4.4 HYDROLOGY AND WATER QUALITY

4.4.1 Introduction

This section describes existing hydrologic resources and water quality in and near the project site as well as project-related impacts on those resources. Following a description of existing conditions and regulations, potentially significant impacts associated with the proposed project are identified, along with mitigation measures to reduce project-related impacts. A water quality evaluation and groundwater pump test were undertaken by Hydrologic Systems, Inc. (HSI) and are incorporated into this section. Two hydrologic evaluations were developed to examine the change in runoff between the existing condition and the proposed vineyard condition. Both watershed runoff evaluations assessed watershed conditions and potential management impacts, as well as the results of the stream flow and runoff modeling. The first, completed by HSI, was conducted using the originally proposed project size of 175 acres corresponding to 31 blocks of vineyard, as opposed to the current project size of 161 acres or 27 blocks of vineyard. The complete text of the HSI hydrologic evaluation is provided in Appendix C.

Due to a reduction in project size (from 175 acres to approximately 161 acres), modification to the number and configuration of vineyard blocks, an additional hydrologic evaluation was completed. A WinTR-55 model was developed by Martin Trso, consulting geomorphologist, and is presented in Appendix B. This model examines five drainage basins for the change in surface runoff between the existing condition and the proposed vineyard condition, and offers a more detailed and site specific delineation of landscape characteristics. As this evaluation is consistent with recent EIR hydrologic evaluations and offers a more detailed landscape characterization, results of the WinTR-55 model are discussed and evaluated in this section.

4.4.2 Methodology

Developing the Base Condition

To establish a base condition from which to determine the hydrologic impact of the project, two watershed runoff models were developed to examine the change in runoff between the existing condition and the proposed vineyard condition.

HEC-HMS Modeling

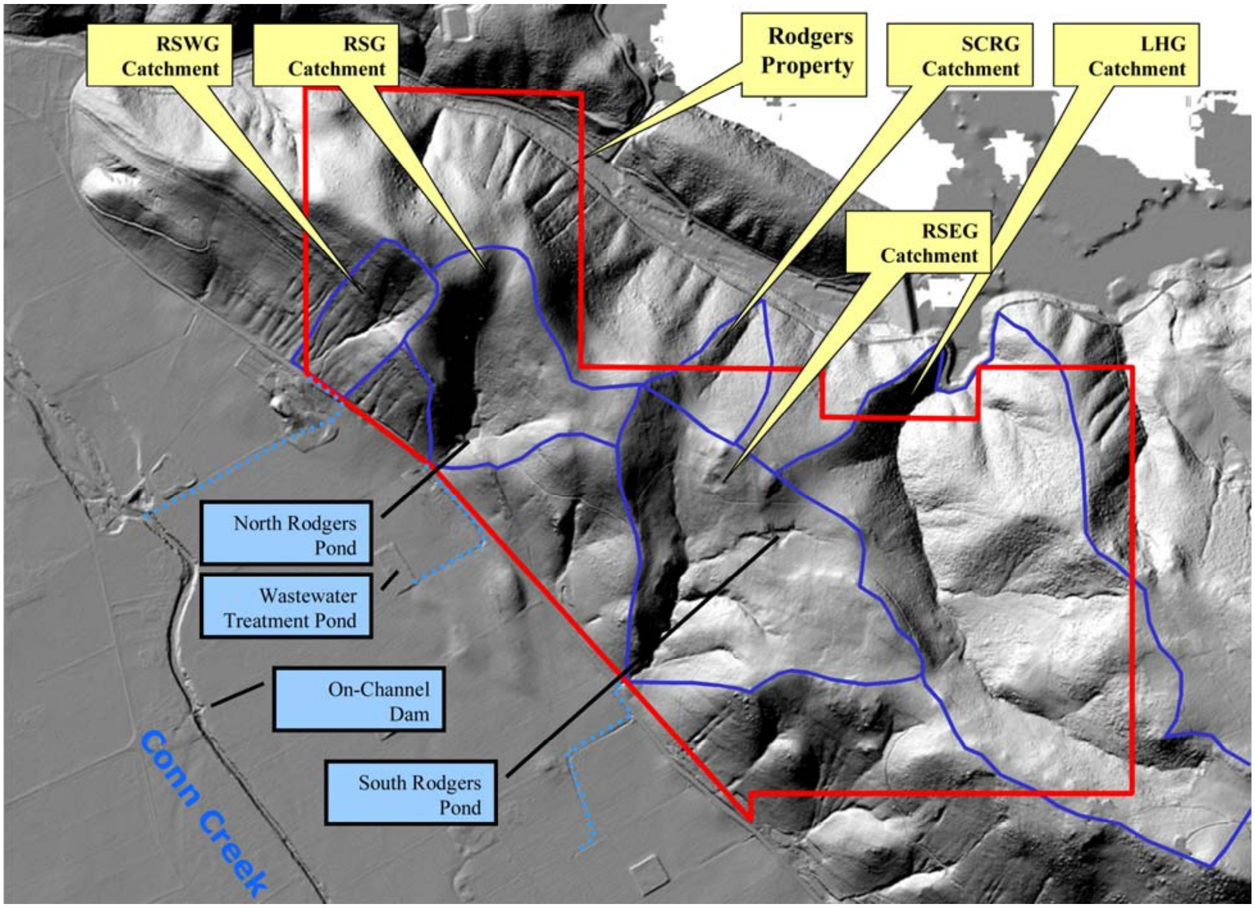
The first model was developed using a watershed study conducted for a vineyard conversion project in Southern Napa County (HSI 2005), the Mondavi Vineyard

Expansion Project. In this study, the US Army Corps of Engineers Hydrologic Modeling System (HEC-HMS) (USACOE 2000) was calibrated from existing conditions and measured precipitation and runoff data collected in the late winter and spring of 2003. Given the similarities of the geology, topography, and land use between the two projects, the calibrated parameters from the Mondavi Project were utilized in this analysis for both existing and proposed conditions. This runoff model was used to compute the pre- and post-project runoff for the 2-, 10-, and 100-year runoff events. The HEC-HMS model calculates the time variation in runoff from a watershed during a storm event. The natural topography of the basin was used to subdivide the watershed into functional drainage components taking into account land use and anthropogenic effects. For the purposes of the model, the property was divided into three drainage zones. Drainage Zone 1 drains into Lake Hennessey, Zone 2 drains into upper Conn Creek, and Zone 3 drains to storm drain ditches along Silverado Trail. The Lake Hennessey drainage represents the smallest watershed with portions of only seven proposed vineyard blocks while the Silverado Trail has the largest watershed with portions of 18 proposed vineyard blocks.

WinTR-55 Modeling

This updated runoff analysis utilized the NRCS United States Department of Agriculture (USDA) Technical Release 55 (TR-55) methodology (USDA-NRCS 2003). WinTR-55 is a single-event, rainfall-runoff, small watershed hydrologic model, which enables the calculations of storm runoff volume, peak rate of discharge, hydrographs, and storage volumes required for floodwater reservoirs. The program calculates the time for three flow types: sheet flow, shallow concentrated flow, and open channel flow. Sheet flow is flow over plane surfaces, occurs at the headwater of streams, and is less than 100 feet in length. The WinTR-55 methodology was used to generate volume and peak flow estimates for the project site.

The WinTR-55 model was applied to five intermittent drainages: 1) the Rodgers Southwest Gulch catchment (24.4 acres), 2) the Rodgers South Gulch catchment (52.5 acres), 3) the Rodgers Southeast Gulch catchment (107.8 acres), 4) the Lake Hennessey Gulch catchment (231.2 acres), and 5) the Sage Canyon Road Gulch catchment (20.4 acres). Figure 4.4-1 outlines the location of each basin. This basin configuration is the same used in the erosion and sedimentation analysis. It was used to calculate the pre- and post-project peak flows for the 2-, 5-, 10-, 25-, 50-, and 100-year return period 24-hour storm events, for both the on-site and off-site conditions. The runoff parameters were adjusted to reflect the existing land-use and the proposed development of 161.3 acres of vineyard on the Rodgers property.



Source: Trso 2006

Figure 4.4-1 Watershed Delineation and Connectivity to Neighboring Waterbodies.
Note: RSWG: Rodgers Southwest Gulch; RSG: Rodgers South Gulch; SCRG: Sage Canyon Road Gulch; RSEG: Rodgers Southeast Gulch; LHG: Lake Hennessey Gulch.

Under the current conditions, the land-use and cover characteristics within the watershed boundary of the Rodgers Southwest Gulch catchment are: 20.5 acres of open stands of oak woodland open space, and 3.9 acres of open stands of oak woodland proposed for conversion. The area-weighted curve number for this watershed is 85. Within the Rodgers South Gulch catchment, the land-use and cover characteristics are: 1.0 acres of grassland open space, 0.3 acres of grassland proposed for conversion, 37.2 acres of moderately dense oak woodland open space, and 14.0 acres of moderately dense oak woodland proposed for conversion. The area-weighted curve number for this watershed is 83. Within the Rodgers Southeast Gulch catchment, the land-use and cover characteristics are: 1.3 acres of grassland open space, 16.3 acres of grassland proposed for conversion, 49.0 acres of moderately dense oak woodland open space, and 41.3 acres of moderately dense oak woodland proposed for conversion. The area-weighted curve number for this watershed is 85.

Within the watershed boundary of the Lake Hennessey Gulch catchment, the land-use and cover characteristics are: 8.2 acres of grassland open space, 2.8 acres of grassland proposed for conversion, 10.0 acres of pasture (located off-site), 133.2 acres of open stands of oak woodland (including 13.7 acres located off-site), 15.6 acres of moderately dense oak woodland proposed for conversion, and 61.4 acres of brush. The area-weighted curve number for this watershed is 85.

Within the Sage Canyon Road Gulch catchment, the land-use and cover characteristics are: 14.4 acres of dense oak woodland open space (including 4.7 acres located off-site), and 6.1 acres of dense oak woodland proposed for conversion. The area-weighted curve number for this watershed is 82.

Because of natural landforms and man-made ponds downstream of the Rodgers property, about 50% of the property area draining to the southwest is fully disconnected from Conn Creek and Napa River for the delivery of runoff and sediment. The portion of the project site that drains to the southwest via road culverts and storm drains across Silverado Trail (except for the Rodgers Southwest Gulch catchment) is largely disconnected from Conn Creek/Napa River. The Rodgers Southeast Gulch catchment (107.8 acres), which is located in the southeastern portion of the project site, is naturally disconnected along the valley alluvial fan. The Rodgers South Gulch catchment (52.5 acres), which is located in the southern portion of the project site, is fully disconnected due to the presence of a wastewater treatment pond near Conn Creek. While the Rodgers Southwest Gulch catchment (24.4 acres), which is located in the southwestern portion of the project site, is fully connected via a storm drain upstream the Ponti Lane road crossing. For more information on drainage basins and characteristics, see Appendix B.

4.4.3 Existing Conditions

Climate and Precipitation

During the summer months, Napa County is protected from the hot weather of the Central Valley of California by the coastal mountain ranges. The Pacific Ocean provides a source of cool, moist marine air, which holds the temperature at a moderate level. The average daily maximum temperature in July is 82^{o}F at the City of Napa. Peak summer temperatures can reach into the low 100's. Average minimum temperatures in the winter are in the 30's but can be as low as 15^{o}F. Mean annual rainfall is 24.28

inches, with the majority of rain falling between November and March. The wettest and driest months are February and July, with average precipitation values 4.39 and 0.02 inches respectively.

Surface Water

Surface waters in the project area are limited to ephemeral streams and two stock ponds. These drain to Lake Hennessey and Conn Creek to the north, and storm drain ditches along the Silverado Trail to the southwest. Most of the drainages eventually flow into the Napa River and San Pablo Bay.

Surface runoff characteristics in the project area depend on site-specific soil type, slope, land use, and geologic characteristics. The project area is dominated by soils exhibiting rapid to very rapid runoff potential with high hazard of erosion. A small area along Silverado Trail exhibits medium runoff potential. A more complete analysis of soils can be found in the Geology and Soil Summary Report (Appendix B) and Section 4.3 of this EIR.

Two stock ponds within the project area, one to the north and one to the south, have respective drainage areas of 0.17 square kilometers (km^2) and 0.03 km^2. Both were constructed circa 1972 and have been affected by sediment deposition from surrounding rangeland. For more information on these ponds see Appendix B.

Project Creeks

Ephemeral streams are the primary surface water in the project area. These seasonal creeks flow for relatively brief periods of time during and shortly after rain events. When they flow, ephemeral creeks can have significant influence on water quality and flooding downstream. These creeks also provide significant habitat benefits by increasing habitat diversity and forming wildlife corridors within the watershed. In general, the beneficial uses as defined by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) of a surface water body apply to all of its tributaries. Therefore, the beneficial uses of the ephemeral streams in the project area would be similar to those of Conn Creek listed below.

Nutrients, biochemical oxygen demand (BOD), coliform, and sediment are all existing potential water quality concerns in the project site drainages. While no water quality data for these contaminants have been collected, they are assumed present based on existing land uses, which include livestock grazing. Livestock can increase soil compaction, channel erosion, and runoff rates. On the project site, cattle grazing is likely to have caused some erosion and sediment delivery to Conn Creek. In addition, grazing can cause elevated nutrient, BOD, and coliform concentrations in receiving waters, particularly when riparian buffers have not been established to prevent direct fecal deposition in streambeds or to reduce surface runoff and erosion.

Lake Hennessey

Lake Hennessey is a 750-acre lake formed by the construction of Conn Dam in 1946. Located just north of the project site, with a 35,000-acre watershed, Lake Hennesey is a drinking water supply reservoir for the City of Napa. The City of Napa withdraws water from an intake located along the northern bank of the reservoir near Conn Dam. Lake Hennessey is fed primarily by Conn Creek from the north, and Sage and Chiles Creeks from the southeast.

Conn Creek

Conn Creek is located below Conn Dam, flows adjacent to the project site and is a major tributary of the Napa River. The beneficial uses of Conn Creek, as defined by the SFBRWQCB, include cold freshwater habitat, freshwater replenishment, fish migration, municipal and domestic supply, water contact recreation, non-contact water recreation, fish spawning, and wildlife habitat (SFBRWQCB 1995).

Napa River

The Napa River is one of the largest Central Coast Range Rivers draining 426 square miles on its 50-mile journey from Mt. St. Helena to the San Pablo Bay. The Napa River and its 47 tributaries serve as important wildlife corridors. The watershed has intensive agriculture practices as well as being partially urbanized. The beneficial uses of Napa River include cold freshwater habitat, agricultural supply, fish migration, municipal and domestic supply, navigation, preservation of rare and endangered species, water contact recreation, non-contact water recreation, fish spawning, warm freshwater habitat, and wildlife habitat (SFBRWQCB 1995). The Napa River is currently listed on the state's 303(d) list of impaired water bodies for sediment, nutrients, and pathogens, and Total Maximum Daily Load (TMDL) programs are in progress for sediment and nutrients. These TMDL's are applicable to all of the tributaries of the Napa River and therefore include Conn Creek, and the unnamed ephemeral creeks in the project area.

Groundwater

Napa County encompasses several groundwater basins, which collectively serve as the primary water source in unincorporated areas of the county. These basins include the North Napa Valley Basin, Milliken-Sarco-Tulucay (MST) Basin, Carneros Valley Basin, Cappell Valley Basin, and the Pope Valley Basin. The beneficial uses of groundwater in the Napa Valley Basin include municipal and domestic supply, industrial service supply, industrial process supply, and agricultural supply (SFRWQCB 1995).

The annual groundwater recharge for the 678-acre project site is estimated to be 305 acre-feet/year. This is based on a mean annual precipitation of 26.4 inches, a mean annual runoff of 7 inches per year and an evapotranspiration rate of 14 inches per year (HSI 2005).

Flooding

Napa County is subject to flooding from many factors including levee failure, high tides, creek overflow, excess rainfall, tsunamis, and seiches. Because the project site is located on elevated ground with a range of slopes, most of these factors do not affect the site. The potential for flooding downstream of the project site is primarily due to the potential for excessive rainfall and surface runoff during major storm events. The FEMA Flood Insurance Rate Map shows that a portion of the project area is located within the 100-year floodplain of Conn Creek just downstream of Conn Dam (FEMA 1980). This segment of Conn Creek traverses the northwest corner of the project area.

Previously, Silverado Trail has experienced flooding issues; however, these issues have recently been resolved. Napa County Department of Public Works (DPW) performed maintenance operations that have eliminated flooding concerns on along the road.

Relying on the updated WinTR-55 hydrologic evaluation, peak discharge rates and volume for the existing condition and the post-development conditions were evaluated. This report is found in Appendix B. Peak discharge rates (see Table 4.4-1) for existing conditions were calculated based on the rainfall during the 2-, 5-, 10-, 25-, 50-, and 100-year rain events as calculated from historical hourly rainfall data collected at Atlas Road (No. E20 0368) and Atlas Peak (No. E30 0372) precipitation gauges.

Table 4.4-1
Existing condition peak discharge (cfs)

Location	Storm Event Frequency					
	2-Yr	**5-Yr**	**10-Yr**	**25-Yr**	**50-Yr**	**100-Yr**
Rodgers SW Gulch	14.7	20.7	26.7	38.8	44.9	51.0
Rodgers South Gulch	29.5	42.2	55.3	81.8	95.1	108.4
Rodgers SE Gulch	63.1	88.5	114.4	166.7	192.8	219.1
Lake Hennessey Gulch	134.4	188.6	243.8	355.5	411.3	467.0
Sage Canyon Road Gulch	11.0	15.8	20.9	31.2	36.4	41.5

4.4.4 Regulatory Framework

Clean Water Act

The major federal legislation governing the water quality aspects of the project is the Clean Water Act (CWA). The objective of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The National Permit for Discharge Elimination System (NPDES), part of the CWA, prohibits discharges into navigable waters except in compliance with specified requirements and authorizations. The NPDES program regulates point sources and non-point sources of pollutant discharges. The Environmental Protection Agency delegated the implementation of this program to the State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards (RWQCBs).

Section 303(d)

The Total Maximum Daily Load (TMDL) Program is required under Section 303(d) provisions of the CWA. A TMDL represents the quantity of pollutants that a water body can receive without resulting in impacts to the designated beneficial uses of that water body. Under the current program, if a water body is designated "impaired" by a Regional Water Quality Control Board, then TMDL must be developed and implemented for the specific pollutant. The "impaired" status implies that the assimilative capacity of a particular water body for a specific pollutant has already been exceeded and any additional increment, however small, constitutes a significant cumulative impact. While many water bodies in California have been listed for various pollutants, very few TMDLs have actually been initiated. The San Francisco Bay RWQCB (SFBRWQCB) has identified waters that are polluted and need further attention to support their beneficial uses. The 303(d) list includes Napa River for nutrients, pathogens, and sedimentation/siltation.

Regional Water Quality Control Board

The State of California's Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code) provides the basis for water quality regulation within the state. The SWRCB administers water rights, water pollution control, and water quality functions throughout the state, while the RWQCBs conduct planning, permitting, and enforcement activities. The project area lies within the jurisdiction of the San Francisco Bay Regional Water Quality Control Board, Region 2 (SFBRWQCB).

The SFBRWQCB is responsible for the protection of beneficial uses of water resources within the San Francisco Bay Region. The SFBRWQCB uses planning, permitting, and enforcement authorities to meet this responsibility, and has adopted the San Francisco Region Water Quality Control Plan (Basin Plan) to implement plans, policies, and provisions for water quality management. Basin Plans are the regional water quality control plans required by both the CWA and Porter-Cologne Act. Beneficial uses of surface waters are described in the Basin Plan and are designated for major surface waters and their tributaries. The existing beneficial uses designated for the Napa River are agricultural, municipal, and domestic supply, cold freshwater habitat, fish migration, navigation, preservation of rare and endangered species, water contact and non-water contact recreation, fish spawning, warm freshwater habitat, and wildlife habitat (SFBRWQCB 1995).

The SFBRWQCB has also set water quality objectives for all surface waters in the region concerning bacteria, bioaccumulation, biostimulatory substances, color, dissolved oxygen, floating material, oil and grease, population and community ecology, pH, salinity, sediment, settleable material, suspended material, sulfide, tastes and odors, temperature, toxicity, turbidity, and un-ionized ammonia. Objectives for specific chemical constituents are also regulated dependent upon the beneficial use of the water body. Water quality objectives are also listed for groundwater, which include bacteria, organic and inorganic chemical constituents, radioactivity, and taste and odor.

The Porter-Cologne Act also requires waste dischargers to notify the RWQCBs of their activities through the filing of Reports of Waste Discharge (RWD) and authorizes the SWRCB and RWQCBs to issue and enforce waste discharge requirements (WDRs), NPDES permits, Section 401 water quality certifications, or other approvals. The RWQCBs also have authority to issue waivers to RWD/WDRs for broad categories of “low threat” discharge activities that have minimal potential for adverse water quality effects when implemented according to prescribed terms and conditions.

Under the NPDES, construction activities on one acre or more are subject to the permitting requirements of the NPDES General Permit for Discharges of Storm Water Runoff Associated with Construction Activity (General Construction Permit). The General Construction Permit requires the preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP) before construction can begin. The SWPPP includes specifications for best management practices that would be implemented during project construction to control degradation of surface water by preventing the potential erosion of sediments or discharge of pollutants from the construction area. However, SWPPPs are not required for agricultural activities such as vineyard installation. With regard to vineyard installation, the components of the erosion control plan would cover the requirements under the General Permit for Construction and Discharge of Stormwater.

Napa County Departments

The Napa County Flood Control and Water Conservation District (a part of the Napa County Department of Public Works) is also the overseeing agency for flood control for the project site. The Department of Public Works' Ordinance No. 627 provides for the control and management of the floodplains of all major streams in the unincorporated area of the county. This ordinance requires a permit for any acts that would alter the hydraulic characteristics of these watercourses (Napa County 2001). The District is also responsible for regulating the use of all waterways in the County and protecting them from alteration and obstruction that could create potential flood hazards and/or disturb riparian vegetation. The District reviews development proposals, issues permits, and enforces standards and regulations set forth in the Napa County Flood Plain Management Ordinance (No. 627 as amended).

The District also reviews storm drainage plans for effects of discharge on flooding potential downstream of development. Any storm drainage improvements are required to conform to the latest Napa County Road and Street Standards. The Napa County Road and Street Standards require 100-year storm events as the basis for storm drainage calculations. If a project cannot contain stormwater runoff on-site, the project sponsor would be required to perform a drainage study of the downstream areas from the point of the storm drain discharge.

The MST aquifer has been designated as a groundwater-deficient area by Napa County Environmental Management and Public Works Departments. Starting in September of 1999, Napa County required a groundwater permit for any new or improved groundwater pumping system within the MST aquifer. As part of the permit, applicants must prove that any new pumping system will not adversely affect the aquifer. This is done by performing a Water Availability Analysis. This analysis consists of a phased approach to determining if new or improved pumping will affect the aquifer.

Napa County Groundwater Conservation Ordinance

The Napa County Board of Supervisors has adopted the Napa County Groundwater Conservation Ordinance, which establishes permit requirements for groundwater withdraws. The ordinance is intended to abate the overdraft of groundwater reserves in Napa County through conservation. In addition, the ordinance is aimed at ensuring an adequate water supply for agriculture, Napa County's primary commerce.

Napa County General Plan

The Napa County General Plan (revised 2003) lists the following policies applicable to the project:

- Policy 1.10: The County will protect the public interest in drainage systems and water impoundments from sedimentation, siltation, and contamination and ensure that urban, agricultural and resource development projects utilize sound short-term and long-term erosion control measures,
- Policy 3.9: The County, working in conjunction with the Soil Conservation Service[1], will monitor hillside agricultural operations, and in conjunction with the Soil Conservation Service, establish standards for terracing, contour planting, and maintenance of permanent cover crops on slopes exceeding 15 percent.

The Conservation and Space Element (Napa County 1998) lists goals and policies that are intended to identify specific items of courses of action. The following policies apply to the proposed project:

I. Open Space for Preservation of Natural Resources
Napa River and its Tributaries:
a) Implement sediment reduction measures in sand and gravel operations and other high sediment producing land uses because soil nitrates stimulate oxygen-consuming algae in the river.
b) Encourage feasibility study of reclamation of wastewater as means of keeping adequate water flow to support fish life and reduce pollution of the river.
c) Prevent the removal of streamside vegetation to reduce the potential to increase water temperature and siltation and improve fishery habitat.
d) Promote good forest management.

II. Open Space for Managed Production of Resources
Goal: To improve the management and protection of the County's water resources.
Protection of Water Quality and Water Reservoirs
Planning Goal: Protect the County's watersheds and public water reservoirs to accomplish the following purposes: For clean drinking water, for public health and safety, for support of the eco-system, for recreation, for scenic beauty, and for open space.

Conservation Policies:
(a) Protect streams from encroachment by establishment of "Official Plan Lines", riparian woodland ordinances and protection procedures, stream

[1] The Soil Conservation Service is now known as the Natural Resources Conservation Service.

obstruction zoning, stream setbacks, flood plain zoning and other appropriate methods.

(b) Encourage flood control agencies to give full consideration to scenic, fish, wildlife, and other environmental benefits when computing costs of alternative methods of flood control.

(d) Adopt and enforce ordinances to prohibit grading and excavation unless it can be demonstrated that such activities will not result in soil erosion, silting of lower slopes, slide damage, flooding problems, severe cutting or scarring, or damage to wildlife and fishery habitats.

(e) Require retention of existing desirable vegetation along all intermittent and perennial streams.

(f) Require replanting and restoration of riparian vegetation as part of any discretionary permit or erosion control plan approved by the County.

Some portions of the project site have slopes greater than five percent; therefore, under Napa County Code Section 18.108.070, the proposed project would require a permit approval before any grading.

Napa County Code (Chapter 18.108 – Conservation Regulations)

Napa County Code 18.108 includes conservation regulations such as requirements for standard erosion control measures, provisions for intermittent or perennial streams, requirements for use of erosion hazard areas. This section of the code also defines streams and provides setbacks for earthmoving and land clearing for agricultural development.

Napa County Resource Conservation District

The Napa County RCD published the Napa River Watershed Owner's Manual in 1996. This manual lists the following objectives and recommendations that pertain to the proposed project:

Objective G: Reduce Soil Erosion

Recommendation G2: Reduce erosion resulting from agricultural activities. Agricultural activities in the Napa River watershed include grazing, viticulture, small farms and horticulture. Soil disturbance or vegetation removal as a result of agricultural activities can result in loss of topsoil and subsequent water quality degradation. Good agricultural management can also benefit water quality and wildlife habitat, and can contribute to the overall good health of the watershed. Sub-recommendations include:

G2.1. Emphasize erosion prevention over sediment retention as a priority in agricultural planning and operations.

G2.2. Promote the use of permanent vegetative ground cover in vineyards. Support research, demonstrations and technology exchange to refine cover crop technology for vineyards and orchards.

G2.3. Establish tree cover in unused areas to decrease erosion of topsoil.

G2.4. Maintain access roads and farm roads to control storm water runoff in agricultural areas. Utilize assistance from the USDA Natural Resource Conservation Service, or other erosion control professionals, for design of storm water runoff control on rural roads.

G2.5. Minimize wet weather vehicle traffic through or across agricultural areas, especially on hillsides.

G2.6. Provide adequate energy dissipaters for culverts and other drainage pipe outlets.

G2.7. Establish vegetated buffer strips along waterways.

G2.8. Develop grazing management plans to increase vegetation residue on rangeland.

4.4.5 Potential Impacts and Mitigation Measures

This section examines the potential for significant environmental impacts from the proposed project and determines if mitigation measures are needed.

Significance Criteria

The project site is not susceptible to inundation by seiche, tsunami, or mudflow. Therefore, there would be no impact associated with seiche, tsunami, or mudflow, and people or structures would not be exposed to a significant loss, injury, or death by such events.

There are no structures within the 100-year flood plain, therefore, there will be no impact related to placing structures in 100-year flood zones.

Napa County has not formally adopted thresholds of significance for assessing environmental impacts (Napa County 2004). The County, however, concludes that based on criteria derived from Appendix G of the CEQA Guidelines that the project would result in significant impact on the environment if it would:

- Violate any water quality standards or waste discharge requirements; create or contribute runoff water that would provide substantial additional sources of polluted runoff; or otherwise substantially degrade water quality;
- Substantially alter the existing drainage pattern of the project site in a manner that would result in flooding on- or off-site; place within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map structures that would impede or redirect flows; or expose people or structures to a significant risk of loss, injury or death involving flooding; or
- Substantially increase the volume or rate of surface runoff in a manner that would result in flooding on- or off-site;
- Substantially deplete groundwater supplies or interfere substantially with ground water recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table.

Impacts and Mitigation Measures

Impact 4.4-1: Water Quality (Less than Significant)

Installation of the ECPA and subsequent planting of the vineyard could introduce pollutants into the water that would violate water quality standards or discharge requirements. The two primary surface waters hydrologically connected to the project site, Conn Creek and Lake Hennessey, drain directly into the Napa River, the San Francisco Bay Estuary, and the Pacific Ocean. Any installation related impacts to local surface waters would also affect the regional watersheds. Installation of the ECPA and subsequent vineyard planting has the potential to cause erosion on the property. The use of heavy machinery, including grading vehicles, tractors and plows, would disturb soils, exposing them to the erosive forces of rain and wind. Furthermore, chemical spills associated with operation and maintenance of heavy machinery could potentially occur during ECPA installation and could be conveyed through groundwater or surface water to nearby streams.

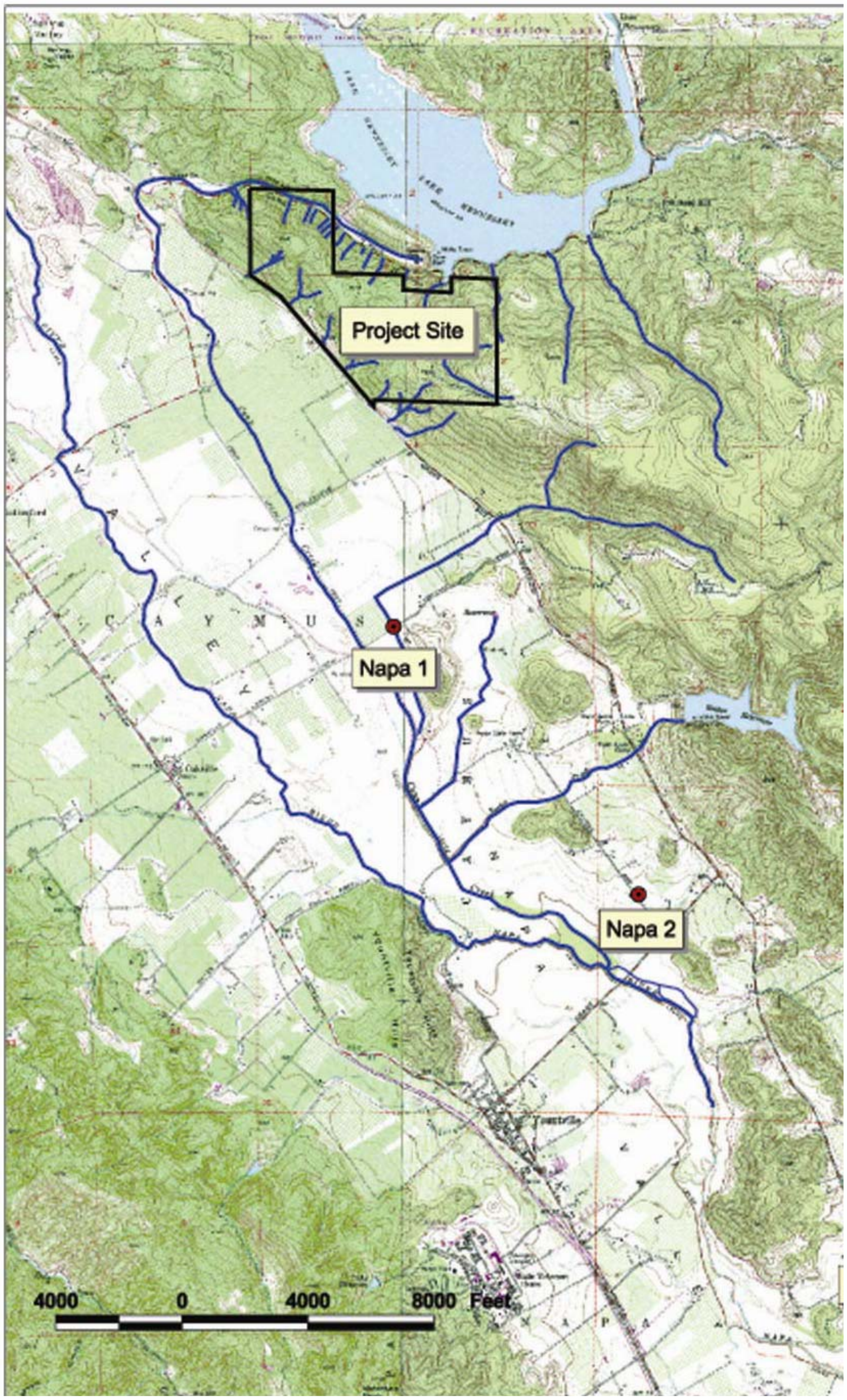
The project would incorporate several measures to minimize the potential for erosion and transport of pollutants during ECPA installation and subsequent vineyard planting activities. For example, the proposed vineyard area would be developed in areas with average slopes not greater than 30%. Water bars would be constructed along roads in the vineyard to divert concentrated flow from vineyard avenues. Straw bale dikes would also be used on the two watercourses between the last vineyard block and the blue-line streams. A permanent no-till cover crop would be used on all vineyard blocks and avenues and all areas would be seeded prior to September 1st to minimize the likelihood of rainfall generated runoff. Further, the ECPA incorporates stream setbacks between proposed vineyard blocks and streams. Following installation of the ECPA and planting of the vineyard, the sediment yield from the vineyard into the creeks and downstream from the project site would be less than under existing conditions (Appendix B).

In assessing these regulations as they pertain to the proposed project, the key regulatory issues whether the proposed project runoff would increase the temperature, the toxicity, or the total suspended sediment load to Conn Creek or Lake Hennessey. Due to the clearing of trees for the vineyard blocks, there exists a potential for elevated runoff temperatures to Lake Hennessey or Conn Creek. Trees provide shade to the runoff surfaces and ephemeral streams flowing from the property. Because the streams are ephemeral, runoff would occur only during the rainy season, which is typified by cool, cloudy weather. Therefore, it is unlikely that the project would contribute to a significant temperature increase in Conn Creek or Lake Hennessey.

If the proposed project would contribute to the toxicity in Conn Creek, Lake Hennessey, or the Napa River, it would likely occur as a result of adsorption of pollutants onto clay particles which are carried through the streams on the suspended sediment, or as direct runoff from the project to the receiving body. Very little published water quality data exists on runoff from existing vineyards. To provide for a better understanding of what contaminants may be in the runoff from the project site, runoff from similar vineyards in the vicinity of the Rodger Project were analyzed. Samples were collected near the end of the 2004 rainy season.

Three sites were sampled. The location of each site is shown on Figure 4.4-2. Each site is downstream of vineyard areas located on hillslopes similar to those found throughout the project area. The collected samples were analyzed for the following 6 parameters: Organochlorine Pesticides, Organophosphorus Pesticides, Chlorinated Herbicides, SVOC/Semi-Volatile Organic Compounds, Copper, and Sulfate. The first 4 parameters actually consist of a suite of analytes.

In total, the samples were analyzed for a total of 125 different pollutants, 19 Organochlorine Pesticides, 28 Organophosphorus Pesticides, 10 Chlorinated Herbicides, 68 Semi-Volatile Organic Compounds, Copper, and Sulphate. From the results of the testing, only 2 contaminants were found to exist in the runoff. Those contaminants are tabulated below.



Source: HSI 2005

Figure 4.4-2. Water Quality Sampling Sites from Surrounding Vineyards.

Table 4.4-2
Water quality results for a single sampling event from three existing vineyards in the vicinity of the project site.

Site	Contaminant	Type	Concentration	SFRWQCB Water Quality Objective
Napa 1	2,4-DB	Chlorinated Herbicide	0.25 ug/L	NA
Napa 2	2,4-DB	Chlorinated Herbicide	0.27 ug/L	NA
Napa 1	Sulfate	Anions	20 mg/L	250 mg/L
Napa 2	Sulfate	Anions	22 mg/L	250 mg/L
Napa 3	Sulfate	Anions	48 mg/L	250 mg/L

The RWQCB has not set surface water quality objectives for either of the identified pollutants. Pollutants discharged into Lake Hennessey can potentially contribute to drinking water quality degradation for the City of Napa. In order to evaluate the potential for water quality degradation the SFRWQCB's water quality objectives for municipal water supply was consulted. The sulfate concentration found on all three sites is well below the 250 mg/L listed as an objective for municipal water supply, while 2,4-DB or Butanoic acid is not a listed parameter.

The applicant can be expected to apply regulated pesticides and herbicides, which are commonly used in Napa County. If used according to the manufacturer's instructions, these applications would not result in substantial water quality impacts. In addition, there is a predicted decrease in sediment delivery from the site.

The details describing each analyte along with the complete water quality analysis report are provided in Appendix C.

Mitigation Measures: None required.

Impact 4.4-2. Construction Water Quality (Less than Significant)
Converting grassland and oak woodlands to operational vineyards could potentially degrade water quality, on-site and within downstream receiving water bodies, by significantly increasing the suspended sediment load and/or contributing other pollutants to the natural waterways.

Alteration of existing drainage patterns can significantly alter the sediment transport and floodplains within a watershed. In order to assess the potential impact on drainage patterns and erosion on site, a geology and soils analysis was prepared by Martin Trso, R.G. in 2006 (Appendix B). The results of this geomorphology study indicate that sediment yield from the site would be reduced under project conditions and that the ECP is sufficient (see Section 4.3 Geology and Soils for additional information).

Mitigation Measures: None required.

Impact 4.4-3: Groundwater Recharge and Consumption (Less than Significant)
Post ECPA installation, subsequent vineyard irrigation activities would not deplete groundwater supplies or interfere substantially with ground water recharge such that there would be a net deficit in aquifer volume or a substantial lowering of the local groundwater table. Annual groundwater consumption for the vineyard would be less than the annual recharge from the project site. The vineyard irrigation system would utilize water as efficiently as possible to minimize use of local groundwater resources through use of a drip irrigation system.

Well withdrawals for agricultural use could contribute to the depletion of aquifer volume and the lowering of groundwater tables. This could impact production from permitted wells in the area. In order to evaluate the significance of groundwater consumption, HSI assessed groundwater recharge as compared to consumptive water use rates (Appendix C). For CEQA purposes, the long-term average natural rainfall recharge rate of the groundwater body in question should be greater than or equal to the estimated consumptive water use rate.

The annual groundwater recharge rate was estimated using the annual water budget method. In this method, mean annual runoff and mean annual evapotranspiration were subtracted from mean annual precipitation to estimate the total amount of incident annual precipitation that is available for annual recharge. Given that the total acreage for the Upper Range is 678 acres, the total annual recharge is equal to 305 acre feet per year (ac-ft/yr).

Next, the consumptive water use rates for the proposed vineyard were calculated. Using the previously proposed project size of 175 acres, which offers a more conservative evaluation, and an estimated water use rate for the hillside vineyards of 9 in/ac/yr, the annual groundwater consumption is estimated to be 122 ac-ft/yr. Therefore, the annual groundwater recharge rate is greater than the consumptive water use by 183 ac-ft/yr. The estimated groundwater consumption for this particular parcel is only 40 percent of the available recharge.

In order to assess potential impact on groundwater recharge and production rate on nearby wells, HSI also performed a groundwater consumption analysis. A groundwater pump test was conducted at the project site. This test followed the protocol of the Napa County's "Phase II Water Availability Test". This test required that the proposed well be pumped at the proposed rate of the project, while simultaneously monitoring the water level in other wells adjacent to the project site. The monitoring of these adjacent wells showed that the pumped well had a minor effect on the water level in the adjacent wells. The pumped well showed a 230-foot drop during the pump test while the adjacent property owners well showed a 1.5-foot drop.

Mitigation Measures: None Required.

Impact 4.4-4: Flooding (Potentially Significant)

Installation of the ECPA and subsequent planting of the vineyard would alter the existing drainage pattern on the project site such that flooding would occur. Installation of the ECPA would result in an increase in volume and peak discharge in the Rodgers Southeast Gulch and the Sage Canyon Road Gulch catchments.

The conversion to a vineyard will affect the runoff characteristics of the site by changing the ground cover from that of the existing grassland/oak woodland habitats to row crops. To help control the runoff and erosion, the spaces between the vineyard rows would be planted with a permanent ground cover. Even with this inter-row planting, it would be expected that the runoff characteristics would change.

A WinTR-55 hydrologic model was used to evaluate volume and peak discharge for the project site. Table 4.4-3 and 4.4-7 detail the existing and proposed peak discharges for the 2-, 5-, 10-, 25-, 50-, and 100-year storm event and summarizes the change in percentages for each event and drainage area. For a detailed summary of the WinTR-55 model runs see Appendix B. These include the calculations of the time of concentration and the peak discharge by rainfall return period, a detailed summary of land-use and curve numbers, and the plots of modeled hydrographs.

Table: 4.4-3
Rodgers Southwest Gulch Watercourse, Existing and Post-Project Peak Discharge

Location	Storm Event Frequency					
	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Existing Conditions	14.7	20.7	26.7	38.8	44.9	51.0
Post-Project Conditions	14.7	20.7	26.7	38.8	44.9	51.0
Change (cfs)	0.0	0.0	0.0	0.0	0.0	0.0
Change (%)	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*

Table: 4.4-4
Rodgers South Gulch Watercourse, Existing and Post-Project Peak Discharge

Location	Storm Event Frequency					
	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Existing Conditions	29.5	42.2	55.3	81.8	95.1	108.4
Post-Project Conditions	29.5	42.2	55.3	81.8	95.1	108.4
Change (cfs)	0.0	0.0	0.0	0.0	0.0	0.0
Change (%)	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*

Table: 4.4-5
Rodgers Southeast Gulch Watercourse, Existing and Post-Project Peak Discharge

Location	Storm Event Frequency					
	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Existing Conditions	63.1	88.5	114.4	166.7	192.8	219.1
Post-Project Conditions	66.0	91.6	117.7	170.1	196.1	222.2
Change (cfs)	+2.9	+3.0	+3.3	+3.4	+3.3	+3.1
Change (%)	*+4.6*	*+3.5*	*+2.9*	*+2.0*	*+1.7*	*+1.4*

Table: 4.4-6
Lake Hennessey Gulch Watercourse, Existing and Post-Project Peak Discharge

Location	Storm Event Frequency					
	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Existing Conditions	134.4	188.6	243.8	355.5	411.3	467.0
Post-Project Conditions	134.4	188.6	243.8	355.5	411.3	467.0
Change (cfs)	0.0	0.0	0.0	0.0	0.0	0.0
Change (%)	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*

Table: 4.4-7
Sage Canyon Road Gulch Watercourse, Existing and Post-Project Peak Discharge

Location	Storm Event Frequency					
	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Existing Conditions	11.0	15.8	20.9	31.2	36.4	41.5
Post-Project Conditions	11.5	16.4	21.5	31.9	37.1	42.2
Change (cfs)	+0.5	+0.6	+0.6	+0.7	+0.7	+0.7
Change (%)	*+4.5*	*+3.8*	*+2.9*	*+2.2*	*+1.9*	*+1.7*

As presented in Tables 4.4-3, 4.4-4 and 4.4-6, the WinTR-55 hydrologic model indicates that there will be a zero increase in the peak flow discharge within and off the Rodgers property from the Lake Hennessy Gulch, Rodgers Southwest Gulch, and Rodgers South Gulch catchments during the 2-, 5-, 10-, 25-, 50-, and 100-year frequency storms, under the post-project conditions. Thus, there would be no runoff impacts to Lake Hennessey and the North Rodgers Pond, and to the on-site stream channel stability of the Lake Hennessey, Rodgers Southwest, and Rodgers South gulches.

As presented in Tables 4.4-5 and 4.4-7, increases in peak flow discharge were predicted to occur within and off the property from the Rodgers Southeast Gulch and the Sage Canyon Road Gulch catchments during the 2-, 5-, 10-, 25-, 50-, and 100-year frequency storms, under the post-project conditions. These increases are related to the slight increase in the curve number, and amount to about 3 cfs (Rodgers Southeast Gulch) and 0.6 cfs (Sage Canyon Gulch). In terms of a relative change, the increases range from 1.4% (the 100-year storm peak runoff) to 4.6% (the 2-year storm peak runoff). A 2.9% increase in runoff was predicted to occur during the 10-year frequency storms.

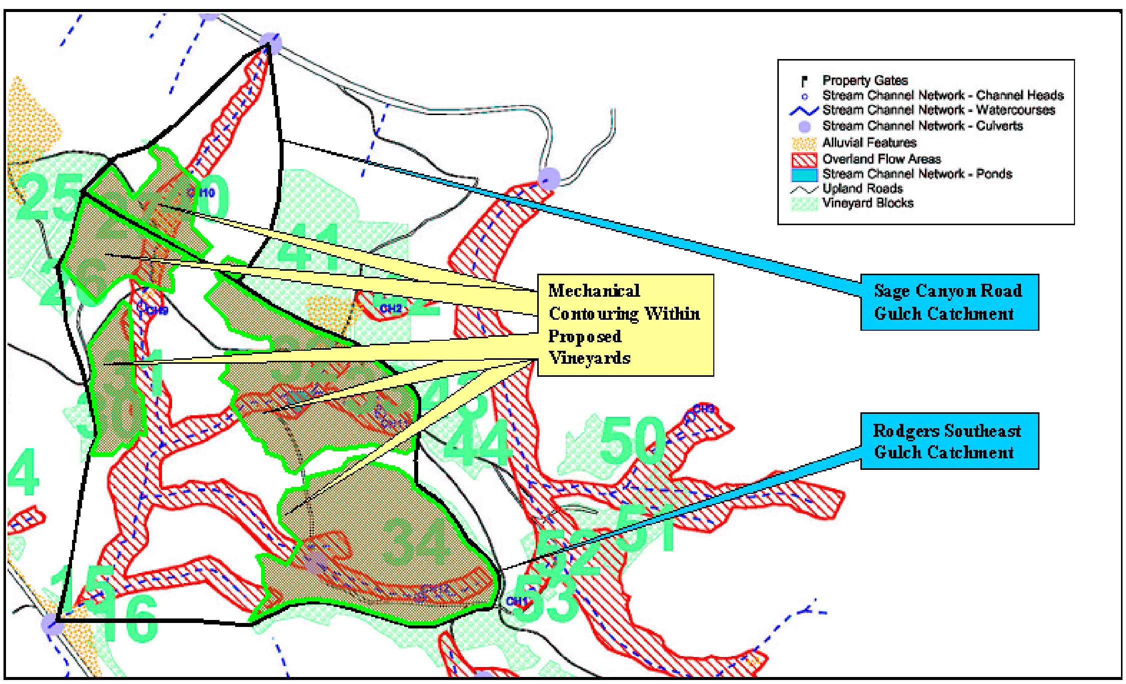
In terms of the total volume of runoff over an hour of peak flow, the predicted increases in the peak flows during a 24-hour, 100-year frequency storm event would amount to 0.3 acre-foot. Increases in the total volume of runoff are only found in the Rodgers Southeast Gulch catchment (0.26 acre-foot) and Sage Canyon Road Gulch catchment (0.06 acre-foot).

Peak discharge increases are predicted in two catchments, Rodgers Southeast Gulch and Sage Canyon Road Gulch, under the post-project conditions. Because of natural landforms, the Rodgers Southeast Gulch catchment is naturally disconnected from Conn Creek and Napa River. Therefore, there would be no runoff impacts to these waterbodies. Additionally, about 20% of the predicted increase in the catchment runoff would occur above the Rodgers South Pond, and therefore would be stored on-site.

However, Sage Canyon Road Gulch is fully connected to Conn Creek for delivery of runoff and sediment. Unless mitigated, the predicted increases within the Sage Canyon Road Gulch catchment would be transmitted to Conn Creek and the Napa River. Since Napa County DPW conducted maintenance operations along Silverado Trail, stormwater drainage is not an immediate concern.

These increases in peak discharge and volume were determined to be significant due to the proximity of Silverado Trail, Conn Creek and the Napa River.

Mitigation Measure 4.4-6. Mechanical Contouring
To mitigate for increased volume and peak flow runoff within the Rodgers Southeast Gulch and the Sage Canyon Road Gulch catchments, the applicant will incorporate mechanical contouring techniques for portions of the proposed vineyard blocks within the relevant catchments (Figure 4.4-3). Mechanical contouring involves the construction of subtle cross-slope, outsloped terrace benches. Such features prevent the concentration of runoff and promote infiltration. In addition, the soil would be amended to ensure the effectiveness of mechanical contouring in reducing volume and peak flow runoff. Assuming that the contouring would take place within the relevant



Source: Trso 2006

Figure 4.4-3. Areas of Mechanical Contouring within Portions of Proposed Vineyard Blocks.

catchment portions of the proposed vineyard blocks, two additional WinTR-55 model runs were performed. These model runs predicted there would be a zero increase in peak flow discharge within and off these two catchments, under the post-project conditions. The results of the peak flow discharge calculations, assuming installation of mitigation measures, are summarized in Tables 4.4-8 and 4.4-9.

Table: 4.4-8
Rodgers Southeast Gulch Watercourse, Existing and Post-Project (with mitigation) Peak Discharge

Location	Storm Event Frequency					
	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Existing Conditions	63.1	88.5	114.4	166.7	192.8	219.1
Post-Project Conditions	60.2	85.3	111.1	163.3	189.5	215.6
Change (cfs)	-2.9	-3.2	-3.3	-3.4	-3.3	-3.5
Change (%)	*-4.6*	*-3.5*	*-2.9*	*-2.0*	*-1.7*	*-1.4*

Table: 4.4-9
Sage Canyon Road Gulch Watercourse, Existing and Post-Project (with mitigation) Peak Discharge

Location	Storm Event Frequency					
	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Existing Conditions	11.0	15.8	20.9	31.2	36.4	41.5
Post-Project Conditions	11.0	15.8	20.9	31.2	36.4	41.5
Change (cfs)	0.0	0.0	0.0	0.0	0.0	0.0
Change (%)	0.0	0.0	0.0	0.0	0.0	0.0

As Table 4.4-8 details, a slight decrease in peak flows would occur within the Rodgers Southeast Gulch catchment, as the curve number for that catchment would decrease from 85 to 84 following the development of the vineyard. The decrease would range from 1.4% (the 100-year storm peak runoff) to 4.6% (the 2-year storm peak runoff). As shown in Table 4.4-9, within the Sage Canyon Road Gulch catchment, peak flows would not change from existing conditions following the installation of mitigation measures.

Significance After Mitigation. Less than significant