
Leptosiphon acicularis Bristly leptosiphon	--/--/4.2	Alameda, Butte, Contra Costa(?), Fresno, Humboldt, Lake, Mendocino, Marin, Napa, Santa Clara, San Mateo, and Sonoma counties.	Chaparral, cismontane woodland, coastal prairie, and valley and foothill grassland. Elevations 55-1,500 meters	April-July	Unlikely. While suitable habitat appears to be present onsite, the historical distribution for this species is largely to the west of the project site.
Leptosiphon jepsonii Jepson's leptosiphon	--/--/1B.2	Lake, Napa, and Sonoma counties.	Chaparral and cismontane woodland, usually volcanic. Elevations 100-500 meters.	March-May	Yes. The woodlands onsite may provide suitable habitat.
Leptosiphon latisectus Broad-lobed leptosiphon; Coast Range linanthus	--/--/4.2	Colusa, Lake, Napa, and Sonoma counties.	Chaparral, cismontane woodland, coastal prairie, valley and foothill grassland, grassy areas in woodlands and chaparral. Elevations 170-1,500 meters.	March-May	Unlikely. The historical distribution for this species is largely to the west of the project site.
Lilaeopsis masonii Mason's lilaeopsis	--/CR/1B	Known to occur in Alameda, Contra Costa, Marin, Napa, Sacramento, San Joaquin, and Solano counties.	Marshes and swamps (brackish or freshwater) and Riparian scrub. Elevations 0-10 meters.	April-November	No. The site is outside the elevation range for this species.
Lilium rubescens Redwood (chapparal) lily	--/--/4.2	Del Norte, Glenn, Humboldt, Lake, Mendocino, Napa, Santa Cruz, Shasta, Siskiyou, Sonoma, and Trinity counties.	Broad-leafed upland forest, chaparral, lower montane coniferous forest, North Coast coniferous forest, and upper montane coniferous forest; sometimes serpentinite, sometimes roadsides. Elevations 30-1,715 meters.	April-August (September)	Unlikely. The historical distribution for this species is largely to the west of the project site.

Scientific Name Common name	Federal/ State/ CNPS	Distribution	Habitat Requirements	Period of Identification	Potential to Occur in the STUDY Area
Limnanthes floccosa ssp. floccosa Wooly meadowfoam	--/--/4.2	Butte, Lake, Lassen, Napa, Shasta, Siskiyou, Tehama, and Trinity Counties and Oregon State.	Chaparral, cismontane woodland, valley and foothill grassland, vernally mesic vernal pools. Elevations; 60 to 1,095.	March-May(June)	No. There are no vernal pools onsite and the historical distribution for this species is largely to the west and north.
Limnanthes vinculans Sebastopol meadowfoam	FE/CE/1B.1	Napa (unverified) and Sonoma counties.	Occurs in meadows and seeps, valley and foothill grassland, and vernal pools (vernally mesic). Elevations from15- 305 meters.	April-May	Yes. The seeps and springs within grasslands onsite could provide suitable habitat.
Lomatium repostum Napa lomatium	--/--/4.3	Lake, Napa, Solano, and Sonoma counties.	Favors serpentine soils in chaparral and cismontane pine/oak woodland. Elevations 90 - 830 meters.	March-June	Marginal. There are no serpentinite soils onsite, but could be found in woodlands on volcanic soils.
Micropus amphiboles Mount Diablo cottonweed	--/--/3.2	Alameda, Contra Costa, Colusa, Lake, Monterey, Marin, Napa, Santa Barbara, Santa Clara, Santa Cruz, San Joaquin, San Luis Obispo, Solano, and Sonoma counties.	Broad-leaved upland forest (openings), Chaparral, Cismontane woodland, and Valley and foothill grassland, in rocky soils. Elevations 45- 825 meters.	March-May	Yes. The woodlands and grasslands onsite provide suitable habitat.
Monardella villosa ssp. *globosa* Robust monardella	--/--/1B.2	Alameda, Contra Costa, Humboldt, Lake, Mendocino, Napa, Santa Clara, Santa Cruz, San Mateo, and Sonoma counties;	Broad-leaved upland forest (openings), Chaparral, Cismontane woodland, Coastal scrub, and Valley and foothill grassland. Elevations 100-915 meters.	June-July (August)	Yes. The woodlands and grasslands onsite provide suitable habitat.
Monardella viridis ssp. *viridis* Green monardella	--/--/4.3	Lake, Mendocino, Napa, Solano, Sonoma, Tehama and Yolo counties.	Broad-leaved upland forest (openings), chaparral, cismontane woodland. Elevations 300-1,000 meters.	June-September	Yes. The woodland openings onsite provide suitable habitat.
Navarretia leucocephala ssp. bakeri Baker's navarretia	--/--/1B.1	Colusa, Glenn, Lake, Mendocino, Marin, Napa, Solano, Sonoma, Sutter, Tehama, and Yolo counties.	Cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, vernal pools/mesic. Elevations 5-1,740 meters.	April-July	Yes. The seeps and springs onsite may provide suitable vernally mesic habitat.
Navarretia leucocephala ssp. *pauciflora* Few-flowered navarretia	FE/CT/1B.1	Lake and Napa counties.	Vernal pools on volcanic ash flow. Elevations 400-855 meters.	May-June	No. The site is outside the historical elevation range of this species, and suitable is not found onsite.
Navarretia sinistra ssp. *pinnatisecta* Pinnate-leaved navarretia	--/--/4.3	Glenn, Lake, Mendocino, Napa, Tehama, and Trinity counties.	Closed-cone coniferous forest and chaparral on serpentinite or volcanic, rocky substrates. Elevations 300-2,200 meters.	May-July	Marginal. The rocky soils in chaparral or woodland openings could provide suitable habitat, but site is outside historical range.
Perideridia gairderi var. *gairdneri* Gairdner's yampah	--/--/4.2; LR in Napa County	Contra Costa, Kern, Los Angeles(*), Mendocino, Monterey, Marin, Napa, Orange (*), San Benito, Santa Clara, Santa Cruz, San Diego (*), San Luis Obispo, San Mateo (*), Solano, and Sonoma counties.	Broad-leaved upland forest (openings), chaparral, coastal prairie, valley and foothill grassland; vernal pools and vernally mesic areas. Elevations 0-365 meters.	June-October	Yes. The seeps, springs and drainages provide suitable habitat.
Penstemon newberryi var. *sonomensis* Sonoma beardstongue	--/--/1B.3	Known to occur in Lake, Napa, and Sonoma counties.	Rocky substrates in chaparral. Elevations: 700-1,370 meters.	April-August	No. Suitable habitat for this species does not occur within the project site. The project site is outside the elevation range for this species.

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Polygonum marinense Marin knotweed	--/--/3.1	Humboldt, Marin, Napa, Solano, and Sonoma counties.	Salt- or brackish marshes and swamps. Elevations 0-10 meters.	(April) May-August (October)	No. There is no suitable habitat onsite and the site is outside the geographical and elevation range of this species.
Potomogeton filiformis Slender-leaved pondweed	--/--/2.2	Alameda, Butte, Contra Costa, El Dorado, Lassen, Merced, Mono, Modoc, Mariposa, Placer, Santa Clara (*), Shasta, San Mateo, Solano, Sonoma counties; Arizona, Nevada, Oregon, Washington, and elsewhere.	Shallow freshwater marshes and swamps. Elevations 300 - 2,150 meters.	May-July	No. There is no suitable habitat onsite and the site is at the lower limit of elevation range for this species.
Rhynchospora californica California beak rush	--/--/1B.2	Butte, Marin, Napa, and Sonoma counties.	Bogs and fens, lower montane coniferous forest, meadows and seeps, marshes and swamps (freshwater). Elevations 45-1,010 meters.	May-July	Yes. The seeps and springs onsite provide suitable habitat.
Ribes victoris Victor's gooseberry	--/--/4.3	Lake, Marin, Napa, and Sonoma counties.	Broadleaved upland forest, chaparral; in wooded slopes in shaded canyons. Elevations 100-750 meters.	March-April	Yes. Areas near springs, seeps and drainages within woodland may provide suitable habitat.
Senecio aphanactis Rayless ragwort	--/--/2.2	Alameda, Contra Costa, Fresno, Los Angeles, Merced, Monterey, Orange, Riverside, Santa Barbara, Santa Clara, Santa Catalina Island, San Diego, San Luis Obispo, Solano, Santa Rosa Island, and Ventura counties. Also Baja California.	Chaparral, Cismontane woodland, and Coastal scrub/ sometimes alkaline. Elevations 15-800 meters.	January-April	No. There are no alkaline soils onsite and the historical distribution for this species is largely to the west and south of the project site.
Sidalcea hickmanii ssp. *napensis* Napa checkerbloom	--/--/1B.1	Lake (?), Marin, Napa and Sonoma counties.	Chaparral; serpentine or volcanic soils. Elevations 415 to 610 meters.	May-July	No. The site is outside the elevation range of this species.
Sidalcea hickmanii ssp. *viridis* Marin checkerbloom	--/--/1B.3	Known to occur in Lake (uncertain), Marin, Napa, and Sonoma counties.	Chaparral (serpentinite). Elevations; 50-430 meters.	May-June	No. There are no serpentinite soils onsite.
Streptanthus breweri var. *hesperidis* Green jewelflower	--/--/1B.2	Glenn, Lake, Napa, and Sonoma Counties.	Chaparral (openings) and cismontane woodland (serpentine, rocky). Elevations 130 to 760 meters.	May-July	No. There are no serpentinite soils onsite.
Symphyotrichum lentum syn. *Aster lentus* Suisun Marsh aster	--/--/1B.2	Known to occur in Contra Costa, Marin, Napa, Sacramento, San Joaquin, Solano, and Sonoma counties.	Marshes and swamps (brackish and freshwater). Elevations; 0-3 meters.	May-November	No. The site is outside the elevation range for this species.
Sisyrinchium californicum California golden eye grass	--/--/LR in Napa County	Central and northern California to British Columbia.	Generally moist areas near the Coast. Elevations from 0-600 meters.	March-June	Yes. The seeps and springs provide suitable habitat.
Trichostema ruygtii Napa bluecurls	--/--/1B.2	Napa County, possibly adjacent Solano County.	Chaparral, cismontane woodland, lower montane coniferous forest, valley and foothill grassland; vernally mesic thin soils and vernal pools. Elevations from 30-680 meters.	June-October	Yes. The grasslands and open woodlands onsite provide suitable habitat.
Trifolium amoenum Two-fork clover, showy Indian clover, showy Rancheria clover	FE/--/1B.1	Alameda (*), Marin, Napa (*), Santa Clara (*), Solano (*), and Sonoma (*?) counties.	Coastal bluff scrub, valley and foothill grassland (sometimes serpentinite). Elevations from 5-415 meters.	April-June	Yes. The grasslands onsite provide suitable habitat.

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Trifolium depauperatum var. *hydrophilum* Saline clover	--/--/1B	Alameda, Colusa (uncertain), Monterey, Napa, San Benito, Santa Clara, Santa Cruz, San Luis Obispo, San Mateo, Solano, and Sonoma counties.	Marshes and swamps, Valley and foothill grassland (mesic, alkaline), and Vernal pools. Elevations 0-300 meters.	April-June	No. There are no alkaline soils onsite.
Triteleia lugens Dark-mouthed triteleia	--/--/4.31	Lake, Monterey, Napa, San Benito, Solano, and Sonoma counties.	Broad-leaved upland forest, chaparral, and lower montane coniferous forest. Elevations 10-1000 meters.	April-June	Yes. The woodlands onsite may provide suitable habitat.
Viburnum ellipticum Oval-leaved viburnum	--/--/2.3	Contra Costa, El Dorado, Fresno, Glenn, Humboldt, Mendocino, Napa, Placer, Shasta, and Sonoma counties. Also occurs in Oregon and Washington.	Chaparral, cismontane woodland and lower montane coniferous forest. Elevations 215-1,400 meters.	May-June	Yes. The woodlands may provide suitable habitat for this species.
ANIMALS					
Invertebrates					
Calasellus californicus (no common name)	--/[1]/--	Has been collected from one locality each in Lake, Napa and Santa Clara counties.	Freshwater habitats. Very little is known about this blind isopod.	Unknown	Yes. Freshwater habitats could provide suitable habitat onsite. A record exists approximately 3.5 miles northwest of the project site. However, this species has no special status designation.
Danaus plexippus Monarch butterfly	--/[1]/--	Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico.	Roosts located in wind protected tree groves (Eucalyptus, Monterey Pine, Cypress) with nectar and water sources nearby.	March-November	No. No suitable habitat for roosting. Larval plants not abundant (milkweeds). May forage for nectar.
Desmocerus californicus dimorphus Valley elderberry longhorn beetle (VELB)	FT/--/--	Restricted to the Central Valley from Redding to Bakersfield. Counties include Amador, Butte, Calaveras, Colusa, El Dorado, Fresno, Glenn, Kern, Madera, Mariposa, Merced, Napa, Placer, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Yolo, and Yuba counties.	Riparian forest communities. Exclusive host plant is elderberry (*Sambucus* species), which must have stems ^{3} 1-inch diameter for the beetle. Elevations typically range from 0-762 meters.	Year-round for exit holes; May-June for adults.	Yes, marginal, near outside limits of range.
Saldula usingeri Wilbur Springs shorebug	--/[1]/--	Known from Wilbur Hot Springs (Colusa county), Sulfur Creek drainages.	Not widely understood, but appears to subsist in high thermal and high-salinity environments around hot springs or drainages connecting to hot springs. (Resh and Sorg, 1983)	Unknown	No. There are no known hot springs in the vicinity of the project site.
Speyeria callippe callippe Callippe silverspot	FT/--/--	Solano County.	Depends on extensive patches of its host plant, Johnny jump-up (*Viola pedunculata*); typically in grasslands, along ridgelines.	April-May	Marginal. While the host plant is present, it is uncommon.
Syncaris pacifica California freshwater shrimp	FE/SE/--	17 stream segments in Napa, Sonoma and Solano counties.	Creeks with pools 12-36 inches deep and undercut banks with exposed live root tangles.	Year-round	Yes. The perennial aquatic habitats may provide suitable habitat.

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Fishes					
Oncorhynchus mykiss irdeus Steelhead; Central California coast ESU	FT/--/--	Russian River south to Soquel Creek, but not including Pajaro River; also San Francisco & San Pablo Bay basins.	For spawning and rearing headwater streams with cold water, deep pools and runs, gravel (1-13 cm) beds for spawning.	Year-round	Yes. The perennial aquatic habitats may provide suitable habitat. Critical habitat for this species is designated within Suscol Creek.
Amphibians					
Rana boylii Foothill yellow-legged frog	--/CSC/--	Coast Ranges from the Oregon border south to the Transverse Mountains in Los Angeles County, throughout most of Northern California west of the Cascade crest, and along the western portion of the Sierra south to Kern County, with a few isolated populations in the Central Valley.	Occurs in shallow flowing streams with some cobble in a variety of habitats including woodlands, riparian forest, coastal scrub, chaparral, and wet meadows. Rarely encountered far from permanent water sources. Elevations typically range from 0-1,940 meters.	March-June	Yes. The perennial aquatic habitats may provide suitable breeding habitat.
Rana draytonii (Rana aurora draytonii) California red-legged frog	FT/CSC/--	Coastal Mendocino Co. to Baja, inland through northern Sacramento Valley into the foothills of the Sierra Nevada, south to east Tulare County, and possibly eastern Kern County. Range excludes the Central Valley	Occurs in permanent and temporary pools of streams, marshes, and ponds with dense grassy and/or shrubby vegetation. Elevations typically range from 10-1,160 meters.	March-June	Yes. The perennial aquatic habitats may provide suitable breeding habitat. Critical habitat for this species is designated in the southeastern corner of the project site in upland habitat.
Reptiles					
Actinemys marmorata western pond turtle	--/CSC/--	West coast of North America from southern Washington, USA to northern Baja California, Mexico. Many populations have been * and others continue to decline throughout the range, especially in southern California.	Requires aquatic habitats with suitable basking sites. Nest sites most often characterized as having gentle slopes (<15 percent) with little vegetation or sandy banks.	March-October	Yes. The perennial aquatic habitats may provide suitable habitat.
Birds					
Accipiter cooperii Cooper's hawk	--/CSC/--	Known to occur from Siskiyou Co. south to San Diego Co; also scattered nesting in interior valleys and woodlands of Coast Range from Humboldt Co. south, and in western foothills of the Sierra Nevada.	Deciduous, mixed, and evergreen forests, and deciduous stands of riparian habitat. Ranges from sea level to above 2700 meters.	Year-round	No. There is insufficient nesting habitat onsite.
Aquila chrysaetos Golden eagle	BCC/CFP/--	Most of the western half of North America.	Generally open country, in prairies, tundra, open coniferous forest and barren areas, especially in hilly or mountainous regions, nesting on cliff ledges and in trees.	Year-round	No. There is insufficient nesting habitat onsite.
Agelaius tricolor Tricolored blackbird	--/CSC/--	Primarily California's Central Valley and major river valleys, as well as adjacent Mexico, with smaller populations as far north as British Columbia and into western Nevada.	Nests in freshwater marsh; forages in grasslands and croplands.	Year-round	Marginal. Although the marsh habitat within the project site is appropriate for nesting of a few pairs of birds, it is not large enough to support a nesting colony.
Ammodramus savannarum Grasshopper sparrow	--/CSC/--	In California, primarily in the Central Valley; appropriate habitat throughout the Americas.	Extensive areas of native and non-native grasslands, often with scattered shrubs.	Year-round	Yes. The grasslands onsite provide suitable nesting and foraging habitat.

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Ardea alba Great egret	--/[1]/--	Large distribution across from southern Canada, across the U.S. and southward to Argentina, and in Europe, Africa, Asia, and Australia. In California, occurs in Butte, Del Norte, Glenn, Humbodlt, Imperial, Kern, Marin, Merced, Napa, Riverside, Sacramento, Solano, Tehama and Yolo counties.	Feeds and rests in fresh and saline emergent wetlands, along the margins of estuaries, lakes, and slow-moving streams, on mudflats and salt ponds, and in irrigated croplands and pastures. Nests and roosts in large trees.	Year-round	No. There is no rookery habitat onsite, though birds may use the site to forage.
Ardea herodias Great blue heron	--/[1]/--	Range extends from Alaska through Canada and into northern South America. In California, occurs in northern, central and southern counties across the state.	Shallow estuaries and fresh and saline emergent wetlands. Less common along riverine and rocky marine shores, in croplands, pastures, and in mountains above foothills.	Year-round	No. There is no rookery habitat onsite, though birds may use the site to forage.
Athene cunicularia Burrowing owl	--/CSC/--	Formerly common within the described habitats throughout the state except the northwest coastal forests and high mountains.	Yearlong resident of open, dry grassland and desert habitats, as well as in grass, forb and open shrub stages of pinyon-juniper and ponderosa pine habitats.	Year-round	Marginal. There are few possible burrowing sites and insufficient prey.
Asio otus Long-eared owl	--/CSC/--	Southeastern Yukon, northeastern British Columbia, and northern Alberta across central Canada to Maritime Provinces and south to northern Baja California, southern Arizona, southern New Mexico, east to Pennsylvania, New York and New England; also Europe and Asia. In Southern California, there is substantial area of extirpation with small remnant populations in interior areas.	Open woodlands and coniferous forests, often near riparian areas. Only one breeding record in Napa County is known from near Lake Berryessa (Shuford, W. D., and Gardali, T., [eds.], 2008).	March-August	Marginal. The riparian areas could provide suitable nesting habitat, but this species is sensitive to disturbance.
Athene cunicularia Western burrowing owl	--/CSC/--	Formerly common within the described habitats throughout the State, except the northwestern coastal forests and high mountains.	Yearlong resident of open, dry grassland and desert habitats, as well as in grass, forb and open shrub stages of pinyon-juniper and ponderosa pine habitats.	April-July (nesting); September-February (wintering)	Marginal nesting, foraging and wintering habitat.
Buteo swainsoni Swainson's hawk (nesting)	--/CT/--	In California, breeds in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen County, and Mojave Desert. Very limited breeding reported from Lanfair Valley, Owens Valley, Fish Lake Valley, Antelope Valley, and in eastern San Luis Obispo County.	Occurs in open habitats with scattered large trees for nesting, as in riparian areas and oak savannah. Forages primarily over flat agricultural lands, pastures, and ranch country.	March-October	Yes. The riparian habitat and oak woodlands provide nesting habitat.
Circus cyaneus Northern harrier (nesting)	--/CSC/--	Permanent residents of the northeastern plateau and coastal areas; less common resident of the Central Valley.	Coastal scrub, Great Basin grassland, marsh and swamp (coastal and fresh water), riparian scrubs, valley and foothill grassland, and wetlands. Nests on the ground, usually in tall, dense clumps of vegetation, either alone or in loose colonies. Occurs from annual grassland up to lodgepole pine and alpine meadow habitats, as high as 3,000 meters.	Year-round	Yes. There is potential nesting habitat in the grassland and woodland openings.
Contopus cooperi Olive-sided flycatcher	--/CSC/--	Coniferous woods across Canada, Alaska and the northeastern and western United States, and other types of wooded areas in California.	Prefers tall coniferous trees for nesting and foraging, but will also use tall blue gum trees. Forages for aerial insects from tall perches. Neotropical migrant.	March-August	Marginal. This species would likely only be present during migration, therefore only foraging habitat is present in the project site.

Scientific Name Common name	Federal/ State/ CNPS	Distribution	Habitat Requirements	Period of Identification	Potential to Occur in the STUDY Area
Dendroica petechia brewsteri Yellow warbler	--/CSC/--	Throughout northern half of continental U.S. plus Canada and Alaska; winters in Central America.	Nests in riparian woodlands dominated by willows and/or cottonwoods; also, in northern California, Oregon ash/willow woodland provide good nesting habitat. This species occurs in a variety of other vegetation communities during migration. Neotropical migrant.	March-August	Marginal. The project site provides only marginal nesting habitat. This species may also be present during migration.
Elanus leucurus White-tailed kite (nesting)	--/CFP/--	Permanent resident of coastal and valley lowlands.	Nests in dense oak, willow, or other tree stands near open foraging areas. Hunts in herbaceous lowlands with variable tree growth.	Year-round. Peak nesting is May-August.	Yes. The woodland and grassland within the project site provide suitable nesting and foraging habitat, respecitvely.
Geothlypis trichas sinuosa San Francisco (saltmarsh) common yellowthroat	--/CSC/--	Breeding range bounded by Tomales Bay on the north, Carquinez Strait on the east, and Santa Cruz county to south, with occurrences in the Bay Area during migration and winter.	Nests in freshwater, saltwater and brackish marshes. Nests just above ground or over water, in thick herbaceous vegetation, often at base of shrub or sapling, sometimes higher in weeds or shrubs up to about 1 meter.	March-May	Marginal. The project site occurs at the northeastern edge of this species' range. There is limited freshwater marsh in the project site for nesting.
Haliaeetus leucocephalus Bald eagle (nesting)	FD/CE/--	Nests in Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, Humboldt, and Trinity Counties. Winters throughout most of California.	Found near ocean shorelines, lakes, reservoirs, river systems, and coastal wetlands. Usually less than 2 km to water that offers foraging opportunities. Suitable foraging habitat consists of large bodies of water or rivers with abundant fish and adjacent perching sites such as snags or large trees.	Year-round	No. There is insufficient nesting and foraging habitat onsite.
Icteria virens Yellow-breasted chat	--/CSC/--	Erratic and localized in occurrence. Common along western edge of southern deserts, in Santa Clara Co. and on coastal slope from Monterey Co. south; uncommon in foothills surrounding Central Valley. Winters in southern coastal lowlands, Colorado River Valley; and in Northern California in small numbers.	Nests in dense riparian habitats. Typical nesting habitats include valley foothill riparian and valley foothill hardwood-conifer with dense understory. Neotropical migrant.	March-August	No. There is insufficient nesting habitat and marginal foraging habitat on site. This species may only be present during migration.
Lanius ludovicianus Loggerhead shrike	BCC/CSC/--	Year-round resident of southern half of the U.S. from California to the Carolinas, and south across the Pacific slope and interior highlands of Mexico. Resident and winter visitor in lowlands and foothills throughout California.	Nests in variety of open habitats. Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches. Highest density in open-canopy valley foothill hardwood, valley foothill hardwood-conifer, valley foothill riparian, pinyon-juniper, juniper, desert riparian, and Joshua tree habitats.	Year-round	Yes. The grasslands provide nesting and foraging habitat.
Melospiza melodia maxillaries Suisun song sparrow	--/CSC/--	Restricted to Suisun Marsh from the Carquinez Strait east to the confluence of the Sacramento and San Joaquin rivers near Antioch.	Tidal marsh and brackish marsh.	Year-round	No. There are no salt- or brackish-waters onsite.
Melospiza melodia samuelis San Pablo song sparrow	--/CSC/--	Distributed in marshes around San Pablo Bay continuously from Gallinas Creek in the west, along the northern San Pablo bayshore, and throughout the extensive marshes along the Petaluma, Sonoma, and Napa rivers.	Commonly found in saltmarsh, brackish marsh, salt marsh (altered), brackish marsh (altered), and fringe areas, where marsh vegetation is limited to edges of dikes, landfills, or other margins of high ground bordering salt or brackish water areas.	Year-round	No. There are no salt- or brackish-waters onsite.

Scientific Name Common name	Federal/ State/ CNPS	Distribution	Habitat Requirements	Period of Identification	Potential to Occur in the STUDY Area
Phalacrocorax auritus Double-crested cormorant	--/CSC/--	A yearlong resident along the entire coast of California and on inland lakes, in fresh, salt and estuarine waters.	Colonial nester on coastal cliffs, offshore islands and along lake margins in the interior of the state. Prefers water less than 9 meters deep with rocky or gravel bottom. Roosts beside water on offshore rocks, islands, steep cliffs, dead branches of trees, wharfs, jetties, or transmission lines. Perching sites must be barren of vegetation.	Year-round	No. There is no suitable habitat for nesting onsite.
Progne subis Purple martin	--/CSC/--	Local summer resident in wooded low-elevation habitats throughout California; rare migrant in spring and fall, absent in winter. In the south, now only a rare and local breeder on the coast and in interior mountain ranges.	Inhabits open forests, woodlands, and riparian areas in breeding season. Found in a variety of open habitats during migration, including grassland, wet meadow, and fresh emergent wetland, usually near water. Nests in conifer stands, often in woodpecker holes. Uses valley foothill and montane hardwood and conifer, and riparian habitats.	March-August	Marginal. Marginal nesting habitat; the project site has a lack of tall, mature and old-growth trees.
Xanthocephalus xanthocephalus Yellow-headed blackbird	--/CSC/--	Breeds from central British Columbia eastward to very western Ontario, southward into central California, central New Mexico, and northern Illinois. Scattered small populations further east along the Great Lakes to Ohio. Winters from southern Arizona and western Texas southward to southern Mexico. Some birds winter in California (Twedt and Crawford, 1995).	Breeds in prairie wetlands and along other western lakes and marshes where tall reeds and rushes are present. Forages in the wetlands and in surrounding grasslands and croplands. In winter large flocks forage in agricultural areas (Twedt and Crawford, 1995).	Year-round	No. There are insufficient wetlands for nesting onsite.
Mammals					
Antrozous pallidus Pallid bat	--/CSC/--	Locally common species at low elevations. Throughout California except for the high Sierra Nevada from Shasta to Kern counties, and the northwestern corner of the state from Del Norte and western Siskiyou counties to northern Mendocino County.	Habitats occupied include grasslands, shrublands, woodlands and forests from sea level through mixed conifer forests below 2,000 meters. The species is most common in open, dry habitats with rocky areas for roosting. Roosts also include cliffs, abandoned buildings, bird boxes, and under bridges.	March-September	Yes. Roosting and foraging habitats exist onsite.
Corynorhinus townsendii Townsend's big-eared bat	--/CSC/Red	Throughout California, excluding subalpine and alpine habitats. Through Mexico to British Columbia and the Rocky Mountain states. Also occurs in several regions of the central Appalachians.	Requires caves, mines, tunnels, buildings, or other human-made structures for roosting. Hibernation sites must be cool and cold, but above freezing.	March-September	Yes. The project site provides foraging habitat only.
Lasiurus blossevillii Western red bat	SSC/CSC/Red	Central Valley in broadleaf tree communities and is less abundant above low and middle elevations in mixed conifer forests.	Generally occurs in arid regions along riparian corridors and in wooded canyons. This species is solitary (i.e., does not form roosting or maternity colonies) and roosts among the foliage of trees.	San Francisco area: September – May elsewhere: late winter-spring	Yes. This species may roost in trees and riparian corridors onsite.
Nyctinomops macrotis Big free-tailed bat	--/CSC/--	Rare in California. Records of the species are from urban areas of San Diego Co., and vagrants found in fall and winter. A probable vagrant was collected in Alameda Co., but this record is suspect.	Big free-tailed bats in other areas prefer rugged, rocky terrain. Found to 2500 m (8000 ft) in New Mexico, southern Arizona, and Texas. Roosts in buildings, caves, and occasionally in holes in trees. Also roosts in crevices in high cliffs or rock outcrop. Probably does not breed in California.	May-September	No. There is no suitable habitat onsite.
Sorex ornatus sinuosus Suisun shrew	--/CSC/--	Tidal marshes of the northern shores of San Pablo and Suisun bays.	Occurs in herbaceous wetlands and tidal marshes in dense, low-lying cover of salicornia.	Year-round	No. There is no suitable habitat onsite.

Scientific Name Common name	Federal/ State/ CNPS	Distribution	Habitat Requirements	Period of Identification	Potential to Occur in the STUDY Area
Taxidea taxus American badger	--/CSC/--	Found throughout most of California in suitable habitat except North Coast.	Suitable habitat occurs in the drier open stages of most shrub, forest, and herbaceous habitats with friable soils. Badgers are generally associated with treeless regions, prairies, parklands, and cold desert areas.	Year-round	Marginal. The project site provides only habitat; soils not ideal and prey species are scarce.

STATUS CODES

[1] This species is tracked by the CNDDB but has no special status designation

FEDERAL: U.S. Fish and Wildlife Service and National Marine Fisheries Service

FE Listed as Endangered by the Federal Government
FT Listed as Threatened by the Federal Government
FD Federal Delisted
BCC Fish and Wildlife Service Birds of Conservation Concern
SSC Fish and Wildlife Service Species of Special Concern

STATE: California Department of Fish and Game

CE Listed as Endangered by the State of California
CT Listed as Threatened by the State of California
CSC California Species of Special Concern
CFP California Fully Protected Species

OTHER:

CNPS: California Native Plant Society

List 1B Plants rare or endangered in California and elsewhere
List 2 Plants rare or endangered in California, but more common elsewhere
List 3 Plants for which more information is needed
List 4 Plants of limited distribution

Threat Ranks

0.1-Seriously threatened in California (high degree/immediacy of threat)
0.2-Fairly threatened in California (moderate degree/immediacy of threat)
0.3-Not very threatened in California (low degree/immediacy of threats or no current threats known)

LR Locally rare

Western Bat Working Group

Red Bats imperiled or are at high risk of imperilment.
Yellow Bats whose status warrants closer evaluation and are threatened with imperilment.

SOURCES: U.S. Fish and Wildlife Service, 2010; California Natural Diversity Data Base, 2003; California Native Plant Society, 2010; Hickman, 1993; Moyle, 2002; USFS, 2010

APPENDIX F

GEOLOGIC EVALUATION

ENGINEERING GEOLOGIC EVALUATION

Suscol Mountain Vineyards
Napa-Vallejo Road and Highway 12
Napa, California

Mr. Jim Bushey
PPI, Engineering, Inc.
2931 Solano Avenue
Napa, California 94559

August 5, 2010
Project No. 91447.01

Gilpin Geosciences, Inc.
Earthquake & Engineering Geology

Gilpin Geosciences, Inc.
Earthquake and Engineering Geology

August 5, 2010
91447.01

Mr. Jim Bushey
PPI Engineering, Inc.
2931 Solano Avenue
Napa, CA 94559

Subject: **Engineering Geological Evaluation**
Suscol Mountain Vineyards
Napa Vallejo Road & Highway 12
Napa, California

Dear Mr. Bushey:

We are pleased to present the results of our engineering geological evaluation of the proposed vineyard development on the Suscol Mountain Vineyards property at the junction of Napa-Vallejo Road and Highway 12, Napa, California. Existing improvements on the parcel include agricultural and grazing facilities, a reservoir and several water tanks.

The site occupies a large portion of the headwaters of the Suscol Creek drainage that flows west down the approximate centerline of the site. The Napa/Solano County line crosses the northeast corner of the site.

We understand that this evaluation will supplement the "SPP Napa Vineyards LLC, Suscol Mountain Vineyards, Erosion Control Plan", prepared by PPI Engineering, Inc. (PPI, April, 2009, revised September 2009).

Based on the results of our evaluation we believe the proposed vineyard improvements are feasible from an engineering geological perspective. The ECP adequately addresses slope stability and erosion control issues, and in general improves the existing drainage and erosion control over existing conditions of the site slopes, especially on proposed Blocks 33 through 46. We present our findings, conclusions and recommendations in the following report.

2038 Redwood Road Napa, CA 94558 • Tel. 707-251-8543 • Fax. 707-257-8543

We trust that this report provides you with the information you require at this time. If you have any questions, please call.

Sincerely,

GILPIN GEOSCIENCES, INC.

REGISTERED GEOLOGIST
L. M. GILPIN
No. 1518
CERTIFIED
ENGINEERING
GEOLOGIST
STATE OF CALIFORNIA

Lou M. Gilpin, PhD
Engineering Geologist

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Suscol Mountain Vineyards
Napa, California

1.0 INTRODUCTION

We are pleased to present the results of our engineering geological evaluation of the proposed vineyard development on the Suscol Mountain Vineyards property at the junction of Napa-Vallejo Road and Highway 12, Napa, California as shown on the Location Map, Figure 1. Existing improvements on the parcel include agricultural and grazing facilities, and a reservoir.

The site occupies a large portion of the headwaters of the Suscol Creek drainage that flows west down the approximate centerline of the site. The Napa/Solano County line crosses the northeast corner of the site. The southern approximately third of the property on the southern-facing slopes of Jameson Canyon is part of the Fagan Creek watershed.

1.1 Scope of Services

The purpose of this investigation is to review the proposed vineyard development and evaluate the potential impact to local surface erosion and slope stability. In order to accomplish this, we performed the following tasks:

- reviewed published and unpublished reports and maps of the site;
- reviewed aerial photographs in order to evaluate the surficial geological features on the site;
- performed a geologic reconnaissance on 20 January 2009
- reviewed test pits on 18 August 2009;
- logged test pits on 2 February 2010.

2.0 REGIONAL GEOLOGY

The site is located in the Coast Ranges geomorphic province, which is characterized by northwest-southeast trending valleys and ridges. These are controlled by folds and faults that resulted from the collision of the Farallon and North American plates and subsequent shearing along the San Andreas fault.

The bedrock in the site vicinity, as shown on the Regional Geology Map, Figure 2, is mapped as Sonoma Volcanics ashflow tuff, andesitic to basaltic lava flows and breccias overlying Kreyenhegen Formation, Markley Sandstone and Domengine Sandstone Units (Sims, et al., 1973; Fox and others, 1973).

The Sonoma Volcanics are characterized by layered volcanic deposits including andesite or basaltic flows. The ash flow deposits are interlayered and crop out in the low-lying drainages and on the crests of some of the ridges at the site. Markely Sandstone is a unit within the Eocene-age (36 million yeas old) Kreyenhegen Formation generally described as massive medium- to coarse-grained sandstone that is indurated but not cemented. The Domingine is a light brownish-gray coarse-grained sandstone that is not well cemented and contains interbedded clay and silty shale lenses. (Manson, 1988).

Surficial deposits include a large landslide complex along the southern-facing sides of the southern ridges of the site incorporating the Markely Sandstone and associated units as well as the overlying Sonoma Volcanics that crop out along the ridge crest (Manson, 1988; Rogers, 1991). The sandstones of the Markley unit are known to disaggregate rapidly in water. Though not exposed at the site, underlying units of Nortonville Shale and Domingene Sandstone are probably also involved in the large landslide complex on the southern slopes of the site. The Nortonville Shale is also very susceptible to slope failures as observed in the North Bay Area.

Rogers (1991) has suggested that the unconformable contact between the older Panoche Formation and deformed Domingine Sandstone controls the southern slopes of the site and is the cause of the weak rock conditions and massive block landslides.

The soil mapped at the site includes Hambright-Rock outcrop, Fagan Clay Loam and a small area in the south underlain by Clear Lake clay (USDA, 1978). These soils are characterized as developing on basic volcanic rocks (Hambright), weathered sandstone and shale (Fagan) and alluvium (Clear lake), respectively. Although much of the southern slopes of the southern part of the property are mapped as Fagan clay loam (shale bedrock source), the underlying landslide deposits are derived in part from the Sonoma Volcanic rocks capping the ridge tops and therefore are more likely the Hambright series, but could also be classified as part of the Forward or Aiken Loam Series (USDA, 1978). The upper one third of the slope is probably underlain by the displaced volcanic units.

Active faults have been mapped in the vicinity. The closest active fault to the site is the Green Valley Fault approximately 2.6 miles east of the site, as shown on the Regional Geology Map, Figure 2. The Concord-Green Valley fault is classified as a type B fault by the UBC, (ICBO, 1988) and is capable of generating a Moment Magnitude 6.9 earthquake.

The site lies within the North San Francisco Bay Aggregate Materials Production – Consumption Region Boundary (CDMG, 1987), however only a small western part of the property actually lies within a designated Mineral Resource Boundary [MRZ-2(a)]. The identified resource is a large deposit of Sonoma Volcanics rhyolite, andesite, basalt, perlitic rhyolite, and tuff that has been quarried since the turn of the century on the grounds of the Napa State Hospital and for several decades at the nearby Basalt Rock Quarry, now operated by Syar Industries, shown on the Regional Geology Map, Figure 2. The majority of the property was not classified, instead it is designated as out side of the "outer boundary of areas subject to urbanization and limit of the area classified" (CDMG, 1987).

3.0 SITE CONDITIONS

We evaluated site conditions based on aerial photo interpretation and a geological reconnaissance on 20 January 2009. Since issuing our initial draft letter report we visited the site to review test pit excavations with you and Mr. David Steiner on 3 August 2009, and to log test pits on 2 February 2010.

The site consists of a broad valley transected by the west-flowing Suscol Creek that cuts the site roughly in half. The valley is bounded by east-west trending ridges at Elevations of 700 feet at the west end to over 1500 feet at the northeast corner of the site. The northern ridgeline contains proposed vineyard Blocks 1 through 24 and extends along the property line. The southern ridgeline of the Suscol Creek drainage contains proposed vineyard Blocks 25 through 32. The southern approximately one third of the property consists of a south-facing slope that continues from the southern ridgeline down into the valley floor of the Jameson Canyon. Proposed vineyard Blocks 33 through 46 are located on the various gently sloping benched surfaces on the generally south-facing slopes. Highway 12 traverses east-west along the Canyon floor south of the site.

Within the Suscol Creek valley the active creek channel flows for about 1 mile along a gently inclined valley floor from approximate Elevation 600 feet at the west side of the property to approximate Elevation 200 where it flows west offsite. Above Elevation 600 feet there is an abrupt change in the channel gradient as it drains the steep west-facing slopes of the site.

The side slopes of the valley tend to be steep and subject to active downcutting at the edges of the broad uplands surfaces. Slopes are inclined steeply to moderately from 1.5:1 to 5:1 horizontal to vertical.

South of the Suscol Creek valley numerous channels and incised gullies cut the south-facing slope along the southern part of the site and are part of the Fagan Creek Drainage that flows out of the west end of Jameson Canyon. A bench on the southern slope lies parallel to and approximately 200 vertical feet below the ridgeline, forming a prominent step in the topography. The ridgelines, uplands, and bench form the main areas proposed for new vineyard development.

3.1 Geology

The site geology is presented on the Site Geologic Map, Figure 3. We describe the various geologic units and mapping criteria in this section.

Sonoma Volcanics crops out on the slopes of the Suscol Creek drainage. It forms the erosion-resistant cap on the bounding ridgelines. We include two units mapped on site: the ash-flow tuffs (Tst) and the basalt or andesitic lava flows (Tsa). The tuff deposits are characterized by locally welded or partially welded units with interbedded agglomeratic (volcanic conglomerates) tuffs and lava flows. The lava flows are characterized by interlayered and locally dipping indurated and hard lava flows of basic composition.

Suscol Creek has cut down through the volcanic deposits leaving along the ridge flanks a series of gently northwest tilting volcanic lava flows exposed along the north side of the Suscol Creek valley. Weathering of these surfaces has left the distinct steps in the topography on the north side and the broad upland area capping the ridgeline on the south side of the valley.

Vegetation changes and more gentle slopes at the lower elevations of the valley indicate exposed volcanic tuff layers that the creek has most recently cut. The tuff is also exposed capping the northeastern-most ridgetop on the site.

Sandstone bedrock of the Markley and Domingine Sandstone units are believed to underlie the volcanic units below the Sonoma Volcanic units capping the ridgeline. Areas mapped as landslide on the south-facing slopes probably include large displaced sandstone blocks. Where encountered in the landslide deposits, blocks of presumed Markley yellowish-brown sandstone appear weak to moderately strong and deeply weathered.

We have observed surficial deposits composed of residual soil, colluvium, alluvium, and landslide deposits. Colluvium is an unconsolidated deposit of soil, weathered bedrock, and organic debris, characteristic of hillsides and emplaced by slow surface creep and erosion. It often interfingers downslope with alluvium and can be incorporated in landslide deposits. For simplicity we have combined colluvium in the mapped landslide unit. Alluvium is mapped in the active channel of Suscol Creek.

The southern, approximately one third of the property is underlain by large blocks of Sonoma Volcanic bedrock that have detached from the southern ridgeline of the site and moved to the south and now form prominent benches on the south-facing slopes. Complex drainage channels, erosion gullies, hummocky topography and numerous seeps and springs are indicative of landslide deposits covering most of the southern flanks of the site.

Evidence of smaller landslides is preserved in the many erosional gullies, steep streambank scarps and bulging toes of hillslopes at lower elevations at the southern edge of the site. Overall slopes on the south-facing flank are moderate, approximately 4:1 (horizontal to vertical), indicating the weak nature of the underlying material, however near the ridge crest where the volcanics units are exposed, the slope is very steep locally, up to 1:1 (horizontal to vertical).

3.1.1 Slope Stability Characterization

We have catalogued the slope stability of the mapped landslides by characterizing each landslide's activity, type, depth (estimated), and certainty of interpretation. The categories are shown as a series of four numbers associated with each landslide. Smaller landslides without numbered categories are typically shallow debris slides, flows or slumps associated with creek banks or local erosion.

Landslide activity is evaluated based on aerial photograph review and field reconnaissance. Photographs dating back to 1958 were reviewed to collect a history of the slope stability conditions at the site. The most recently active landslides are characterized by scarps in their source areas, fresh ground cracks along the lateral limits of the deposit, and steep slopes at the toes of the deposits where they are overriding the original ground surface. Often seepage and tonal variations are obvious on the aerial photographs. Activity characterized as dormant may include some of the active characteristics (scarp, well defined limits to the deposits, bulging toe, and seepage), however they are more subdued and may show signs of erosion. Ancient landslide activity is characterized by severe erosion leading to only limited parts of the landslide being preserved. In the case of an ancient block landslide we would expect that the scarp would be completely eroded and the only evidence that is preserved is a displacement or offset in a topographic ridgeline.

We have characterized the south-facing slope of the site as a large dormant deep-seated bedrock block landslide. The blocks support the benched topography of the slope. The source area is characterized by the volcanic-capped steep slopes near the crest of the ridgeline. Along the boundaries of discrete blocks, and on the face of these blocks, below the prominent benches, we map a complex of various shallow to moderately deep (5 feet to 20 feet deep) debris and slump landslides. Since the scarp areas and most of the boundaries of these blocks are preserved but there is little evidence of recent ground cracking or shearing associated with their boundaries we have characterized the block landslide as dormant. The shallow slide complexes on the face of the block in general do not appear to be active over the period of our study. However, we have noted three areas of recent activity and designated these with an "1r". These are shown on our Site Geologic Map, Figure 3 and are located at the southeastern and southwestern corners of the site, and along the drainage north of vineyard Block 39A. Many of the unlabeled shallow debris flows and slumps within the drainage channels have been active recently as a result of heavy winter storms.

3.2 Subsurface Conditions

We explored the site with 11 test pit excavations in order to characterize the subsurface conditions for design of some of the critical locations proposed for drainage improvements in the Erosion Control Plan (PPI, 2009). The test pits were excavated with a Takeuchi TB 175 track-mounted excavator with a 30-inch wide bucket.

Test pits 1 through 5 were excavated in the series of landslides mapped in proposed vineyard block 36A and the proposed drainage improvements. The excavations were located to check the slope stability of the stormwater drain design. Test pit 1 encountered seepage and weak soils and sheared clay with gravels at a depth of 6 feet. The test pit was caving from a depth of 2 feet below the ground surface. Test pit 2 was excavated to the northeast of Test pit 1 to identify a more suitable alignment and we encountered dense gravel landslide deposits at a depth of 2.5 feet to the bottom of the excavation at approximately 5 feet below the ground surface. Test pit 3 was located to explore the potential storm drain alignment upslope of an active slump landslide scarp. We encountered a very thin soil deposit overlying massive ash-flow tuff bedrock. Test pits 4 and 5 were excavated in the upper reaches of landslide deposits near proposed storm drain alignments. In test pit 4 we encountered approximately 7 feet of medium stiff silty clay overlying a block of moderately strong sandstone. In test pit 5 we encountered approximately 2 feet of clay topsoil overlying 3.5 feet of medium stiff to stiff colluvium with seepage near its base. The excavation extended approximately 1 foot into a stiff clay with sand to 8.5 feet from the surface.

Test pits 6 through 10 were excavated in two proposed rock disposal areas of the site. The purpose of the excavations was to characterize the subsurface conditions that may be encountered during construction of a keyway for the rock disposal. Test pits 6 through 8 were excavated along the axis of the swale proposed for the rock disposal that extends from the southeast end of vineyard Block 37 to the west end of vineyard Block 42. Test pits 9 and 10 were excavated in the swale proposed for rock disposal in the more central part of vineyard Block 42.

We encountered loose and wet cobbles in a clay matrix to depths of 7 feet below ground surface in test pit 6. Seepage at the clay topsoil cobble boundary was observed at approximately 4 feet below the ground surface. We encountered similar cobble material at depth in Test pit 7 however the sidewalls started caving at 6 feet deep when we encountered a loose cobble layer. Test pit 8 was excavated near the toe of the proposed rock disposal site and we encountered approximately 3 feet of soft to medium stiff clay overlying stiff clay with gravel. A block of andesite lava with interbedded tuff was encountered from 6 feet below the surface to the almost 8 feet, the total depth explored.

Test pits 9 and 10 were excavated in the rock disposal area in vineyard Block 42. Test pit 9 was excavated to a total depth of 14 feet below the ground surface. We encountered soft to medium stiff old colluvium with many pores. We then excavated test pit 10 upslope within the same swale to explore for suitable soil in which to found a keyway for the rock disposal. We encountered old colluvium, similar to test pit 9, however, it increased in strength with depth below 6 feet.

We explored the area south of vineyard Block 41 with test pit 11 in order to understand the mapped debris flow failure and its potential impact on the proposed vineyards. We encountered no groundwater in the test pit 11 excavation and the excavator hit refusal in the dense conglomerate at approximately 4.5 feet below the ground surface. It appears the debris flow failure occurred as a result of very localized ground water conditions, perhaps caused by an old drainage channel buried by farming operations or some change in the surface runoff from periodic landslide movement upslope.

4.0 CONCLUSIONS

Based on our research and review of the site conditions, the proposed vineyard development appears feasible from the standpoint of our engineering geological evaluation as long as our recommendations are incorporated. We have identified three areas of the site that can be characterized by level of landslide hazards, from north to south and increasing in level of hazard: (1) Suscol Creek Valley (Blocks 1-32); (2) South ridgeline and bench of south-facing slopes (Blocks

33, 34, 36, 37,42-46); (3) Slopes south of bench on south-facing slopes (Blocks 35, 38-41). Over the two thirds of the northern part of the site within the Suscol Creek Valley, we observed little or no slope stability issues. In the proposed vineyard areas we observed favorable slope stability conditions with low inclinations, combined with underlying strong to very strong andesitic lava bedrock.

On the northern part of the site including proposed vineyard blocks 1 through 32 we observe no evidence of global slope instability such as deep-seated landslides. Several areas of slumps and/or shallow unstable areas subject to soil creep were mapped along the edges of the proposed vineyard blocks. Proper surface drainage improvements are proposed to control the runoff and divert it onto erosion-protected channels. The proposed vineyard development on these blocks has been located so as to have minimal impact on the existing slope stability. In our opinion, the proposed vineyard development on Blocks 1 through 32 does not significantly impact the existing site slope stability.

The northern ridgeline of the site is dominated by thick volcanic units. The north-facing slope is not affected by adverse bedding and geological structure orientations resulting in unstable slopes like the southern ridgeline discussed below.

The landslide hazards increase on the southern slopes of the site. The southern slope of the site is characterized as Zone 4, the most susceptible to landsliding by Manson (1988). We map many active and old dormant landslides along the southern flank of the site. The slope is dominated by older deep-seated bedrock block landslides that have detached from the ridge crest. The weak and easily weathered Markely Sandstone and Nortonville shale units underlying the volcanics are commonly associated with large landslide complexes in the North Bay area. The prominent bench in the topography forms the top of these detached, deep-seated, block landslides. These large blocks do not appear to be active under present day conditions, nevertheless poor drainage, weak rock and poor soil conditions along the periphery of these old blocks, have contributed to periodic slope failures which could be masking slow creep of the large block slides.

The younger active slides have been triggered by these adverse conditions. We have highlighted the few recent active landslides ("r" designation on Figure 3) and suggest that drainage improvements that can improve drainage by reducing the overland flow and infiltration across the site by directing runoff to another drainage or to elevations below instabilities. This will reduce the risk of reactivating landslide deposits and will significantly reduce the overall sediment release from this site. The active landslides are the result of crushed and weak bedrock, seepage and steep slopes. Continued cattle grazing in these areas without the benefit of the proposed drainage improvements would likely result in continued periodic landslides and release of sediment.

The southern ridgeline forms an abrupt boundary between the gently undulating volcanic uplands of most the northern part of the site and the hummocky and irregular topography of the southern slopes of the site. The thick deposit of talus accumulated below the ridgeline on the southern bench is a measure of the amount of time it has been subject to weathering and erosion since the large block slide failures. The crest of the ridgeline has performed well over the period we reviewed in the aerial photographs.

Local deposits of debris, alluvium and or colluvium can be destabilized by adverse groundwater conditions. One shallow earthflow failure near the southern property boundary where we excavated test 11, may be indicative of other subsurface conditions on the site where seepage and pockets of loose debris, and /or old drainage channels combined to cause local failures.

4.1 Recommendations

As stated above, the ECP (PPI, Inc. 2009) adequately addresses slope stability and erosion control issues on proposed Blocks 1-32. The ECP adequately addresses slope stability and erosion control issues, and in general improves the existing drainage and erosion of the site slopes on proposed Blocks 33 through 46 over existing conditions. However, because of the complex landslide deposits and history of slope instability additional precautions should be taken during vineyard construction on Blocks 33 through 46. After a review of the proposed vineyard blocks 33 through 46, in the light of our landslide mapping, we have developed recommendations for the proposed vineyard development. We understand that block 35 has been removed from the vineyard development plans.

Grading should be reduced to a minimum in order to maintain the current level of stability on the southern slopes of the site.
During excavation and grading of the proposed vineyard Blocks 33 through 46 care must be taken to minimize the disturbance to the slopes. Any significant removal or placement of earth could cause localized slope instabilities.

Since surface runoff is being controlled, ripping actually enhances infiltration, thus reduces runoff. Where seeps or other saturated subsurface conditions are encountered drains should be installed. Otherwise ripping from 3 to 6 feet is appropriate on the slopes proposed for development.

Although no areas within vineyard blocks were observed to have subsurface drainage problems, it is possible that localized areas will be encountered during construction that will need to be addressed. In the event such areas are encountered, we should be contacted to consult on proper drainage methods.

We have reviewed all storm water drainage outlets and other water diversion facilities. These have appropriate armored, erosion-resistant surfaces that do not direct surface or subsurface runoff into slopes susceptible to landslide failure.

Tree removal from the slopes proposed for vineyards does not pose an instability issue. Trees on the steeper slopes of the site should be left in place where possible.

Rock storage areas should be prepared by grubbing and excavating a keyway at the toe of the proposed storage area. The keyway should extend two feet into firm soil or bedrock at the downslope edge of the keyway. In the case of the rock storage area proposed for the mid-Block 42 area the limits of the storage area should be constrained so that the keyway (downslope limit of storage) is excavated in the area near test pit 10 where stiff older colluvium was encountered at depth.

In the event unstable landslide deposits are encountered and/or localized slope failures occur during construction, appropriate slope stabilization methods should be employed to restore the slope to a stable configuration. At that time, a geotechnical engineer should be engaged to prepare specifications for the slope stabilization design.

A hypothetical conceptual repair plan would include a spectrum of specifications based on the scale of the failure. For example, it would show engineered backfill material ranging from rip rap material with little or no subsurface drainage to installation of an earth buttress with a keyway and subdrainage. Given the size of the overall project there is sufficient space to leave landslide material in-place upslope of the buttress repair.

5.0 LIMITATIONS

Our services have been performed in accordance with generally accepted principles and practices of the geological profession. This warranty is in lieu of all other warranties, either expressed or implied. In addition, the preliminary conclusions and recommendations presented in this report are professional opinions based on the indicated project criteria and data described in this report. They are intended only for the purpose, site location and project indicated.

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U.S. Geological Survey, 1978, Mt. George, Cordelia, Cuttings Wharf Quadrangles California 7.5 Minute Series (Topographic), scale 1;24,000.

Aerial Photographs

Date	Photo Number	Scale	Source
07/29/97	AV-5461-7-13,14,15 & 16	1:12,000	Pacific Aerial Survey
07/29/97	AV-5461-8-15,16,17&18	1:12,000	Pacific Aerial Survey
03/2/58	SF Area 2-50,51	1:36,000	Pacific Aerial Survey

FIGURES

Reference: CORDELIA, CUTTINGS WHARF, NAPA QUADS, U.S.G.S., 1995.

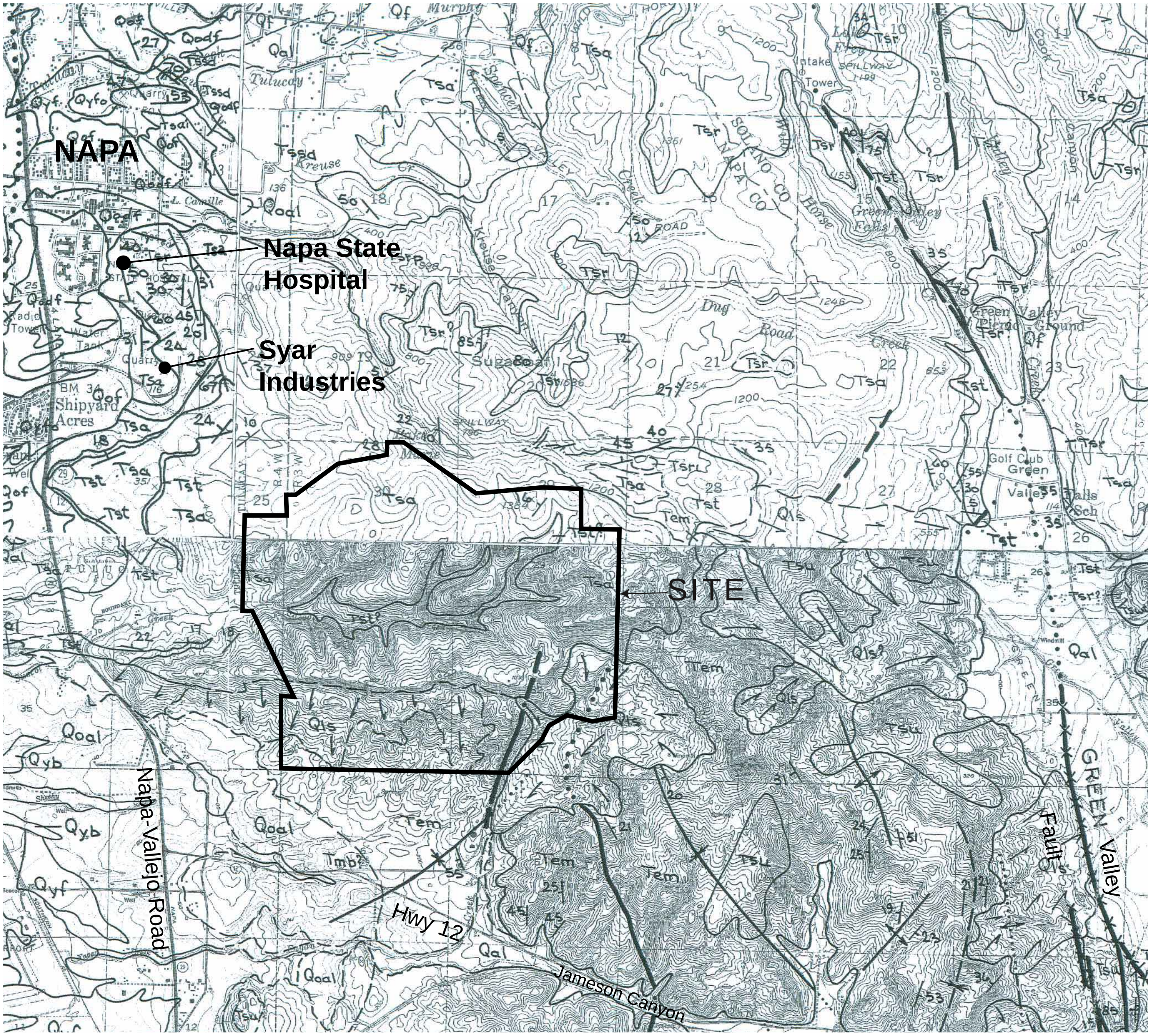
SITE LOCATION MAP

SUSCOL MOUNTAIN VINEYARDS
Napa, California

FIGURE 1

Gilpin Geosciences, Inc.
Earthquake & Engineering Geology Consultants

JOB NUMBER	DATE
91447.01	8/5/10



EXPLANATION

Geologic Units

- Qal - Alluvium
- Qoal - Older Alluvium
- Qls - Landslide deposits

Sonoma Volcanics

- Tsu - Sonoma Volcanics, undivided
- Tsa - andesitic lava
- Tst - pumucitic ash-flow tuff
- Tsri - rhyolite intrusive plugs, dikes

Briones Sandstone

- Tmb - Briones Sandstone

Kreyenhegen Formation

- Tem - Markley Sandstone member
- Ted - Domengine Sandstone

0 1 mile

Approximate Scale

N

Base Map: Fox, et al., 1973; Sims et al., 1973.

REGIONAL GEOLOGY MAP

Gilpin Geosciences, Inc.

Earthquake & Engineering Geology Consultants

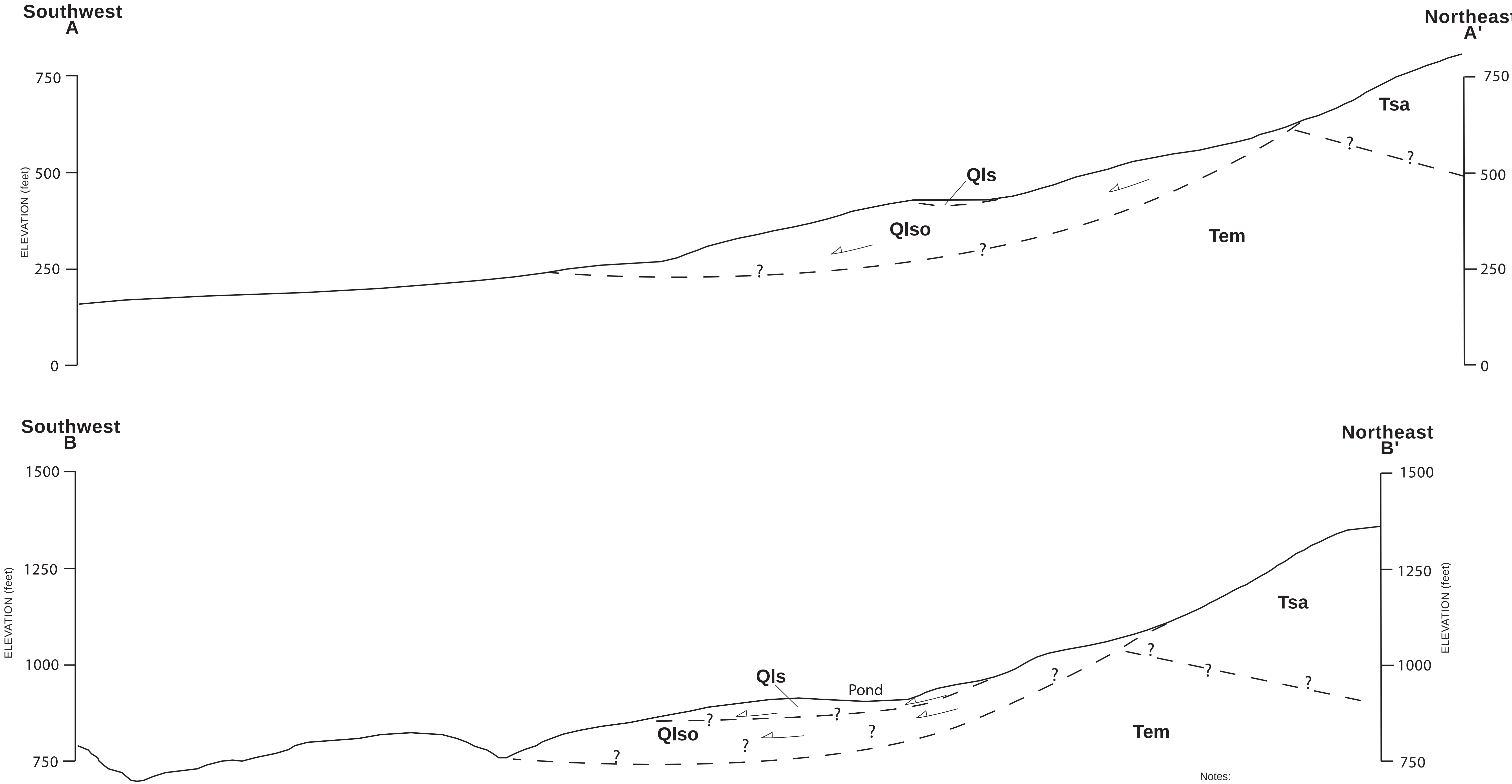
Suscol Mountan Vineyards

Napa, California

JOB NUMBER 91447.01

DATE 8/5/10

FIGURE 2



Notes:
1. No vertical exaggeration (Horizontal = Vertical).
2. See Site Geologic Map (Figure 3) for section location.

Geologic Units

Qls	Landslide Deposit
Qlso	Older Landslide deposit
Tsa	Andesite (Sonoma Volcanics)
Tem	Markley Sandstone (Kreyenhagen Formation)

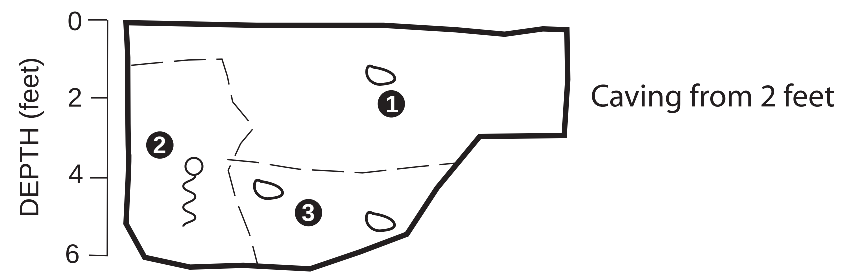
GEOLOGIC CROSS SECTIONS
A-A' and B-B'

SUSCOL MOUNTAIN VINEYARDS
Napa, California

Date 8/5/10	Project No. 91447.01	Figure **4**

Gilpin Geosciences, Inc.
Earthquake & Engineering Geology Consultants

TP-1
N70 W, north wall
Elevation 236.0 ft



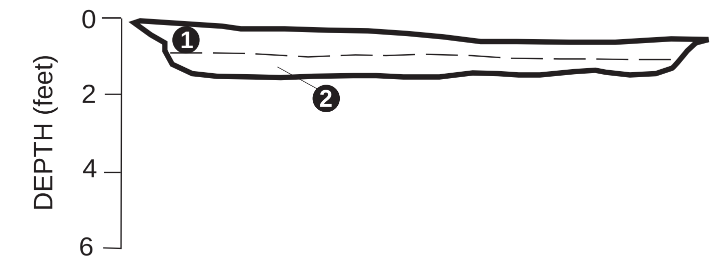
UNIT DESCRIPTIONS

❶ SILTY CLAY (CL), dark brown, medium stiff, moist with organics (Top soil).

❷ SANDY CLAYEY GRAVEL (GP), light brown, loose, saturated (Colluvium).

❸ CLAY WITH GRAVEL (CL), Light brown mottled grey, medium stiff, wet with sheared clay gouged gravels (Landslide Deposit)

TP-3
N75 E, north wall
Elevation: 313 ft

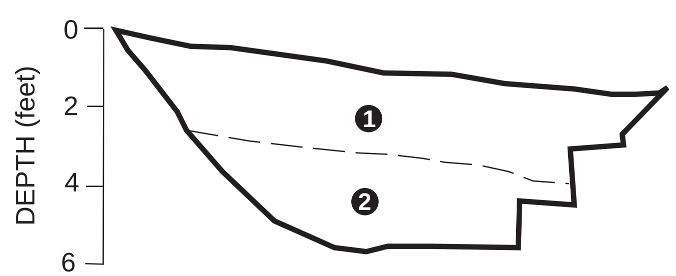


UNIT DESCRIPTIONS

❶ SILTY CLAY (CL), dark brown, soft, (Top soil).

❷ ASH FLOW TUFF, Light yellow- brown, weak to moderately strong, deep to little weathering, massive.

TP-2
N15 E, northwest wall
Elevation: 252 ft



UNIT DESCRIPTIONS

❶ SILTY CLAY (CL), dark brown, medium stiff, moist with organics (Top soil).

❷ SANDY CLAYEY GRAVEL (GP), Light grey mottled brown, dense, moist (Landslide Deposit)

Notes:
1. See figure 2 for test pit locations.
2. Ground surface profiles constructed using hand level and tape.
3. Horizontal = Vertical Scale.
4. Excavated by Takeuchi TB 175 track mounted excavator with 30 inch bucket

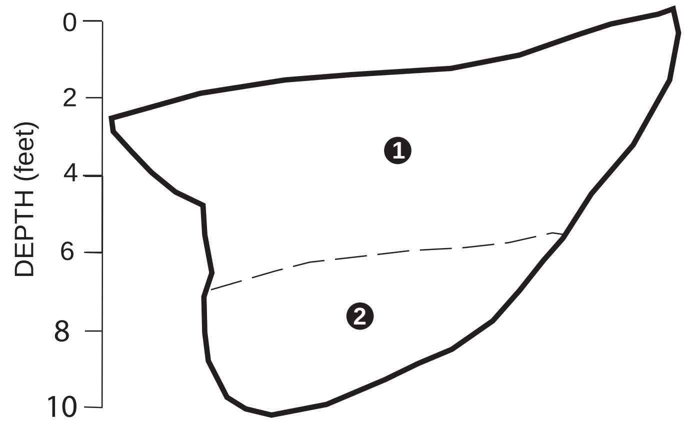
LOG OF TEST PITS 1, 2, & 3

SUSCOL MOUNTAIN VINEYARDS
Napa, California

Date 8/5/10	Project No. 91447.01	Figure 5

Gilpin Geosciences, Inc.
Earthquake & Engineering Geology Consultants

TP-4
N10 W, west wall
Elevation: 374 ft

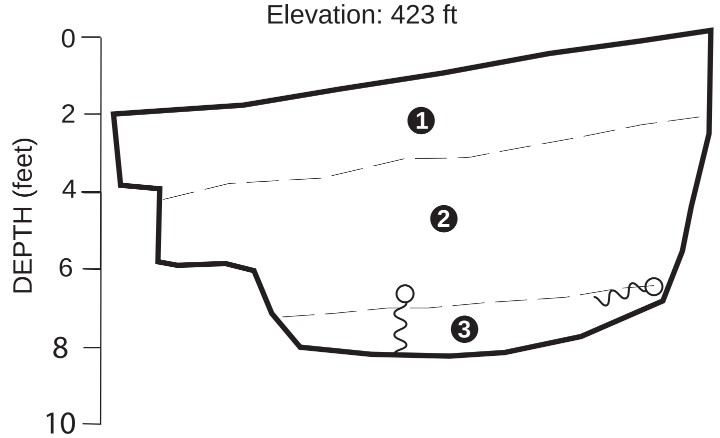


UNIT DESCRIPTIONS

1. SILTY CLAY (CL), brown, medium stiff, moist, caving (Colluvium).

2. SANDSTONE brown to light grey, closely fractured, moderately hard, moderate weathering, moderately strong (Landslide).

TP-5
N30 E, west wall
Elevation: 423 ft



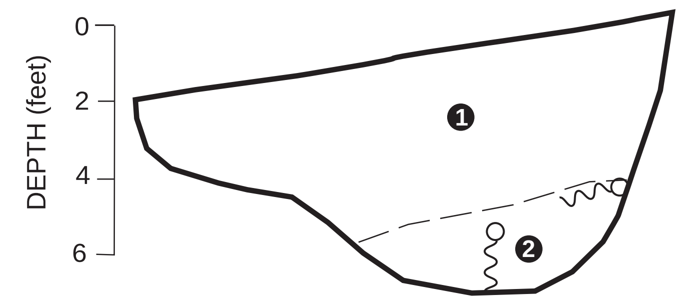
UNIT DESCRIPTIONS

1. SILTY CLAY (CL), dark brown, soft, moist (Top soil).

3. CLAY (CL), dark brown, medium stiff to stiff, moist to wet at lower contact, with few gravels and cobbles, (Colluvium).

CLAY WITH SAND, (CL) light grey, stiff, moist (Landslide)

TP-6
N65 E, north wall
Elevation: 645 ft



UNIT DESCRIPTIONS

1. SILTY CLAY (CL), dark brown, medium stiff, moist (Top soil & Colluvium).

2. COBBLES WITH CLAY (GP) brown, loose, wet with seeps (Landslide).

Notes:
1. See figure 2 for test pit locations.
2. Ground surface profiles constructed using hand level and tape.
3. Horizontal = Vertical Scale.
4. Excavated by Takeuchi TB 175 track mounted excavator with 30 inch bucket

LOG OF TEST PITS 4, 5 & 6

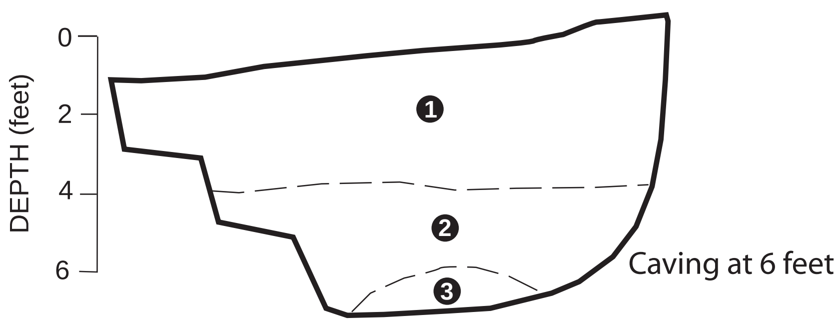
SUSCOL MOUNTAIN VINEYARDS
Napa, CAlifornia

Date 8/5/10	Project No. 91447.01	Figure 6

Gilpin Geosciences, Inc.
Earthquake & Engineering Geology Consultants

TP-7

N65 E, north wall
Elevation: 590 ft



UNIT DESCRIPTIONS

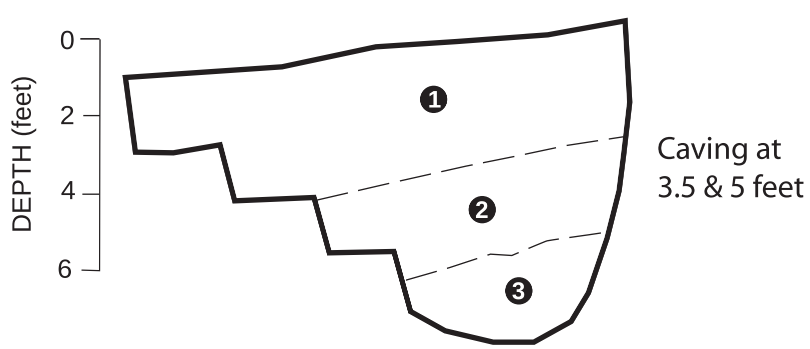
❶ SILTY CLAY (CL), dark brown, soft to medium stiff, moist with organics (Top soil).

❷ CLAY WITH GRAVEL AND COBBLES (CL), dark brown, stiff, moist to wet (Colluvium/Landslide deposit).

❸ COBBLES WITH CLAY (GP), loose, wet (Colluvium/Landslide).

TP-8

N65 E, north wall
Elevation: 542 ft



UNIT DESCRIPTIONS

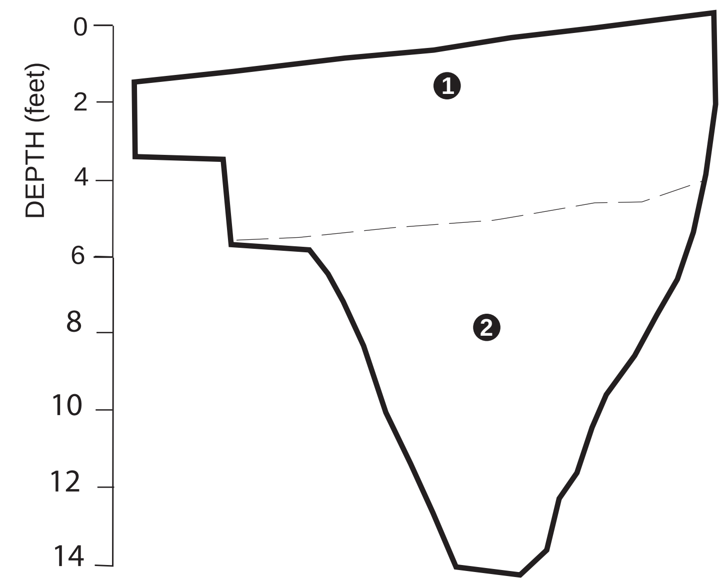
❶ SILTY CLAY (CL), dark brown, soft to medium stiff, moist with organics (Top soil).

❷ CLAY WITH GRAVEL(CL), dark brown, stiff, moist to wet (Colluvium/Landslide deposit).

❸ ANDESITE / TUFF light to medium grey, closely fractured, moderately strong, little weathered, hard with breccia to 6 feet(Landslide).

TP-9

N20 E, west wall
Elevation: 633 ft



UNIT DESCRIPTIONS

❶ SILTY CLAY (CL), dark brown, soft, moist with organics (Top soil).

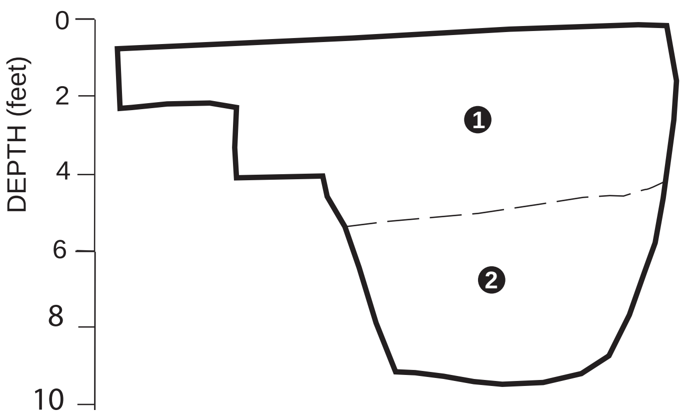
❷ CLAY WITH GRAVEL(CL), red brown, soft to medium stiff, moist to wet, many pores below 8 feet (Old Colluvium).

Notes:
1. See figure 2 for test pit locations.
2. Ground surface profiles constructed using hand level and tape.
3. Horizontal = Vertical Scale.
4. Excavated by Takeuchi TB 175 track mounted excavator with 30 inch bucket

LOG OF TEST PITS 7, 8, & 9		
SUSCOL MOUNTAIN VINEYARDS Napa, CAlifornia		
Date 8/5/10	Project No. 91447.01	Figure **7**
Gilpin Geosciences, Inc. Earthquake & Engineering Geology Consultants		

TP-10

N20 E, west wall
Elevation: 645 ft



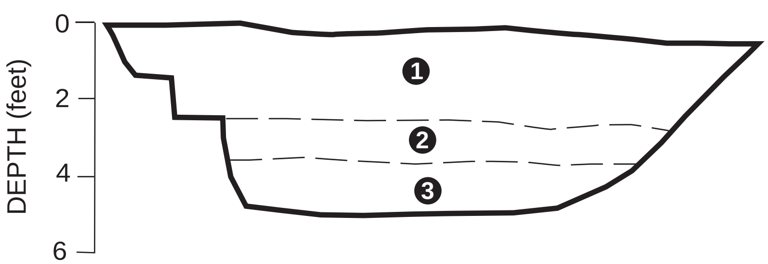
UNIT DESCRIPTIONS

1. SILTY CLAY (CL), dark brown, soft to medium stiff, moist with organics (Top soil).

2. CLAY WITH GRAVEL(CL), red brown, soft to medium dense to dense, moist, many pores, increasing strength with depth wet at 9 feet (Old Colluvium).

TP-11

N55W, south wall
Elevation: 312 ft



UNIT DESCRIPTIONS

1. CLAY (CH), black, medium stiff, moist with organics (Top soil).

2. CLAY (CL), dark grey, stiff, moist, (Residual Soil).

3. CONGLOMERATE, Brown motttled, dense, dry clayey sand matrix supported, various volcanic clasts and calcium carbonate (Sonoma Volcanics sedimentary rock)

Notes:
1. See figure 2 for test pit locations.
2. Ground surface profiles constructed using hand level and tape.
3. Horizontal = Vertical Scale.
4. Excavated by Takeuchi TB 175 track mounted excavator with 30 inch bucket

TEST PIT LOGS 10 & 11

Gilpin Geosciences, Inc.
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SUSCOL MOUNTAIN VINEYARDS
Napa, California

JOB NUMBER	DATE	FIGURE
91447.01	8/5/10	8

APPENDIX G

HYDROLOGIC STUDY

Hydrologic assessment of proposed vineyard conversion, Suscol Mountain Vineyard, Napa County, California

Report prepared for:

Suscol Mountain Vineyards

Prepared by:

Scott Brown

Kathleen Thompson

Barry Hecht

Balance Hydrologics, Inc.

August 2010

A report prepared for:

Suscol Mountain Vineyards
855 Bordeaux Way, Suite 100
Napa, California 94558
707-261-8719
Attention: Beth Painter (Balanced Planning, Inc.)

Hydrologic assessment of proposed vineyard conversion, Suscol Mountain Vineyard, Napa County, California

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August 25, 2010

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1. INTRODUCTION

1.1 Purpose

Balance has been asked to assess the potential impact of vineyard conversion on stream and spring flow for Suscol Mountain Ranch in southern Napa County (Figure 1). The project area contains the upper watershed of Suscol Creek, which provides high value habitat for steelhead, among other species (LSA Associates, 2009), as well as tributary watersheds of Fagan and Sheehy Creeks. Some downstream reaches of the streams draining the property are capacity-limited, and therefore increases in peak flows as a result of the project are a concern. Concentration of flow into certain tributary channels may also induce erosion, contributing sediment to downstream reaches. In addition, there are numerous seeps and springs on the property that support wetland species habitat as well as contribute to stream baseflow. This report summarizes our findings related to potential changes in surface runoff and near-surface groundwater resulting from partial conversion from grazing to vineyard uses and improved grazing management of grasslands not converted to vineyards.

1.2 Project Description

The Suscol Mountain Vineyard project would convert approximately 560 acres of a 2,123 property from ranching to vineyard land uses (Figure 2). Deer fencing would exclude cattle grazing from approximately 947 acres of the ranch (including the vineyard blocks)[1]. Within the remaining 1,176 acres grazing would be properly managed for resource objectives, but not entirely eliminated. While the grazing management objectives have not yet been fully defined for the grazing area not excluded by the proposed deer fencing, management will likely include cattle exclusion from some portions of that area, seasonal management of grazing in other areas, and/or a net reduction in grazing intensity[2].

PPI Engineering (2010) has prepared an erosion control plan for the project site that describes the structural and non-structural best management practices (BMPs) that will be incorporated to

---

[1] Non-vineyard areas within deer fences may be occasionally mowed or used for limited grazing for grassland management purposes, but under normal operation grazing will be excluded from these areas. This management would be limited in frequency, duration, and intensity, and therefore a net decrease in grazing intensity is expected.

[2] As with deer fenced areas, areas that are designated as 'cattle exclusion' areas may be opened for occasional grazing for grassland management and reduction in fuel loads.

slow stormwater runoff and minimize erosion within and downstream of the vineyard blocks. These measures include (among others) permanent, no-till cover crop in vineyard blocks, grassed waterways, down-slope dispersion (pipe spreaders) of run-on[3], repairs/stabilization of headcuts, and energy dissipaters at outfalls.

Vineyard irrigation would be provided by groundwater pumped on-site. Richard C. Slade & Associates (2010) has provided an assessment of groundwater supply at the site. There is one existing well on the property, located north of Suscol Creek near the western property line.

1.2.1 Fish Friendly Farming Certification

In addition to the erosion control measures described above and elsewhere in this report, Suscol Mountain Ranch is actively pursuing a 'Fish Friendly Farming Certification', a third party program that addresses how grape growers can manage their lands using sustainable and environmentally beneficial practices[4]. The recently-adopted Napa River sediment TMDL (RWQCB, 2009) cites the development of a farm plan under Fish Friendly Farming Certification as one possible method of meeting Napa River TMDL performance standards to control sediment erosion and transport from agricultural areas within the watershed.

1.3 Objectives

In order to describe potential hydrologic impacts as a result of vineyard conversion, this report addresses several tasks:

- **Assess source areas of major springs on the property**. Of particular concern is that areas of vineyard conversion might reduce infiltration that directly contributes to springs such that springs would no longer sustain flow through the dry season.

- **Assess sources of sustained baseflow within Suscol Creek**. As with the spring assessment, our goal is to qualitatively assess the potential impact to baseflow as a result of land use change within the watershed.

- **Describe potential changes in surface runoff**. Increases in peak runoff (and/or runoff volume) have the potential to cause or exacerbate flooding in downstream reaches of the

---

[3] Water that would normally run on to some vineyard blocks will be collected up-slope of the vineyard block and dispersed on the down-slope side.
[4] See http://www.fishfriendlyfarming.org/ for more details about this program.

streams draining the project area. Napa County requires that discretionary projects are designed such that post-project peak runoff is not greater than predevelopment conditions (CON-50 in Napa County, 2008). Our goal is to assess the likely magnitude of changes in runoff and, where increases are expected, recommend strategies for controlling stormwater runoff.

- **Describe connection of deeper groundwater to baseflow in Suscol Creek**, to assess the potential for well-water pumping to affect stream baseflow. The work under this objective was summarized in a separate memorandum, included here as Appendix A.

1.4 General Technical Approach

Our approach combines field and aerial photograph assessment with hydrologic modeling of the project site to describe potential changes in surface hydrology and near-surface hydrogeology as a result of proposed vineyard conversion. An initial site visit was conducted on October 1, 2008 to assess field conditions in preparation for hydrologic modeling, to collect water quality samples from selected springs and creek locations to describe source contributions, and to characterize channel characteristics, baseflow conditions, and past peak-flow magnitudes. Aerial photographs were inspected to identify seep and spring locations, to assist in assessing source areas, and to describe spring reliability during extended dry periods. A second round of sampling was conducted in May 2009 to bracket seasonal changes in water chemistry. Results of the seep, spring, and baseflow assessment are presented in Chapter 3.

Hydrologic modeling of sub-watersheds within the project area was conducted to assess potential changes in peak flows and runoff volume. Events assessed ranged between the 2-year and 100-year events. The model incorporated expected changes in runoff conditions due to the proposed land-use changes, including changes in soil infiltration and vegetation type/density, and the addition of piped drainage systems within several of the vineyard blocks. Modeling results are discussed in Chapter 4.

2. SETTING

2.1 Location and Regional Setting

The project site is located in southeastern Napa County, approximately 4 miles southeast of the City of Napa (Figure 1). The site encompasses the entire upper portion of the Suscol Creek watershed (approximately one-third of the entire watershed), as well as the upper portions of tributaries draining to Sheehy and Fagan Creeks, south of Suscol Ridge. Small portions of the property drain to northern, un-named watersheds that ultimately drain to the Napa River, and to the east into watersheds within Solano County that ultimately drain to Green Valley Creek and Suisun Bay. Elevations within the project site range from 150 to 1510 feet above sea level.

2.2 Land Use

The site is currently used for rangeland cattle grazing. Historic ranching uses have resulted in highly compacted soils in the areas that have been heavily grazed (flatter areas near water sources, for example), and recent grazing has resulted in sparse vegetation cover late in the summer in some portions of the project area (Figure 3). There are approximately 25 miles of existing ranch roads within the site, all of which are composed of compacted dirt, gravel, and exposed bedrock, though less-used portions of the road network have sparse to heavy vegetation cover at times during the year. Several existing road fords cross Suscol Creek near the western property line.

2.3 Climate

The lower Napa Valley is located in the Mediterranean-type climate zone of coastal central California. This climate zone is characterized by cool, wet winters and warm, dry summers. Average precipitation in the area is between about 20 and 27 inches (Lambert and Kashiwagi, 1978), with increasing precipitation to the north and, more prominently, at higher elevations to the east and northeast. Long-term precipitation data are available from a gauge at the Napa Fire Department (NSH; approximately 3 miles northwest of the project site), with a period of record from 1905 to the present (Figure 4). Average rainfall (by water year[5]) recorded at this gauge is 24.5 inches. As is typical in the region, annual precipitation varies significantly from

[5] Most hydrologic and geomorphic monitoring occurs for a period defined as a water year, which begins on October 1 and ends on September 30 of the named year. For example, water year 2010 (WY 2010) begins on Oct. 1, 2009, and concludes on September 30, 2010.

year to year, from as low as 10.26 inches (1924) to as much as 42.02 inches (1998). Rainfall at the project site is likely somewhat higher due to the higher elevations than the NSH station. On-site weather data (including rainfall) has been collected at several stations since 2007, but the length of the data record is not sufficient to adequately compare to the Napa long-term record at this time.

2.4 Geology

Napa County lies within the Coast Range of California, formed at and near the boundary of two major tectonic plates—the North American and Pacific plates. The lower Napa Valley can generally be considered a down-warped basin, the depth of which has been accentuated by additional down-faulting. The oldest rocks in the area, exposed along the flanks of the valley, are the sedimentary units of the Great Valley sequence[6]. The Great Valley sequence is, in turn, overlain by shales, sandstones, and siltstones of early to mid-Tertiary age. These sedimentary units were deformed and in some places moderately metamorphosed as a result of the uplift of the region.

Thick deposits of late-Tertiary age volcanic material, primarily tuff and rhyolite, cover the sedimentary units throughout much of the valley, as far south as Suscol Ridge. The Napa Valley floor is composed of Quaternary-aged (recent) sediments, deposited on the Napa River floodplain and in alluvial fans built up at tributary mouths along the base of the valley flanks, sometimes overlying the volcanic rocks.

The predominant water-bearing geologic unit in the Suscol area is the Tertiary-aged Sonoma Volcanics, approximately three to six million years in age (Farrar and Metzker, 2003). This unit is composed of numerous layers of andesite, tuff, rhyolite, pumice, and volcanic breccia—lava and ash-flow deposits that were the product of several different volcanic vents in the area (Farrar and Metzker, 2003). Due to the multiple sources of the flows, as well as later faulting and folding of the units, the distribution of individual layers is complicated and often difficult to correlate over long distances.

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[6] These units were originally part of the intact, overriding (North American) plate that were uplifted after the plate margin changed from a subduction zone to a transform fault, approximately 25 million years ago (Alt and Hyndman, 2000).

Near the project site, the Sonoma Volcanics layers are predominately basalt and basaltic andesite flows, interbedded with ash-flows (tuff) and volcanic breccia (Clahan and others, 2004; Bezore and others, 2004). These layers are stratigraphically near the bottom of the Sonoma Volcanics unit, being among the oldest of the flow deposits. The Suscol Creek watershed is composed entirely of these flow layers (Figure 5).

The southern portion of the project site (south of Suscol Ridge) overlies an area of predominately early-Tertiary sedimentary and metamorphic rocks (Bezore and others, 1998; Figure 5). The Markley formation, a mix of well-cemented sandstone, siltstone, and shale layers, is the primary unit exposed in this area, though exposures of the Nortonville shale and Domengine sandstone may be present near the ridge top. The San Pablo Group (marine sandstone and conglomerate) underlies portions of the southwestern corner of the project site.

Extensive landslide deposits are present within the southern portion of the project site, extending southward from the southern side of Suscol Ridge. Most of the seeps and springs in this area emanate from these deposits, though it is unclear whether they are an artifact of the landslide material or the underlying rocks. Landslides are, in general, not a feature of the landscape north of Suscol Ridge, which is underlain by volcanic rocks.

2.4.1 Groundwater

The tuffs and brecciated (fractured) andesite units of the Sonoma Volcanics are one of the primary water bearing units in the region (Hecht, 1979). These units are predominately confined above and below by less permeable volcanic units, and some wells in the area are or have been artesian (Kunkel and Upton, 1960).

Water within the Sonoma Volcanics is sometimes held in distinct, confined and stacked aquifers. Due to the complicated distribution of the flows and similar lithologic characteristics of the aquifers it is difficult to evaluate the lateral extent of aquifers over great distances. In addition, faulting, jointing and weathering may increase the hydrologic connectivity between distinct units, allowing some migration of water between the individual aquifer units.

2.5 Soils

Soils within the project site are primarily of two types—Fagan clay loam and Hambright loam[7]. The Fagan soils dominate the southern and southeastern portions of the property, while the Hambright complex soils are present primarily within the Suscol Creek watershed. Several areas of contiguously-mapped rock outcrop (very little soil development) are also present, especially on the steep slopes north of Suscol Creek.

Hambright soils are typically a well-drained, shallow soils derived from weathering of basalt or similar bedrock (Lambert and Kashiwagi, 1978). Fagan soils are typically derived from weathering of sandstone and shale bedrock and have a deeper profile than Hambright soils, as well as a somewhat clayier composition. Within the project site, both soil types have been affected by past ranching practices, resulting in a compacted layer near the soil surface that impedes water infiltration. Below this layer, the soil infiltration rates are largely dependent on the underlying rock type, especially for the Hambright soils due to their shallow profile. The underlying basalt/tuff layers within the Suscol watershed have differing permeabilities and water holding capacities (Figure 6), and these variations are likely reflected in varying soil infiltration rates (though to a muted degree under existing conditions due to compaction of the surface layer).

2.6 Hydrology and Geomorphology

Stream channels within the project site range from grassy swales to well-defined channels in heavily wooded riparian corridor. Stream channels within the southern portion of the property, especially the tributary to Fagan Creek, show evidence of past and on-going incision (downcutting), seemingly in response to changes in runoff characteristics as a result of past ranching practices (see soils discussion; section 2.5). This response has left deep and narrow channel forms which are prone to bank slumping and channel widening, especially where banks have been trampled by cattle activity. Similar channel response to watershed compaction has been documented in numerous other stream channels in Napa County and throughout the Bay Area.

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7 At the project site the Hambright soils are present along with small, un-mapped bedrock outcrop areas, and are officially designated as Hambright-rock outcrop complex.

Due to the presence of near-surface, competent bedrock within the Suscol watershed, however, the stream channels there have generally not experienced major incision in response to hydrologic changes due to ranching. Localized and reach-scale incision is present (Figure 7), but the typical 'unraveling' and migration of incision has not been widely noted, as incision has generally been arrested by competent bedrock layers.

Because of the steepness of the terrain and lack of at-risk infrastructure, flooding within the project site is not a management concern. In downstream alluvial reaches, however, flooding is a significant concern where channel capacity is constrained due to road crossings, culverts, shallow slopes and the presence of residential and industrial developments.

Many channels within the project site are seasonal and carry flow only during or immediately following rainstorms. Two primary subwatersheds north of Suscol Creek (designated 'Suscol Trib 5' and 'Suscol Trib 4' on Figure 2) do not sustain baseflow even in spring (at least in average to below-average rainfall years). The mainstem of Suscol Creek as well as the tributary of Fagan Creek in the southeast corner of the site, though, do sustain baseflow perennially—even in dry years[8]. Year-round wetted conditions are present in some sections of the smaller tributary channels resulting from seep and spring contribution.

2.7 Habitat

The Suscol Creek watershed has a very low-level of urbanization and moderate to dense riparian corridor vegetation, and therefore provides good habitat for steelhead. Portions of the stream dry seasonally, while other segments, such as the mainstem within the project site, are perennially flowing. The primary baseflow reaches of the Suscol Creek watershed within the project site are the mainstem from the property line to the spring complex above the confluence with Suscol tributary 1, as well as most of the length of the south branch of Suscol tributary 3.3 (see Figure 2). The Suscol Creek Collaborative Partnership Restoration Project (Dewberry, 2005) describes the existing habitat conditions for steelhead within the Suscol watershed. Though the study has not identified impacts to streamflow due to ground-water pumping within the watershed, they do recognize that maintaining steelhead habitat in the long-term will require adequate monitoring and assessment of potential impacts to the stream due to ground-water extraction within the watershed.

[8] See section 3.2.2 for additional discussion.

Suscol Creek is one of only five creeks in the eastern Napa River watershed rated as having a 'high' ranking for steelhead habitat (Rich, 2007). Existing habitat is constrained, however, by high water temperatures in certain reaches, low- to intermittent streamflow in the lower reaches, and the presence of migration barriers (Rich, 2007; Koehler and Edwards, 2009). LSA Associates (2009) observed numerous individuals residing in deep pools in the mainstem of Suscol Creek within the project boundary. The southern watersheds (Sheehy and Fagan Creeks) do not support steelhead, though other aquatic species are present, such as the California newt (LSA Associates, 2010).

LSA Associates (2010) assessed the existing habitat at the project site. They identified a number of seeps and springs on the property that support high-value wetland habitat, though some wetland areas have been impacted by grazing.

3. SEEP, SPRING, AND BASEFLOW ASSESSMENT

3.1 Methods

An initial site visit was conducted on October 1, 2008 to assess field conditions in preparation for hydrologic modeling, to collect water quality samples from selected springs and creek locations to describe source contributions, and to characterize channel characteristics, baseflow conditions, and past peak flow magnitudes. An additional visit was conducted on May 10, 2009, during which repeat spring/seep/creek samples were collected for comparison to earlier samples, modeling assumptions were verified and refined, baseflow in Suscol Creek was measured and stream gaging sites were sited for monitoring of streamflow during well testing[9].

Specific conductance (as a proxy for total dissolved solids) was measured in several different springs and along the profile of Suscol Creek to extend the characterization to other areas. Not all seeps and springs were measured due to lack of surface flow at the time of the initial canvass.

Late-season color infrared aerial photographs[10] from three different years (July 1982, July 1987, and October 1991) were compared to assess the changes in wetland areas under different climatic conditions. WY1982 was a very wet year in the region (approximately 130 percent of mean annual rainfall), with heavy rains continuing through mid-April. WY1987, on the other hand, was one of the driest. (It did, however, follow the winter of 1986, the latter half of which was one of the wettest periods of record in Napa County.) WY1991 was a dry year near the end of an extended drought period that lasted from 1987 to 1993[11]. Variation in wetland extent and vigor gleaned from the aerial photographs was used to characterize the longevity and sustainability of each of the wetlands, as well as the likely contributing recharge area.

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[9] Additional site visits were conducted during summer, 2009 for stream monitoring during the baseflow and pump test assessment period. The results of this monitoring are summarized in Appendix A.
[10] Color infrared (CIR) aerial photographs highlight areas of vigorous plant growth. Plants with high water content show up as red areas on the photographs, dormant (dry) vegetation shows up as green or tan.
[11] Admittedly, there was a significant rainfall event on October 1, 1991. Thus, conditions on October 21, 1991 may have been wetter than conditions in a more typical October. The 1987 photograph may better represent very dry conditions, despite being much earlier in the multi-drought period. Late-summer, high-resolution CIR photographs were not available for other periods within this drought.

3.2 Results

3.2.1 General site observations

The upper Suscol Creek watershed has a high-relief, very steep terrain. Surprisingly, however, we saw little evidence of extensive rilling or gullying of the landscape, even where roadways traversed or climbed steep slopes. This is not to say that sediment contribution from the watershed is low under existing conditions, but that sediment contribution is likely the result of small, dispersed soil erosion and erosion of degraded (trampled) stream banks rather than large-scale 'unraveling' of first-order swales or roadway drainages[12]. The lack of gullying is likely a reflection of the quite competent bedrock that underlies the generally thin soils within the northern part of the ranch and, in the case of some of the larger drainages, the riparian vegetation supported by surface or near-surface water that serves to reduce flow velocities and to strengthen channel beds and banks.

Within the southern portion of the property, however, evidence of past erosion is much more prominent. Channels in this area are generally moderately to deeply incised, though some channel reaches have widened and now support established vegetation that has likely served to reduce sediment input rates somewhat. Slump and debris flow scarps are commonly present at the heads of the tributary channels as well as other areas of the steeply-sloped terrain.

Vegetation cover in the open areas of the project site varied considerably due to the time of year (available soil water) and grazing patterns. Some areas that were almost bare in October had moderate-density, high grassy cover in May. Similar conditions were noted at some sections of ranch road, where portions of easily discernable roadway segments in October were almost completely obscured by tall, grassy vegetation in May. Areas left bare by summer grazing would likely contribute higher runoff and sediment volumes during heavy, early-season storms (before vegetation re-establishment occurs), especially if the areas are adjacent to watercourses.

[12] We did not canvass the entire property, nor did we intend to concentrate our efforts in identifying existing sediment sources within the watersheds. There may, in fact, be some large sediment sources (gullies or incising stream reaches, for example) of which we are not aware. Our observations simply reflect the relative lack of such features within the landscape compared to other sites within the region.

3.2.2 Aerial photographs

Table 1 summarizes the results of the aerial photograph analysis of the seeps and springs on the project site. Locations of the springs are shown on Figure 8. The table provides a qualitative comparison of the surface expression of the seeps and springs in the mid-summer following wet and dry periods, as discussed above. It is important to note that the springs were identified by aerial photograph inspection and may not match the spring survey or the map prepared by LSA Associates (2010), as they were compiled using different methods.

Of the 51 springs identified in the aerial photographs, 28 had the same or similar surface expression in all three years of aerial photographs, despite very different antecedent conditions. The springs within the Suscol Creek watershed appear to be very reliable, with 15 of the 21 springs having similar conditions in dry years as in wet years. In the southern watersheds, the most reliable springs are those located in the northern and eastern portions of that area near the southern side of Suscol Ridge, apparently associated with the Sonoma Volcanics layers, as are those in the Suscol Creek watershed. Some of the springs in the southwestern portion of the property appear to have smaller contributing areas, and are likely more fed by groundwater in localized landslide, slump, and colluvial deposits.

3.2.3 Water chemistry

Balance collected samples for water chemistry analysis at three springs and four Suscol Creek locations in October, 2008. We collected the water before any rain fell so that we could document dry season conditions, when springs and the creek are most likely to be influenced by deeper, sustained, groundwater inflows. We took additional samples at each location (except for one of the mid-reach creek locations) in May, 2009 to document early-spring recession flow water chemistry. Spring baseflow conditions are more likely to be influenced by near-surface (recent) ground- or soil-water contributions, and therefore by comparing the two results we can assess the seasonality of sources to the springs (i.e. if springs are affected by different sources at different times of the year).

The sample collection locations are shown on Figure 9. Two of the three springs are located within the Suscol watershed, and one spring is located just south of Suscol Ridge. Creek samples were collected: 1) between two major spring complexes in the upper Suscol watershed; 2) just downstream of the confluence of 'Suscol Trib 3'; 3) at the downstream property line; and 4) at the entrance road bridge across Suscol Creek, approximately 0.6 miles west of the property line.

Results of the water chemistry analysis are summarized in Table 2. (Full lab reports are included in Appendix B). Results are also presented graphically in Figure 10, showing the relative concentrations of several significant constituents analyzed in the collected water samples ('Piper diagram'). Additional water quality samples from nearby wells are also shown for reference. The samples on and near the project site have somewhat similar water chemistry signatures, shown by the relatively close cluster on the graph. This indicates a similar geologic aquifer source, though does not necessarily indicate a connectedness between the source aquifers for each hydrologic feature. The Sonoma Volcanics well samples from near the Napa River plot further to the left of the diagram, indicating the potential contribution of another source aquifer, or continued evolution of water chemistry with increased travel time within the aquifer.

Seasonal variation of the seeps and creek appears to be very low, at least for WY2009, as the October and May samples showed very little change in water chemistry. Some slight variation is present, though in almost all cases the magnitude of the variation is small enough to be negligible. Some consistent trends can be parsed from the data, however. Many of the October samples showed moderate levels of nitrate, whereas very few May samples detected nitrate. Spring A and Spring B samples showed somewhat more variation than other samples, with both recording higher bicarbonate and lower iron in May compared to October. These sites are located on opposite sides of Suscol Ridge, and may have a common sub-source that is not contributing significantly to Suscol Creek. The differences highlighted above are very small, though, as depicted by the tight cluster of spring and creek water samples in Figure 10.

Figure 10 also depicts water chemistry analyses from several wells in the area—one on-site well, four neighboring wells[13] and other three wells in the area. Well NAPA-B3 is located several miles south of the project site, draws water from a fractured shale/siltstone aquifer, and provides a reference of water chemistry from a very different aquifer type. The other two are located west of the project site near the Napa River and, along with the neighboring and on-site wells draw water from the Sonoma Volcanics.

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13 Data for the neighboring wells were obtained through the California DWR, and specific locations are not provided for privacy reasons. Data are included here for general comparison only.

Figure 11 depicts specific conductance values of Suscol Creek and sampled springs within the watershed plotted relative to location along the creek profile. The plot shows that specific conductance (and therefore dissolved mineral content), rises slightly toward the downstream portion of the stream, as is typical of baseflow in streams. Most notable on the graph, however, is lack of a significant difference between fall and spring measurements at a given point in the stream. Typically, specific conductance is much higher in fall than in spring, as contribution to baseflow from deeper groundwater sources (with higher dissolved mineral content) becomes greater than the contribution from shallow groundwater that recharged the previous season. The fact that SC changed little during the WY2009 wet season indicates that the creek is likely supported by a relatively constant, metered source of groundwater throughout the year.

3.2.4 Flow measurements and estimates

3.2.4.1 Baseflow

Spring and creek flow were estimated at various locations during the October 2008 field visit. During the May 2009 field visit, streamflow was measured at two locations (at the property line and approximately 1000 feet upstream of the property line), and estimated at the springs and at the uppermost creek sampling location. Flow measurements and estimates are summarized in Table 2.

Baseflow was higher in May than in October at all locations, though less so than might be encountered in most Napa County streams. Baseflow in Suscol Creek ranged between 2 and 30 gallons per minute (gpm) in October 2008, and between 10 and 80 gpm in May, 2009. During both field visits, flow increased markedly in the reach adjacent to the spring complex south of Vineyard Block 22 and continued to increase through the central portion of the property. In October 2008, flow at the property line appeared to be somewhat lower than that in the central part of the canyon (20 and 30 gpm, respectively), and the creek had no flow 0.6 miles downstream of the property line. In May, 2009, however, flow at the property line (80 gpm) was higher than at any point upstream, and the creek was flowing at about 60 gpm 0.6 miles downstream of the property line.

3.2.4.2 Peak flows

During the October 2008 field canvass, Balance staff made rough estimates of previous peak flow events at several locations along Suscol Creek. Estimates were based on high-water marks of past flow events along with rough measurements of peak flow channel dimensions. Peak flow velocities were estimated in the field based on roughness characteristics of the channel.

Two prominent high-water marks were noted in the field. It was estimated that the lower high-water mark was a result of WY2008 peak flow, whereas the upper high-water mark was likely evidence of the WY2006 event. Regionally, these two storm events are estimated to be approximately a two-year and twenty- to twenty-five year event, respectively[14].

Near the spring complex in the upper portion of the canyon (springs 11-14), WY2006 peak flow was estimated to be approximately 80 to 100 cubic feet per second (cfs), while the WY2008 peak was likely only about 5 cfs. Near the property line, WY2006 peak flow was estimated at about 180 to 200 cfs, while the WY2008 peak was estimated to be about 40 cfs.

3.3 Discussion

3.3.1 Seeps and springs

Spring flow and water chemistry did not appreciably change before and after the WY2009 wet season, a year with lower-than-average rainfall. Aerial photograph analysis along with field interpretation indicates that flow at many of the springs is sustained even through the latter part of dry years and dry periods (1987 and 1991). These observations suggest that many of the springs are supported by a relatively large-volume source with residence time substantially longer than seasonal-scale. Presence of a large and seemingly-resilient steelhead run for a stream of this size adds a note of biological confirmation, an independent line of evidence for the persistent flows in the creek over drought cycles.

Figure 12 shows a conceptual diagram of the hydrogeologic support and setting of the resilient seeps within Suscol Mountain Ranch. Some of the rain falling on the ground surface infiltrates into the underlying volcanic rock, perhaps more-so in areas underlain by porous layers. The infiltrating water moves downward and collects on less-permeable layers within the stack of interfingering basaltic/tuff flows. Cracks, joints, and/or weathered and fractured regions within the less permeable layers do allow some water to infiltrate to the underlying, more-permeable layers, where water then continues to infiltrate downward to the next less permeable

[14] Preliminary analysis of the WY2006 storm (Dec. 31, 2005) suggests that peak flows on the Napa River were within the range of a 10- to 50-year event (Parrett and Hunrichs, 2006). The more southern gaging station, though, was estimated to be within a 10- to 25-year event. The degree to which this correlates to a north-south rainfall gradient (as opposed to other watershed characteristics) is unclear at this time. We therefore estimate that the 2006 event was within the upper end of the estimated recurrence range for the southern-most Napa gage.

layer. Seeps and springs occur where the perched water intersects the surface (Figures 13 and 14). In some cases the springs may head at large fractures or erosional surfaces in the less-permeable units (underlying the permeable units) that serve to 'funnel' a portion of the perched water toward the spring, resulting in a concentrated discharge area (Figure 15).

The layering within the volcanic stack of flows provides a mechanism for metering the seasonal rainfall effects, allowing for a relatively steady flow of water at the springs. The highly-porous nature of the more-permeable layers provides ample storage to sustain the springs during the dry season and through multi-year drought periods.

It is important to note that we did not sample from all of the springs on the property due to time and access constraints, lack of sufficient surface flow, and the reconnaissance-scale level of analysis intended for this study. It is conceivable that some springs may operate differently from the ones described above, though aerial photographs and our field observations indicate that most, if not all, major springs within the Suscol Creek watershed have similar persistence. In the sedimentary rocks south of the ridge, in the southwestern portion of the property, some springs appear to be related to landslide deposits and/or have a more localized contributing area than those springs associated with the Sonoma Volcanics. (Compare, for example, the estimated contributing area for springs 1 and 44 in Figure 8.)

Based on the evidence above, aerial photograph analysis, and on site topography, we estimated the likely contributing area to each of the major springs or spring complexes identified within the ranch (Figure 8). While recharge and contribution to the spring likely varies in different portions of the recharge area, and the exact infiltration pathways from the surface to the spring may be complex, the data indicate that springs emanating from the Sonoma Volcanics generally draw from a somewhat broad area. Land-use change that affects infiltration rates could affect the springs, but the impacts are likely to be relative to broad-scale changes rather than related to localized changes in infiltration and would be muted due to the metering effect of the volcanic layers.

In general, we expect to see discernibly improved infiltration rates in some portions of the non-vineyard areas as grasslands recover from continuous grazing (see section 3.3.2 below), especially within the deer-fenced areas. In addition, many of the vineyard areas are likely to have similar or slightly greater infiltration due to soil 'ripping' of low-infiltration soils during establishment of the vineyard blocks (see Section 4.2.2.2 below). While watering of the vines is planned to be carefully managed to reduce water demand, some of the irrigation water may recharge to the underlying perched aquifers, which will help sustain seep and spring flow (see Section 3.3.3 below for discussion of water quality concerns).

Of the seeps and springs identified on the property, only three include a very high (greater than about 80) percentage of proposed vineyard within the recharge area, while one more has a high (60-80) percentage of proposed vineyard area. Of these, two do not appear, in the aerial photographs, to exhibit significant surface expression of spring flow in non-wet years, and are therefore presently considered somewhat transient in nature, and are likely not reliable or persistent wetland habitat areas. Still, these transient wetlands are most likely to be impacted by vineyard development, as the low persistence indicates a relatively small recharge area. Therefore the springs most likely to be discernibly impacted by vineyard development are springs 17 and 51. Springs 2 and 26 may also be impacted, based on the potentially large proportion of the recharge area affected by vineyard development. Additional mitigation measures have been proposed to provide protection for these springs (see section 5.2).

It is important to note that spring designation, as identified in aerial photograph, does not necessarily indicate the presence of a wetland. For example, seeps 17 and 51 do not appear on the vegetation/habitats map (Figure 3; LSA Associates, 2010), possibly because there was no surface expression of the seep during the biologic field investigations. Further field investigation in preparation of formal wetland surveys may indicate that these areas are not wetland or otherwise critical habitat, and therefore potential impacts to the springs may not be significant.

3.3.2 Suscol Creek baseflow

As with the seeps and springs, baseflow in Suscol Creek appears to be maintained by a large-volume, reliable groundwater source. Water chemistry data indicate that the source of the baseflow in Suscol Creek is closely tied to seep and spring flow. In 2009 (thought to be at least somewhat characteristic of non-wet years), baseflow in the spring months was only marginally higher (twice as high, rather than an order of magnitude higher) than late-season baseflow. The relatively slow rate of baseflow decline suggests a constant, metered source of baseflow that is somewhat disconnected from the strong seasonal variations in precipitation. In this way, baseflow in Suscol Creek appears to operate within the same conceptual model diagrammed in Figure 12. The creek is likely fed both directly by the springs, and by perched groundwater contributing directly to the creek or to minor spring complexes or seepage zones adjacent to the creek not identified in our aerial photograph survey.

The main area contributing to baseflow in Suscol Creek is the reach between (and including) springs 11-13 and Suscol tributary 3 (the tributary that wraps around the north side of the bedrock 'knob'). While additional flow is contributed to the Creek downstream of this location, it is relatively minor compared to increases observed in the middle section of the Canyon. In fact, October 2008 field observations indicated that flow decreased within the lower half-mile or so of Suscol Creek within the project area, changing from a gaining reach to a losing reach sometime in the middle of the summer. Water levels in a well approximately 800 feet north of the creek in the spring of 2009 were actually lower than the elevation of the creek, despite minor increases in flow measured over that reach, suggesting a complicated, tiered groundwater flow pattern.

The most prominent change to baseflow conditions in Suscol Creek as a result of the project will result from the management of cattle grazing in the non-vineyard areas. While a grazing management plan has not yet been completed, grazing intensity and season of use will be properly managed to attain resource objectives in over 1,500 acres of the project area that will not be converted to vineyard blocks, and grazing will be almost entirely excluded from areas enclosed by deer fencing (947 acres, 379 of which will be maintained as grassland). Over time, this will allow for increased vegetation density on slopes and within tributary swales, and vegetative re-working of the soil to reverse the effects of cattle compaction on the soil, resulting in increases in infiltration. Because topsoil compaction is such a significant limiting factor in areas with high underlying (bedrock) infiltration capacity (such as is the case for many of the beds within the Suscol Volcanics), much of the Suscol watershed will likely see a significant change in infiltration as grazing is managed properly and natural bioturbation processes break up the compacted soil layer[15].

McCalla and others (1984) recorded twice the amount of infiltration in moderately-grazed compared to heavily grazed areas of silty-clay soil on the Edwards Plateau in Texas. Rauzi and Hanson (1966) found a linear correlation of infiltration with grazing intensity, with infiltration rates as much as 2.5 times higher on lightly grazed pastures (South Dakota) than in ones that had been heavily grazed. Admittedly, not all of the increased infiltration will contribute to

[15] Bioturbation is the mixing of soils and/or sediment layers by biological activity, including burrowing rodents and insects, as well as root growth. The process also serves to decrease soil density, breaking up hardpans and introducing organics into the soil.

baseflow in Suscol Creek, as some will be consumed by the increased vegetation density on the landscape. However, given the high infiltration capacity of some of the underlying volcanic bedrock layers, increased soil infiltration during large events will likely contribute additional water to the perched aquifers that support Suscol Creek baseflow (as well as spring flow), especially during wet years. The increased infiltration during wet years will carry-over to support creek and spring flow during subsequent, non-wet years.

Our hydrologic modeling effort (see Chapter 4 below) showed that peak runoff and stormwater runoff volume will generally decrease as a result of the project. While we recognize that some of this reduction is due to additional capture and retention of rainfall by vineyard and more robust grassland vegetation (compared to grazed annual grasslands), another portion is due to greater soil infiltration rates expected as a result of preparation of the vineyard blocks and biologic reworking of the soils[16]. Some of this infiltration may be used by the vines, but, because of the good infiltration rate of the underlying volcanic layers, some of the excess soil infiltration will be recharged to the near-surface aquifers—especially during long-duration storms with extended periods of soil saturation. DHI (2007) conducted watershed modeling within the Napa River basin, and showed that an increase in baseflow of 3 to 35% in Bell Creek (near Angwin; similar geology to the Suscol area) was likely as a result of anticipated vineyard conversion.

3.3.3 Water quality

Nutrients (fertilizers), herbicides/pesticides, sediment, and water temperature are the primary water quality concerns within the Suscol Creek and neighboring watersheds. The Napa River (and therefore its tributary watersheds) has been listed as impaired for sediment, bacteria, and nutrients. In addition, water temperature during baseflow periods has been identified as a potentially limiting factor in some portions of the Suscol Creek watershed (Koehler and Edwards, 2009).

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[16] The vines and generally heavier ground cover will likely have somewhat higher evapotranspiration rates of the rainfall, but a portion of this retained rainfall will infiltrate to the near-surface and regional groundwater, especially during high-intensity rainfall events.

3.3.3.1 Sediment

As discussed in the project biology report (LSA, 2010), Suscol Creek provides high quality habitat for native fish and amphibians, including steelhead. Fagan Creek provides habitat for California newt. In each case, an increase in the transport of fine sediment to the creek would negatively impact habitat value.

Despite historic, continuous grazing in some portions of the project area, the bed of Suscol Creek does not appear to be overly sedimented with fines under current conditions, though there is certainly evidence that cattle trampling has contributed to sediment inputs near some springs and stream banks (see Figure 15, for example). The pools in Suscol Creek within the project site contain primarily gravel and cobble deposits with some bedrock outcrops, with little to no fine sediment deposits stored within the pools. The southern portion of the property, underlain by consolidated sedimentary rocks and landslides, shows stronger evidence of erosive response to past ranching, in the presence of eroded gullies and incised stream reaches, especially in Fagan Creek. This observation is consistent with known differences in sedimentation potential associated with the two rock types, and with the assessment in the Napa TMDL assessment (Napolitano and others, 2009), where watersheds underlain by Sonoma Volcanic flows are considered to have low sediment input rates, while watersheds with 'sandstones and clayey rocks' (such as the Great Valley Sequence units exposed in the southern portion of the ranch) are designated as having medium inputs.

Existing sediment sources within the watersheds primarily come from four types of sources:

1.) Rill and sheetwash erosion from upland areas,

2.) Gullying within drainage swales (primarily in the southern watersheds),

3.) Incision and bank erosion in stream and tributary channels (again, primarily within the southern watersheds), and

4.) Landslides (almost exclusively in the southern portion of the project area).

The proposed areas of conversion to vineyard are located in upland areas where existing sediment generation is primarily from rilling and sheetwash of pasture lands. PPI (2010) has addressed concerns of sediment generation as part of the project erosion control plan. A permanent, no-till cover crop will be used in all vineyard blocks (between 70 and 80 percent cover). Of the 45 proposed vineyard blocks, 40 will have no drainage pipes or drop inlets, and have vegetated buffers of at least 50 feet (often much wider) between the vineyard blocks and existing swales, springs, and creeks.[17] In these blocks, runoff patterns will mimic existing conditions, and the buffer strips will help to reduce transport of fine sediment to the receiving streams. In addition, straw wattles and 'rock repositories' are planned along portions of the down-slope boundaries of vineyard blocks that will also serve to slow and filter storm runoff[18]. As part of vineyard block preparation, stones larger than three inches would be removed, but some of this rock would be crushed to approximately 1-inch size and returned to the block to help stabilize the soil. The rest would be used for road gravel or stored on-site for later soil amendment or road repairs.

The drainage outlets in Block 21 and Block 36C will terminate in level spreaders designed to dissipate the flow (and any associated sediment) across the vegetated slope to provide a buffer before reaching the creek or drainage. The outlet in Block 34A will discharge via gravity outlet to a natural depression that will act as a small detention basin to attenuate and infiltrate stormflows, and provide retention of sediment. All other drainage pipes (Blocks 23, 27, 34D, 36E, and 41) will terminate in gravity outlets. These outlet structures have been placed at natural points of concentration within the sub-watersheds and will discharge to riprap aprons designed to dissipate energy of the discharging water and reduce the potential for gullying in downstream swales.

The erosion control measures summarized above and detailed in the ECP are expected to limit the sediment generated and/or transported off of vineyard blocks, buffer sediment inputs to the aquatic habitats of Suscol and Fagan Creeks, and reduce sediment runoff when compared to existing, grazed conditions. Additional measures will likely be incorporated as part of the Fish Friendly Farming Certification process. Attaining this certification is considered acceptable compliance with the recently completed Napa River sediment TMDL (Napolitano and others, 2009).

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[17] The initial (2009) project ECP submittal showed 13 wetland areas with buffers of less than 50 feet, however vineyard blocks will be reconfigured to maintain a 50-foot buffer (see Mitigation Measure BIO-7 in LSA, 2010).
[18] 'Rock repositories' are strips of coarse field rock planned at the edges of some vineyard blocks. These strips will absorb and slow stormwater runoff as it flows off of the vineyard block. See detail 3 on sheet 10 in the ECP (PPI, 2009) for a diagram of these features.

Of equal (if not greater) importance in controlling sediment transport within the project will be the exclusion of cattle from non vineyard areas within the proposed deer fencing. The deer fencing will enclose 947 acres, 379 acres of which will be non-vineyard area (which constitutes about 18 percent of the total project area). A net reduction in sediment from these areas as a result of improved grassland conditions would be an improvement within the watersheds. Any additional grazing management in areas not enclosed by deer fencing would further reduce direct sediment inputs caused by trampling of the stream bed and banks (especially prominent in the southern watersheds). In addition, increased vegetation density within the swale areas as a result of managed grazing would serve as added buffer and sediment retention for drainage areas upstream.

An additional sediment-reducing aspect of the project is the long-term effect of decreased wildfire frequency. Wildfire is a significant contributor of episodic sediment contribution in California watersheds. Fires reduce vegetation density and can change near-surface soil conditions to reduce infiltration rates (c.f. DeBano, 2000), often causing increases in runoff and sediment generation that result in orders-of-magnitude increases in sediment deposition in receiving streams (Hecht, 1993). The proposed project is likely to reduce the frequency of watershed wildfire, as 1) the presence of the vineyard provides added incentive to fire protection; 2) access-road improvements will allow for easier access to the upper watershed to fight fire; 3) vineyard irrigation during the dry season will reduce the presence of dry fuels that are susceptible to fire; and 4) the vineyard irrigation system will provide storage of water that could be used to directly fight wildfire. These fire-reducing effects will, correspondingly, reduce the episodic pulses of sediment to the stream that are associated with such wildfire events. The reduction in sediment generation associated with eliminating fire as a sediment mobilizer is appreciable. Most small-watershed investigations in central coastal California indicate that about 25% to 50% of long-term reservoir sediment occurs during the 2 to 4 years immediately following watershed-scale fires.[19] It would be reasonable to expect a reduction in long-term sediment generation of at least 10% associated with near-eradication of fire occurrence within the upper Suscol watershed.

Over the whole project area, rates of sediment generation are expected to be the same or lower within the 55 percent of the property within the grazing management area; better within the 18

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[19] See above-referenced reports, and the citations they contain.

percent cattle exclusion grassland area; and controlled by erosion control measures summarized above and described in the ECP within the vineyard blocks (27 percent of the project area).

Hydrologic modeling shows that all of the subwatersheds will have a reduction in stormwater runoff (both peaks and volumes) for design storms with a full range of recurrence intervals, as described in Chapter 4 of this report. Cumulative stormwater runoff volume reduction (for all subwatersheds) is expected to be approximately 20 acre-feet per two-year event[20]. Correspondingly, stormwater transport of fine sediment would be reduced. As discussed in section 2.6 above, the southern watersheds, including Fagan Creek, appear to be most susceptible to hydromodification effects (erosion associated with changes in the frequency and duration of erosive flows that might be expected due to drainage pipe discharges). Responding to the fundamental geologic differences, we recommend additional mitigation downstream of the pipe outlets within the Fagan tributary 2 and Sheehy 1.5 subwatersheds (those where gravity outlets are proposed), even though the hydrologic modeling indicates a net decrease in runoff. See section 5.2 for additional details.

Given the expected cumulative decrease in stormwater runoff volume, the important comparison is what changes to sediment *generation* might occur as a result of the project. Nearly all of the proposed vineyard blocks are located in areas that are currently open, grazed grassland. (The one significant area of tree removal, in Block 15, is located on a relatively flat area with no concentrated run-on and underlain by stable geologic units and is therefore not likely to contribute additional sediment.) With the proposed permanent ground cover within the vineyard blocks and the reduced slope lengths for runoff (Block 27c, for example), the sediment generation rates within vineyard blocks are not expected to increase significantly over existing, grazed conditions. Given the expected decrease in surface runoff volume, as described above, total sediment transport from the vineyard blocks is unlikely to significantly increase over existing conditions.

Especially within the Suscol watershed (which contains the more valuable and sustained aquatic habitat), the upland areas are generally resistant to erosion, as evidenced by the lack of

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[20] Flow volume reductions are also expected for the larger events: 24 acre-feet per five- and ten-year event, 27 acre-feet per twenty-five-year event, 28 acre-feet per fifty-year event, and 30 acre-feet per one hundred-year event. See also Appendix C and D.

rilling, gullying, incision and notable sedimentation associated with the existing road network (see also Napolitano and others, 2008). It appears that the fine sediment that is getting to the habitat reaches of Suscol Creek is associated with localized inputs from trampling and de-vegetation of stream banks and the areas adjacent to springs (see Figure 15)[21]. The benefit of cattle management, then, would have a direct improvement as the mitigation will occur adjacent to the riparian habitat area, whereas the vineyard blocks are predominately located on ridgetops and upland areas, further away from the channel (which allows for a buffer zone between vineyard blocks and riparian habitat).

Vineyard blocks 1, 12, and 13, on the north side of Suscol Creek, are closest to baseflow reaches of Suscol Creek (see section 2.7), with approximately 800, 200, and 400 feet of block frontage within 200 feet of the creek, respectively. Blocks 1 and 12, however, do not drain directly to Suscol Creek; Block 1 drains north to a vegetated swale area and Block 12 drains north toward Suscol tributary 5, which has no spring or summer baseflow and is therefore not a habitat reach. These tributary drainages provide additional buffering/metering of sediment prior to the confluence with the baseflow reaches of Suscol Creek[22]. Additional erosion protection methods and/or grazing management (buffer maintenance) may be warranted in/around Block 13 due to its proximity to habitat reaches of Suscol Creek.

Several existing road fords are present on the mainstem of Suscol Creek near the western property line. Though there was no substantial gullying observed associated with the roads, these crossings are likely contributing some fine sediment to Suscol Creek, especially the lower-most crossing, at which the stream appears to have been partially diverted from its natural channel along the oblique crossing. Increased traffic across these fords could contribute additional fine sediment to Suscol Creek, impacting fish habitat in the creek and in downstream reaches. Increased traffic along the existing ranch roads may also lead to sediment generation above existing levels. Additional mitigation at these crossings and along the main vineyard access roads is recommended (see section 5.2)

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[21] As mentioned previously, the existing sediment inputs do not appear to be impacting habitat within Suscol Creek, suggesting that the stream has some added resiliency for metering of sediment inputs compared to streams which have already been heavily impacted.

[22] This is not to say that increased sediment is expected from the vineyard blocks, but simply that these tributary drainages will provide additional buffering as they do under existing, grazed conditions.

The project proposes the removal of approximately 1200 trees for the preparation of the vineyard plots. Removal of trees in areas where deep root strength is critical to soil stability (such as along stream banks or in swales filled with unconsolidated sediment) could result in increased sediment generation. All but 16 trees to be removed are located in the northern portion of the property where the underlying geology indicates more stable terrain. In planning the vineyard layout, trees within swales were specifically avoided. Almost all trees slated for removal are located in flatter areas of the ridgetops and moderately-sloped areas, where root strength contribution to soil stabilization is less important. Thus, tree removal is not anticipated to have a significant impact to rates of sediment generation.

3.3.3.2 Temperature

Water temperature in Suscol Creek is typically in the 15 to 20°C range during the baseflow season, sufficient for supporting in-stream rearing habitat. Increases in stream temperature as a result of the proposed project are unlikely, as stream buffer areas will maintain (or possibly improve in some areas as a result of grazing management) vegetation cover and corresponding shading of surface water.

Water temperature is not a constraint to habitat during the storm season, when any potential stormflow runoff reductions would be realized (see section 4.4). As discussed above, spring and summer baseflows may actually increase as a result of the project, but this would not negatively impact in-stream fisheries habitat.

It is important to note that elevated water temperatures (around 25°C) have been observed in Well 1-2009 (the only existing well on the property, located north of Suscol Creek near the western property line). Direct discharge of well water into the creek at times of low flow may elevate stream water temperatures to levels that might stress juvenile steelhead if sustained for several hours and if the discharges occur during the hottest time of day. Normal drip irrigation of well water, however, is unlikely to affect in-stream water temperatures, as the water rapidly cools to air or soil temperatures within the irrigation systems. Additionally, stream buffers (along with low application rates) will prevent direct discharges of irrigation to the creek.

3.3.3.3 Nutrients and pathogens

Water-quality testing of several springs and in Suscol Creek indicates that slightly elevated levels of nitrogen are present within waters, likely attributed to cattle grazing at the site (see Appendix B for water quality data sheets; Figure 9 for sample locations). Pathogen analysis was not conducted, but pathogen contamination is commonly associated with ranching uses as well, especially where cattle have direct access to the creek and springs, as is currently the case within Suscol Ranch. As with sediment, management of grazing intensity and season of use, as well as exclusion of cattle from some streams, springs, and swales, would greatly reduce this existing impact.

Long residence time and broad-scale recharge areas for the creek and most of the springs suggest that water quality impacts of the vineyard are likely to be small, as contaminants infiltrating to the groundwater are likely to be 1) broken down or sorbed during the relatively long transit time; and/or 2) diluted by infiltration to the aquifer(s) from non-vineyard areas (where water quality may improve due to management of cattle grazing). In other words the complicated and broad-scale infiltration pathways would serve to attenuate constituents such as fertilizers or pesticides coming from the vineyard blocks.

Vegetative strips of a minimum of 50 feet around wetlands, and of widths consistent with Napa County regulations (Napa County Ordinance 18.108.025) adjoining all streams on the property have been incorporated into the vineyard plan. In all but a few boundaries the vegetative buffer greatly exceeds the minimum requirement (see regulatory buffer area and vineyard blocks in sheets 2-9 of the project ECP; PPI, 2010).

The project will use drip irrigation for application of fertilizers, which can reduce the rate of fertilizer by nearly half compared to spray irrigation (Wang and others, 2004) and avoids the over-application hotspots associated with broadcast or with-tillage fertilizer application. In addition, drip irrigation eliminates the need to use bulk fertilizer application that relies on rainwater for forced infiltration. Initial fertilizer inputs will be calculated based on soil survey data and soil profile and mineral analysis in soil pits. Once the vines are planted, fertilizer adjustments will be based on annual tests of the vine leaves and analysis of soil samples taken from beneath the drip irrigation system. These methods will minimize over-application of fertilizers by customizing the application rates for the various blocks based on the results of the analyses.

The project will utilize limited strip spraying for pesticide application, limiting the affected application area. Rates and timing of fungicide application will be set by analysis of on-site weather stations to model the onset of powdery mildew, beginning at the end of March and continuing into July, when rainfall is typically low and vegetation cover in buffer strips is high. Pesticide application will be decided by weekly scouting in each vineyard block, using sustainable thresholds developed by UC Integrated Pest Management (IPM) population thresholds. In addition, the vineyard is pursuing a Fish Friendly Farming Certification, which prohibits the use of the certain pesticides that are particularly harmful to aquatic species.

Because substantial denitrification and nutrient losses occur in the saturated soils adjoining springs and seeps (c.f. Mitsch and others, 2005; Hernandez and Mitsch, 2007), it is unlikely that additional nitrogen or phosphorus will reach Suscol Creek, as relatively little now appears to be delivered despite intensive congregation of cattle near and within the seep and spring zone under current conditions. Nor will most of the springs within the project area be affected, due to the proposed buffer zones around the wetlands, the application methods discussed above, and the hydrologic contribution to the wetlands from areas that will not be converted to vineyard uses. In addition, 15 of the seeps would be included within the area enclosed by the deer fencing, and would experience reduction in grazing intensity, most likely resulting in improved water quality conditions and more robust buffer conditions. Other seeps would benefit from grazing management in the areas not enclosed by the deer fencing (as proposed as part of the biological mitigation; LSA Associates, 2010).

As discussed in 3.3.1, there are four seeps where vineyard areas comprise a high or very high proportion of the estimated recharge area (seeps 2, 17, 26, and 51). Though, as with the other seeps, the potential for significant water quality impacts would be low due to the irrigation and pesticide application methods discussed above, additional mitigation is recommend to further reduce the potential impact (see section 5.2).

4. SURFACE FLOW ASSESSMENT

4.1 Purpose

We conducted the following analysis to evaluate the potential impact of vineyard conversion on stormwater runoff at the Suscol Mountain Vineyard project site. The effort is intended to identify the location and estimate the magnitude of increases/reductions in stormwater runoff so that specific runoff reduction mitigation measures (if needed) can be recommended for inclusion in the project.

4.2 Methods

4.2.1 Modeling software

Peak flow estimates and event hydrographs were established using the U.S. Army Corps of Engineers Hydrologic Modeling System (HEC-HMS) version 3.1.0 in conjunction with the Geospatial Hydrologic Modeling Extension (HEC-GeoHMS) version 1.1 for use with ArcView Geographic Information System version 3.3.

HEC-HMS is an industry standard package for modeling rainfall, hydrologic losses, overland hydrograph routing, and runoff storage in detention basins or reservoirs. HEC-GeoHMS was developed as a geospatial hydrology tool kit for engineers and hydrologists that operates within ArcView. The program allows users to visualize spatial information, delineate sub-basins and streams, construct inputs to hydrologic models, and assist with report preparation. It is a data structure that supports hydrologic simulation models, but is not itself a simulation model. It operates as an extension for ArcGIS that analyzes digital terrain information and transforms the drainage paths and watershed boundaries into a hydrology data structure that represents the watershed response to precipitation. The hydrologic results from HEC-GeoHMS are imported to HEC-HMS, where meteorological data are added and the rainfall-runoff relation is simulated.

4.2.2 Model parameters

Input parameters for the watershed model were developed in ArcView version 3.3 using 2-ft contour and survey data prepared by Michael W. Brooks and Associates, Inc., and Airmaps, Inc., July 1, 2008. The survey data did not cover the entire extent of the Suscol Mountain Vineyard watersheds, so it was supplemented with a digital elevation model (DEM) developed from LiDAR data obtained freely from the National Center of Airborne Laser Mapping on April 24, 2009[23]. A new DEM was interpolated from the surveyed contours and LiDAR DEM and the Suscol Mountain watersheds were delineated using the HEC-GeoHMS extension within ArcView. The following attributes were assigned for each sub-watershed: reach length and slope, centroid location, longest flow path, flow path to centroid, change in elevation, and weighted curve number.

4.2.2.1 Meteorological model

Precipitation data was obtained for a 24-hour storm from the National Oceanic and Atmospheric Administration (NOAA) Atlas 2, Volume XI: *Precipitation Frequency Atlas for the Western United States, 1973*. The precipitation data are summarized in Table 3 and were used to create a hypothetical storm within the model using a 24-hour SCS Type IA storm distribution. Precipitation distributions were developed for the 2-, 5-, 10-, 50-, and 100-year recurrence intervals events. As the primary interest of this study was to describe the *change* in runoff from pre- to post-project conditions, we did not adjust the storm distribution based on nearby rainfall records. Modeled flows appeared to be conservatively high compared to estimated stormflows and recurrences of storms in WY2008 and WY2006 based on high-water marks (described previously in this report).

4.2.2.2 Watersheds

The sub-watersheds were delineated using the combined DEM, as described above in section 4.2.2. There are five watersheds that receive runoff from the property: Suscol Creek to the west, Sheehy and Fagan Creeks to the south, an unnamed tributary within the Tulucay watershed to the north, and a tributary of the Green Valley Creek watershed draining east into Solano County. No vineyard blocks are proposed that would drain east (to Solano County) and therefore these areas were not included in the model. In addition, the sub-watersheds that drain to the north from the Suscol watershed boundary were not modeled, as the area impacted by vineyard conversion in those watersheds is small (approximately 16.5 acres), the vineyard blocks proposed for that area will not contain any drainage pipes or outlets, and those areas affected will not drain directly to main streams. In addition, modeling of other subwatersheds within the project area indicated that the amount of runoff will be less under post-project

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[23] Available for public download at http://calm.geo.berkeley.edu/ncalm/ddc.html.

conditions due to the increased permeability of the amended soils, and we expect the same for the small, north-draining watersheds.

The delineated sub-watersheds are shown in Figures 18 and 19. Some sub-watersheds extend beyond the property boundary of the Suscol Mountain Vineyards in order to estimate the effects the proposed vineyard will have on neighboring waterways. Points of concentration were determined at junctions of major tributaries to analyze the effects the vineyard blocks would have on the system within the property boundaries.

4.2.2.3 Land use

The land use curve number indicates the runoff potential of a landscape and is based on vegetation (both type and density) and soil type. The curve number for a given sub-watershed is the weighted average of the individual land use/soil type curve numbers within the sub-watershed. Tables 4 and 5 summarize the existing and post-project curve numbers used for this project. For consistency with other recent hydrologic analyses reviewed and approved by the County, the curve numbers that were used for this modeling effort followed those used at Circle S Ranch (Ayers Associates, 2006).

Existing land cover is shown in Figure 20 (based on the project biological mapping; LSA Associates, 2010), and consists mainly of grasslands and riparian forest associations. Currently, the project area is grazed in the grassland areas, resulting in sparse ground cover in some areas, especially in the late-summer and fall (Figure 3). Grazing has also apparently compacted the soils in heavily-used areas, likely resulting in higher runoff potential than would exist under natural conditions. The site biology report (LSA Associates, 2010) provides additional description of the character of the existing vegetation within the project area.

Post-project land cover is shown in Figure 21. Approximately 26 percent of the property would be cleared for vineyard uses (with 21 percent converted to vine acreage), almost all of which is annual grasslands under existing conditions. As part of the proposed project, grazing within the project area would be reduced (or almost entirely eliminated) within the 947 acres that will be enclosed by deer fencing (including 387 acres that will not be impacted by clearing). In addition, a grazing management plan would prescribe grazing intensity and season of use to attain resource objectives, which would decrease the land-use curve number within the areas outside of deer fencing, resulting in a corresponding decrease in stormwater runoff from these areas. However, because the intensity, duration, and season of grazing outside of deer fencing has not yet been prescribed, **this effect was not included in the modeling effort**. In order to provide a conservative estimate of change in flows, we assumed *for the purposes of hydrologic modeling* that all grasslands outside of the proposed vineyard blocks would continue to be grazed at current (moderate) intensities.[24] (The anticipated change *within* the deer-fenced areas, however, was incorporated into the model.) We also used the curve number associated with 'fair' vineyard conditions, even though the proposed cover crop and other erosion control measures will likely maintain 'good' or 'excellent' vineyard conditions, adding an additional level of conservativeness to the analysis.

Soils present at the Suscol Mountain Vineyard property consist mainly of Fagan Clay Loams and the Hambright-Rock Outcrop Complex (Figure 22). The hydrologic group for the Fagan Clay Loams is C and the Hambright-Rock Outcrop Complex is D, giving the property very high runoff potential. In preparation for vineyard planting, the soil within each block will be ripped to a depth of approximately 36 inches. This is expected to improve infiltration within the Hambright soils group, resulting in a reclassification of the soil from hydrologic group D to C (Appendix E). This conversion would result in a decrease in the land use curve number in areas of Hambright soils because of the overall change in hydrologic group type (Figures 23 and 24). The resulting curve numbers for various portions of the subwatersheds are shown on Figures 25 (pre-project conditions) and 26 (post-project conditions).

4.2.2.4 Basin lag time

Selected, accessible channels were measured during site visits and used as representative channels for the different watersheds within the model. (See Figures 27 and 28 for example channel cross sections.) Where channels were not directly surveyed, channel dimensions were estimated based on the 2008 survey data. Channel dimensions as well as Manning's roughness values were estimated and used to calculate the time lag within each sub-watershed.

Basin time lag was calculated using the NRCS curve number method, a method developed for watersheds of less than 2,000 acres. First the basin slope was calculated from the DEM per sub-watershed, and then the lag was computed using the following equation:

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[24] In other words, the modeled condition outside of the deer fencing was the same for both the pre- and post-project scenario, even though hydrologic conditions may improve with the implementation of the grazing management plan.

$$\text{Lag} = \frac{(L^{0.8} * (S + 1)^{0.7}}{(1900 * Y^{0.5})}$$

Where:
Lag = Basin lag time, hr
L = Hydraulic length of watershed, ft
S = Potential maximum retention, estimated by S = [1000/CN] – 10
CN = Land use curve number
Y = Watershed slope, %

The lag method was used to calculate a lag time for both existing and post-project conditions, the post-project watershed slope in the equation is assumed to mimic existing conditions, as there is no leveling or grading proposed for the vineyard conversion. The SCS Unit Hydrograph method was used as the routing method within the model. This was thought to be the best for this project because the SCS Unit Hydrograph method was originally developed from observed data collected in small, agricultural watersheds. No baseflow was modeled at this time as it was considered negligible relative to the magnitude of peak flows within the watershed[25].

4.3 Results

The data discussed above was input to HEC-HMS and run for the various hypothetical storm events (2-, 5-, 10-, 25-, 50-, and 100-year). The results are presented below and in Appendices C and D.

4.3.1 Existing conditions

Hydrologic modeling indicates that the existing storm runoff near the property boundary for the 100-year event ranges from 6.9 cfs peak flow (2.2 acre-feet total event volume) to 1,980 cfs (684 acre-feet) for the various subwatersheds on the property. Two-year stormflows range from 2.2 cfs (0.8 acre feet) to 660 cfs (253 acre-feet). The results for all points of concentration and events modeled are shown in Appendix C; flows leaving the property boundaries are highlighted in blue.

4.3.2 Post-project conditions

Post-project stormflows exiting the project area are estimated to range from 6.9 cfs (2.2 acre-feet) to 1,900 cfs (564 acre-feet) for the 100-year event, and 2.2 cfs (0.8 acre-feet) to 603 cfs (239 acre-

[25] See section 3.2.3.1 and Appendix A for discussion of baseflow observations.

feet) for the 2-year event. Post-project model results are shown in Appendix C; flows leaving the property boundaries are highlighted in blue.

4.4 Discussion

The model shows a reduction of peak flows and runoff volumes from all of the sub-watersheds of Suscol Creek after implementation of the project, resulting in lower peak stormflows and volumes exiting the project site from that watershed. Similarly the sub-watersheds within the southern portion of the property all have reduced runoff after project implementation when compared to existing conditions (see Appendices C and D for full comparison).

One of the primary factors in this reduction is the amendment of soils (ripping) that will take place in order for the vineyard plants to be viable and productive. By amending the soils, the hydrologic group would be changed from D to C in the majority of the converted areas (see Figures 23 and 24). Under existing conditions type C soils make up 27% of the watershed area, after conversion to vineyards, type C soils will comprise 41% of the watershed area, an increase of 14%. This change from D to C soils is largely responsible for the reduction in peak flows because the land use curve numbers associated with type C soils is lower than type D soils, even with the conversion to vineyards. As a result, peak flow in sub-watersheds with proposed vineyard blocks would decrease by approximately four to twenty percent for the 2-year flow and one to twelve percent for the 100-year flow. Stormwater volume is also reduced for these watersheds, though by a somewhat lesser extent.

A second factor in the reduction in peak stormwater flows is the result of reduction in grazing in portions of the proposed project area. The project area is currently grazed at light to moderate levels depending on location within the property. After conversion, cattle will be removed from vineyard blocks and within areas enclosed by deer fence, and properly managed in other areas as prescribed by the grazing management plan (part of the proposed project mitigation). Typically, the removal of cattle results in reductions in peak storm runoff due to the increased density of vegetative land cover and its ability to absorb more rainfall. At this time, it is not known to what extent grazing will be reduced outside of the deer fencing, and in an effort to be conservative, the **effects of the grazing management on peak flows and runoff volume have not been accounted for in the model**. The effect of grazing reduction within the deer fenced areas was incorporated into the model, and contributed to the modeled reduction in stormwater runoff post-project.

Six of the vineyard blocks will contain some drainage pipe networks to capture and divert runoff from upslope areas and within the block, and these drainage networks were incorporated into the post-project model. The areas of proposed drainage pipes can be most easily visualized on Figure 19.[26] Despite what one might generally expect (increased peak flows where piped drainage networks are present), for the Suscol Vineyard project hydrologic modeling indicates that the change in soil infiltration rate (ripping) and increased roughness (cattle exclusion) more than offsets any decreases in time-of-concentration due to drainage pipes, resulting in overall lower peak flows under post-project conditions.

It is important to note that the decrease in modeled runoff is a decrease in 'direct' runoff during storm events. The modeling does not take into account indirect runoff that infiltrates to shallow groundwater and then to the springs and stream channel, nor does it account for anticipated increases in spring/summer baseflow as a result of increases in deeper groundwater percolation, as discussed elsewhere in this report. Thus the actual reduction in total runoff volume would be somewhat less than the slight decrease discussed in the modeling chapter of the report. This shift from direct to indirect runoff may actually improve anadromous fish habitat, as it would support higher recession flows and baseflows, allowing for longer-duration periods for fish passage.

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[26] The tightly-spaced modeling nodes on Figure 19 highlight the drainages of individual drop inlets within the drainage system. See Sheets 1-13 in the project ECP (PPI, 2010) for additional details and plans.

5. SUMMARY AND CONCLUSIONS

5.1 Summary

Based on the analyses presented above, we make the following conclusions:

- Past ranching practices at the site have impacted creek, springs, and swale drainages, though to a greater degree in the southern watersheds. While some incision of the mainstem of Suscol Creek has occurred, many of the tributaries are stabilized by underlying bedrock at multiple locations along their profiles.

- Subsurface flow to springs will likely increase due to grazing management, reduced grazing within deer-fenced areas, increased infiltration due to ripping of soils in vineyard blocks, and vineyard irrigation. Most springs are supported by moderately-large volume, perched aquifers that receive recharge from a relatively broad area and sustain flow at the springs through dry periods.

- Correspondingly, summer baseflow in Suscol Creek is likely to increase as a result of the project. Streamflow is supported both by direct contribution of some of the springs, and by a relatively large, partially perched aquifer (similar to the system feeding the springs). This increase is likely to occur over an approximately 5- to 10-year period, as the full benefit of grazing management is realized.

- Conversion of the existing grazing land to vineyard uses, associated reduction in stormwater peaks and volumes for most sub-watersheds, the incorporation of the erosion control plan, cattle exclusion from within the deer-fenced areas, and grazing management within much of the remaining property, is expected to generally decrease fine-sediment generation and input to receiving waters, especially in the southern watersheds. However, erosion may occur in swales and stream segments downstream of pipe outlets in the southern watersheds if not mitigated. Also, additional sediment may be introduced to Suscol Creek by increased traffic at the road ford near across Suscol Creek near the western project boundary and on the main access roads. Mitigation measures are proposed below to minimize these potential impacts.

- Peak flows and direct stormwater runoff volume is expected to be the same or decrease in the receiving waters downstream of the Suscol Mountain Ranch as a result of the project. Grazing management, higher infiltration rates within most vineyard blocks, and reduced grazing with deer-fenced areas (resulting in higher roughness), will all contribute to the expected decrease.

- The proposed project is expected to reduce the amount of direct stormwater runoff, increase the amount of baseflow, and reduce the amount of fine sediment and nutrients (nitrogen) compared to existing conditions. No significant cumulative effects are expected.

5.2 Impacts and Mitigation Measures

Based on the analyses discussed above, the following section summarizes the potential hydrologic impacts that are likely to occur as a result of the proposed project. For each impact we have provided a brief discussion of suggested mitigation measures to be incorporated into the project to reduce the potential impacts to less than significant levels.

Impact 1: Though hydrologic modeling indicated that stormwater peaks and volumes would decrease with implementation of the project, small changes in the timing and frequency of flows downstream of drainage pipe networks may occur that may induce erosive effects in susceptible channels downstream. Flow from the drainage pipe networks within Blocks 21 and 36C would be laterally spread across slopes using level spreaders or other distributed outlet configuration to reduce this potential. Other networks (within the Fagan Creek and Sheehy Creek 1.5 sub-watersheds) would discharge via gravity outlets with riprap aprons designed to dissipate energy of the discharging water. These various types of outlets, combined with the expected decrease in stormwater peaks and volume, are expected to limit downstream erosive effects. However, because of the relatively high susceptibility to erosion of some of the drainages within the southern portion of the property, mitigation measure HYDRO-1a is proposed to provide additional erosion protection below gravity outlets. Mitigation measure HYDRO-1b is proposed to maintain proper function of level spreaders and flow dissipation structures.

Mitigation measure HYDRO-1a: Grazing management (and/or a planting program, if necessary) shall be used to minimize impacts on swales and on slopes downstream of CPP gravity outlets within the Fagan Creek and Sheehy 1.5 watersheds. Grazing impacts on swales and downstream areas can be minimized by limiting livestock use to the cool winter and spring season when cattle get most of their water from green grass and are less attracted to shade and standing water. In addition, strategic placement of water troughs and supplements away from swales and other wet areas will be used to lessen impacts.

Monitoring of pipe outfalls shall be conducted yearly during the first five years following project construction. Should signs of gullying be noted during monitoring efforts, additional energy dissipation structures shall be incorporated into the design of the gravity outlets, or additional detention/retention shall be designed to further control flows. One potential structure would be the inclusion of rock-filled pits that will dissipate energy and encourage infiltration of discharged water.

Mitigation Measure HYDRO-1b: All gravity, level spreader, and other drainage pipe outlets shall be inspected annually (prior to the rainy season) and cleaned, if necessary, to maintain the proper function of the outlets.

Impact 2: Unless mitigated, increased traffic at the primary access road ford may increase the contribution of fine sediment to Suscol Creek. Mitigation Measure BIO-12 proposes that the ford crossings not be used for vineyard construction or maintenance until bridges have been constructed at the crossings, and the western-most crossing repaired. Mitigation Measure HYDRO-2a is proposed in conjunction with Mitigation Measure BIO-12 to reduce the potential for bridge crossings to cause scour and corresponding sedimentation, and to limit the direct runoff from access roads adjacent to Suscol Creek to a less-than-significant level.

There are approximately 25 miles of existing ranch roads within the site, all of which are composed of compacted dirt, gravel, and exposed bedrock. Though signs of existing rilling and gullying are limited (especially in the Suscol watershed—primarily due to the underlying geology), increased traffic on the main access roads (those labeled as 'existing primary vineyard access roads' on Figure 6 in the project ECP) may increase sediment generation rates. Cattle exclusion within deer-fenced areas and grazing management in other portions of the project area, as discussed above, would reduce this potential impact by decreasing the volume of runoff flowing onto the roads from upslope areas, and by providing more robust buffer zones downslope of the roads. Still, some sections of the existing road network may be prone to increased sediment generation. Mitigation measure HYDRO-2b is proposed to increase the resistance to erosion of high traffic segments and in areas where roads may concentrate stormwater runoff.

Mitigation measure HYDRO-2a: Bridges across Suscol Creek shall be designed to completely span the bankfull channel, and shall be designed to minimize channel constriction that may induce scour at bridge abutments. Roads near crossings shall be graded such that road runoff does not drain directly to the creek, passing first across a stream buffer area or within a vegetated swale, where feasible.

Mitigation measure HYDRO-2b: Existing ranch roads that will be used for vineyard access under the proposed project (those labeled 'existing primary vineyard access roads' in Figure 6 of the project ECP) shall be managed with BMPs to reduce the potential for additional sediment generation. BMPs shall be implemented to reduce the concentration of flow on the roads (rolling dips, outsloping, crowning), to increase the resistance to erosion (gravelling), and to provide vegetative buffers adjacent to roadways. The Fish Friendly Farming standards for roads assessment (including multiple parameters such as road surface condition and drainage, hillslope stability, and stream crossings) will be used to guide BMP selection and management and BMPs shall be field-fit to on-site conditions. Access roads shall be surveyed annually and after large storms to identify problem segments that may be present, and the BMPs shall be amended or refined, as necessary.

Impact 3: The temperature of the water pumped from Well #1 at the project site was recorded at above 25 degrees Celsius on several occasions during the spring and summer of 2009 (RSA, 2010). The temperature of this water is above the threshold considered adequate for steelhead rearing habitat, and may impact habitat in Suscol Creek if discharged directly to the stream, especially during mid- and late-day hours and during periods when natural discharge in the stream is low. Mitigation Measure HYDRO-3 is proposed to limit the timing and routing of periodic well discharges to reduce the impact to a less-than-significant level.

Mitigation Measure HYDRO-3: Water from Well #1 shall not be discharged directly to Suscol Creek when the stream is at summer baseflow levels (between April 1 and October 1; below about 0.5 cfs at the property line). Should excess pumping be required during this period (for well purging, for example), the water shall be collected and stored for later use, discharged via sprinklers or spreaders at the site with at least a 100-foot buffer between the discharge point and the baseflow portion of Suscol Creek, or discharged through the vineyard irrigation system.

Impact 4: Most springs within the Suscol Mountain Ranch property have recharge areas that will not be significantly altered by vineyard conversion (see section 3.3.1, above). However there are four springs with contributing areas that are predominantly within proposed vineyard blocks (seeps 2, 17, 26, and 51). The application methods discussed in section 3.3.3, as well as the proposed 50-foot buffers around these springs (Mitigation Measure BIO-7), will limit water quality impacts (as with the other springs within the project area); however, these five wetlands would have a greater sensitivity to impacts due to the high percentage of contributing area that would be converted to vineyard. In these areas, the constituents of greatest concern are fertilizers, pesticides, fungicides, and herbicides. For herbicides and fungicides (those susceptible to oxidation, with relatively short half-lives), limiting use to the non-rainy season allows better control of application rates and an increase in the residence time within the soil (without excess precipitation). Similarly, application of synthetic pesticides during the non-rainy season will limit the impact to susceptible seeps, though many pesticides have longer residual persistence and require a longer non-application period before the beginning of the rainy season to effectively mitigate the impact. Pre-emergence herbicides, however, have longer half-lives and thus are not effectively mitigated by prescribed seasonal application. Wide application buffers are more appropriate to limit the potential impact to seeps and springs. Mitigation measure HDYRO-4a has been proposed to further refine the application of fertilizers, fungicides, synthetic pesticides, and herbicides in the vineyard blocks near the 5 seeps that would be most sensitive to water quality impacts, reducing the potential impact to a less-than-significant level.

All but one (seep 17) of the five seeps discussed above are enclosed by the proposed deer fencing, and will therefore experience reduced levels of grazing within and around the seep, reducing the direct impacts of grazing and improving the buffering capacity of surrounding setback area. As discussed in the project biology report (LSA Associates, 2010) grazing management would result in enhanced conditions of the seeps. Mitigation measure HYDRO-4b has been proposed to include wetland 17 within the area of reduced grazing and enhance conditions at the seep.

In addition, drainage pipes from Block 34 will discharge at or near springs 24, 26, and 27. These discharges may impact the hydrologic function and/or water quality of the springs and/or wetland areas supported by the springs. Mitigation measure HYDRO-4c has been proposed to reduce these potential impacts to a less-than-significant level.

> Mitigation Measure HDYRO-4a: The use of fertilizers and fungicides shall be restricted to the period between April 1 and September 1 in vineyard Blocks 15, 32, 34, 36, and 41. Similarly, the application of synthetic pesticides shall be restricted to the period between April 1 and August 1. In addition, pre-

emergence herbicides shall not be applied within a 100-foot buffer zone of seeps 2, 17, 26, and 51. During the allowed application period (as described above), application of pesticides and fungicides will be avoided immediately prior to and during storm events with a predicted rainfall total greater than two inches.

Mitigation Measure HYDRO-4b: The alignment of the deer fence at the western side of vineyard Block 32 shall be altered to encompass spring 17 in order to exclude cattle grazing in a 50-foot buffer zone around the spring. Alternatively, a separate cattle fence may be used to provide an exclusion buffer around this seep.

Mitigation Measure HDYRO-4c: Gravity outlets will be field-fit to minimize direct hydrologic impacts to wetland areas associated with springs 24, 26, and 27. To the extent feasible, the gravity outlets will be designed to discharge to vegetated buffer areas and/or to swales downstream of springs and not directly to wetlands associated with the above springs.

Impact 5: Vineyard Block 13 drains directly to the stream buffer zone adjacent to a critical baseflow reach of Suscol Creek. Given the potential sensitivity of the stream habitat, additional hydrologic controls are needed to reduce this potential impact to a less-than-significant level.

Mitigation Measure HYDRO-5: A riparian planting program shall be instituted in the stream buffer zone adjacent to vineyard Block 13. Cattle shall be excluded from this area, and the vineyard block shall be graded to maximize the spreading of flow from the block across the slope adjacent to the buffer. Straw wattles shall be inspected following all major storms within the first 3 years of vineyard development and shall be repaired if needed. Additional measures to control the concentration of runoff (such as vegetated retention ponds) may be required if concentration of flow remains a problem after stream buffer and vineyard cover crop is established.

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TABLES

Table 1. Aerial photograph assessment of seep/spring response to wet and dry periods, Suscol Mountain Ranch, Napa County, California[1].

Spring/seep designation	Expression in 1982 photograph[2]	Expression in 1987 photograph[2]	Expression in 1991 photograph[2]	Proportion of proposed vineyard in recharge area[3]	Comments
Suscol Creek Watershed					
1	vg	g	g	minimal	upper portion of seep has good expression in all years; lower, linear section much better expressed in 1982 (likely flowing at surface), but still distinguishable in other years; seep has similar extent in 1987 and 1991
2	vg	vg	g	very high	extent of seep area similar in all years
3	--	--	--	minimal	seep in area of trees, difficult to assess in aerial photograph
4	--	--	--	minimal	seep in area of trees, difficult to assess in aerial photograph
5	--	--	--	minimal	seep in area of trees, difficult to assess in aerial photograph
6	vg	vg	vg	minimal	
7	vg	vg	vg	minimal	
8	vg	vg	vg	minimal	
9	vg	g	vg	minimal	spring expression may be obscured by shadow in 1987
10	vg	vg	vg	moderate	moderate shrub vegetation present in 1987 and 1991 photos
11	vg	vg	vg	minimal	similar surface expression in all years
12	g	p	f	minimal	small seep relative to 11 and 13
13	vg	vg	vg	minimal	lower extent fans out slightly more in 1982, but similar extent in 1987 and 1991
14	vg	g	g-f?	moderate	somewhat obscured by shadow in 1991
15	vg	vg	vg	none	
16	g	p	f	none	
17	vg	f	p	very high	
18	g	f	f	moderate	seep is bigger in 1982 than in other years; similar extent in 1987 and 1991
19	vg	g	p	moderate	seep barely discernable except in channel just upstream of trees in 1991; upper area of seep is wider in 1982 than in 1987, but still well-expressed in 1987
20	g	g	f	minimal	small seep; extent is similar in all years
21	g	g	f	minimal	small seep; extends slightly further along base of slope in 1982
Fagan Creek watershed					
22	vg	vg	vg	none	similar surface expression in all years
23	vg	vg	vg	none	similar surface expression in all years
24	g	g	g	minimal	similar expression in all years
25	g	g	g	none	similar expression in all years; heavy grazing evident in upstream plot (outside the project limit) in 1989

Table 1. Aerial photograph assessment of seep/spring response to wet and dry periods, Suscol Mountain Ranch, Napa County, California[1].

Spring/seep designation	Expression in 1982 photograph[2]	Expression in 1987 photograph[2]	Expression in 1991 photograph[2]	Proportion of proposed vineyard in recharge area[3]	Comments
26	vg	vg	vg	high	wetted area extends further down swale (to tributary) in 1982; wetted area extends half-way to tributary in 1987, but is more localized in 1991
27	vg	g	g	minimal	seep in confluence area just downstream of spring complex is of similar aerial extent in 1991 compared to 1982, despite a lesser expression at the springs themselves; extent in 1987 somewhat less than other years
28	vg	vg	g	minimal	seep in confluence area just downstream of spring complex is of similar aerial extent in 1991 compared to 1982, despite a lesser expression at the springs themselves; extent in 1987 somewhat less than other years
29	vg	vg	g	minimal	seep in confluence area just downstream of spring complex is of similar aerial extent in 1991 compared to 1982, despite a lesser expression at the springs themselves; extent in 1987 somewhat less than other years
30	vg	vg	g	minimal	seep in confluence area just downstream of spring complex is of similar aerial extent in 1991 compared to 1982, despite a lesser expression at the springs themselves; extent in 1987 somewhat less than other years
31	vg	p	g	minimal	expression may be slightly obscured by shadow in 1987
Sheehy Creek watershed					
32	vg	p	p	minimal	spring is more extensive in 1982
33	vg	f	n	minimal	almost fully-connected to 32 in 1982
34	vg	vg	g	minimal	feeds ponded area
35	vg	vg	g	minimal	feeds ponded area
36	p	vg	n	minimal	reason for poor expression in 1982 is unknown, but could be a result of differences in vegetation management
37	vg	p	n	n/a	likely heavily influenced by recharge from pond; pond was dry in 1987 and 1991 photos
38	vg	p	n	n/a	likely heavily influenced by recharge from pond; pond was dry in 1987 and 1991 photos
39	g	p	f	n/a	likely heavily influenced by recharge from pond; pond was dry in 1987 and 1991 photos
40	vg	p	n	none	
41	f	p	f	moderate	seep better expressed in channel downstream in 1982; but localized to head area in 1987 and 1991
42	g	g	p	none	localized recharge area in small landslide; very small expression in 1991
43	p	p	n	moderate	likely a transient spring with small recharge area

Table 1. Aerial photograph assessment of seep/spring response to wet and dry periods, Suscol Mountain Ranch, Napa County, California[1].

Spring/seep designation	Expression in 1982 photograph[2]	Expression in 1987 photograph[2]	Expression in 1991 photograph[2]	Proportion of proposed vineyard in recharge area[3]	Comments
44	vg	vg	f	none	localized recharge area in small landslide
45	vg	g	g	minimal	good expression at spring head in 1987 and 1991, but poor to no expression in channel area downstream of spring
46	vg	g	g	minimal	good expression at spring head in 1987 and 1991, but poor to no expression in channel area downstream of spring
47	g	n	n	none	
48	g	g	p	moderate	downstream channel is continuously wetted in 1982, but patchy in 1987
49	vg	p-n	p	minimal	localized recharge area
50	g	f	p	moderate	
51	g	n	n-p	very high	recharge area is likely limited

Notes;

[1] See Figure 8 for spring locations. Springs were identified by aerial photograph analysis and do not necessarily match the springs surveyed by in the project biologic assessment (LSA Associates, 2010).

[2] 'Expression' is a qualitative rating of how well-defined a seep area is on the photograph.
vg (very good) = high contrast between dark seep area and surrounding landscape, likely saturated or flowing at surface;
g (good) = well-expressed seep boundary, but moderate contrast to surrounding area; may be locally saturated at surface
f (fair) = moderate expression of seep boundary and/or low contrast to surrounding landscape;
p (poor) = barely discernable contrast to surrounding landscape and poor expression of seep area;
n (none) = no distinguishable expression of seep in aerial photograph

[3] Due to the uncertainty in estimating recharge area; proportions were estimated from Figure 8, rather than directly calculated within GIS
none = 0%; minimal = 1-30%; moderate = 30-60%; high = 60-80%; very high 80-100%

Table 2. Water quality analysis results for samples in and near upper Suscol Canyon, Napa County, California.

	Units	Title 22 MCL	**SRSA081001: 1004**	**SRSA090507: 1322**	**SRSB081001: 1141**	**SRSB090507: 1400**	**SRSC081001: 1245**	**SRSC090507: 1432**
Date collected			10/01/08	5/7/09	10/01/08	5/7/09	10/01/08	5/7/09
Time			10:04	13:22	11:41	14:00	12:45	14:32
DESCRIPTORS								
Source			**Spring**	**Spring**	**Spring**	**Spring**	**Spring**	**Spring**
Geology[2]			Tsv	Tsv	Tsv	Tsv	Tsv	Tsv
Lab used[3]			Soil Control	CalTest	Soil Control	CalTest	Soil Control	CalTest
Sample collected by[4]			SB	SB,TB	SB	SB, TB	SB	SB, TB
FIELD MEASUREMENTS								
Dissolved oxygen	% Saturation		--	--	--		--	--
Estimated flow	gpm		~2	5	<0.1	<2	2	10
pH (paper)	pH Units		--	--	--	--	--	--
Specific conductance (@ 25°C)	μmhos/cm		176	155	166	204	164	159
Specific conductance (@ field temp)	μmhos/cm		146	141	156	195	153	159
Temperature	°C		16.1	20.3	21.8	27.1	21.8	25.1
WATER QUALITY INDICATORS (LAB)								
Alkalinity (total)	mg/L CaCO3		--	52	--	69	--	54
E. Coli	MPN/100ml		--		--		--	
Hardness (total)	mg/L CaCO3		--	36	--	50	--	41
pH	pH Units		6.0	7.6	7.2	7.3	6.2	7.5
Specific conductance (@ 25°C)	μmhos/cm	1600	140	140	170	160	150	140
Total dissolved solids	mg/L	1000	88	190	110	160	96	150
Turbidity	NTU		--	30	--	76	--	36
GENERAL MINERALS								
Bicarbonate (HCO3)	mg/L HCO3		48	63	48	85	62	65
Boron (B)	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium (Ca)	mg/L		6.7	7.6	11	14	8	8.5
Carbonate (CO3)	mg/L CO3	120	<5	<6	<5	<6	<5	<6
Chloride (Cl)	mg/L	250	9.6	8.9	12	9.9	9.3	10
Fluoride (F)	mg/L		--	0.14	--	<0.1	--	0.16
Total Iron (Fe)	mg/L	0.3	**2.4**	0.19	**1.4**	**0.39**	0.16	0.11
Magnesium (Mg)	mg/L		4.3	4.7	5.6	5.3	5.8	5.4
Manganese (Mn)	mg/L	0.05	0.035	<0.0050	**0.075**	**0.56**	<0.02	0.0064
Potassium (K)	mg/L		3.0	3.8	3.6	9.4	2.5	3.7
Silica (Si)	mg/L SiO2		--	82	--	50	--	80
Sodium (Na)	mg/L		16	15	13	12	14	13
Sulfate (SO4)	mg/L	250	10	8.8	14	3.8	4.2	4.3
Sodium absorption ratio	--		1.2	0.83	0.81	0.58	0.94	--
TRACE AND HEAVY ELEMENTS								
Arsenic	μg/L	10	--	4.0	--	1.5	--	2.2
Cadmium	mg/L	0.005	--	--	--	--	--	--
Chromium								
Copper	mg/L	1	--	--	--	--	--	--
Lead	mg/L	0.015	--	--	--	--	--	--
Mercury	mg/L	0.002	--	--	--	--	--	--
Selenium	mg/L	0.05	--	--	--	--	--	--
Titanium								
Vanadium								
Zinc	mg/L	5	--	<0.02	--	<0.02	--	<0.02
NUTRIENTS								
Nitrite as NO2	mg/L		--		--		--	
Nitrate as NO3	mg/L	45	1.1	<2.0	12	<2	4.2	4.5
Ortho phosphate as P	mg/L		--		--		--	
Phosphate (P2O5)	mg/L		--		--		--	
LAB CHECK								
Major Cation (Ca+Mg+K+Na)	meq/L		1.5	1.4	1.7	1.5	1.5	1.4
Major Anion (HCO3+CO3+Cl+SO4)	meq/L		1.4	1.5	1.6	1.8	1.6	1.5
Ion Balance (Cation/Anion)	--		1.02	0.93	1.05	0.83	0.98	0.93
Sum of ionic constituents analyzed	mg/L							

NOTES
1. -- = not sampled, nr = not reported, na = not applicable, nd = non detect
2. Geology is Sonoma Volcanics (Tsv)--basalt and tuff layers
3. Samples analyzed by Soil Control Lab; Watsonville, CA; CalTest, Napa, CA; and Harris Labs, Lincoln, NE
4. SB= Scott Brown; TB = Travis Baggett; PO= Pete Opatz (Suscol Mountain Vineyard)
*5. Values in **bold** exceed Title 22 MCL values.*

Table 2. Water quality analysis results for samples in and near upper Suscol Canyon, Napa County, California.

	Units	Title 22 MCL	SRCA081001: 1402	SRCA090507:1 450	SRCC081001: 1551	SRCB081001: 1452	SRCB090507: 1302	SRCD081001: 1630	SRCD090507: 1531
Date collected			10/01/08	5/7/09	10/01/08	10/01/08	5/7/09	10/01/08	5/7/09
Time			14:02	14:50	15:51	14:52	13:02	16:30	15:31
DESCRIPTORS									
Source			**Suscol Creek**	**Suscol Creek**	**Suscol Creek**	**Suscol Creek**	**Suscol Creek**	**Suscol Creek**	**Suscol Creek**
Geology[2]			Tsv	Tsv	Tsv	Tsv	Tsv	Tsv	Tsv
Lab used[3]			Soil Control	CalTest	Soil Control	Soil Control	CalTest	Soil Control	CalTest
Sample collected by[4]			SB	SB, TB	SB	SB	SB, TB	SB	SB, TB
FIELD MEASUREMENTS									
Dissolved oxygen	% Saturation		--	--	--	--	--	--	--
Estimated flow	gpm		5+	25	30	~20	80	0	60
pH (paper)	pH Units		--	--	--	--	--	--	--
Specific conductance (@ 25°C)	μmhos/cm		132	150	155	156	176	274	189
Specific conductance (@ field temp)	μmhos/cm		110	118	131	144	149	248	165
Temperature	°C		16.3	13.9	17.1	21.2	17.0	20.1	18.3
WATER QUALITY INDICATORS (LAB)									
Alkalinity (total)	mg/L CaCO3		--	40	--	--	62	--	67
E. Coli	MPN/100ml		--		--	--		--	
Hardness (total)	mg/L CaCO3		--	32	--	--	48	--	54
pH	pH Units		6.2	7.5	6.4	6.3	7.7	6.2	7.7
Specific conductance (@ 25°C)	μmhos/cm	1600	130	130	160	170	160	280	170
Total dissolved solids	mg/L	1000	87	160	100	110	170	180	160
Turbidity	NTU		--	4.1	--	--	1.2	--	0.91
GENERAL MINERALS									
Bicarbonate (HCO3)	mg/L HCO3		50	48	68	77	75	130	82
Boron (B)	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium (Ca)	mg/L		7.5	7.3	9.7	11	10	18	11
Carbonate (CO3)	mg/L CO3	120	<5	<6	<5	<5	<6	<5	<6
Chloride (Cl)	mg/L	250	10	9.8	10	11	12	15	12
Fluoride (F)	mg/L		--	0.88	--	--	<0.1	--	<0.1
Total Iron (Fe)	mg/L	0.3	**0.5**	0.09	0.065	0.2	0.12	0.19	0.13
Magnesium (Mg)	mg/L		3.8	3.4	6.0	6.0	5.6	12.0	6.3
Manganese (Mn)	mg/L	0.05	<0.02	<0.005	<0.2	<0.02	0.013	**0.08**	<0.0050
Potassium (K)	mg/L		3.1	3.8	2.7	2.3	3.3	2.0	3.0
Silica (Si)	mg/L SiO2		--	84	--	--	71	--	66
Sodium (Na)	mg/L		15	13	15	17	14	25	16
Sulfate (SO4)	mg/L	250	6.0	5.8	5.9	4.9	5.4	14	8.4
Sodium absorption ratio	--		1.1	--	0.93	1.0	--	1.1	0.79
TRACE AND HEAVY ELEMENTS									
Arsenic	μg/L	10	--	2.1	--	--	1.6	--	1.4
Cadmium	mg/L	0.005	--	--	--	--	--	--	--
Chromium									
Copper	mg/L	1	--	--	--	--	--	--	--
Lead	mg/L	0.015	--	--	--	--	--	--	--
Mercury	mg/L	0.002	--	--	--	--	--	--	--
Selenium	mg/L	0.05	--	--	--	--	--	--	--
Titanium									
Vanadium									
Zinc	mg/L	5	--	<0.02	--	--	<0.02	--	<0.02
NUTRIENTS									
Nitrite as NO2	mg/L		--		--	--		--	
Nitrate as NO3	mg/L	45	4.2	<2	1.7	<1	2.2	<1	<2
Ortho phosphate as P	mg/L		--		--	--		--	
Phosphate (P2O5)	mg/L		--		--	--		--	
LAB CHECK									
Major Cation (Ca+Mg+K+Na)	meq/L		1.4	1.2	1.7	1.8	1.6	3.0	1.8
Major Anion (HCO3+CO3+Cl+SO4)	meq/L		1.4	1.2	1.8	2.0	1.7	3.3	1.9
Ion Balance (Cation/Anion)	--		1.01	1.00	0.96	0.94	0.94	0.91	0.95
Sum of ionic constituents analyzed	mg/L								

NOTES
1. -- = not sampled, nr = not reported, na = not applicable, nd = non detect
2. Geology is Sonoma Volcanics (Tsv)--basalt and tuff layers
3. Samples analyzed by Soil Control Lab; Watsonville, CA; CalTest, Napa, CA; and Harris Labs, Lincoln, NE
4. SB= Scott Brown; TB = Travis Baggett; PO= Pete Opatz (Suscol Mountain Vineyard)
*5. Values in **bold** exceed Title 22 MCL values.*

Table 2. Water quality analysis results for samples in and near upper Suscol Canyon, Napa County, California.

	Units	Title 22 MCL	KC	KC	KW	KW
Date collected			4/28/09	4/24/09	4/28/09	4/24/09
Time			…	12:00	…	11:30
DESCRIPTORS						
Source			**Suscol Creek**	**Suscol Creek**	**Well #1-2009**	**Well #1-2009**
Geology[2]			Tsv	Tsv	Tsv	Tsv
Lab used[3]			Harris Labs	Caltest	Harris Labs	Caltest
Sample collected by[4]			PO	PO	PO	PO
FIELD MEASUREMENTS						
Dissolved oxygen	% Saturation		--	--	--	--
Estimated flow	gpm		--	--	--	--
pH (paper)	pH Units		--	--	--	--
Specific conductance (@ 25°C)	µmhos/cm		--	--	--	--
Specific conductance (@ field temp)	µmhos/cm		--	--	--	--
Temperature	°C		--	--	--	--
WATER QUALITY INDICATORS (LAB)						
Alkalinity (total)	mg/L CaCO3		--	65	--	100
E. Coli	MPN/100ml		--	--	--	
Hardness (total)	mg/L CaCO3		57.4	50.0	51.7	47.0
pH	pH Units		7.2	7.7	7.9	8.1
Specific conductance (@ 25°C)	µmhos/cm	1600	170	170	220	220
Total dissolved solids	mg/L	1000	--	160	--	210
Turbidity	NTU		--	1.4	--	8.3
GENERAL MINERALS						
Bicarbonate (HCO3)	mg/L HCO3		76	80	112	120
Boron (B)	mg/L		0.0	<0.1	0.1	<0.1
Calcium (Ca)	mg/L		13	10	10	9
Carbonate (CO3)	mg/L CO3	120	0.0	<6.0	4.8	<6.0
Chloride (Cl)	mg/L	250	17.1	10	12	11
Fluoride (F)	mg/L		--	<0.1	--	0.13
Total Iron (Fe)	mg/L	0.3	0.09	0.07	0.17	<0.05
Magnesium (Mg)	mg/L		6.0	5.7	6.4	6.5
Manganese (Mn)	mg/L	0.05	0.04	0.0095	**0.09**	**0.054**
Potassium (K)	mg/L		2.1	--	2.5	--
Silica (Si)	mg/L SiO2		--	72	--	88
Sodium (Na)	mg/L		11	14	25	30
Sulfate (SO4)	mg/L	250	9.1	4.8	7.3	4.0
Sodium absorption ratio	--		0.7	0.8	1.9	1.9
TRACE AND HEAVY ELEMENTS						
Arsenic	µg/L	10	--	1.4	--	6.1
Cadmium	mg/L	0.005	--	--	--	--
Chromium						
Copper	mg/L	1	--	--	--	--
Lead	mg/L	0.015	--	--	--	--
Mercury	mg/L	0.002	--	--	--	--
Selenium	mg/L	0.05	--	--	--	--
Titanium						
Vanadium						
Zinc	mg/L	5	--	<0.02	--	<0.02
NUTRIENTS						
Nitrite as NO2	mg/L		--	--	--	--
Nitrate as NO3	mg/L	45	0.4	2.7	0.0	<2
Ortho phosphate as P	mg/L		--	--	--	--
Phosphate (P2O5)	mg/L		1.1	--	0.5	--
LAB CHECK						
Major Cation (Ca+Mg+K+Na)	meq/L		1.7	1.6	2.2	2.2
Major Anion (HCO3+CO3+Cl+SO4)	meq/L		2.0	1.7	2.5	2.4
Ion Balance (Cation/Anion)	--		0.87	0.94	0.88	0.92
Sum of ionic constituents analyzed	mg/L					

NOTES

1. -- = not sampled, nr = not reported, na = not applicable, nd = non detect

2. Geology is Sonoma Volcanics (Tsv)--basalt and tuff layers

3. Samples analyzed by Soil Control Lab; Watsonville, CA; CalTest, Napa, CA; and Harris Labs, Lincoln, NE

4. SB= Scott Brown; TB = Travis Baggett; PO= Pete Opatz (Suscol Mountain Vineyard)

*5. Values in **bold** exceed Title 22 MCL values.*

TABLE 3. Precipitation data used for modeling the Suscol Mountain Vineyards, Napa and Solano Counties, California

	NOAA Atlas 24-hour rainfall *in*
2-year	3.75
5-year	4.75
10-year	5.25
25-year	6
50-year	6.5
100-year	7.5

Data taken from NOAA Atlas 2, Volume 11.

Table 4. Curve numbers for various land cover classifications used for hydrologic modeling, Suscol Mountain Vineyard, Napa County, California. 'Fair' conditions were used for existing conditions and post-project conditions outside of deer fencing. 'Good' conditions were used for areas enclosed by deer fencing under post-project conditions. See text for additional discussion.

LAND USE	CONDITION	A	B	C	D
Agriculture					
Moderate Grazing	*Fair*		*69*	*79*	*84*
Ungrazed	*Good*		*61*	*75*	*81*
Barberry					
Moderate Grazing	*Fair*		*69*	*79*	*84*
Ungrazed	*Good*		*61*	*74*	*80*
CA Annual Grasslands Alliance					
Moderate Grazing	*Fair*		*69*	*79*	*84*
Ungrazed	*Good*		*61*	*74*	*80*
California Sagebrush					
	Fair		*56*	*70*	*77*
	Good		*48*	*65*	*73*
Chamise Alliance					
	Fair		*56*	*70*	*77*
	Good		*48*	*65*	*73*
California Bay - Madrone - Coast Live Oak - (Black Oak Big - Leaf Maple) NFD Super Alliance					
Moderate Grazing	*Fair*		*69*	*79*	*84*
Managed or No Grazing	*Good*		*61*	*74*	*80*
Coast Live Oak - Blue Oak - (Foothill Pine) NFD Association					
Grazed	*Fair*		*60*	*73*	*79*
Ungrazed	*Good*		*55*	*70*	*77*
Coast Live Oak Alliance					
Grazed	*Fair*		*60*	*73*	*79*
Ungrazed	*Good*		*55*	*70*	*77*
Purple Needlegrass					
Managed Grazing	*Fair*		*69*	*79*	*84*
Ungrazed	*Good*		*61*	*74*	*80*
Seep					
Managed Grazing	*Fair*		*69*	*79*	*84*
Ungrazed	*Good*		*61*	*74*	*80*

Upland Annual Grasslands & Forbs Formation					
Managed Grazing	*Fair*		*69*	*79*	*84*
Ungrazed	*Good*		*61*	*74*	*80*
Valley Oak - Fremont Cottonwood - (Coast Live Oak) Riparian Forest NFD Association					
	Fair		*60*	*73*	*79*
	Good		*55*	*70*	*77*
Vineyard					
	Fair		*69*	*79*	*84*
Water		98	98	98	98
White Alder					
	Fair		*60*	*73*	*79*
	Good		*55*	*70*	*77*
Willow Woodland					
	Fair		*60*	*73*	*79*
	Good		*55*	*70*	*77*

TABLE 5. Change in basin curve numbers and lag time with the development of Suscol Mountain Vineyards, Napa and Solano Counties, California

GeoHMS ID	Area		Hydraulic Length	Basin Slope[1]	EXIST				POST			
					Ia	BCN	S	Basin Lag	Ia	BCN	S	Basin Lag
	mi^2	ac	ft	%	in			min	in			min
Fagan Ck 1	0.0350	22.4	2,855	23	0.5000	80	2.5	9.14	0.5000	80	2.5	9.14
Fagan Ck 2	0.0150	9.6	1,419	44	0.5641	78	2.8	4.06	0.5641	78	2.8	4.06
Fagan Ck 3	0.0090	5.8	1,406	27	0.5641	78	2.8	5.10	0.5641	78	2.8	5.10
Fagan Ck 4	0.0440	28.2	2,664	27	0.5641	78	2.8	8.57	0.5641	78	2.8	8.57
Fagan Ck 5	0.0450	28.8	2,701	42	0.5974	77	3.0	7.13	0.5974	77	3.0	7.13
Fagan Trib 1	0.1640	105.0	5,708	26	0.5316	79	2.7	15.53	0.5316	79	2.7	15.53
Fagan Trib 2*	0.2120	135.7	4,777	32	0.5316	79	2.7	12.15	0.6948	74	3.5	16.99
Fagan Trib 3	0.0280	17.9	2,739	27	0.4390	82	2.2	7.74	0.5000	80	2.5	8.25
Fagan Trib 4	0.0490	31.4	2,559	39	0.5316	79	2.7	6.69	0.5641	78	2.8	6.90
Sheehy Ck 1*	0.1100	70.4	3,719	25	0.3810	84	1.9	9.49	0.4494	82	2.2	11.39
Sheehy Ck 1.5	0.0080	5.1	1,158	15	0.5000	80	2.5	5.56	0.5000	80	2.5	5.56
Sheehy Ck 2*	0.1690	108.2	5,429	25	0.4390	82	2.2	13.84	0.5000	80	2.5	14.76
Sheehy Ck 3	0.1650	105.6	5,673	24	0.4390	82	2.2	14.74	0.5000	80	2.5	15.71
Sheehy Ck 4	0.1600	102.4	5,449	28	0.5000	80	2.5	13.94	0.5316	79	2.7	14.37
Sheehy Ck 5	0.1120	71.7	6,322	30	0.4390	82	2.2	14.28	0.5000	80	2.5	15.23
Sheehy Ck 6.1	0.0200	12.8	2,050	19	0.5316	79	2.7	8.03	0.5641	78	2.8	8.28
Sheehy Ck 6.2*	0.1290	82.6	4,176	33	0.5316	79	2.7	10.69	0.5641	78	2.8	11.02
Suscol Ck 1	0.1970	126.1	4,980	40	0.4691	81	2.3	10.61	0.5000	80	2.5	10.95
Suscol Ck 2	0.0450	28.8	2,345	45	0.5316	79	2.7	5.82	0.5641	78	2.8	6.00
Suscol Ck 3*	0.0810	51.8	3,121	38	0.4691	81	2.3	7.48	0.5316	79	2.7	7.96
Suscol Ck 4	0.3570	228.5	6,754	33	0.4390	82	2.2	14.31	0.5000	80	2.5	15.25
Suscol Ck 5	0.0780	49.9	2,210	37	0.4691	81	2.3	5.72	0.4691	81	2.3	5.72
Suscol Ck 6	0.1322	84.6	4,391	26	0.3810	84	1.9	10.70	0.4390	82	2.2	11.44
Suscol Ck 7	0.0080	5.1	1,433	24	0.5974	77	3.0	5.68	0.5974	77	3.0	5.68

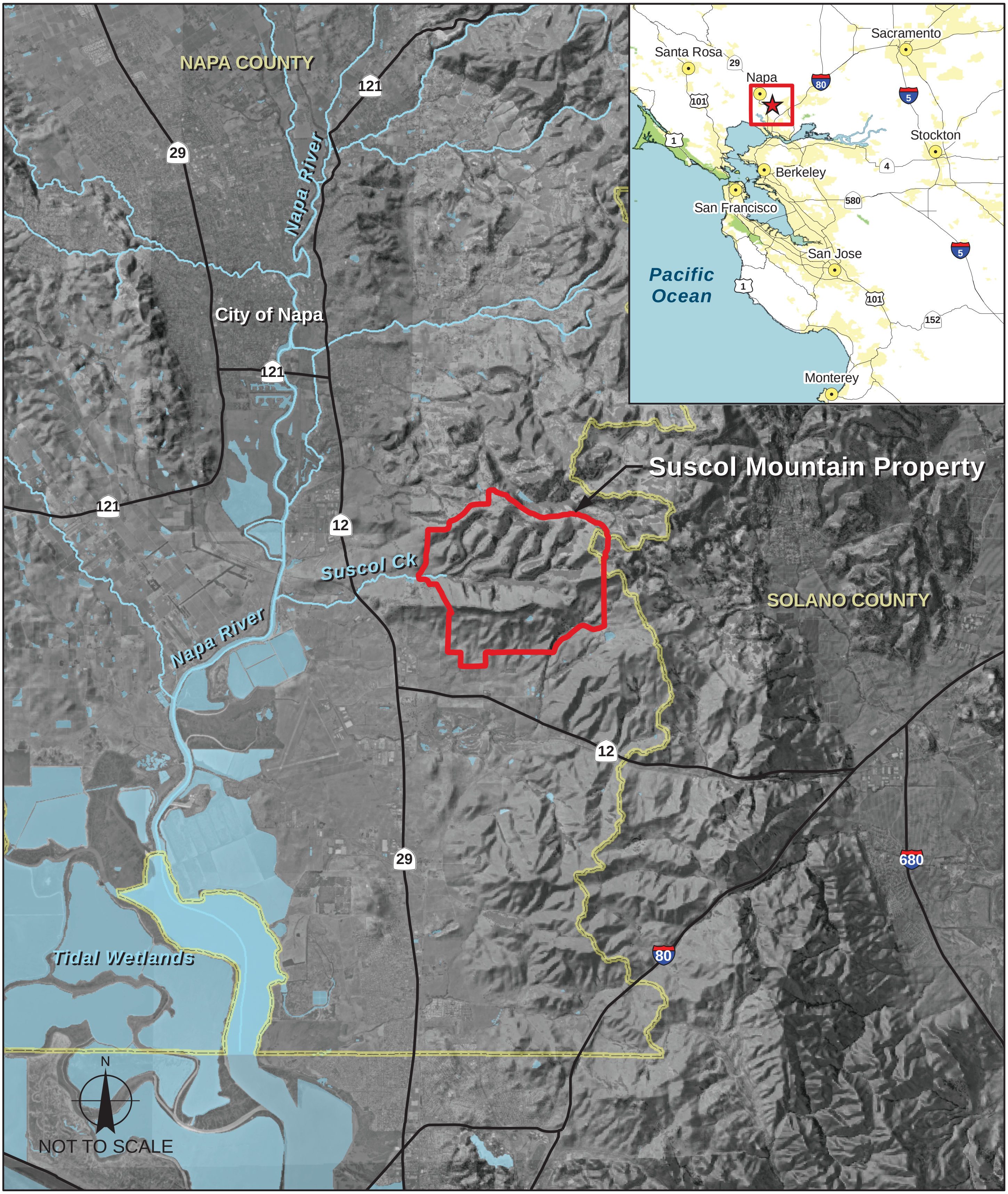
TABLE 5. Change in basin curve numbers and lag time with the development of Suscol Mountain Vineyards, Napa and Solano Counties, California

GeoHMS ID	Area		Hydraulic Length	Basin Slope[1]	EXIST				POST			
					Ia	BCN	S	Basin Lag	Ia	BCN	S	Basin Lag
	mi^2	ac	ft	%	in			min	in			min
Suscol Trib 1*	0.2359	151.0	5,863	38	0.4096	83	2.0	11.59	0.4691	81	2.3	12.37
Suscol Trib 2	0.1670	106.9	4,790	27	0.4096	83	2.0	11.72	0.5000	80	2.5	10.86
Suscol Trib 3.1	0.1700	108.8	5,643	38	0.4390	82	2.2	11.54	0.4691	81	2.3	14.26
Suscol Trib 3.2	0.1110	71.0	4,032	36	0.4390	82	2.2	9.06	0.4691	81	2.3	9.11
Suscol Trib 3.3	0.0420	26.9	2,530	38	0.4691	81	2.3	6.26	0.5000	80	2.5	6.65
Suscol Trib 4	0.2840	181.8	8,229	39	0.4390	82	2.2	15.47	0.4691	81	2.3	16.07
Suscol Trib 5.1	0.0720	46.1	4,351	35	0.4390	82	2.2	9.86	0.4691	81	2.3	9.60
Suscol Trib 5.2	0.1760	112.6	5,274	40	0.4390	82	2.2	10.65	0.4691	81	2.3	11.88
Suscol Trib 5.3	0.0500	32.0	2,723	38	0.4691	81	2.3	6.72	0.5000	80	2.5	6.69
Suscol Trib 6	0.0490	31.4	3,745	25	0.4096	83	2.0	9.96	0.5316	79	2.7	9.23
Suscol Trib 7	0.1230	78.7	5,644	26	0.4096	83	2.0	13.58	0.4390	82	2.2	14.30

Green = weighted averages for whole watershed for tabular purposes only, broken down into subwatersheds for model

1. Basin slope given only for existing project conditions

FIGURES



Source: TerraServer, 1993.

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Figure 1. Location map for Suscol Mountain Vineyards, Napa and Solano Counties, California

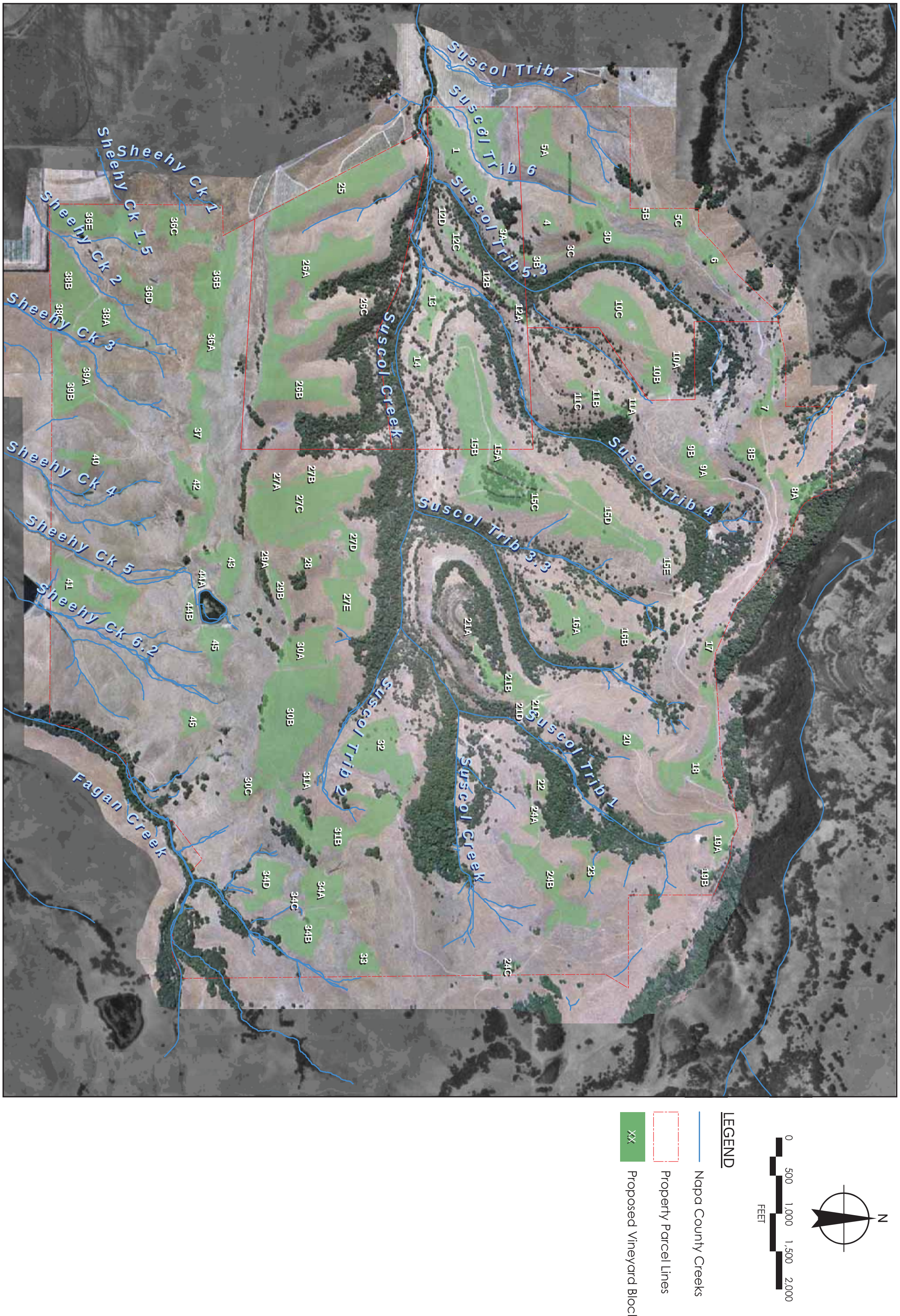

Figure 2. Suscol Mountain Vineyard, proposed vineyard plots, Napa and Solano Counties, California.

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Figure 3. Photograph showing grazed conditions in the upper Suscol Creek watershed, Napa County, California. Image captured October 1, 2008 near spring 19. Note the large blocks of basalt present on the ground surface.

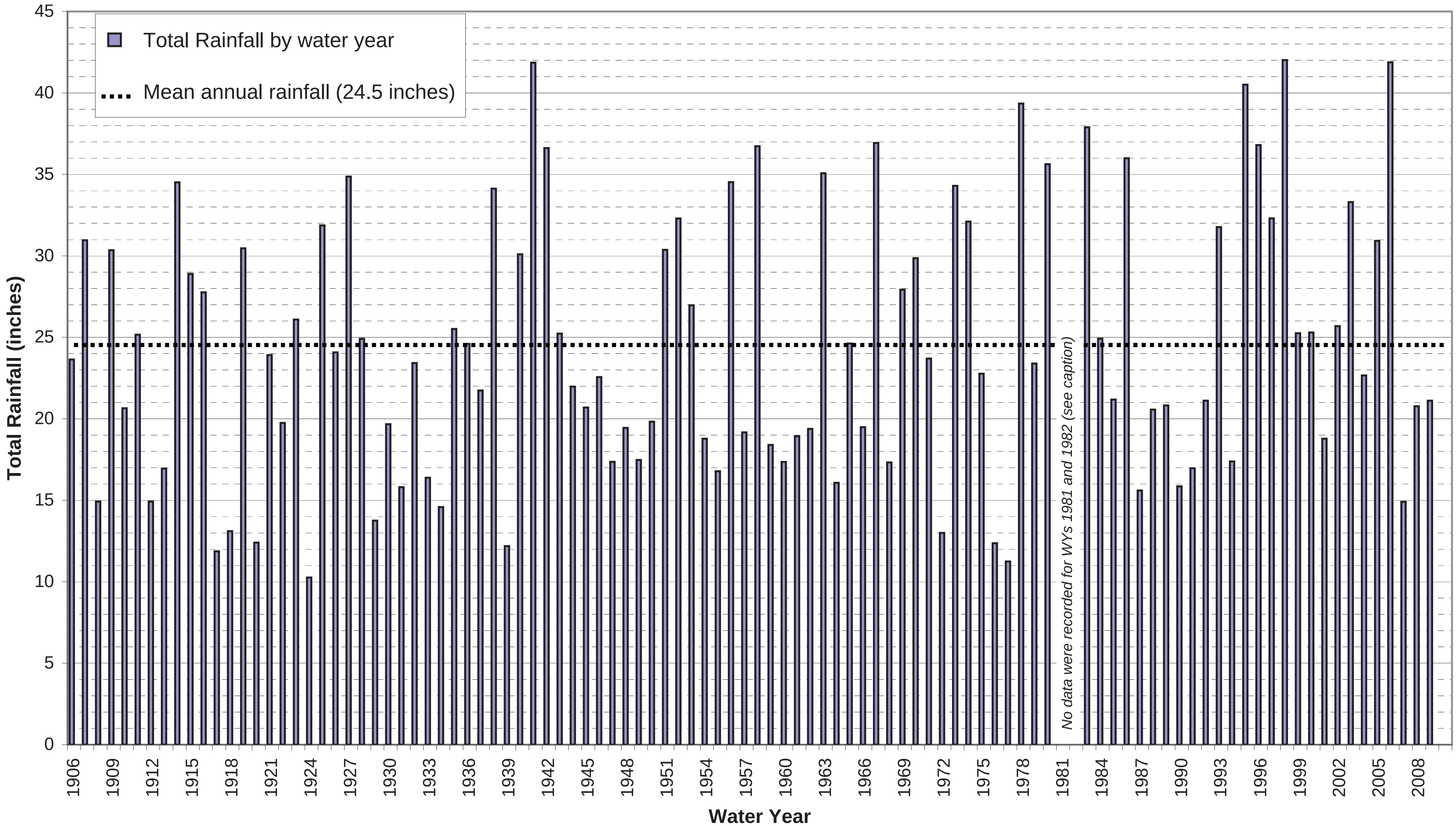

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Figure 4. Annual precipitation, by water year, at the Napa Fire Department (NSH) station. Precipitation has varied between 10 and 42 inches at this location, but would be somewhat higher at the Suscol Mountain project site. During 1981 and 1982, rainfall was approximately 70% and 130% of annual mean, respectively, based on data from the Clear Lake Highlands (CLH) gage. Data from the California Data Exchange Center (CDEC) website.

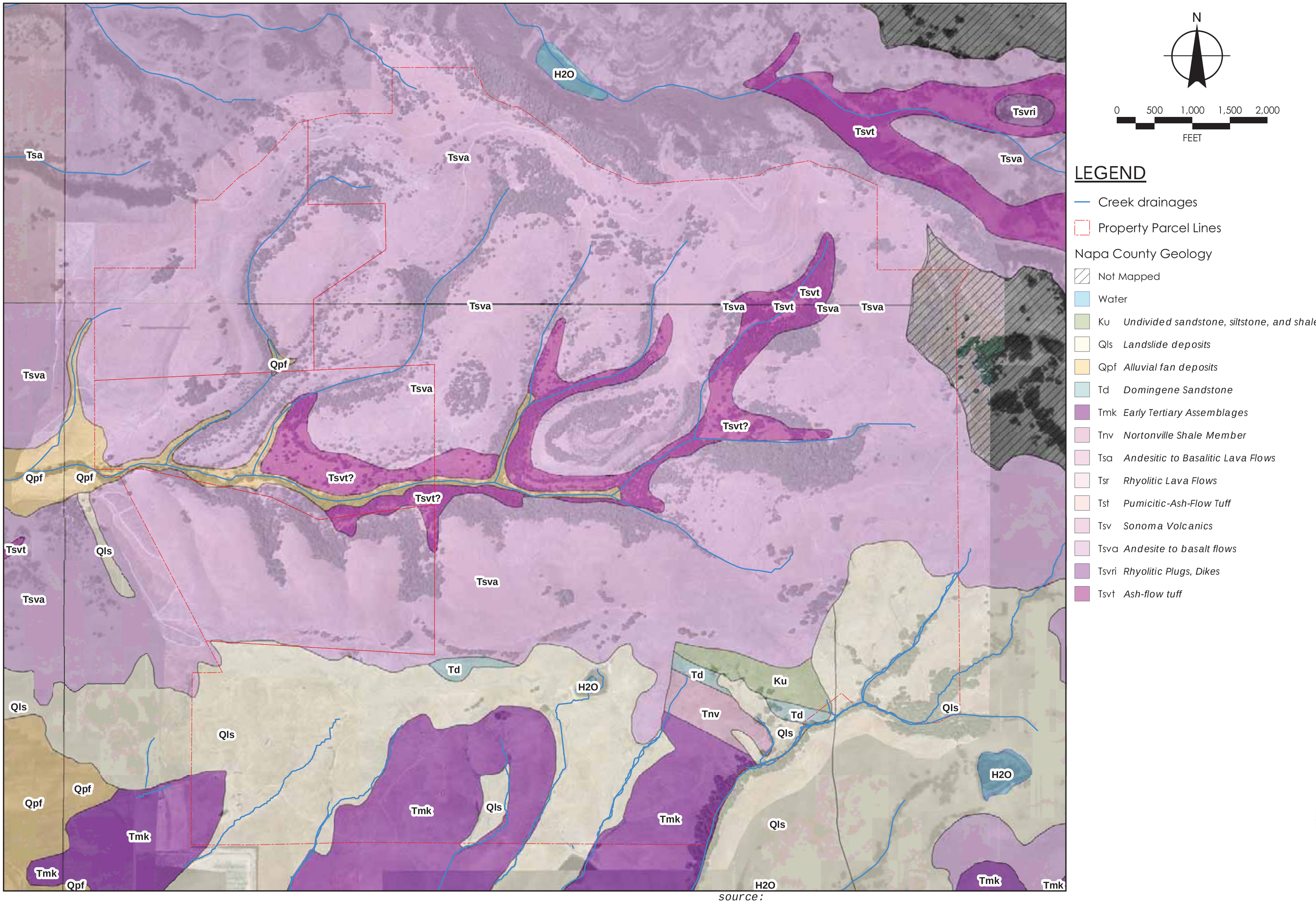

Figure 5. Suscol Mountain Vineyard, existing geology map, Napa and Solano Counties, California.

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Figure 6. Photograph of striped vegetation patterns within the Suscol watershed. Stripes highlight the water capacity of the underlying layered volcanics. See Figure 12 for diagrammatic sketch of the infiltration and near-surface groundwater flow patters. Image captured May 7, 2009

Figure 7. Localized incision and undercut banks on upper Suscol Creek, Suscol Mountain Ranch, Napa County, California. Photo captured October 1, 2008, approximately 1.7 miles upstream of the project property line. Photo taken looking upstream.

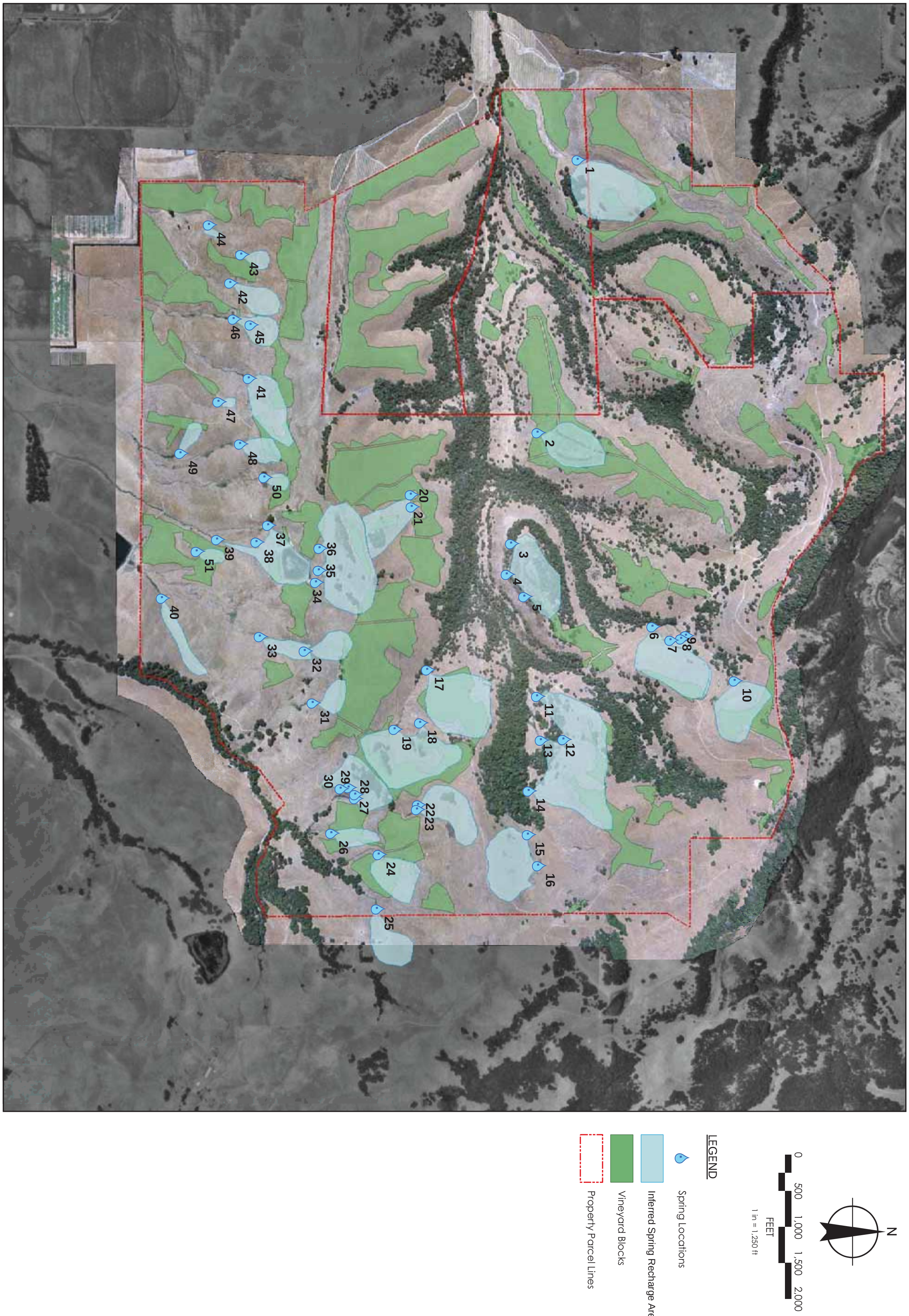

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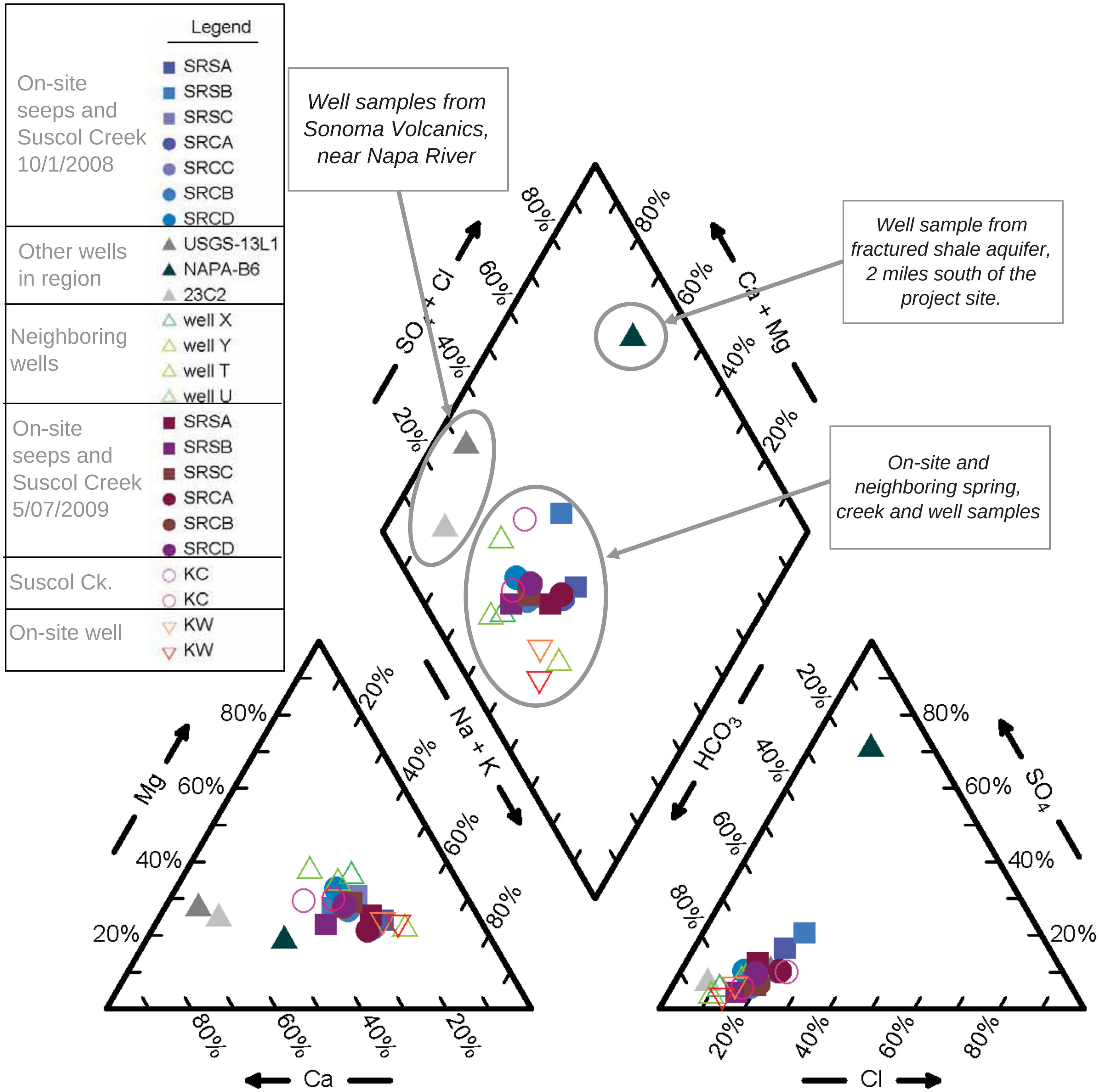
Figure 8. Spring locations and inferred recharge areas on the Suscol Mountain Vineyard property, Napa County, California.

W:\Projects\208159\208159 Springs Map 082510.mxd

Background image captured from Google Earth

Figure 9. Locations of seep, spring, and creek samples, Suscol Ranch, Napa County, California. Sample designations beginning with 'SRS' are seep/spring samples. Sample designations beginning with 'SRC' were taken from Suscol Creek. The site of the existing well is shown for reference. Approximate property line shown as dotted white line. Sample collection was attempted at five other spring locations, but no surface flow was present.

208159 Photo figures.ppt



The diagram shows cations in the ternary plot on the left and anions on the right plot. The double ternary (diamond) plot in the center separates hardness dominated (on the left) from saline dominated water (on the right).

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Figure 10. Piper plot of water samples collected on and near the Suscol Mountain Ranch, Napa County, California. See Table 1 for a summary of water chemistry and additional information on sampling locations. Spring sample designations begin with SRS, and creek samples begin with SRC.

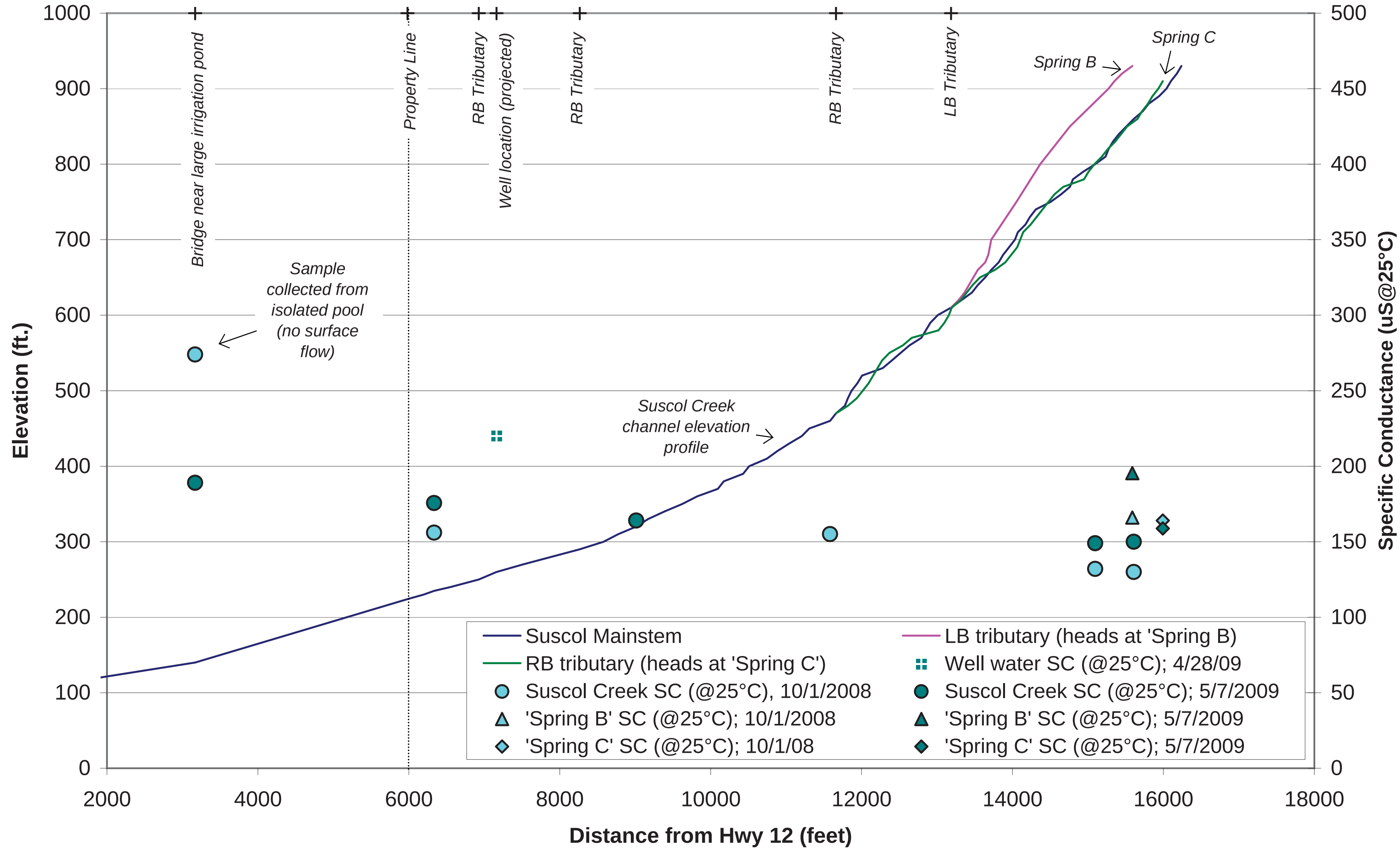

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Figure 11. **Specific conductance profile of Suscol Creek and nearby springs, Suscol Mountain Ranch, Napa County, California.** Note that specific conductance values generally fall within a relatively narrow range, and show very little change between fall and spring conditions at a given location . Specific conductance at Suscol Well #1 is also shown.

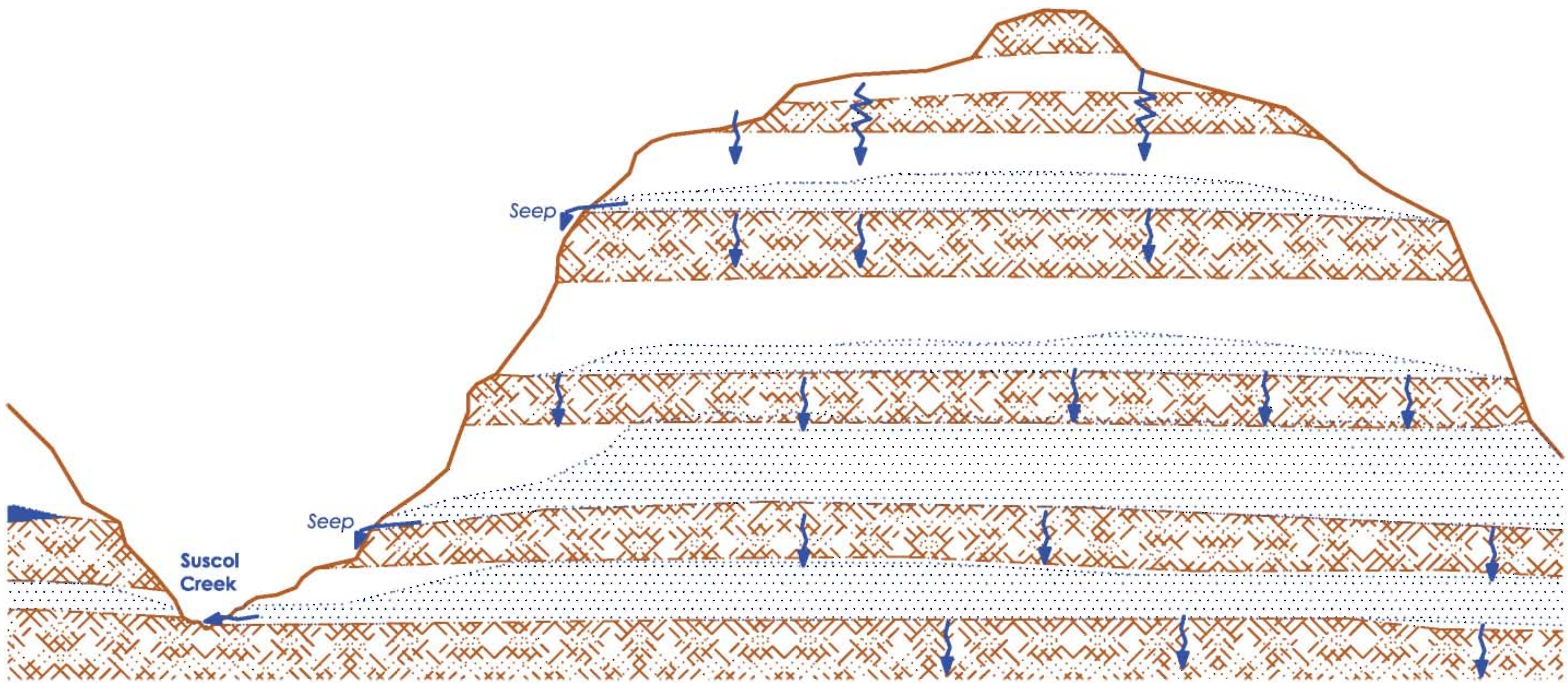

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Figure 12. Conceptual hydrologic diagram of spring and stream baseflow sources, Suscol Vineyards, Napa County, California. The layered volcanics serve to meter seasonal rainfall effects, resulting in a relatively steady flow in the creek and springs through the dry season and during prolonged drought periods.

208159 conceptual hydrologic section.dwg 12-9-09

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Figure 13. Photograph of spring 13, Suscol Mountain Ranch, Napa County, California. Image captured October 1, 2008. The ground surface of the spring was saturated, but flow was too spread out to collect a reliable water sample for water chemistry analysis. Note the bedrock exposed at the ground surface in the foreground of the image.

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Figure 14. Photograph of spring 2, Suscol Mountain Ranch, Napa County, California. Photo captured October 1, 2008. The ground surface of the spring was damp, but not saturated.

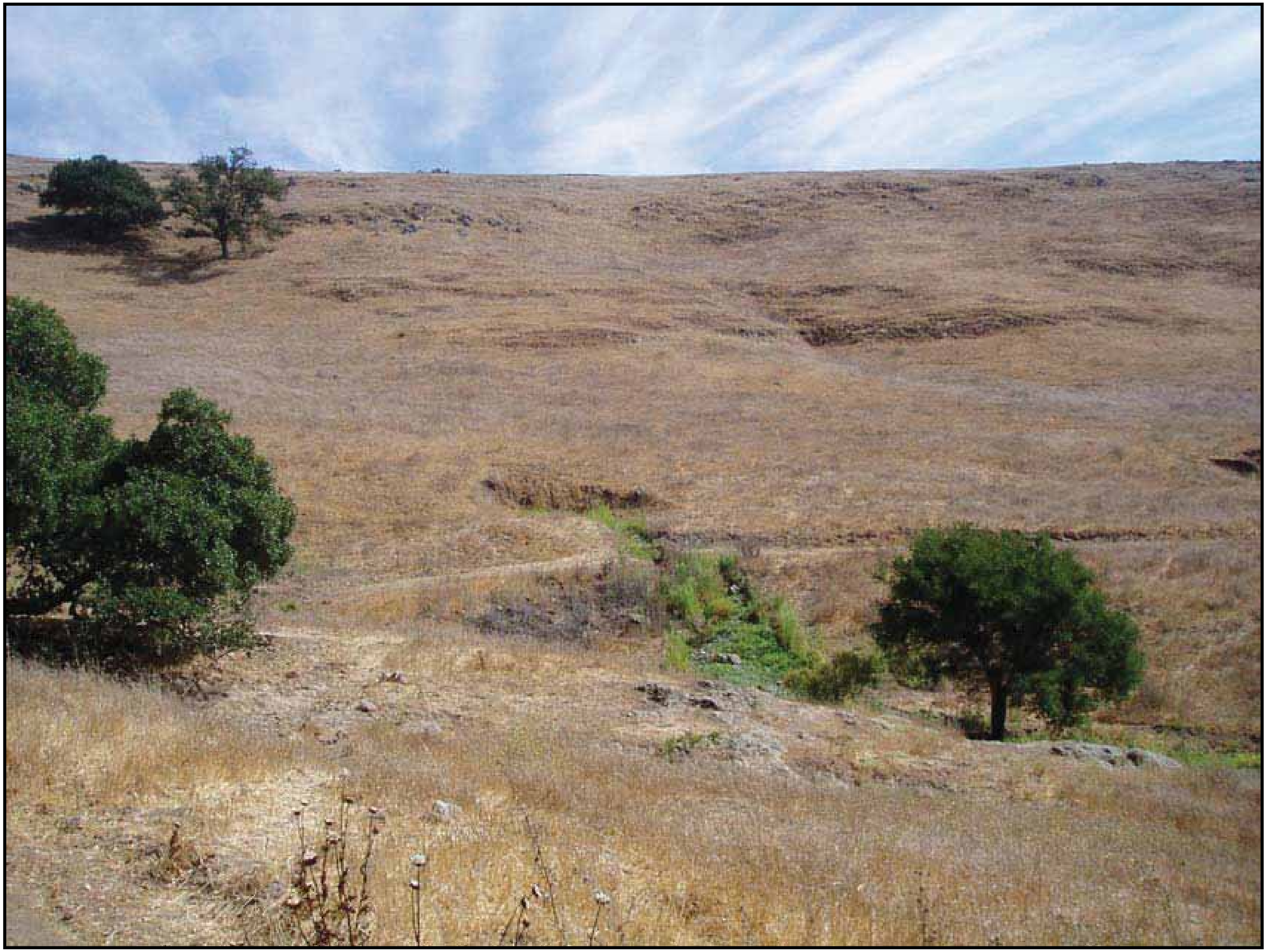

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Figure 15. Photograph of spring 9, Suscol Mountain Ranch, Napa County, California. Photo captured October 1, 2008. The Spring was flowing at greater than 2 gpm at the time of the site visit. Adjacent springs (just outside the right frame of the image) were contributing similar amounts of flow to the tributary stream.

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Figure 16. Photograph of exposed bedrock control in Suscol Creek tributary 3.2.
Basalt layers serve as grade control and limit the amount of incision experienced within the tributaries. Image captured May 7, 2009, downstream of Spring 9.

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Figure 17. Photograph of exposed bedrock in the Suscol Creek mainstem. Basalt layers serve as grade control and limit the amount of incision. Image captured October 1, 2008.

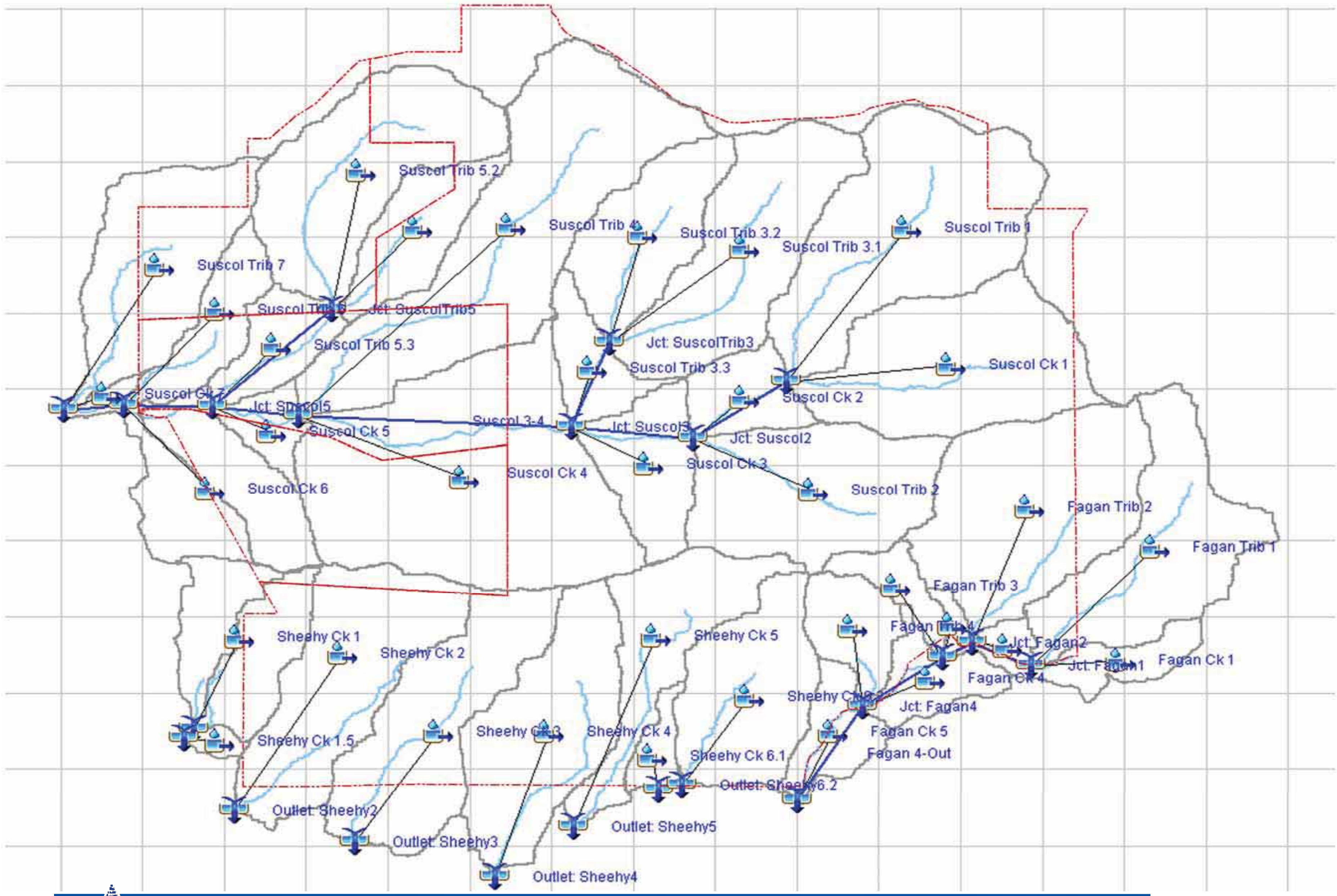

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FIGURE 18. Suscol Mountain Vineyards existing conditions model schematic
Suscol Mountain Vineyards, Napa and Solano Counties, California

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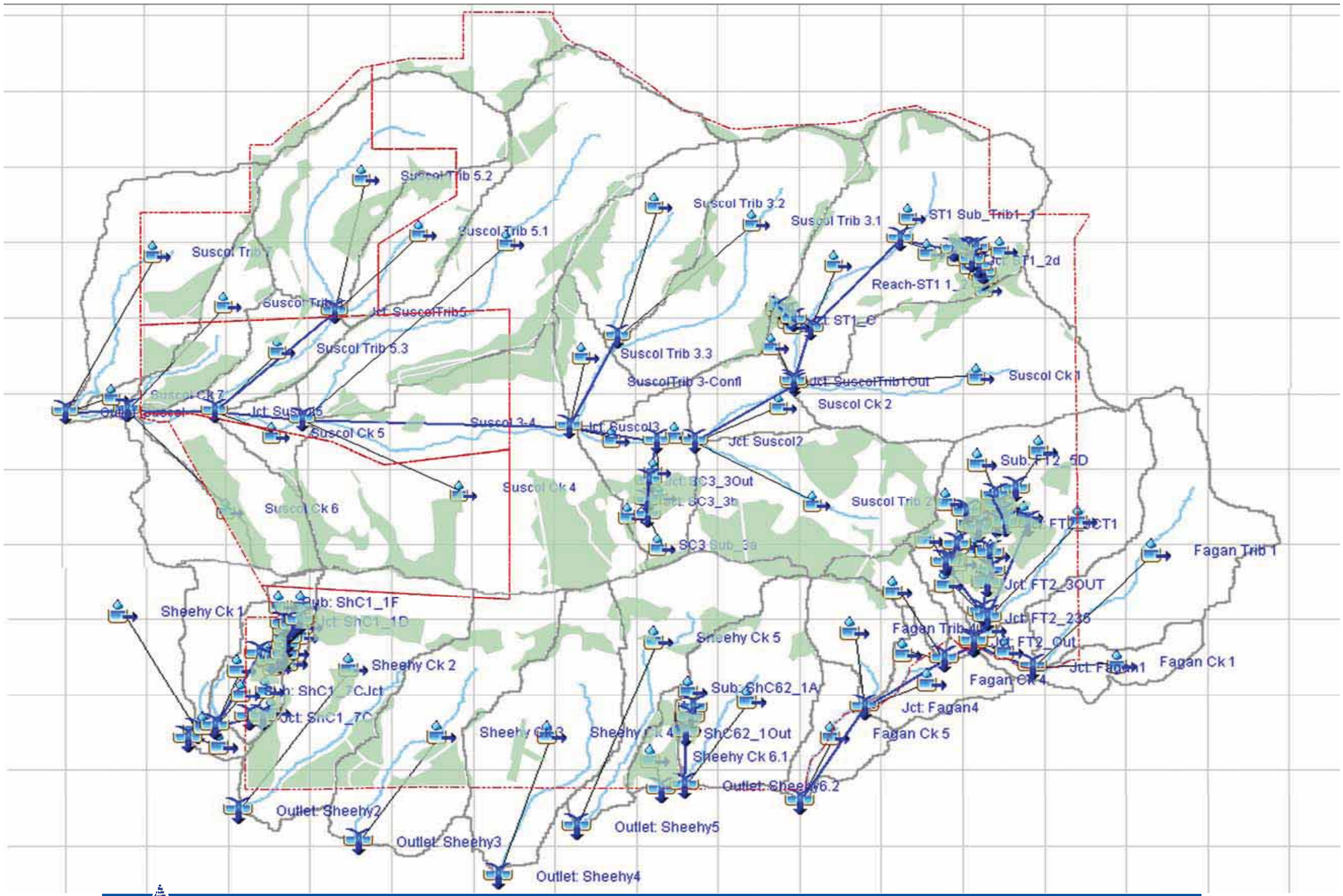

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FIGURE 19. Suscol Mountain Vineyards post-project model schematic
Suscol Mountain Vineyards, Napa and Solano Counties, California

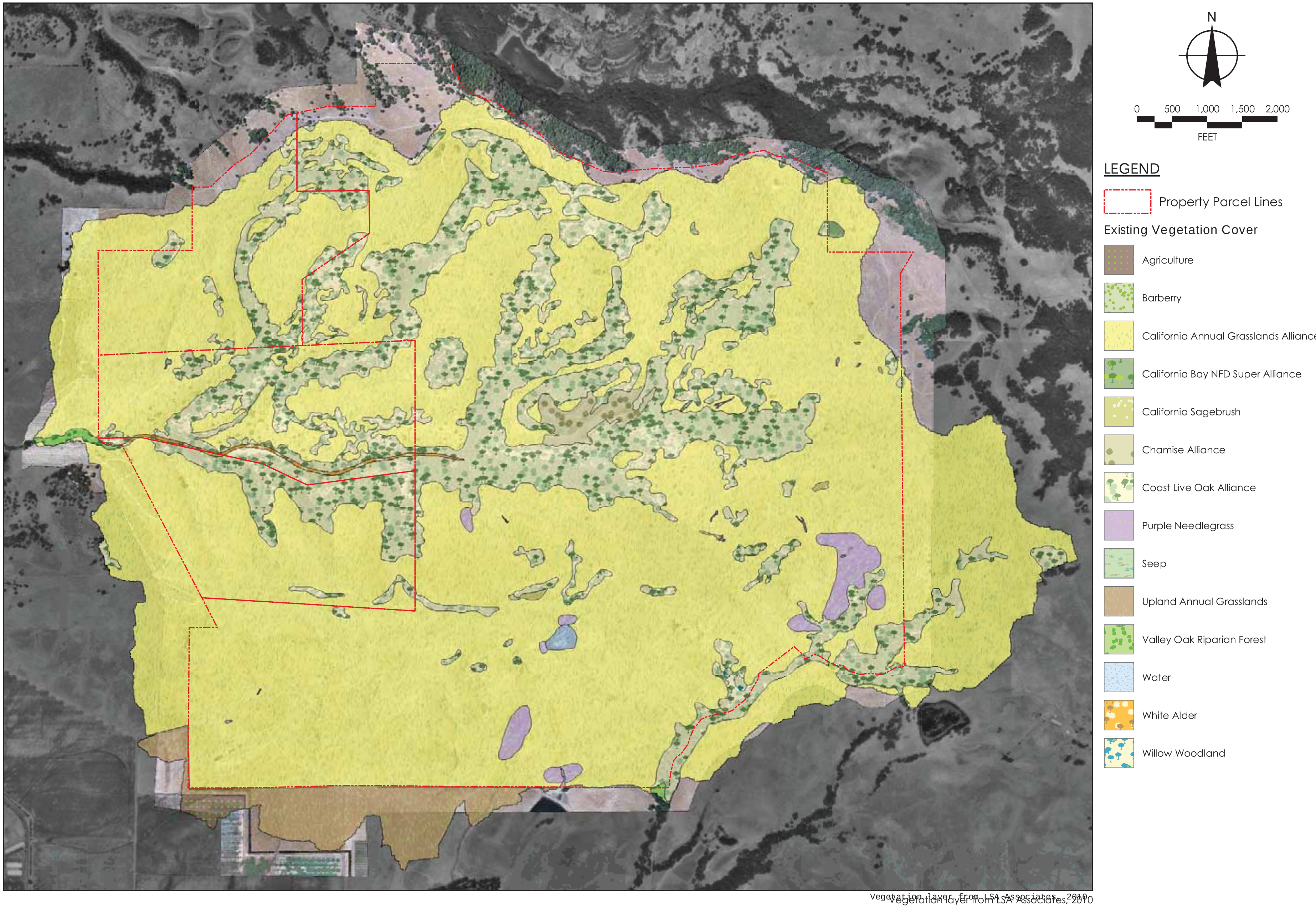

Figure 20. Existing land cover within Suscol Mountain Vineyard, Napa and Solano Counties, California

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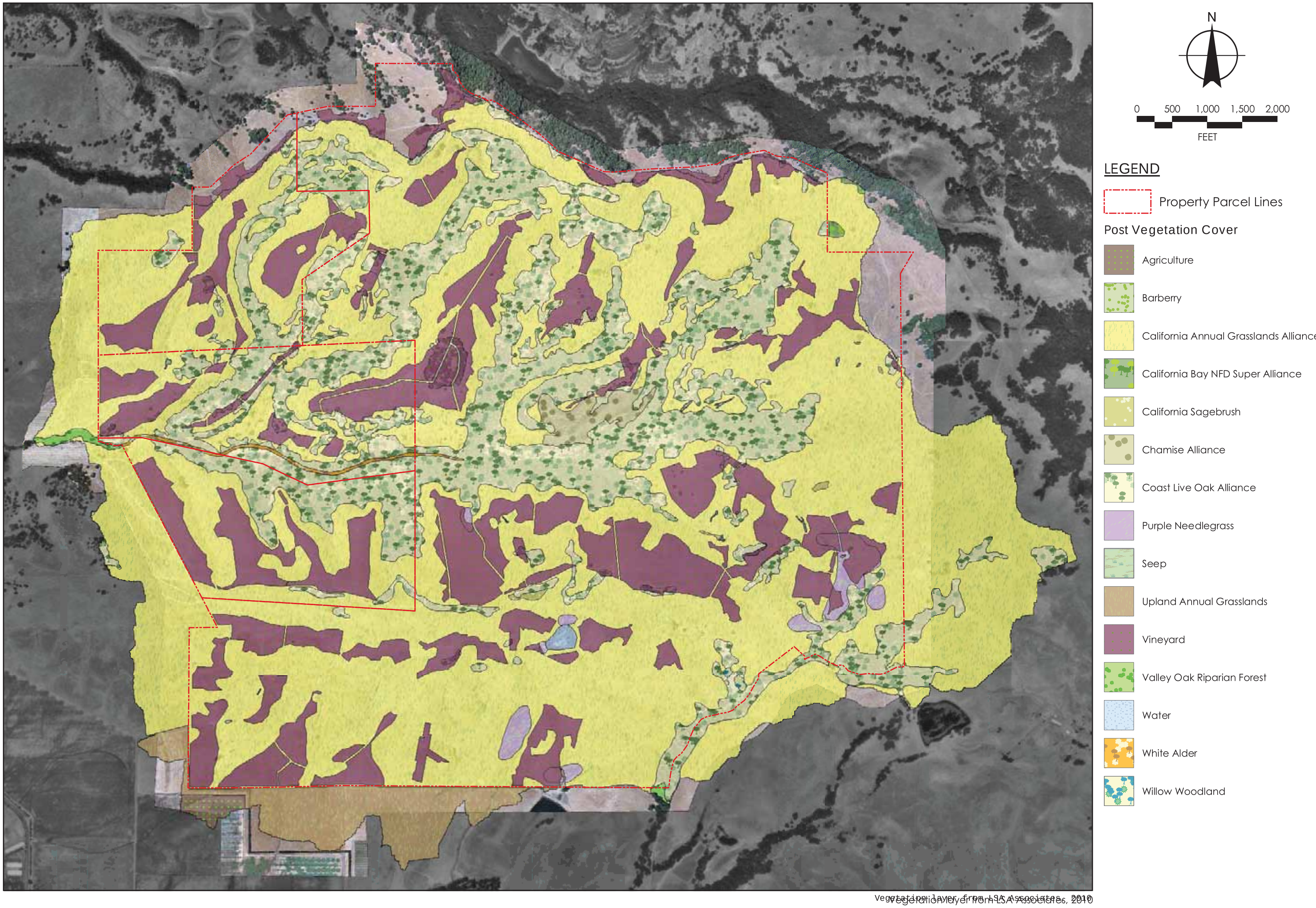

Figure 21. Post-project land cover within Suscol Mountain Vineyard, Napa and Solano Counties, California

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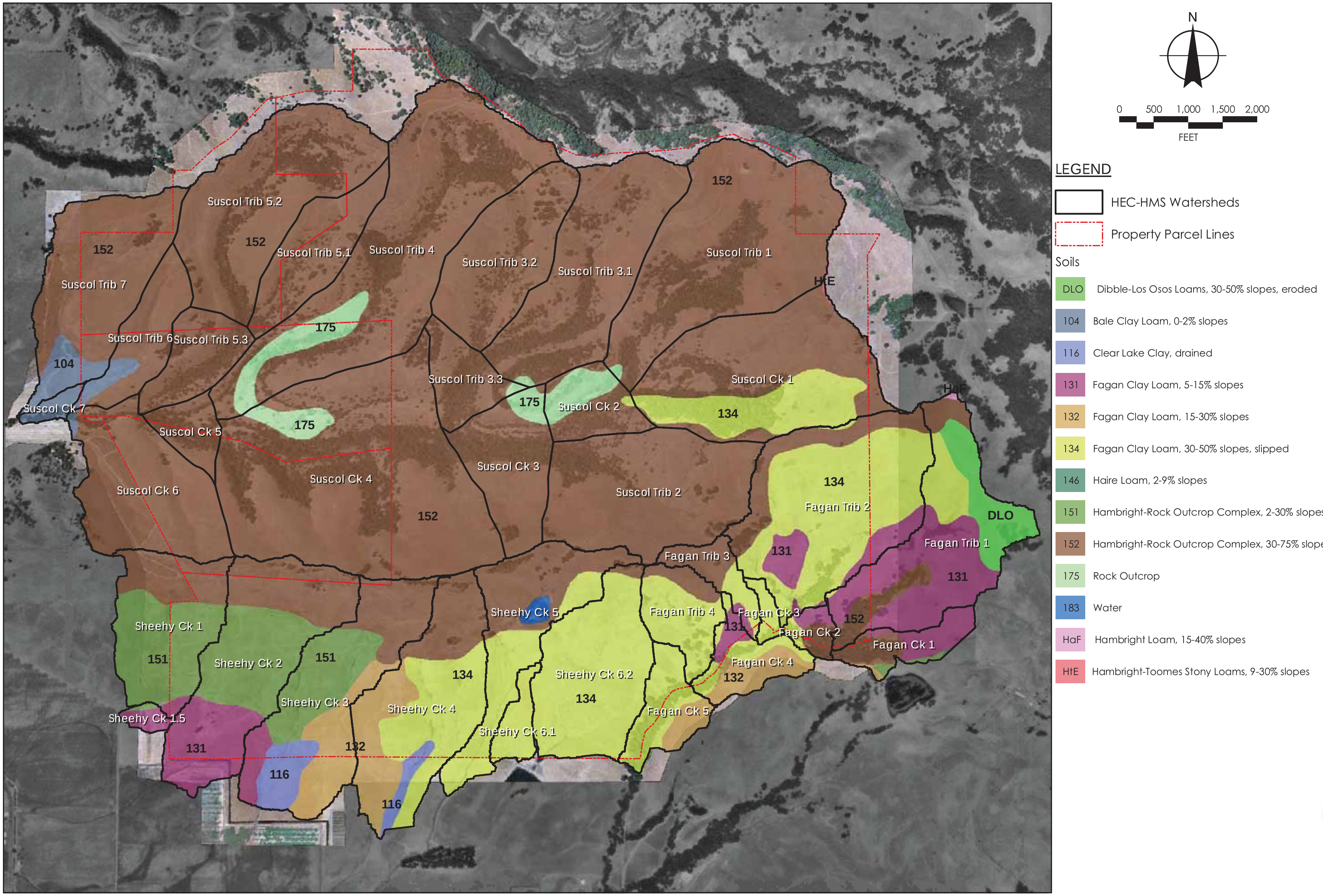

Figure 22. Existing soils at Suscol Mountain Vineyard, Napa and Solano Counties, California

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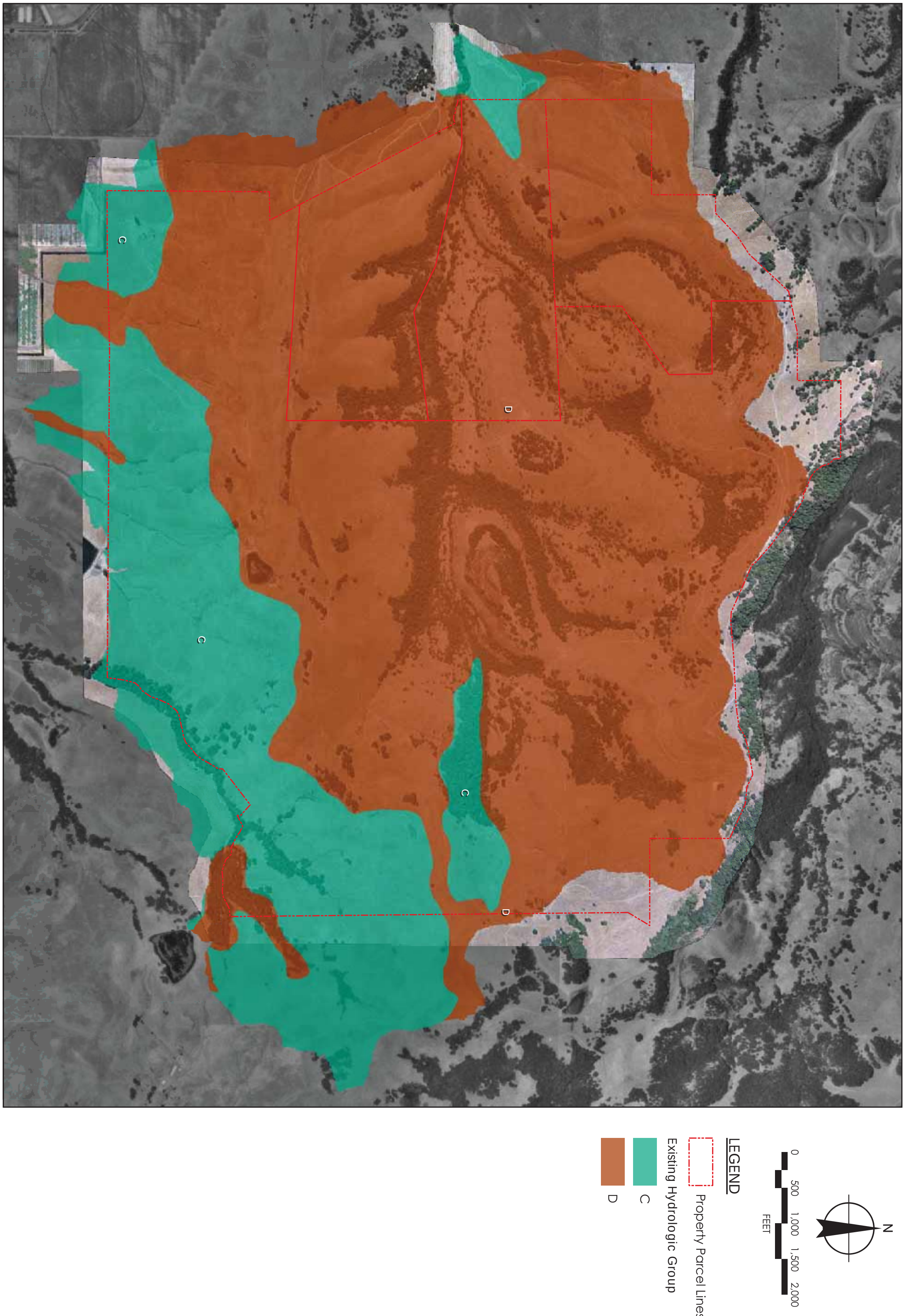

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Figure 23. Existing hydrologic group for soils within Suscol Mountain Vineyard, Napa and Solano Counties, California

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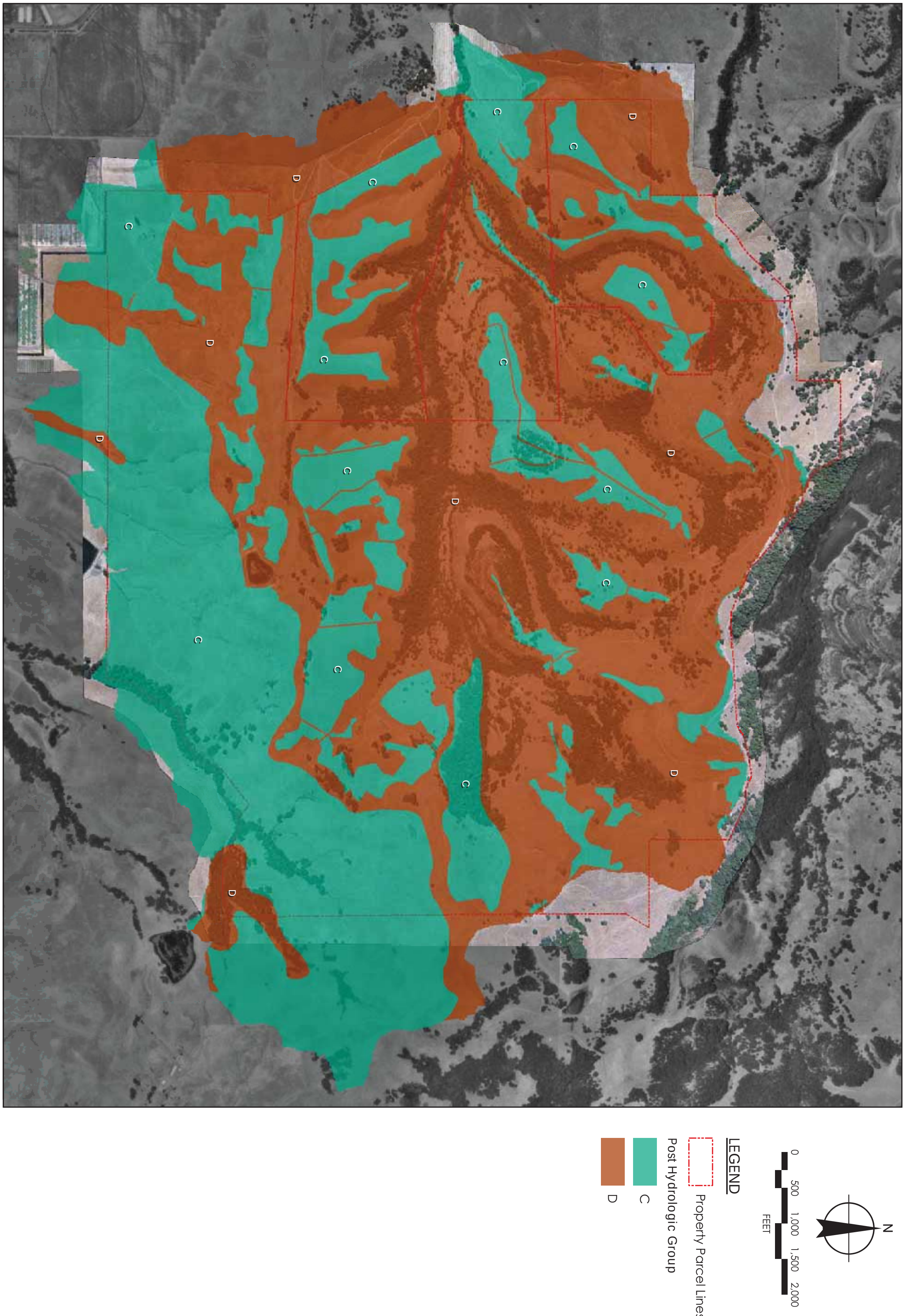

Figure 24. Post-project hydrologic group for soils within Suscol Mountain Vineyard, Napa and Solano Counties, California

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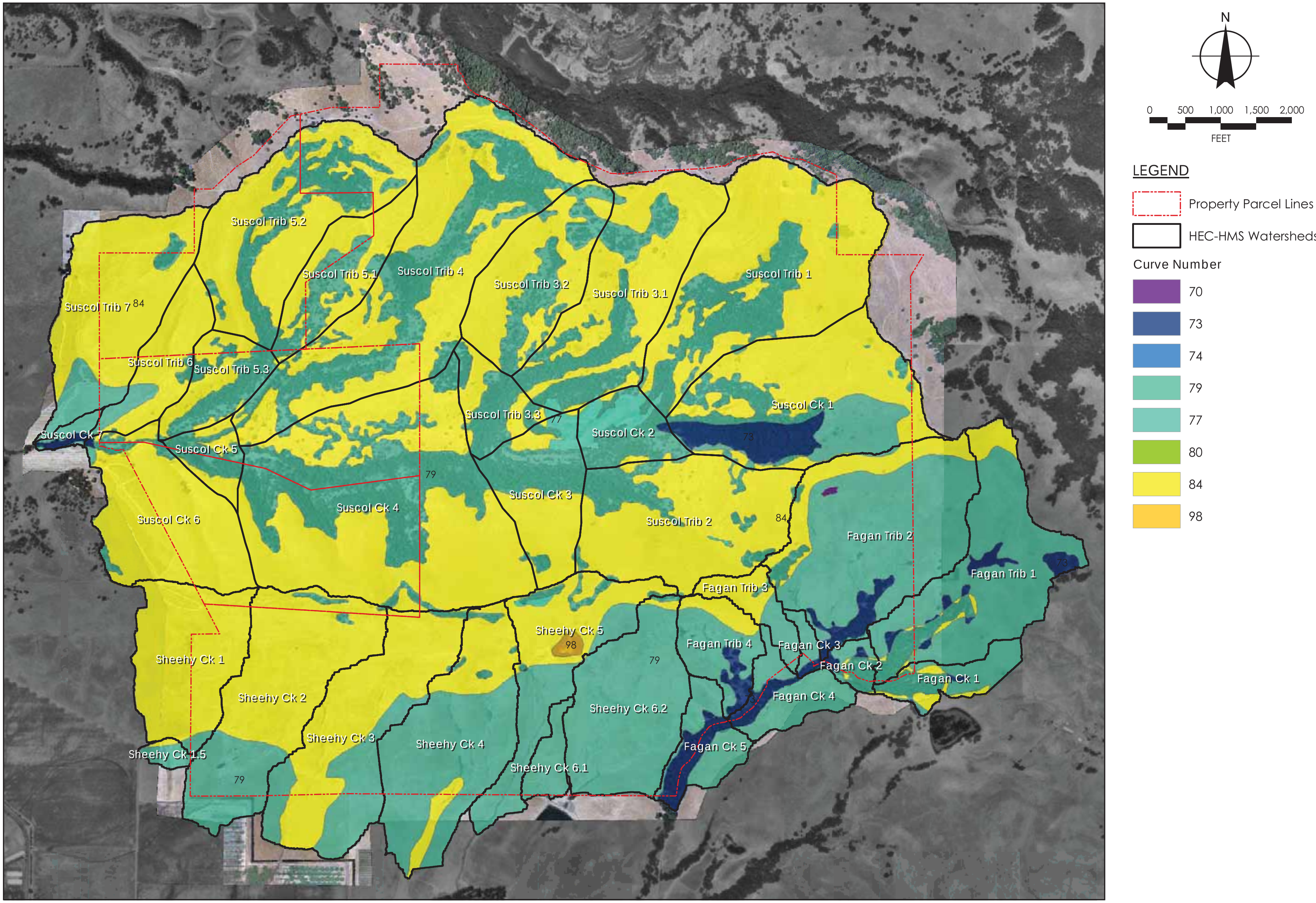

Figure 25. Existing curve numbers for Suscol Mountain Vineyard, Napa and Solano Counties, California

Balance Hydrologics, Inc.

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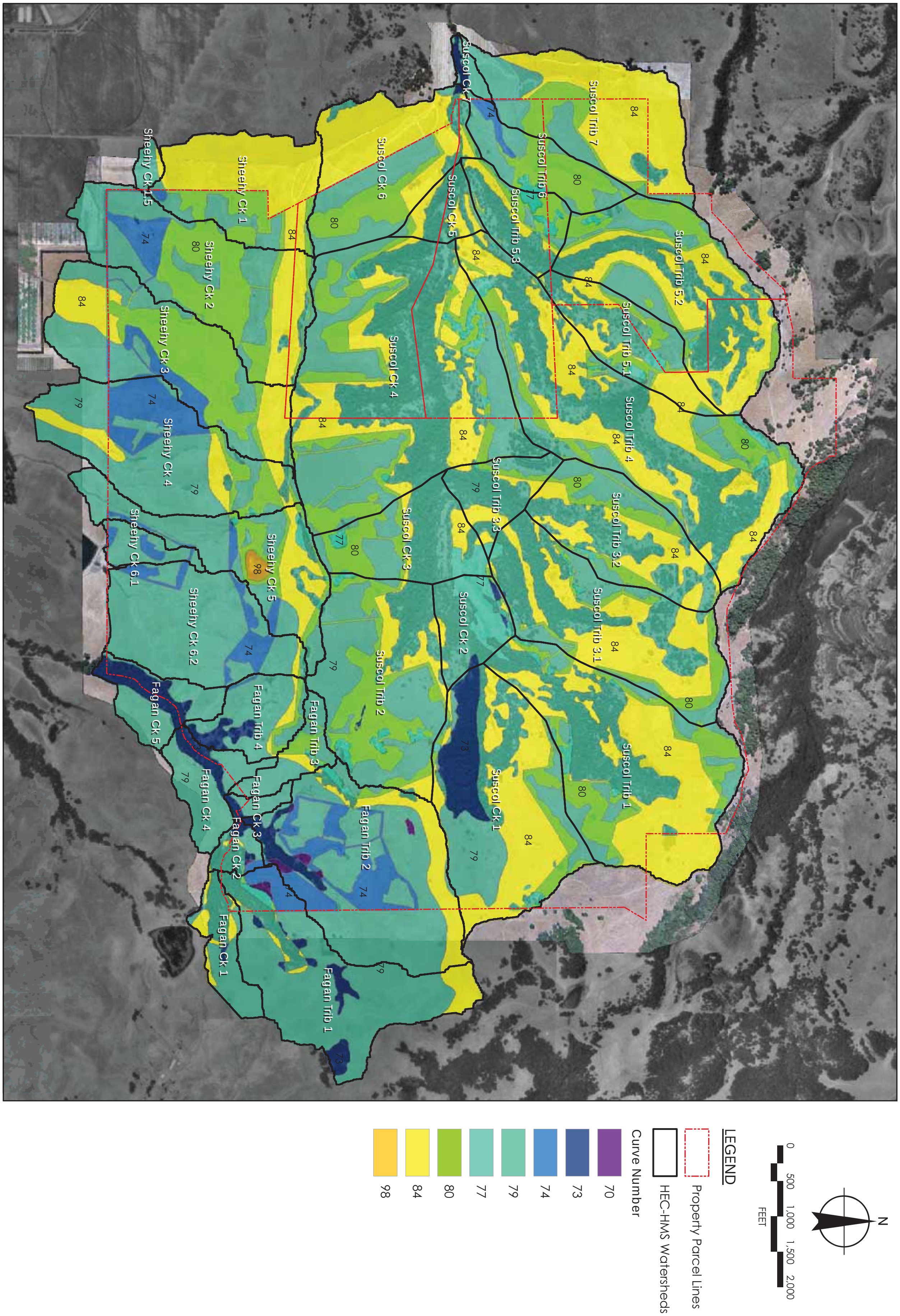

Figure 26. Post-project curve numbers for Suscol Mountain Vineyard, Napa and Solano Counties, California

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Figure 27. Photograph of channel conditions in Suscol Creek, Suscol Mountain Ranch, Napa County, California. Image captured October 1, 2008, approximately 0.6 miles upstream of the project property line. Streamflow in this reach was estimated at about 30 gpm.

Figure 28. Photograph of channel conditions in Fagan Creek tributary 2 subwatershed, Suscol Mountain Ranch, Napa County, California. Image captured May 7, 2009, approximately 300 feet downstream of spring complex 27-30. Streamflow in this reach was estimated at about 5 gpm.

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APPENDICES

APPENDIX A

Summary of Stream Monitoring of Suscol Creek During Testing of Suscol Mountain Vineyard Well #1

BALANCE HYDROLOGICS, Inc.

Memo

To: Beth Painter

From: Scott Brown, Travis Baggett, and Barry Hecht, CHg, CEG

Date: October 2, 2009

Subject: Summary of stream monitoring of Suscol Creek during testing of Suscol Mountain Vineyard Well #1, Napa County, California

Introduction

In preparation for the potential conversion of ranchland to vineyard in upper Suscol Canyon, the project team conducted a series of well tests to define aquifer parameters and potential well yield of a new well located within the Sonoma Mountain Vineyard Property. The well is located within the northwest portion of property, in the southwest quarter of Sec. 30, T5N, R3W, approximately 700 feet north of Suscol Creek and 300 feet northwest of an unnamed tributary to Suscol Creek (Figure 1).

In addition to well development and aquifer assessment, another critical component of these tests was to assess the potential for pumping from the well to deplete baseflow in Suscol Creek, a stream that is well-documented as critical steelhead trout habitat (e.g. LSA, 2009; Gardner, 2006; Koelhler and Edwards, 2009). Balance designed and implemented a baseflow monitoring program for Suscol Creek during the pump test. The pump test itself was managed by Richard C. Slade and Associates (RCS), conducted by LGS, Inc. The results of the aquifer tests are summarized by RCS in a separate memorandum (RCS, in prep).

This memorandum describes the stream monitoring effort in Suscol Creek between June 10, 2009 and July 25, 2009. Initial well development and step tests were conducted on June 18 and 19, and a 72-hour constant rate well test was conducted on July 6 to July 9. Approximately 300,000 gallons of water were pumped during the initial testing, and over 1,000,000 gallons were pumped during the constant rate test[1]. Pre-, interim-, and post-pumping background periods (approximately 1, 2, and 2 weeks respectively) were monitored to provide information on the natural variation and trends within the system during periods of no pumping.

Stream monitoring was conducted following a year with below average rainfall, approximately 87% of the long-term mean[2]. The two previous wet seasons also had below average rainfall, with 85% of mean in water year 2008, and 61% of mean in water year 2007[3]. The most recent wet year was in water year 2006, with annual rainfall of about 172% of mean. Given these antecedent conditions, stream monitoring

[1] Water pumped from the well during the tests was discharged to a large storage pond approximately 0.25 miles downstream of the Suscol Vineyard property line via a temporary pipe system set up specifically for these tests.
[2] Rainfall statistics derived from the Napa Fire Department (NSH) record, available at www.cdec.water.ca.gov.
[3] Most hydrologic monitoring occurs for a period defined as a water year, which begins on October 1 and ends on September 30 of the named year. For example, water year 2009 includes the period from Oct. 1, 2008 to September 30, 2009.

was conducted during a period of very low-flow within the long-term record, when small effects of pumping may be most easily observed.

Monitoring stations

Balance installed stream monitoring stations at six locations along Suscol Creek adjacent to and upstream of the well (Figure 1)[4]. Two monitoring stations were each equipped with Campbell Scientific dataloggers, two pressure transducers and a temperature/specific conductance probe[5], and served as the primary monitoring stations during the pump tests. A staff plate was installed at each primary station to serve as a reference for water depth within the gage pool and to serve as a visual calibration and accuracy check on the pressure transducer readings[6]. The upstream station (SCUS), located approximately 1,800 feet upstream of the well location, was intended to serve as a control station, recording the amount of inflow to the monitored reach[7]. The downstream station, approximately 500 feet downstream of the well location was installed to record the cumulative loss (if any) of streamflow due to pumping within the monitored reach of Suscol Creek.

Four supplementary stations (S-1, S-2, S-3, and S-4) were established to provide additional stage data at points in between the primary stations and to provide a comparison and/or backup for the primary datalogger records. At each station, a self-contained, depth-recording datalogger (Levelogger®) was installed in a deep pool, and a single-point depth reference was established (nail in tree root at water level) to serve as a visual reference of relative pool depth during subsequent visits. S-1 served as a supplementary control station. S-2 and S-3 were located between the primary stations, with S-3 located almost directly south of the test well. S-4 was located downstream of the SCDS station to record conditions at the property line. Pool depths at the six stations ranged from about 0.5 to 1.5 feet.

Water level (stage) in pools is a direct reflection of inflow (from upstream surface flow and seepage gains from stream banks and/or bed) relative to pool outflow (surface outflow and seepage losses to the bed and/or banks[8], as well as evapotranspiration). A drop in stage results from either a decrease in the amount of water flowing into a pool, or an increase in the outflow from a pool. Where pools are hydrologically well-connected to an adjacent aquifer (or aquifers), a drop in water level within the adjacent aquifer (due to well water extraction, for example) would either reduce the amount of inflow (seepage) from the aquifer to the stream, or increase the rate of seepage from the pool to the aquifer. Because the drop in aquifer water level increases closer to the well, the decline in water level (and flow) in the creek will also typically decline more in reaches closer to the well in streams that are in fact affected by pumping.

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[4] The tributary just southeast of the well location is typically dry and carries flow only during storms or during high winter baseflow. Because this tributary is dry during the spring and summer months, the potential effects of well pumping on steelhead rearing habitat were not measured.

[5] Specific conductance, a measure of the electrical conductivity of water, is an easily measured property that is often used as an index of salinity.

[6] Staff plates are essentially ‘rulers’ with graduated markings of 0.01 feet, fixed vertically at the streambank of a pool in order to quantify changes in pool depth over time.

[7] Distances provided are stream distance upstream and downstream of the point on the stream perpendicular to the location of the well, not direct distance from the well itself.

[8] At low flow, 50 percent or more of the total flow in a stream can be carried as ‘interflow’ within the gravels and adjacent bank materials, sand bars and other material.

We made initial measurements of stream stage, flow, specific conductance and temperature when the dataloggers, probes, and staff plates were installed on June 10, 2009. Additional field monitoring visits were conducted on June 19 and 26, and July 6, 9, and 24. Equipment was removed from all supplementary station and the SCUS station on July 24. The SCDS station was left in place to continue extended monitoring of baseflow conditions for the remainder of the dry season[9]. Table 1 summarizes measurements and observations made at each of the stations during the field visits.

Results

The following section summarizes the results of our monitoring effort. Because of the difficulty in accurately measuring very low flows in rock-bedded channels, our analysis of potential pumping effects relies primarily on the pool water level records recorded at the monitoring stations[10]. Water level (or ‘stage’), which correlates very closely with flow, can be accurately measured at low flow in such channels. Under such conditions, water-level records can be preferable even to the bucket-wheel flow measurements that we made at each site. Specific conductance and temperature were also used as secondary parameters of analysis. Our analysis concentrates on five distinct time segments during the monitoring period:

1. Pre-pumping baseline: The time between installation of the monitoring equipment and the beginning of well development (June 10-18),
2. Well development and step test: The two-day period that included well purging and pumping for well development and initial testing, and a step test at various rates up to 300 gallons per minute (June 18-19; see RCS report, in prep, for additional details),
3. Interim baseline: The time between recovery from the step test and the beginning of the constant rate test (June 20- July 6),
4. Constant rate testing: RCS conducted a 72-hour constant rate test of the Well #1, at a rate of approximately 250 gallons per minute (July 6-9),
5. Post-pumping baseline: Two week period following recovery from the constant rate test (July 10-24).

Stage

We recorded water level (stage), among other parameters, in six pools within Suscol Creek adjacent to and upstream of the area of estimated potential influence of pumping from Well #1. The stage record for each of the stations is shown in Figures 2 through 7. Primary and supplementary station records are discussed separately below.

[9] This extended monitoring period is not considered part of the monitoring for the pump test, and is therefore not discussed in this memorandum.
[10] At such low-flows, water level is an adequate, if not better, indicator of summer pool habitat than flow, as the water level in the creek determines the amount of accessible habitat area. Flow certainly has its own influences, though, especially for dissolved oxygen levels and potential for migration between pools.

Primary Stations

Figures 2 and 3 show the stage records at the SCUS and SCDS stations. Both records show daily fluctuations in stage, primarily a result of changes in evapotranspiration (ET)[11]. The downstream record shows higher daily fluctuations than the upstream station, likely a reflection of the fact that the downstream station is located in a more open section of the creek that experiences higher temperature fluctuations. The downstream fluctuations are especially high during warm spells, such as those that occurred in late June and mid-July.

During the monitoring period, stage at the SCUS station varied by less than 0.05 feet (about 0.6 inches), with an average daily stage variation of about 0.02 feet (0.24 inches). Maximum stage occurred on July 24, as stage rose in response to a relatively cool spell at the end of the monitoring period. Minimum stage occurred on July 13, a day when the maximum air temperature exceeded 35°C (95°F), and similarly low stage values were recorded during a hot spell on June 27-28. Stage values on the days of well development and the step and constant rate tests were within this small range of variation, as shown on Figure 2, and did not show a response to pumping from the well, as would be expected for the 'control' station.

Stage at the SCDS station varied by only 0.12 feet (1.4 inches) over the course of the monitoring period. Average daily fluctuation in stage at this station was 0.05, slightly higher than at the SCUS station. Maximum stage occurred on the morning of June 26, just before the late-June warm spell that lowered stage to among the lowest in the record. The lowest stage, however, was recorded on July 14, during a series of hot days. Stage at SCDS was relatively low on the day of the step test, however this low is within the range of what would be expected in response to warmer temperatures on that day—the low stage value was reached again several days after the end of the test in response to a similarly warm sequence of days, and dipped even further in response to the hotter days near the end of June. The SCDS stage trend during the constant rate test follows the gradual, slight decline that began around July 1, and continued through the mid-July warm spell. Stage fluctuations during the constant rate test were similar to the non-pumping periods before and after the test.

Figure 8 compares the daily stage fluctuation at each station with the air temperature record to highlight the correlation between the two. Stage fluctuation was calculated by subtracting the minimum stage from the maximum stage on a given day. The figure shows the higher fluctuations at the SCDS station relative to the SCUS station. For each station, higher stage fluctuations occur on warmer days, and periods of pumping do not alter this pattern.

Figure 9 shows a graph of the difference in stage between the upstream and downstream stations. This comparison provides a way to identify changes in stage that affect one station but not the other[12]. When stage is low at the downstream station (SCDS) relative to the upstream station (SCUS), it plots lower on the graph. Given that the SCDS station is much closer to the test well, it should show a greater response to pumping than the SCUS station, *if a connection exists*. There is a gradual, slight (~0.03 feet) decrease in stage at the downstream station relative to the upstream station through the entire monitoring period but, as with the individual stage records, pumping does not produce a discernable response in stage difference within this general decline. Water level in the well returned to nearly pre-pumping levels

[11] Evapotranspiration includes water 'losses' due to direct evaporation and uptake of water by riparian vegetation, and typically varies directly with temperature.

[12] Peaks in stage at the SCDS station generally lag behind SCUS peaks by about 2 hours. To account for this lag time stage at the downstream station was subtracted from the stage from two hours earlier at the upstream station.

within a day or so of the end of the tests, so this decline is also not associated with a corresponding gradual decline in aquifer water level. It is important to note that while pumping effects in Suscol Creek would manifest as a decrease in stage at the downstream station relative to the upstream, such a decrease is not necessarily indicative of a connection unless it corresponds to the pumping period. The trendline in Figure 9 does show a slight decrease on July 5 that does not appear to correspond directly to temperature, but this occurred the day *before* the constant rate test began. July 5 was an abnormally windy day within that part of monitoring period, and likely increased ET, causing the relative drop in stage at the SCDS station.

<u>Supplementary Stations</u>

The supplementary stage records also showed near-constant daily variations throughout the monitoring period, with the exception of the S-4 station (see discussion below). As with the primary stations, the stage records showed some variation attributed to temperature/ET changes during the monitoring period, but showed no anomalous changes during periods of well pumping (Figures 4 through 7).

Though the S-2, S-3, and S-4 records show slight decreases in stage during well development and during the constant rate test, these decreases are consistent with the expected decreases due to increased temperatures, such as those that occurred on June 22 and 23, with no pumping from the well.

Station S-4 (the downstream-most station) showed a particularly strong response to periods of hot weather. On the hottest days, stage in the pool dropped by as much as 0.7 feet in the late afternoon and evening following the hottest parts of the day, but returned to typical levels by the next morning. We interpret this fluctuation as a result of a sharp decrease or cessation of inflow to the pool, while continued seepage outflow around and under the rootwad that controls the lower end of the pool allowed the pool level to drop. As ET decreased at night, inflow to the pool increased and filled or nearly filled it again by mid-morning. It appears that the pool went dry or nearly dry on seven days within the monitoring period, especially during the hot spell between July 14 and July 20 (Figure 7). The fact that this pool showed such a remarkable response to temperature variation, but did not respond during periods of pumping beyond what would be expected due to the temperature variation is a strong indication of the lack of connection between the well aquifer and Suscol Creek.

Figure 10 shows an overlay of all four stage records at the supplementary stations. S-1 and S-3 show very similar records of stage fluctuation, though S-3 recorded somewhat lower stage during warm periods, especially in mid-July. S-2 and S-4 show greater fluctuations in stage, but these fluctuations are consistent with temperature variations, and anomalous drops in the records are not present during the pumping periods.

Flow

Streamflow was measured at the two primary monitoring stations during each visit to site. Additional measurements and estimates were conducted during earlier visits to the site (Table 1). Streamflow was generally higher at the downstream monitoring station during the monitoring period, though the difference in flow between the stations appears to have decreased slightly toward the end of the monitoring period. The difficulty in making accurate measurements at such low flows makes it difficult to reach a definite conclusion about this trend, and this one reason we relied on the stage record for our analysis of potential pumping impacts. The trend, however, is consistent with observations from October

2008, when Balance's estimates of flow in Suscol Creek suggested that flow near the property line was lower than that present within the upper portion of the creek (see Brown and others, 2009 [in prep], for additional discussion of baseflow conditions).

Specific Conductance

Figure 11 shows the specific conductance (SC) records for the SCUS and SCDS monitoring stations, along with manual measurements made during site visits. SC at both stations generally ranged between 160 and 185 µmhos/cm, with the SCUS record showing slightly higher SC than the SCDS station near the end of the monitoring period. Given that SC can vary by as much as 10 percent in a pool with low flow and where mixing is poor, this difference is negligible. Several spikes in specific conductance occurred at the SCDS station (on June 12 and 24, and July 25), with individuals peaks of up to 205 µmhos/cm. These events are likely a result of cow activity in the creek upstream of the gaging site.

Specific conductance of the well water was measured at 230 µmhos/cm on June 19, and 250 µmhos/cm on July 6, significantly higher than that measured in the Creek, but still a relatively small difference given that SC in natural waters can vary by orders of magnitude[13]. Given this difference, one would expect to a decrease in SC of the stream water if pumping from the well is drawing water from the creek as a result of a reduced contribution of higher SC groundwater to the creek as water level in the aquifer is drawn down, resulting in a greater percentage of near surface water. The SC record within Suscol Creek, however, is quite stable through the monitoring period and does not indicate any response to periods of pumping from Well #1.

Water Temperature

Figure 11 shows the trend in water temperature at the two primary stations during the pump test. Water temperature in Suscol Creek was typically between 15 and 20°C, though did reach as high as 24°C at the downstream station during the warmest days of the monitoring period. Water temperature at the SCDS station fluctuates more than at the SCUS station, which is consistent with the fluctuations in the stage record (Figures 2 and 3).

Water temperature recorded at Well #1 was consistently above 25°C, which is relatively high for local groundwater (RCS personal communication, June 18, 2009).

Other parameters and conditions

Water chemistry analyses of the water in Suscol Creek show a similar chemical signature to water drawn from Suscol Well #1 (see Brown and others, 2009, for summary of chemical analyses). Water from the well does show significantly higher sodium concentrations, which may indicate a contribution of water from the non-volcanic Markley formation. The water in Suscol Creek does not show this signature.

It is important to note that the static water elevation in Well #1 before testing was approximately 60 feet below the elevation of the Creek bed at the property line. While this does not preclude a potential connection between streamflow in the creek and the aquifer from which the well draws water, it does

[13] Sea water is typically in the range of 53,000 µmhos/cm @ 25°C, whereas rain water is below 100 µmhos/cm.

suggest that if a connection exists the pathways of groundwater flow may be rather complex. This is the primary reason that we added the supplementary stations to monitoring program.

Eric Lichtwardt (Biologist, LSA Associates) surveyed pool habitat conditions on July 8, 2009, during the constant rate pump test. He did not observe any effects from the well test on aquatic habitat at that time (see attached memorandum).

Summary of findings and conclusions

Based on the above discussion, we conclude the following in regards to Suscol Creek baseflow conditions during the July-July, 2009 test period:

- Water level in Suscol Creek showed daily fluctuations about 0.02 to 0.04 feet in response to changes in air temperature, evapotranspiration, and other environmental factors. Fluctuations were more prominent during warm spells and near the downstream property line.
- We used water level ('stage') to evaluate potential effects of pumping because it can be measured with great precision and accuracy. Flow in Suscol Creek could not be measured as accurately to sufficiently track slight changes in response to well pumping. Given the variability of the flow measurements given the rocky bed of Suscol Creek, we determined that stage was a more reliable and accurate metric for use in analyzing potential well impacts.
- None of the stage records showed an anomalous response during pump test periods. Stage fluctuations were consistent with temperature variation through the entire monitoring period.
- Comparison of the stage record at the two primary gaging stations showed a slight decline in stage at the downstream station (adjacent to the test well) relative to the upstream (control) station over the course of the monitoring period. This decline was gradual, however, and is consistent with the general trend of drying in the downstream reaches. We found no correlation in the stage difference fluctuations to periods of pumping from the well.
- The well test was conducted during the dry season following the third year of below-normal rainfall, when the effects of pumping on streamflow would generally be easiest to detect and quantify.
- Specific conductance and temperature of Suscol Creek is lower than that recorded in Well #1. No changes in specific conductance or temperature were identified that corresponded to pumping periods during the well tests.
- The water chemistry of the well water is similar to that of the water in Suscol Creek, though has slightly higher total dissolved solids and slightly higher levels of sodium, likely indicating some contribution to the well from water in the underlying Markley formation.

Given the above findings, we conclude that pumping from Suscol Mountain Vineyard Well #1 did not influence water level or flow in Suscol Creek during the monitoring period. Assuming the pump will operate under a similar or lower regime under post-project conditions, pumping from the well will not significantly impact streamflow in Suscol Creek, nor will it impact summering pool habitat.

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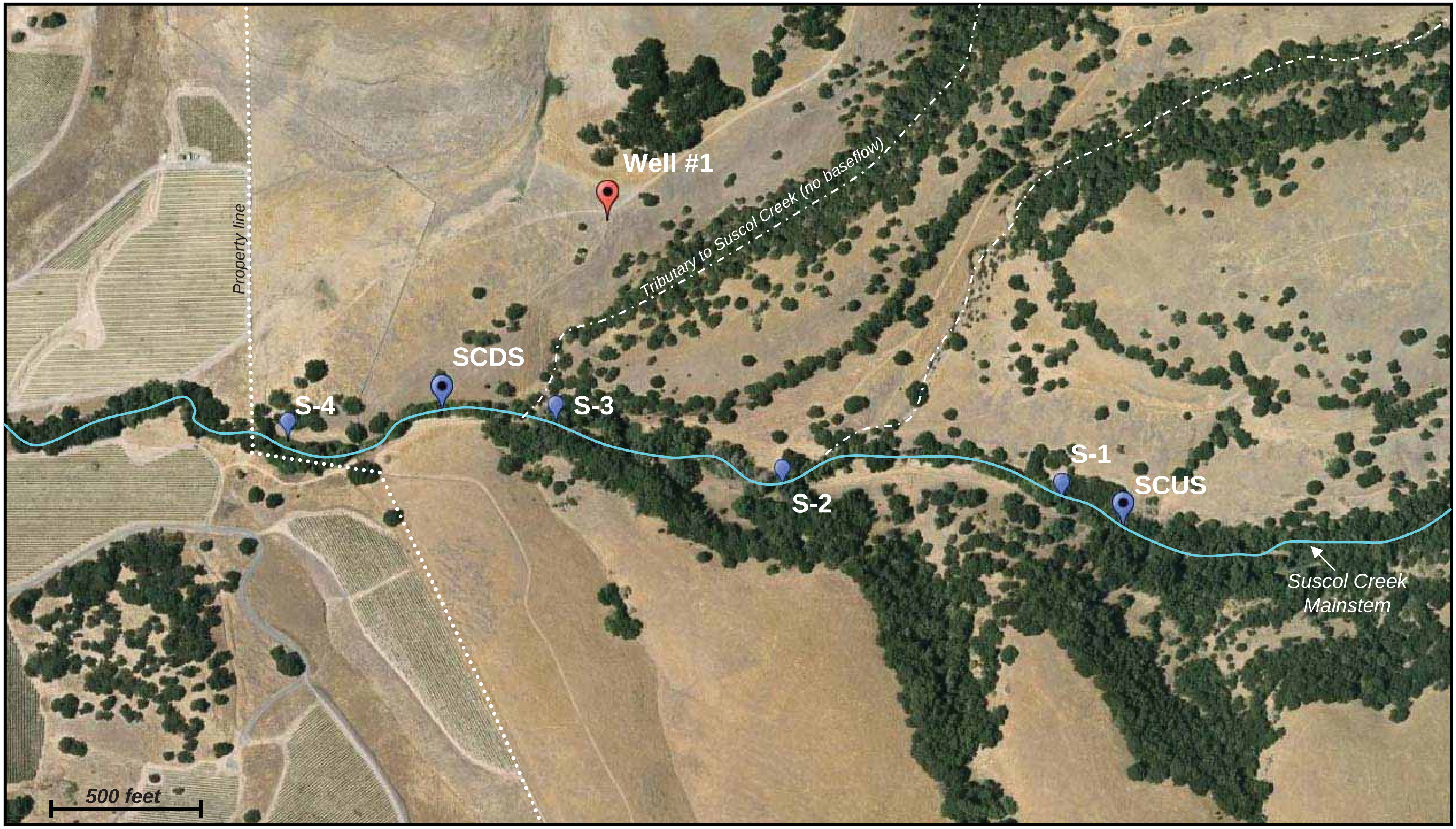
FIGURES



Background image captured from Google Earth

Balance Hydrologics, Inc.

Figure 1. **Locations of stream monitoring sites during pump testing of Well #1, Suscol Ranch, Napa County, California.** Stations SCUS and SCDS served as the primary monitoring stations, and stations S-1, S-2, S-3, and S-4 served as secondary stations. SCUS and S-1 served as upstream control stations (outside the estimated radius of influence of pumping).

208159 Stream monitoring location figure.ppt

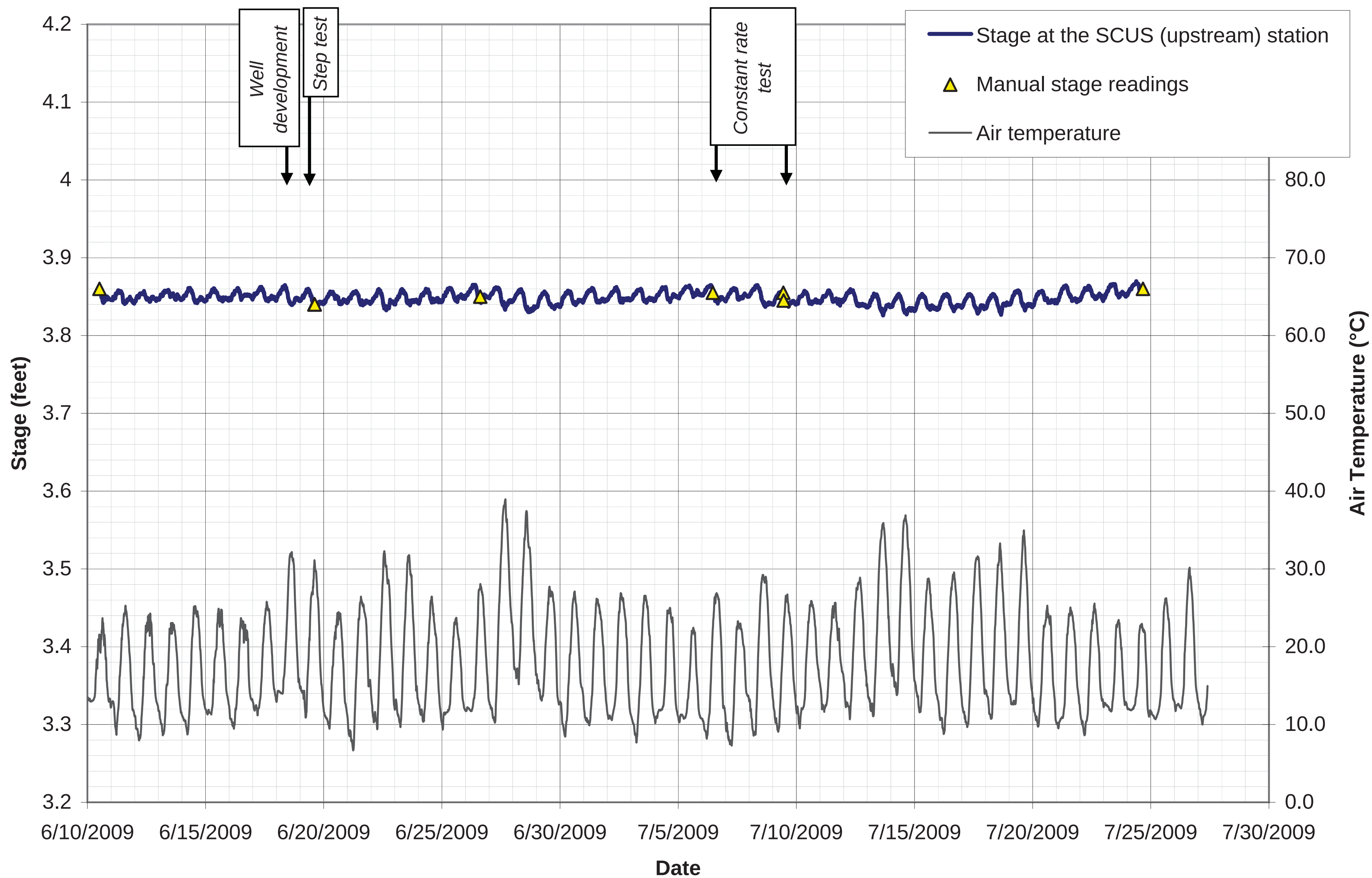


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Figure 2. Stage at the SCUS monitoring station, Suscol Mountain Ranch, Suscol Creek, Napa County, California. Stage varied by less than 0.05 feet during the monitoring period, and showed no response to periods of pumping.

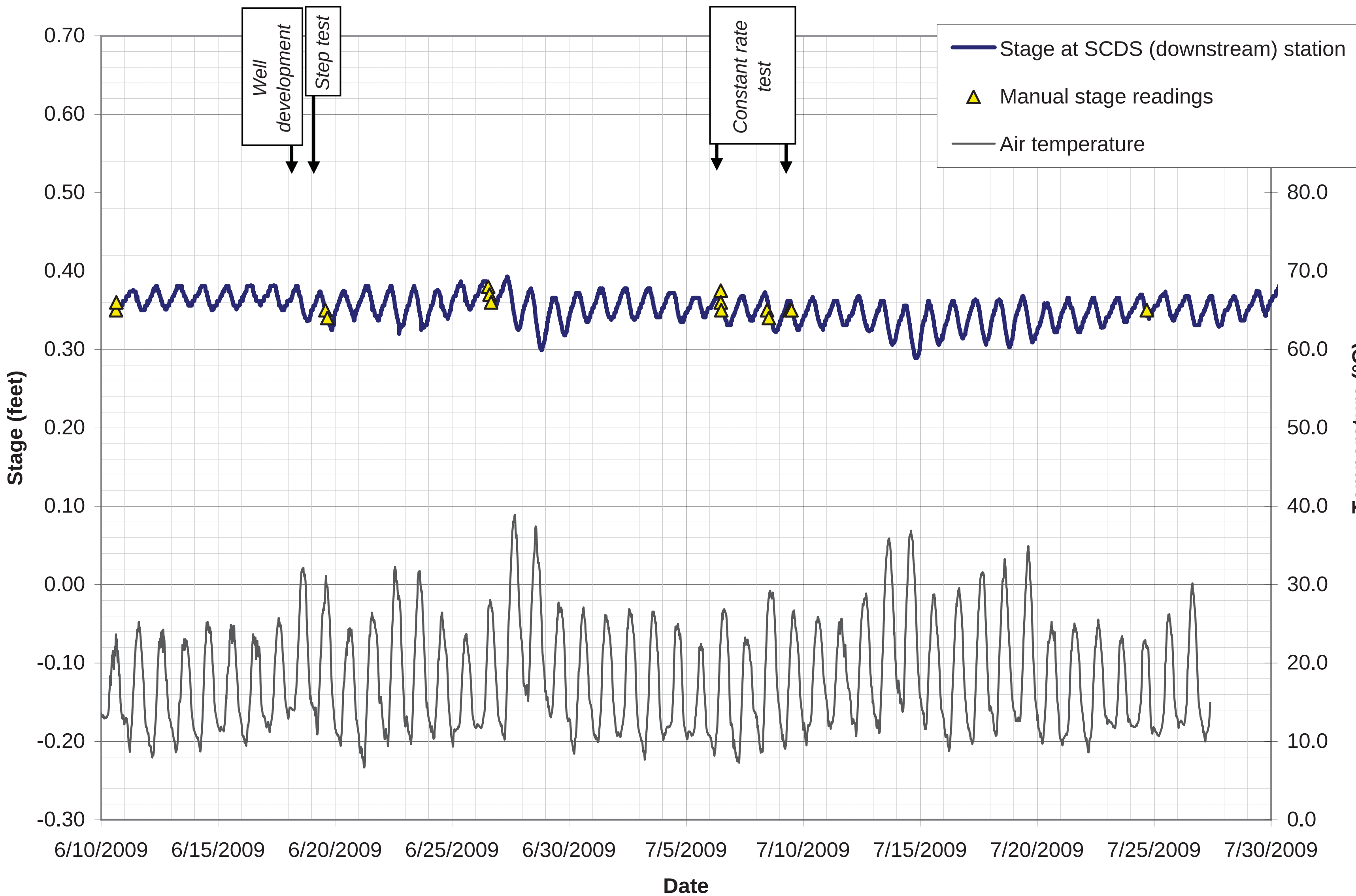

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Figure 3. Stage at the SCDS monitoring station, Suscol Mountain Ranch, Suscol Creek, Napa County, California. Stage varied by 0.12 feet during the monitoring period, but showed no response to periods of pumping.

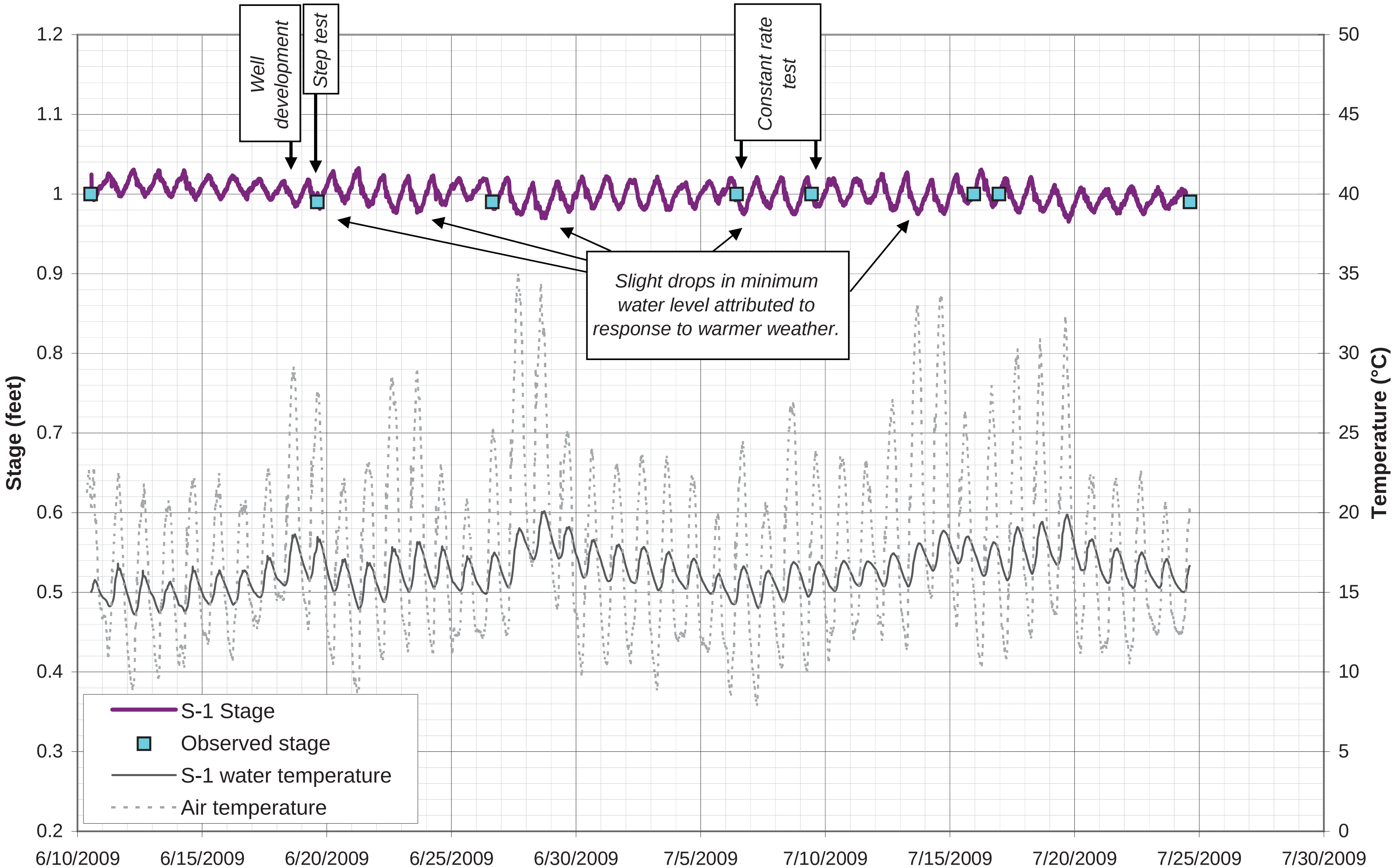

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Figure 4. Water level and temperature record at monitoring site S-1, Suscol Creek, Suscol Ranch, Napa County, California. S-1 is approximately 1,700 feet upstream of the well, upstream of the estmated zone of influence of the well, and serves as a secondary control station.

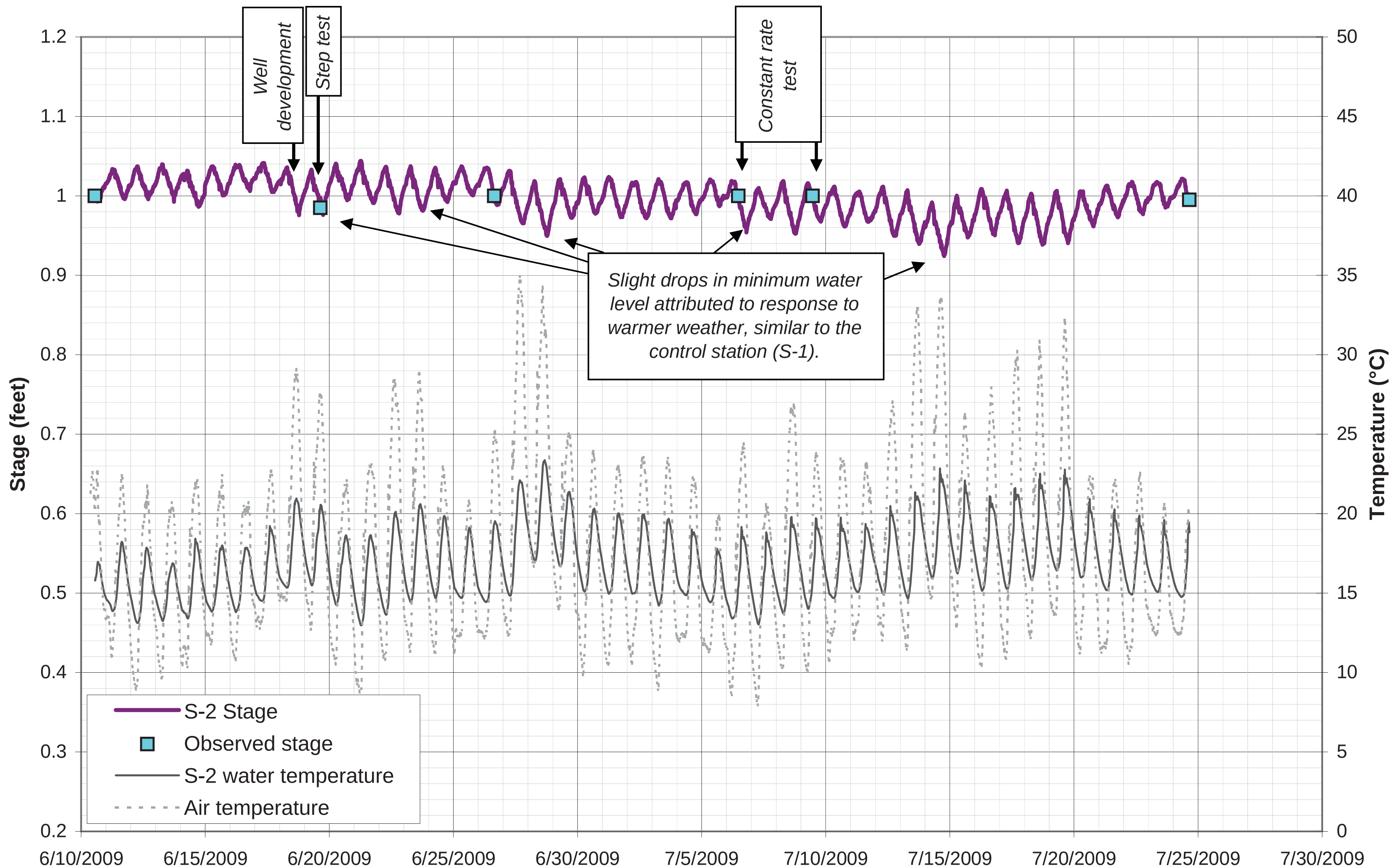

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Figure 5. Water level and temperature record at monitoring site S-2, Suscol Creek, Suscol Ranch, Napa County, California. Slight drop in stage minimum during the constant rate test attributed to temperature variation, and is not considered an effect of pumping.

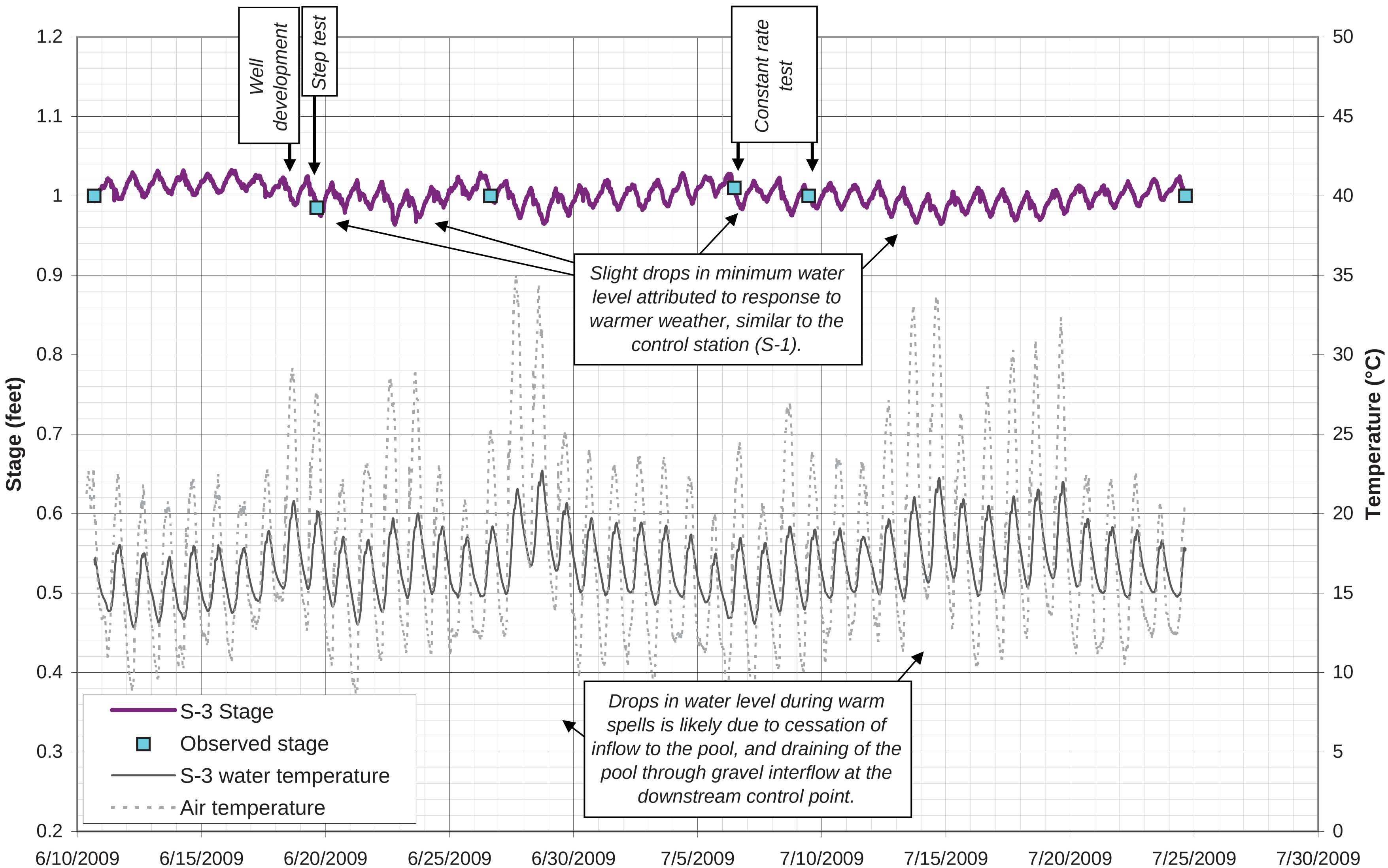

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Figure 6. Water level and temperature record at monitoring site S-3, Suscol Creek, Suscol Ranch, Napa County, California. No influence of well pumping could be identified in the water level record.

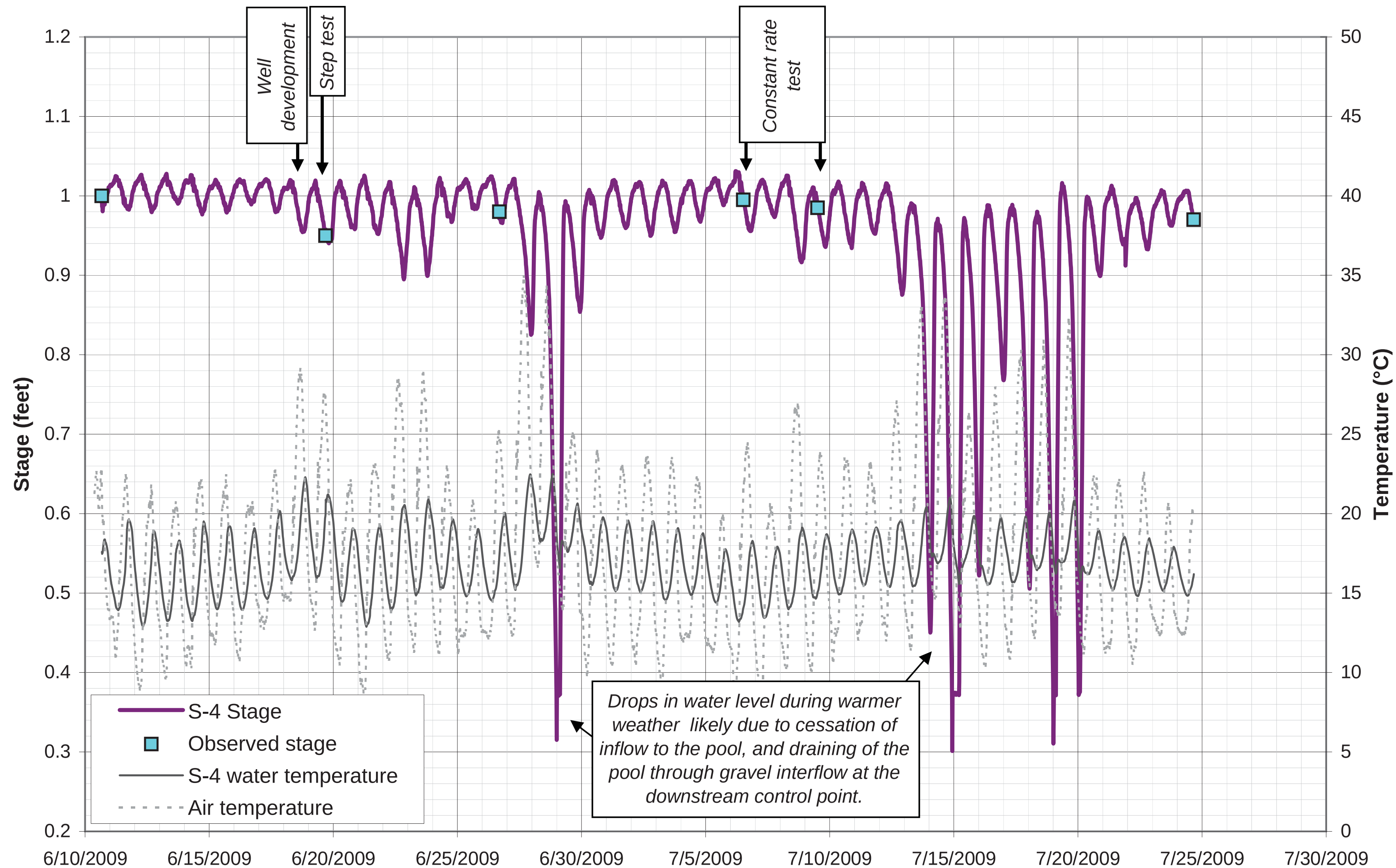

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Figure 7. Water level and temperature record at monitoring site S-4, Suscol Creek, Suscol Ranch, Napa County, California. No influence of well pumping could be identified in the water level record.

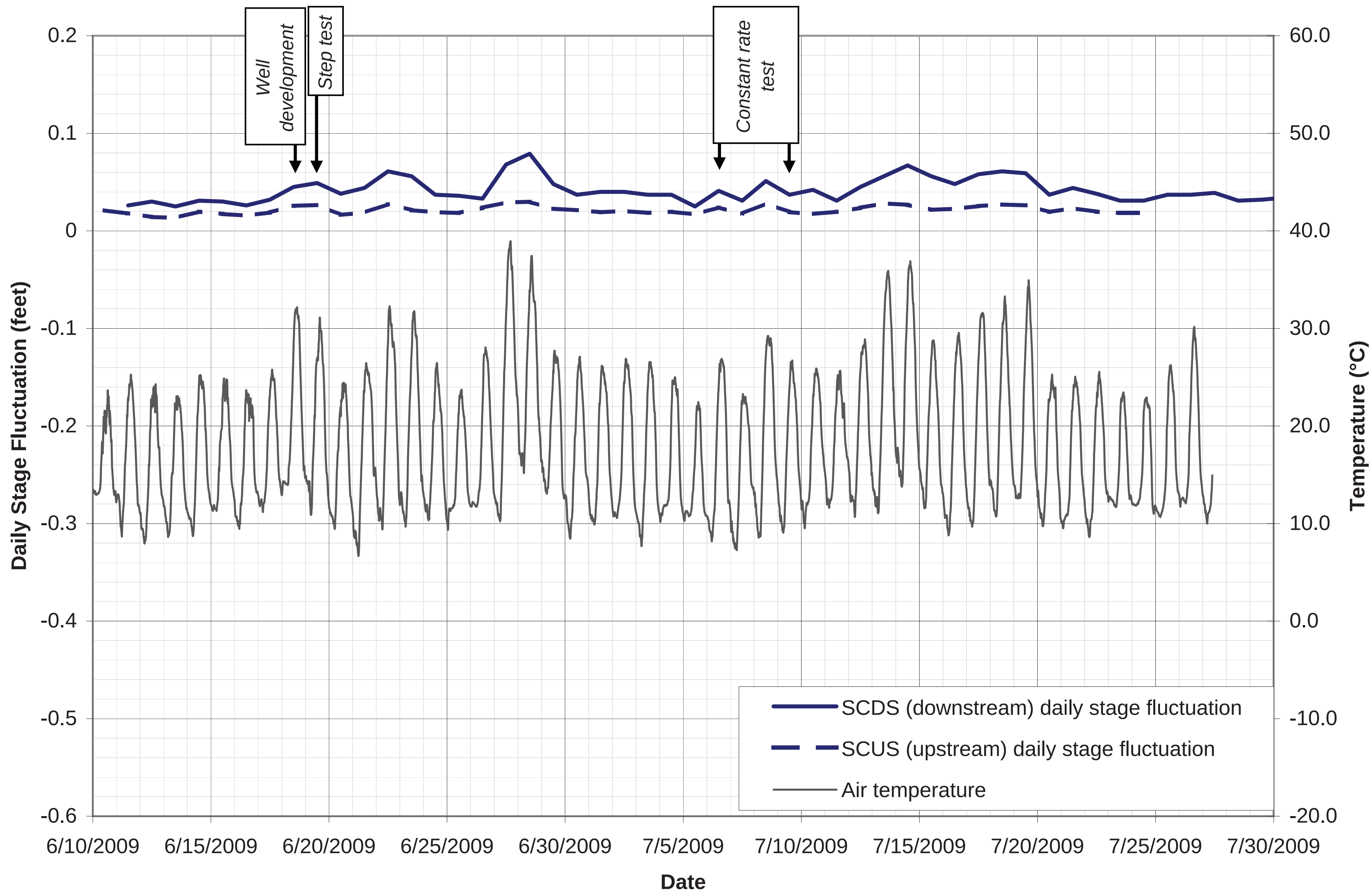

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Figure 8. Daily stage variation at the SCUS and SCDS monitoring stations. Note the strong correlation between stage fluctuation and maximum air temperature. Daily stage fluctuation is the difference between maximum and minimum stage on a given day.

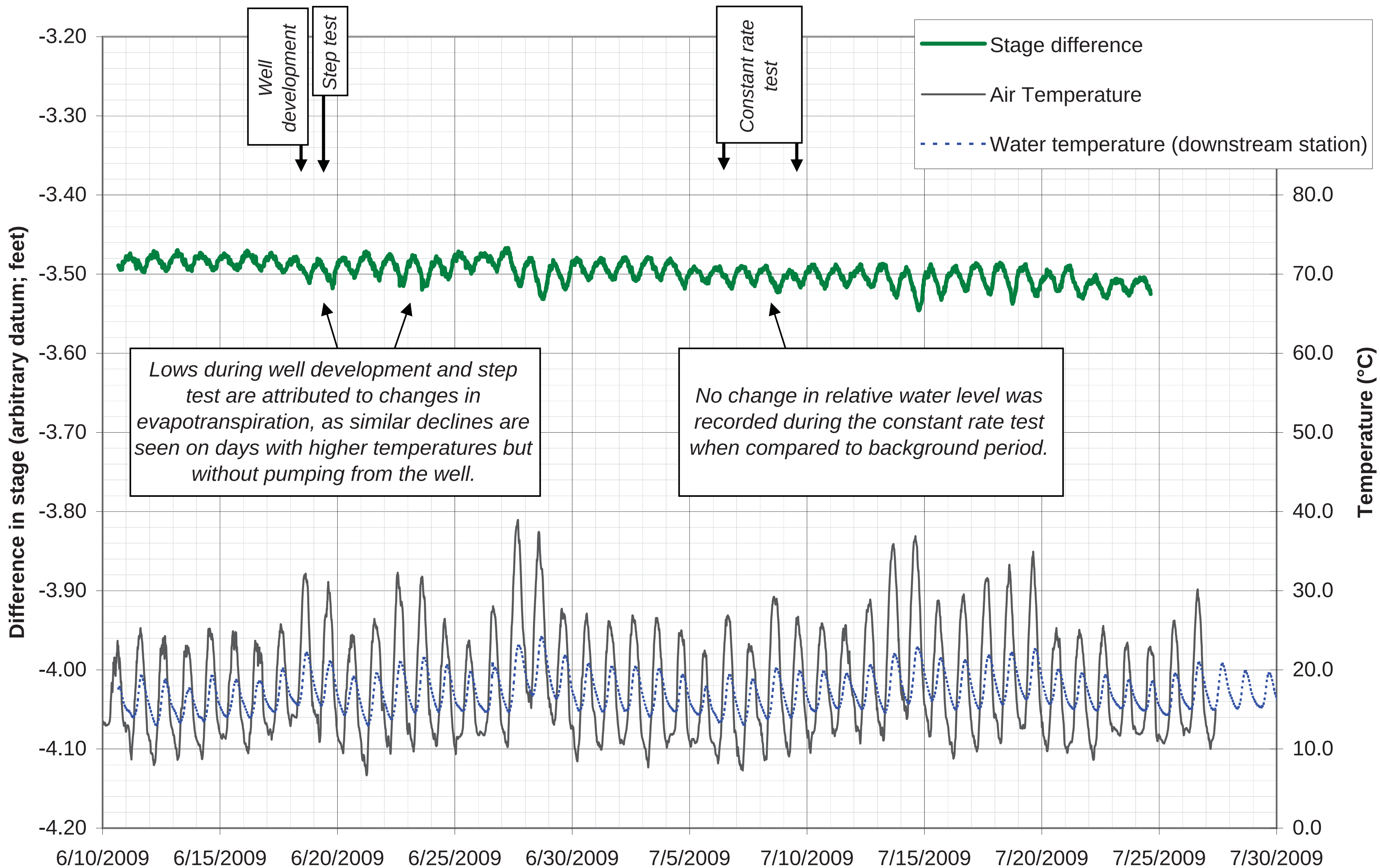

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Figure 9. Difference in stage between the downstream and upstream gaging stations on Suscol Creek, Napa County, California. Lows in the trend line indicate times when the water level at the downstream station was low relative to that at the upstream station.

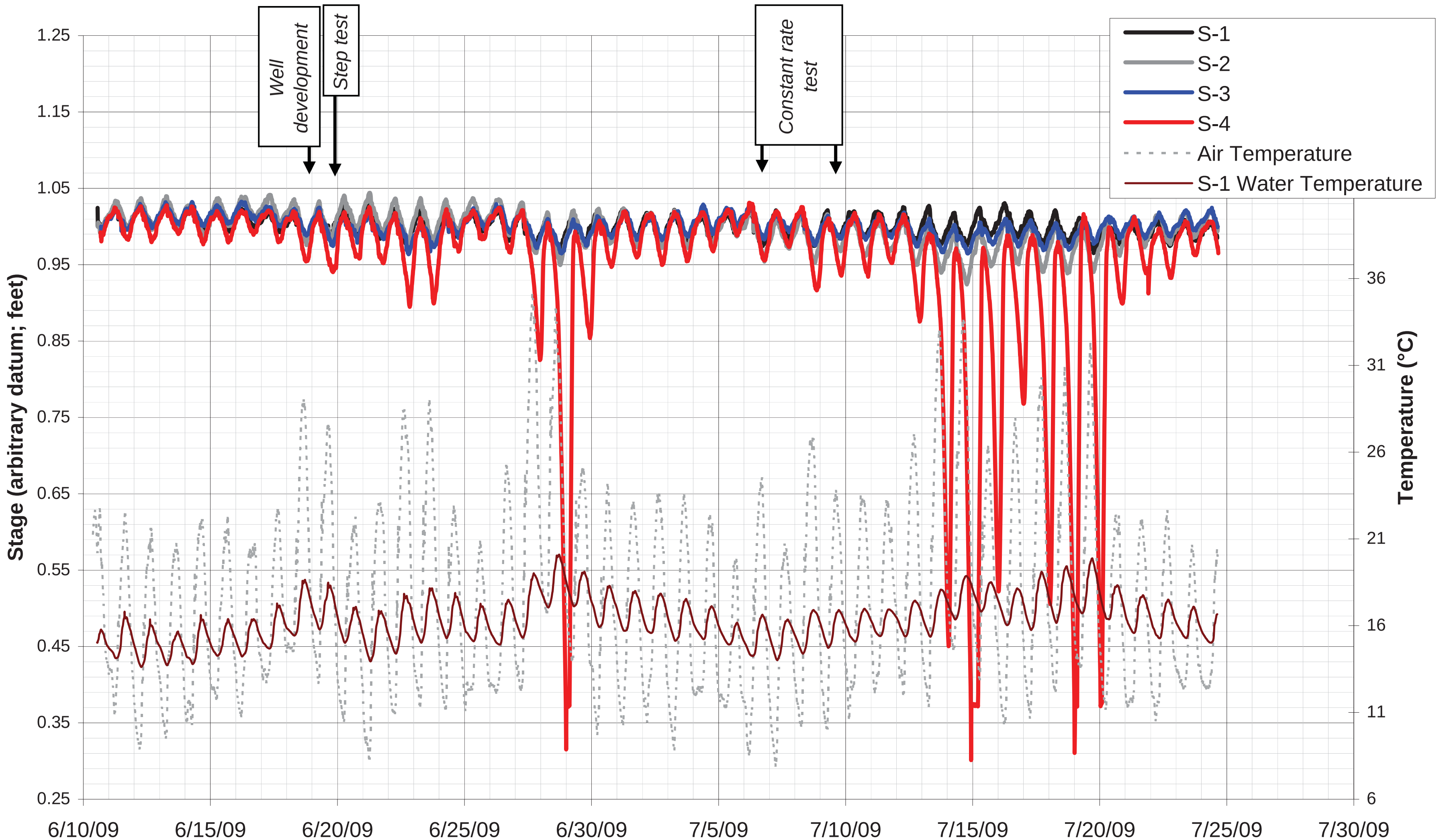

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Figure 10. Hydrograph of stage for Suscol Creek at Suscol Ranch, Napa, California. S-1 is the furthest upstream station and serves as a control station. S-4 is the furthest downstream. Note that change in water level correlates well with air temperature, and variations during periods of pumping is the same as the background periods. Air and water temperature are plotted as a proxy for evapotranspiration. See Figure 7 for explanation of large stage fluctuations at S-4.

208159 Leveloggers (8-18-09).xls, Stage_all

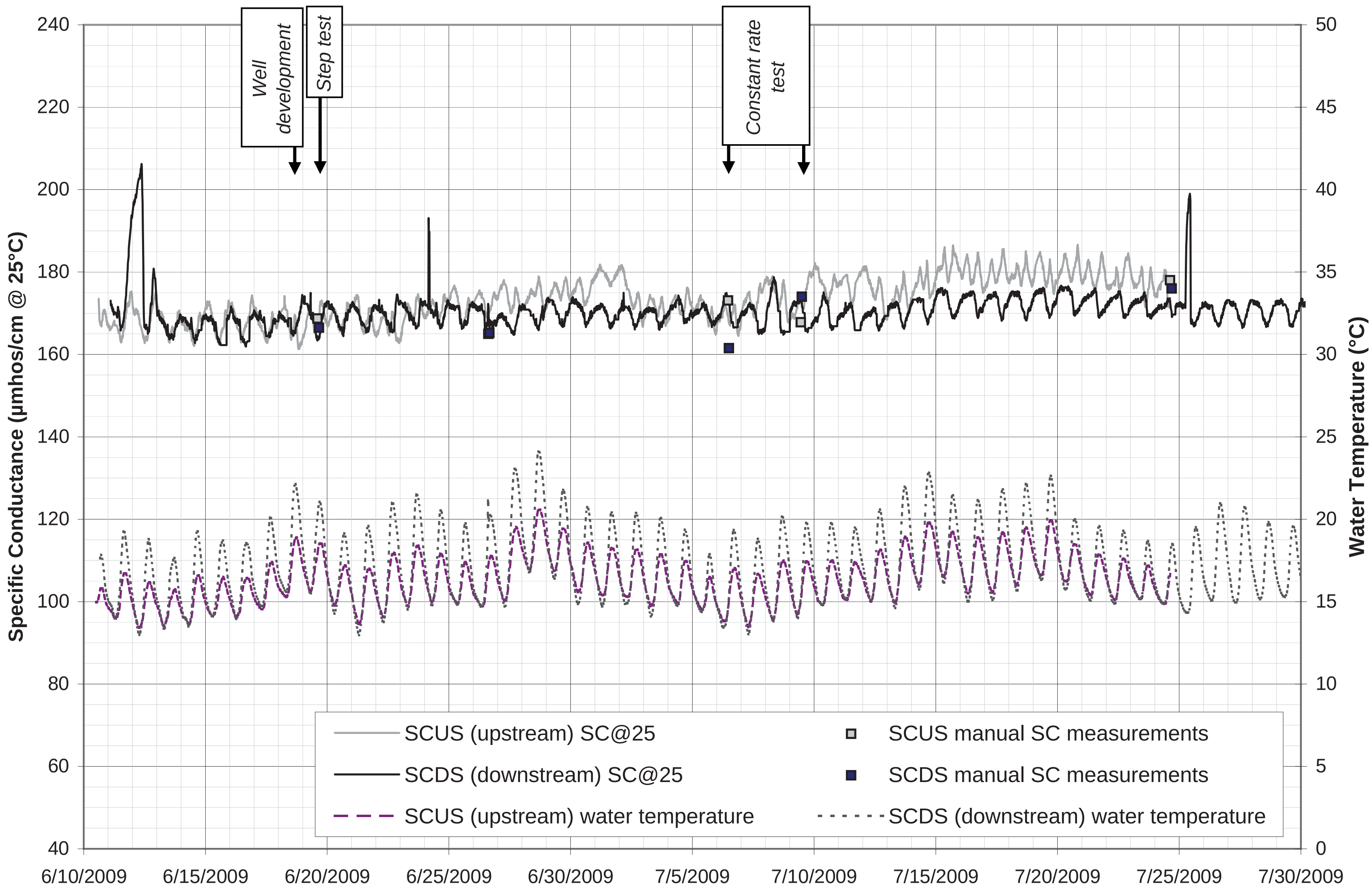

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Figure 11. Specific conductance and water temperature in Suscol Creek, Napa County, California. Parameters remained relatively constant thoroughout the monitoring period, except for occasional spikes in specific conductance at the downstream station. These spikes likely correspond to cow activity upstream of the monitoring station.

LSA

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CARLSBAD
FT. COLLINS

FRESNO
IRVINE
PALM SPRINGS

RIVERSIDE
ROCKLIN
SAN LUIS OBISPO
SOUTH SAN FRANCISCO

MEMORANDUM

DATE: July 21, 2009

TO: Beth Painter (Balanced Planning, Inc.)

FROM: Eric Lichtwardt (LSA Associates, Inc.)

SUBJECT: Suscol Mountain Vineyard Well Test Biological Monitoring

Richard C. Slade and Associates conducted a 250 gallon per minute constant rate well test of the new well on the Suscol Mountain Vineyard property from July 6 (1200 hours) to July 9 (1200 hours), 2009. As part of the well test Balance Hydrologics established a gaging station with a staff plate to measure changes in water depth in the creek near the downstream property line (as well as in several other locations). The gaging station was located in a pool in the lower part of the creek just upstream of the road crossing. As part of the well test, LSA Biologist Eric Lichtwardt conducted biological monitoring of the creek on July 8. The purpose of the biological monitoring was to determine if pumping ground water from the well had any effects on the aquatic habitat of lower Suscol Creek. The creek was surveyed during the mid morning to early afternoon hours from 1108 to 1255 hours. The staff plate read 0.35 feet at 1108 hours and slightly less at 1255 hours. These measurements fall within normal daily creek fluctuations (0.33-0.37 feet) as measured by Balance Hydrologics during pre-well baseline test monitoring of the creek.

The following aquatic vertebrates were observed in the lower creek during the monitoring: steelhead/rainbow trout (*Oncorhynchus mykiss*), California roach (*Lavinia symmetricus*), and rough-skinned newt (*Taricha granulosa*). LSA did not observe any effects from the well test on aquatic habitat in Suscol Creek during the biological monitoring. If you have any questions regarding biological monitoring during the well test please give me a call at (510) 236-6810 or send me an e-mail at eric.lichtwardt@lsa-assoc.com.

APPENDIX B

Water Quality Analysis Data Reports

APPENDIX B

Water quality analysis data reports

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

SOIL CONTROL LAB

42 HANGAR WAY
WATSONVILLE
CALIFORNIA
95076
USA

TEL: 831-724-5422
FAX: 831-724-3188

Account Number:
8100075-7-4205

Balance Hydrologics Inc.
800 Bancroft Way, Suite 101
Berkeley, CA 94710-2227
Attn: Scott Brown

Reporting Date:
October 8, 2008

Date Received: Water samples received 10/02/08
Sample Identification: SRSA081001:1004 (Filtered), collected 10/01/08 10:04
Report: Quantitative chemical analysis with results reported in mg/L (ppm) unless otherwise stated.
Laboratory #: 8100075-2/7

		Degree of Restriction on Irrigation Use	
		Surface	**Sprinkler**
pH value (pH units)	6.0	Normal Range 6.5 to 8.4	
Conductivity (millimhos/cm)	0.14	None	None
Carbonate Alkalinity (as CO_3)	less than 5	-	-
Bicarbonate Alkalinity (as HCO_3)	48	-	None
Total Dissolved Solids	88	None	None
Nitrate (as NO3)	1.1	None	None
Chloride (as Cl)	9.6	None	None
Sulfate (as SO4)	10	-	-
Phosphate (PO4)	less than 1	-	-
Boron (B)	less than 0.1	None	None
Calcium (Ca)	6.7	-	-
Magnesium (Mg)	4.3	-	-
Potassium (K)	3.0	-	-
Sodium (Na)	16	None	None
Iron (Fe)	2.4	See Below	-
Manganese (Mn)	0.035	None	-
Adjusted Rna	0.85	Severe	Severe
Sodium Absorption Ratio (SAR)	1.2	-	-
Adjusted SAR	0.85	-	-

	lbs/acre ft of water
Nitrogen (as N)	0.66
Phosphorus (as P_2O_5)	less than 2.1
Potassium (as K_2O)	9.9

Iron in excess of 0.30 ppm or Manganese in excess of 0.05 ppm can cause blockages with drip irrigation.

Mike Galloway

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Balance Hydrologics Inc.
800 Bancroft Way, Suite 101
Berkeley, CA 94710-2227
Attn: Scott Brown

Reporting Date:
October 8, 2008

Date Received:	Water samples received 10/02/08
Sample Identification:	SRSB081001:1141 (Filtered), collected 10/01/08 11:41
Report:	Quantitative chemical analysis with results reported in mg/L (ppm) unless otherwise stated.
Laboratory #:	8100075-1/7

		Degree of Restriction on Irrigation Use	
		Surface	**Sprinkler**
pH value (pH units)	7.2	Normal Range 6.5 to 8.4	
Conductivity (millimhos/cm)	0.17	None	None
Carbonate Alkalinity (as CO_3)	less than 5	-	-
Bicarbonate Alkalinity (as HCO_3)	48	-	None
Total Dissolved Solids	110	None	None
Nitrate (as NO3)	12	None	None
Chloride (as Cl)	12	None	None
Sulfate (as SO4)	14	-	-
Phosphate (PO4)	less than 1	-	-
Boron (B)	less than 0.1	None	None
Calcium (Ca)	11	-	-
Magnesium (Mg)	5.6	-	-
Potassium (K)	3.6	-	-
Sodium (Na)	13	None	None
Iron (Fe)	1.4	See Below	-
Manganese (Mn)	0.075	See Below	-
Adjusted Rna	0.58	Severe	Severe
Sodium Absorption Ratio (SAR)	0.81	-	-
Adjusted SAR	0.69	-	-

	lbs/acre ft of water
Nitrogen (as N)	7.5
Phosphorus (as P_2O_5)	less than 2.1
Potassium (as K_2O)	12

Iron in excess of 0.30 ppm or Manganese in excess of 0.05 ppm can cause blockages with drip irrigation.

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800 Bancroft Way, Suite 101
Berkeley, CA 94710-2227
Attn: Scott Brown

Reporting Date:
October 8, 2008

Date Received:	Water samples received 10/02/08
Sample Identification:	SRSC081001:1245 (Filtered), collected 10/01/08 12:45
Report:	Quantitative chemical analysis with results reported in mg/L (ppm) unless otherwise stated.
Laboratory #:	8100075-7/7

		Degree of Restriction on Irrigation Use	
		Surface	**Sprinkler**
pH value (pH units)	6.2	Normal Range 6.5 to 8.4	
Conductivity (millimhos/cm)	0.15	None	None
Carbonate Alkalinity (as CO_3)	less than 5	-	-
Bicarbonate Alkalinity (as HCO_3)	62	-	None
Total Dissolved Solids	96	None	None
Nitrate (as NO3)	4.2	None	None
Chloride (as Cl)	9.3	None	None
Sulfate (as SO4)	4.2	-	-
Phosphate (PO4)	less than 1	-	-
Boron (B)	less than 0.1	None	None
Calcium (Ca)	8.0	-	-
Magnesium (Mg)	5.8	-	-
Potassium (K)	2.5	-	-
Sodium (Na)	14	None	None
Iron (Fe)	0.16	None	-
Manganese (Mn)	less than 0.02	None	-
Adjusted Rna	0.74	Severe	Severe
Sodium Absorption Ratio (SAR)	0.94	-	-
Adjusted SAR	0.86	-	-

	lbs/acre ft of water
Nitrogen (as N)	2.6
Phosphorus (as P_2O_5)	less than 2.1
Potassium (as K_2O)	8.1

Iron in excess of 0.30 ppm or Manganese in excess of 0.05 ppm can cause blockages with drip irrigation.

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800 Bancroft Way, Suite 101
Berkeley, CA 94710-2227
Attn: Scott Brown

Reporting Date:
October 8, 2008

Date Received:	Water samples received 10/02/08
Sample Identification:	SRCA081001:1402 (Filtered), collected 10/01/08 14:02
Report:	Quantitative chemical analysis with results reported in mg/L (ppm) unless otherwise stated.
Laboratory #:	8100075-6/7

		Degree of Restriction on Irrigation Use	
		Surface	**Sprinkler**
pH value (pH units)	6.2	Normal Range 6.5 to 8.4	
Conductivity (millimhos/cm)	0.13	None	None
Carbonate Alkalinity (as CO_3)	less than 5	-	-
Bicarbonate Alkalinity (as HCO_3)	50	-	None
Total Dissolved Solids	87	None	None
Nitrate (as NO3)	4.2	None	None
Chloride (as Cl)	10	None	None
Sulfate (as SO4)	6.0	-	-
Phosphate (PO4)	less than 1	-	-
Boron (B)	less than 0.1	None	None
Calcium (Ca)	7.5	-	-
Magnesium (Mg)	3.8	-	-
Potassium (K)	3.1	-	-
Sodium (Na)	15	None	None
Iron (Fe)	0.50	See Below	-
Manganese (Mn)	less than 0.02	None	-
Adjusted Rna	1.4	Severe	Severe
Sodium Absorption Ratio (SAR)	1.1	-	-
Adjusted SAR	0.78	-	-

	lbs/acre ft of water
Nitrogen (as N)	2.6
Phosphorus (as P_2O_5)	less than 2.1
Potassium (as K_2O)	10

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Berkeley, CA 94710-2227
Attn: Scott Brown

Reporting Date:
October 8, 2008

Date Received: Water samples received 10/02/08
Sample Identification: SRCC081001:1551 (Filtered), collected 10/01/08 15:51
Report: Quantitative chemical analysis with results reported in mg/L (ppm) unless otherwise stated.
Laboratory #: 8100075-4/7

		Degree of Restriction on Irrigation Use	
		Surface	**Sprinkler**
pH value (pH units)	6.4	Normal Range 6.5 to 8.4	
Conductivity (millimhos/cm)	0.16	None	None
Carbonate Alkalinity (as CO_3)	less than 5	-	-
Bicarbonate Alkalinity (as HCO_3)	68	-	None
Total Dissolved Solids	100	None	None
Nitrate (as NO3)	1.7	None	None
Chloride (as Cl)	10	None	None
Sulfate (as SO4)	5.9	-	-
Phosphate (PO4)	less than 1	-	-
Boron (B)	less than 0.1	None	None
Calcium (Ca)	9.7	-	-
Magnesium (Mg)	6.0	-	-
Potassium (K)	2.7	-	-
Sodium (Na)	15	None	None
Iron (Fe)	0.065	None	-
Manganese (Mn)	less than 0.02	None	-
Adjusted Rna	0.74	Severe	Severe
Sodium Absorption Ratio (SAR)	0.93	-	-
Adjusted SAR	0.92	-	-

	lbs/acre ft of water
Nitrogen (as N)	1.0
Phosphorus (as P_2O_5)	less than 2.1
Potassium (as K_2O)	8.9

Iron in excess of 0.30 ppm or Manganese in excess of 0.05 ppm can cause blockages with drip irrigation.

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800 Bancroft Way, Suite 101
Berkeley, CA 94710-2227
Attn: Scott Brown

Reporting Date:
October 8, 2008

Date Received:	Water samples received 10/02/08
Sample Identification:	SRCB081001:1452 (Filtered), collected 10/01/08 14:52
Report:	Quantitative chemical analysis with results reported in mg/L (ppm) unless otherwise stated.
Laboratory #:	8100075-5/7

		Degree of Restriction on Irrigation Use	
		Surface	**Sprinkler**
pH value (pH units)	6.3	Normal Range 6.5 to 8.4	
Conductivity (millimhos/cm)	0.17	None	None
Carbonate Alkalinity (as CO_3)	less than 5	-	-
Bicarbonate Alkalinity (as HCO_3)	77	-	None
Total Dissolved Solids	110	None	None
Nitrate (as NO3)	less than 1	None	None
Chloride (as Cl)	11	None	None
Sulfate (as SO4)	4.9	-	-
Phosphate (PO4)	less than 1	-	-
Boron (B)	less than 0.1	None	None
Calcium (Ca)	11	-	-
Magnesium (Mg)	6.0	-	-
Potassium (K)	2.3	-	-
Sodium (Na)	17	None	None
Iron (Fe)	0.20	None	-
Manganese (Mn)	less than 0.02	None	-
Adjusted Rna	0.85	Severe	Severe
Sodium Absorption Ratio (SAR)	1.0	-	-
Adjusted SAR	1.1	-	-

	lbs/acre ft of water
Nitrogen (as N)	less than 0.6
Phosphorus (as P_2O_5)	less than 2.1
Potassium (as K_2O)	7.6

Iron in excess of 0.30 ppm or Manganese in excess of 0.05 ppm can cause blockages with drip irrigation.

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8100075-7-4205

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800 Bancroft Way, Suite 101
Berkeley, CA 94710-2227
Attn: Scott Brown

Reporting Date:
October 8, 2008

Date Received: Water samples received 10/02/08
Sample Identification: SRCD081001:1630 (Filtered), collected 10/01/08 16:30
Report: Quantitative chemical analysis with results reported in mg/L (ppm) unless otherwise stated.
Laboratory #: 8100075-3/7

		Degree of Restriction on Irrigation Use	
		Surface	**Sprinkler**
pH value (pH units)	6.2	Normal Range 6.5 to 8.4	
Conductivity (millimhos/cm)	0.28	None	None
Carbonate Alkalinity (as CO_3)	less than 5	-	-
Bicarbonate Alkalinity (as HCO_3)	130	-	Moderate
Total Dissolved Solids	180	None	None
Nitrate (as NO3)	less than 1	None	None
Chloride (as Cl)	15	None	None
Sulfate (as SO4)	14	-	-
Phosphate (PO4)	less than 1	-	-
Boron (B)	less than 0.1	None	None
Calcium (Ca)	18	-	-
Magnesium (Mg)	12	-	-
Potassium (K)	2.0	-	-
Sodium (Na)	25	None	None
Iron (Fe)	0.19	None	-
Manganese (Mn)	0.082	See Below	-
Adjusted Rna	1.0	Moderate	Moderate
Sodium Absorption Ratio (SAR)	1.1	-	-
Adjusted SAR	1.7	-	-

	lbs/acre ft of water
Nitrogen (as N)	less than 0.6
Phosphorus (as P_2O_5)	less than 2.1
Potassium (as K_2O)	6.7

Iron in excess of 0.30 ppm or Manganese in excess of 0.05 ppm can cause blockages with drip irrigation.

Mike Galloway

ANALYTICAL RESULTS

Lab Order: J050374
Project ID 208159

Lab ID:	J050374001	Date Collected:	5/7/2009 13:22	Matrix:	Drinking Water
Sample ID:	**208159 SRSA**	Date Received:	5/7/2009 16:05		

Parameters	Result	Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual
pH, Electrometric Analysis	**Analytical Method:**	EPA 150.1 / SM4500-H B					**Analyzed by:** KMC		
pH	7.6	pH Units		1			05/08/09 16:05	BIO 6855	
Calculation, Adjusted SAR	**Analytical Method:**	Calculation					**Analyzed by:** PJB		
Adj. Sodium Absorption Ratio	0.83	units		1			05/18/09 08:41	CALC 1186	
Calculation, Hardness	**Analytical Method:**	Calculation					**Analyzed by:** LM		
Hardness Calculation	36	mg/L		1			05/13/09 00:00	CALC 1188	
Calculation, Total Anions	**Analytical Method:**	Calculation					**Analyzed by:** NP		
Total Anions	1.5	meq/L		1			05/13/09 12:10	CALC 1189	
Calculation, Total Cations	**Analytical Method:**	Calculation					**Analyzed by:** LM		
Total Cations	1.4	meq/L		1			05/13/09 00:00	CALC 1187	
Metals Analysis by ICP	**Prep Method:**	EPA 200.2			**Prep by:** ECV				
	Analytical Method:	EPA 200.7					**Analyzed by:** LM		
Calcium	7.6	mg/L	0.50	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Magnesium	4.7	mg/L	0.50	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Potassium	4.0	mg/L	1.0	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Sodium	15	mg/L	1.0	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Metals Analysis by ICP, Dissolved	**Prep Method:**	EPA 200.2			**Prep by:** UK				
	Analytical Method:	EPA 200.7 (filtered)					**Analyzed by:** LM		
Boron	ND	mg/L	0.1	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Iron	0.19	mg/L	0.05	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Manganese	ND	mg/L	0.0050	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Potassium	3.8	mg/L	1.0	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Silica (as SiO2)	82	mg/L	1.0	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Zinc	ND	mg/L	0.020	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Metals Analysis by ICPMS, Dissolved	**Prep Method:**	EPA 200.8 (filtered)			**Prep by:** UK				
	Analytical Method:	EPA 200.8 (filtered)					**Analyzed by:** SMD		
Arsenic	4.0	ug/L	0.50	1	05/12/09 00:00	MPR 7571	05/20/09 20:42	MMS 4898	
Turbidity Analysis	**Analytical Method:**	EPA 180.1					**Analyzed by:** RTE		
Turbidity	30	NTU	0.1	2			05/08/09 08:20	WET 5030	
Electrical Conductance Analysis	**Analytical Method:**	EPA 120.1 / SM2510B					**Analyzed by:** NP		
Conductivity	140	umhos/cm	10	1			05/11/09 12:39	WET 5032	
Total Dissolved Solids Analysis	**Analytical Method:**	EPA 160.1 / SM2540C					**Analyzed by:** RTE		
Total Dissolved Solids	190	mg/L	10	1			05/14/09 15:53	WGR 3878	

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(707) 258-4000 • Fax: (707) 226-1001 • e-mail: info@caltestlabs.com

ANALYTICAL RESULTS

Lab Order: J050374

Project ID 208159

Lab ID: J050374001 Date Collected: 5/7/2009 13:22 Matrix: Drinking Water

Sample ID: 208159 SRSA Date Received: 5/7/2009 16:05

Parameters	Result	Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual
Anions by Ion Chromatography	**Analytical Method:**	EPA 300.0					**Analyzed by:** NP		
Chloride	8.9	mg/L	1	1			05/08/09 23:18	WIC 2334	
Fluoride	0.14	mg/L	0.1	1			05/08/09 23:18	WIC 2334	
Nitrate, as NO3	ND	mg/L	2	1			05/08/09 23:18	WIC 2334	
Sulfate (as SO4)	8.8	mg/L	0.5	1			05/08/09 23:18	WIC 2334	
Alkalinity, Total by Standard Methods	**Analytical Method:**	SM20-2320 B					**Analyzed by:** NP		
Alkalinity, Total (as CACO3)	52	mg/L	10	1			05/13/09 12:10	WTI 1743	
Bicarbonate (as HCO3)	63	mg/L	12	1			05/13/09 12:10	WTI 1743	
Carbonate (as CO3)	ND	mg/L	6.0	1			05/13/09 12:10	WTI 1743	
Hydroxide (as OH)	ND	mg/L	1.7	1			05/13/09 12:10	WTI 1743	

Lab ID: J050374002 Date Collected: 5/7/2009 15:31 Matrix: Drinking Water

Sample ID: 208159 SRCD Date Received: 5/7/2009 16:05

Parameters	Result	Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual
pH, Electrometric Analysis	**Analytical Method:**	EPA 150.1 / SM4500-H B					**Analyzed by:** KMC		
pH	7.7	pH Units		1			05/08/09 16:07	BIO 6855	
Calculation, Adjusted SAR	**Analytical Method:**	Calculation					**Analyzed by:** PJB		
Adj. Sodium Absorption Ratio	0.79	units		1			05/18/09 08:41	CALC 1186	
Calculation, Hardness	**Analytical Method:**	Calculation					**Analyzed by:** LM		
Hardness Calculation	54	mg/L		1			05/13/09 00:00	CALC 1188	
Calculation, Total Anions	**Analytical Method:**	Calculation					**Analyzed by:** NP		
Total Anions	1.9	meq/L		1			05/13/09 12:18	CALC 1189	
Calculation, Total Cations	**Analytical Method:**	Calculation					**Analyzed by:** LM		
Total Cations	1.8	meq/L		1			05/13/09 00:00	CALC 1187	
Metals Analysis by ICP	**Prep Method:**	EPA 200.2			**Prep by:** ECV				
	Analytical Method:	EPA 200.7					**Analyzed by:** LM		
Calcium	11	mg/L	0.50	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Magnesium	6.3	mg/L	0.50	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Potassium	2.9	mg/L	1.0	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Sodium	16	mg/L	1.0	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Metals Analysis by ICP, Dissolved	**Prep Method:**	EPA 200.2			**Prep by:** UK				
	Analytical Method:	EPA 200.7 (filtered)					**Analyzed by:** LM		
Boron	ND	mg/L	0.1	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	

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ANALYTICAL RESULTS

Lab Order: J050374
Project ID: 208159

Lab ID: J050374002 Date Collected: 5/7/2009 15:31 Matrix: Drinking Water
Sample ID: 208159 SRCD Date Received: 5/7/2009 16:05

Parameters	Result	Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual
Iron	0.13	mg/L	0.05	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Manganese	ND	mg/L	0.0050	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Potassium	3.0	mg/L	1.0	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Silica (as SiO2)	66	mg/L	1.0	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Zinc	ND	mg/L	0.020	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Metals Analysis by ICPMS, Dissolved	**Prep Method:** EPA 200.8 (filtered) **Analytical Method:** EPA 200.8 (filtered)				**Prep by:** UK		**Analyzed by:** SMD		
Arsenic	1.4	ug/L	0.50	1	05/12/09 00:00	MPR 7571	05/20/09 20:45	MMS 4898	
Turbidity Analysis	**Analytical Method:** EPA 180.1						**Analyzed by:** RTE		
Turbidity	0.91	NTU	0.05	1			05/08/09 08:28	WET 5030	
Electrical Conductance Analysis	**Analytical Method:** EPA 120.1 / SM2510B						**Analyzed by:** NP		
Conductivity	170	umhos/cm	10	1			05/11/09 12:40	WET 5032	
Total Dissolved Solids Analysis	**Analytical Method:** EPA 160.1 / SM2540C						**Analyzed by:** RTE		
Total Dissolved Solids	160	mg/L	10	1			05/14/09 15:53	WGR 3878	
Anions by Ion Chromatography	**Analytical Method:** EPA 300.0						**Analyzed by:** NP		
Chloride	12	mg/L	1	1			05/09/09 00:37	WIC 2334	
Fluoride	ND	mg/L	0.1	1			05/09/09 00:37	WIC 2334	
Nitrate, as NO3	ND	mg/L	2	1			05/09/09 00:37	WIC 2334	
Sulfate (as SO4)	8.4	mg/L	0.5	1			05/09/09 00:37	WIC 2334	
Alkalinity, Total by Standard Methods	**Analytical Method:** SM20-2320 B						**Analyzed by:** NP		
Alkalinity, Total (as CACO3)	67	mg/L	10	1			05/13/09 12:18	WTI 1743	
Bicarbonate (as HCO3)	82	mg/L	12	1			05/13/09 12:18	WTI 1743	
Carbonate (as CO3)	ND	mg/L	6.0	1			05/13/09 12:18	WTI 1743	
Hydroxide (as OH)	ND	mg/L	1.7	1			05/13/09 12:18	WTI 1743	

Lab ID: J050374003 Date Collected: 5/7/2009 14:00 Matrix: Drinking Water
Sample ID: 208159 SRSB Date Received: 5/7/2009 16:05

Parameters	Result	Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual
pH, Electrometric Analysis	**Analytical Method:** EPA 150.1 / SM4500-H B						**Analyzed by:** KMC		
pH	7.3	pH Units		1			05/08/09 16:12	BIO 6855	
Calculation, Adjusted SAR	**Analytical Method:** Calculation						**Analyzed by:** PJB		
Adj. Sodium Absorption Ratio	0.58	units		1			05/18/09 08:41	CALC 1186	

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ANALYTICAL RESULTS

Lab Order: J050374
Project ID 208159

Lab ID: J050374003	Date Collected: 5/7/2009 14:00	Matrix:	Drinking Water
Sample ID: 208159 SRSB	Date Received: 5/7/2009 16:05		

Parameters	Result Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual
Calculation, Hardness	**Analytical Method:** Calculation					**Analyzed by:** LM		
Hardness Calculation	50 mg/L		1			05/13/09 00:00	CALC 1188	
Calculation, Total Anions	**Analytical Method:** Calculation					**Analyzed by:** NP		
Total Anions	1.8 meq/L		1			05/13/09 12:27	CALC 1189	
Calculation, Total Cations	**Analytical Method:** Calculation					**Analyzed by:** LM		
Total Cations	1.5 meq/L		1			05/13/09 00:00	CALC 1187	
Metals Analysis by ICP	**Prep Method:** EPA 200.2			**Prep by:** ECV				
	Analytical Method: EPA 200.7					**Analyzed by:** LM		
Calcium	14 mg/L	0.50	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Magnesium	5.3 mg/L	0.50	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Potassium	9.6 mg/L	1.0	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Sodium	12 mg/L	1.0	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Metals Analysis by ICP, Dissolved	**Prep Method:** EPA 200.2			**Prep by:** UK				
	Analytical Method: EPA 200.7 (filtered)					**Analyzed by:** LM		
Boron	ND mg/L	0.1	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Iron	0.39 mg/L	0.05	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Manganese	0.56 mg/L	0.0050	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Potassium	9.4 mg/L	1.0	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Silica (as SiO2)	50 mg/L	1.0	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Zinc	ND mg/L	0.020	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Metals Analysis by ICPMS, Dissolved	**Prep Method:** EPA 200.8 (filtered)			**Prep by:** UK				
	Analytical Method: EPA 200.8 (filtered)					**Analyzed by:** SMD		
Arsenic	1.5 ug/L	0.50	1	05/12/09 00:00	MPR 7571	05/20/09 20:56	MMS 4898	
Turbidity Analysis	**Analytical Method:** EPA 180.1					**Analyzed by:** RTE		
Turbidity	76 NTU	0.2	5			05/08/09 08:34	WET 5030	
Electrical Conductance Analysis	**Analytical Method:** EPA 120.1 / SM2510B					**Analyzed by:** NP		
Conductivity	160 umhos/cm	10	1			05/11/09 12:42	WET 5032	
Total Dissolved Solids Analysis	**Analytical Method:** EPA 160.1 / SM2540C					**Analyzed by:** RTE		
Total Dissolved Solids	160 mg/L	10	1			05/14/09 15:53	WGR 3878	
Anions by Ion Chromatography	**Analytical Method:** EPA 300.0					**Analyzed by:** NP		
Chloride	9.9 mg/L	1	1			05/09/09 01:41	WIC 2334	
Fluoride	ND mg/L	0.1	1			05/09/09 01:41	WIC 2334	
Nitrate, as NO3	ND mg/L	2	1			05/09/09 01:41	WIC 2334	
Sulfate (as SO4)	3.8 mg/L	0.5	1			05/09/09 01:41	WIC 2334	

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ANALYTICAL RESULTS

Lab Order: J050374
Project ID 208159

Lab ID: J050374003 | Date Collected: 5/7/2009 14:00 | Matrix: Drinking Water
Sample ID: 208159 SRSB | Date Received: 5/7/2009 16:05

Parameters	Result	Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual
Alkalinity, Total by Standard Methods	**Analytical Method:** SM20-2320 B						**Analyzed by:** NP		
Alkalinity, Total (as CACO3)	69	mg/L	10	1			05/13/09 12:27	WTI 1743	
Bicarbonate (as HCO3)	85	mg/L	12	1			05/13/09 12:27	WTI 1743	
Carbonate (as CO3)	ND	mg/L	6.0	1			05/13/09 12:27	WTI 1743	
Hydroxide (as OH)	ND	mg/L	1.7	1			05/13/09 12:27	WTI 1743	

Lab ID: J050374004 | Date Collected: 5/7/2009 13:02 | Matrix: Drinking Water
Sample ID: 208159 SRCB | Date Received: 5/7/2009 16:05

Parameters	Result	Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual
pH, Electrometric Analysis	**Analytical Method:** EPA 150.1 / SM4500-H B						**Analyzed by:** KMC		
pH	7.7	pH Units		1			05/08/09 16:14	BIO 6855	
Calculation, Adjusted SAR	**Analytical Method:** Calculation						**Analyzed by:** PJB		
Adj. Sodium Absorption Ratio	7.1E14	units		1			05/18/09 08:41	CALC 1186	
Calculation, Hardness	**Analytical Method:** Calculation						**Analyzed by:** LM		
Hardness Calculation	48	mg/L		1			05/13/09 00:00	CALC 1188	
Calculation, Total Anions	**Analytical Method:** Calculation						**Analyzed by:** NP		
Total Anions	1.7	meq/L		1			05/13/09 12:35	CALC 1189	
Calculation, Total Cations	**Analytical Method:** Calculation						**Analyzed by:** LM		
Total Cations	1.6	meq/L		1			05/13/09 00:00	CALC 1187	
Metals Analysis by ICP	**Prep Method:** EPA 200.2				**Prep by:** ECV				
	Analytical Method: EPA 200.7						**Analyzed by:** LM		
Calcium	10	mg/L	0.50	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Magnesium	5.6	mg/L	0.50	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Potassium	3.2	mg/L	1.0	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Sodium	14	mg/L	1.0	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Metals Analysis by ICP, Dissolved	**Prep Method:** EPA 200.2				**Prep by:** UK				
	Analytical Method: EPA 200.7 (filtered)						**Analyzed by:** LM		
Boron	ND	mg/L	0.1	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Iron	0.12	mg/L	0.05	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Manganese	0.013	mg/L	0.0050	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Potassium	3.3	mg/L	1.0	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Silica (as SiO2)	71	mg/L	1.0	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Zinc	ND	mg/L	0.020	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	

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ANALYTICAL RESULTS

Lab Order: J050374
Project ID 208159

Lab ID: J050374004	Date Collected: 5/7/2009 13:02	Matrix:	Drinking Water
Sample ID: 208159 SRCB	Date Received: 5/7/2009 16:05		

Parameters	Result	Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals Analysis by ICPMS, Dissolved	**Prep Method:**	EPA 200.8 (filtered)			**Prep by:** UK				
	Analytical Method:	EPA 200.8 (filtered)					**Analyzed by:** SMD		
Arsenic	1.6	ug/L	0.50	1	05/12/09 00:00	MPR 7571	05/20/09 21:00	MMS 4898	
Turbidity Analysis	**Analytical Method:**	EPA 180.1					**Analyzed by:** RTE		
Turbidity	1.2	NTU	0.05	1			05/08/09 08:41	WET 5030	
Electrical Conductance Analysis	**Analytical Method:**	EPA 120.1 / SM2510B					**Analyzed by:** NP		
Conductivity	160	umhos/cm	10	1			05/11/09 12:43	WET 5032	
Total Dissolved Solids Analysis	**Analytical Method:**	EPA 160.1 / SM2540C					**Analyzed by:** RTE		
Total Dissolved Solids	170	mg/L	10	1			05/14/09 15:53	WGR 3878	
Anions by Ion Chromatography	**Analytical Method:**	EPA 300.0					**Analyzed by:** NP		
Chloride	12	mg/L	1	1			05/09/09 01:57	WIC 2334	
Fluoride	ND	mg/L	0.1	1			05/09/09 01:57	WIC 2334	
Nitrate, as NO3	2.2	mg/L	2	1			05/09/09 01:57	WIC 2334	
Sulfate (as SO4)	5.4	mg/L	0.5	1			05/09/09 01:57	WIC 2334	
Alkalinity, Total by Standard Methods	**Analytical Method:**	SM20-2320 B					**Analyzed by:** NP		
Alkalinity, Total (as CACO3)	62	mg/L	10	1			05/13/09 12:35	WTI 1743	
Bicarbonate (as HCO3)	75	mg/L	12	1			05/13/09 12:35	WTI 1743	
Carbonate (as CO3)	ND	mg/L	6.0	1			05/13/09 12:35	WTI 1743	
Hydroxide (as OH)	ND	mg/L	1.7	1			05/13/09 12:35	WTI 1743	

Lab ID: J050374005	Date Collected: 5/7/2009 14:50	Matrix:	Drinking Water
Sample ID: 208159 SRCA	Date Received: 5/7/2009 16:05		

Parameters	Result	Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual
pH, Electrometric Analysis	**Analytical Method:**	EPA 150.1 / SM4500-H B					**Analyzed by:** KMC		
pH	7.5	pH Units		1			05/08/09 16:18	BIO 6855	
Calculation, Adjusted SAR	**Analytical Method:**	Calculation					**Analyzed by:** PJB		
Adj. Sodium Absorption Ratio	7.2E14	units		1			05/18/09 08:41	CALC 1186	
Calculation, Hardness	**Analytical Method:**	Calculation					**Analyzed by:** LM		
Hardness Calculation	32	mg/L		1			05/13/09 00:00	CALC 1188	
Calculation, Total Anions	**Analytical Method:**	Calculation					**Analyzed by:** MYS		
Total Anions	1.2	meq/L		1			05/28/09 00:08	CALC 1189	

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ANALYTICAL RESULTS

Lab Order: J050374
Project ID: 208159

Lab ID:	J050374085	Date Collected:	5/7/2009 14:50	Matrix:	Drinking Water
Sample ID:	208159 SRCA	Date Received:	5/7/2009 16:05		

Parameters	Result Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual
Calculation, Total Cations	**Analytical Method:** Calculation					**Analyzed by:** LM		
Total Cations	1.2 meq/L		1			05/13/09 00:00	CALC 1187	
Metals Analysis by ICP	**Prep Method:** EPA 200.2			**Prep by:** ECV				
	Analytical Method: EPA 200.7					**Analyzed by:** LM		
Calcium	7.3 mg/L	0.50	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Magnesium	3.4 mg/L	0.50	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Potassium	3.7 mg/L	1.0	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Sodium	13 mg/L	1.0	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Metals Analysis by ICP, Dissolved	**Prep Method:** EPA 200.2			**Prep by:** UK				
	Analytical Method: EPA 200.7 (filtered)					**Analyzed by:** LM		
Boron	ND mg/L	0.1	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Iron	0.09 mg/L	0.05	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Manganese	ND mg/L	0.0050	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Potassium	3.8 mg/L	1.0	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Silica (as SiO2)	84 mg/L	1.0	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Zinc	ND mg/L	0.020	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Metals Analysis by ICPMS, Dissolved	**Prep Method:** EPA 200.8 (filtered)			**Prep by:** UK				
	Analytical Method: EPA 200.8 (filtered)					**Analyzed by:** SMD		
Arsenic	2.1 ug/L	0.50	1	05/12/09 00:00	MPR 7571	05/22/09 11:10	MMS 4898	
Turbidity Analysis	**Analytical Method:** EPA 180.1					**Analyzed by:** RTE		
Turbidity	4.1 NTU	0.05	1			05/08/09 08:45	WET 5030	
Electrical Conductance Analysis	**Analytical Method:** EPA 120.1 / SM2510B					**Analyzed by:** NP		
Conductivity	130 umhos/cm	10	1			05/11/09 12:45	WET 5032	
Total Dissolved Solids Analysis	**Analytical Method:** EPA 160.1 / SM2540C					**Analyzed by:** RTE		
Total Dissolved Solids	160 mg/L	10	1			05/14/09 15:53	WGR 3878	
Anions by Ion Chromatography	**Analytical Method:** EPA 300.0					**Analyzed by:** MYS		
Chloride	9.8 mg/L	1	1			05/28/09 00:08	WIC 2351	
Fluoride	0.88 mg/L	0.1	1			05/09/09 02:12	WIC 2334	
Nitrate, as NO3	ND mg/L	2	1			05/09/09 02:12	WIC 2334	
Sulfate (as SO4)	5.8 mg/L	0.5	1			05/28/09 00:08	WIC 2351	
Alkalinity, Total by Standard Methods	**Analytical Method:** SM20-2320 B					**Analyzed by:** NP		
Alkalinity, Total (as CACO3)	40 mg/L	10	1			05/13/09 12:43	WTI 1743	
Bicarbonate (as HCO3)	48 mg/L	12	1			05/13/09 12:43	WTI 1743	
Carbonate (as CO3)	ND mg/L	6.0	1			05/13/09 12:43	WTI 1743	
Hydroxide (as OH)	ND mg/L	1.7	1			05/13/09 12:43	WTI 1743	

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ANALYTICAL RESULTS

Lab Order: J050374
Project ID 208159

Lab ID:	J050374005	Date Collected:	5/7/2009 14:50	Matrix:	Drinking Water
Sample ID:	208159 SRCA	Date Received:	5/7/2009 16:05		

Parameters	Result	Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual

Lab ID:	J050374006	Date Collected:	5/7/2009 14:32	Matrix:	Drinking Water
Sample ID:	208159 SRSC	Date Received:	5/7/2009 16:05		

Parameters	Result	Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual
pH, Electrometric Analysis	**Analytical Method:**	EPA 150.1 / SM4500-H B					**Analyzed by:** KMC		
pH	7.5	pH Units		1			05/08/09 16:21	BIO 6855	
Calculation, Adjusted SAR	**Analytical Method:**	Calculation					**Analyzed by:** PJB		
Adj. Sodium Absorption Ratio	6.7E14	units		1			05/18/09 08:41	CALC 1186	
Calculation, Hardness	**Analytical Method:**	Calculation					**Analyzed by:** LM		
Hardness Calculation	41	mg/L		1			05/13/09 00:00	CALC 1188	
Calculation, Total Anions	**Analytical Method:**	Calculation					**Analyzed by:** NP		
Total Anions	1.5	meq/L		1			05/13/09 12:52	CALC 1189	
Calculation, Total Cations	**Analytical Method:**	Calculation					**Analyzed by:** LM		
Total Cations	1.4	meq/L		1			05/13/09 00:00	CALC 1187	
Metals Analysis by ICP	**Prep Method:**	EPA 200.2			**Prep by:** ECV				
	Analytical Method:	EPA 200.7					**Analyzed by:** LM		
Calcium	8.5	mg/L	0.50	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Magnesium	5.4	mg/L	0.50	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Potassium	3.8	mg/L	1.0	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Sodium	13	mg/L	1.0	1	05/12/09 00:00	MPR 7568	05/13/09 00:00	MIC 2960	
Metals Analysis by ICP, Dissolved	**Prep Method:**	EPA 200.2			**Prep by:** UK				
	Analytical Method:	EPA 200.7 (filtered)					**Analyzed by:** LM		
Boron	ND	mg/L	0.1	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Iron	0.11	mg/L	0.05	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Manganese	0.0064	mg/L	0.0050	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Potassium	3.7	mg/L	1.0	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Silica (as SiO2)	80	mg/L	1.0	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Zinc	ND	mg/L	0.020	1	05/12/09 00:00	MPR 7569	05/13/09 00:00	MIC 2962	
Metals Analysis by ICPMS, Dissolved	**Prep Method:**	EPA 200.8 (filtered)			**Prep by:** UK				
	Analytical Method:	EPA 200.8 (filtered)					**Analyzed by:** SMD		
Arsenic	2.2	ug/L	0.50	1	05/12/09 00:00	MPR 7571	05/20/09 21:18	MMS 4898	
Turbidity Analysis	**Analytical Method:**	EPA 180.1					**Analyzed by:** RTE		
Turbidity	36	NTU	0.1	2			05/08/09 08:48	WET 5030	

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ANALYTICAL RESULTS

Lab Order: J050374

Project ID 208159

Lab ID:	**J050374006**	Date Collected:	5/7/2009 14:32	Matrix:	Drinking Water
Sample ID:	**208159 SRSC**	Date Received:	5/7/2009 16:05		

Parameters	Result	Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual
Electrical Conductance Analysis	**Analytical Method:**	EPA 120.1 / SM2510B					**Analyzed by:** NP		
Conductivity	140	umhos/cm	10	1			05/11/09 12:46	WET 5032	
Total Dissolved Solids Analysis	**Analytical Method:**	EPA 160.1 / SM2540C					**Analyzed by:** RTE		
Total Dissolved Solids	150	mg/L	10	1			05/14/09 15:53	WGR 3878	
Anions by Ion Chromatography	**Analytical Method:**	EPA 300.0					**Analyzed by:** NP		
Chloride	10	mg/L	1	1			05/09/09 02:28	WIC 2334	
Fluoride	0.16	mg/L	0.1	1			05/09/09 02:28	WIC 2334	
Nitrate, as NO3	4.5	mg/L	2	1			05/09/09 02:28	WIC 2334	
Sulfate (as SO4)	4.3	mg/L	0.5	1			05/09/09 02:28	WIC 2334	
Alkalinity, Total by Standard Methods	**Analytical Method:**	SM20-2320 B					**Analyzed by:** NP		
Alkalinity, Total (as CACO3)	54	mg/L	10	1			05/13/09 12:52	WTI 1743	
Bicarbonate (as HCO3)	65	mg/L	12	1			05/13/09 12:52	WTI 1743	
Carbonate (as CO3)	ND	mg/L	6.0	1			05/13/09 12:52	WTI 1743	
Hydroxide (as OH)	ND	mg/L	1.7	1			05/13/09 12:52	WTI 1743	

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QUALITY CONTROL DATA

Lab Order: J050374
Project ID: 206159

Analysis Description:	pH, Electrometric Analysis	**QC Batch:**	BIO/6855
Analysis Method:	EPA 150.1 / SM4500-H B	**QC Batch Method:**	EPA 150.1 / SM4500-H B

SAMPLE DUPLICATE: 273301

Parameter	Units	J050001007 Result	DUP Result	RPD	Max RPD	Qualifiers
pH	pH Units	8.37	8.4	0.2	20	

Analysis Description:	Calculation, Adjusted SAR	**QC Batch:**	CALC/1186
Analysis Method:	Calculation	**QC Batch Method:**	Calculation

Analysis Description:	Calculation, Total Cations	**QC Batch:**	CALC/1187
Analysis Method:	Calculation	**QC Batch Method:**	Calculation

Analysis Description:	Calculation, Hardness	**QC Batch:**	CALC/1188
Analysis Method:	Calculation	**QC Batch Method:**	Calculation

Analysis Description:	Calculation, Total Anions	**QC Batch:**	CALC/1189
Analysis Method:	Calculation	**QC Batch Method:**	Calculation

Analysis Description:	Metals Analysis by ICP	**QC Batch:**	MPR/7568
Analysis Method:	EPA 200.7	**QC Batch Method:**	EPA 200.2

METHOD BLANK: 273503

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QUALITY CONTROL DATA

Lab Order: J050374

Project ID: 208159

Analysis Description:	Metals Analysis by ICP	**QC Batch:**	MPR/7568
Analysis Method:	EPA 200.7	**QC Batch Method:**	EPA 200.2

Parameter	Blank Result	Reporting Limit	Units	Qualifiers
Calcium	ND	0.50	mg/L	
Magnesium	ND	0.50	mg/L	
Potassium	ND	1.0	mg/L	
Sodium	ND	1.0	mg/L	

LABORATORY CONTROL SAMPLE: 273504

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Calcium	mg/L	20	19	97	80-120	
Magnesium	mg/L	20	19	97	80-120	
Potassium	mg/L	20	20	98	80-120	
Sodium	mg/L	20	22	110	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 273505 273506

Parameter	Units	J050368001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Calcium	mg/L	38	20	57	56	92	90	80-120	0.7	20	
Magnesium	mg/L	7.7	20	27	27	99	99	80-120	0.2	20	
Potassium	mg/L	25	20	46	45	103	101	80-120	0.9	20	
Sodium	mg/L	52	20	75	74	116	113	80-120	0.7	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 273507 273508

Parameter	Units	J050382001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Calcium	mg/L	30	20	50	50	98	97	80-120	0.5	20	
Magnesium	mg/L	22	20	42	41	100	99	80-120	0.8	20	
Potassium	mg/L	22	20	45	44	114	111	80-120	1.4	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 273507 273508

Parameter	Units	J050382001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Sodium	mg/L	140	20	160	160	125	119	80-120	0.7	20	1

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QUALITY CONTROL DATA

Lab Order: J050374

Project ID: 208159

Analysis Description:	Metals Analysis by ICP, Dissolved	**QC Batch:**	MPR/7569
Analysis Method:	EPA 200.7 (filtered)	**QC Batch Method:**	EPA 200.2

METHOD BLANK: 273683

Parameter	Blank Result	Reporting Limit	Units	Qualifiers
Boron	ND	0.1	mg/L	
Iron	ND	0.05	mg/L	
Manganese	ND	0.0050	mg/L	
Potassium	ND	1.0	mg/L	
Silica (as SiO2)	ND	1.0	mg/L	
Zinc	ND	0.020	mg/L	

FILTER BLANK: 273704

Parameter	Blank Result	Reporting Limit	Units	Qualifiers
Boron	ND	0.1	mg/L	
Iron	ND	0.05	mg/L	
Manganese	ND	0.0050	mg/L	
Potassium	ND	1.0	mg/L	
Silica (as SiO2)	ND	1.0	mg/L	
Zinc	ND	0.020	mg/L	

LABORATORY CONTROL SAMPLE: 273684

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	mg/L	1	1	100	80-120	
Iron	mg/L	1	1	100	80-120	
Manganese	mg/L	0.04	0.041	103	80-120	
Potassium	mg/L	20	21	104	80-120	
Silica (as SiO2)	mg/L	43	44	102	80-120	
Zinc	mg/L	0.1	0.1	102	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 273685 273686

Parameter	Units	J050152001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Boron	mg/L	0.41	1	1.4	1.4	99	101	80-120	0.9	20	
Iron	mg/L	0	1	0.95	.96	95	96	80-120	1.9	20	
Manganese	mg/L	0.2	0.04	0.23	.23	84	79	80-120	0.9	20	1
Potassium	mg/L	3.6	20	29	29	126	127	80-120	0.5	20	2
Silica (as SiO2)	mg/L	19	43	62	62	99	99	80-120	0.1	20	
Zinc	mg/L	0	0.1	0.1	.1	100	101	80-120	0.7	20	

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QUALITY CONTROL DATA

Lab Order: J050374

Project ID: 206159

Analysis Description:	Metals Analysis by ICP, Dissolved	QC Batch:	MPR/7569
Analysis Method:	EPA 200.7 (filtered)	QC Batch Method:	EPA 200.2

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 273687 273688

Parameter	Units	J050374001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Boron	mg/L	0.034	1	1	1.1	101	103	80-120	1.9	20	
Iron	mg/L	0.19	1	1.2	1.2	100	100	80-120	0.1	20	
Manganese	mg/L	0.0042	0.04	0.045	.045	102	102	80-120	0.1	20	
Potassium	mg/L	3.8	20	25	25	107	105	80-120	1.1	20	
Silica (as SiO2)	mg/L	82	43	120	120	94	91	80-120	0.8	20	
Zinc	mg/L	0	0.1	0.099	.1	99	100	80-120	1.1	20	

Analysis Description:	Metals Analysis by ICPMS, Dissolved	QC Batch:	MPR/7571
Analysis Method:	EPA 200.8 (filtered)	QC Batch Method:	EPA 200.8 (filtered)

METHOD BLANK: 273709

Parameter	Blank Result	Reporting Limit	Units	Qualifiers
Arsenic	ND	0.50	ug/L	

FILTER BLANK: 273714

Parameter	Blank Result	Reporting Limit	Units	Qualifiers
Arsenic	ND	0.50	ug/L	

LABORATORY CONTROL SAMPLE: 273710

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	ug/L	20	19	95	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 273712 273713

Parameter	Units	J050374002 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Arsenic	ug/L	1.4	20	21	20	96	94	85-115	1.6	20	

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QUALITY CONTROL DATA

Lab Order: J050374
Project ID: 208159

Analysis Description:	Turbidity Analysis	**QC Batch:**	WET/5030
Analysis Method:	EPA 180.1	**QC Batch Method:**	EPA 180.1

METHOD BLANK: 273199

Parameter	Blank Result	Reporting Limit	Units	Qualifiers
Turbidity	ND	0.05	NTU	

LABORATORY CONTROL SAMPLE: 273200

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Turbidity	NTU	4	4	100	90-110	

SAMPLE DUPLICATE: 273201

Parameter	Units	J050382001 Result	DUP Result	RPD	Max RPD	Qualifiers
Turbidity	NTU	1.45	1.4	0.7	20	

Analysis Description:	Electrical Conductance Analysis	**QC Batch:**	WET/5032
Analysis Method:	EPA 120.1 / SM2510B	**QC Batch Method:**	EPA 120.1 / SM2510B

METHOD BLANK: 273430

Parameter	Blank Result	Reporting Limit	Units	Qualifiers
Conductivity	ND	10	umhos/c	

LABORATORY CONTROL SAMPLE: 273431

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Conductivity	umhos/c	1400	1400	98	80-120	

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QUALITY CONTROL DATA

Lab Order: J050374
Project ID: 208159

Analysis Description:	Electrical Conductance Analysis	**QC Batch:**	WET/5032
Analysis Method:	EPA 120.1 / SM2510B	**QC Batch Method:**	EPA 120.1 / SM2510B

SAMPLE DUPLICATE: 273432

Parameter	Units	J041223002 Result	DUP Result	RPD	Max RPD	Qualifiers
Conductivity	umhos/c	500	500	0	20	

Analysis Description:	Total Dissolved Solids Analysis	**QC Batch:**	WGR/3878
Analysis Method:	EPA 160.1 / SM2540C	**QC Batch Method:**	EPA 160.1 / SM2540C

METHOD BLANK: 274226

Parameter	Blank Result	Reporting Limit	Units	Qualifiers
Total Dissolved Solids	ND	10	mg/L	

LABORATORY CONTROL SAMPLE: 274227

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	500	510	101	80-120	

SAMPLE DUPLICATE: 274228

Parameter	Units	J050305001 Result	DUP Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1024	1000	1.2	20	

Analysis Description:	Anions by Ion Chromatography	**QC Batch:**	WIC/2334
Analysis Method:	EPA 300.0	**QC Batch Method:**	EPA 300.0

METHOD BLANK: 273331

Parameter	Blank Result	Reporting Limit	Units	Qualifiers
Chloride	ND	1	mg/L	
Fluoride	ND	0.1	mg/L	
Nitrate, as NO3	ND	2	mg/L	
Sulfate (as SO4)	ND	0.5	mg/L	

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QUALITY CONTROL DATA

Lab Order: J050374

Project ID: 208159

Analysis Description:	Anions by Ion Chromatography	**QC Batch:**	WIC/2334
Analysis Method:	EPA 300.0	**QC Batch Method:**	EPA 300.0

LABORATORY CONTROL SAMPLE: 273332

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	8	8.8	110	90-110	
Fluoride	mg/L	2	2.2	109	90-110	
Nitrate, as NO3	mg/L	18	19	109	90-110	
Sulfate (as SO4)	mg/L	10	11	110	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 273333 273334

Parameter	Units	J050374001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Chloride	mg/L	8.9	8	19	19	131	130	90-110	0.5	20	1
Fluoride	mg/L	0.14	2	2.4	2.5	115	116	90-110	0.7	20	1
Nitrate, as NO3	mg/L	1.6	22	27	28	117	117	90-110	0.1	20	1
Sulfate (as SO4)	mg/L	8.8	16	28	28	118	119	90-110	0.5	20	1

Analysis Description:	Anions by Ion Chromatography	**QC Batch:**	WIC/2351
Analysis Method:	EPA 300.0	**QC Batch Method:**	EPA 300.0

METHOD BLANK: 276832

Parameter	Blank Result	Reporting Limit	Units	Qualifiers
Chloride	ND	1	mg/L	
Sulfate (as SO4)	ND	0.5	mg/L	

LABORATORY CONTROL SAMPLE: 276833

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	8	7.9	99	90-110	
Sulfate (as SO4)	mg/L	10	10	103	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 276834 276835

Parameter	Units	J050916010 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Chloride	mg/L			190	190				0.5	20	

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QUALITY CONTROL DATA

Lab Order: J050374

Project ID: 208159

Analysis Description:	Anions by Ion Chromatography	**QC Batch:**	WIC/2351
Analysis Method:	EPA 300.0	**QC Batch Method:**	EPA 300.0

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 276834 276835

Parameter	Units	J050916010 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Sulfate (as SO4)	mg/L			73	73				0.2	20	

Analysis Description:	Alkalinity, Total by Standard Methods	**QC Batch:**	WTI/1743
Analysis Method:	SM20-2320 B	**QC Batch Method:**	SM20-2320 B

METHOD BLANK: 273818

Parameter	Blank Result	Reporting Limit	Units	Qualifiers
Alkalinity, Total (as CACO3)	ND	10	mg/L	
Carbonate (as CO3)	ND	6.0	mg/L	
Bicarbonate (as HCO3)	ND	12	mg/L	
Hydroxide (as OH)	ND	1.7	mg/L	

LABORATORY CONTROL SAMPLE: 273819

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total (as CACO3)	mg/L	100	97	97	80-120	
Bicarbonate (as HCO3)	mg/L	120	120	97	80-120	

SAMPLE DUPLICATE: 273820

Parameter	Units	J050194001 Result	DUP Result	RPD	Max RPD	Qualifiers
Alkalinity, Total (as CACO3)	mg/L	30.8	31	1	20	
Carbonate (as CO3)	mg/L	0	0	0	20	
Bicarbonate (as HCO3)	mg/L	37.576	38	1	20	
Hydroxide (as OH)	mg/L	0	0	0	20	

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ENVIRONMENTAL ANALYSES

ANALYTICAL RESULTS

Lab Order: J041085

Project ID SUSCOLMOUNTAIN

Lab ID:	**J041085001**	Date Collected:	4/24/2009 11:30	Matrix: Drinking Water
Sample ID:	**WELL-KW**	Date Received:	4/24/2009 13:57	

Parameters	Result	Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual
pH, Electrometric Analysis	**Analytical Method:**	EPA 150.1 / SM4500-H B					**Analyzed by:** KMC		
pH	8.1	pH Units		1			04/25/09 11:48	BIO 6806	
Calculation, Hardness	**Analytical Method:**	Calculation					**Analyzed by:** LM		
Hardness Calculation	47	mg/L		1			04/28/09 00:00	CALC	
Calculation, Sodium Absorption Ratio	**Analytical Method:**	Calculation					**Analyzed by:** LM		
Sodium Absorption Ratio	1.9	units		1			04/28/09 00:00	CALC	
Calculation, Total Anions	**Analytical Method:**	Calculation					**Analyzed by:** NP		
Total Anions	2.4	meq/L		1			05/04/09 12:34	CALC	
Calculation, Total Cations	**Analytical Method:**	Calculation					**Analyzed by:** LM		
Total Cations	2.2	meq/L		1			04/28/09 00:00	CALC	
Metals Analysis by ICP	**Prep Method:**	EPA 200.2			**Prep by:** UK				
	Analytical Method:	EPA 200.7					**Analyzed by:** LM		
Calcium	8.6	mg/L	0.50	1	04/30/09 00:00	MPR 7518	05/01/09 00:00	MIC 2944	
Magnesium	6.5	mg/L	0.50	1	04/30/09 00:00	MPR 7518	05/01/09 00:00	MIC 2944	
Metals Analysis by ICP, Dissolved	**Prep Method:**	EPA 200.2			**Prep by:** UK				
	Analytical Method:	EPA 200.7 (filtered)					**Analyzed by:** LM		
Boron	ND	mg/L	0.1	1	04/27/09 00:00	MPR 7507	04/29/09 00:00	MIC 2941	
Iron	ND	mg/L	0.05	1	04/27/09 00:00	MPR 7507	04/28/09 00:00	MIC 2941	
Manganese	0.054	mg/L	0.0050	1	04/27/09 00:00	MPR 7507	04/28/09 00:00	MIC 2941	
Silica (as SiO_2)	88	mg/L	1.0	1	04/27/09 00:00	MPR 7507	04/28/09 00:00	MIC 2941	
Sodium	30	mg/L	1.0	1	04/27/09 00:00	MPR 7507	04/28/09 00:00	MIC 2941	
Zinc	ND	mg/L	0.020	1	04/27/09 00:00	MPR 7507	04/28/09 00:00	MIC 2941	
Metals Analysis by ICPMS, Dissolved	**Prep Method:**	EPA 200.8 (filtered)			**Prep by:** UK				
	Analytical Method:	EPA 200.8 (filtered)					**Analyzed by:** SMD		
Arsenic	6.1	ug/L	0.50	1	04/29/09 00:00	MPR 7519	05/01/09 20:36	MMS 4874	
Turbidity Analysis	**Analytical Method:**	EPA 180.1					**Analyzed by:** RTE		
Turbidity	8.3	NTU	0.05	1			04/30/09 09:15	WET 5015	1
Electrical Conductance Analysis	**Analytical Method:**	EPA 120.1 / SM2510B					**Analyzed by:** NP		
Conductivity	220	umhos/cm	10	1			05/01/09 10:48	WET 5017	
Total Dissolved Solids Analysis	**Analytical Method:**	EPA 160.1 / SM2540C					**Analyzed by:** JDC		
Total Dissolved Solids	210	mg/L	10	1			04/30/09 15:28	WGR 3867	
Anions by Ion Chromatography	**Analytical Method:**	EPA 300.0					**Analyzed by:** MYS		
Chloride	11	mg/L	1	1			04/25/09 00:54	WIC 2320	

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ANALYTICAL RESULTS

Lab Order: J041085

Project ID SUSCOLMOUNTAIN

Lab ID: **J041085001** Date Collected: 4/24/2009 11:30 Matrix: Drinking Water

Sample ID: **WELL-KW** Date Received: 4/24/2009 13:57

Parameters	Result	Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual
Fluoride	0.13	mg/L	0.1	1			04/25/09 00:54	WIC 2320	
Nitrate, as NO3	ND	mg/L	2	1			04/25/09 00:54	WIC 2320	
Sulfate (as SO4)	4.0	mg/L	0.5	1			04/25/09 00:54	WIC 2320	
Alkalinity, Total by Standard Methods	**Analytical Method:**	SM20-2320 B					**Analyzed by:** NP		
Alkalinity, Total (as CACO3)	100	mg/L	10	1			05/04/09 12:34	WTI 1733	
Bicarbonate (as HCO3)	120	mg/L	12	1			05/04/09 12:34	WTI 1733	
Carbonate (as CO3)	ND	mg/L	6.0	1			05/04/09 12:34	WTI 1733	
Hydroxide (as OH)	ND	mg/L	1.7	1			05/04/09 12:34	WTI 1733	

Lab ID: **J041085002** Date Collected: 4/24/2009 12:00 Matrix: Drinking Water

Sample ID: **WELL-KC** Date Received: 4/24/2009 13:57

Parameters	Result	Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual
pH, Electrometric Analysis	**Analytical Method:**	EPA 150.1 / SM4500-H B					**Analyzed by:** KMC		
pH	7.7	pH Units		1			04/25/09 11:50	BIO 6806	
Calculation, Hardness	**Analytical Method:**	Calculation					**Analyzed by:** LM		
Hardness Calculation	50	mg/L		1			04/28/09 00:00	CALC	
Calculation, Sodium Absorption Ratio	**Analytical Method:**	Calculation					**Analyzed by:** LM		
Sodium Absorption Ratio	0.83	units		1			04/28/09 00:00	CALC	
Calculation, Total Anions	**Analytical Method:**	Calculation					**Analyzed by:** NP		
Total Anions	1.7	meq/L		1			05/04/09 12:42	CALC	
Calculation, Total Cations	**Analytical Method:**	Calculation					**Analyzed by:** LM		
Total Cations	1.6	meq/L		1			04/28/09 00:00	CALC	
Metals Analysis by ICP	**Prep Method:**	EPA 200.2			**Prep by:** UK				
	Analytical Method:	EPA 200.7					**Analyzed by:** LM		
Calcium	10	mg/L	0.50	1	04/30/09 00:00	MPR 7518	05/01/09 00:00	MIC 2944	
Magnesium	5.7	mg/L	0.50	1	04/30/09 00:00	MPR 7518	05/01/09 00:00	MIC 2944	
Metals Analysis by ICP, Dissolved	**Prep Method:**	EPA 200.2			**Prep by:** UK				
	Analytical Method:	EPA 200.7 (filtered)					**Analyzed by:** LM		
Boron	ND	mg/L	0.1	1	04/27/09 00:00	MPR 7507	04/28/09 00:00	MIC 2941	
Iron	0.07	mg/L	0.05	1	04/27/09 00:00	MPR 7507	04/28/09 00:00	MIC 2941	
Manganese	0.0095	mg/L	0.0050	1	04/27/09 00:00	MPR 7507	04/28/09 00:00	MIC 2941	
Silica (as SiO2)	72	mg/L	1.0	1	04/27/09 00:00	MPR 7507	04/28/09 00:00	MIC 2941	
Sodium	14	mg/L	1.0	1	04/27/09 00:00	MPR 7507	04/28/09 00:00	MIC 2941	

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ENVIRONMENTAL ANALYSES

ANALYTICAL RESULTS

Lab Order: J041085

Project ID SUSCOLMOUNTAIN

Lab ID: **J041085002** Date Collected: 4/24/2009 12:00 Matrix: Drinking Water

Sample ID: **WELL-KC** Date Received: 4/24/2009 13:57

Parameters	Result	Units	R. L.	DF	Prepared	Batch	Analyzed	Batch	Qual
Zinc	ND	mg/L	0.020	1	04/27/09 00:00	MPR 7507	04/28/09 00:00	MIC 2941	
Metals Analysis by ICPMS, Dissolved	**Prep Method:**		EPA 200.8 (filtered)		**Prep by:** UK				
	Analytical Method:		EPA 200.8 (filtered)				**Analyzed by:** SMD		
Arsenic	1.4	ug/L	0.50	1	04/29/09 00:00	MPR 7519	05/01/09 20:42	MMS 4874	
Turbidity Analysis	**Analytical Method:**		EPA 180.1				**Analyzed by:** RTE		
Turbidity	1.4	NTU	0.05	1			04/30/09 09:16	WET 5015	1
Electrical Conductance Analysis	**Analytical Method:**		EPA 120.1 / SM2510B				**Analyzed by:** NP		
Conductivity	170	umhos/cm	10	1			05/01/09 10:50	WET 5017	
Total Dissolved Solids Analysis	**Analytical Method:**		EPA 160.1 / SM2540C				**Analyzed by:** JDC		
Total Dissolved Solids	160	mg/L	10	1			04/30/09 15:28	WGR 3867	
Anions by Ion Chromatography	**Analytical Method:**		EPA 300.0				**Analyzed by:** MYS		
Chloride	10	mg/L	1	1			04/25/09 01:25	WIC 2320	
Fluoride	ND	mg/L	0.1	1			04/25/09 01:25	WIC 2320	
Nitrate, as NO3	2.7	mg/L	2	1			04/25/09 01:25	WIC 2320	
Sulfate (as SO4)	4.8	mg/L	0.5	1			04/25/09 01:25	WIC 2320	
Alkalinity, Total by Standard Methods	**Analytical Method:**		SM20-2320 B				**Analyzed by:** NP		
Alkalinity, Total (as CACO3)	65	mg/L	10	1			05/04/09 12:42	WTI 1733	
Bicarbonate (as HCO3)	80	mg/L	12	1			05/04/09 12:42	WTI 1733	
Carbonate (as CO3)	ND	mg/L	6.0	1			05/04/09 12:42	WTI 1733	
Hydroxide (as OH)	ND	mg/L	1.7	1			05/04/09 12:42	WTI 1733	

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APPENDIX C

Table of Hydrologic Modeling Results for Subwatersheds, Concentration Points, and Outlets, Pre- and Post-Project Conditions, Suscol Mountain Vineyard, Napa and Solano Counties, California

Hydrologic Element	2-yr Q_{peak} (cfs)		2-yr Volume (ac-ft)		Change			
	Existing	Post-Project	Existing	Post-Project	Q (cfs)	%	Vol (ac-ft)	%
Fagan 1-2	46.8	46.8	18.8	18.8	0.0	0.0%	0.0	0.0%
Fagan 2-3	100.5	98.2	40.1	39.6	-2.3	-2.3%	-0.5	-1.2%
Fagan 3-4	110.1	107.3	43.9	43.2	-2.8	-2.5%	-0.7	-1.6%
Fagan 4-Out	130.8	127.4	52.5	51.6	-3.4	-2.6%	-0.9	-1.7%
Fagan Ck 1	9.4	9.4	3.4	3.4	0.0	0.0%	0.0	0.0%
Fagan Ck 2	3.8	3.8	1.4	1.4	0.0	0.0%	0.0	0.0%
Fagan Ck 3	2.2	2.2	0.8	0.8	0.0	0.0%	0.0	0.0%
Fagan Ck 4	10.5	10.5	4.0	4.0	0.0	0.0%	0.0	0.0%
Fagan Ck 5	10.3	10.3	3.9	3.9	0.0	0.0%	0.0	0.0%
Fagan Trib 1	38.0	38.0	15.4	15.4	0.0	0.0%	0.0	0.0%
Fagan Trib 2	51.6	49.5	19.9	19.4	-2.1	-4.1%	-0.5	-2.5%
Fagan Trib 3	8.5	7.6	3.0	2.7	-0.9	-10.6%	-0.3	-10.0%
Fagan Trib 4	12.7	12.0	4.6	4.4	-0.7	-5.5%	-0.2	-4.3%
Jct: Fagan1	46.8	46.8	18.8	18.8	0.0	0.0%	0.0	0.0%
Jct: Fagan2	100.6	98.3	40.1	39.6	-2.3	-2.3%	-0.5	-1.2%
Jct: Fagan3	110.1	107.3	43.9	43.2	-2.8	-2.5%	-0.7	-1.6%
Jct: Fagan4	130.9	127.5	52.5	51.6	-3.4	-2.6%	-0.9	-1.7%
Jct: Suscol1	127.2	119.3	46.1	43.7	-7.9	-6.2%	-2.4	-5.2%
Jct: Suscol2	188.7	172.6	68.7	64.1	-16.1	-8.5%	-4.6	-6.7%
Jct: Suscol3	303.3	277.8	111.1	104.8	-25.5	-8.4%	-6.3	-5.7%
Jct: Suscol4	479.2	437.6	179.2	168.8	-41.6	-8.7%	-10.4	-5.8%
Jct: Suscol5	576.9	529.1	218.6	207.0	-47.8	-8.3%	-11.6	-5.3%
Jct: Suscol6	625.1	570.6	239.2	225.6	-54.5	-8.7%	-13.6	-5.7%
Jct: SuscolTrib3	82.7	76.0	29.8	28.7	-6.7	-8.1%	-1.1	-3.7%
Jct: SuscolTrib5	73.3	68.6	26.3	25.3	-4.7	-6.4%	-1.0	-3.8%
Outlet: FaganCk	139.2	135.8	56.4	55.4	-3.4	-2.4%	-1.0	-1.8%
Outlet: Sheehy1	36.5	31.7	12.6	11.0	-4.8	-13.2%	-1.6	-12.7%
Outlet: Sheehy1.5	2.2	2.2	0.8	0.8	0.0	0.0%	0.0	0.0%
Outlet: Sheehy2	47.8	42.2	17.9	16.6	-5.6	-11.7%	-1.3	-7.3%
Outlet: Sheehy3	46.1	40.5	17.5	16.2	-5.6	-12.1%	-1.3	-7.4%
Outlet: Sheehy4	40.3	37.7	15.7	15.0	-2.6	-6.5%	-0.7	-4.5%
Outlet: Sheehy5	31.5	27.7	11.9	11.0	-3.8	-12.1%	-0.9	-7.6%
Outlet: Sheehy6.1	5.1	4.3	1.9	1.6	-0.8	-15.7%	-0.3	-15.8%
Outlet: Sheehy6.2	32.0	28.6	12.1	11.8	-3.4	-10.6%	-0.3	-2.5%
Outlet: Suscol	659.7	603.0	253.4	239.4	-56.7	-8.6%	-14.0	-5.5%
Sheehy Ck 1	*36.5*	-	*12.6*	-	*Watershed boundaries changed*			
Sheehy Ck 1.5	*Same as Outlet: Sheehy1.5*							
Sheehy Ck 2	*Same as Outlet: Sheehy2*							
Sheehy Ck 3	46.1	40.5	17.5	16.2	-5.6	-12.1%	-1.3	-7.4%
Sheehy Ck 4	40.3	37.7	15.7	15.0	-2.6	-6.5%	-0.7	-4.5%
Sheehy Ck 5	31.5	27.7	11.9	11.0	-3.8	-12.1%	-0.9	-7.6%
Sheehy Ck 6.1	5.1	4.3	1.9	1.6	-0.8	-15.7%	-0.3	-15.8%
Sheehy Ck 6.2	*Same as Outlet: Sheehy6.2*							
Suscol 1-2	127.2	119.3	46.1	43.7	-7.9	-6.2%	-2.4	-5.2%
Suscol 2-3	*188.6*	-	*68.7*	-	*Watershed boundaries changed*			
Suscol 3-4	303.0	277.6	111.1	104.8	-25.4	-8.4%	-6.3	-5.7%

Suscol 4-5	478.8	437.3	179.2	168.8	-41.5	-8.7%	-10.4	-5.8%
Suscol 5-6	576.5	528.8	218.6	207.0	-47.7	-8.3%	-11.6	-5.3%
Suscol 6-Out	624.8	570.2	239.2	225.6	-54.6	-8.7%	-13.6	-5.7%
Suscol Ck 1	55.0	51.7	20.1	19.3	-3.3	-6.0%	-0.8	-4.0%
Suscol Ck 2	11.8	11.1	4.2	4.1	-0.7	-5.9%	-0.1	-2.4%
Suscol Ck 3	*23.4*	-	*8.3*	-	*Watershed boundaries changed*			
Suscol Ck 4	100.2	88.3	37.9	35.0	-11.9	-11.9%	-2.9	-7.7%
Suscol Ck 5	22.9	22.9	8.0	8.0	0.0	0.0%	0.0	0.0%
Suscol Ck 6	43.3	38.6	15.2	14.0	-4.7	-10.9%	-1.2	-7.9%
Suscol Ck 7	1.9	1.9	0.7	0.7	0.0	0.0%	0.0	0.0%
Suscol Trib 1	72.2	67.7	26.0	24.4	-4.5	-6.2%	-1.6	-6.2%
Suscol Trib 2	51.2	43.9	18.4	16.4	-7.3	-14.3%	-2.0	-10.9%
Suscol Trib 3.1	49.6	45.2	18.1	17.3	-4.4	-8.9%	-0.8	-4.4%
Suscol Trib 3.2	33.3	31.5	11.8	11.3	-1.8	-5.4%	-0.5	-4.2%
Suscol Trib 3.3	12.3	11.6	4.3	4.1	-0.7	-5.7%	-0.2	-4.7%
SuscolTrib 3-Confl	82.6	75.9	29.8	28.7	-6.7	-8.1%	-1.1	-3.7%
Suscol Trib 4	78.5	73.5	30.2	29.0	-5.0	-6.4%	-1.2	-4.0%
Suscol Trib 5.1	21.4	20.3	7.6	7.3	-1.1	-5.1%	-0.3	-3.9%
Suscol Trib 5.2	51.9	48.3	18.7	18.0	-3.6	-6.9%	-0.7	-3.7%
Suscol Trib 5.3	14.6	13.8	5.1	4.9	-0.8	-5.5%	-0.2	-3.9%
SuscolTrib 5-Confl	73.2	68.5	26.3	25.3	-4.7	-6.4%	-1.0	-3.8%
Suscol Trib 6	15.4	12.4	5.4	4.6	-3.0	-19.5%	-0.8	-14.8%
Suscol Trib 7	36.8	34.5	13.6	13.1	-2.3	-6.2%	-0.5	-3.7%

Hydrologic Element	5-yr Q_{peak} (cfs)		5-yr Volume (ac-ft)		Change			
	Existing	Post-Project	Existing	Post-Project	Q (cfs)	%	Vol (ac-ft)	%
Fagan 1-2	73.0	73.0	27.6	27.6	0.0	0.0%	0.0	0.0%
Fagan 2-3	157.1	154.0	58.9	58.3	-3.1	-2.0%	-0.6	-1.0%
Fagan 3-4	171.8	168.1	64.4	63.5	-3.7	-2.2%	-0.9	-1.4%
Fagan 4-Out	205.0	200.9	77.0	75.9	-4.1	-2.0%	-1.1	-1.4%
Fagan Ck 1	14.4	14.4	5.0	5.0	0.0	0.0%	0.0	0.0%
Fagan Ck 2	5.9	5.9	2.0	2.0	0.0	0.0%	0.0	0.0%
Fagan Ck 3	3.5	3.5	1.2	1.2	0.0	0.0%	0.0	0.0%
Fagan Ck 4	16.6	16.6	5.9	5.9	0.0	0.0%	0.0	0.0%
Fagan Ck 5	16.5	16.5	5.8	5.8	0.0	0.0%	0.0	0.0%
Fagan Trib 1	59.4	59.4	22.6	22.6	0.0	0.0%	0.0	0.0%
Fagan Trib 2	80.4	77.7	29.3	28.6	-2.7	-3.4%	-0.7	-2.4%
Fagan Trib 3	12.7	11.6	4.3	4.0	-1.1	-8.7%	-0.3	-7.0%
Fagan Trib 4	19.7	18.8	6.8	6.5	-0.9	-4.6%	-0.3	-4.4%
Jct: Fagan1	73.1	73.1	27.6	27.6	0.0	0.0%	0.0	0.0%
Jct: Fagan2	157.1	154.1	58.9	58.3	-3.0	-1.9%	-0.6	-1.0%
Jct: Fagan3	171.9	168.2	64.4	63.5	-3.7	-2.2%	-0.9	-1.4%
Jct: Fagan4	205.0	201.0	77.0	75.9	-4.0	-2.0%	-1.1	-1.4%
Jct: Suscol1	190.0	181.9	66.0	63.3	-8.1	-4.3%	-2.7	-4.1%
Jct: Suscol2	282.1	264.9	98.5	93.1	-17.2	-6.1%	-5.4	-5.5%
Jct: Suscol3	455.2	426.5	159.4	152.2	-28.7	-6.3%	-7.2	-4.5%
Jct: Suscol4	720.8	672.9	257.1	245.0	-47.9	-6.6%	-12.1	-4.7%

Jct: Suscol5	869.7	814.1	313.8	300.3	-55.6	-6.4%	-13.5	-4.3%
Jct: Suscol6	943.3	880.1	342.9	327.2	-63.2	-6.7%	-15.7	-4.6%
Jct: SuscolTrib3	123.7	115.4	42.8	41.4	-8.3	-6.7%	-1.4	-3.3%
Jct: SuscolTrib5	109.6	103.9	37.8	36.6	-5.7	-5.2%	-1.2	-3.2%
Outlet: FaganCk	218.9	214.8	82.8	81.7	-4.1	-1.9%	-1.1	-1.3%
Outlet: Sheehy1	53.2	47.0	17.8	15.7	-6.2	-11.7%	-2.1	-11.8%
Outlet: Sheehy1.5	3.4	3.4	1.1	1.1	0.0	0.0%	0.0	0.0%
Outlet: Sheehy2	71.6	64.9	25.7	24.2	-6.7	-9.4%	-1.5	-5.8%
Outlet: Sheehy3	69.1	62.4	25.1	23.5	-6.7	-9.7%	-1.6	-6.4%
Outlet: Sheehy4	62.1	58.9	22.8	22.1	-3.2	-5.2%	-0.7	-3.1%
Outlet: Sheehy5	47.2	42.7	17.1	16.0	-4.5	-9.5%	-1.1	-6.4%
Outlet: Sheehy6.1	8.0	6.8	2.8	2.4	-1.2	-15.0%	-0.4	-14.3%
Outlet: Sheehy6.2	49.9	45.3	17.8	17.4	-4.6	-9.2%	-0.4	-2.2%
Outlet: Suscol	996.3	930.4	363.3	346.9	-65.9	-6.6%	-16.4	-4.5%
Sheehy Ck 1	*53.2*	-	*17.8*	-	*Watershed boundaries changed*			
Sheehy Ck 1.5	*Same as Outlet: Sheehy1.5*							
Sheehy Ck 2	*Same as Outlet: Sheehy2*							
Sheehy Ck 3	69.1	62.4	25.1	23.5	-6.7	-9.7%	-1.6	-6.4%
Sheehy Ck 4	62.1	58.9	22.8	22.1	-3.2	-5.2%	-0.7	-3.1%
Sheehy Ck 5	47.2	42.7	17.1	16.0	-4.5	-9.5%	-1.1	-6.4%
Sheehy Ck 6.1	8.0	6.8	2.8	2.4	-1.2	-15.0%	-0.4	-14.3%
Sheehy Ck 6.2	*Same as Outlet: Sheehy6.2*							
Suscol 1-2	189.9	181.9	66.0	63.3	-8.0	-4.2%	-2.7	-4.1%
Suscol 2-3	*282.0*	-	*98.5*	-	*Watershed boundaries changed*			
Suscol 3-4	454.8	426.1	159.4	152.2	-28.7	-6.3%	-7.2	-4.5%
Suscol 4-5	720.5	672.5	257.1	245.0	-48.0	-6.7%	-12.1	-4.7%
Suscol 5-6	868.9	813.8	313.8	300.3	-55.1	-6.3%	-13.5	-4.3%
Suscol 6-Out	942.7	879.6	342.9	327.2	-63.1	-6.7%	-15.7	-4.6%
Suscol Ck 1	83.3	79.4	29.1	28.1	-3.9	-4.7%	-1.0	-3.4%
Suscol Ck 2	18.3	17.4	6.2	6.0	-0.9	-4.9%	-0.2	-3.2%
Suscol Ck 3	*35.4*	-	*11.9*	-	*Watershed boundaries changed*			
Suscol Ck 4	150.3	136.0	54.4	50.9	-14.3	-9.5%	-3.5	-6.4%
Suscol Ck 5	34.5	34.5	11.5	11.5	0.0	0.0%	0.0	0.0%
Suscol Ck 6	63.1	57.7	21.5	20.1	-5.4	-8.6%	-1.4	-6.5%
Suscol Ck 7	3.0	3.0	1.0	1.0	0.0	0.0%	0.0	0.0%
Suscol Trib 1	106.8	102.5	37.0	35.2	-4.3	-4.0%	-1.8	-4.9%
Suscol Trib 2	75.8	67.4	26.3	23.8	-8.4	-11.1%	-2.5	-9.5%
Suscol Trib 3.1	74.2	68.6	25.9	25.1	-5.6	-7.5%	-0.8	-3.1%
Suscol Trib 3.2	49.8	47.7	16.9	16.4	-2.1	-4.2%	-0.5	-3.0%
Suscol Trib 3.3	18.5	17.7	6.2	6.0	-0.8	-4.3%	-0.2	-3.2%
SuscolTrib 3-Confl	123.7	115.3	42.8	41.4	-8.4	-6.8%	-1.4	-3.3%
Suscol Trib 4	117.7	111.8	43.3	41.9	-5.9	-5.0%	-1.4	-3.2%
Suscol Trib 5.1	32.0	30.8	11.0	10.6	-1.2	-3.8%	-0.4	-3.6%
Suscol Trib 5.2	77.6	73.3	26.8	26.0	-4.3	-5.5%	-0.8	-3.0%
Suscol Trib 5.3	22.0	21.0	7.4	7.1	-1.0	-4.5%	-0.3	-4.1%
SuscolTrib 5-Confl	109.6	103.9	37.8	36.6	-5.7	-5.2%	-1.2	-3.2%
Suscol Trib 6	22.7	19.3	7.7	6.8	-3.4	-15.0%	-0.9	-11.7%
Suscol Trib 7	54.5	51.8	19.3	18.7	-2.7	-5.0%	-0.6	-3.1%

Hydrologic Element	10-yr Q_{peak} (cfs)		10-yr Volume (ac-ft)		Change			
	Existing	Post-Project	Existing	Post-Project	Q (cfs)	%	Vol (ac-ft)	%
Fagan 1-2	86.8	86.8	32.2	32.2	0.0	0.0%	0.0	0.0%
Fagan 2-3	186.9	183.4	68.7	68.0	-3.5	-1.9%	-0.7	-1.0%
Fagan 3-4	204.2	200.2	75.0	74.1	-4.0	-2.0%	-0.9	-1.2%
Fagan 4-Out	243.9	239.5	89.8	88.6	-4.4	-1.8%	-1.2	-1.3%
Fagan Ck 1	17.0	17.0	5.8	5.8	0.0	0.0%	0.0	0.0%
Fagan Ck 2	7.0	7.0	2.3	2.3	0.0	0.0%	0.0	0.0%
Fagan Ck 3	4.2	4.2	1.4	1.4	0.0	0.0%	0.0	0.0%
Fagan Ck 4	19.8	19.8	6.9	6.9	0.0	0.0%	0.0	0.0%
Fagan Ck 5	19.7	19.7	6.8	6.8	0.0	0.0%	0.0	0.0%
Fagan Trib 1	70.7	70.7	26.4	26.4	0.0	0.0%	0.0	0.0%
Fagan Trib 2	95.6	92.6	34.1	33.5	-3.0	-3.1%	-0.6	-1.8%
Fagan Trib 3	14.9	13.7	4.9	4.6	-1.2	-8.1%	-0.3	-6.1%
Fagan Trib 4	23.4	22.4	7.9	7.6	-1.0	-4.3%	-0.3	-3.8%
Jct: Fagan1	86.8	86.8	32.2	32.2	0.0	0.0%	0.0	0.0%
Jct: Fagan2	186.9	183.4	68.7	68.0	-3.5	-1.9%	-0.7	-1.0%
Jct: Fagan3	204.3	200.2	75.0	74.1	-4.1	-2.0%	-0.9	-1.2%
Jct: Fagan4	244.1	239.7	89.8	88.6	-4.4	-1.8%	-1.2	-1.3%
Jct: Suscol1	222.6	214.5	76.3	73.4	-8.1	-3.6%	-2.9	-3.8%
Jct: Suscol2	330.5	313.0	113.9	108.2	-17.5	-5.3%	-5.7	-5.0%
Jct: Suscol3	533.7	504.0	184.4	176.8	-29.7	-5.6%	-7.6	-4.1%
Jct: Suscol4	845.8	795.3	297.4	284.6	-50.5	-6.0%	-12.8	-4.3%
Jct: Suscol5	1,021.0	963.0	362.9	348.7	-58.0	-5.7%	-14.2	-3.9%
Jct: Suscol6	1,108.1	1,041.3	396.5	379.9	-66.8	-6.0%	-16.6	-4.2%
Jct: SuscolTrib3	144.9	135.8	49.5	48.1	-9.1	-6.3%	-1.4	-2.8%
Jct: SuscolTrib5	128.4	122.3	43.7	42.4	-6.1	-4.8%	-1.3	-3.0%
Outlet: FaganCk	260.9	256.5	96.6	95.4	-4.4	-1.7%	-1.2	-1.2%
Outlet: Sheehy1	61.8	54.9	20.5	18.1	-6.9	-11.2%	-2.4	-11.7%
Outlet: Sheehy1.5	4.0	4.0	1.3	1.3	0.0	0.0%	0.0	0.0%
Outlet: Sheehy2	83.9	76.8	29.8	28.1	-7.1	-8.5%	-1.7	-5.7%
Outlet: Sheehy3	81.0	73.9	29.1	27.4	-7.1	-8.8%	-1.7	-5.8%
Outlet: Sheehy4	73.4	70.1	26.6	25.8	-3.3	-4.5%	-0.8	-3.0%
Outlet: Sheehy5	55.3	50.5	19.7	18.6	-4.8	-8.7%	-1.1	-5.6%
Outlet: Sheehy6.1	9.4	8.1	3.2	2.8	-1.3	-13.8%	-0.4	-12.5%
Outlet: Sheehy6.2	59.2	54.1	20.8	20.4	-5.1	-8.6%	-0.4	-1.9%
Outlet: Suscol	1,170.0	1,100.9	420.0	402.7	-69.1	-5.9%	-17.3	-4.1%
Sheehy Ck 1	*61.8*	-	*20.5*	-	*Watershed boundaries changed*			
Sheehy Ck 1.5	*Same as Outlet: Sheehy1.5*							
Sheehy Ck 2	*Same as Outlet: Sheehy2*							
Sheehy Ck 3	81.0	73.9	29.1	27.4	-7.1	-8.8%	-1.7	-5.8%
Sheehy Ck 4	73.4	70.1	26.6	25.8	-3.3	-4.5%	-0.8	-3.0%
Sheehy Ck 5	55.3	50.5	19.7	18.6	-4.8	-8.7%	-1.1	-5.6%
Sheehy Ck 6.1	9.4	8.1	3.2	2.8	-1.3	-13.8%	-0.4	-12.5%
Sheehy Ck 6.2	*Same as Outlet: Sheehy6.2*							
Suscol 1-2	222.5	214.4	76.3	73.4	-8.1	-3.6%	-2.9	-3.8%

Suscol 2-3	*330.3*	-	*113.9*	-	*Watershed boundaries changed*			
Suscol 3-4	533.4	503.7	184.4	176.8	-29.7	-5.6%	-7.6	-4.1%
Suscol 4-5	845.3	795.0	297.4	284.6	-50.3	-6.0%	-12.8	-4.3%
Suscol 5-6	1,020.5	962.1	362.9	348.7	-58.4	-5.7%	-14.2	-3.9%
Suscol 6-Out	1,107.6	1,041.0	396.5	379.9	-66.6	-6.0%	-16.6	-4.2%
Suscol Ck 1	98.0	93.9	33.7	32.7	-4.1	-4.2%	-1.0	-3.0%
Suscol Ck 2	21.6	20.8	7.2	7.0	-0.8	-3.7%	-0.2	-2.8%
Suscol Ck 3	*41.5*	-	*13.9*	-	*Watershed boundaries changed*			
Suscol Ck 4	176.3	161.0	62.9	59.3	-15.3	-8.7%	-3.6	-5.7%
Suscol Ck 5	40.5	40.5	13.3	13.3	0.0	0.0%	0.0	0.0%
Suscol Ck 6	73.3	67.6	24.7	23.3	-5.7	-7.8%	-1.4	-5.7%
Suscol Ck 7	3.5	3.5	1.2	1.2	0.0	0.0%	0.0	0.0%
Suscol Trib 1	124.5	120.6	42.6	40.7	-3.9	-3.1%	-1.9	-4.5%
Suscol Trib 2	88.4	79.7	30.3	27.7	-8.7	-9.8%	-2.6	-8.6%
Suscol Trib 3.1	86.9	80.8	30.0	29.1	-6.1	-7.0%	-0.9	-3.0%
Suscol Trib 3.2	58.3	56.1	19.6	19.0	-2.2	-3.8%	-0.6	-3.1%
Suscol Trib 3.3	21.8	20.9	7.2	7.0	-0.9	-4.1%	-0.2	-2.8%
SuscolTrib 3-Confl	144.8	135.7	49.5	48.1	-9.1	-6.3%	-1.4	-2.8%
Suscol Trib 4	138.1	131.7	50.0	48.6	-6.4	-4.6%	-1.4	-2.8%
Suscol Trib 5.1	37.5	36.2	12.7	12.3	-1.3	-3.5%	-0.4	-3.1%
Suscol Trib 5.2	90.9	86.3	31.0	30.1	-4.6	-5.1%	-0.9	-2.9%
Suscol Trib 5.3	25.8	24.8	8.6	8.3	-1.0	-3.9%	-0.3	-3.5%
SuscolTrib 5-Confl	128.3	122.2	43.7	42.4	-6.1	-4.8%	-1.3	-3.0%
Suscol Trib 6	26.4	22.9	8.9	7.9	-3.5	-13.3%	-1.0	-11.2%
Suscol Trib 7	63.6	60.7	22.3	21.7	-2.9	-4.6%	-0.6	-2.7%

Hydrologic Element	25-yr Q_{peak} (cfs)		25-yr Volume (ac-ft)		Change			
	Existing	Post-Project	Existing	Post-Project	Q (cfs)	%	Vol (ac-ft)	%
Fagan 1-2	107.9	107.9	39.2	39.2	0.0	0.0%	0.0	0.0%
Fagan 2-3	232.7	228.5	83.7	83.0	-4.2	-1.8%	-0.7	-0.8%
Fagan 3-4	254.1	249.6	91.4	90.4	-4.5	-1.8%	-1.0	-1.1%
Fagan 4-Out	304.0	299.1	109.4	108.1	-4.9	-1.6%	-1.3	-1.2%
Fagan Ck 1	21.0	21.0	7.1	7.1	0.0	0.0%	0.0	0.0%
Fagan Ck 2	8.7	8.7	2.9	2.9	0.0	0.0%	0.0	0.0%
Fagan Ck 3	5.2	5.2	1.7	1.7	0.0	0.0%	0.0	0.0%
Fagan Ck 4	24.8	24.8	8.4	8.4	0.0	0.0%	0.0	0.0%
Fagan Ck 5	24.7	24.7	8.3	8.3	0.0	0.0%	0.0	0.0%
Fagan Trib 1	88.0	88.0	32.2	32.2	0.0	0.0%	0.0	0.0%
Fagan Trib 2	119.0	115.6	41.6	40.9	-3.4	-2.9%	-0.7	-1.7%
Fagan Trib 3	18.2	17.0	6.0	5.6	-1.2	-6.6%	-0.4	-6.7%
Fagan Trib 4	29.0	28.0	9.6	9.4	-1.0	-3.4%	-0.2	-2.1%
Jct: Fagan1	108.0	108.0	39.2	39.2	0.0	0.0%	0.0	0.0%
Jct: Fagan2	232.8	228.7	83.7	83.0	-4.1	-1.8%	-0.7	-0.8%
Jct: Fagan3	254.2	249.7	91.4	90.4	-4.5	-1.8%	-1.0	-1.1%
Jct: Fagan4	304.1	299.3	109.4	108.1	-4.8	-1.6%	-1.3	-1.2%
Jct: Suscol1	272.2	264.5	92.1	89.0	-7.7	-2.8%	-3.1	-3.4%
Jct: Suscol2	404.2	386.7	137.4	131.3	-17.5	-4.3%	-6.1	-4.4%

Jct: Suscol3	653.7	622.7	222.6	214.5	-31.0	-4.7%	-8.1	-3.6%
Jct: Suscol4	1,036.2	983.4	358.9	345.3	-52.8	-5.1%	-13.6	-3.8%
Jct: Suscol5	1,252.8	1,190.8	438.1	422.9	-62.0	-4.9%	-15.2	-3.5%
Jct: Suscol6	1,359.9	1,289.1	478.4	460.6	-70.8	-5.2%	-17.8	-3.7%
Jct: SuscolTrib3	177.3	167.1	59.8	58.2	-10.2	-5.8%	-1.6	-2.7%
Jct: SuscolTrib5	157.0	150.5	52.7	51.4	-6.5	-4.1%	-1.3	-2.5%
Outlet: FaganCk	325.5	320.7	117.7	116.5	-4.8	-1.5%	-1.2	-1.0%
Outlet: Sheehy1	74.8	66.8	24.6	21.8	-8.0	-10.7%	-2.8	-11.4%
Outlet: Sheehy1.5	4.9	4.9	1.6	1.6	0.0	0.0%	0.0	0.0%
Outlet: Sheehy2	102.8	95.2	35.9	34.2	-7.6	-7.4%	-1.7	-4.7%
Outlet: Sheehy3	99.2	91.5	35.1	33.3	-7.7	-7.8%	-1.8	-5.1%
Outlet: Sheehy4	90.9	87.3	32.3	31.4	-3.6	-4.0%	-0.9	-2.8%
Outlet: Sheehy5	67.7	62.5	23.8	22.6	-5.2	-7.7%	-1.2	-5.0%
Outlet: Sheehy6.1	11.7	10.2	3.9	3.4	-1.5	-12.8%	-0.5	-12.8%
Outlet: Sheehy6.2	73.7	67.7	25.3	24.9	-6.0	-8.1%	-0.4	-1.6%
Outlet: Suscol	1,436.4	1,362.5	506.8	488.3	-73.9	-5.1%	-18.5	-3.7%
Sheehy Ck 1	*74.8*	-	*24.6*	-	*Watershed boundaries changed*			
Sheehy Ck 1.5	*Same as Outlet: Sheehy1.5*							
Sheehy Ck 2	*Same as Outlet: Sheehy2*							
Sheehy Ck 3	99.2	91.5	35.1	33.3	-7.7	-7.8%	-1.8	-5.1%
Sheehy Ck 4	90.9	87.3	32.3	31.4	-3.6	-4.0%	-0.9	-2.8%
Sheehy Ck 5	67.7	62.5	23.8	22.6	-5.2	-7.7%	-1.2	-5.0%
Sheehy Ck 6.1	11.7	10.2	3.9	3.4	-1.5	-12.8%	-0.5	-12.8%
Sheehy Ck 6.2	*Same as Outlet: Sheehy6.2*							
Suscol 1-2	272.1	264.4	92.1	89.0	-7.7	-2.8%	-3.1	-3.4%
Suscol 2-3	*403.9*	-	*137.4*	-	*Watershed boundaries changed*			
Suscol 3-4	653.3	622.3	222.6	214.5	-31.0	-4.7%	-8.1	-3.6%
Suscol 4-5	1,035.9	982.6	358.9	345.3	-53.3	-5.1%	-13.6	-3.8%
Suscol 5-6	1,252.0	1,190.1	438.1	422.9	-61.9	-4.9%	-15.2	-3.5%
Suscol 6-Out	1,359.1	1,288.5	478.4	460.6	-70.6	-5.2%	-17.8	-3.7%
Suscol Ck 1	120.5	116.1	40.8	39.7	-4.4	-3.7%	-1.1	-2.7%
Suscol Ck 2	26.8	25.9	8.8	8.6	-0.9	-3.4%	-0.2	-2.3%
Suscol Ck 3	*51.0*	-	*16.8*	-	*Watershed boundaries changed*			
Suscol Ck 4	215.8	199.3	75.9	72.0	-16.5	-7.6%	-3.9	-5.1%
Suscol Ck 5	49.7	49.7	16.2	16.2	0.0	0.0%	0.0	0.0%
Suscol Ck 6	88.8	82.8	29.6	28.1	-6.0	-6.8%	-1.5	-5.1%
Suscol Ck 7	4.4	4.4	1.5	1.5	0.0	0.0%	0.0	0.0%
Suscol Trib 1	151.6	148.3	51.3	49.3	-3.3	-2.2%	-2.0	-3.9%
Suscol Trib 2	107.6	98.5	36.4	33.7	-9.1	-8.5%	-2.7	-7.4%
Suscol Trib 3.1	106.3	99.5	36.2	35.2	-6.8	-6.4%	-1.0	-2.8%
Suscol Trib 3.2	71.2	69.0	23.6	23.0	-2.2	-3.1%	-0.6	-2.5%
Suscol Trib 3.3	26.7	25.8	8.7	8.5	-0.9	-3.4%	-0.2	-2.3%
SuscolTrib 3-Confl	177.2	167.1	59.8	58.2	-10.1	-5.7%	-1.6	-2.7%
Suscol Trib 4	169.1	162.2	60.4	58.8	-6.9	-4.1%	-1.6	-2.6%
Suscol Trib 5.1	45.9	44.5	15.3	14.9	-1.4	-3.1%	-0.4	-2.6%
Suscol Trib 5.2	111.2	106.1	37.4	36.5	-5.1	-4.6%	-0.9	-2.4%
Suscol Trib 5.3	31.7	30.7	10.4	10.1	-1.0	-3.2%	-0.3	-2.9%
SuscolTrib 5-Confl	157.0	150.4	52.7	51.4	-6.6	-4.2%	-1.3	-2.5%

Suscol Trib 6	32.2	28.4	10.7	9.6	-3.8	-11.8%	-1.1	-10.3%
Suscol Trib 7	77.5	74.4	26.8	26.2	-3.1	-4.0%	-0.6	-2.2%

	50-yr Q_{peak} (cfs)		50-yr Volume (ac-ft)		Change			
Hydrologic Element	Existing	Post-Project	Existing	Post-Project	Q (cfs)	%	Vol (ac-ft)	%
Fagan 1-2	122.3	122.3	44.0	44.0	0.0	0.0%	0.0	0.0%
Fagan 2-3	263.7	259.3	93.9	93.2	-4.4	-1.7%	-0.7	-0.7%
Fagan 3-4	288.0	283.2	102.5	101.4	-4.8	-1.7%	-1.1	-1.1%
Fagan 4-Out	344.8	339.8	122.7	121.4	-5.0	-1.5%	-1.3	-1.1%
Fagan Ck 1	23.7	23.7	7.9	7.9	0.0	0.0%	0.0	0.0%
Fagan Ck 2	9.9	9.9	3.2	3.2	0.0	0.0%	0.0	0.0%
Fagan Ck 3	5.9	5.9	1.9	1.9	0.0	0.0%	0.0	0.0%
Fagan Ck 4	28.1	28.1	9.4	9.4	0.0	0.0%	0.0	0.0%
Fagan Ck 5	28.2	28.2	9.4	9.4	0.0	0.0%	0.0	0.0%
Fagan Trib 1	99.8	99.8	36.1	36.1	0.0	0.0%	0.0	0.0%
Fagan Trib 2	134.9	131.2	46.7	45.9	-3.7	-2.7%	-0.8	-1.7%
Fagan Trib 3	20.4	19.1	6.6	6.3	-1.3	-6.4%	-0.3	-4.5%
Fagan Trib 4	32.9	31.8	10.8	10.5	-1.1	-3.3%	-0.3	-2.8%
Jct: Fagan1	122.4	122.4	44.0	44.0	0.0	0.0%	0.0	0.0%
Jct: Fagan2	263.9	259.5	93.9	93.2	-4.4	-1.7%	-0.7	-0.7%
Jct: Fagan3	288.1	283.3	102.5	101.4	-4.8	-1.7%	-1.1	-1.1%
Jct: Fagan4	344.9	339.9	122.7	121.4	-5.0	-1.4%	-1.3	-1.1%
Jct: Suscol1	305.6	298.1	102.7	99.6	-7.5	-2.5%	-3.1	-3.0%
Jct: Suscol2	453.8	436.6	153.2	146.9	-17.2	-3.8%	-6.3	-4.1%
Jct: Suscol3	734.7	703.2	248.4	240.0	-31.5	-4.3%	-8.4	-3.4%
Jct: Suscol4	1,165.0	1,110.3	400.5	386.4	-54.7	-4.7%	-14.1	-3.5%
Jct: Suscol5	1,408.7	1,345.4	489.0	473.2	-63.3	-4.5%	-15.8	-3.2%
Jct: Suscol6	1,529.8	1,456.5	533.8	515.4	-73.3	-4.8%	-18.4	-3.4%
Jct: SuscolTrib3	199.1	188.3	66.7	65.1	-10.8	-5.4%	-1.6	-2.4%
Jct: SuscolTrib5	176.3	169.5	58.9	57.4	-6.8	-3.9%	-1.5	-2.5%
Outlet: FaganCk	369.6	364.7	132.1	130.8	-4.9	-1.3%	-1.3	-1.0%
Outlet: Sheehy1	83.5	74.9	27.4	24.3	-8.6	-10.3%	-3.1	-11.3%
Outlet: Sheehy1.5	5.6	5.6	1.8	1.8	0.0	0.0%	0.0	0.0%
Outlet: Sheehy2	115.5	107.6	40.1	38.3	-7.9	-6.8%	-1.8	-4.5%
Outlet: Sheehy3	111.5	103.5	39.2	37.3	-8.0	-7.2%	-1.9	-4.8%
Outlet: Sheehy4	102.7	98.9	36.1	35.2	-3.8	-3.7%	-0.9	-2.5%
Outlet: Sheehy5	76.1	70.7	26.6	25.3	-5.4	-7.1%	-1.3	-4.9%
Outlet: Sheehy6.1	13.3	11.5	4.4	3.9	-1.8	-13.5%	-0.5	-11.4%
Outlet: Sheehy6.2	83.5	77.0	28.4	28.0	-6.5	-7.8%	-0.4	-1.4%
Outlet: Suscol	1,615.6	1,540.0	565.4	546.2	-75.6	-4.7%	-19.2	-3.4%
Sheehy Ck 1	*83.5*	-	*27.4*	-	*Watershed boundaries changed*			
Sheehy Ck 1.5	*Same as Outlet: Sheehy1.5*							
Sheehy Ck 2	*Same as Outlet: Sheehy2*							
Sheehy Ck 3	111.5	103.5	39.2	37.3	-8.0	-7.2%	-1.9	-4.8%
Sheehy Ck 4	102.7	98.9	36.1	35.2	-3.8	-3.7%	-0.9	-2.5%
Sheehy Ck 5	76.1	70.7	26.6	25.3	-5.4	-7.1%	-1.3	-4.9%
Sheehy Ck 6.1	13.3	11.5	4.4	3.9	-1.8	-13.5%	-0.5	-11.4%

Sheehy Ck 6.2	*Same as Outlet: Sheehy6.2*							
Suscol 1-2	305.5	298.0	102.7	99.6	-7.5	-2.5%	-3.1	-3.0%
Suscol 2-3	*453.6*	-	*153.2*	-	*Watershed boundaries changed*			
Suscol 3-4	734.2	702.9	248.4	240.0	-31.3	-4.3%	-8.4	-3.4%
Suscol 4-5	1,164.5	1,109.6	400.5	386.4	-54.9	-4.7%	-14.1	-3.5%
Suscol 5-6	1,408.1	1,344.3	489.0	473.2	-63.8	-4.5%	-15.8	-3.2%
Suscol 6-Out	1,529.1	1,455.9	533.8	515.4	-73.2	-4.8%	-18.4	-3.4%
Suscol Ck 1	135.8	131.2	45.6	44.5	-4.6	-3.4%	-1.1	-2.4%
Suscol Ck 2	30.4	29.4	9.9	9.7	-1.0	-3.3%	-0.2	-2.0%
Suscol Ck 3	*57.4*	-	*18.8*	-	*Watershed boundaries changed*			
Suscol Ck 4	242.5	225.3	84.7	80.6	-17.2	-7.1%	-4.1	-4.8%
Suscol Ck 5	55.9	55.9	18.1	18.1	0.0	0.0%	0.0	0.0%
Suscol Ck 6	99.1	93.0	32.9	31.4	-6.1	-6.2%	-1.5	-4.6%
Suscol Ck 7	5.1	5.1	1.7	1.7	0.0	0.0%	0.0	0.0%
Suscol Trib 1	169.8	166.9	57.1	55.1	-2.9	-1.7%	-2.0	-3.5%
Suscol Trib 2	120.5	111.3	40.6	37.7	-9.2	-7.6%	-2.9	-7.1%
Suscol Trib 3.1	119.5	112.1	40.3	39.4	-7.4	-6.2%	-0.9	-2.2%
Suscol Trib 3.2	80.0	77.6	26.3	25.7	-2.4	-3.0%	-0.6	-2.3%
Suscol Trib 3.3	30.0	29.1	9.7	9.5	-0.9	-3.0%	-0.2	-2.1%
SuscolTrib 3-Confl	199.1	188.3	66.7	65.1	-10.8	-5.4%	-1.6	-2.4%
Suscol Trib 4	190.0	182.9	67.4	65.8	-7.1	-3.7%	-1.6	-2.4%
Suscol Trib 5.1	51.5	50.1	17.1	16.7	-1.4	-2.7%	-0.4	-2.3%
Suscol Trib 5.2	124.9	119.6	41.8	40.8	-5.3	-4.2%	-1.0	-2.4%
Suscol Trib 5.3	35.6	34.6	11.6	11.3	-1.0	-2.8%	-0.3	-2.6%
SuscolTrib 5-Confl	176.3	169.4	58.9	57.4	-6.9	-3.9%	-1.5	-2.5%
Suscol Trib 6	36.0	32.2	11.9	10.8	-3.8	-10.6%	-1.1	-9.2%
Suscol Trib 7	86.8	83.5	29.9	29.2	-3.3	-3.8%	-0.7	-2.3%

Hydrologic Element	100-yr Q_{peak} (cfs)		100-yr Volume (ac-ft)		Change			
	Existing	Post-Project	Existing	Post-Project	Q (cfs)	%	Vol (ac-ft)	%
Fagan 1-2	151.6	151.6	53.7	53.7	0.0	0.0%	0.0	0.0%
Fagan 2-3	327.0	321.8	114.7	113.9	-5.2	-1.6%	-0.8	-0.7%
Fagan 3-4	356.9	351.4	125.1	124.0	-5.5	-1.5%	-1.1	-0.9%
Fagan 4-Out	427.7	422.2	149.9	148.5	-5.5	-1.3%	-1.4	-0.9%
Fagan Ck 1	29.2	29.2	9.6	9.6	0.0	0.0%	0.0	0.0%
Fagan Ck 2	12.3	12.3	3.9	3.9	0.0	0.0%	0.0	0.0%
Fagan Ck 3	7.3	7.3	2.4	2.4	0.0	0.0%	0.0	0.0%
Fagan Ck 4	35.0	35.0	11.6	11.6	0.0	0.0%	0.0	0.0%
Fagan Ck 5	35.2	35.2	11.6	11.6	0.0	0.0%	0.0	0.0%
Fagan Trib 1	123.8	123.8	44.1	44.1	0.0	0.0%	0.0	0.0%
Fagan Trib 2	167.1	162.7	57.0	56.2	-4.4	-2.6%	-0.8	-1.4%
Fagan Trib 3	24.9	23.6	8.0	7.7	-1.3	-5.2%	-0.3	-3.8%
Fagan Trib 4	40.6	39.5	13.2	12.9	-1.1	-2.7%	-0.3	-2.3%
Jct: Fagan1	151.6	151.6	53.7	53.7	0.0	0.0%	0.0	0.0%
Jct: Fagan2	327.1	321.8	114.7	113.9	-5.3	-1.6%	-0.8	-0.7%
Jct: Fagan3	357.0	351.4	125.1	124.0	-5.6	-1.6%	-1.1	-0.9%
Jct: Fagan4	427.8	422.4	149.9	148.5	-5.4	-1.3%	-1.4	-0.9%

Jct: Suscol1	373.0	366.2	124.3	121.0	-6.8	-1.8%	-3.3	-2.7%
Jct: Suscol2	554.1	537.7	185.4	178.8	-16.4	-3.0%	-6.6	-3.6%
Jct: Suscol3	898.1	866.1	300.8	291.9	-32.0	-3.6%	-8.9	-3.0%
Jct: Suscol4	1,424.6	1,367.6	484.9	470.0	-57.0	-4.0%	-14.9	-3.1%
Jct: Suscol5	1,724.4	1,657.7	592.1	575.4	-66.7	-3.9%	-16.7	-2.8%
Jct: Suscol6	1,873.6	1,797.6	646.1	626.5	-76.0	-4.1%	-19.6	-3.0%
Jct: SuscolTrib3	243.1	231.1	80.7	79.0	-12.0	-4.9%	-1.7	-2.1%
Jct: SuscolTrib5	215.3	208.0	71.2	69.7	-7.3	-3.4%	-1.5	-2.1%
Outlet: FaganCk	459.5	454.2	161.5	160.0	-5.3	-1.2%	-1.5	-0.9%
Outlet: Sheehy1	101.0	91.1	32.9	29.3	-9.9	-9.8%	-3.6	-10.9%
Outlet: Sheehy1.5	6.9	6.9	2.2	2.2	0.0	0.0%	0.0	0.0%
Outlet: Sheehy2	141.1	132.7	48.5	46.6	-8.4	-6.0%	-1.9	-3.9%
Outlet: Sheehy3	136.2	127.7	47.4	45.4	-8.5	-6.2%	-2.0	-4.2%
Outlet: Sheehy4	126.7	122.6	44.0	43.0	-4.1	-3.2%	-1.0	-2.3%
Outlet: Sheehy5	93.0	87.2	32.2	30.8	-5.8	-6.2%	-1.4	-4.3%
Outlet: Sheehy6.1	16.4	14.4	5.4	4.7	-2.0	-12.2%	-0.7	-13.0%
Outlet: Sheehy6.2	103.3	95.9	34.7	34.3	-7.4	-7.2%	-0.4	-1.2%
Outlet: Suscol	1,979.6	1,900.2	684.3	663.9	-79.4	-4.0%	-20.4	-3.0%
Sheehy Ck 1	*101.0*	-	*32.9*	-	*Watershed boundaries changed*			
Sheehy Ck 1.5	*Same as Outlet: Sheehy1.5*							
Sheehy Ck 2	*Same as Outlet: Sheehy2*							
Sheehy Ck 3	136.2	127.7	47.4	45.4	-8.5	-6.2%	-2.0	-4.2%
Sheehy Ck 4	126.7	122.6	44.0	43.0	-4.1	-3.2%	-1.0	-2.3%
Sheehy Ck 5	93.0	87.2	32.2	30.8	-5.8	-6.2%	-1.4	-4.3%
Sheehy Ck 6.1	16.4	14.4	5.4	4.7	-2.0	-12.2%	-0.7	-13.0%
Sheehy Ck 6.2	*Same as Outlet: Sheehy6.2*							
Suscol 1-2	372.8	366.2	124.3	121.0	-6.6	-1.8%	-3.3	-2.7%
Suscol 2-3	*554.0*	-	*185.4*	-	*Watershed boundaries changed*			
Suscol 3-4	897.2	865.1	300.8	291.9	-32.1	-3.6%	-8.9	-3.0%
Suscol 4-5	1,423.3	1,367.0	484.9	470.0	-56.3	-4.0%	-14.9	-3.1%
Suscol 5-6	1,723.4	1,657.0	592.1	575.4	-66.4	-3.9%	-16.7	-2.8%
Suscol 6-Out	1,872.7	1,796.8	646.1	626.5	-75.9	-4.1%	-19.6	-3.0%
Suscol Ck 1	166.5	161.7	55.4	54.2	-4.8	-2.9%	-1.2	-2.2%
Suscol Ck 2	37.5	36.5	12.1	11.8	-1.0	-2.7%	-0.3	-2.5%
Suscol Ck 3	*70.4*	-	*22.8*	-	*Watershed boundaries changed*			
Suscol Ck 4	296.3	277.9	102.6	98.2	-18.4	-6.2%	-4.4	-4.3%
Suscol Ck 5	68.5	68.5	21.9	21.9	0.0	0.0%	0.0	0.0%
Suscol Ck 6	120.0	113.6	39.6	38.0	-6.4	-5.3%	-1.6	-4.0%
Suscol Ck 7	6.3	6.3	2.1	2.1	0.0	0.0%	0.0	0.0%
Suscol Trib 1	206.5	204.6	68.9	66.8	-1.9	-0.9%	-2.1	-3.0%
Suscol Trib 2	146.5	137.2	49.0	45.9	-9.3	-6.3%	-3.1	-6.3%
Suscol Trib 3.1	145.9	137.6	48.8	47.8	-8.3	-5.7%	-1.0	-2.0%
Suscol Trib 3.2	97.6	95.2	31.9	31.2	-2.4	-2.5%	-0.7	-2.2%
Suscol Trib 3.3	36.8	35.8	11.8	11.6	-1.0	-2.7%	-0.2	-1.7%
SuscolTrib 3-Confl	243.0	231.0	80.7	79.0	-12.0	-4.9%	-1.7	-2.1%
Suscol Trib 4	232.2	224.6	81.6	79.9	-7.6	-3.3%	-1.7	-2.1%
Suscol Trib 5.1	62.9	61.5	20.7	20.2	-1.4	-2.2%	-0.5	-2.4%
Suscol Trib 5.2	152.5	146.7	50.6	49.5	-5.8	-3.8%	-1.1	-2.2%

Suscol Trib 5.3	43.7	42.6	14.1	13.8	-1.1	-2.5%	-0.3	-2.1%
SuscolTrib 5-Confl	215.2	207.8	71.2	69.7	-7.4	-3.4%	-1.5	-2.1%
Suscol Trib 6	43.8	39.8	14.4	13.2	-4.0	-9.1%	-1.2	-8.3%
Suscol Trib 7	105.6	102.1	36.1	35.3	-3.5	-3.3%	-0.8	-2.2%

APPENDIX D

Figure set Showing Comparisons of Pre- and Post-project Peak Stormwater Runoff by Sub-watershed, Suscol Mountain Vineyard, Napa and Solano Counties, California

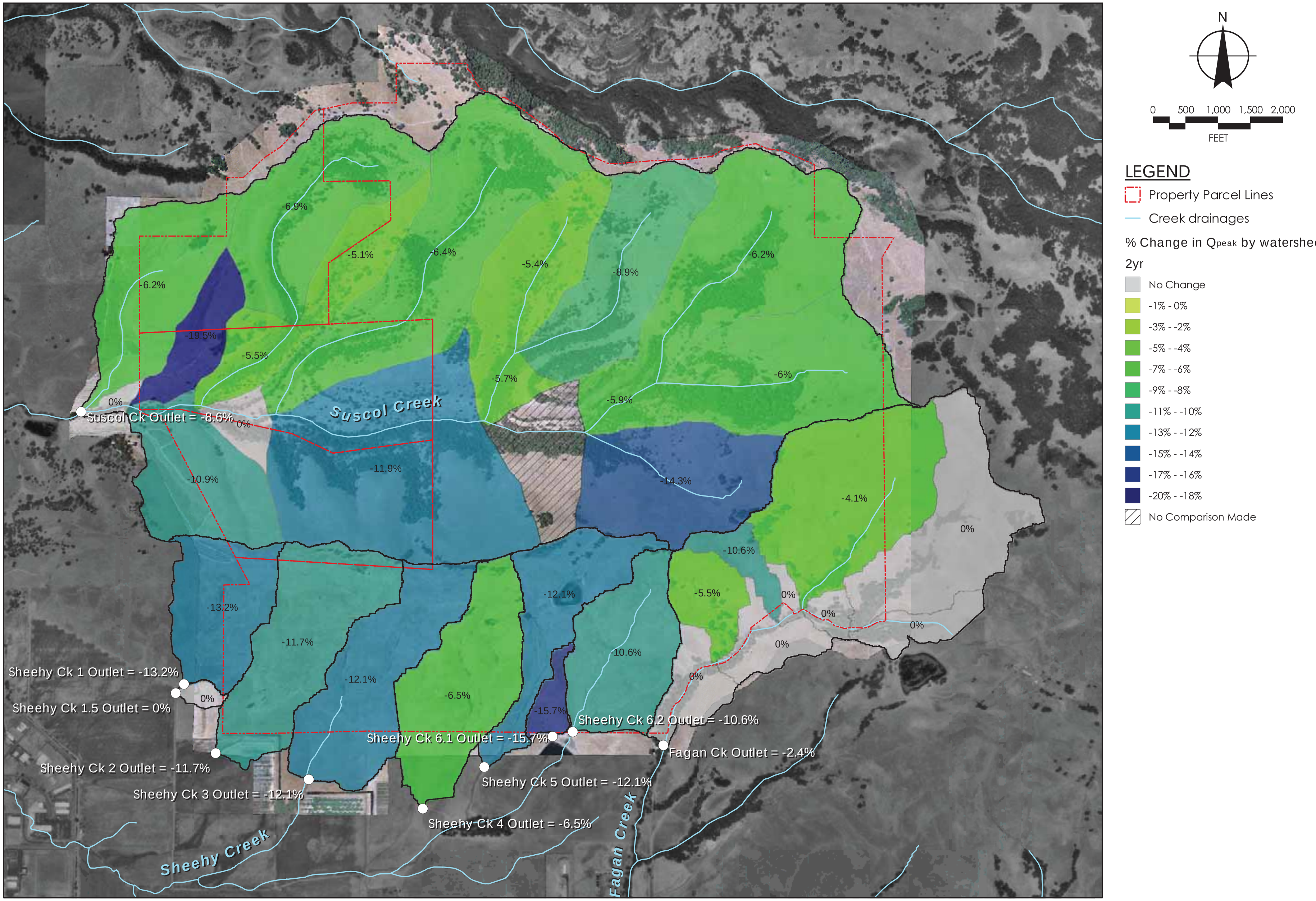
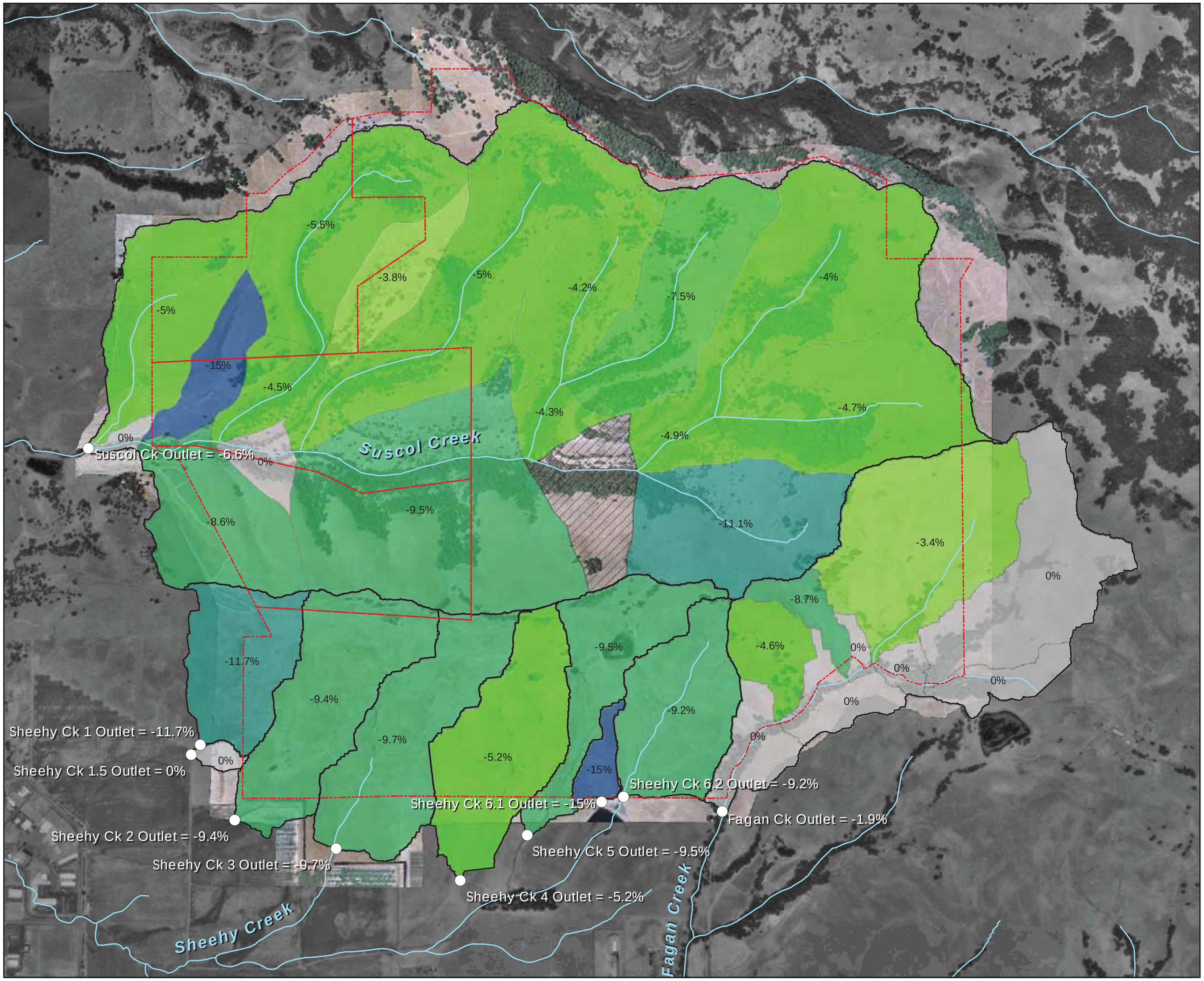


Figure D-1. Modeled change in 2-year peak runoff after conversion to vineyards by subwatershed
Suscol Mountain Vineyard, Napa and Solano Counties, California

Balance Hydrologics, Inc.

W:\Projects\208159\208159 2yr Qpeak Figure.mxd



N

0 500 1,000 1,500 2,000

FEET

LEGEND

Property Parcel Lines

Creek drainages

% Change in Q_{peak} by watershed

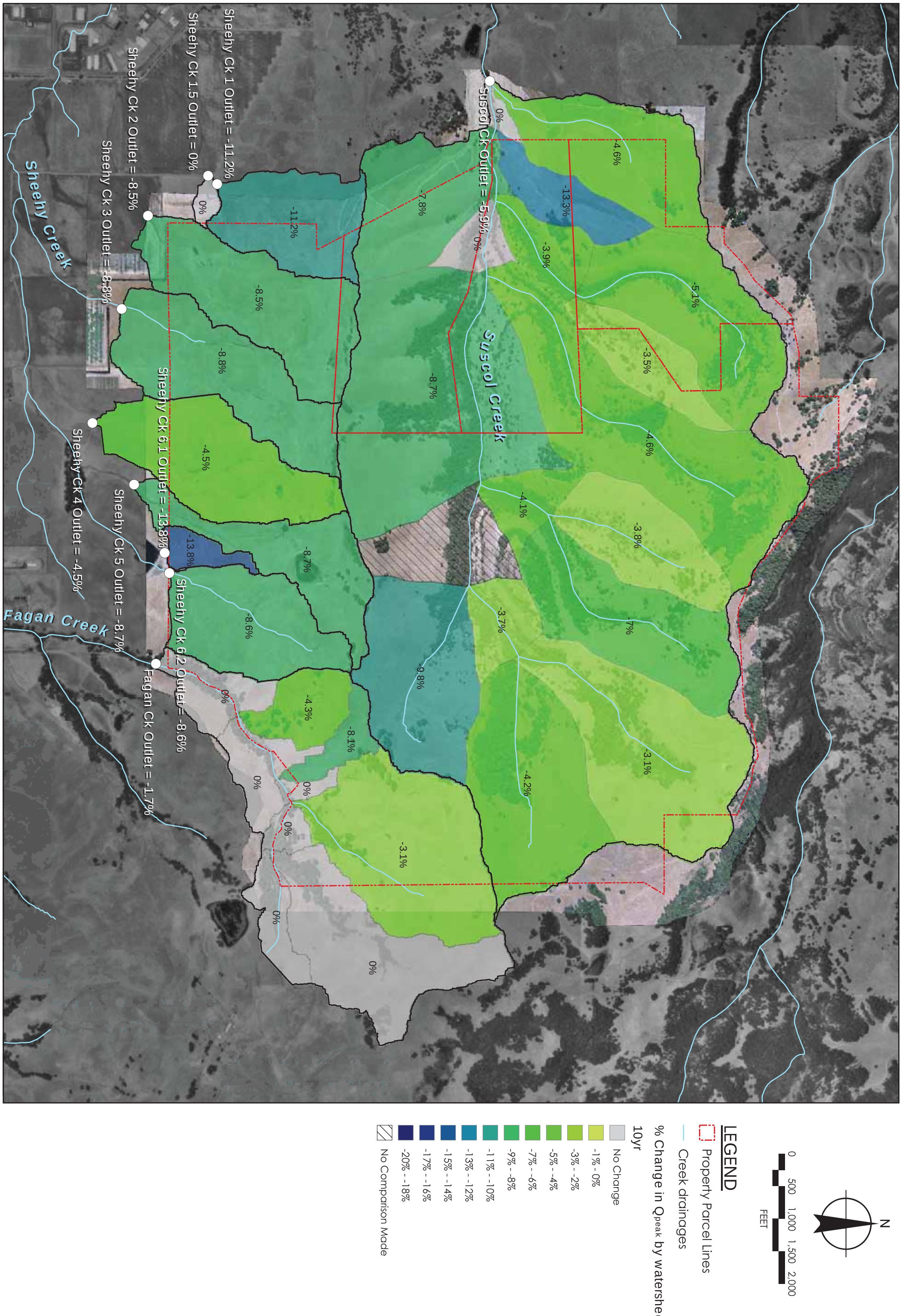
5yr

- No Change
- -1% - 0%
- -3% - -2%
- -5% - -4%
- -7% - -6%
- -9% - -8%
- -11% - -10%
- -13% - -12%
- -15% - -14%
- -17% - -16%
- -20% - -18%
- No Comparison Made

Figure D-2. Modeled change in 5-year peak runoff after conversion to vineyards by subwatershed
Suscol Mountain Vineyard, Napa and Solano Counties, California

Balance Hydrologics, Inc.

W:\Projects\208159\208159 5yr Qpeak Figure.mxd



Balance Hydrologics, Inc.

Figure D-3. Modeled change in 10-year peak runoff after conversion to vineyards by subwatershed
Suscol Mountain Vineyard, Napa and Solano Counties, California

W:\Projects\208159\208159 10yr Qpeak Figure.mxd

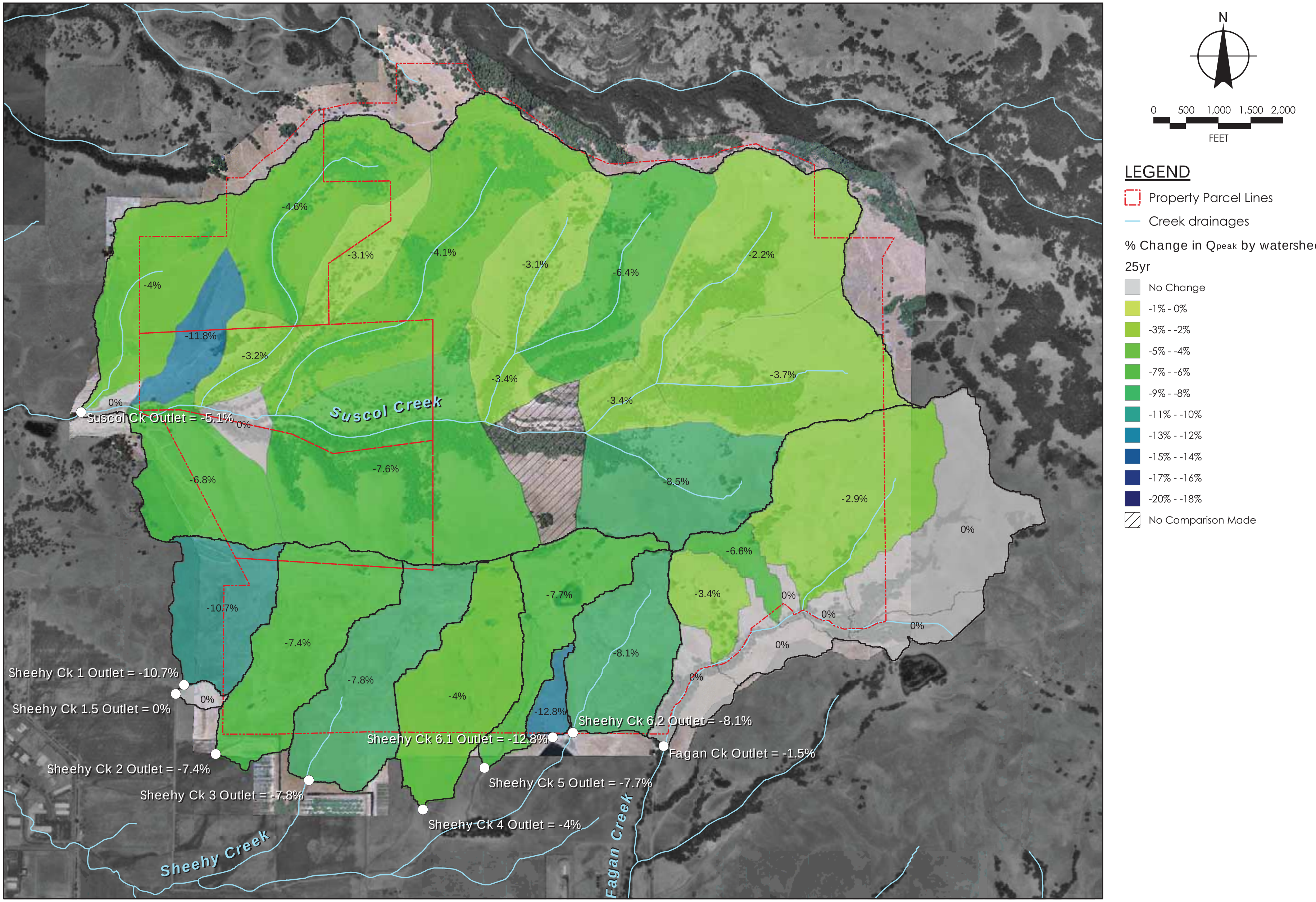
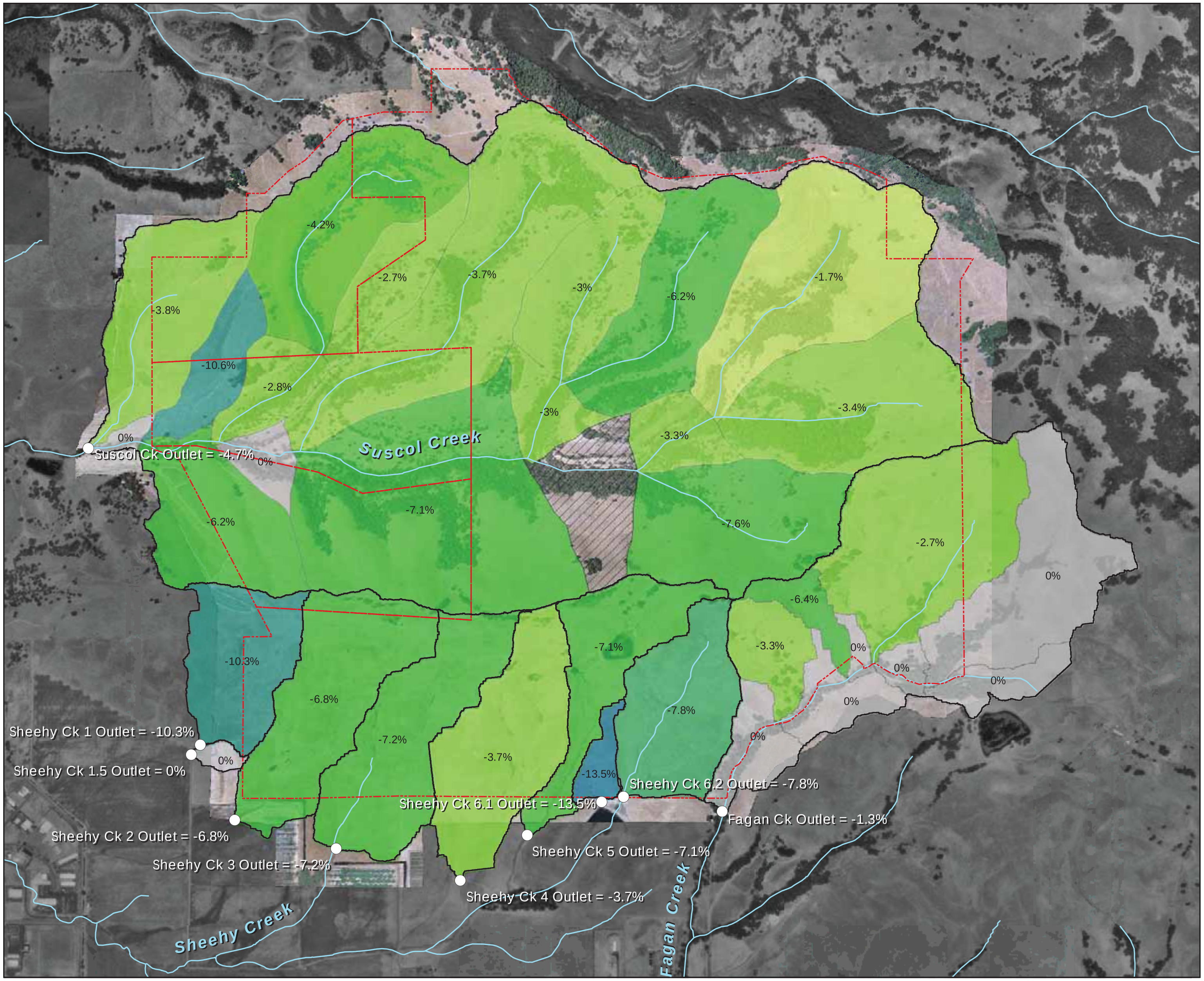


Figure D-4. Modeled change in 25-year peak runoff after conversion to vineyards by subwatershed
Suscol Mountain Vineyard, Napa and Solano Counties, California

Balance Hydrologics, Inc.

W:\Projects\208159\208159 25yr Qpeak Figure.mxd



N

0 500 1,000 1,500 2,000

FEET

LEGEND

Outflow_Pts

Property Parcel Lines

Creek drainages

% Change in Q_{peak} by watershed

50yr

- No Change
- -1% - 0%
- -3% - -2%
- -5% - -4%
- -7% - -6%
- -9% - -8%
- -11% - -10%
- -13% - -12%
- -15% - -14%
- -17% - -16%
- -20% - -18%
- No Comparison Made

Figure D-5. Modeled change in 50-year peak runoff after conversion to vineyards by subwatershed
Suscol Mountain Vineyard, Napa and Solano Counties, California

Balance Hydrologics, Inc.

W:\Projects\208159\208159 50yr Qpeak Figure.mxd

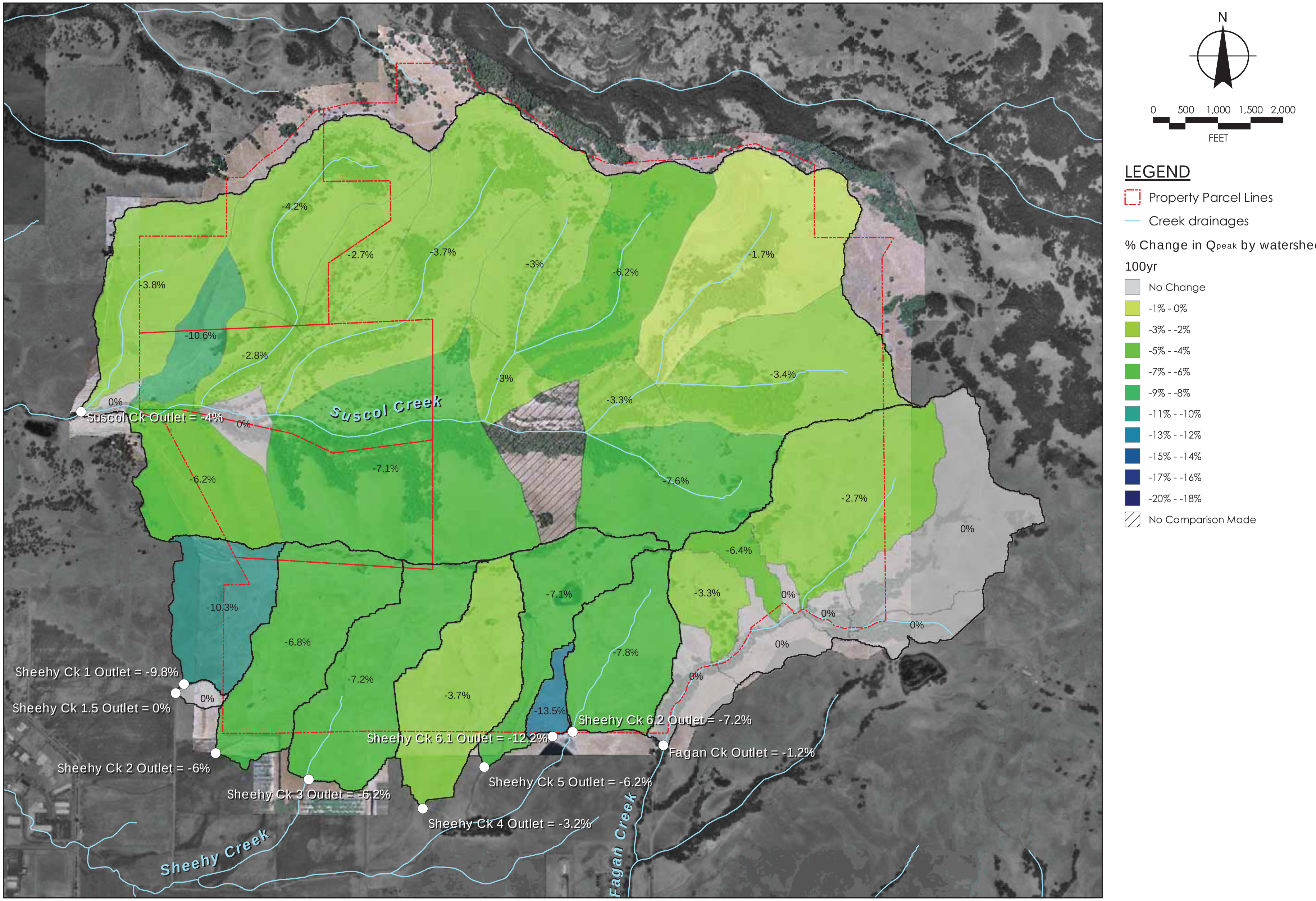


Figure D-6. Modeled change in 100-year peak runoff after conversion to vineyards by subwatershed
Suscol Mountain Vineyard, Napa and Solano Counties, California

Balance Hydrologics, Inc.

W:\Projects\208159\208159 100yr Qpeak Figure.mxd

APPENDIX E

NRCS letter:
Effect of Ripping on Hydrologic Soil Group

United States Department of Agriculture
NRCS Natural Resources Conservation Service

65 Main St., Suite 108
Templeton CA 93465
(805) 434-0396
FAX (805) 434-0284

February 12, 2008

Phill Blake
USDA – Natural Resources Conservation Service
Napa, California

Subject: Effect of Ripping on Hydrologic Soil Group

I determined the hydrologic soil groups for the Guenoc and Hambright soils both before and after ripping to 36 inches. The attached table summarizes the results and documents the criteria and other references I used. The Guenoc soils stays in hydrologic group C, but the Hambright soil changes from hydrologic group D to C upon ripping to 36 inches.

The National Engineering Handbook section 630.0702 states "As a result of construction and other disturbances, the soil profile can be altered from its natural state and the listed group assignments generally no longer apply, nor can any supposition based on the natural soil be made that will accurately describe the hydrologic properties of the disturbed soil. In these circumstances, an onsite investigation should be made to determine the hydrologic group."

Hydrologic groups may change upon ripping if (1) ripping changes the depth class from < 20" to 20 to 40", or from 20 to 40" to > 60", or (2) the ripping increases the saturated hydrologic conductivity by mixing a subsoil higher in % clay with a surface layer that is lower in % clay. Rock fragments are not considered in the criteria for estimating saturated hydrologic conductivity or hydrologic soil group.

Thanks for asking.

Ken Oster
Area Resource Soil Scientist

United States Department of Agriculture
NRCS Natural Resources Conservation Service

65 Main St., Suite 108
Templeton CA 93465
(805) 434-0396
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Effect of Ripping Soils on Hydrologic Soil Group

Map Unit Symbol	Soil Name	Natural or Ripped Soil?	Soil Texture least transmissive layer	% Clay least transmissive layer	Saturated hydraulic conductivity of the least transmissive layer (3) (inches/hour)	Depth to water impermeable layer (inches)	Depth to high water table (inches)	Hydrologic soil group (4)
143	Guenoc	Natural	clay loam	40	.06 - 0.2	30 (1)	None	C
		Ripped to 36"	clay loam	33 (2)	.2 - .6	36 (1)	None	C
151	Hambright	Natural	loam	24	.6 - 2	12 (1)	None	D
		Ripped to 36"	loam	24 (2)	.6 - 2	36 (1)	None	C

(1) unweathered bedrock
(2) weighted average of ripped and mixed soil profile
(3) using current criteria for saturated hydraulic conductivity based on soil texture and % clay http://www.ca.nrcs.usda.gov/intranet/techres/mlra02/guides/properties/sathydcond.html
(4) May 2007 criteria in National Engineering Handbook http://directives.sc.egov.usda.gov/media/pdf/H_210_630_7.pdf

by Ken Oster, Area Resource Soil Scientist, USDA-NRCS, 2/12/2008

APPENDIX H

GROUNDWATER ASSESSMENT

RICHARD C. SLADE & ASSOCIATES LLC
CONSULTING GROUNDWATER GEOLOGISTS

HYDROGEOLOGIC ASSESSMENT
AND
REPORT OF PUMPING TEST

FOR
PROPOSED SUSCOL MOUNTAIN VINEYARD PROJECT
NAPA COUNTY, CA

PREPARED FOR:

SILVERADO PREMIUM PARTNERS

NAPA, CALIFORNIA

PREPARED BY:

RICHARD C. SLADE & ASSOCIATES LLC

CONSULTING GROUNDWATER GEOLOGISTS

JOB NO.383-NPA01

JULY 2010

12750 VENTURA BLVD., SUITE 202, STUDIO CITY, CALIFORNIA 91604
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HYDROGEOLOGIC ASSESSMENT AND REPORT OF PUMPING TEST FOR PROPOSED SUSCOL MOUNTAIN VINEYARD PROJECT NAPA COUNTY, CA

PREPARED FOR:
SILVERADO PREMIUM PARTNERS
NAPA, CALIFORNIA

PREPARED BY:
RICHARD C. SLADE & ASSOCIATES LLC
CONSULTING GROUNDWATER GEOLOGISTS
JOB NO. 383-NPA01

JULY 2010

Anthony Hicke
Certified Hydrogeologist No. 858

Richard C. Slade
Professional Geologist No. 2998

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INTRODUCTION

General Statement

Presented in this report are the findings and conclusions of our hydrogeologic assessment and the results of our pumping test (aquifer test) of the existing water-supply well for the Suscol Mountain Vineyard development project in the southeastern portion of the Napa Valley, Napa County, California. As shown on Figure 1, "Location Map," the subject property has a total area of approximately 2123 acres and lies along the west-facing slopes in the hills just southeast of the City of Napa. Comprising the property are four separate parcels, two of which have multiple APNs, as shown on Figure 1. The APNs of these four parcels are: 045-360-008;, 045-360-010 and 045-360-011; 057-020-076; and 045-360-009, 057-020-077, and 057-030-012, respectively). We understand that up to 438 net acres of new vineyards may be developed on these four parcels. The location of the existing water-supply well (known herein as Well No. 1) is also shown on Figure 1.

Purpose and Scope of Services

The purpose of our work was to determine the hydrogeologic feasibility of using the existing well for irrigation-supply purposes on the property. We also evaluated the feasibility of developing new onsite groundwater resources for additional irrigation-supply to the proposed vineyards and selected one or more prospective onsite locations for possible new water wells. It is probable that new water-supply wells will be needed to meet the future irrigation demands of the proposed vineyards at the subject property.

Our initial Scope of Hydrogeologic Services for this project consisted of the following tasks:

Task 1 Reviewing basic data on local geology, and available information on the depths to groundwater and water quality from other wells in the area.

Task 2 Conducting a field reconnaissance visit (performed on October 13, 2008).

Task 3 Providing hydrogeologic analysis of the available data and performing a pumping test on the existing well.

Task 4 Preparing this hydrogeologic assessment report to summarize our conclusions and to provide recommendations regarding the feasibility of developing onsite groundwater resources and the selection of additional drill site(s) on the property.

As a part of Task 3, RCS geologists created Drilling Guidelines in order to guide the selected drilling contractor during the drilling, construction and initial well development activities for the existing well. Thereafter, RCS geologists logged the drill cuttings generated during the drilling process, provided the final well design to the contractor, and provided occasional monitoring of the mechanical and pumping development of this well.

Finally, as part of our work on this project, RCS conducted a pumping test of the well and has prepared this report to document our hydrogeologic assessment work and to discuss the results of the pumping test of this onsite well.

FINDINGS

Existing Site Conditions and Initial Field Visit

The subject property surrounds the westerly-draining Suscol Creek and basically consists of undeveloped land at this time. Cattle grazing is currently taking place and has been conducted in the past on the property. Approximately 25 miles of graded roads cross the property and are used as a part of the cattle grazing operations. Figure 2, “Aerial Photo of Subject Property,” provides, in color, an aerial photograph to illustrate the locations and boundaries of the subject property; note that this property is comprised of four parcels. The aerial photograph provided on Figure 2 was taken in 2007, and downloaded from the Napa County GIS website. The location of new onsite Well No. 1 is shown for reference on this figure.

The main channel of Suscol Creek is represented on Figure 2 by the dense line of dark green trees which crosses from east to west across the center of the property. This creek drains westerly toward its confluence with the Napa River, which occurs about two miles farther west.

Drainage on the two northern parcels is directed via sheet flow into a few south/southwesterly draining channels toward Suscol Creek; these channels are represented by the curvilinear alignments of dark green trees on Figure 2 on these two parcels. An east-west trending ridge line traverses across the middle of the two southern parcels and causes drainage on the north side of this ridge line to flow north toward Suscol Creek, whereas drainage on the south side of this ridge flows south toward an offsite and smaller creek that also flows west toward the Napa River.

The onsite well is the only well known to exist at the subject property. No other wells were observed during our field visit and no other wells are known to have ever been constructed on the subject property. There are several onsite seeps and/or springs. These seeps and springs are discussed in detail by others (Balance Hydrologics, 2010).

Estimated Future Water Demands

Assuming the subject property could be developed with up to 438 vine acres, and that unit irrigation demand of the vines will be approximately 0.6 acre feet of groundwater per acre of vineyard per season (AF/ac/season), and that the annual irrigation season will entail a duration of 16 weeks (from mid-May through mid-September of each year), then the future groundwater demands (Q) are estimated as follows:

Q = (areas of vines) x (unit water demand) ÷ (16-week season)

= (438 ac) x (0.6 AF/ac season) ÷ (16-week season)
= 16.4 AF/week

Using more standard units, and recognizing that 1 AF ≈ 325,851 gallons, then Q = 5,343,956 gallons per week or about 763,422 gallons per day (gpd) for the proposed 438 vine acres. This approximate groundwater demand calculates to a combined total pumping rate for all future onsite wells of about 530 gallons per minute (gpm). This total combined rate assumes that all future onsite water wells would be pumped on a 100% operational basis, that is, 24 hrs/day, 7 days/week, for the entire 16-week irrigation season each year.

However, wells pumping continuously at a 100% operational basis for extended periods are neither desired nor recommended. Instead, more practical operational pumping bases during the irrigation season of 50% of the time (12 hrs/day, 7 days/week) or 75% of the time (18 hrs/day, 7 days/week) are often considered. Thus, the total combined pumping rate required from all future onsite water wells would approximately be: 710 gpm at a 75% operational pumping basis; and 1060 gpm at a 50% operational use basis.

The rates calculated above do not include possible peak rates needed to supply the drip emitter systems in the various vineyard blocks in conformance with the needs of the entire onsite water distribution system in the future. Also not included in the above rates are the possible additional water requirements for frost protection, or for domestic water supply for ancillary facilities, if any.

As reported by the owner, no traditional sprinkler frost protection will be used at the subject property.

It is important to note that the 0.6 AF/ac of vines groundwater use estimate is not the same as the County's "fair share allotment" for groundwater use in hillside areas. The estimated annual groundwater demand for the property presented herein is 263 AF/yr [(438 vine-acres) x (0.6 AF/ac of vines)]. For this 2,123-acre property, the County's "fair share allotment" would be 1,061.5 AF/yr of groundwater (2,123 ac x 0.5 AF/ac/yr), which is four times greater than the estimated annual groundwater demand for the subject property.

Nearby Project Research

Several studies have been performed by other consultants for other proposed projects in the area surrounding the subject property. Of the reports prepared for these other projects, the following were reviewed by RCS geologists:

- *Robert Mondavi Properties Vineyard Draft EIR* – Prepared by EDAW, Inc., May 2004.
- *Geologic Report: Syar Napa Quarry,* Prepared by Kleinfelder, March 2008.
- *Preliminary Geologic Reconnaissance: Pasini Property.* Prepared by Kleinfelder. November 2008.
- *Project Information for Notice of Preparation (NOP) of an Environmental Impact Report (EIR), Syar Napa Quarry, Surface Mining Permit #P08-0037*, Prepared by Winzler & Kelly, June 2009.
- *Draft Groundwater Report, Former Napa Pipe Corporation,* Prepared by Stetson Engineering, Inc., August 31, 2009.

Rainfall

To assess overall rainfall conditions in the area of the subject property, and to look for possible trends in rainfall over time, RCS obtained annual rainfall data from a raingage located at the Napa State Hospital (raingage No. 046074). These data are available online at the website of the Western Regional Climate Center (WRCC; http://www.wrcc.dri.edu). This Napa State Hospital gage, located approximately 1.8 miles northwest of the subject property, represents the nearest raingage to the subject property for which long-term data are available. A period of record dating from 1893 to 2009 is available for this raingage; however, significant data are missing for the raingage in the years prior to 1917. Therefore, only data that exist for this raingage solely from 1918 to 2008 have been used for the purposes of this study. December rainfall data are missing for the 2008 record, but data for that year were included in our analysis.

Figure 3A, "Yearly Rainfall for Napa State Hospital Raingage No. 046074, CA," provides a bar graph of these annual rainfall data for the period of useable record. As shown on the graph, based on the available data, and using only the data from 1918 onward, the long-term average annual rainfall at this site is calculated to be 24.6 inches. Historic low and high rainfall totals for the period of available records were 9.74 inches in 1946, and 51.3 inches in 1983, respectively.

RCS also calculated the cumulative departure from the average annual rainfall for the Napa State Hospital raingage data. Figure 3B, "Cumulative Rainfall Departure Curve," illustrates the results of calculating the accumulated departure of each year of rainfall relative to the long-term average annual rainfall at the raingage. Review of the graph on Figure 3B reveals:

- Whenever the graph ascends upward to the right (such as the period of 1994 through 2006) a period of above-average rainfall (i.e., an overall "wet" period) has occurred. That is, on average, most individual years of annual rainfall in this period were at or above the long-term average for rainfall.
- Whenever the graph descends downward to the right (e.g., 1983 through 1994), an overall period of below average (deficient) rainfall has occurred. That is, on average, most individual years of annual rainfall during this period were at or below the long-term average rainfall.

It should be noted that other sources of rainfall data were evaluated by RCS geologists for this project. Napa County maintains GIS data on a website from which RCS obtained a database that included isohyetal data (lines of equal rainfall). Those data reflect a 60-year period of record ranging from 1900 to 1960, as compiled by the County from numerous sources. Based on those isohyetal data, the average rainfall at the subject property during that 60-year period was 22.5 inches. Data available online from the Prism Climate Group (http://www.prism.oregonstate.edu/) shows an average rainfall for the subject property of approximately 27.5 inches per year. This average is based on data ranging from 1971 to 2000.

Local Geologic and Hydrogeologic Conditions

Figure 4A, "Geology Map," has been prepared to illustrate the results of regional geologic field mapping performed by others, as available in the published geologic literature. Specifically, Figure 4A provides the locations for and geologic contacts between the various earth materials that are exposed directly at ground surface at and near the subject property. Figure 4A is actually a composite of 4 different geologic maps. Three of the maps are Digital Compilations of Preliminary Geologic Maps, obtained from the California Geologic Survey (http://www.consrv.ca.gov/CGS). These geologic maps include those for: the Mt. George quadrangle in most of the northern portion of the region, the Napa quadrangle in a small part of the northwestern portion of Figure 4A, and the Cuttings Wharf quadrangle in a small portion on the southwestern part of Figure 4A. A majority of the southern part of the map is adapted from the United States Geologic Survey (USGS) Open File Report Digital Compilation Map titled "Geology of the Cordelia and the Northern Part of the Benicia 7.5-minute Quadrangles, California; a digital database." Figure 4B, "Legend to Geology Map," provides the legend (i.e., the geologic nomenclature) for the various symbols shown on the Figure 4A geology map. The following provides a brief description, from geologically youngest to oldest, of the various earth materials, that are exposed at ground surface at/near the subject property:

<u>Alluvium (Figure 4A map symbol, Qa, Qpaf)</u>. These materials lie along the channel of Suscol Creek, having been deposited by runoff along this creek, and are also exposed to the south of the subject property along an unnamed creek. Alluvium is composed by a thin accumulation of gravel, sand, silt and clay that contains occasional cobbles. Due to its narrow width and very limited vertical thickness, the alluvium is not considered to be a viable source of groundwater for the proposed project.

<u>Landside Deposits (map symbol, Qls)</u>. Several landslides have been mapped in the region in the published literature (see Figure 4A). These include a few relatively small ones in the northern parts of the two northerly parcels, and several others in the offsite areas to the north that are small to moderately-sized in their lateral extent; arrows within these mapped landslide area show the general direction of ground surface movement with each landslide. Relatively large and aerially extensive landslides are also present on the southerly halves of the two southern parcels of the subject property (see Figure 4A). The northern limits of these extensive landslides tend to occur along the southern mapped limit (geologic contact) of the Sonoma Volcanics.

All of these deposits are capable of storing only limited amounts of groundwater and the amount of this stored groundwater, if present, would be highly dependent on season rainfall. Thus, landslide deposits are not considered to be a viable source of groundwater for the proposed project.

<u>Huichica Formation (map symbol Th).</u> This sedimentary formation consists of gravel, sand, silt and clay derived from the underlying Sonoma Volcanics. Ground surface exposures of this geologic formation exist only to the southwest of the subject property. Thus, this formation neither exists on nor underlies the subject property; it is not available for onsite groundwater development.

Sonoma Volcanics (map symbols, Tsv and Tsvm). This formation is of Pliocene to possibly Miocene in geologic age and is comprised by a highly variable sequence of chemically and lithologically diverse volcanic rocks. Among the rock types are hard lave flows of basaltic and andesitic composition, basaltic and andesitic breccias, volcanic agglomerate and tuff. RCS geologists observed some local rock outcrops at the subject property, and were able to observe pumicitic agglomerate and basaltic flow-type rocks to corroborate the geologic mapping. These rocks underlie approximately the northernmost three-fourths of the subject property. Based on cross section data presented in a 2003 USGS Water Resources Investigation Report (WRI 03-4229) by Farrar and Metzger, the Sonoma Volcanics in the area of the subject property may extend to depths of at least 1000 ft or more in the vicinity of the subject property.

These Sonoma Volcanics are considered to be the principal water-bearing geologic materials at the subject property. The Sonoma Volcanics can yield groundwater in moderate quantities from open joints and fractures existing in the various rock units. In the agglomerate tuff and breccia units, groundwater can also be stored in the pore spaces that exist between individual ash particles and breccia clasts. The amount of groundwater available to a water well in these volcanic rocks is dependent on such factors as well depth, and the size, number, frequency, openness, lateral continuity and degree of interconnection of the joints and fractures encountered at each individual location. As mentioned above, a significant thickness of Sonoma Volcanics is interpreted to exist beneath the subject property. Wells constructed into thick sections of fractured Sonoma Volcanics have a greater possibility of encountering sufficient fractures and joints for groundwater production compared to wells constructed in areas where such rocks of the Sonoma Volcanics are relatively thin. Rocks of the Sonoma Volcanics represent the principal source of groundwater for the proposed project.

Older Sedimentary units (Tmk, Tnv, Tc). The Markley Formation (map unit Tmk) and the Nortonville Shale (map unit Tnv) represent quartz-rich sandstone and shale, respectively. These rocks are exposed in the southern portion of the subject property, south of the steep ridge of Sonoma Volcanics. Both of these formations are of Eocene geologic age, and they may underlie the Sonoma Volcanics at depth beneath the subject property. Because of their geologic age and consolidated nature, these formations are not considered capable of containing or producing groundwater in sufficient quantity and of adequate quality for the proposed project. Therefore, these units are considered to be non-water bearing for the purposes of this project.

Figure 4A map unit Tc, the Capay Shale, is also an Eocene-aged sedimentary geologic unit that is not water-bearing. Only a small exposure of these geologic materials are shown on the geologic map, and it lies southwest of the subject property.

It should be noted that the Figure 4A Geologic Map shows a geologic unit “Tsp” that is not defined on the legend for that map. However, based on the adjacent geologic map to the east, this Tsp unit is likely equivalent to map unit “Tmk,” the Markley Formation, and hence, it too is non water-bearing.

Great Valley Sequence (Map unit Ku). These geologically old (early- and late-Cretaceous-aged) rocks are exposed in a small ground surface exposure located in the southern portion of the subject property. These rocks consist mainly of lithified sandstone and shale. Due to their old geologic age, the high degree of consolidation, and their limited lateral extent at the subject property, these rocks are not considered to be a viable water-bearing formation for the proposed project. These rocks are also known to underlie all other geologically-younger rocks beneath the subject property, and are considered to be the bedrock for the area.

Geologic Structure - Two north-south trending faults are shown to exist in the southeastern portion of the subject property, particularly on APN 045-360-009 (also includes APN 057-020-077 and APN 057-030-012). There are no data available to suggest that these faults act as barriers to groundwater flow. Also of note, an anticline (a geologic fold) is mapped at ground surface in the northern portion of the subject property. This anticline also likely has no barrier effect on the groundwater beneath the subject property. It may suggest, however, that the rocks in the area may be more fractured due to the intense geologic forces necessary to create such folding in the rocks over time.

Onsite Water Well

One well exists, known as Well No. 1, on the subject property at the location shown on Figure 1 (a.k.a. Well 1-2009). The well was drilled and constructed in April 2009 by Huckfeldt Well Drilling (Huckfeldt) of Napa, CA. RCS geologists geologically logged the drill cuttings, prepared the final design for the well, directed the development of the well, and subjected this well to pumping tests (details of these tests are provided later in this report).

Drilling of the pilot borehole was completed to a depth of 660 ft below ground surface (ft bgs) by Huckfeldt using air-rotary drilling methods. Following drilling of the borehole, a geophysical electric log (or E-log) and a caliper survey were conducted in the open pilot borehole. Based on the geologic logging of the drill cuttings and evaluation of the E-log and caliper log, RCS geologists interpreted the drill cuttings from the borehole to be various volcanic rocks of the Sonoma Volcanics to a depth of approximately 640 ft bgs. This actual downhole finding is corroborated by the geology map (Figure 4A) which shows rocks of the Sonoma Volcanics are exposed at ground surface across the entire northern portion of the property. Below 640 ft bgs, and extending to the 660-foot depth of the pilot borehole, RCS interpreted the drill cuttings at this site to be shale and clay of the Great Valley Sequence.

Based on the RCS-prepared memorandum titled “Final Well Design Recommendations,” the well was cased to a depth of 618 ft bgs. Casing in the well consists of 10-inch diameter, SDR-17 PVC. Perforations are factory-cut, 0.032-inch (or “32 slot”) openings, that extend between the depths of 258 ft to 298 ft, 318 ft to 518 ft, and 528 ft to 598 ft. A sanitary seal consisting of cement and bentonite pellets was installed in the annular space around the casing to a depth of 150 ft.

Following well construction, mechanical and pumping well development techniques were performed to remove drilling fluids and fine-grained drill cuttings generated during the drilling and installation of the casing. These development methods consisted initially of single swab airlifting, and then pumping and surging with a test pump. Because the well was drilled using air-rotary drilling methods, only minimal development was necessary. Following development, pumping tests were performed in Well No. 1, as described later in this report."

Offsite Water Wells and Water Level Data

Several offsite water wells exist to the west of the subject property. Figure 5, "Offsite Well Location Map," shows the location of some of these existing offsite wells. RCS has consulted on the siting, design and construction of some of these offsite wells in the area just west of the subject property. In addition, as a part of those previous RCS well construction projects, RCS has developed an in-house database on the locations of various domestic and irrigation wells that exist in the area (see Figure 5). The current status, ownership, activity and usage of these offsite wells are generally unknown, with the exception of the wells located immediately west of the northern half of the subject property.

For the wells immediately west of the northern half of the subject property, the specific well construction data are proprietary to the owners of those offsite wells; however, these wells are reported to be on the order of 400 to 500 ft deep, and able to produce groundwater at rates as high as 300 gpm, as monitored by RCS geologists during the construction and testing of certain of those wells.

A number of other wells in the area are monitored for water levels by Napa County. These water level data are listed on the California Department of Water Resources (DWR) Water Data Library (http://well.water.ca.gov). Relatively long-term water level data are available for two of these offsite wells located near the subject property; these two locations are specially denoted on Figure 5. For those two wells, State Well Numbers 5N/4W-13H1 and 5N/4W-14J3, graphs of the depths to water (known as hydrographs) monitored by the County over time have been prepared and are presented on Figure 6 "Historic Water Level Data." The periods of water level data available from the County for these two offsite wells date from 1963 and 1979, respectively. Also depicted on Figure 6 is a portion of the cumulative rainfall departure curve discussed above.

The two wells for which the hydrographs have been prepared (5N/4W-13H1 and 5N/4W-14J3) are located approximately 1.8 miles north and 2 miles north of the northwestern corner of the subject parcels, respectively. Data provided in the 2003 USGS report by Farrar and Metzger reveal that these wells are 280 ft and 364 ft deep, respectively. As shown in that USGS report, and even though the 2 wells were constructed within ground surface exposures of alluvial-type sediments on the floor of Napa Valley, both wells are considered to derive their groundwater from the volcanic rocks of the Sonoma Volcanics that underlie that alluvium. Hence, their hydrographs are considered to be representative of local groundwater conditions within the Sonoma Volcanics in this portion of Napa Valley. As seen on Figure 5, both wells are located in the southern end of the MST area; the subject property is not located within the MST area.

Both hydrographs display a long-term relative stability of groundwater levels over their respective periods of record. The hydrographs also show that water levels tend to be higher in the spring months and slightly lower in the fall months of each year. No long-term, continuous or ongoing or progressive decline in water levels has occurred in either well over time. The hydrograph for Well -13H1 dates from the early-1960s through ±2008. Groundwater levels (see Figure 6) for this well are very shallow (at depths of 5 to 10 ft below ground surface) and show a slight trend with the rainfall departure curve for the available record through 1995. After 1995, the data are a bit more sparse (including a data gap from 1995-2000) and display the following: larger seasonal fluctuations; and a somewhat deeper depth to water (at 20- to 40-foot depths), compared to the pre-1995 data. The ±150-foot depth to water in this well shown for the early-2000s is an anomalous pumping level or a partial recovery level, and <u>not</u> a true static water level.

In contrast, there may be a slight correlation between the hydrograph for Well -14J3 and the cumulative rainfall departure curve. The hydrograph for Well -14J3 (even with its long data gap from the late-1940s through the late-1970s) tends to correlate with the cumulative rainfall departure curve. Importantly, water levels in this well have been: at relatively consistent depths of 50 to 70 ft bgs; and at/near their historic high in recent years.

This correlation would suggest that groundwater levels in the latter well have responded to long-term trends in annual rainfall; that is, following periods of above average rainfall (and, hence, increased opportunity for groundwater recharge), water levels tend to rise. In contrast, during periods of below average rainfall (and hence decreased opportunity for groundwater recharge), water levels have naturally tended to decline slightly.

Recharge to the Sonoma Volcanic rocks is expected to occur as a result of: deep percolation of direct rainfall on the surface exposures of these rocks in the hillsides and in the local watershed of the subject property; infiltration of surface water runoff following rainfall on and within the watersheds of the subject property; and possibly from percolation of surface water runoff along Suscol Creek. Discharge from the Sonoma Volcanics is expected to occur naturally by subsurface outflow to the west, and, to a minor degree, by seep and/or spring discharge on the subject property; groundwater discharge also occurs via the pumping of various wells. As stated previously, up until the construction of Well No. 1, there has never been any groundwater production on the subject property.

Spring Locations

RCS geologists observed the locations of a few seeps and/or springs during the field reconnaissance of the subject property. The maximum flow rate for any of the seeps/springs observed by RCS on October 13, 2008 was 2 to 3 gpm; most of the observed springs were only damp areas with no flowing water. This is likely due to the fact that the RCS geologist visited the site at the end of the dry season when spring flows are naturally at their lowest. Hence, flow at the seeps and springs at the subject property is very likely seasonally variable. That is, flow rates from the seeps/springs are typically higher following periods of precipitation and recharge, and are typically lower during the summer/fall months.

Discharges of the seeps/springs in the northern three-fourths of the subject property appear to flow into various drainages that are tributary to Suscol Creek. In the southern one-fourth of the property, south of the steep volcanic rock ridge, the discharge from seeps/springs is directed toward tributaries that flow to the southwest.

More detailed mapping and evaluations of these seeps and springs at the subject property have been performed by others, including: Balance Hydrologics, Inc., in their March 2010 report titled “Hydrologic Assessment of Proposed Vineyard Conversion, Suscol Mountain Vineyard, Napa

County, California; and LSA Associates, in their March 2010 report, titled “Draft Biological Survey Report for the Suscol Mountain Vineyard Property, Napa County, California.”

Groundwater Flow Direction & MST Area

Because only one well currently exists at the subject property, the groundwater flow direction beneath the subject property cannot be accurately defined. However, based on the surface topography of the area, and because, in general, groundwater typically flows in the same direction as the topography, the regional direction of groundwater flow beneath the property would be to the west. A westerly direction of groundwater flow in the region is corroborated by the Draft Groundwater Report (Stetson, 2009) for the former Napa Pipe site. Specifically, Figure 11 in that Draft Groundwater Report (not included herein) shows a westerly direction of groundwater flow in the area of the proposed Suscol Mountain Vineyard project.

Probably the earliest but the most detailed published map showing contours of the equal elevation of groundwater for all of Napa Valley is that prepared by Kunkel and Upson (1960) for the USGS (Water Supply Paper 1495). Plate 4 in that report (not re-printed herein) shows groundwater elevation contours for 1949/50 along the entire floor of Napa Valley; included also are similar elevation contours for much of the northern one-half of the Milliken-Sarco-Tulocay (MST) area. The MST area is located north of the subject property as shown on Figure 5. The southern narrow tip of MST area boundary, at its closest point to the subject property, is roughly 1 mile northwest of the northwesternmost corner of the property boundary, and therefore, the subject property is NOT within the MST area. Review of those published groundwater elevation contours for the northern part of the MST area reveals the following groundwater flow directions: to the west in the northern part of MST, and to the southwest in the central part of the MST area. It is important to note that the subject property is not within the MST area. In fact, the northwestern corner of the subject property lies roughly 1 mile southeast of the southernmost corner of the MST area.

Another early report of the MST area is the USGS report prepared by Johnson (August, 1977; Water Resources Investigations 77-82; Open File Report). Figures 9 and 10 therein (not re-printed herein) show groundwater elevations only for the MST area, and only for April 1976 and September 1975, respectively. These maps tend to show that groundwater at those dates flowed from the northeast, east or southeast into the MST area and then in various directions across the MST toward the Soda Canyon fault on the west side of the MST area.

Johnson (USGS, 1977) also mentioned the following:

a. Different parts of the MST area display different groundwater depths and elevations, and some wells even have flowing artesian conditions (p.16, therein); the author stated that these differences in groundwater depths reflect different rocks, complex geology, compartmentalization of the area by faulting, and lack of fracture continuity in and around the MST area.

b. Groundwater flow is generally to the west across the MST area (p.16, therein).

c. The major source of groundwater recharge is precipitation on the MST area along with "some underflow from the Wild Horse Valley area" (p.22, therein). This Wild Horse Valley area is known to occur in the higher portions of the Howell Mountains located due east of the MST area.

d. Hydrographs for 1950-1975 in wells in different parts of the MST area have displayed different water level decline rates over time; other wells in that same time period showed a water level rise (p. 29-31, therein).

e. Some wells in the MST have shown water level declines dating back to the early part of the 20th Century.

As evidenced by the information presented above, groundwater declines in the MST area are long standing, and are related to the site specific geologic conditions within the MST. Geologic materials within the MST area differ from those that underlie the subject property. Geologic materials beneath the MST area consist mainly of ash-type volcanic deposits, and as such, these materials have poor recharge capabilities. In contrast, the geologic materials beneath the subject property consist of fractured, hard, volcanic flow rocks, which have a greater ability to be recharged and to transmit groundwater to water wells. Hence, the subject property and the MST area have different hydrogeologic characteristics, and are hydraulically not connected.

Pumping Tests

Background Information

Pumping tests were performed by RCS geologists on Well No. 1 following its construction and development. The basic purposes of these pumping tests were to collect water level and pumping rate data and to enable the geologists to define the pump depth setting and an operational pumping rate for a new permanent pump. In addition, analyses of the test data were also intended to help estimate the possible future impact of pumping this well on the subject property, and on the area surrounding the subject property.

Water level measurements were collected during the aquifer test using both an automatically-recording water level pressure transducer and a manual electric-tape water level sounder. Measurements were collected by the transducer at 1-minute intervals during the entire monitoring period. A 300 psi transducer was used, which, as reported by the transducer manufacturer, In-Situ, Inc., has an accuracy of ±0.346 ft. Manual water level measurements were collected periodically during the pumping tests by the onsite pumping contractor to corroborate the automatically collected-transducer water level data. In addition to a water level transducer, a barometric pressure transducer was used to measure fluctuations in the barometric pressure during the test period. This barometric pressure transducer has a reported accuracy range of about 0.018 ft. After testing was complete, the electronically-collected water level data were corrected using the barometric data, so that the effects of barometric pressure changes on the device were not reflected in the water level measurements. Based on the reported accuracy ranges for both of the transducers, the water level data presented herein are assumed to have an accuracy of about ±0.364 ft (the sum of the approximated error ranges of the two devices).

<u>Step Drawdown Test</u>

The pumping test of Well No. 1 began on the morning of June 19, 2009 with a 9-hour, three-point step drawdown test. For this test, the well was pumped continuously at the RCS-recommended nominal pumping rates of 150 gallons per minute (gpm), 250 gpm, and 350 gpm, and for RCS-recommended durations of 3 continuous hours at each rate. Figure 7A, “Step Drawdown Test,” shows a graph of the water levels collected in Well No. 1 during this step drawdown test. The following summarizes key data collected during the step test:

- An initial pre-test static water level (SWL) of 173.6 ft below the wellhead reference point (ft brp) was measured prior to turning on the pump.
- The three-point step test was performed at the average pumping rates of 163 gpm, 254 gpm, and 353 gpm; each step rate lasted three hours. The average flow rates were determined from the totalizer flow dial installed by the pumper.
- Pumping water levels (PWLs) ranged from 187.9 ft to 209.6 ft brp, resulting in water level drawdowns ranging from 14.3 ft to 36.0 ft for the three step test rates, respectively.

- Specific capacities for the step test rates ranged from 11.4 gallons per minute per foot of water level drawdown (gpm/ft ddn) at a pumping rate of 163 gpm, to 9.79 gpm/ft ddn at a pumping rate of 353 gpm.

Based on the results of this step drawdown test, RCS recommended that a constant rate pumping test be performed in the pumping well at a rate of approximately 250 gpm. Because of the proximity of the well to the existing Suscol Creek, the property owner retained Balance Hydrologics, Inc. (Balance) of Berkeley, CA, to collect stream flow measurements during the Well No. 1 pumping test. The results of the stream flow monitoring are presented under separate cover in a Memorandum prepared by Balance; the Balance Memorandum is attached in the Appendix.

<u>Constant Rate Pumping Test</u>

Immediately following the step drawdown test, in the evening on June 19, 2009, background water level monitoring for the constant rate pumping test began. Figure 7B, Water Level Measurements, Well No. 1," shows all of the transducer-collected water level data from Well No. 1. Figure 7C. "Water Level Measurements, Scale Change, Well No. 1," shows the same transducer collected water level data as Figure 8B, but the y-axis on the Figure 8C graph has been modified to show primarily SWLs measured by the transducer.

Background water levels were monitored for a period of about 16 days (between June 19 and July 6), prior to the start of the pumping test; see the red-colored curve on Figures 7B and 7C. Analysis of that curve yields the following observations:

- Initially, in the first day or two of background water level monitoring, water levels were still increasing (recovering) from the prior 9-hour step drawdown test pumping period.
- On about June 20 or 21, non-pumping water levels in Well No. 1 stopped increasing, and began to decrease slowly for the remainder of the background monitoring period, until the actual pumping portion of the constant rate test began on July 6.
- During the background monitoring period, there appears to be relatively small and spontaneous (i.e., not caused by pumping of Well No. 1) decreases in water levels, followed by spontaneous increases in water levels; these fluctuations range from 0.4 ft to 0.6 ft of change. These changes, shown on Figure 7C, are slightly larger than the range of the combined error reported for the two transducers, and appear to be characteristic of the pumping influence of offsite wells in the region. Hence, nearby, offsite wells owned by others appear to have a small effect on the water levels in Well No. 1.

- Overall, SWLs appeared to decrease at a relatively constant rate during the background monitoring period, as shown on Figures 7B and 7C. This suggests that, during the background monitoring period, regional water levels were showing an overall decline. This regional decline during the summer months is typical of volcanic rock aquifers in the Napa Valley, and is usually followed by regional water level increases during the winter months when deep percolation of precipitation is occurring (i.e., rainfall recharge).

Pumping for the constant rate pumping test of Well No. 1 began on July 6, 2009 at 12:00 PM. The well was then pumped continuously for a period 4320 minutes (72 hours) and at an overall average rate of 258 gpm; pumping ceased on July 9, 2009 at 12:00 PM. Figure 8D, "Constant Rate Pumping Test, Well No. 1," shows the water level data collected by the transducer during the pumping test, as well as a few of the corroborative manual water level measurements collected by the onsite pump during the test. A summary of key test data is as follows:

- Before pumping began, an initial SWL of 175.3 ft brp was monitored in Well No. 1.
- Using a flowmeter and a totalizer dial, the pumping contractor pumped the well at a constant rate for the entire duration of the test. Based on those totalizer readings, the average pumping rate during the 72-hour pumping portion of this aquifer test was 258 gpm.
- At the end of the pumping period, a final PWL of 203.4 ft brp was measured in Well No. 1. This represents a total drawdown during the pumping test of 28.1 ft.
- The specific capacity of the well during the pumping period was 9.2 gpm/ft ddn.
- Water levels were not stable at the end of the pumping test, but were continuing to decrease slightly. During the last hour of pumping, water levels in the well were declining at a rate of approximately 0.2 ft per hour. Such decline is typical of wells constructed in the aquifers of the Sonoma Volcanics.

Immediately after the cessation of pumping for the constant rate pumping test, the water level recovery period began. The recovery of water levels in Well No. 1 was then measured for a period of approximately 15 days between July 9, 2009 and July 24, 2009 (See Figure 8D, and also Figures 7B and 7C). Below is a summary of key water level recovery data.

- Water levels recovered up to a "high" of 177.0 ft brp during the recovery period on July 19, following about 4 days of recovery. This recovery "high" is 1.7 ft lower than the pre-test SWL in this well.
- After July 19, and through the remainder of the recovery monitoring period, water levels ceased to increase and began to decrease at a relatively constant rate. The decrease appears to be similar to the decrease observed during the background water level monitoring period described above. This continuous but slow decline in water

levels is attributed to the typical regional water level decline in the area in the summer months.

- At the end of the 15-day water level recovery monitoring period, a SWL of 178.4 ft brp was measured. This depth is approximately 3.1 ft lower than the SWL in this well prior to the start of the constant rate test.

Calculation of Aquifer Parameters

Important aquifer parameters such as transmissivity (T) and storativity (S) can often be determined using data collected during pumping tests. Transmissivity is a measure of the rate at which groundwater can move through an aquifer system, and therefore is essentially a measure of the ability of an aquifer to transmit water to a pumping well. Transmissivity is expressed in units of gallons per day per foot of aquifer width (gpd/ft). Storativity (S) is a measure of the volume of groundwater taken into or released from storage in an aquifer for a given volume of aquifer materials; storativity is dimensionless and has no units. Storativity calculations can only be performed using water level drawdown data, if any, monitored in observation wells during a pumping test and not by water level drawdown data acquired solely from the pumping well. Because no other wells exist on this subject property, no additional water level observation wells were available during the pumping test; hence aquifer storativity cannot be directly calculated from the pumping test data from the onsite well.

Water level drawdown data and recovery data for Well No. 1 were input into the software program AQTESOLV (version 4.5 Professional). Numerous analytical solutions were utilized to determine transmissivity values using an automatic curve fitting procedure. The solutions utilized consisted only of confined aquifer or semi-confined aquifer solutions; no unconfined aquifer solutions were used. Note that RCS Geologists did analyze a few “unconfined solutions” during the analyses but curve fitting was unsuccessful and these solutions were not deemed valid; they are not presented herein. Also, certain assumptions must be made about the aquifer when using these solutions. In general, for the solutions listed below, assumptions are made that the aquifer has an infinite areal (lateral) extent that the pumping well is fully penetrating the aquifer system(s), and that water is instantaneously released from storage with the decline of hydraulic head. Also, for the purposes of this analysis, the assumption is made that the local volcanic rock aquifer system is 340 ft thick. This was determined by taking the known distance between the top of the perforations (258 ft) and the bottom of the perforations (598 ft) in Well No. 1.

As discussed above, during both the pre-test background water level monitoring and the post-test water level recovery monitoring period, a constant water level decrease attributed to regional water level decline was observed in the data set. Initial attempts at calculating aquifer transmissivity proved successful, but the automatic line-fitting procedure produced skewed results. Hence the approximate summertime rate of regional water level decline had to be estimated by fitting a straight line across the SWL data, as shown on Figure 7B. Calculating the slope of this line revealed that the regional water level decline was about 0.15 ft per day. Hence, RCS geologists factored out this 0.15-foot decline from the raw water level data from the pumping tests results, and generated another curve using the adjusted transducer data. Figures 7B and 7C show the adjusted water level data as a blue-colored line. Note that with the regional decline factored out of the original raw data set, water levels measured at the end of the water level recovery period appear stable beginning on July 19. Upon review of the raw data set, July 19, 2009 is the date at which water level increases ended; thereafter water levels began to slowly decrease at a constant rate (discussed above).

Using the adjusted water level data shown on Figures 7B and 7C, RCS geologists used the AQTESOLV software package to perform the automatic curve fitting procedure. Below is a list of the different curve-fitting solutions used, the transmissivity value calculated, the figure number on which the water level data and fitted-curve are presented, and additional assumptions about the aquifer inherent in the solution.

- Theis (1935) – Figure 8A, "Constant Rate Pumping Test Analysis, Theis Confined Aquifer Solution, Well 1." Using the Theis solution, a transmissivity value of 29,200 gallons per day per foot of aquifer (gpd/ft) is calculated for these data. The Theis solution assumes numerous conditions, including that the aquifer is isotropic (the same in all directions). Also note that RCS used both the confined and unconfined Theis solutions, but there was only little change in the resultant transmissivity value.
- Barker (1988) – Figure 8B, "Constant Rate Pumping Test Analysis, Barker Fractured Aquifer Solution, Spherical Blocks, Well No. 1." A transmissivity value of 28,870 gpd/ft was calculated from the pumping test data. Curve fitting procedures yielded a good fit using this solution. The size of the spherical blocks is a variable when fitting this solution using the AQTESOLV software. However, analysis by RCS geologists revealed that

changes in this spherical block-size software parameter did not significantly affect the transmissivity value calculated by the software package.

- Cooper-Jacob (1946) – Figure 8C, "Constant Rate Pumping Test Analysis, Cooper-Jacob Confined Aquifer Solution, Well No. 1." As shown on the figure, the solution is a relatively good fit of the data for the drawdown portion of the pumping test. A transmissivity value of 33,550 gpd/ft is calculated for the pumping test data. The Cooper-Jacob solution also assumes that the aquifer is isotropic (the same in all directions). As described above for the Theis method, RCS used both the confined and unconfined Cooper-Jacob solutions and both solutions resulted in similar T values.
- Moench (1984) – Figure 8D, "Constant Rate Pumping Test Analysis, Moench Fractured Aquifer, Slab Blocks, Well No. 1." A transmissivity value of 29,180 gpd/ft/ was calculated for the pumping test. Using the Moench Slab Block solution, as shown on Figure 8E, "Constant Rate Pumping Test Analysis, Moench Fractured Aquifer, Spherical Blocks, Well No. 1," a transmissivity of 29,190 gpd/ft is calculated.

Based on the information above, and for the purposes of this report, an overall transmissivity value of 29,000 gpd/ft will be assigned to the volcanic rock aquifer systems(s) into which Well No. 1 is constructed.

In comparison to our onsite work, determination of aquifer parameters was also performed by Stetson for the Napa Pipe project which is located on the floor of Napa Valley, approximately 1.7 miles west of the subject property. On Page 3-7 of the Draft Groundwater Report by Stetson for the Napa Pipe project, a transmissivity value of 336,645 gpd/ft is reported and is described to have been derived using the Theis solution (based on the Stetson pumping test data from their onsite Well NRP-01). This well was reported to derive its groundwater solely from the Sonoma Volcanics rocks. This Stetson-derived T value is much larger than the values determined by RCS using pumping test data from Well No. 1 at the Suscol Mountain Vineyard property. This may be the result of increased fracturing of the volcanic rock aquifers beneath the Napa Pipe property, the existence of a potentially continuous recharge source (the Napa River) near Napa Pipe, or a number of other factors. In any event, the RCS-derived transmissivity value determined for the subject property is considered conservative with respect to the value determined by Stetson as a part of their Draft Groundwater Report (Stetson 2009) for the former Napa Pipe site.

Also note that in the Draft Groundwater Report (Stetson 2009) for the former Napa Pipe site, a reported value for storativity of 0.00045 was calculated for the aquifers of the Sonoma Volcanics. This value is consistent with typical storativity values for fractured rock aquifers, although such values vary greatly for volcanic rocks, due to the anisotropic nature of fractured rock aquifers. For the purposes of this study, and because no storativity value could be calculated with the available pumping test data for Well No. 1, RCS will also assume a storativity value of 0.00045 for the subject property.

Theoretical Water Level Drawdown Analysis

Using the data and aquifer parameters collected during the construction and testing of Well No. 1, a theoretical water level drawdown analysis was conducted for this well. This analysis was completed using the PUMPIT (v4.2) software package, and was used to determine theoretical distance-drawdown values that might possibly be created while pumping Well No. 1 in the future under normal operational conditions. When pumping a well, a region of temporary water level drawdown (known as a cone of depression) is created around the well. Once pumping is ceased, water levels within this cone of depression will begin to recover back to their pre-pumping static water levels. Hence, the purpose of these drawdown calculations was to provide estimates of the possible amount of temporary water level drawdown that might be induced in any existing or future wells constructed either on or near the property, as a result of pumping Well No. 1 at a normal operational rate and for various continuous durations of pumping during the assumed 16-week irrigation season in the future.

Certain assumptions about the aquifer are inherent in the PUMPIT software package, such as: the aquifer is homogeneous and isotropic; the wells all fully penetrate the same aquifer system(s); and the aquifer is of infinite lateral (areal) extent. It must be recognized that fractured rock aquifer systems do not necessarily meet all of these assumptions. Because of these differences, and the highly variable and somewhat compartmentalized nature of the fractured aquifers within the Sonoma Volcanics, theoretical results derived using the PUMPIT software package (and other software packages) may tend to over-estimate the amount of water level drawdown interference that might occur in wells surrounding a pumping well.

Table 1, “Theoretical Drawdown Calculations,” shows the results of the initial PUMPIT calculation, using the transmissivity value determined from our curve-fitting procedures. As shown on Table 1, the theoretically-predicted water level drawdown at the pumping well is shown to be 19.0 ft. During the pumping test, a water level drawdown of 28.1 ft was actually recorded. Just as the nature of fractured rock aquifers is variable, so is the reliability of the theoretical predictions regarding volcanic rock aquifers. However, to address these assumptions and the possible unreliability of computational exercises, RCS then calibrated the software package to mimic actually-monitored results detected during the pumping test of Well No. 1.

Software Calibration

Calibration was performed by first simulating a 72-hour pumping period in Well No. 1 and then attempting to reproduce the water level drawdown values that were actually recorded by the transducer in the pumping well during the aquifer test. The representative value of T initially used for these computer simulations was T = 29,000 gpd/ft, as discussed above. To calibrate the software, it was necessary to adjust and then re-adjust this T value in the software. Eventually it was determined that a T value of ± 19,000 gpd/ft was able to more closely mimic the actual pumping test drawdown value of 28.1 ft recorded in Well No. 1 at the end of the constant rate test (see Table 1).

Theoretical Impacts on Offsite Wells

Once the computer run was calibrated to the actual field drawdown value that was monitored in the pumping well at the end of the 72-hour constant rate pumping test, the theoretically predicted water level drawdowns were then calculated for other known or assumed well sites located at distances of 1370 ft, 5000 ft, 8760 ft, and 10,100 ft from Well No. 1. These distances correspond to the nearest known offsite well, other known offsite irrigation wells in the area, the approximate distance from Well No. 1 to the former Napa Pipe site, and the approximate location of the offsite Syar well, respectively; see well locations on Figure 5.

Calculations of theoretical drawdown were made for two pumping durations: a 72-hour pumping duration to mimic the 72-hour pumping test conducted in Well No. 1; and a longer duration of 112 days (16 weeks) of continuous pumping. This 16-week period of continuous pumping was modeled to simulate a typical irrigation season at the property. In both simulations, a pumping rate of 258 gpm was used; this is the same rate at which the pumping test was performed. In reality, the future pumping rate and pumping duration of Well No. 1 during a normal irrigation season are unknown but can be reasonably assumed to be at a lower rate and for a less continuous period, in part, because there may be other onsite water-supply wells in the future.

Additional onsite wells in the future will provide the property owner with substantial flexibility in his/her pumping rates and pumping durations.

The computer simulation assumes that Well No. 1 pumps for the 16-week period continuously, 24 hours per day, 7 days a week, even though RCS does not recommend ever pumping a well for such a continuous period without periodically allowing for intervening periods of non-pumping and water level recovery. Typically, a maximum 12-hour to 18-hour per day operational pumping period (i.e. a 50% to 75% operational basis, respectively) would be recommended for future pumping of Well No. 1 (and other future onsite wells).

Table 1 shows the theoretically calculated water level drawdown values for each of the known or assumed water level monitoring (observation) wells described above. However, such theoretically-predicted drawdowns will not likely occur when pumping Well No. 1, because:

1. It has been the experience of RCS, based on a large number of prior pumping tests in the Sonoma Volcanics and from prior calculations of theoretical drawdowns in observation wells, that the actual amounts of water level drawdown created in observation wells are less than the theoretically-predicted values. This inconsistency is due to the assumptions about the aquifer that are inherent in the software package.
2. Volcanic rock aquifer systems are not homogeneous or isotropic. In essence, the fractures in the rocks are not typically continuous over large distances; this tends to result in compartmentalization of portions of the aquifer system. Due to this compartmentalization, drawdown will not progress uniformly outward around a pumping well and such drawdown impacts are very difficult to predict with any accuracy, regardless of the software package or computer model used to generate the predicted drawdown values.
3. Neither the existing well nor any future onsite wells will ever be pumped on an operational basis for such long and continuous periods of time as are being modeled for this project. That is, RCS never recommends that wells be pumped on a 100% operational basis and at very high pumping rates and/or for extended time periods; instead, the wells might be pumped for 12 to 18 hours each day and only during the 16-week irrigation season. Hence, during the remaining 6 to 12 hours each day during each irrigation season, and for nearly all of the remaining 36 weeks of each year, the onsite irrigation-supply wells will not be pumped (except for perhaps a few minutes every 3 or 4 days to help control the possible growth of organic bacteria in the aquifer). During all such future periods of non-pumping, water levels in the area will have the opportunity to recover.

Assuming the theoretically-predicted drawdown values listed on Table 1 were to occur (again, for the reasons above, the values on Table 1 are considered to be overestimated), these values show that, as a worst case scenario, near the end of a 16-week period of assumed continuous pumping during the irrigation season, water levels in known offsite wells closest to Well No. 1 could theoretically be lowered by about 10 ft or less. Such theoretical drawdowns, even assuming they were to actually occur, would tend to induce some increased, but temporary, pumping lifts in those offsite wells.

Groundwater In Storage

As discussed above, roughly two-thirds of the subject property is underlain by volcanic rocks, and the aquifer system(s) that exists within these volcanic rocks is considered to be the sole source of groundwater for the subject property. To estimate the volume of groundwater that is currently in storage within these volcanic rocks beneath the property, and that might be available for existing and future onsite water wells, the surface area of the volcanics on the subject property is first considered. Using GIS software, RCS compared the geologic map of the region with the approximate boundaries of the subject property; note that these property boundaries were obtained from the Napa County GIS website and are considered to be approximate. RCS measured that the total area of the volcanic rocks exposed at ground surface solely within the boundaries of the subject property is 1,582 acres. The thickness of volcanics rocks beneath the property is unknown, but, based on the data collected during the drilling of Well No. 1, it is known that the volcanic rocks extend to a depth of 640 ft at this well. Hence, to be conservative, we will assume, for the purposes of this estimate only, that the volcanic rocks extend to a constant depth of 600 ft beneath the entire property. As stated above, we also assume that the saturated aquifer thickness is 340 ft.

By multiplying the thickness of saturated volcanic rocks (340 ft), by the area of volcanic rocks exposed solely within the subject property boundaries (1,582 ac), then the total volume of saturated volcanic rocks currently beneath the subject property is estimated to be 537,880 AF. Of this volume of saturated rock, we assume (conservatively) that only 2% of the water could be recovered via water wells constructed at the subject property (this 2% is referred to as the specific yield of the aquifer). Note that a 2% value is very conservative; some references show the specific yield of the Sonoma Volcanics ranging from 3% to 7%.

Multiplying the saturated thickness of volcanic rocks beneath the property (537,880 AF) by the conservative estimate of specific yield (2%), then the approximate volume of groundwater in the

Sonoma Volcanics beneath the subject property that might currently be available for extraction by onsite wells is approximately 10,757 AF. Because static water levels are known to change in wells seasonally and from year to year, it must be recognized that the amount of groundwater in storage beneath the site will also change over time.

In comparison, the calculated groundwater demand for the proposed new vineyards at the subject property is approximately 263 AF per year (16.4 AF/wk x 16-week irrigation season). This annual 263-acre foot irrigation demand for all proposed onsite vineyards represents less than 3% of the groundwater estimated to be currently in storage beneath the subject property.

Groundwater Recharge

To estimate the groundwater recharge that might occur on a long-term average annual basis to the subject property, RCS utilized only the area of the volcanic rocks exposed at the property, because the volcanic rocks are considered to be the only viable aquifer system for this project. As discussed above, the area of volcanic rocks exposed at ground surface solely within the boundaries of the subject property is 1,582 ac, and the long-term average rainfall at the subject property is 24.6 in/yr. Hence, the total amount of precipitation that could be available for deep percolation into the volcanic rock aquifer system beneath the subject property is on the order of 3,240 AF per year (1,582 ac x 24.6 in/yr ÷ 12 in/ft).

Of the 3,240 AF/yr of average annual rainfall, only about 10% of the rainfall that falls directly onto the subject property has the potential to deep percolate into the underlying volcanic rocks (the remaining 90% of this rainfall tends to either flow offsite as direct surface water runoff or will tend to be evapotranspirated). This 10% estimate is based, in part, on RCS review of the USGS Water Resources Investigation (WRI 77-82) by Michael Johnson, dated August 1977, and from our experience in preparing numerous hydrogeologic assessments throughout Napa County. A similar but slightly higher 10.5% recharge rate was calculated for the Sonoma Volcanic rocks in the hills east of the former Napa Pipe site in the Draft Groundwater Report (Stetson 2009) for that project.

Hence, based on the average annual rainfall of 24.6 in/yr, the estimated average annual recharge over the long-term for the subject property is 324 AF/yr (10% of 3,240 AF/yr); this represents the average annual volume of groundwater available for deep percolation to the subject property. Note that the estimated annual irrigation demand of 263 AF/yr for the proposed onsite vineyards represents about 81% of the estimated long-term average annual recharge that occurs solely onto the ground surface exposures of volcanic rocks on the subject property.

Water Quality Data

Water quality data are available for Well No. 1, and also for a few nearby offsite wells. In addition, water quality sampling was previously performed in a few seeps/springs by Balance. A summary of the available data is provided below.

<u>Onsite Well</u>

A water sample was collected from Well No. 1 at the end of the constant rate test. Just before the pump was turned off on July 9, 2009, the pumper collected a water sample, and subsequently delivered that sample to CalTest Analytical Laboratory in Napa, CA. The sample was analyzed for general mineral constituents, general physical constituents, and inorganic chemicals (trace elements). Below is a summary of those data:

- a sodium bicarbonate groundwater character
- a total dissolved solids (TDS) concentration of 190 milligrams per liter (mg/L)
- a total hardness (TH) concentration of 50 mg/L
- a not detected (ND) concentration of iron, and a low manganese concentration of 0.043 mg/L
- arsenic was detected at 0.0041 mg/L, which is acceptable for both irrigation use and future potable water supply use, if desired
- boron was not detected (ND)
- adjusted sodium absorption ratio (adj. SAR) was 1.2 units
- silica was 88 mg/L, which is typical for groundwater from the Sonoma Volcanics

Throughout the pumping test, the onsite pumper occasionally monitored the water temperature of the pumped groundwater. Also, the installed transducer collected water temperature readings. In general, temperatures of the groundwater pumped from Well No. 1 were on the order of 24.5º to 25ºC (76º to 77º F). This is considered slightly elevated for groundwater relative to the average annual air temperature in the region.

Offsite Wells

Water quality data for nearby wells to the west (for which RCS has some in-house data) also exhibit a sodium bicarbonate water character. Iron and manganese concentrations in these offsite wells are relatively low, similar to the concentrations in the northern spring sampled by Balance (see below). TDS concentrations in these offsite wells are on the order of 200 mg/L, slightly higher than the concentrations measured in the samples collected from the onsite seeps/springs. Groundwater in these offsite wells also has moderate to high concentrations of silica, typical of wells constructed in the Sonoma Volcanics.

Seeps and Springs

Water quality data for seeps/springs are available from Balance and are based on the sampling performed during their site visit of October 1, 2008. The three springs sampled by Balance are located within the eastern parcel (this parcel has three APNs: 045-360-009, 057-020-077 and 057-030-012). All three of the sampled springs are located within ground surface exposures of the Sonoma Volcanics. In general, the resulting laboratory test data are representative of the groundwater derived from the Sonoma Volcanics. Each of the three samples exhibited a sodium bicarbonate water character. In the two springs sampled in the southeastern parcels, elevated concentrations of iron and manganese were reported that are above their respective State Title 22 Secondary Maximum Contamination Limit (MCL) for domestic use. However, the water sample for the spring in the northeastern parcel showed relatively low concentrations of iron and manganese. Boron concentrations are very low in all three of the spring samples. The water quality analysis summary for seeps/springs provided to RCS by Balance did not include testing for silica concentrations. Total dissolved solids (TDS) concentrations in the sampled seeps/springs were on the order of 100 milligrams per liter (mg/L).

Cumulative Impacts

To assess possible cumulative impacts to the volcanic rock aquifer caused by pumping for irrigation purposes from both the subject property and neighboring properties, identification of groundwater use surrounding the subject property is necessary. Importantly, only the nearby properties that produce groundwater from the Sonoma Volcanics were assessed for cumulative impact analysis because all wells at the subject property will be constructed only into volcanic rocks.

Nearby but offsite properties were identified via the following methods: based on various site reconnaissance visits of the area over the years for this and other prior RCS projects; review of readily available air photos, geologic maps, and parcel maps; and locations of existing vineyards near the subject property. In addition, a similar method of cumulative impact analysis was utilized in the Stetson Draft Groundwater Report for the former Napa Pipe site (2009). Therein, nearby groundwater producers were listed showing the approximate acreage and the Stetson-estimated groundwater demand for each site.

<u>Estimated Nearby Offsite Groundwater Demands</u>

Based on the data sources listed above, the nearby groundwater producers are listed below along with their estimated annual groundwater production volumes:

- *Existing vineyards west of the subject property* - According to the Draft Napa Pipe Report, approximately 593 acres of vines exist in the area between Hwy 121 and the western boundary of the subject property. Based on our review of available data, this estimate appears to be reasonable. However, the Draft Napa Pipe Report estimated that the groundwater use for these offsite vineyard parcels is 1.2 AF/yr per acre of vineyard. Prior conversations with the owners of other Napa County vineyards and owners of some of the vineyards in the area in question reveal that the 1.2 AF/yr per acre water use for vineyards is an over-estimate. Those owners stated that 0.5 AF per acre is a much more appropriate estimate. In addition, some of the vineyards in the area are obligated to use 0.5 AF/yr per acre of vines or less, based on groundwater use estimates in the County's Phase I Water Availability Analysis.

  Based on this information, RCS estimates the demand for these offsite vineyards located west of the subject property to be about 296.5 AF/yr (0.5 AF/yr per acre of vines x 593 acres of vines).

  Irrigation demand for vineyard-supply was also estimated for vineyard areas in the Robert Mondavi Properties DEIR (EDAW 2004). Based on the maps shown in that report, the vineyard areas for which groundwater demand was estimated are the same as the area of vineyards that is located west of the subject property and east of Hwy 121. Therein, the total irrigation demand is estimated to be 229 AF/yr. Hence, our estimate of irrigation demand is larger than that in the referenced DEIR (EDAW 2004) for essentially the same area.

- *Former Napa Pipe Site* – The Former Napa Pipe project site is located approximately 1.7 miles west of the subject property. As listed in the Draft Groundwater Report (Stetson 2009) for this site, the annual water demand for that proposed project is 620 AF/yr.

- *Syar Quarry* – The Syar Quarry well is located approximately 10,100 ft (nearly 2 miles) northwest of the subject property. Further, based on review of the NOP for the Syar Quarry (Winzler & Kelly 2009), a description of two existing wells for that property is provided on page 7 therein. Based on that description, it appears that one of the Syar wells is located within the MST area, whereas the other Syar well is located west of Hwy 121, near the former Napa Pipe site; recall that the subject property is not within the MST area. In the Draft Groundwater Report (Stetson 2009) for the former Napa Pipe site, it was reported that no data relating to water use were obtained by Stetson for the Syar property. Hence, groundwater use for the Syar property was estimated by Stetson (2009) to be 50 AF/yr, with a caveat therein that a future expansion of the Syar Quarry may occur, and this may change the estimated groundwater use in the future. To be consistent with the Draft Groundwater Report (Stetson 2009) for the former Napa Pipe site, RCS will apply the same groundwater use values for the Syar property that were utilized by Stetson (2009).

Estimated Cumulative Groundwater Impacts

It is our opinion that the cumulative impacts for the subject property need only address the vineyard areas immediately west of the subject property and east of Hwy 121. Due to the compartmentalized nature of volcanic rock aquifers, effects of future onsite pumping will very likely be limited in lateral extent. Also, a large percentage of the groundwater estimated to be available in the Draft Groundwater Report (Stetson 2009) for the former Napa Pipe site was attributed by Stetson to subsurface underflow from volcanic rocks beneath the alluvium along the floor of Napa Valley to the former Napa Pipe site. In contrast, RCS assumed that no groundwater underflow occurred from the north toward the subject property. In order to be consistent with the analysis in the Draft Groundwater Report for the former Napa Pipe site, the estimated offsite cumulative annual groundwater use by the offsite groundwater pumpers near the subject property is 966.5 AF/yr (296.5 AF/yr for the vineyards just west of the subject property + 620 AF/yr for the former Napa Pipe site + 50AF/yr for Syar Quarry).

RCS-Defined Cumulative Impact Area

To estimate the cumulative impacts of pumping by both the proposed project and nearby offsite pumpers, RCS geologists initially calculated the amount of average annual groundwater recharge to the subject property and to the nearby vineyard properties which lie west of the subject site but east of Hwy 12. For this estimate, and based on the locations of the offsite wells and the available geologic map of the area, RCS geologists assumed that the vineyards west of the subject property (but east of Hwy 121) all produce groundwater from wells constructed into the Sonoma Volcanics. Further, to present a very conservative estimate, RCS considered only the volcanic rocks that lie in an easterly and westerly direction from the subject property, due to the fact that the groundwater flow direction in the area is roughly east to west. Figure 5 shows the area of volcanic rocks in the RCS-defined cumulative impact area used for this comparison; this surface area is 3,360 acres. Similar to the calculation above, the estimated long-term average annual recharge to this area would be 689 AF/yr (3,360 ac x 24.6 in of annual rainfall ÷ 12 in/ft x 10% deep percolation). The estimated average annual water demand for the nearby but offsite vineyards is 296.5 AF/yr, and for the proposed vineyards on the subject property is 263 AF/y, for a total demand in the cumulative impact area of 559.5 AF/yr. Hence, this total cumulative groundwater demand represents roughly 81% of the estimated long-term average annual volume of groundwater recharge (689 AF/yr) to the RCS-defined cumulative impact area.

Cumulative Impact Area (Including the Former Napa Pipe Site and Syar Quarry Site)

As stated above, to be consistent with the cumulative impact analysis present as a part of the Draft Groundwater Report (Stetson 2009) for the former Napa Pipe site, the cumulative impacts of the proposed project at the former Napa Pipe site and the Syar Quarry site were also assessed. The volume of groundwater available to the properties being evaluated for cumulative impact is also assessed in the Draft Groundwater Report (Stetson 2009) for the former Napa Pipe site. Therein, the groundwater supply available for both the proposed project at the former Napa Pipe site and the nearby offsite groundwater uses described above is reported to be 3,100 AF/yr. This value was derived by Stetson assuming 2,700 AF/yr of groundwater underflow into their project site from the north, and 400 AF/yr of underflow from the east; both underflow values were attributed to deep percolation of groundwater into the Sonoma Volcanics. Note that the Stetson study actually provided a calculation of 800 AF/yr of deep percolation from the east, but this value was further adjusted by Stetson to account for inconsistencies in other references.

The cumulative annual groundwater demand for the properties listed above is 1,229.5 AF/yr (296.5 for nearby vineyards + 620AF/yr for the project at the former Napa Pipe site + 50 AF/yr for Syar Quarry + 263 AF/yr for the proposed vineyards at the subject property). Based on these data, the cumulative annual demand of 1,229.5 AF/yr represents about 40% of annual recharge estimated for the region.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. It is considered hydrogeologically feasible to drill and construct additional irrigation-supply water wells on the subject property. As stated above, assuming the irrigation demand for the entire 438-acre vineyard development will be met by pumping groundwater from the existing onsite well and future additional onsite wells, a total combined pumping rate from all such wells of 710 gpm (at 75% operational use for 16 weeks of irrigation each year), or up to 1060 gpm (at 50% operational use for 16 weeks each year) will be necessary.

2. A pumping test was performed in the existing onsite Well No. 1 to help determine the long-term operational pumping rate of this well, and to also help determine important aquifer parameters so that theoretical water level changes in the aquifer system due to pumping could be predicted by a computer program.

   - Well No. 1 was successfully pumped at a constant rate of 258 gpm and for a continuous period of 72 hours; a maximum drawdown of 28.1 ft was created in this well by virtue of this pumping. Hence, the well has a specific capacity of about 9.2 gpm/ft ddn. In our experience, this is a relatively high specific capacity for a well constructed into the Sonoma volcanics in this area of the Napa Valley.

   - Transmissivity, an important aquifer factor, was determined to be on the order of 29,000 gpd/ft. This value is reasonable for the fractured volcanic rock aquifers into which Well No. 1 was constructed.

   - Water level monitoring before and after the pumping portion of the subject pumping test revealed a slow, constant rate of water level decline in the region. This decline is typical for fractured volcanic rock aquifers. During the summer months, when groundwater recharge is limited and groundwater extractions for irrigation-supply are occurring, water levels typically tend to decline, as shown by the regional water level decline noted in the water level data collected during the pumping test performed for this project. However, precipitation during winter months will recharge the aquifers, and a period of water level increase will occur due to recharge to the local aquifers from precipitation.

3. Assuming that additional onsite wells will be constructed in the future, RCS further estimates that each new well will have an operational pumping capacity in the range of ±50 to ±250 gpm. Therefore, to meet the maximum 1100 gpm demand (at 50% operational use for 16 weeks), it is evident that several additional wells will be needed. Again, the number of new wells will depend on the long-term operational rate of each future well that is determined after it has been drilled and tested.

4. The groundwater quality of existing and future onsite wells is expected to be suitable for irrigation-supply purposes.

5. As shown on Table 1, theoretical water level drawdown impacts from pumping Well No. 1 were calculated to estimate the potential offsite impacts of pumping Well No. 1. That analysis showed, after a period of continuous pumping for 16 weeks (112 days, a typical vineyard irrigation season) and at a pumping rate of 258 gpm, that a maximum of about 10 ft of water level decline would be theoretically predicted by the model in the nearest offsite well owned by others. Further, theoretical water level declines at the former Napa Pipe site and the Syar well were predicted by the model to be 4.6 ft and 4.2 ft, respectively.

   It is important to note that all of these computer-generated theoretical drawdown values are very likely overestimated. Due to the heterogeneous nature of volcanic rock aquifers, and assumptions about the aquifer that are inherent in the PUMPIT software, theoretical values typically do not match real world conditions. Further, based on our considerable experience in performing pumping tests and determining theoretical drawdown values for many other wells constructed in the Sonoma Volcanics, the theoretically-derived water level drawdown values have typically overestimated the actual water level drawdowns monitored in observation wells surrounding other pumping wells. Hence, under real world pumping conditions, the actual drawdown caused by Well No. 1 will likely be less than the theoretical values shown on Table 1. In addition, for the purposes of making theoretical predictions, Well No. 1 was assumed to be pumping at 258 gpm and for a continuous duration of 112 days. RCS recommends that existing and future onsite wells should never be pumped for such an extended period of time. Also, depending on the numbers of wells constructed at the subject property, the 258-gpm pumping rate may be higher than the normal operational pumping rate for Well No. 1 in the future.

6. The long-term average annual rainfall recharge that occurs within the volcanic rocks that exist solely beneath the boundaries of the subject property is estimated to be 324 AF/yr, whereas the irrigation demand for the proposed vineyards is 263 AF/yr. Hence, the irrigation demand represents about 81% of the average annual groundwater recharge that may occur solely into the volcanic rocks that lie beneath the boundaries of the subject property. Clearly this recharge volume is sufficient to supply the proposed vineyards on a long-term average annual basis.

7. Our estimate of groundwater in storage solely within the volcanic rocks beneath the subject property is 10,757 AF. Hence the total water demand for the proposed vineyards of 263 AF represents less than 3% of the current groundwater in storage.

8. The southern narrow tip of MST area boundary, at its closest point to the subject property, is roughly 1 mile northwest of the northwesternmost corner of the property boundary; hence, the subject property is NOT within the MST area. Further, groundwater declines in the MST area are long standing, and are related to the site specific geologic conditions within the MST. Geologic materials within the MST consist mainly of ash-type geologic deposits, and as such, these deposits have poor recharge capabilities. In contrast, geologic materials beneath the subject property consist of fractured, hard, volcanic flow rocks, which have a greater ability to transmit groundwater to a water well. Hence, the subject property and the MST area have different hydrogeologic characteristics, and are hydraulically not connected.

9. Cumulative impacts of the subject property were assessed using two different definitions of the cumulative impact area. RCS defined the cumulative impact area as the vineyards east of Hwy 121 and west of the subject property, as shown on Figure 5. In the Draft Groundwater Report (Stetson 2009) for the former Napa Pipe site, the cumulative area is shown to include the above-mentioned vineyards, the former Napa Pipe site, and the Syar Quarry.

   For the RCS cumulative impact area, long-term average the recharge estimated to occur in the volcanic rocks (within the defined cumulative impact area, see Figure 5) is 689 AF/yr, whereas the estimated cumulative groundwater demands for the subject property (263 AF/yr) and the vineyards west of the subject property and east of Hwy 121 (296.5 AF/yr) are a combined total of 559.5 AF/yr. Hence the estimated cumulative demand represents about 81% of the estimated recharge in the area on an average annual long-term basis. This recharge estimate is considered to be conservative. Earlier work in the area (Robert Mondavi Properties Vineyard DEIR, EDAW 2004) shows a much higher percentage of recharge potential from rainfall than the 10% assumed by RCS for the vineyard properties west of the subject property and east of Hwy 121.

   RCS does not include the former Napa Pipe site or the Syar Quarry within our cumulative impact analysis. However, in order to be consistent with the analysis in the Draft Groundwater Report for the former Napa Pipe site, the cumulative water demand impacts of the former Napa Pipe site, the Syar Quarry site, the vineyard areas west of the subject property (but east of Hwy 121) and the subject property were evaluated by RCS. As reported in the Draft Groundwater Report (Stetson 2009) for the former Napa Pipe site, a majority of the groundwater available for that project is from subsurface underflow from the north of that project (2,700 AF/yr); that report also assumed only about 400 AF are derived from recharge in the volcanic hills east of the Napa Pipe site, for a combined total of 3,100 AF/yr. To present a conservative estimate, RCS assumed that neither the subject property nor the vineyards east of Hwy 121 and west of the subject property benefit from subsurface underflow from the north. Cumulative impacts of the former Napa Pipe site, the Syar Quarry, and the vineyard areas (including the subject property) are estimated to be 1,229.5 AF/yr, roughly 40% of the 3,100 AF/yr estimated to be available in the cumulative impact area developed for the proposed project at the former Napa Pipe site.

Recommendations

1. RCS recommends that a groundwater monitoring plan be implemented at the subject property. Such a plan will be valuable due to the known highly variable nature of volcanic rock aquifers which tends to increase the likelihood that real world conditions during normal operation use of existing and future onsite wells could vary from the estimates and predictions set forth in this report. This monitoring plan should consists of:

   - Water level monitoring in the existing and all future onsite wells. At a minimum, water level should be monitored using an electric tape water level device at a minimum of one measurement per month, and more frequently during the irrigation season. Preferably, an automatically-recording pressure transducer should be used in each onsite well to collect water levels on a 15-minute frequency throughout the year.

- Dual reading flow meters with totalizer dials should be installed at each wellhead, and readings of total pumped groundwater should be collected on a monthly basis at a minimum. This will enable the vineyard owner and managers to determine the volume of groundwater pumped by each well during each irrigation season.

- All generated field data should be reviewed on a semi-annual basis at a minimum by a qualified professional groundwater geologist. Based on the data, the geologist can work with vineyard personnel to modify or develop new pumping scenarios and/or durations to help manage and protect the wells and the local groundwater resources.

- The collected water level data can also be reviewed for possible trends overtime, which will help to determine the cumulative impacts, if any, to the local aquifer systems encountered by the onsite wells and the nearby offsite wells.

- From an operation and maintenance perspective, the groundwater monitoring plan and the technical analyses will also help to determine when a specific well is in need of rehabilitation. Then, necessary rehabilitation work can be planned during the non-irrigation season, when such wells are not being actively pumped.

2. All future wells for the subject property shall be constructed within the Sonoma Volcanics. Drilling exploration within the rocks of the Markley Formation, the Nortonville shale, or the Great Valley Sequence will not be feasible. Further, development of groundwater resources should initially be focused on the northwestern portion of the subject property. Advantages to developing groundwater resources in the northwestern area are as follows:

   - The Sonoma Volcanics in this region may exhibit the greatest thickness beneath the subject property. As shown on the Figure 4A geologic map, the Sonoma Volcanics do not exist in the southern one-fourth of the subject property.

   - Testing of Well No. 1, in addition to data from nearby wells, suggests that each new well constructed in this area could potentially produce groundwater at rates on the order of ±50 gpm to perhaps as high as 250 gpm.

   - An anticline (geologic fold) is shown on the geologic map. This may suggest that rock fracturing in the area is high, increasing the chances for each new well in the area to intercept numerous, open and interconnected fractures in the rocks.

3. Potential problems that may be encountered during drilling within the Sonoma Volcanics are:

   - Fracture systems in volcanic rocks are highly variable. The degree of fracturing and interconnection of the various fractures and joints can change over short lateral distances. Due to this degree of variability, a new well could have the potential problem of not intercepting sufficient water-bearing fractures to provide groundwater to a new well in useable quantities for the proposed project.

- If the volcanic rocks at the drill site are highly fractured, difficulties with borehole stability may be encountered and down-hole caving could occur when using the air rotary drilling method. Such problems can be overcome by changing-over the drilling method to direct (mud) rotary.

4. Figure 9, “Recommended Well Location Map” provides the locations for the drilling of the initial three new boreholes, ranked in priority order. Once these three boreholes are fully constructed and tested, and a long-term operational pumping rate for each well is determined, then additional well sites can be selected, drilled and tested as needed.

   The target depth for the pilot boreholes at Sites A, B and C is a minimum of 800 ft. Future wells may have slightly different target depths depending on the location of the borehole on the subject property. Although the anticipated thickness of the Sonoma Volcanics in the northwestern area of the property could be as great as ±1000 ft, the pilot borehole at each well site should not be drilled deeper than the base of the Sonoma Volcanic rocks, if that horizon is encountered during drilling.

   Drilling of each new well should be attempted using direct air-rotary drilling methods. By using such methods, the driller can observe the depths to and possible amounts of groundwater inflow rates into the pilot borehole as drilling proceeds. In addition, this drilling method enables representative drill cuttings to be collected and to be subsequently evaluated by the geologist. Hence, the borehole can be made shallower or can be deepened depending on the results of airlift pumping in that open pilot borehole. On the other hand, if anomalously poor results are encountered, then the borehole can be backfilled and destroyed without incurring the extra expense of reaming the hole and installing well casing and gravel pack.

   A drill rig could likely reach any area of the property, although some light grading and road work may be required. Drill rig access to the higher elevations on steep roads may be difficult in rainy weather.

5. Following drilling, a geophysical electric log (e-log) and a caliper log should be performed in the open borehole.

6. Final requirements for constructing, developing and testing each new well shall be provided following completion of the pilot borehole, and after a decision has been made to complete that borehole with well casing.

   Based on results of the pilot borehole drilling (geologic log of cuttings, drilling penetration rates, the observed rates and depths of groundwater inflow into the pilot hole), a decision can then be made to either ream out and complete the borehole into a new well or to destroy the new borehole (if insufficient groundwater is encountered in this pilot borehole).

Under no circumstances should fluids generated during drilling or testing be allowed to flow offsite, or into Suscol Creek. All fluids generated during well drilling and testing must be contained onsite or hauled offsite.

Either 6-inch or 8-inch diameter PVC casing can be utilized for each new well, depending on the groundwater inflow data estimated by the driller during the pilot borehole drilling process.

All new wells constructed at the subject property should be fitted with a 1-inch diameter PVC sounding tube when the permanent pumps are installed. This will greatly facilitate future monitoring of water levels, and will also permit the installation of a water level transducer to automatically record groundwater levels in the future.

7. Wells constructed in the future at the subject property are intended for irrigation-supply use only. However, each new well, should be constructed with an adequate cement sanitary seal (at least 50 ft in length) to permit usage in the future, if needed, for both domestic and irrigation usage. Further, a deep sanitary seal will also help isolate each new well from shallow groundwater sources such as springs and seeps. Note that Well No. 1 was provided with a 150-foot deep cement seal.

8. Based on the available water quality data obtained from onsite Well No.1, as well as that from nearby offsite wells, groundwater produced from the local fractured rock aquifer(s) will likely be capable of meeting the needs of onsite irrigation uses without treatment. Water quality testing should be performed after each well is constructed, however, to verify the water quality.

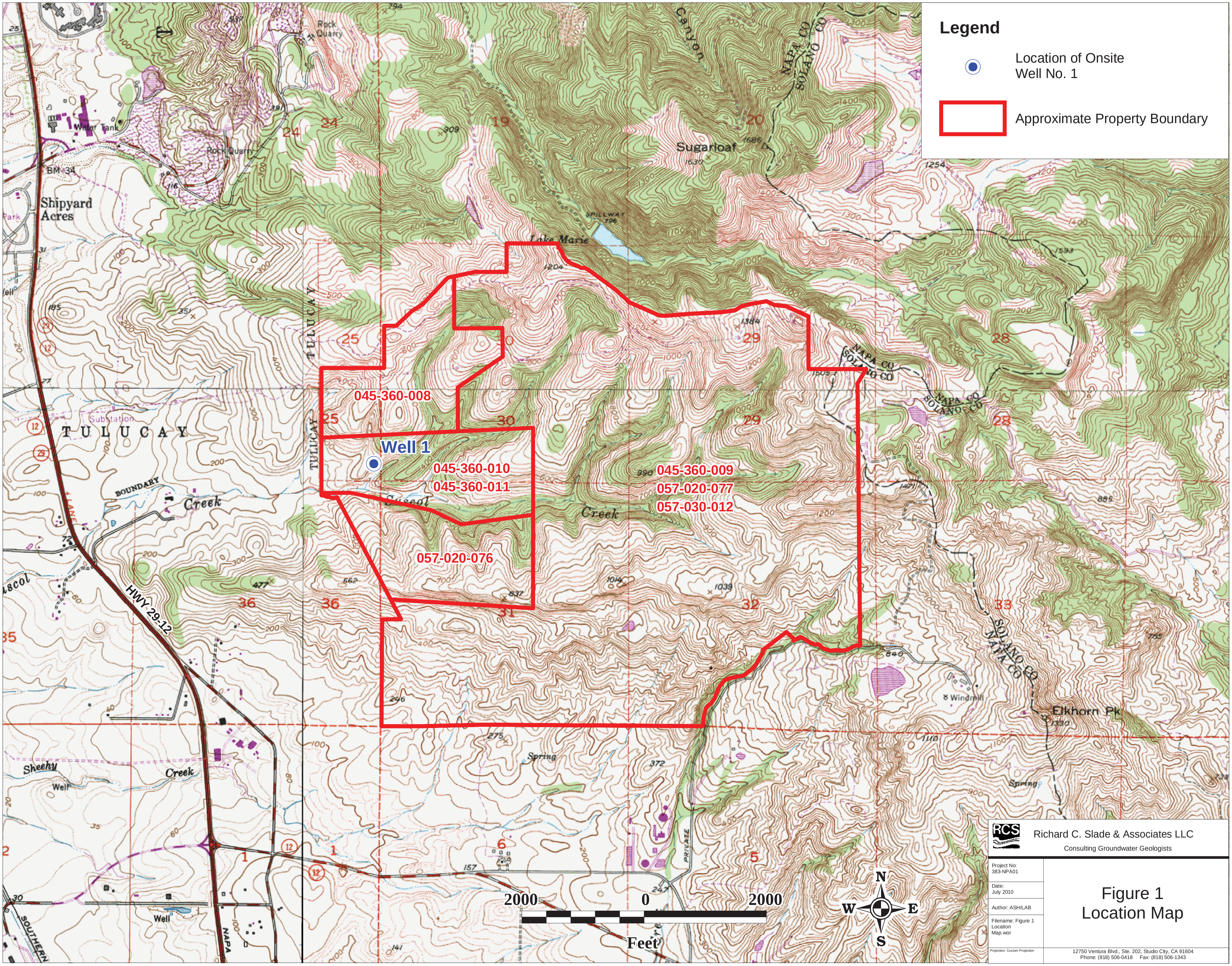

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Figure 1
Location Map

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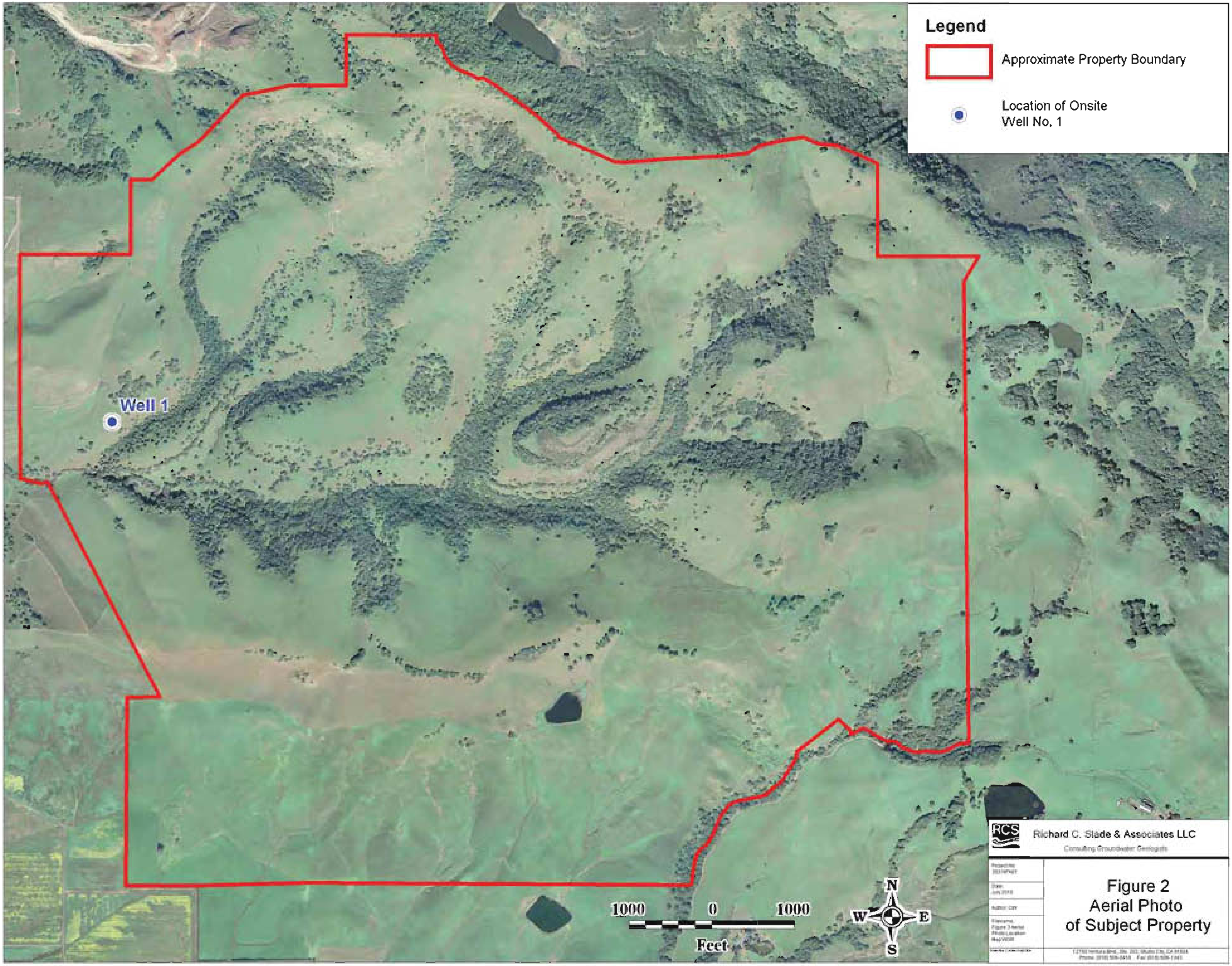

Figure 2
Aerial Photo
of Subject Property

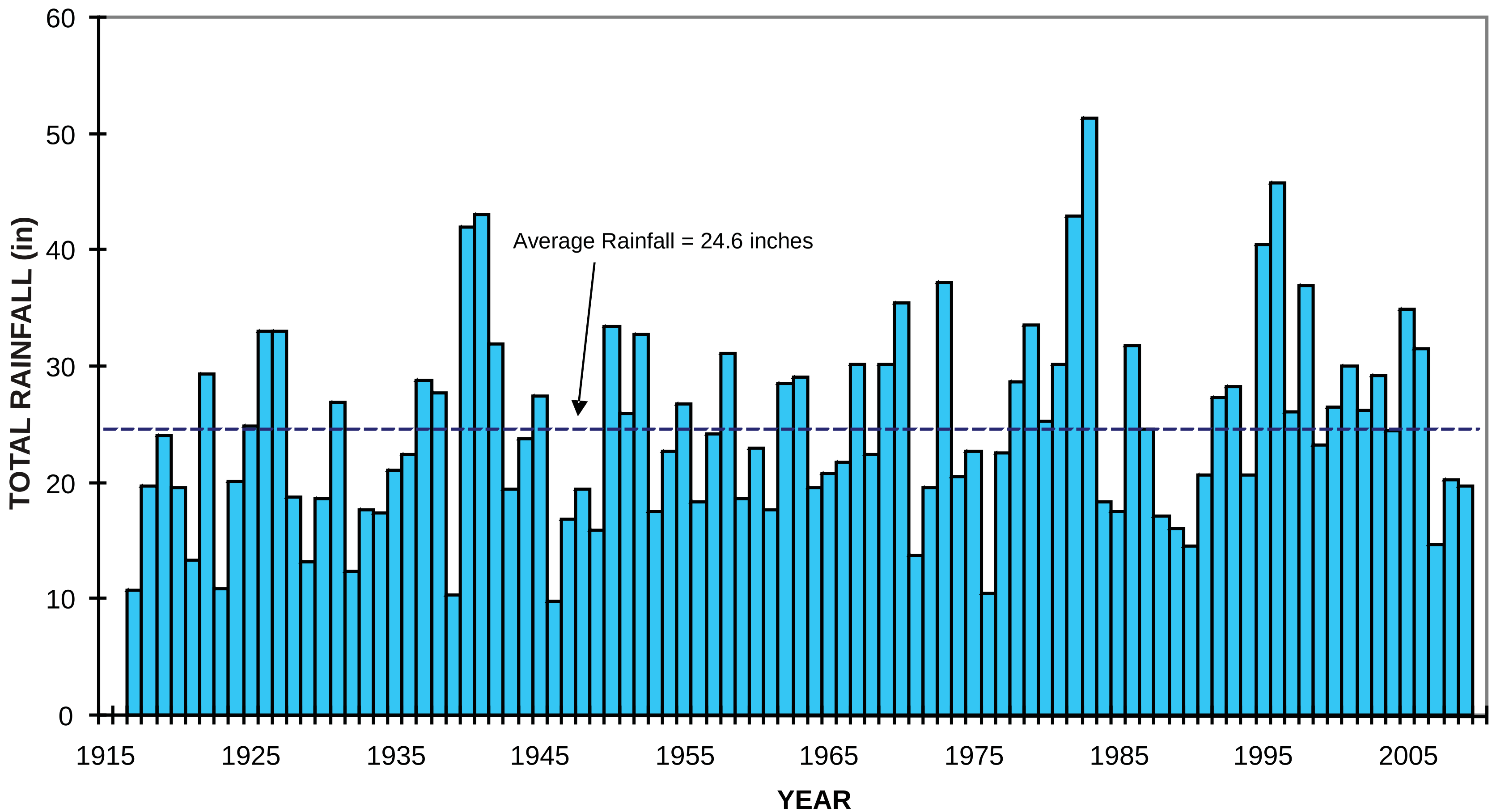

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FIGURE 3A
YEARLY RAINFALL FOR
NAPA STATE HOSPITAL RAIN GAGE NO. 046074

Job No. 383-NPA01 **July 2010**

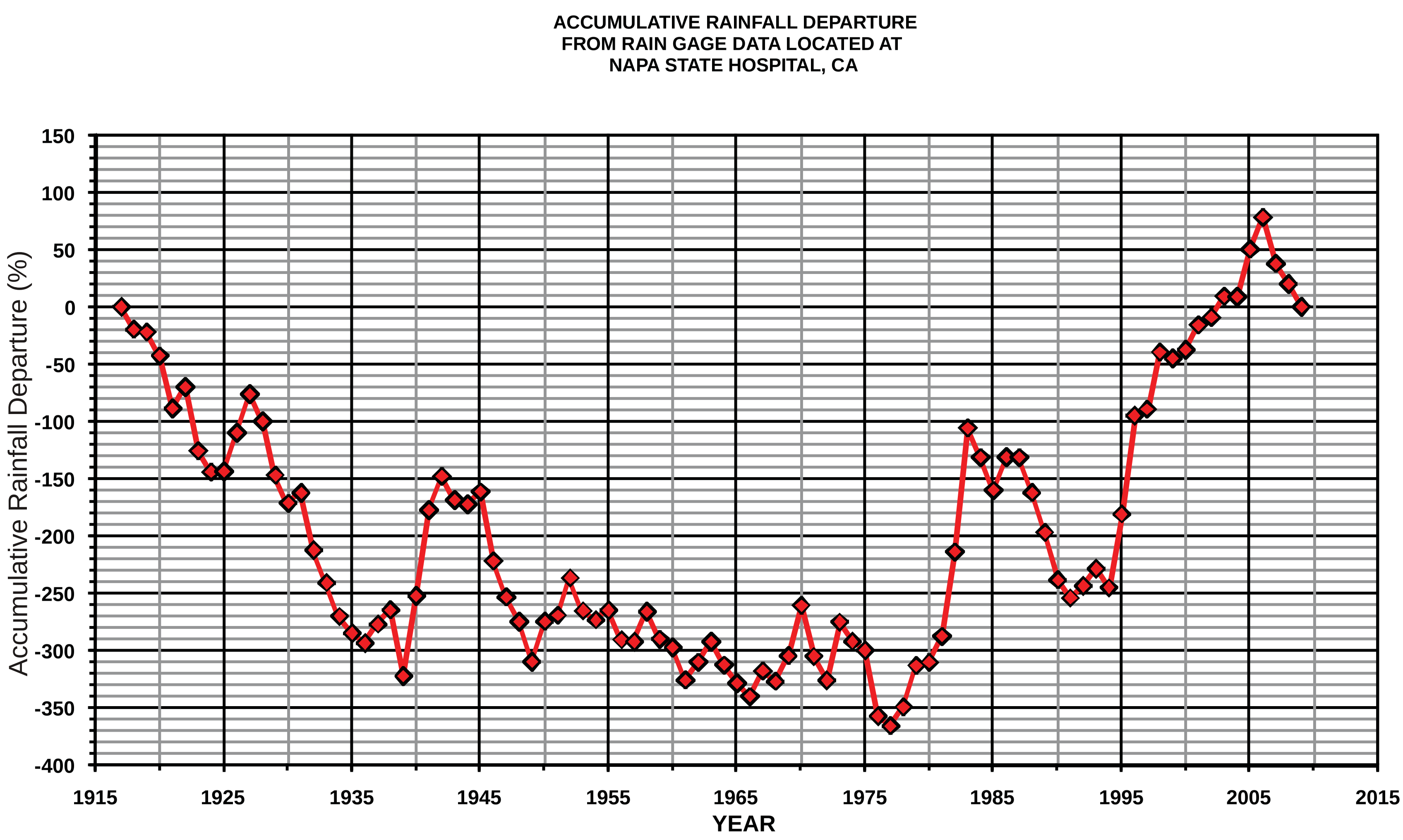

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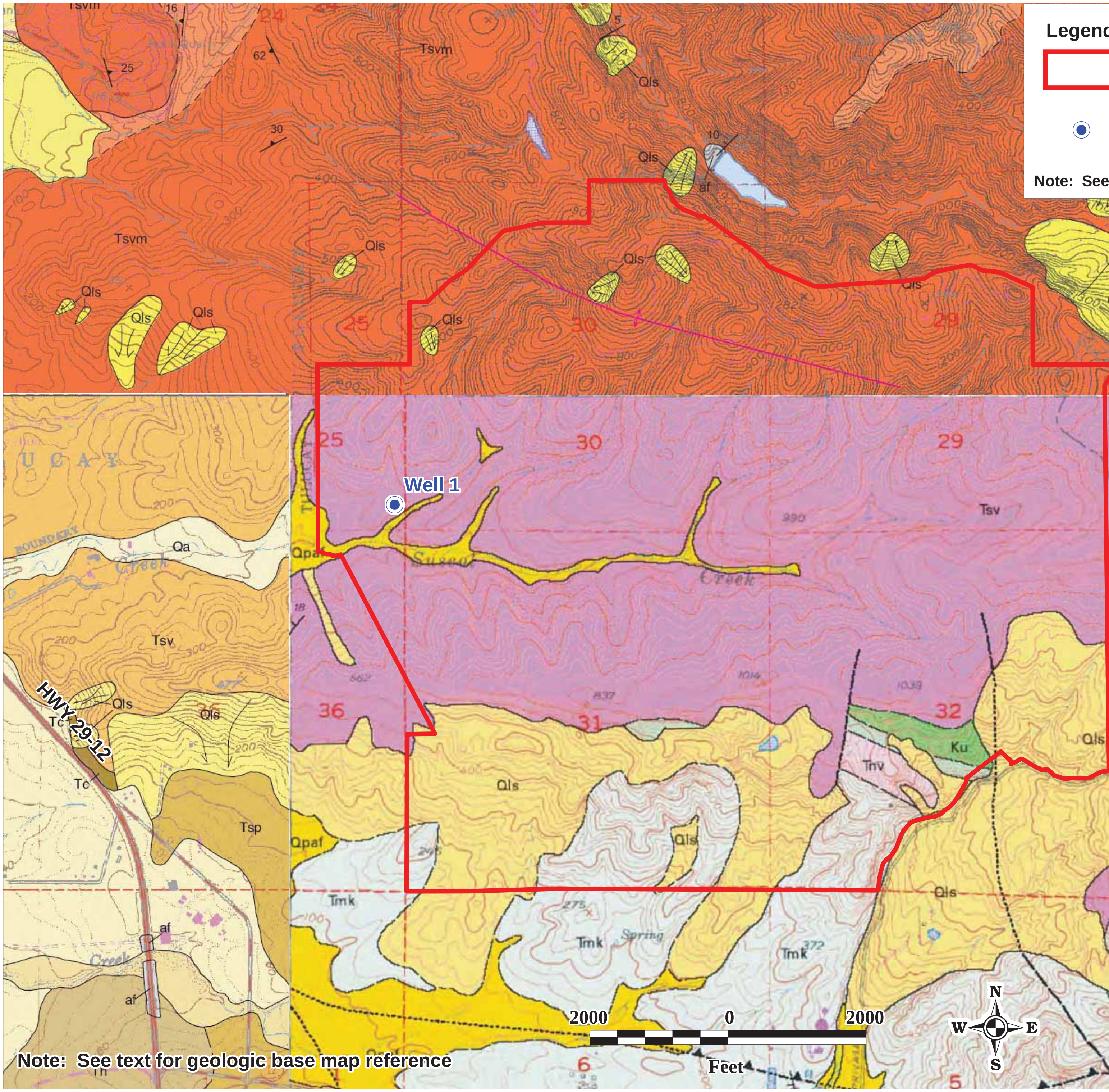
FIGURE 3B
CUMULATIVE RAINFALL DEPARTURE CURVE

Job No. 383-NPA01

July 2010



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Project No: 383-NPA01
Date: July 2010
Author: CW/LAB
Filename: Figure 4A Geology Map.wor
Projection: Custom Projection

Figure 4A Geology Map

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Qa Alluvium, undivided (latest Pleistocene to Holocene) - Flat, relatively undissected fan, terrace, and basin deposits.

Qls **Landslide deposits (Pleistocene and/or Holocene)** —Poorly sorted clay, silt, sand, and gravel. Only large landslides have been mapped. For a more complete map of landslide deposits, see Nilsen and others (1979) and Ellen and Wieczorek (1988).

Qpaf **Alluvial fan and fluvial deposits (Pleistocene)** —Brown, dense, gravely and clayey sand or clayey gravel that fines upward to sandy clay. These deposits display variable sorting and are located along most stream channels in the county. All Qpaf deposits can be related to modern stream courses. They are distinguished from younger alluvial fans and fluvial deposits by higher topographic position, greater degree of dissection, and stronger soil profile development. They are less permeable than Holocene deposits, and locally contain fresh water mollusks and extinct late Pleistocene vertebrate fossils. They are overlain by Holocene deposits on lower parts of the alluvial plain, and incised by channels that are partly filled with Holocene alluvium on higher parts of the alluvial plain. Maximum thickness is unknown but is at least 50 m.

Th Huichica Formation (Pliocene). Fluvial gravel, sand, silt, and clay. Sediments are derived mostly from the Sonoma Volcanics. A tuff interbed yields a K/Ar date of 4.09 + 0.19 [Andre Sarna, written communication, 1981, reported in Kelly (1982)].

Tsv Sonoma Volcanics, undivided (Pliocene). Basalt to rhyolite flows, agglomerates, and tuffs.

Tsvm Mafic flows and breccias - Basalt, basaltic andesite and andesite flows and breccias, interbedded with volcanic agglomerate and tuff.

Tmk **Markley Formation (Eocene)** —Mainly buff weathering, white to light-gray, quartz-mica sandstone. Characterized in many places by including small to large plates of white mica (up to several mm). In places, the sandstone includes carbonized plant debris and other carbonaceous material. This unit also includes white or brown weathering, brown or dark-gray, foraminifer- and diatom-bearing mudstone and sandy mudstone. In the mapped area, this formation also includes, mapped locally:

Tnv **Nortonville Shale (Eocene)** —Gray-weathering, brown shale. Also contains thin beds of fine-grained, dark-gray, quartz-lithic-glauconitic sandstone. This unit pinches out in the area north of American Canyon.

Tc Capay Shale (Eocene). Grayish-brown sandy shale.

Ku **Great Valley Sequence:**
Undivided sandstone and shale (Early and Late Cretaceous) — Interbedded carbonaceous-biotite wacke, white-mica-carbonaceous sandstone, greenish-gray mudstone and shale, laminated fine-grained sandstone and gray shale, carbonaceous siltstone, black shale, and fine-grained mica wacke. Locally includes hard, laminated, clean, white, quartz-lithic-biotite sandstone and fossil-hash gritstone. This unit contains foraminifers of both Albian and Campanian age in the mapped area.

Contact between map units - Solid where accurately located, dashed where approximately located, dotted where concealed.

Fault - Solid where accurately located, dashed where approximately located, dotted where concealed.

Axis of anticline

Landslide - Arrows indicate principal direction of movement.

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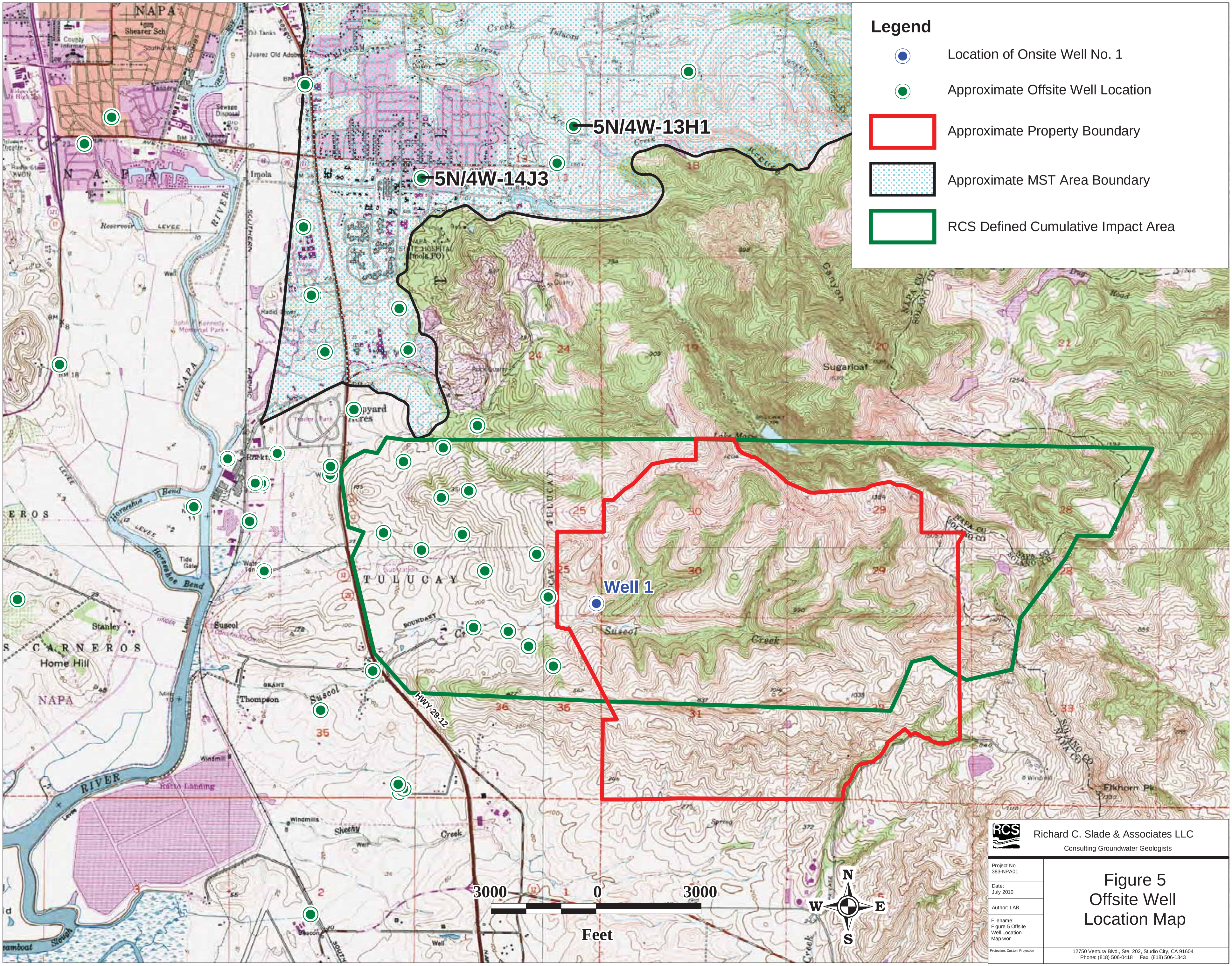
Note: This geologic legend is a composite legend created from the four base maps used to create the Figure 4A Geology Map. For base map reference information please refer to the text of the report.

Figure 4B
Geologic Map Legend

Job No. 383-NPA01 **July 2010**



Legend
Location of Onsite Well No. 1
Approximate Offsite Well Location
Approximate Property Boundary
Approximate MST Area Boundary
RCS Defined Cumulative Impact Area
5N/4W-13H1
5N/4W-14J3
Well 1
HWY 29-12
TULUCAY
NAPA
Sugarloaf
Suscol
Creek
Home Hill
CARNEROS
RIVER
Imola
3000
0
3000
Feet
N
W
E
S
Richard C. Slade & Associates LLC
Consulting Groundwater Geologists
Project No: 383-NPA01
Date: July 2010
Author: LAB
Filename: Figure 5 Offsite Well Location Map.wor
Figure 5
Offsite Well
Location Map
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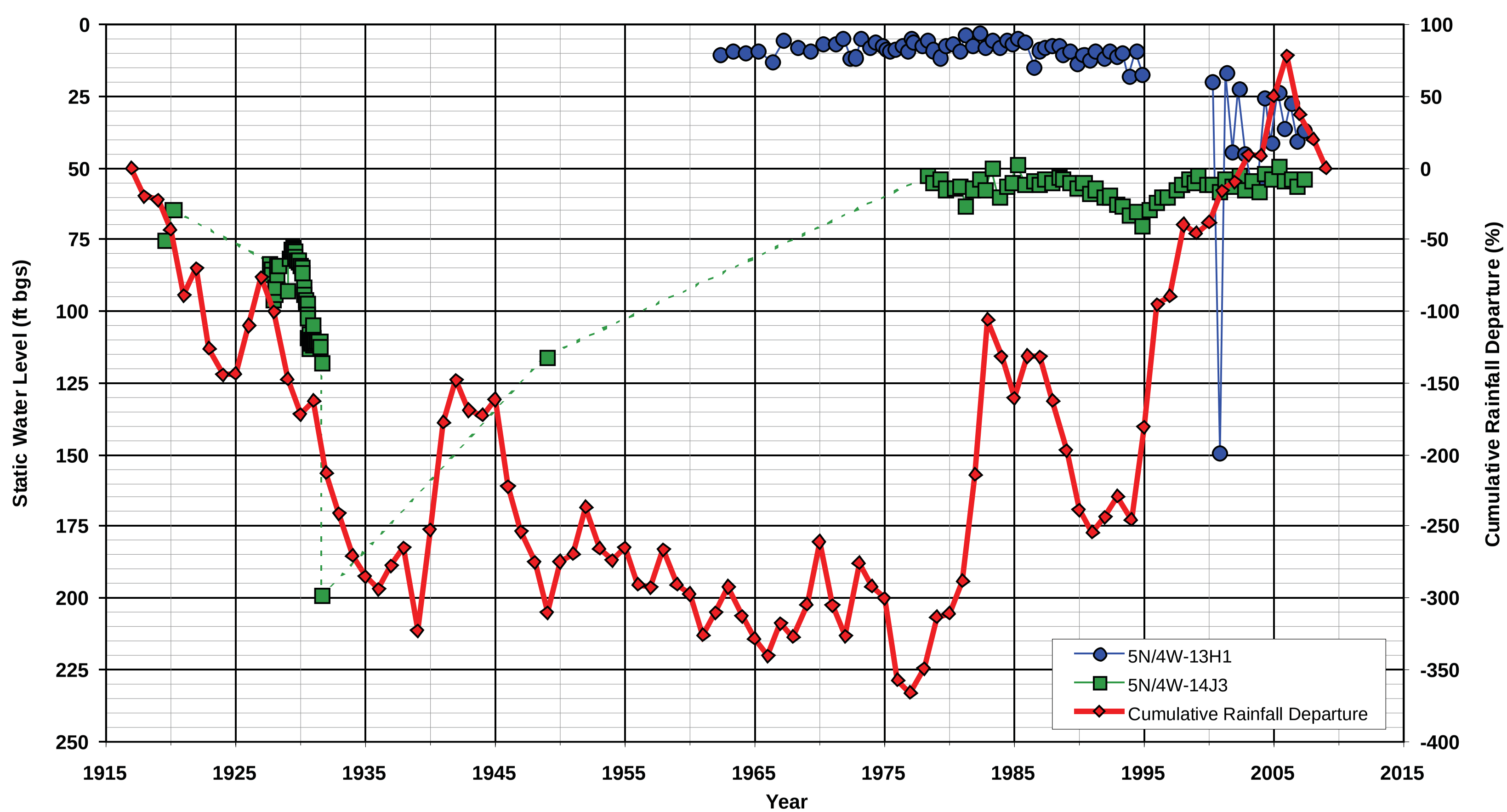
Phone: (818) 506-0418 Fax: (818) 506-1343



ft bgs - ft below ground surface

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FIGURE 6
HISTORIC WATER LEVEL DATA

Job No. 383-NPA01 **July 2010**

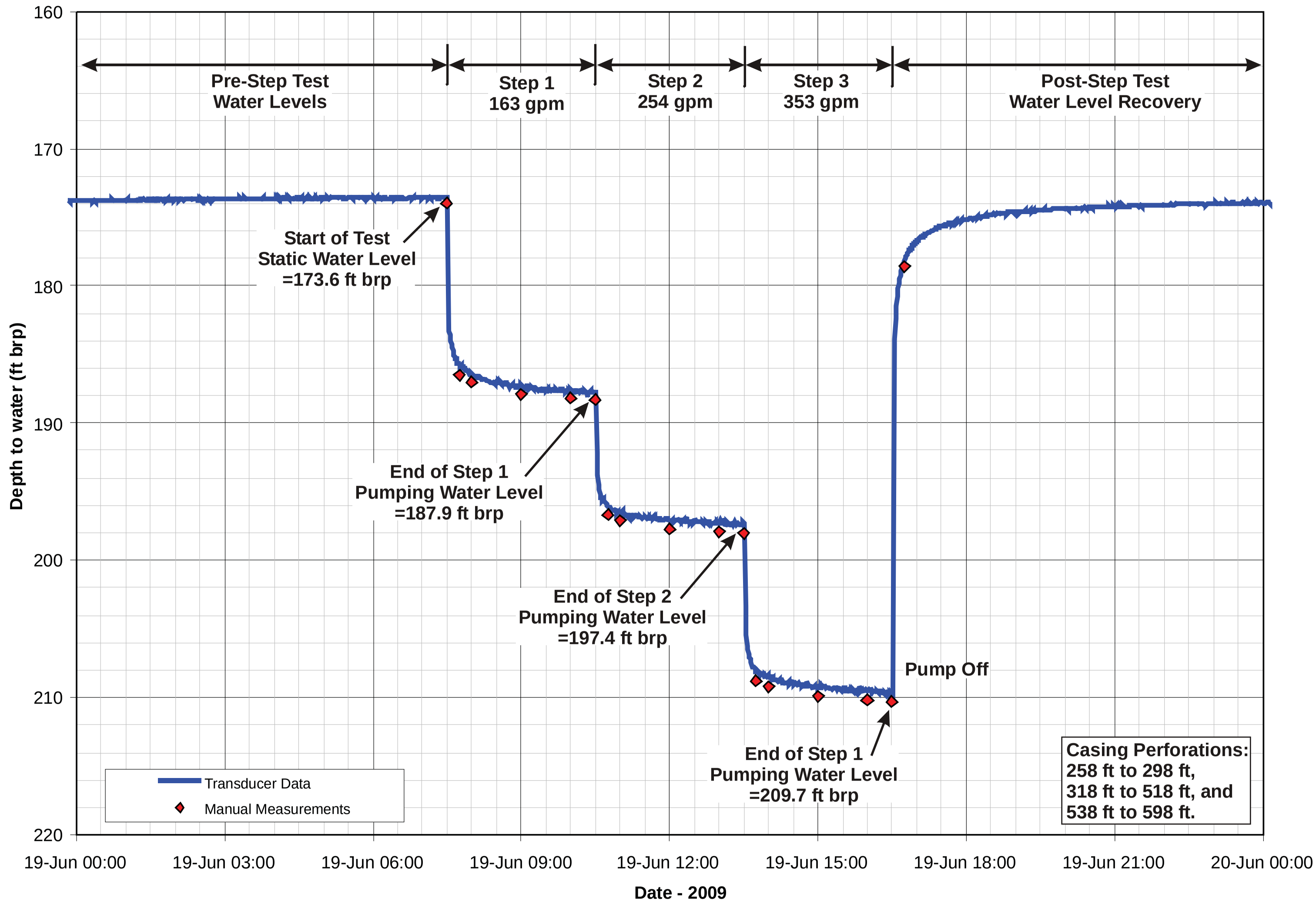

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FIGURE 7A
STEP DRAWDOWN TEST
WELL NO. 1

Job No. 383-NPA01

July 2010

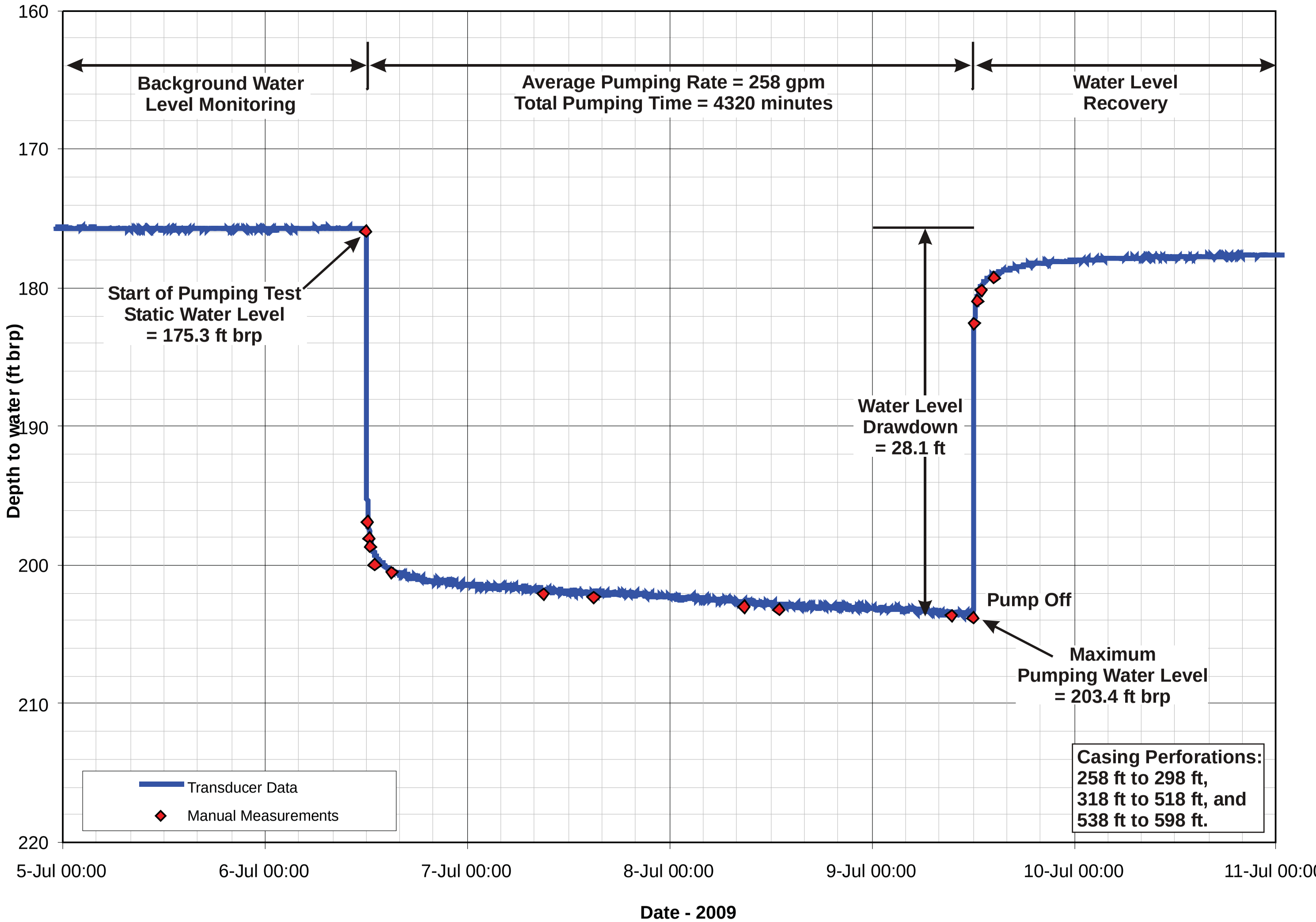

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FIGURE 7D
CONSTANT RATE PUMPING TEST
WELL NO. 1

Job No. 383-NPA01 **July 2010**

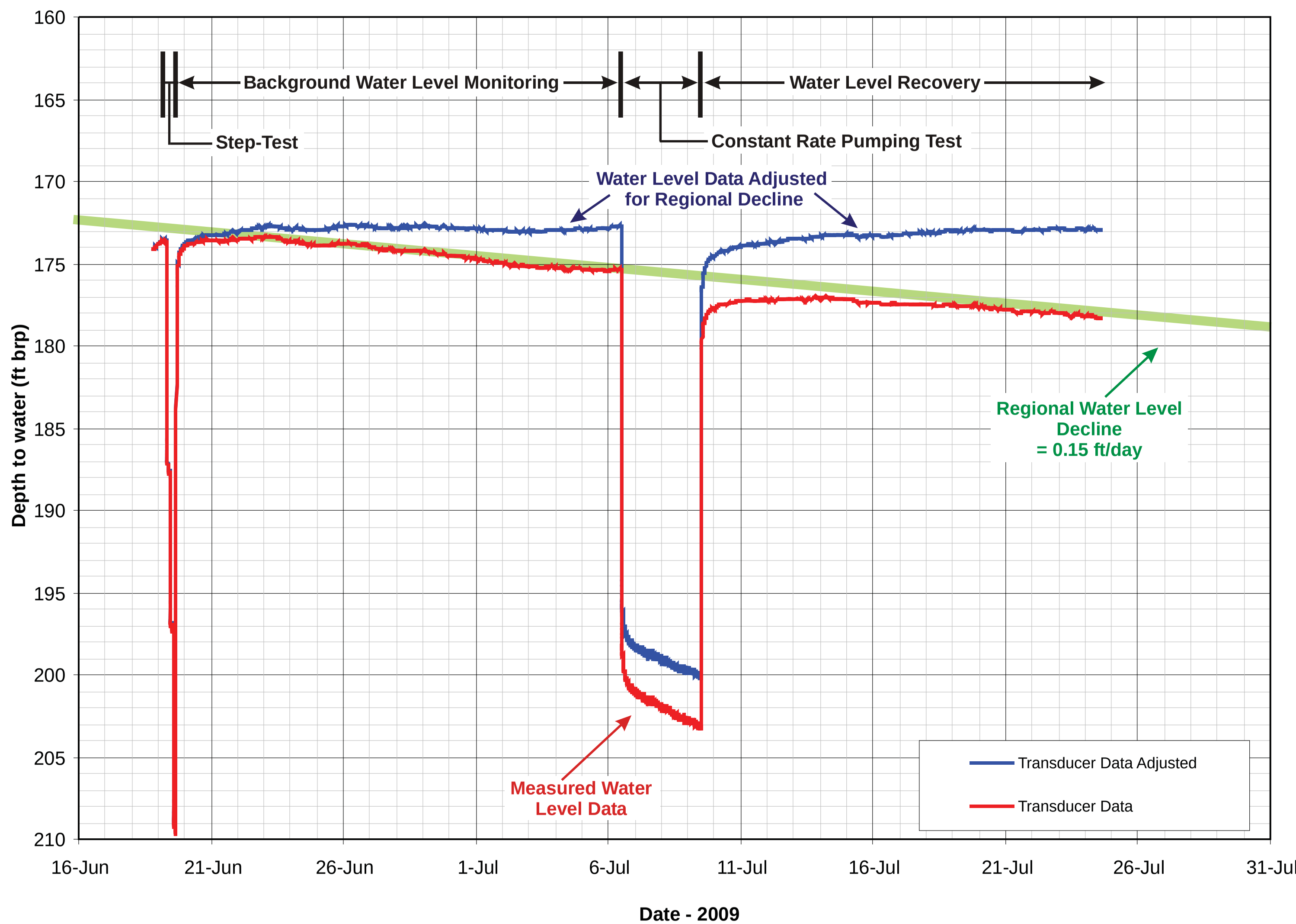

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FIGURE 7B
WATER LEVEL MEASUREMENTS
WELL NO. 1

Job No. 383-NPA01

July 2010

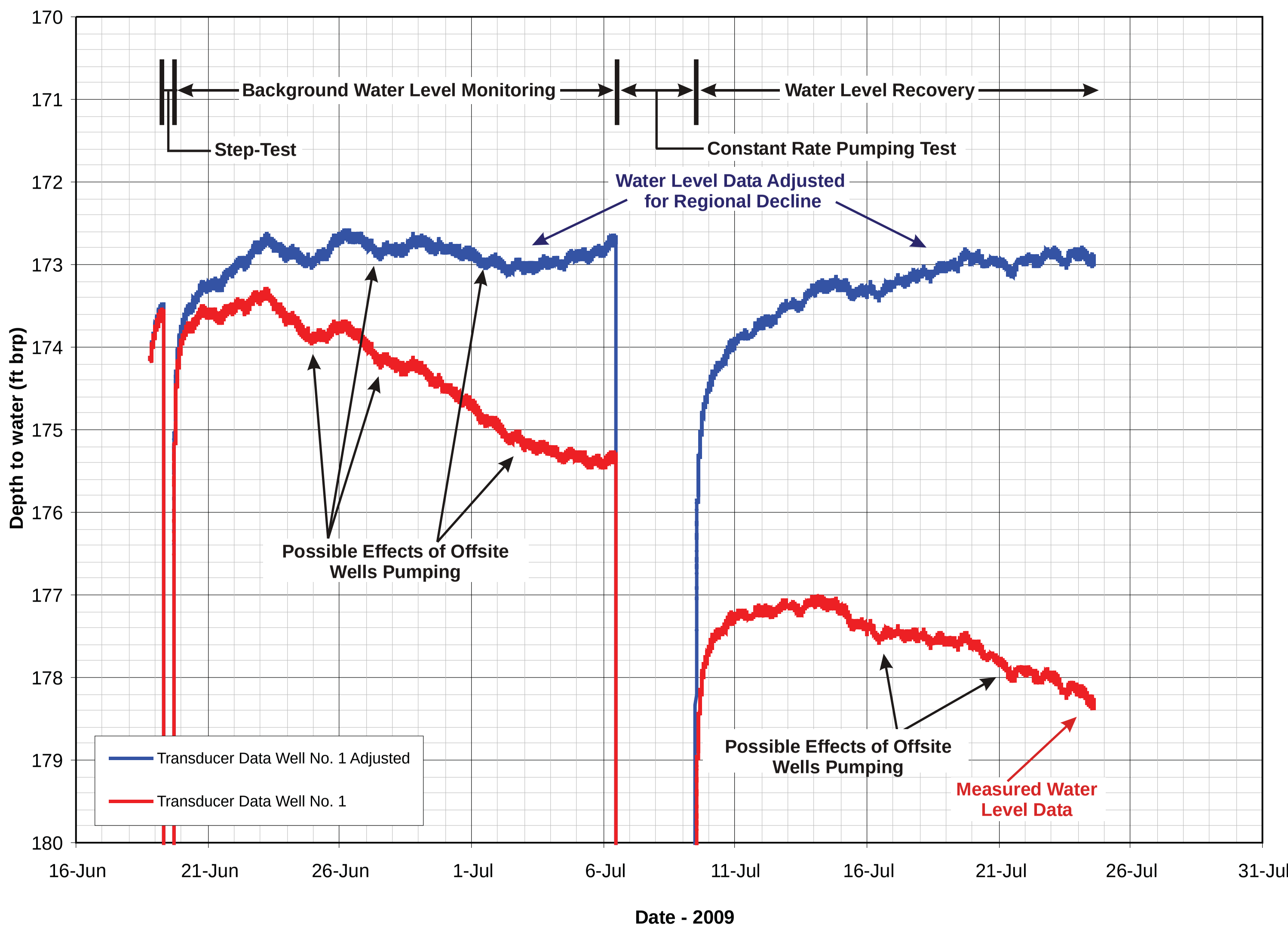

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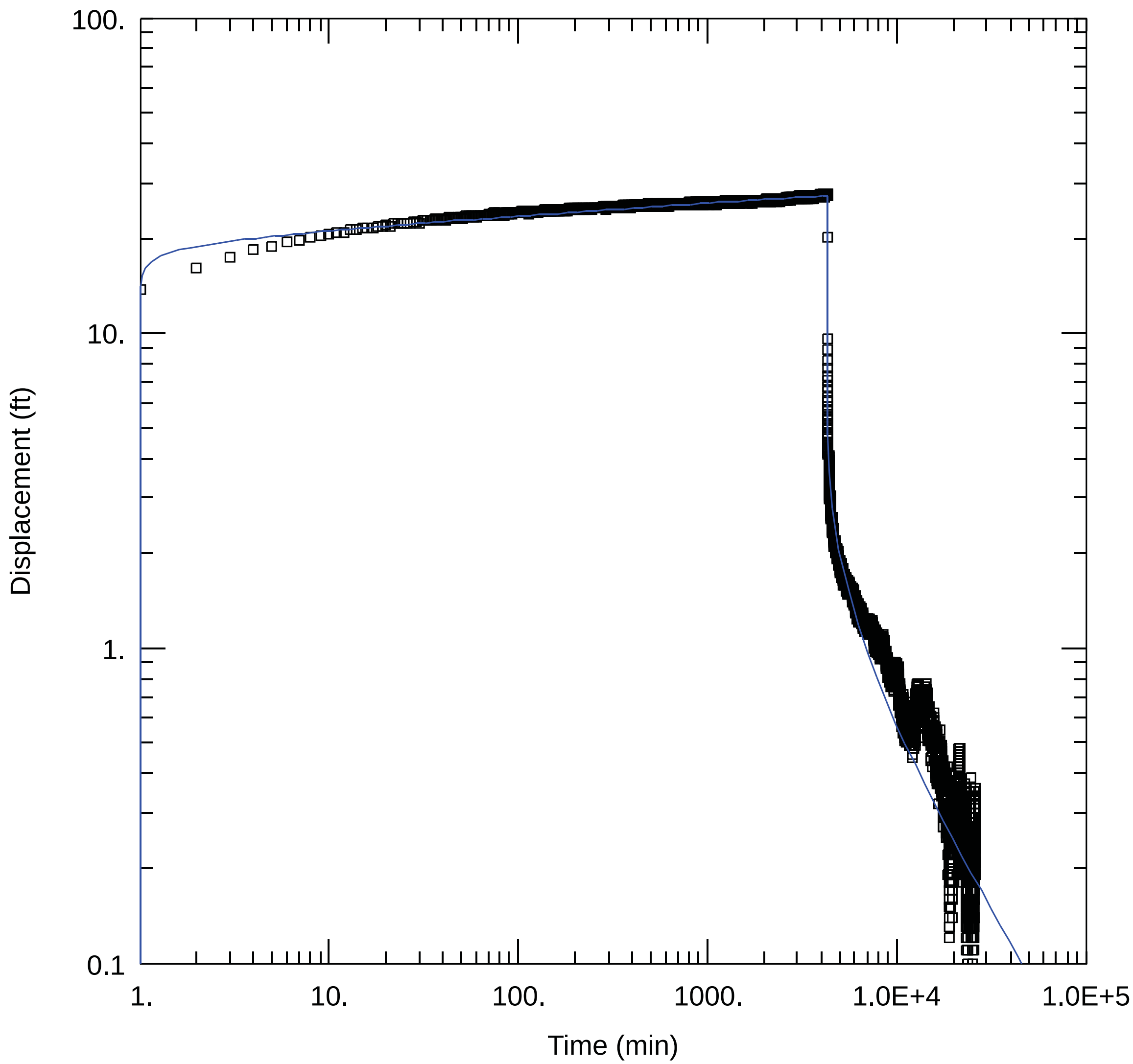
FIGURE 7C
WATER LEVEL MEASUREMENTS, SCALE CHANGE
WELL NO. 1

Job No. 383-NPA01 **July 2010**



Obs. Wells

□ Well No. 1

Aquifer Model

Confined

Solution

Theis

Parameters

T= 29,220 gal/day/ft

Test Date = July 6 to 9, 2009
(72-hour test)
Pre-Test
Static Water Level = 173.5 ft brp

Average pumping rate = 258 gpm

Graphical Solution by:
AQTESOLV Vers. 4.50 Pro
by Hydrosolve, Inc.

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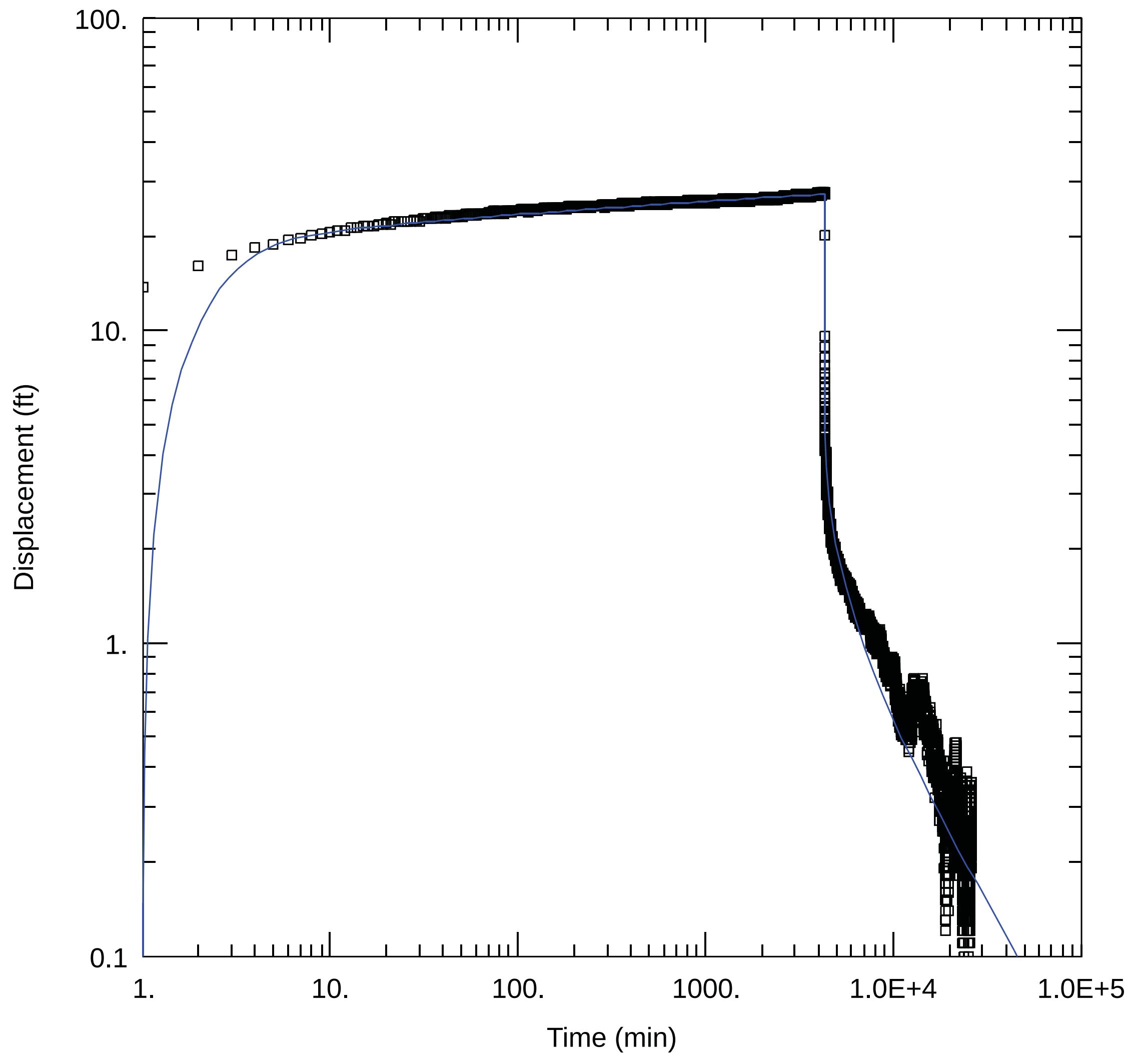
FIGURE 8A
CONSTANT RATE PUMPING TEST ANALYSIS
THEIS CONFINED AQUIFER SOLUTION
WELL NO. 1

Job No. 383-NPA01

July 2010



Obs. Wells

□ Well No. 1

Aquifer Model

Fractured

Solution

Barker

Parameters

T= 29,200 gal/day/ft

Test Date = July 6 to 9, 2009
(72-hour test)
Pre-Test
Static Water Level = 173.5 ft brp

Average pumping rate = 258 gpm

Graphical Solution by:
AQTESOLV Vers. 4.50 Pro
by Hydrosolve, Inc.

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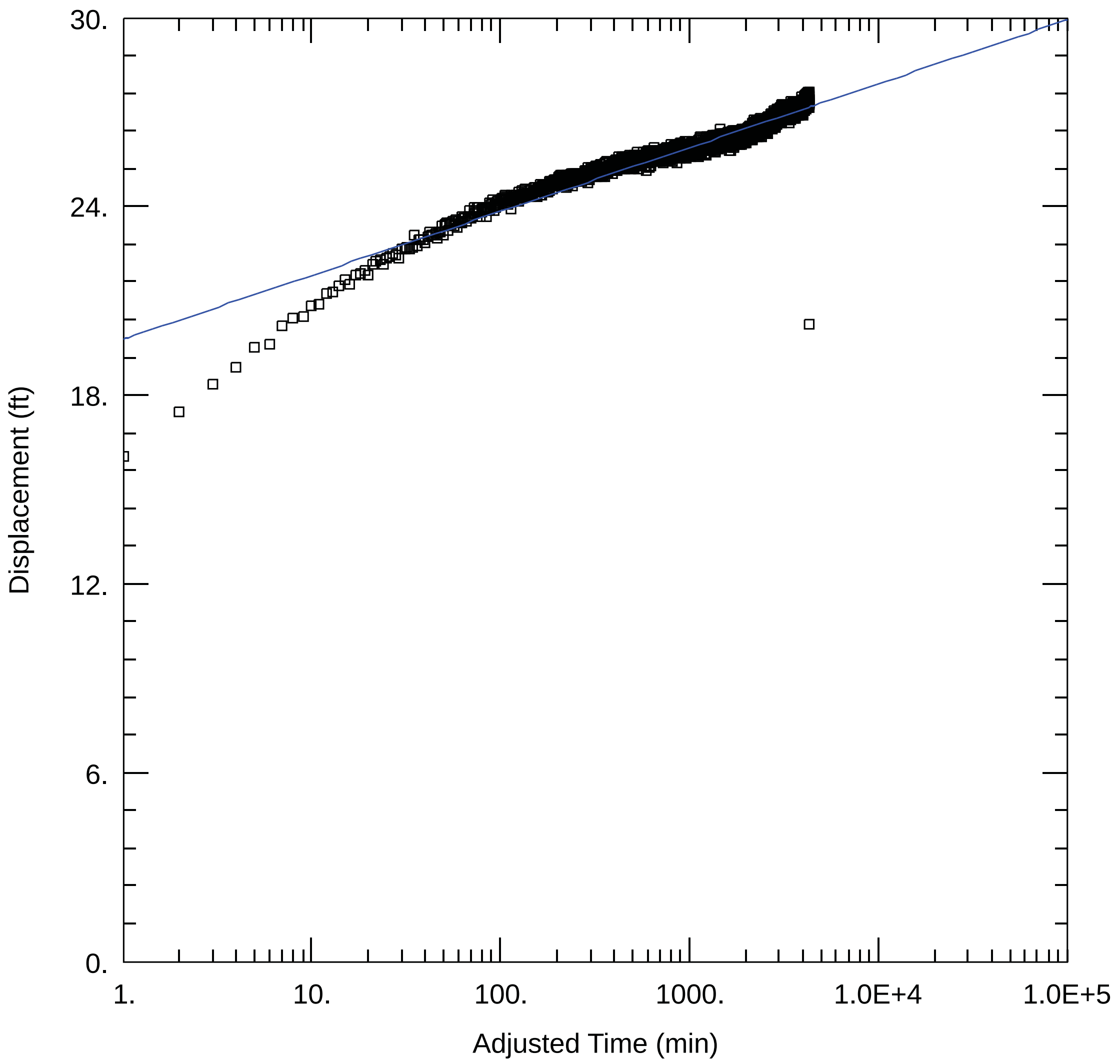
FIGURE 8B
CONSTANT RATE PUMPING TEST ANALYSIS
BARKER FRACTURED AQUIFER
WITH SPHERICAL BLOCKS
WELL NO. 1

Job No. 383-NPA01

July 2010



Obs. Wells

□ Well No. 1

Aquifer Model

Confined

Solution

Copper-Jacob

Parameters

T = 33,550 gal/day/ft

Test Date = July 6 to 9, 2009
(72-hour test)
Pre-Test
Static Water Level = 173.5 ft brp

Average pumping rate = 258 gpm

Graphical Solution by:
AQTESOLV Vers. 4.50 Pro
by Hydrosolve, Inc.

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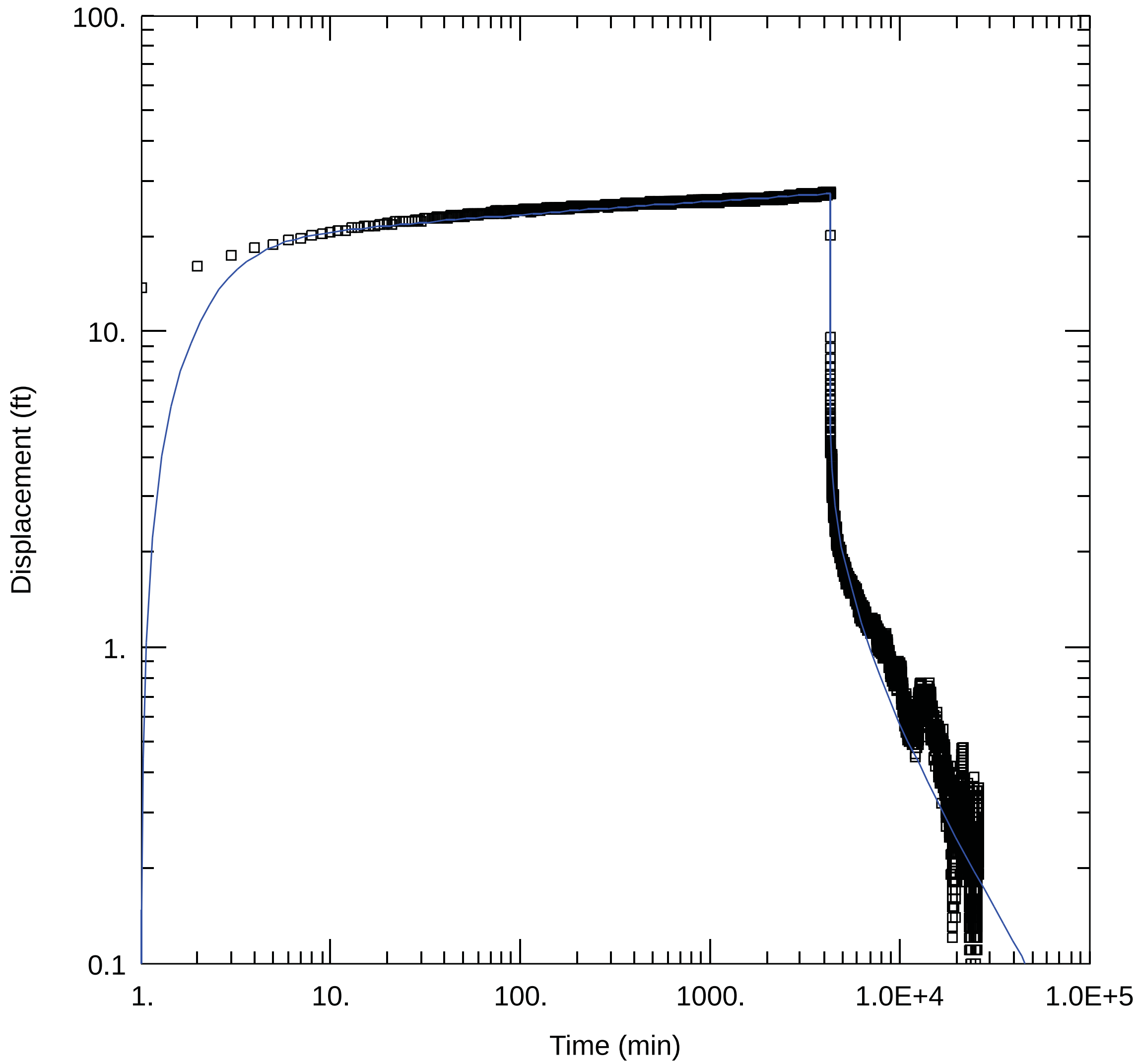
FIGURE 8C
CONSTANT RATE PUMPING TEST ANALYSIS
COOPER-JACOB CONFINED AQUIFER SOLUTION
WELL NO. 1

Job No. 383-NPA01 **July 2010**



Obs. Wells

□ Well No. 1

Aquifer Model

Fractured

Solution

Moench with Slab Blocks

Parameters

T= 29,180 gal/day/ft

Test Date = July 6 to 9, 2009 (72-hour test)
Pre-Test
Static Water Level = 173.5 ft brp

Average pumping rate = 258 gpm

Graphical Solution by:
AQTESOLV Vers. 4.50 Pro
by Hydrosolve, Inc.

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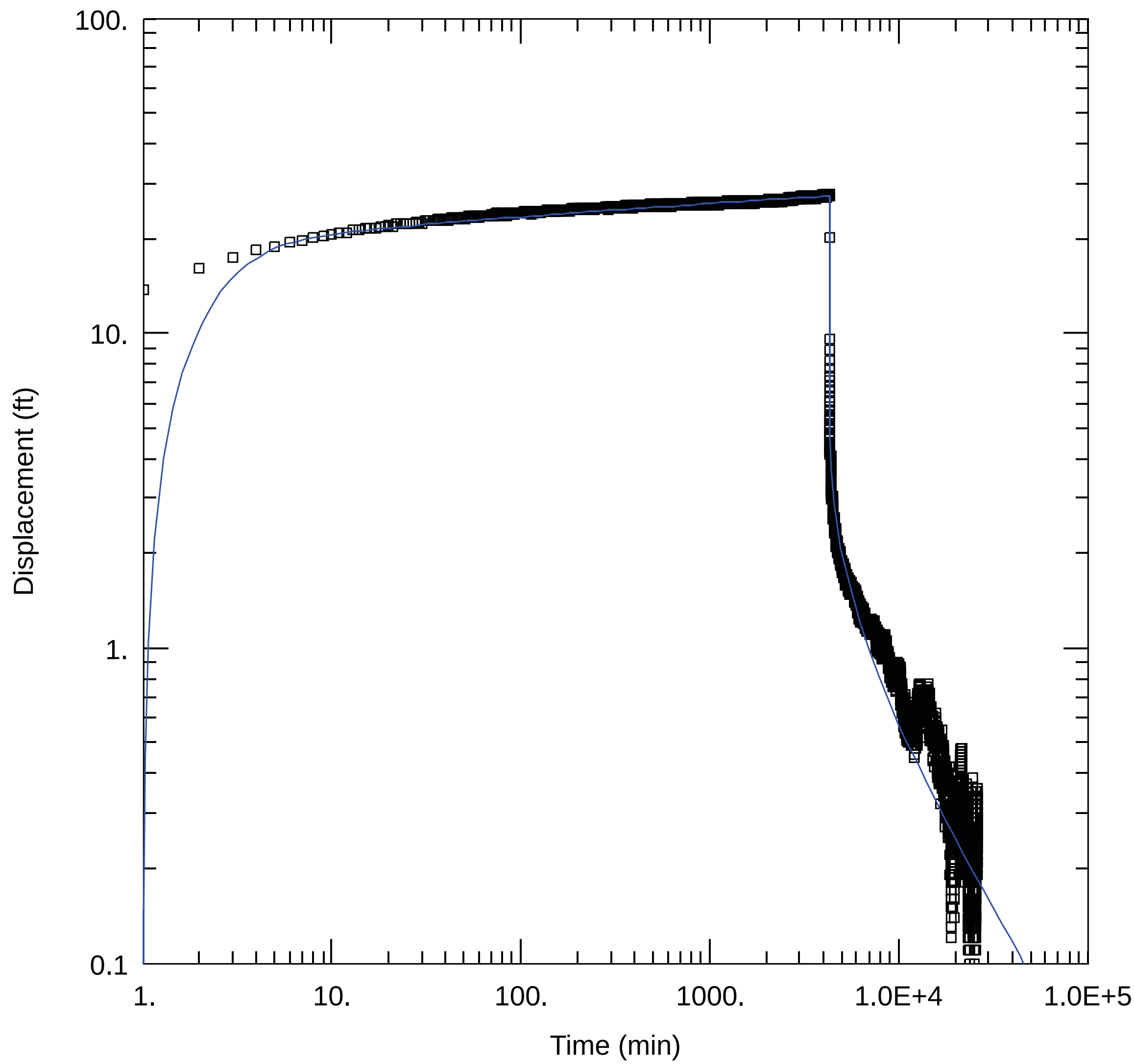
FIGURE 8D
CONSTANT RATE PUMPING TEST ANALYSIS
MOENCH FRACTURED AQUIFER SOLUTION
WITH SLAB BLOCKS
WELL NO. 1

Job No. 383-NPA01

July 2010



Obs. Wells

□ **Well No. 1**

Aquifer Model

Fractured

Solution

Moench with Spherical Blocks

Parameters

T = 29,190 gal/day/ft

Test Date = July 6 to 9, 2009
(72-hour test)
Pre-Test
Static Water Level = 173.5 ft brp

Average pumping rate = 258 gpm

Graphical Solution by:
AQTESOLV Vers. 4.50 Pro
by Hydrosolve, Inc.

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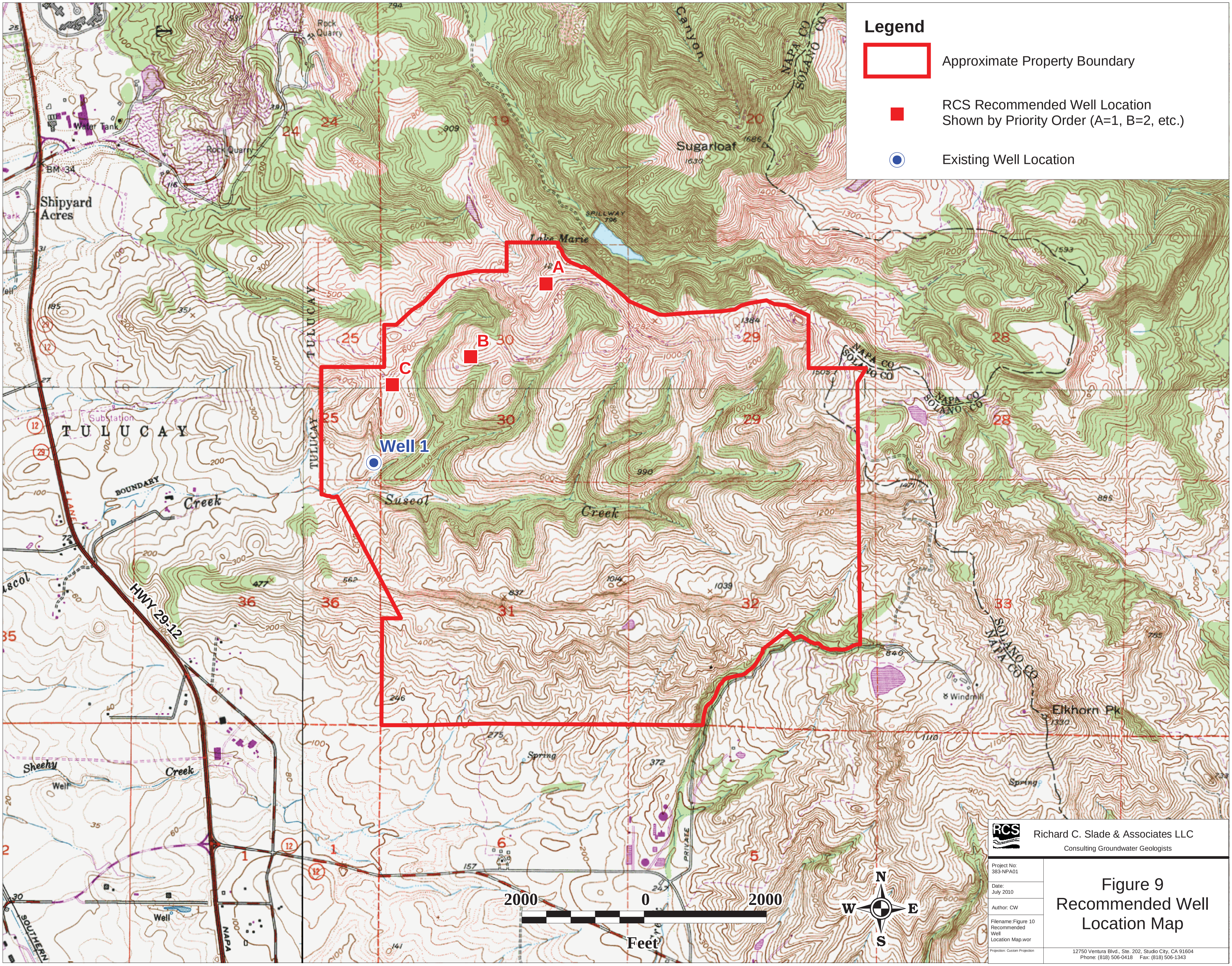
FIGURE 8E
CONSTANT RATE PUMPING TEST ANALYSIS
MOENCH FRACTURED AQUIFER SOLUTION
WITH SPHERICAL BLOCKS
WELL NO. 1

Job No. 383-NPA01 **July 2010**



Richard C. Slade & Associates LLC
Consulting Groundwater Geologists

Project No:
383-NPA01

Date:
July 2010

Author: CW

Filename:Figure 10 Recommended Well Location Map.wor

Projection: Custom Projection

Figure 9
Recommended Well
Location Map

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APPENDIX A

Summary of Stream Monitoring of Suscol Creek During Testing of Suscol Mountain Vineyard Well #1

BALANCE HYDROLOGICS, Inc.

Memo

To: Beth Painter

From: Scott Brown, Travis Baggett, and Barry Hecht, CHg, CEG

Date: October 2, 2009

Subject: Summary of stream monitoring of Suscol Creek during testing of Suscol Mountain Vineyard Well #1, Napa County, California

Introduction

In preparation for the potential conversion of ranchland to vineyard in upper Suscol Canyon, the project team conducted a series of well tests to define aquifer parameters and potential well yield of a new well located within the Sonoma Mountain Vineyard Property. The well is located within the northwest portion of property, in the southwest quarter of Sec. 30, T5N, R3W, approximately 700 feet north of Suscol Creek and 300 feet northwest of an unnamed tributary to Suscol Creek (Figure 1).

In addition to well development and aquifer assessment, another critical component of these tests was to assess the potential for pumping from the well to deplete baseflow in Suscol Creek, a stream that is well-documented as critical steelhead trout habitat (e.g. LSA, 2009; Gardner, 2006; Koelhler and Edwards, 2009). Balance designed and implemented a baseflow monitoring program for Suscol Creek during the pump test. The pump test itself was managed by Richard C. Slade and Associates (RCS), conducted by LGS, Inc. The results of the aquifer tests are summarized by RCS in a separate memorandum (RCS, in prep).

This memorandum describes the stream monitoring effort in Suscol Creek between June 10, 2009 and July 25, 2009. Initial well development and step tests were conducted on June 18 and 19, and a 72-hour constant rate well test was conducted on July 6 to July 9. Approximately 300,000 gallons of water were pumped during the initial testing, and over 1,000,000 gallons were pumped during the constant rate test[1]. Pre-, interim-, and post-pumping background periods (approximately 1, 2, and 2 weeks respectively) were monitored to provide information on the natural variation and trends within the system during periods of no pumping.

Stream monitoring was conducted following a year with below average rainfall, approximately 87% of the long-term mean[2]. The two previous wet seasons also had below average rainfall, with 85% of mean in water year 2008, and 61% of mean in water year 2007[3]. The most recent wet year was in water year 2006, with annual rainfall of about 172% of mean. Given these antecedent conditions, stream monitoring

[1] Water pumped from the well during the tests was discharged to a large storage pond approximately 0.25 miles downstream of the Suscol Vineyard property line via a temporary pipe system set up specifically for these tests.
[2] Rainfall statistics derived from the Napa Fire Department (NSH) record, available at www.cdec.water.ca.gov.
[3] Most hydrologic monitoring occurs for a period defined as a water year, which begins on October 1 and ends on September 30 of the named year. For example, water year 2009 includes the period from Oct. 1, 2008 to September 30, 2009.

was conducted during a period of very low-flow within the long-term record, when small effects of pumping may be most easily observed.

Monitoring stations

Balance installed stream monitoring stations at six locations along Suscol Creek adjacent to and upstream of the well (Figure 1)[4]. Two monitoring stations were each equipped with Campbell Scientific dataloggers, two pressure transducers and a temperature/specific conductance probe[5], and served as the primary monitoring stations during the pump tests. A staff plate was installed at each primary station to serve as a reference for water depth within the gage pool and to serve as a visual calibration and accuracy check on the pressure transducer readings[6]. The upstream station (SCUS), located approximately 1,800 feet upstream of the well location, was intended to serve as a control station, recording the amount of inflow to the monitored reach[7]. The downstream station, approximately 500 feet downstream of the well location was installed to record the cumulative loss (if any) of streamflow due to pumping within the monitored reach of Suscol Creek.

Four supplementary stations (S-1, S-2, S-3, and S-4) were established to provide additional stage data at points in between the primary stations and to provide a comparison and/or backup for the primary datalogger records. At each station, a self-contained, depth-recording datalogger (Levelogger®) was installed in a deep pool, and a single-point depth reference was established (nail in tree root at water level) to serve as a visual reference of relative pool depth during subsequent visits. S-1 served as a supplementary control station. S-2 and S-3 were located between the primary stations, with S-3 located almost directly south of the test well. S-4 was located downstream of the SCDS station to record conditions at the property line. Pool depths at the six stations ranged from about 0.5 to 1.5 feet.

Water level (stage) in pools is a direct reflection of inflow (from upstream surface flow and seepage gains from stream banks and/or bed) relative to pool outflow (surface outflow and seepage losses to the bed and/or banks[8], as well as evapotranspiration). A drop in stage results from either a decrease in the amount of water flowing into a pool, or an increase in the outflow from a pool. Where pools are hydrologically well-connected to an adjacent aquifer (or aquifers), a drop in water level within the adjacent aquifer (due to well water extraction, for example) would either reduce the amount of inflow (seepage) from the aquifer to the stream, or increase the rate of seepage from the pool to the aquifer. Because the drop in aquifer water level increases closer to the well, the decline in water level (and flow) in the creek will also typically decline more in reaches closer to the well in streams that are in fact affected by pumping.

[4] The tributary just southeast of the well location is typically dry and carries flow only during storms or during high winter baseflow. Because this tributary is dry during the spring and summer months, the potential effects of well pumping on steelhead rearing habitat were not measured.
[5] Specific conductance, a measure of the electrical conductivity of water, is an easily measured property that is often used as an index of salinity.
[6] Staff plates are essentially ‘rulers’ with graduated markings of 0.01 feet, fixed vertically at the streambank of a pool in order to quantify changes in pool depth over time.
[7] Distances provided are stream distance upstream and downstream of the point on the stream perpendicular to the location of the well, not direct distance from the well itself.
[8] At low flow, 50 percent or more of the total flow in a stream can be carried as ‘interflow’ within the gravels and adjacent bank materials, sand bars and other material.

We made initial measurements of stream stage, flow, specific conductance and temperature when the dataloggers, probes, and staff plates were installed on June 10, 2009. Additional field monitoring visits were conducted on June 19 and 26, and July 6, 9, and 24. Equipment was removed from all supplementary station and the SCUS station on July 24. The SCDS station was left in place to continue extended monitoring of baseflow conditions for the remainder of the dry season[9]. Table 1 summarizes measurements and observations made at each of the stations during the field visits.

Results

The following section summarizes the results of our monitoring effort. Because of the difficulty in accurately measuring very low flows in rock-bedded channels, our analysis of potential pumping effects relies primarily on the pool water level records recorded at the monitoring stations[10]. Water level (or ‘stage’), which correlates very closely with flow, can be accurately measured at low flow in such channels. Under such conditions, water-level records can be preferable even to the bucket-wheel flow measurements that we made at each site. Specific conductance and temperature were also used as secondary parameters of analysis. Our analysis concentrates on five distinct time segments during the monitoring period:

1. Pre-pumping baseline: The time between installation of the monitoring equipment and the beginning of well development (June 10-18),
2. Well development and step test: The two-day period that included well purging and pumping for well development and initial testing, and a step test at various rates up to 300 gallons per minute (June 18-19; see RCS report, in prep, for additional details),
3. Interim baseline: The time between recovery from the step test and the beginning of the constant rate test (June 20- July 6),
4. Constant rate testing: RCS conducted a 72-hour constant rate test of the Well #1, at a rate of approximately 250 gallons per minute (July 6-9),
5. Post-pumping baseline: Two week period following recovery from the constant rate test (July 10-24).

Stage

We recorded water level (stage), among other parameters, in six pools within Suscol Creek adjacent to and upstream of the area of estimated potential influence of pumping from Well #1. The stage record for each of the stations is shown in Figures 2 through 7. Primary and supplementary station records are discussed separately below.

[9] This extended monitoring period is not considered part of the monitoring for the pump test, and is therefore not discussed in this memorandum.
[10] At such low-flows, water level is an adequate, if not better, indicator of summer pool habitat than flow, as the water level in the creek determines the amount of accessible habitat area. Flow certainly has its own influences, though, especially for dissolved oxygen levels and potential for migration between pools.

Primary Stations

Figures 2 and 3 show the stage records at the SCUS and SCDS stations. Both records show daily fluctuations in stage, primarily a result of changes in evapotranspiration (ET)[11]. The downstream record shows higher daily fluctuations than the upstream station, likely a reflection of the fact that the downstream station is located in a more open section of the creek that experiences higher temperature fluctuations. The downstream fluctuations are especially high during warm spells, such as those that occurred in late June and mid-July.

During the monitoring period, stage at the SCUS station varied by less than 0.05 feet (about 0.6 inches), with an average daily stage variation of about 0.02 feet (0.24 inches). Maximum stage occurred on July 24, as stage rose in response to a relatively cool spell at the end of the monitoring period. Minimum stage occurred on July 13, a day when the maximum air temperature exceeded 35°C (95°F), and similarly low stage values were recorded during a hot spell on June 27-28. Stage values on the days of well development and the step and constant rate tests were within this small range of variation, as shown on Figure 2, and did not show a response to pumping from the well, as would be expected for the ‘control’ station.

Stage at the SCDS station varied by only 0.12 feet (1.4 inches) over the course of the monitoring period. Average daily fluctuation in stage at this station was 0.05, slightly higher than at the SCUS station. Maximum stage occurred on the morning of June 26, just before the late-June warm spell that lowered stage to among the lowest in the record. The lowest stage, however, was recorded on July 14, during a series of hot days. Stage at SCDS was relatively low on the day of the step test, however this low is within the range of what would be expected in response to warmer temperatures on that day—the low stage value was reached again several days after the end of the test in response to a similarly warm sequence of days, and dipped even further in response to the hotter days near the end of June. The SCDS stage trend during the constant rate test follows the gradual, slight decline that began around July 1, and continued through the mid-July warm spell. Stage fluctuations during the constant rate test were similar to the non-pumping periods before and after the test.

Figure 8 compares the daily stage fluctuation at each station with the air temperature record to highlight the correlation between the two. Stage fluctuation was calculated by subtracting the minimum stage from the maximum stage on a given day. The figure shows the higher fluctuations at the SCDS station relative to the SCUS station. For each station, higher stage fluctuations occur on warmer days, and periods of pumping do not alter this pattern.

Figure 9 shows a graph of the difference in stage between the upstream and downstream stations. This comparison provides a way to identify changes in stage that affect one station but not the other[12]. When stage is low at the downstream station (SCDS) relative to the upstream station (SCUS), it plots lower on the graph. Given that the SCDS station is much closer to the test well, it should show a greater response to pumping than the SCUS station, *if a connection exists*. There is a gradual, slight (~0.03 feet) decrease in stage at the downstream station relative to the upstream station through the entire monitoring period but, as with the individual stage records, pumping does not produce a discernable response in stage difference within this general decline. Water level in the well returned to nearly pre-pumping levels

[11] Evapotranspiration includes water ‘losses’ due to direct evaporation and uptake of water by riparian vegetation, and typically varies directly with temperature.
[12] Peaks in stage at the SCDS station generally lag behind SCUS peaks by about 2 hours. To account for this lag time stage at the downstream station was subtracted from the stage from two hours earlier at the upstream station.

within a day or so of the end of the tests, so this decline is also not associated with a corresponding gradual decline in aquifer water level. It is important to note that while pumping effects in Suscol Creek would manifest as a decrease in stage at the downstream station relative to the upstream, such a decrease is not necessarily indicative of a connection unless it corresponds to the pumping period. The trendline in Figure 9 does show a slight decrease on July 5 that does not appear to correspond directly to temperature, but this occurred the day *before* the constant rate test began. July 5 was an abnormally windy day within that part of monitoring period, and likely increased ET, causing the relative drop in stage at the SCDS station.

Supplementary Stations

The supplementary stage records also showed near-constant daily variations throughout the monitoring period, with the exception of the S-4 station (see discussion below). As with the primary stations, the stage records showed some variation attributed to temperature/ET changes during the monitoring period, but showed no anomalous changes during periods of well pumping (Figures 4 through 7).

Though the S-2, S-3, and S-4 records show slight decreases in stage during well development and during the constant rate test, these decreases are consistent with the expected decreases due to increased temperatures, such as those that occurred on June 22 and 23, with no pumping from the well.

Station S-4 (the downstream-most station) showed a particularly strong response to periods of hot weather. On the hottest days, stage in the pool dropped by as much as 0.7 feet in the late afternoon and evening following the hottest parts of the day, but returned to typical levels by the next morning. We interpret this fluctuation as a result of a sharp decrease or cessation of inflow to the pool, while continued seepage outflow around and under the rootwad that controls the lower end of the pool allowed the pool level to drop. As ET decreased at night, inflow to the pool increased and filled or nearly filled it again by mid-morning. It appears that the pool went dry or nearly dry on seven days within the monitoring period, especially during the hot spell between July 14 and July 20 (Figure 7). The fact that this pool showed such a remarkable response to temperature variation, but did not respond during periods of pumping beyond what would be expected due to the temperature variation is a strong indication of the lack of connection between the well aquifer and Suscol Creek.

Figure 10 shows an overlay of all four stage records at the supplementary stations. S-1 and S-3 show very similar records of stage fluctuation, though S-3 recorded somewhat lower stage during warm periods, especially in mid-July. S-2 and S-4 show greater fluctuations in stage, but these fluctuations are consistent with temperature variations, and anomalous drops in the records are not present during the pumping periods.

Flow

Streamflow was measured at the two primary monitoring stations during each visit to site. Additional measurements and estimates were conducted during earlier visits to the site (Table 1). Streamflow was generally higher at the downstream monitoring station during the monitoring period, though the difference in flow between the stations appears to have decreased slightly toward the end of the monitoring period. The difficulty in making accurate measurements at such low flows makes it difficult to reach a definite conclusion about this trend, and this one reason we relied on the stage record for our analysis of potential pumping impacts. The trend, however, is consistent with observations from October

2008, when Balance's estimates of flow in Suscol Creek suggested that flow near the property line was lower than that present within the upper portion of the creek (see Brown and others, 2009 [in prep], for additional discussion of baseflow conditions).

Specific Conductance

Figure 11 shows the specific conductance (SC) records for the SCUS and SCDS monitoring stations, along with manual measurements made during site visits. SC at both stations generally ranged between 160 and 185 µmhos/cm, with the SCUS record showing slightly higher SC than the SCDS station near the end of the monitoring period. Given that SC can vary by as much as 10 percent in a pool with low flow and where mixing is poor, this difference is negligible. Several spikes in specific conductance occurred at the SCDS station (on June 12 and 24, and July 25), with individuals peaks of up to 205 µmhos/cm. These events are likely a result of cow activity in the creek upstream of the gaging site.

Specific conductance of the well water was measured at 230 µmhos/cm on June 19, and 250 µmhos/cm on July 6, significantly higher than that measured in the Creek, but still a relatively small difference given that SC in natural waters can vary by orders of magnitude[13]. Given this difference, one would expect to a decrease in SC of the stream water if pumping from the well is drawing water from the creek as a result of a reduced contribution of higher SC groundwater to the creek as water level in the aquifer is drawn down, resulting in a greater percentage of near surface water. The SC record within Suscol Creek, however, is quite stable through the monitoring period and does not indicate any response to periods of pumping from Well #1.

Water Temperature

Figure 11 shows the trend in water temperature at the two primary stations during the pump test. Water temperature in Suscol Creek was typically between 15 and 20°C, though did reach as high as 24°C at the downstream station during the warmest days of the monitoring period. Water temperature at the SCDS station fluctuates more than at the SCUS station, which is consistent with the fluctuations in the stage record (Figures 2 and 3).

Water temperature recorded at Well #1 was consistently above 25°C, which is relatively high for local groundwater (RCS personal communication, June 18, 2009).

Other parameters and conditions

Water chemistry analyses of the water in Suscol Creek show a similar chemical signature to water drawn from Suscol Well #1 (see Brown and others, 2009, for summary of chemical analyses). Water from the well does show significantly higher sodium concentrations, which may indicate a contribution of water from the non-volcanic Markley formation. The water in Suscol Creek does not show this signature.

It is important to note that the static water elevation in Well #1 before testing was approximately 60 feet below the elevation of the Creek bed at the property line. While this does not preclude a potential connection between streamflow in the creek and the aquifer from which the well draws water, it does

[13] Sea water is typically in the range of 53,000 µmhos/cm @ 25°C, whereas rain water is below 100 µmhos/cm.

suggest that if a connection exists the pathways of groundwater flow may be rather complex. This is the primary reason that we added the supplementary stations to monitoring program.

Eric Lichtwardt (Biologist, LSA Associates) surveyed pool habitat conditions on July 8, 2009, during the constant rate pump test. He did not observe any effects from the well test on aquatic habitat at that time (see attached memorandum).

Summary of findings and conclusions

Based on the above discussion, we conclude the following in regards to Suscol Creek baseflow conditions during the July-July, 2009 test period:

- Water level in Suscol Creek showed daily fluctuations about 0.02 to 0.04 feet in response to changes in air temperature, evapotranspiration, and other environmental factors. Fluctuations were more prominent during warm spells and near the downstream property line.
- We used water level (‘stage’) to evaluate potential effects of pumping because it can be measured with great precision and accuracy. Flow in Suscol Creek could not be measured as accurately to sufficiently track slight changes in response to well pumping. Given the variability of the flow measurements given the rocky bed of Suscol Creek, we determined that stage was a more reliable and accurate metric for use in analyzing potential well impacts.
- None of the stage records showed an anomalous response during pump test periods. Stage fluctuations were consistent with temperature variation through the entire monitoring period.
- Comparison of the stage record at the two primary gaging stations showed a slight decline in stage at the downstream station (adjacent to the test well) relative to the upstream (control) station over the course of the monitoring period. This decline was gradual, however, and is consistent with the general trend of drying in the downstream reaches. We found no correlation in the stage difference fluctuations to periods of pumping from the well.
- The well test was conducted during the dry season following the third year of below-normal rainfall, when the effects of pumping on streamflow would generally be easiest to detect and quantify.
- Specific conductance and temperature of Suscol Creek is lower than that recorded in Well #1. No changes in specific conductance or temperature were identified that corresponded to pumping periods during the well tests.
- The water chemistry of the well water is similar to that of the water in Suscol Creek, though has slightly higher total dissolved solids and slightly higher levels of sodium, likely indicating some contribution to the well from water in the underlying Markley formation.

Given the above findings, we conclude that pumping from Suscol Mountain Vineyard Well #1 did not influence water level or flow in Suscol Creek during the monitoring period. Assuming the pump will operate under a similar or lower regime under post-project conditions, pumping from the well will not significantly impact streamflow in Suscol Creek, nor will it impact summering pool habitat.

References

Brown, S., Thompson, K., and Hecht, B., in prep., Hydrologic assessment of seeps, springs, baseflow, and stormwater runoff, Suscol Mountain Vineyard, Napa County, California. Consulting report prepared by Balance Hydrologics for Suscol Mountain Vineyards.

Gardner, S., 2006, Historical ecology of the Suscol Creek watershed, part 2. Institute for Conservation Advocacy, Research and Education report dated Dec. 15, 2006, 11 p.

Koelhler, J., and Edwards, C., 2009, Southern Napa River Watershed Project. Report prepared for California Department of Fish and Game, Fisheries Restoration Grant Program, 179p.

LSA Associates (LSA), 2009, Biological survey report for the Suscol Mountain Vineyard Property, Napa County, California. Consulting report prepared for Silverado Premium Properties, 54p.

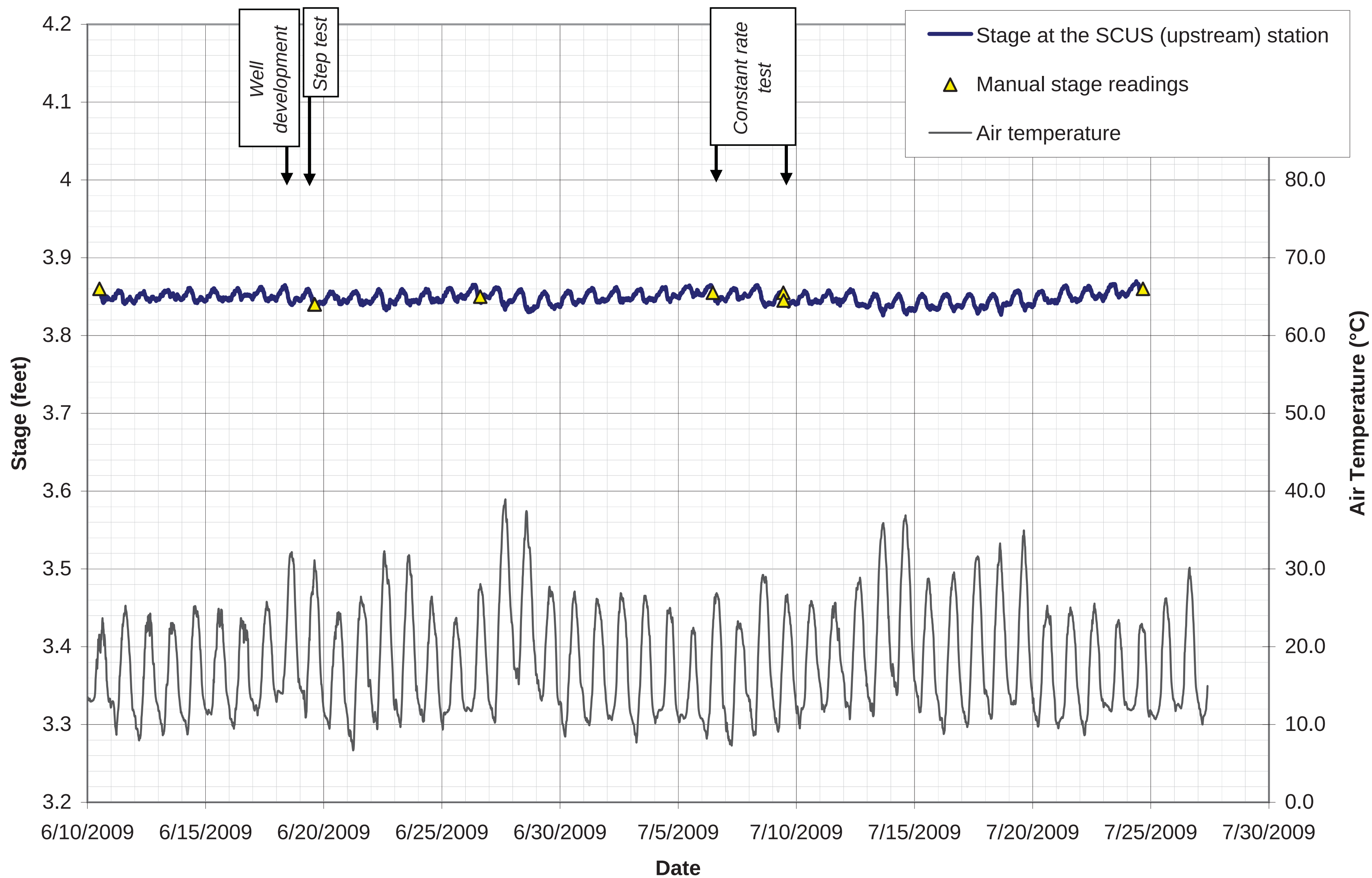
Richard C. Slade and Associates, in prep., Hydrogeologic Assessment and Report of Pumping Test, Proposed Suscol Mountain Vineyard Project. Consulting report prepared for Silverado Premium Properties.

FIGURES

Background image captured from Google Earth

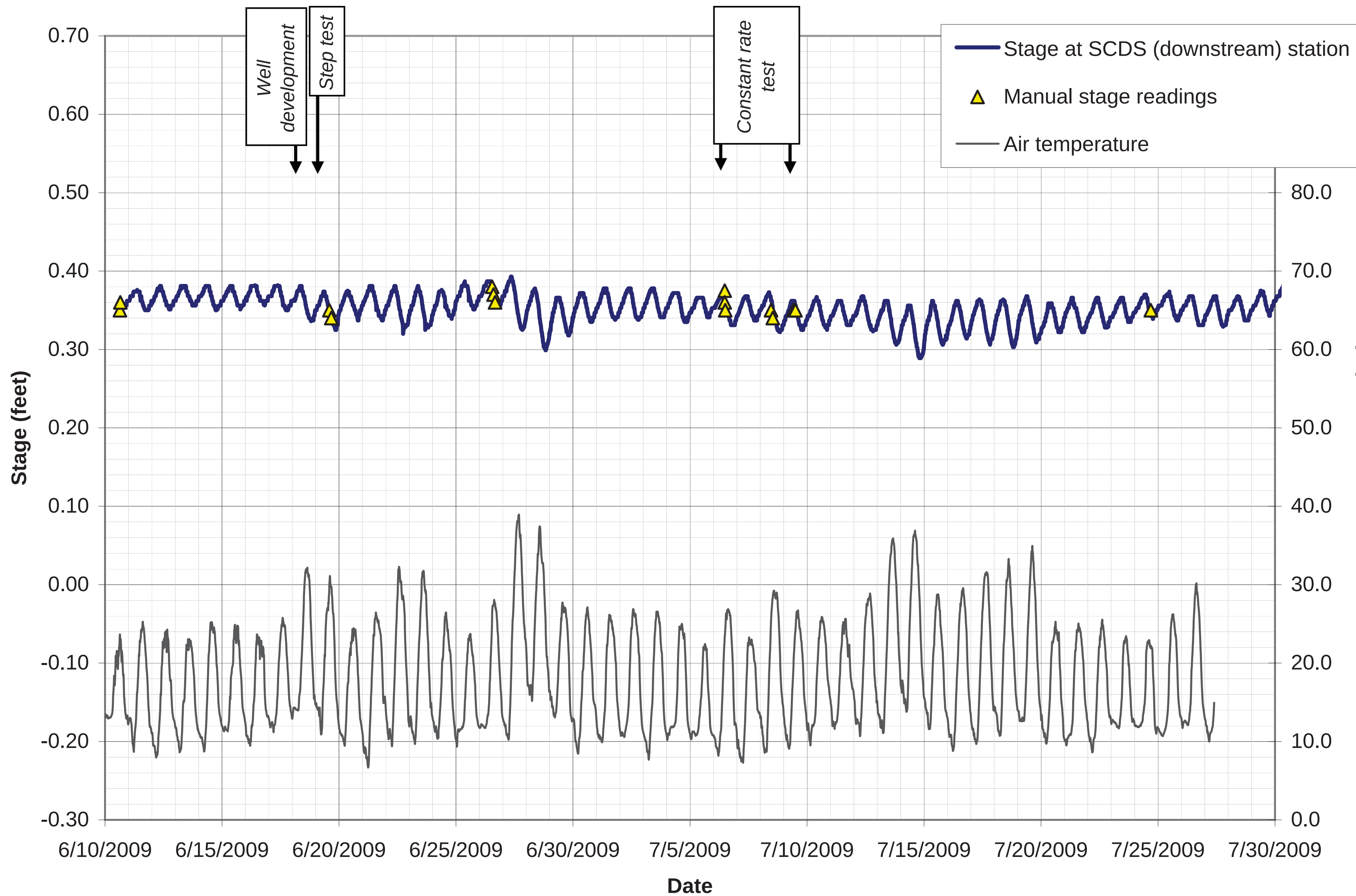
Balance Hydrologics, Inc.

Figure 1. **Locations of stream monitoring sites during pump testing of Well #1, Suscol Ranch, Napa County, California.** Stations SCUS and SCDS served as the primary monitoring stations, and stations S-1, S-2, S-3, and S-4 served as secondary stations. SCUS and S-1 served as upstream control stations (outside the estimated radius of influence of pumping).



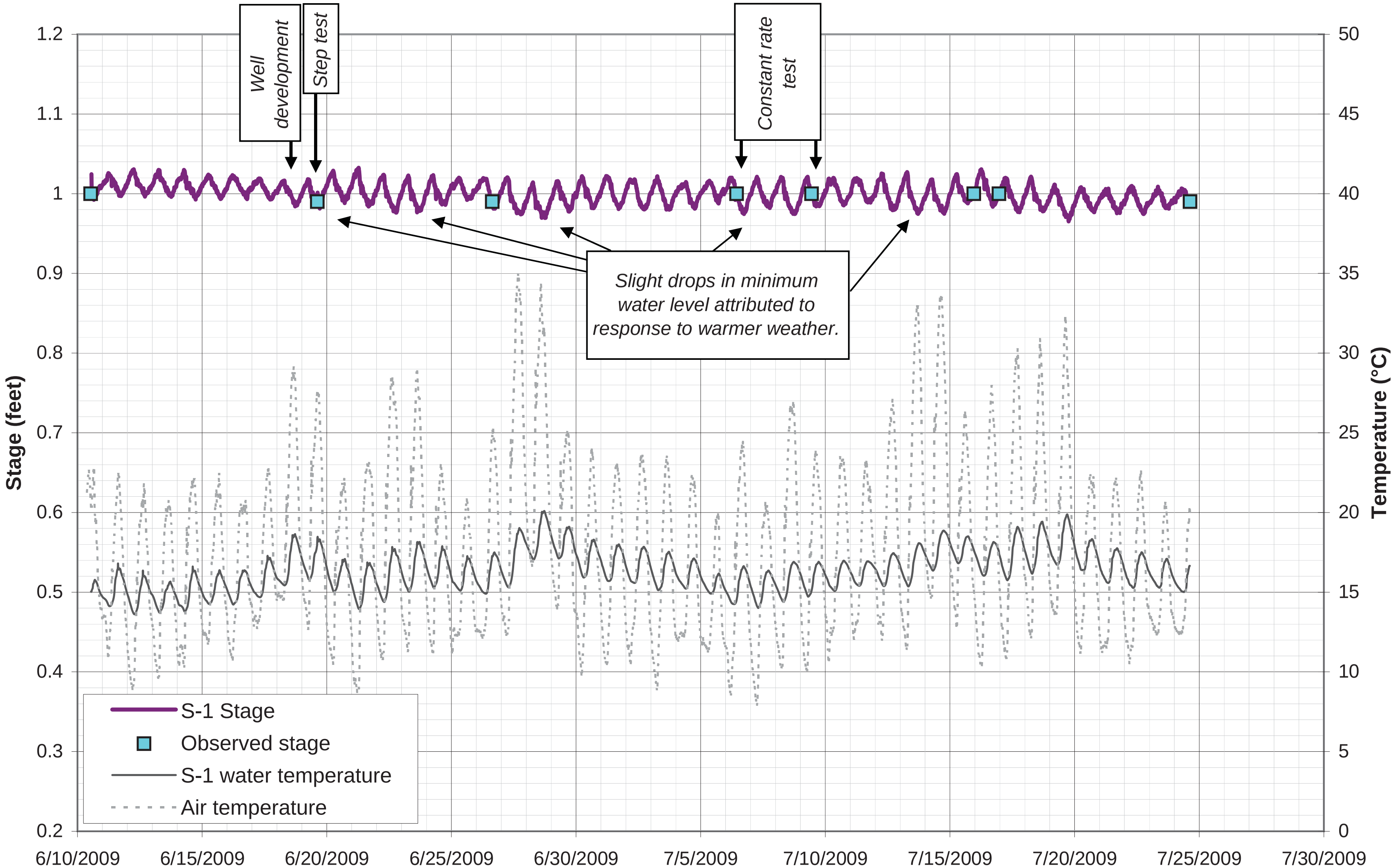
Balance Hydrologics, Inc.

Figure 2. Stage at the SCUS monitoring station, Suscol Mountain Ranch, Suscol Creek, Napa County, California. Stage varied by less than 0.05 feet during the monitoring period, and showed no response to periods of pumping.



Balance Hydrologics, Inc.

Figure 3. Stage at the SCDS monitoring station, Suscol Mountain Ranch, Suscol Creek, Napa County, California. Stage varied by 0.12 feet during the monitoring period, but showed no response to periods of pumping.



Balance Hydrologics, Inc.

Figure 4. Water level and temperature record at monitoring site S-1, Suscol Creek, Suscol Ranch, Napa County, California. S-1 is approximately 1,700 feet upstream of the well, upstream of the estmated zone of influence of the well, and serves as a secondary control station.

208159 Leveloggers (8-18-09).xls, S-1

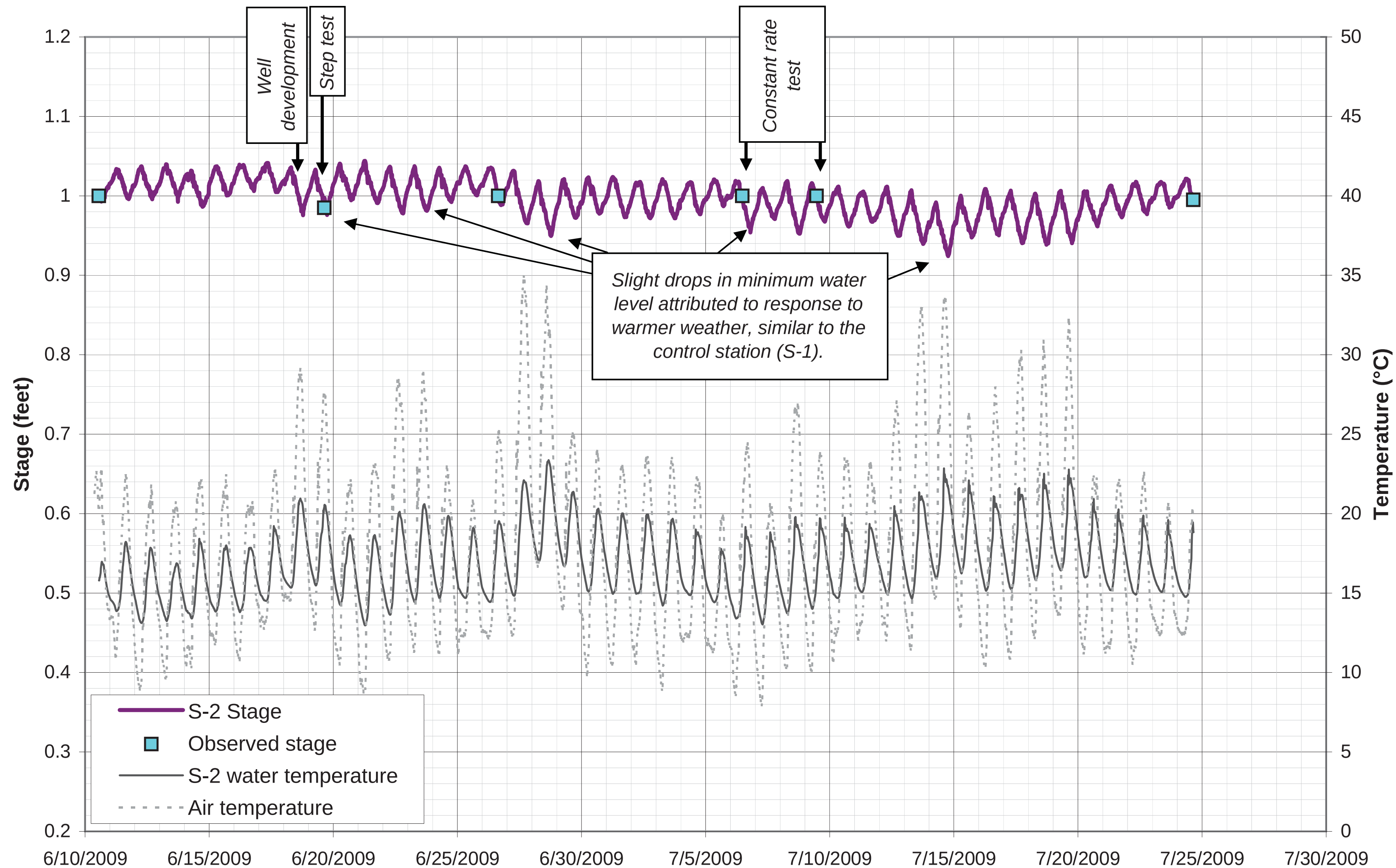


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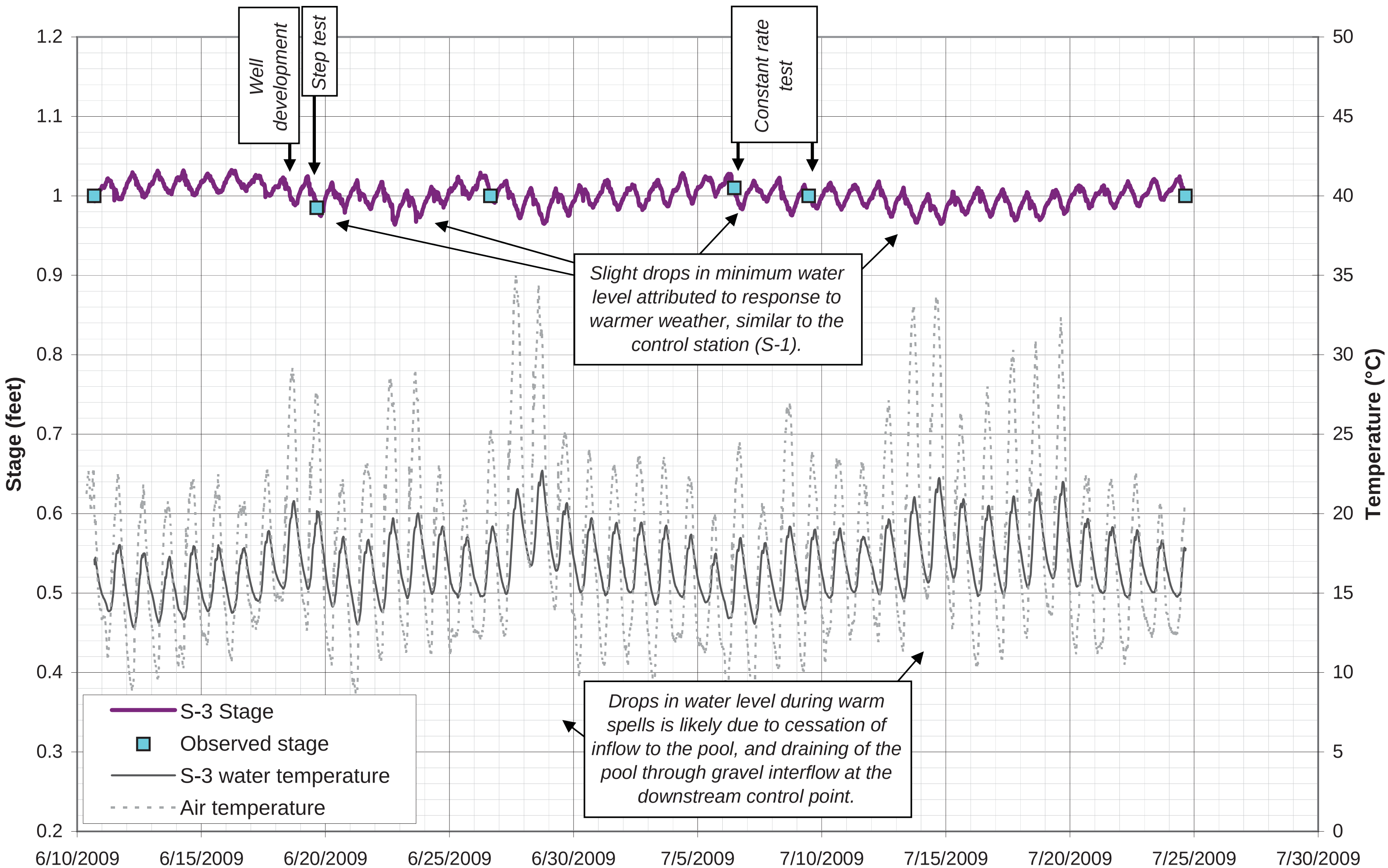
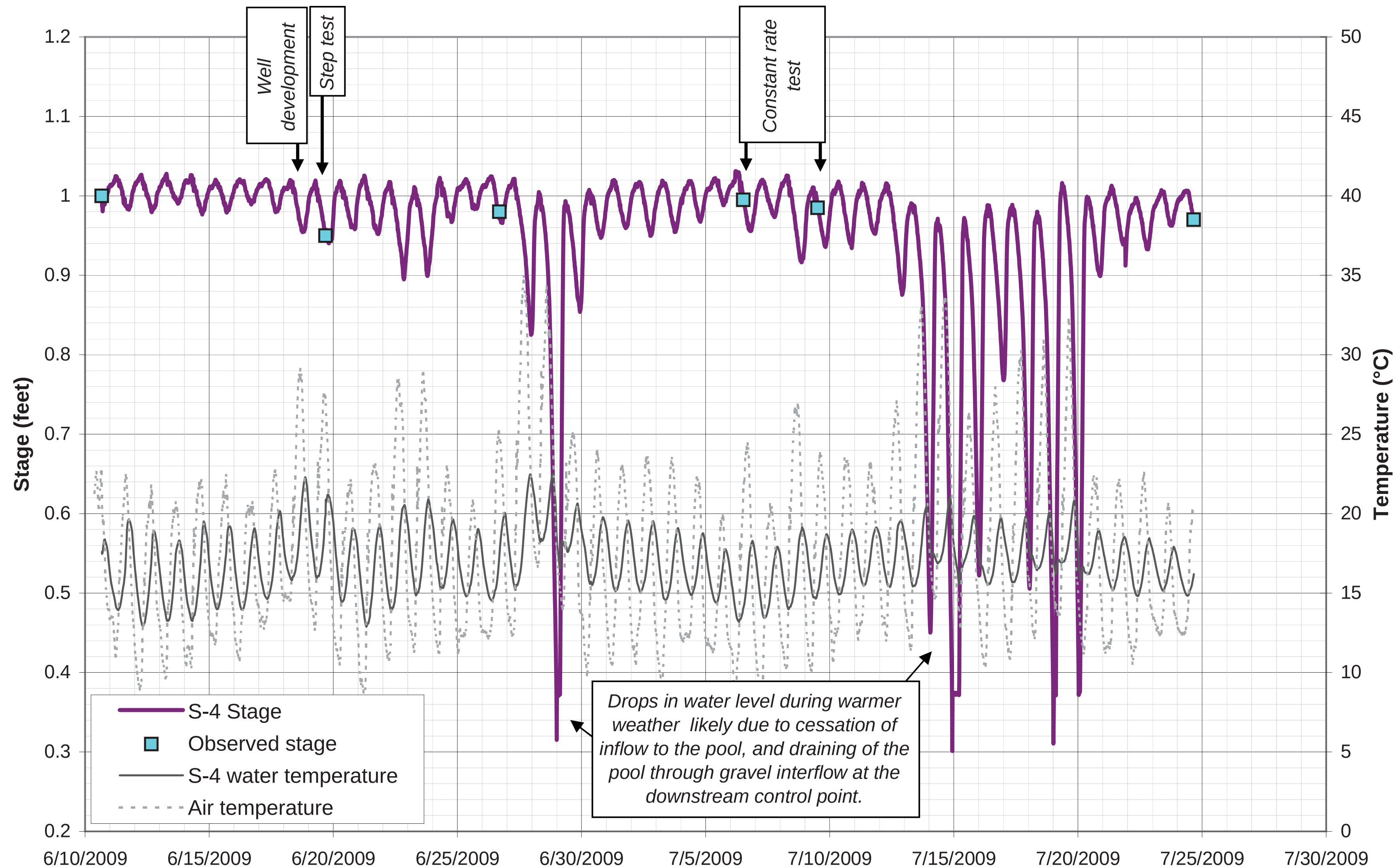
Figure 5. Water level and temperature record at monitoring site S-2, Suscol Creek, Suscol Ranch, Napa County, California. Slight drop in stage minimum during the constant rate test attributed to temperature variation, and is not considered an effect of pumping.



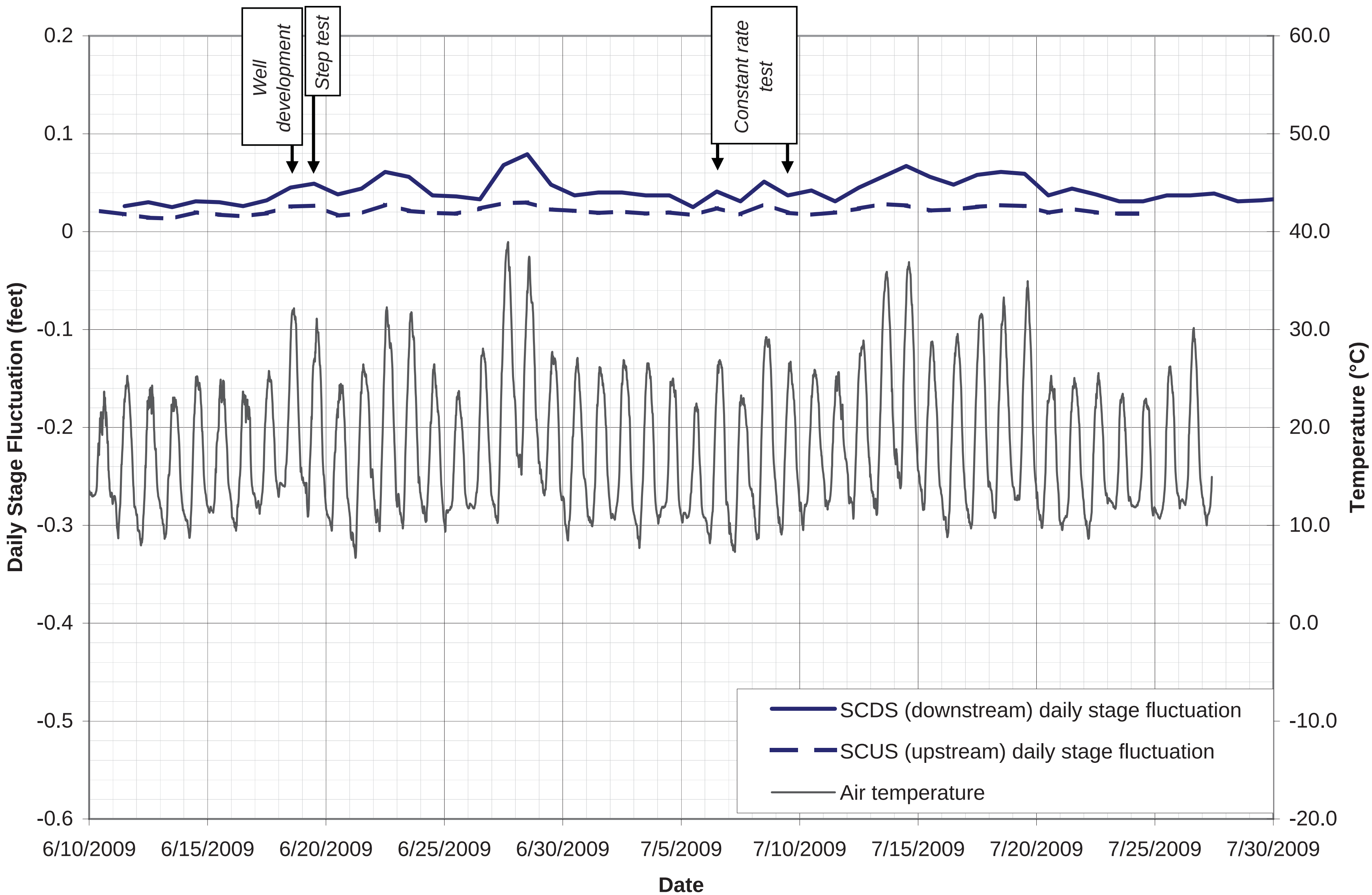
Balance Hydrologics, Inc.

Figure 6. Water level and temperature record at monitoring site S-3, Suscol Creek, Suscol Ranch, Napa County, California. No influence of well pumping could be identified in the water level record.



Balance Hydrologics, Inc.

Figure 7. Water level and temperature record at monitoring site S-4, Suscol Creek, Suscol Ranch, Napa County, California. No influence of well pumping could be identified in the water level record.



Balance Hydrologics, Inc.

Figure 8. Daily stage variation at the SCUS and SCDS monitoring stations. Note the strong correlation between stage fluctuation and maximum air temperature. Daily stage fluctuation is the difference between maximum and minimum stage on a given day.

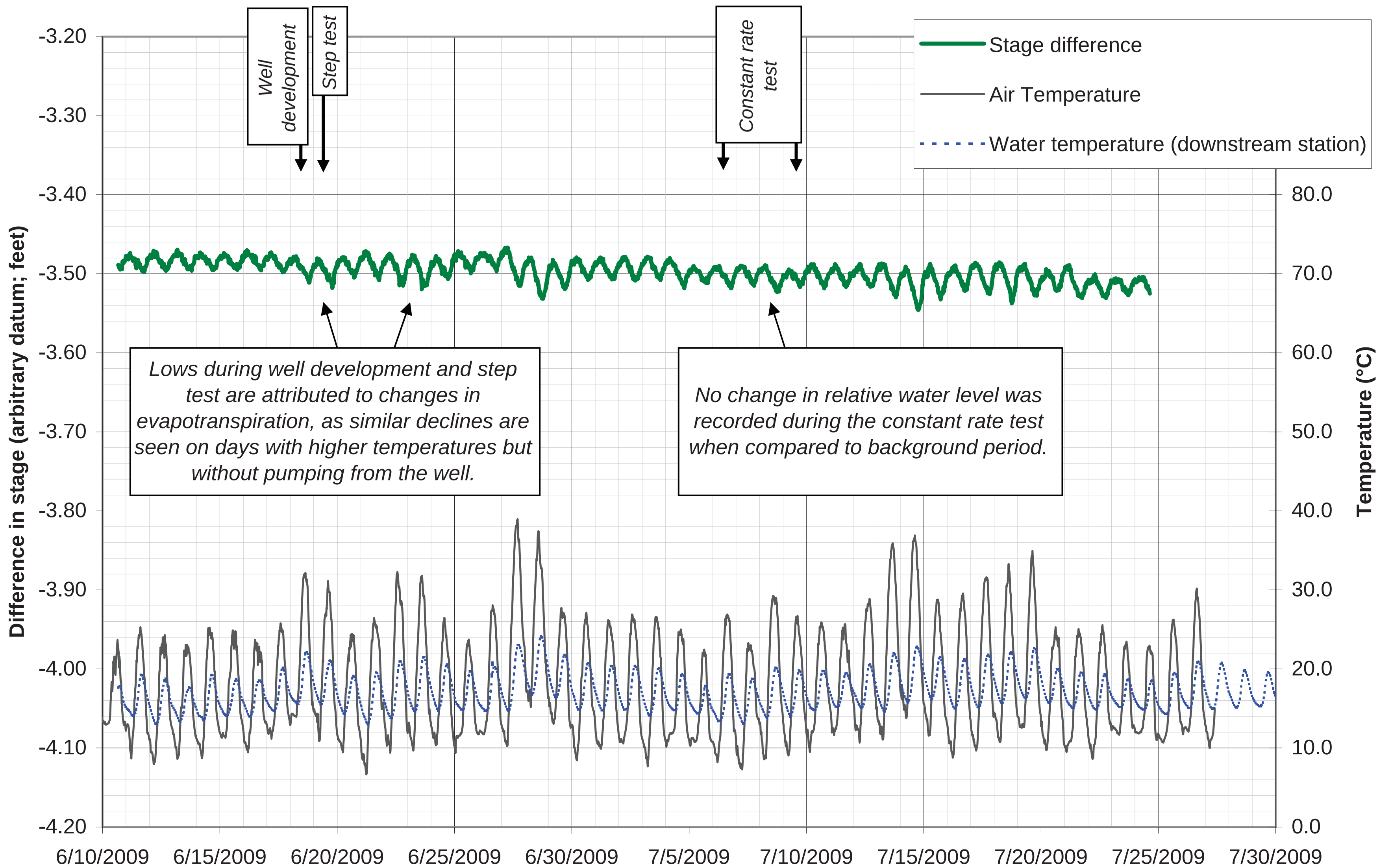


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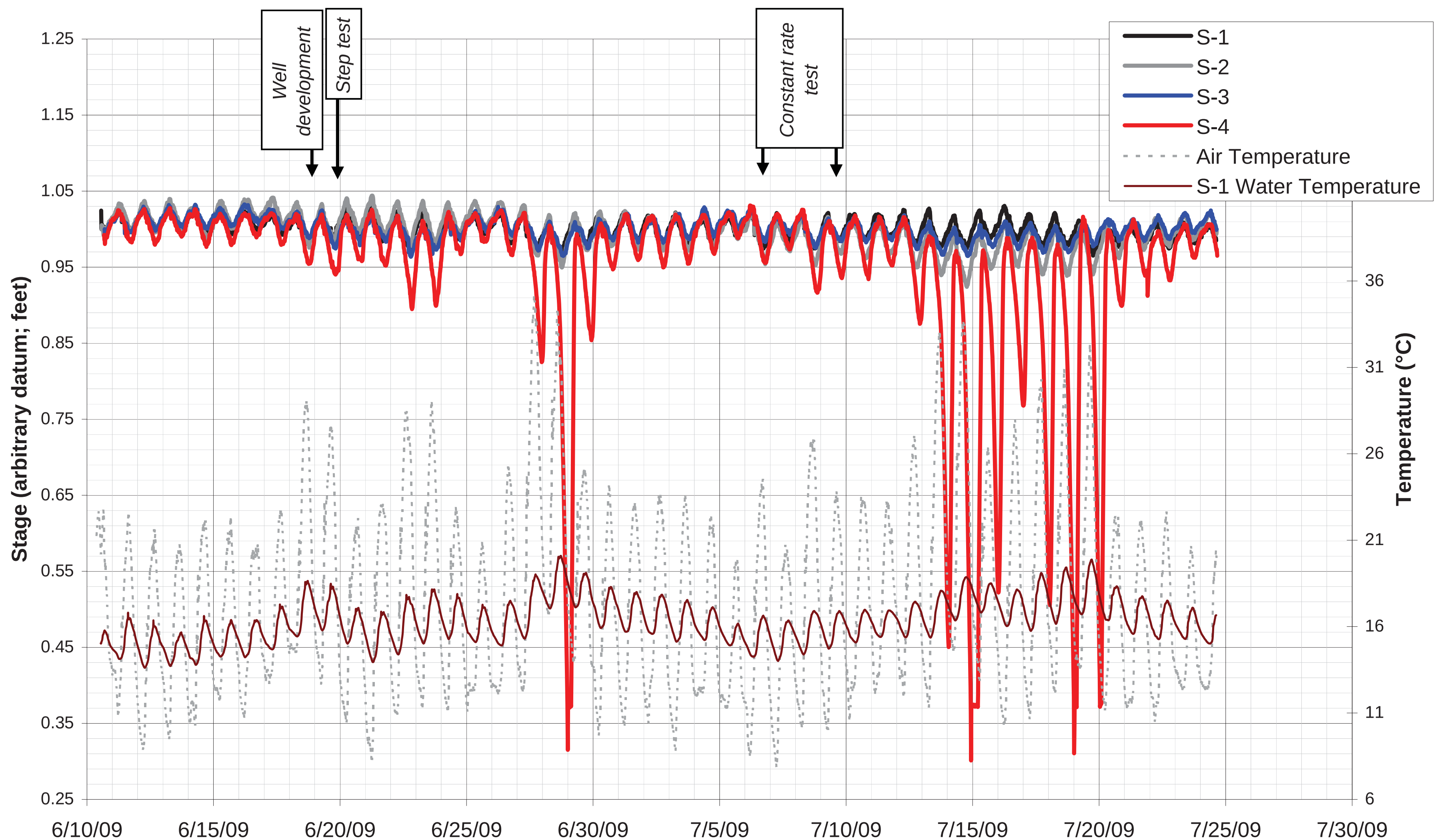
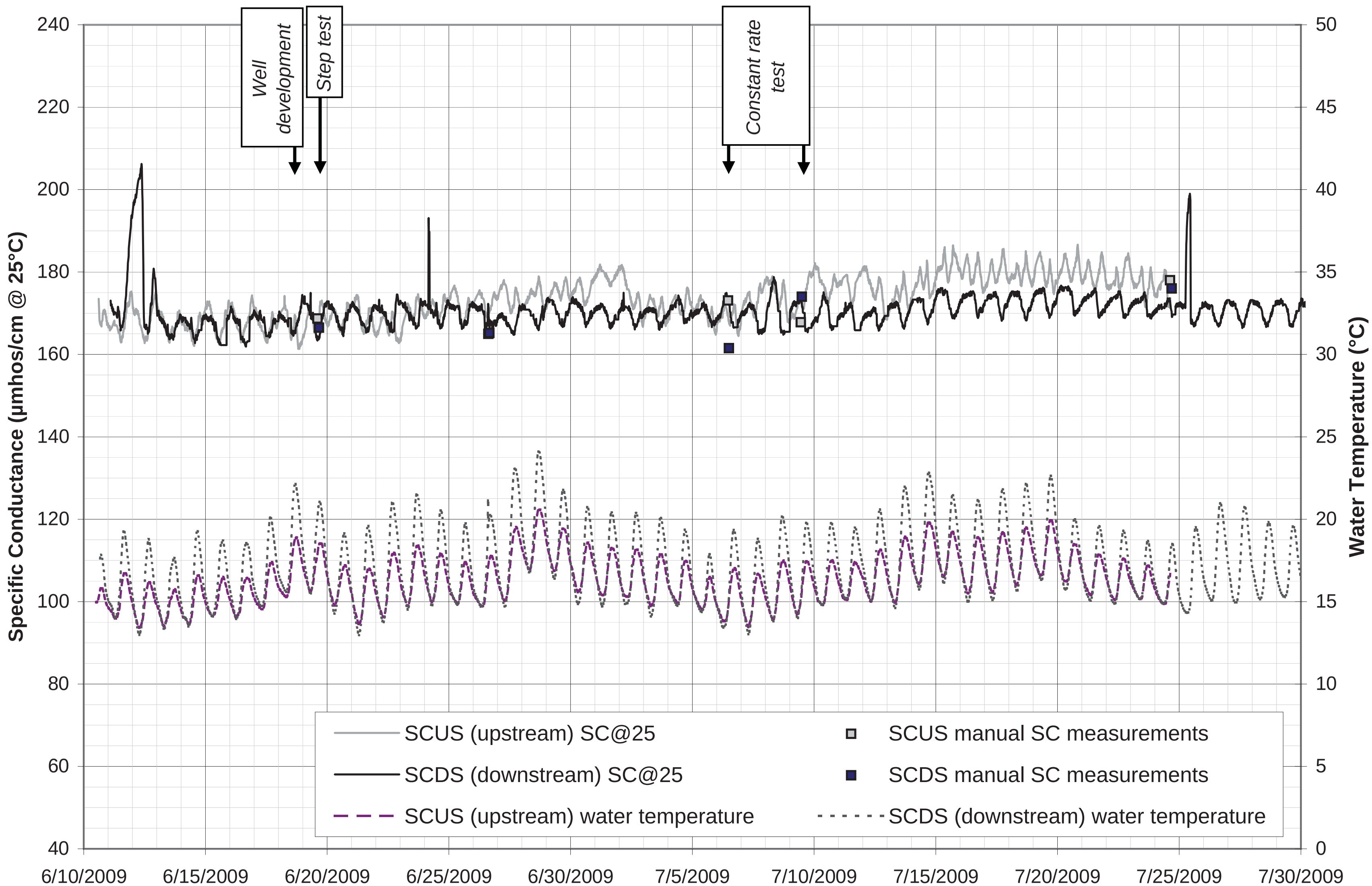
Figure 9. Difference in stage between the downstream and upstream gaging stations on Suscol Creek, Napa County, California. Lows in the trend line indicate times when the water level at the downstream station was low relative to that at the upstream station.



Balance Hydrologics, Inc.

Figure 10. Hydrograph of stage for Suscol Creek at Suscol Ranch, Napa, California. S-1 is the furthest upstream station and serves as a control station. S-4 is the furthest downstream. Note that change in water level correlates well with air temperature, and variations during periods of pumping is the same as the background periods. Air and water temperature are plotted as a proxy for evapotranspiration. See Figure 7 for explanation of large stage fluctuations at S-4.



Balance Hydrologics, Inc.

Figure 11. Specific conductance and water temperature in Suscol Creek, Napa County, California. Parameters remained relatively constant thoroughout the monitoring period, except for occasional spikes in specific conductance at the downstream station. These spikes likely correspond to cow activity upstream of the monitoring station.

APPENDIX I

LICENSE 13800 FOR DIVERSION AND USE OF WATER

STATE OF CALIFORNIA
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
STATE WATER RESOURCES CONTROL BOARD

DIVISION OF WATER RIGHTS

License for Diversion and Use of Water

APPLICATION 30247 PERMIT 20762 LICENSE **13800**

THIS IS TO CERTIFY, That

Madison Vineyard Holdings, LLC and
Suscol Mountain Vineyards, LLC
c/o Mr. Erich Kroll
5619 DTC Parkway, Suite 800
Greenwood Village, CO 80111

have made proof as of **July 15, 2008 and August 8, 2008** (dates of inspections) to the satisfaction of the State Water Resources Control Board (State Water Board) of a right to the use of the waters of **2 Unnamed Streams** in **Napa County**

tributary to **Sheehy Creek thence Steamboat Slough thence Napa River thence San Pablo Bay**

for the purpose of **Stockwatering, Recreational, Wildlife Enhancement, and Fire Protection uses**

under **Permit 20762** of the State Water Board; that the right to the use of this water has been perfected in accordance with the laws of California, the Regulations of the State Water Board, and the permit terms; that the priority of this right dates from **April 28, 1993**; and that the amount of water to which this right is entitled and hereby confirmed is limited to the amount actually beneficially used for the stated purposes and shall not exceed **a total of seventy-three (73) acre-feet per annum to be collected from November 1 of each year to May 1 of the succeeding year as follows: (1) 24 acre-feet per annum in Reservoir #1, and (2) 49 acre-feet per annum in Reservoir #2.**

The capacities of Reservoir #1 and Reserovir #2 covered by this license shall not exceed 24 acre-feet and 49 acre-feet, respectively.

After the initial filling of the reservoirs, the licensee's right under this license extends only to water necessary to keep the storage reservoir full by replacing water beneficially used and water lost by evaporation and seepage, and to refill if emptied for necessary maintenance or repair. This right shall be exercised only during the authorized diversion season.

(0000041)

THE POINTS OF DIVERSION OF SUCH WATER ARE LOCATED:

(1) Reservoir #1 - By California Coordinate System of 1983, Zone 2, North 1,847,766 feet and East 6,496,313 feet, being within NE¼ of SE¼ of Section 31, T5N, R3W, MDB&M.

(2) Reservoir #2 - By California Coordinate System of 1983, Zone 2, North 1,845,203 feet and East 6,496,246 feet, being within NE¼ of NE¼ of Section 6, T4N, R3W, MDB&M.

A DESCRIPTION OF THE LANDS OR THE PLACE WHERE SUCH WATER IS PUT TO BENEFICIAL USE IS AS FOLLOWS:

Recreational use at Reservoir #1 within NE¼ of SE¼ of Section 31, and NW¼ of SW¼ of Section 32, all within T5N, R3W, MDB&M, and

Stockwatering, Recreational, Wildlife Enhancement and Fire Protection uses at Reservoir #2 located within NW¼ of NW¼ of Section 5, and NE¼ of NE¼ of Section 6, all within T4N, R3W, MDB&M, as shown on map on file with the State Water Board.

Licensees shall install and maintain outlet pipes, in each reservoir, of adequate capacities in the dams as near as practicable to the bottom of the natural stream channel, or provide other means satisfactory to the Chief of the Division of Water Rights, in order that water entering the reservoirs which is not authorized for appropriation under this license may be released.

(0050043)

The right hereby confirmed to the diversion and use of water is restricted to the point or points of diversion herein specified and to the lands or place of use herein described.

Reports shall be filed promptly by the licensee on the appropriate forms which will be provided for the purpose from time to time by the State Water Board.

Licensee shall allow representatives of the State Water Board and other parties, as may be authorized from time to time by the State Water Board, reasonable access to project works to determine compliance with the terms of this license.

Pursuant to Water Code sections 100 and 275 and the common law public trust doctrine, all rights and privileges under this license, including method of diversion, method of use, and quantity of water diverted, are subject to the continuing authority of the State Water Board in accordance with law and in the interest of the public welfare to protect public trust uses and to prevent waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of said water.

The continuing authority of the State Water Board may be exercised by imposing specific requirements over and above those contained in this license with a view to eliminating waste of water and to meeting the reasonable water requirements of licensee without unreasonable draft on the source. Licensee may be required to implement a water conservation plan, features of which may include but not necessarily be limited to: (1) reusing or reclaiming the water allocated; (2) using water reclaimed by another entity instead of all or part of the water allocated; (3) restricting diversions so as to eliminate agricultural tailwater or to reduce return flow; (4) suppressing evaporation losses from water surfaces; (5) controlling phreatophytic growth; and (6) installing, maintaining, and operating efficient water measuring devices to assure compliance with the quantity limitations of this license and to determine accurately water use as against reasonable water requirement for the authorized project. No action will be taken pursuant to this paragraph unless the State Water Board determines, after notice to affected parties and opportunity for hearing, that such specific requirements are physically and financially feasible and are appropriate to the particular situation.

The continuing authority of the State Water Board also may be exercised by imposing further limitations on the diversion and use of water by the licensee in order to protect public trust uses. No action will be taken pursuant to this paragraph unless the State Water Board determines, after notice to affected parties and opportunity for hearing, that such action is consistent with California Constitution article X, section 2; is consistent with the public interest and is necessary to preserve or restore the uses protected by the public trust.

The quantity of water diverted under this license is subject to modification by the State Water Board if, after notice to the licensee and an opportunity for hearing, the State Water Board finds that such modification is necessary to meet water quality objectives in water quality control plans which have been or hereafter may be established or modified pursuant to division 7 of the Water Code. No action will be taken pursuant to this paragraph unless the State Water Board finds that: (1) adequate waste discharge requirements have been prescribed and are in effect with respect to all waste discharges which have any substantial effect upon water quality in the area involved, and (2) the water quality objectives cannot be achieved solely through the control of waste discharges.

This license does not authorize any act which results in the taking of a threatened or endangered species or any act which is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the federal Endangered Species Act (16 U.S.C.A. sections 1531 to 1544). If a "take" will result from any act authorized under this water right, the licensee shall obtain authorization for an incidental take prior to construction or operation of the project. Licensee shall be responsible for meeting all requirements of the applicable Endangered Species Act for the project authorized under this license.

If construction or rehabilitation work is required for the diversion works covered by this license within the bed, channel, or bank of the affected water body, the licensee shall enter into a streambed or lake alteration agreement with the State Department of Fish and Game. Licensee shall submit a copy of the agreement, or waiver thereof, to the Division of Water Rights prior to commencement of work. Compliance with the terms and conditions of the agreement is the responsibility of the licensee.

This license is granted and the licensee accepts all rights herein confirmed subject to the following provisions of the Water Code:

Section 1625. Each license shall be in such form and contain such terms as may be prescribed by the State Water Board.

Section 1626. All licenses shall be under the terms and conditions of this division (of the Water Code).

Section 1627. A license shall be effective for such time as the water actually appropriated under it is used for a useful and beneficial purpose in conformity with this division (of the Water Code) but no longer.

Section 1628. Every license shall include the enumeration of conditions therein which in substance shall include all of the provisions of this article (of the Water Code) and the statement that any appropriator of water to whom a license is issued takes the license subject to the conditions therein expressed.

Section 1629. Every licensee, if he accepts a license, does so under the conditions precedent that no value whatsoever in excess of the actual amount paid to the State therefor shall at any time be assigned to or claimed for any license granted or issued under the provisions of this division (of the Water Code), or for any rights granted or acquired under the provisions of this division (of the Water Code), in respect to the regulation by any competent public authority of the services or the price of the services to be rendered by any licensee or by the holder of any rights granted or acquired under the provisions of this division (of the Water Code) or in respect to any valuation for purposes of sale to or purchase, whether through condemnation proceedings or otherwise, by the State or any city, city and county, municipal water district, irrigation district, lighting district, or any political subdivision of the State, of the rights and property of any licensee, or the possessor of any rights granted, issued, or acquired under the provisions of this division (of the Water Code).

Section 1630. At any time after the expiration of twenty years after the granting of a license, the State or any city, city and county, municipal water district, irrigation district, lighting district, or any political subdivision of the State shall have the right to purchase the works and property occupied and used under the license and the works built or constructed for the enjoyment of the rights granted under the license.

Section 1631. In the event that the State, or any city, city and county, municipal water district, irrigation district, lighting district, or political subdivision of the State so desiring to purchase and the owner of the works and property cannot agree upon the purchase price, the price shall be determined in such manner as is now or may hereafter be provided by law for determining the value of property taken in eminent domain proceedings.

STATE WATER RESOURCES CONTROL BOARD

ORIGINAL SIGNED BY
JOHN O'HAGAN FOR:

Victoria A. Whitney, Chief
Division of Water Rights

Dated: FEB 24 2010

APPENDIX J

MITIGATION TABLE

SUSCOL MOUNTAIN VINEYARDS MITGATION TABLE

	Impact/Resource											
	Biology								Geology		Archaeology	
Block #	Oaks and Notable Trees	Grassland	Plants	Wetlands	Seeps/Springs	Special Status Animals	Western Pond Turtle Movement	Wildlife Movement	Slope Stability and Landslides	Erosion and Sedimentation	Rock Walls	Other Resources
1	X			X			X				X	X
2				X							X	X
3A	X									X		
3B												
3D	X									X		
6	X		X					X				
7	X		X									
8A	X										X	
8B	X		X							X		
9A	X											
10A										X		
10B	X							X		X		
11A										X		
11B	X											
12A	X						X					
12B	X						X					
12C	X						X					
12D	X						X					
13	X						X					
14	X											
15A	X									X		
15B	X			X								
15C	X											
16A	X											
16B	X											
17	X									X		
18	X		X									
19A	X											
19B	X											
21A	X											
21B	X											
21C							X					
21D							X					
22	X									X		
23	X									X		
24A												
24B						X						
24C	X									X		
25						X						
26A								X				
26B	X							X				
26C												
27	X									X		
27C	X							X				
27D	X			X				X		X		
27E	X		X	X				X		X		
28	X							X		X		
29A	X							X		X		

SUSCOL MOUNTAIN VINEYARDS MITGATION TABLE

	Biology								Geology		Archaeology	
Block #	Oaks and Notable Trees	Grassland	Plants	Wetlands	Seeps/Springs	Special Status Animals	Western Pond Turtle Movement	Wildlife Movement	Slope Stability and Landslides	Erosion and Sedimentation	Rock Walls	Other Resources
29B	X							X		X		
30A	X			X							X	
30B	X										X	
31B	X						X					X
32	X		X									
33									X			
34A		X		X					X			X
34B	X	X		X			X		X			X
34C		X				X			X			
34D		X		X					X			
36A	X								X	X		
36B									X			
36C									X	X		
36D				X					X			
36E									X			
37									X			
38A				X	X		X		X			
38B									X			
38C							X		X			
39A									X			
39B									X			
40									X			
41		X							X			X
42	X							X	X			
43	X					X	X		X			
44A									X			
44B								X	X	X		
44C									X			
45				X	X	X	X		X			
46									X			

Notes:
Oaks and Notable Trees include any proposed blocks with tagged oak trees, Block 1 with large trees, and the nine acres of ridge top woodlands
Grassland includes Creeping Ryegrass and Wild Oats Grassland with 3% Purple Needlegrass and less than 5% Creeping Ryegrass
Plants include streamside daisy populations
Special Status Animals include the shrike, sparrow and pond turtle locations
Wetlands and Seeps/Springs information was from LSA field data
Slope Stability and Landslides information was from Gilpin data
Erosion and Sedimentation information was from USLE calculations for the project