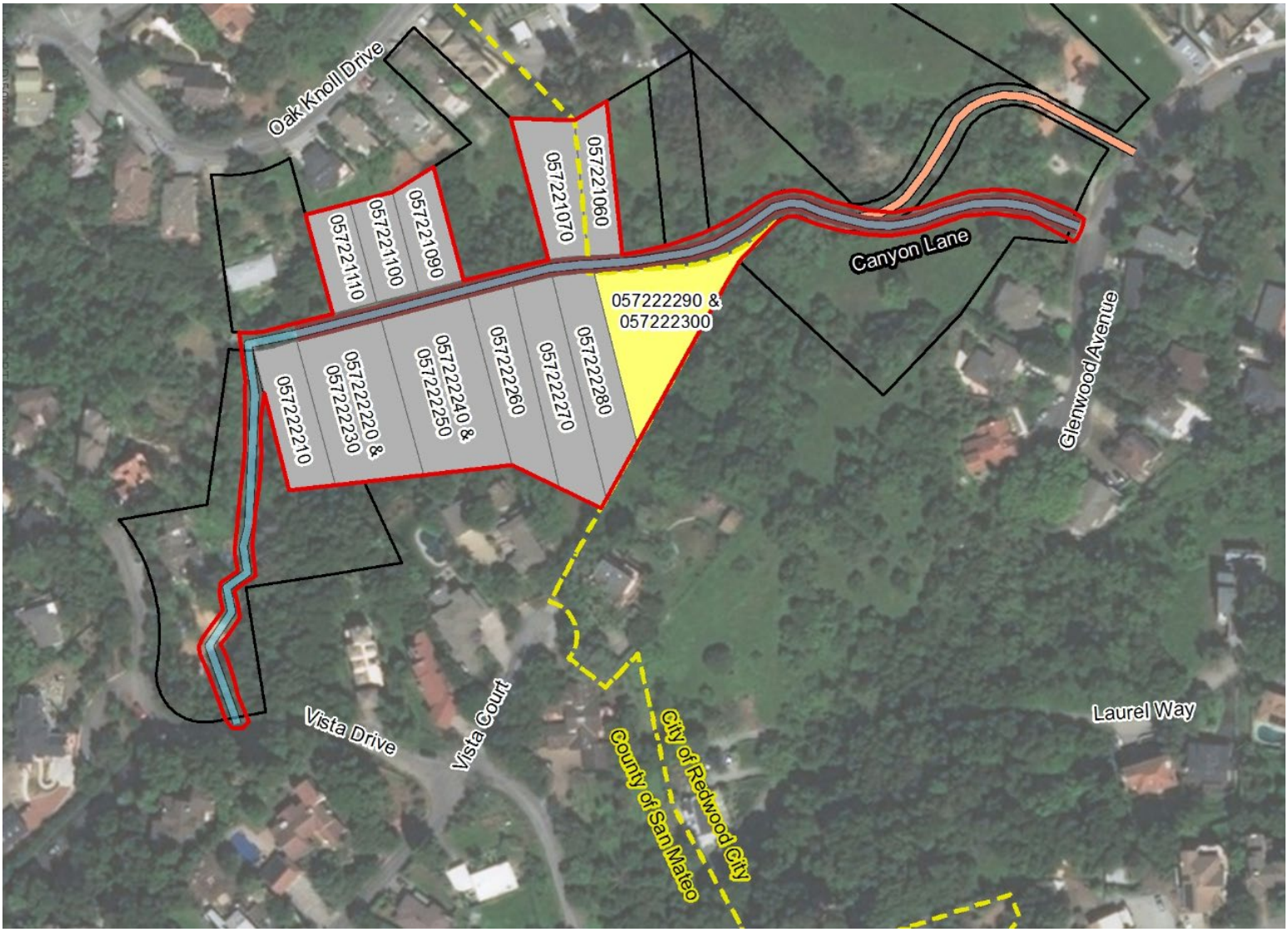


CANYON LANE ROADWAY IMPROVEMENTS DEVELOPMENT PROJECT

Draft Environmental Impact Report

September 2019

Prepared for:
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Abbreviations and Acronyms

Acronym	Term
AB	Assembly Bill
ABAG	Association of Bay Area Governments
AC	alternating current
AFY	acre-feet per year
ALUCP	Airport Land Use Compatibility Plan
AMI	Area Median Income
APNs	Assessor Parcel Numbers
BAAQMD	Bay Area Air Quality Management District
BGEPA	Bald and Golden Eagle Protection Act
BMPs	Best Management Practices
Btu	British thermal unit
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
Cal/EPA	California Environmental Protection Agency
CAL FIRE	California Department of Forestry and Fire Protection
Cal/OSHA	California Occupational Safety and Health Administration
CalRecycle	California Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CaRFG	California Reformulated Gasoline
CBRP	Comprehensive Bicycle Route Plan
C/CAG	City/County Association of Governments
CCR	California Code of Regulations
CDF	California Department of Forestry
CDFW	California Department of Fish and Wildlife
CDOC	California Department of Conservation
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CGS	California Geological Survey
CHRIS	California Historical Resources Information System
CIWMB	California Integrated Waste Management Board
CMA	Congestion Management Agency
CMP	Congestion Management Program

Acronym	Term
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources
CTP	Countywide Transportation Plan
CWA	Clean Water Act
CWPP	Community Wildfire Protection Plan
CY	cubic yards
dB	decibel
dBA	decibel A-weighting
dbh	diameter at breast height
DC	direct current
DOE	Department of Energy
DOSD	Division of Safety of Dams
DRRP	Diesel Risk Reduction Plan
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EECAP	Energy Efficiency Climate Action Plan
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
ESCP	Erosion and Sediment Control Plan
FAR	Floor Area Ratio
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FHSZ	fire hazard severity zone
FHWA	Federal Highway Administration
FMMP	Farmland Mapping and Monitoring Program
FTA	Federal Transit Administration
GHG	greenhouse gases
GIS	Geographical Information System
GPD	gallons per day
H_2S	Hydrogen sulfide
HAPs	Hazardous Air Pollutants
HCD	Housing and Community Development
HCP	Habitat Conservation Plan
HMBPs	Hazardous Materials Business Plans

Acronym	Term
HMMP	Habitat Mitigation and Monitoring Plan
HSWA	Hazardous and Solid Waste Act
HWCA	Hazardous Waste Control Act
Hz	Hertz
I-280	Interstate 280
IEPR	Integrated Energy Policy Report
IFC	International Fire Code
IFTDSS	Interagency Fuel Treatment Decision Support System
ITE	Institute of Transportation Engineers
kV	kilovolt
LAFCo	Local Agency Formation Commission
LACM	Natural History Museum of Los Angeles County
LEED	Leadership in Energy and Environmental Design
Leq	steady-state energy level
LID	Low Impact Development
LRA	Local Responsibility Areas
LUST	Leaking Underground Storage Tank
MBTA	Migratory Bird Treaty Act
MGD	million gallons per day
mg/L	milligrams per liter
MLD	Most Likely Descendant
MRP	Municipal Regional Stormwater Permit
MRZ	Mineral Resource Zones
MT/yr	metric tons per year
MW	megawatts
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NFIP	National Flood Insurance Program
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO_X	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NWS	National Weather Service
NRSC	Natural Resources Conservation Service

Acronym	Term
NWIC	Northwest Information Center
O_3	ozone
OES	Office of Emergency Services
OSHA	Occupational Safety and Health Administration
Pb	lead
PCE	Peninsula Clean Energy
PG&E	Pacific Gas and Electric Company
PM	particulate matter
$PM_{2.5}$	Fine Particulate Matter
PM_{10}	Coarse Particulate Matter
PPV	peak particle velocity
PRC	Public Resources Code
PRMMP	Paleontological Resources Monitoring and Mitigation Plan
PRPA	Paleontological Resources Preservation Act
RCFD	Redwood City Fire Department
RCPD	Redwood City Police Department
RCRA	Resource Conservation and Recovery Act
RH	Residential Hillside
RH/DR	Residential Hillside/Design Review
RHNA	Regional Housing Need Allocation
RMMP	Riparian Mitigation & Monitoring Plan
ROG	reactive organic gases
RPS	Renewable Portfolio Standard
RWQCB	Regional Water Quality Control Boards
SamTrans	San Mateo County Transit District
SARA	Superfund Amendments and Reauthorization Act
SB	Senate Bill
SFBAAB	San Francisco Bay Area Air Basin
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SFPUC	San Francisco Public Utilities Commission
SMARA	Surface Mining and Reclamation Act of 1975
SMCOA	San Mateo County Operational Area
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SO_2	sulfur dioxide
SPCC	Spill, Prevention, Control, and Countermeasure
SR 82	State Route 82
SRA	State Responsibility Area
SSC	Species of Special Concern
SVP	Society of Vertebrate Paleontology

Acronym	Term
SVCW	Silicon Valley Clean Water
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminant
TIRE	Traffic Infusion on Residential Environment
TMDLs	Total Maximum Daily Loads
TPP	Tree Protection Plan
TPZ	Timberland Preserve (Production) Zone District
TPZs	Tree Protection Zones
TPZ/CZ	Timberland Preserve (Production) Zone/District/Coastal Zone
UCMP	University of California Museum of Paleontology
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VdB	Vibration levels
VOCs	volatile organic chemicals
VPD	vehicles per day
VMT	vehicle miles travelled
WDRs	Waste Discharge Requirements
WEAP	Worker Environmental Awareness Program
WHO	World Health Organization
WWTP	wastewater treatment plant
ZNE	zero net energy

EXECUTIVE SUMMARY

1. INTRODUCTION AND PURPOSE OF THE EIR

The County of San Mateo (County), serving as the lead agency under the California Environmental Quality Act of 1970 (CEQA), has prepared this Environmental Impact Report (EIR) to assess the impacts that may result from approval of a Grading Permit to allow for the construction of the Canyon Lane Roadway Improvements Development Project (project). The County has approval authority and responsibility for considering the environmental effects of the project as a whole. The City of Redwood City (City) and San Mateo Local Agency Formation Commission (LAFCo) will serve as Responsible Agencies under CEQA.

The EIR will be used for the following discretionary approvals:

- Approval of a Grading Permit by the Planning Commission for the improvement of Canyon Lane, the construction of a single-span bridge across an unnamed creek at the north side of the roadway as part of a required turnaround area for emergency vehicles, and construction of one single-family residence;
- Design review approval by the Planning Commission;
- Variance approval by the Planning Commission for grading associated with a single-family residence where the grading quantity will exceed 1,000 cubic yards in the County's RH/DR Zoning District;
- Approval of an Outside Service Agreement by LAFCo and the City to extend Redwood City water service outside of City jurisdictional boundaries for a new (minimum) 8-inch water line.

2. PROJECT OBJECTIVES

The objectives (underlying purpose) identified for the project include those put forth by the Applicant as well as the County. The project objectives are as follows:

- To improve Canyon Lane in order to facilitate routine and emergency access to 12 parcels that would become developable. The objectives of the individual future property owners may vary, but, assuming project approval, owners of the lots could construct single-family homes in accordance with zoning restrictions, with any necessary subsequent environmental review, and after approval of all necessary planning and building permits.
- To provide housing, and the opportunity for future housing on lots associated with the project, on an underutilized site that is currently zoned for single-family housing.
- Assist in maximizing housing opportunities in San Mateo County, while maintaining the predominantly single-family character of the neighborhood.

3. PROJECT DESCRIPTION

The project involves the improvement of Canyon Lane and development of a single-family residence on one parcel. The improvements to Canyon Lane will create the potential for future development of residences on eleven parcels that are currently inaccessible and without services. Construction activities associated with the improvement of Canyon Lane would involve regrading and paving the existing gravel roadway into a 20-foot-wide paved roadway. Improvements to Canyon Lane would include adding a

stitch pier wall along the south side of the roadway, a turnaround for emergency vehicles, and a single-span bridge that would cross the intermittent Emerald Branch that traverses the project area. The roadway improvements would also include the construction of a minimum 8-inch water line that would extend approximately 1,050 linear feet to connect the water mains at Glenwood Avenue and Vista Drive to provide water service and fire protection to the 12 parcels. Other roadway utilities include a new underground 12 kilovolt (kV) distribution line and an existing sewer main underlying Canyon Lane. Stormwater on the roadway would be conveyed through a storm drain that runs east along the south side of Canyon Lane. Four catch basins with 9-inch side openings would be installed along the storm drain to facilitate drainage. Stormwater would flow into an approximately 161-foot-long biotreatment swale that would be installed near the base of Canyon Lane.

Construction activities associated with the singe-family residence would involve the construction of an approximately 3,847-square-foot single-family residence on a merged parcel (057-222-290 & 300) of approximately 16,151 square feet. The proposed residence would have a lot coverage of no more than 25 percent, Floor Area Ratio (FAR) of no more than 30 percent, and would comprise three levels: a garage level, a main level, and an upper level. Stormwater runoff collected on the property would be conveyed along a new storm drain installed within the backyard to the south of the residence. The storm drain would traverse the property, traveling from the western edge to the eastern edge, and would include a bioretention system near the western end of the storm drain. Sewer services would be provided to the property by a new lateral that would connect the property to the existing sewer main beneath Canyon Lane. Water would be provided by a new lateral that would connect to the proposed water line beneath Canyon Lane. Electricity would be provided by the new underground 12 kV distribution line.

The improvements to Canyon Lane would extend the road and utilities to 11 other existing legal parcels, which is reasonably expected to allow for the future development of the 11 remaining parcels; however, no development is currently proposed for these parcels. As required under CEQA Guidelines Section 15126.2(d), future development of these parcels is analyzed in the EIR as a growth-inducing and reasonably foreseeable impact as a result of the project.

The project area is located on approximately 3.8 acres within the Emerald Lake Hills area of the County. The project area is located along Canyon Lane east of Lower Emerald Lake and west of George L Garrett Jr. Memorial Park (Garrett Park) and encompasses 12 undeveloped parcels. One parcel (APN 057-221-060) is located within the City and the 11 remaining parcels (APNs 057-221-070, 057-221-090, 057-221-100, 057-221-110, 057-222-210, 057-222-220 & 230, 057-222-240 & 250, 057-222-260, 057-222-270, 057-222-280, 057-222-290 & 300) are located within the unincorporated County.

4. AREAS OF PUBLIC CONTROVERSY

The County held a public scoping meeting at the County Planning and Building Department on December 18, 2018. The Notice of Preparation review period closed on January 10, 2019. The purpose of the meeting was to inform the public on the environmental review process and to receive public comment on the scope of the EIR. Oral and written comments were received from the public. Comments were received on the following topics:

- **Biological Resources**
    - Adequacy of any proposed tree mitigation measures that do not account for the maturity and size of the trees being removed as part of the project.
    - Biological and aesthetic value that would be lost when replacing mature trees with immature trees.
    - Impacts on special-status plant species.

  - Potential adverse effects to riparian areas and wildlife species resulting from tree removal and grading activities.

- **Land Use**
  - The City of Redwood City's authority and approval over the realignment of Canyon Lane.
- **Population and Housing**
  - The impacts from population growth resulting from the project and similar housing projects occurring in the area.
- **Wildfire**
  - The potential wildfire risks associated with siting a project within a canyon with limited entry and exit points.
- **Hydrology and Water Quality**
  - The potential threats to life and property resulting from the failure of the Emerald Lake Dam. The integrity of the dam was also called into question due to its age and constructed material.
  - Potential impacts to water quality associated with the Hetch Hetchy water system.
  - Potential impacts to drainage patterns and water quality that would result from grading activities along the roadway and at all 12 parcels.
  - The effects of climate change and increased rainfall intensity on flooding hazards and water releases associated with Emerald Lake Dam.
- **Noise**
  - The potential for the canyon's ability to influence and amplify sound generated during construction and operation of the project.
  - The effect of tree removal on noise generated during construction and operation of the project.
- **Transportation and Traffic**
  - The increased traffic that would be generated by the project and the potential to increase congestion on local roadways that are already operating at high levels of service, thus making ingress and egress into the Emerald Hills area more difficult.
- **Recreation**
  - Potential recreational impacts to the community from any restricted public access to Canyon Lane. Canyon Lane is informally used for dog walking and hiking, and is perceived as an extension of nearby George L Garrett Jr. Memorial Park (Garrett Park).
- **Utilities and Service Systems**
  - Potential impacts to the existing sewer system.
- **Other Topics**
  - The potential for the project to affect the rights to release water from Emerald Lake into the ephemeral stream.
  - Access to the stream for California Department of Water Resources inspections related to the Emerald Lake Dam.

Prior to the EIR scoping meeting and initiation of the CEQA process, the County facilitated a pre-application workshop for the proposed project on August 4, 2016. Concerns over the project were the same as those listed above.

5. SIGNIFICANT ENVIRONMENTAL IMPACTS IDENTIFIED

The scope of the EIR includes an analysis of all potential environmental impacts associated with the project and alternatives for the project. The EIR includes an analysis of the following resource areas:

- Aesthetics
- Agriculture and Forestry
- Air Quality
- Biological Resources
- Cultural Resources (including Tribal Cultural Resources)
- Energy
- Geology and Soils
- Greenhouse Gases
- 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
- Wildfire

Impacts of the project and alternatives have been classified using the following categories:

- **Significant, unavoidable, adverse impacts:** This determination applies to adverse effects that exceed the applicable significance criteria and that cannot be fully and effectively mitigated. No measures could be taken to avoid or reduce these adverse effects to insignificant or negligible levels.
- **Significant, but mitigable impacts:** This determination applies if the project would result in an adverse effect that exceeds the applicable significance criterion for a significant impact, but feasible mitigation measures are available that would eliminate the impact or reduce it to a less-than-significant impact. These impacts are potentially similar in significance to significant, unavoidable, adverse impacts, but can be substantially reduced or avoided by the implementation of mitigation measures.
- **Less than significant impacts:** This impact determination applies when there is a potential for some limited impact, but not a substantial adverse effect that qualifies under the applicable significance criterion as a significant impact. Mitigation measures may still be required for these impacts as long as there is rough proportionality between the environmental impacts caused by the Project and the mitigation measures imposed on the project.

Potentially significant impacts and mitigation measures are summarized below and provided in Table ES-1, Summary of Impacts and Mitigation Measures. The table includes all identified potentially significant impacts, which are identified with an impact number (e.g., AES Impact 1).

Project Impacts

Potential project impacts and associated mitigation measures are summarized in Table ES-1.

6. PROJECT ALTERNATIVES

Criteria used to develop a reasonable range of alternatives included the potential to avoid significant impacts and whether or not the considered alternative could generally meet the project objectives. Identified alternatives are summarized below.

Alternative 1: Reduced Roadway

The Reduced Roadway Alternative would limit the roadway improvement activities to approximately 550 feet. The Reduced Roadway Length Alternative would be sufficient to reach the proposed single-family residence. Because the roadway would not reach the developable parcels, only the proposed single-family residence would be constructed as part of the project. The Reduced Roadway Alternative would include an emergency-vehicle turnaround designed and constructed in accordance with the California Fire Code (Title 24, Part 9 of the California Code of Regulations).

Table ES-1. Summary of Project Impacts

Resource Area	Significant and Unavoidable	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Impact Summary	Mitigation Number
Aesthetics	☐	☒	☐	☐	1. The project would remove existing vegetation, including 43 trees 2. The project would result in the introduction of new light to the area	1. AE/mm-1 2. AE/mm-2
Agricultural and Forestry	☐	☐	☐	☒	No agricultural or forest resources are present on the project area	Not Applicable (NA)
Air Quality	☐	☒	☐	☐	The project would create fugitive dust emissions	AQ/mm-1.1
Biological Resources	☒	☐	☐	☐	1. The project could potentially impact the bent-flowered fiddleneck 2. The project could potentially impact the San Mateo Wooly Sunflower 3. The project could potentially impact San Francisco dusky-footed woodrat nests 4. The project could potentially impact the western pond turtle 5. The project could potentially impact nesting birds 6. The project could potentially impact roosting bats 7. The project could promote invasion of non-native species 8. The project would result in the removal of 32 trees within the riparian zone along Canyon Lane as well as within the proposed water line installation area 9. The project could potentially impact potentially jurisdictional water features 10. The project could potentially impact protected trees, as defined by the Redwood City Tree Preservation Ordinance and the San Mateo County Significant Tree Ordinance	1. BIO/mm-1.1-1.3 2. BIO/mm-2.1-2.2 3. BIO/mm-3.1-3.3 4. BIO/mm-4.1 5. BIO/mm-5.1-5.3 6. BIO/mm-6.1 7. BIO/mm-7.1 8. BIO/mm-8.1-8.3 9. BIO/mm-9.1-9.2 10. BIO/mm-10.1-10.3
Cultural Resources	☐	☒	☐	☐	1. The project would have the potential to result in unanticipated discoveries of subsurface archaeological resources 2. The project has the potential to result in unanticipated discoveries of subsurface human remains	1. CUL/mm-1.1 2. CUL/mm-2.1
Energy	☐	☐	☒	☐	The project would not result in wasteful, inefficient, or unnecessary consumption of energy.	NA
Geology and Soils	☐	☒	☐	☐	1. The project could expose people or structures to substantial adverse effects involving seismic hazards, resulting in potentially significant impacts. 2. The project could result in substantial soil erosion or the loss of topsoil 3. The project could cause the destruction of paleontological resources, resulting in potentially significant impacts.	1. GEO/mm-1.1-1.2 2. GEO/mm-1.3 3. GEO/mm-1.4-1.5
Greenhouse Gas	☐	☒	☐	☐	The project would require the use of construction equipment and worker vehicles that would generate GHG emissions	GHG/mm-1.1-1.3
Hazards and Hazardous Materials	☐	☒	☐	☐	Construction of the project would involve the routine use, transport, storage, and disposal of hazardous materials, which could potentially expose the public, construction workers, and the environment to potentially hazardous materials	HAZ/mm-1.1
Hydrology and Water Quality	☒	☐	☐	☐	The project would risk the release of pollutants due to project inundation by the failure of the Emerald Lake Lower Dam	NANA
Land Use and Planning	☐	☐	☒	☐	The project is consistent with land use plans and policies and would obtain a variance for grading limit exceedances	NA
Mineral Resources	☐	☐	☐	☒	No mineral resources are located in the project area	NA
Noise	☐	☒	☐	☐	The project would result in temporary elevate noise levels during construction activities	NOI/mm-1.1-1.2
Population and Housing	☐	☐	☒	☐	The project would result in increases in population and housing consistent with planned population and housing growth	NA
Public Services	☐	☐	☒	☐	The project would result in negligible increases in demand for public services	NA
Recreation	☐	☐	☒	☐	The project would result in negligible increases in demand for recreational facilities	NA
Transportation and Traffic	☐	☐	☒	☐	The project would result in an increase in vehicle trips and vehicle miles traveled; however, it would not conflict with circulation, nor result in a hazard or inadequate emergency access	NA

Utilities and Service Systems	☐	☐	☒	☐	The project would result in negligible increases in demand for utilities and service systems	NA
Wildfire	☐	☒	☐	☐	Project construction activities could spark a wildfire in an area subject to prevailing westerly winds and within a high fire hazard severity zone The proposed single-family residence and Canyon Lane improvements would not exacerbate wildfire risk	WF/mm-1.1-1.3

Alternative 2: Annexation

The Annexation Alternative would involve the annexation of the unincorporated area of the project area into the City prior to the occurrence of development. Under the Annexation Alternative, the project would be subject to the City's zoning and land use requirements.

No Project Alternative

The No Project Alternative would maintain existing conditions at the project area. No construction of the single-family residence or roadway improvements would occur. As a result, the other 11 parcels would remain inaccessible and would be unlikely to develop in the near term. As such, no environmental impacts would occur. However, the lots could be developed at a future time, subject to extension of the road and necessary services, and, in some cases, a process to confirm the legality of the lot. The No Project Alternative would fail to meet any of the project objectives and underlying purpose. The No Project Alternative would not provide residential development and opportunities for future development, would not provide routine and emergency access to any of the developable parcels and proposed single-family residence, and would not assist in maximizing housing opportunities in San Mateo County, while maintaining the predominantly single-family character of the neighborhood.

7. ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA requires the alternatives section of an EIR to describe a reasonable range of alternatives to the project that avoid or substantially lessen any of the significant effects identified in the EIR analysis while still attaining most of the basic project objectives. The alternative that most effectively reduces impacts while meeting project objectives should be considered the "environmentally superior alternative." In the event that the No Project Alternative is considered the Environmentally Superior Alternative, the EIR should identify the Environmentally Superior Alternative among the other alternatives.

The No Project Alternative is the Environmentally Superior Alternative, as it would avoid all impacts of the project and would not create any new significant impacts of its own. However, the No Project Alternative would fail to contribute toward meeting the County's Regional Housing Needs Assessment allocations identified in Table 3.14-5 in Chapter 3.14, Population and Housing, and would not benefit local communities through creation of jobs, demand for local goods and services, and increased sales and use tax revenue. Additionally, the No Project Alternative also would fail to meet any of the basic project objectives, including the provision of housing and routine and emergency access to developable parcels. Since the Environmentally Superior Alternative is the No Project Alternative, the Reduced Roadway Alternative was identified as the Environmentally Superior Alternative among the other alternatives based strictly on an analysis of the relative environmental impacts.

The Reduced Roadway Alternative would substantially reduce impacts to biological resources and would require less ground disturbance and impervious hardscaping. However, the significant and unavoidable impact related to flooding hazards cannot be reduced to a less-than-significant level under this alternative. This alternative would only partially meet the project objectives, as it would fail to maximize housing opportunities within the County and facilitate future development of residentially-zoned property. Further, this alternative's contribution towards the County's Regional Housing Needs Assessment allocation and General Plan goals would be reduced when compared to the Project.

The Annexation Alternative may change the scale of the single-family residences associated with the future developable parcels, as the City's Residential Hillside Zoning District--a zoning designation that

would likely apply to the Annexation Alternative—allows for a substantially greater lot coverage allowance (40 percent) than the proposed project and has no maximum FAR. Because the Annexation Alternative may result in the construction of larger residences, this alternative could result in greater impacts to some environmental resources. This alternative would not avoid or substantially reduce any of the potentially significant effects of the project and is, therefore, not considered an environmentally superior alternative.

CHAPTER 1. INTRODUCTION

1.1 EIR PROCESS

The County of San Mateo (County), serving as the Lead Agency under the California Environmental Quality Act (CEQA), has prepared this Environmental Impact Report (EIR) to assess the impacts that may result from approval of a Grading Permit, Design Review, and Variance to allow for the construction of the Canyon Lane Roadway Improvements Development Project (project). The project involves the improvement of Canyon Lane, development of a single-family residence on one parcel, and the construction of new utilities, including a water line that would loop-in with an existing water line within the City of Redwood City and an underground electrical distribution line and stormwater infrastructure. As a result of the road improvements and utility extensions, the project has the potential to lead to future development of residences on eleven parcels.

The EIR will be used by the County, general public, and responsible agencies to review and evaluate the environmental effects associated with the project and the potential mitigation measures recommended to address or minimize those effects.

1.2 NOTICE OF PREPARATION

In compliance with the CEQA Guidelines, the County has taken steps to provide opportunities for the public to participate in the environmental process. The County distributed a Notice of Preparation on December 10, 2018, to various agencies, organizations, and interested persons throughout the County and surrounding area. The project was described, the scope of the environmental review was identified, the date and location of the public scoping meeting was provided, and agencies and the public were invited to review and comment on the Notice of Preparation.

1.3 PUBLIC SCOPING

The County held a public scoping meeting at the County Planning and Building Department on December 18, 2018. The Notice of Preparation review period closed on January 10, 2019. The purpose of the meeting was to inform the public on the environmental review process and to receive public comment on the scope of the EIR. Oral and written comments were received from the public. Comments were received on the following topics:

- **Biological Resources**
    - Adequacy of any proposed tree mitigation measures that do not account for the maturity and size of the trees being removed as part of the project.
    - Biological and aesthetic value that would be lost when replacing mature trees with immature trees.
    - Impacts on special-status plant species.
    - Potential adverse effects to riparian areas and wildlife species resulting from tree removal and grading activities.
- **Land Use**
    - The City of Redwood City's authority and approval over the realignment of Canyon Lane.

- **Population and Housing**
    - The impacts from population growth resulting from the project and similar housing projects occurring in the area.
- **Wildfire**
    - The potential wildfire risks associated with siting a project within a canyon with limited entry and exit points.
- **Hydrology and Water Quality**
    - The potential threats to life and property resulting from the failure of the Emerald Lake Dam. The integrity of the dam was also called into question due to its age and constructed material.
    - Potential impacts to water quality associated with the Hetch Hetchy water system.
    - Potential impacts to drainage patterns and water quality that would result from grading activities along the roadway and at all 12 parcels.
    - The effects of climate change and increased rainfall intensity on flooding hazards and water releases associated with Emerald Lake Dam.
- **Noise**
    - The potential for the canyon's ability to influence and amplify sound generated during construction and operation of the project.
    - The effect of tree removal on noise generated during construction and operation of the project.
- **Transportation and Traffic**
    - The increased traffic that would be generated by the project and the potential to increase congestion on local roadways that are already operating at high levels of service, thus making ingress and egress into the Emerald Hills area more difficult.
- **Recreation**
    - Potential recreational impacts to the community from any restricted public access to Canyon Lane. Canyon Lane is informally used for dog walking and hiking, and is perceived as an extension of nearby George L Garrett Jr. Memorial Park (Garrett Park).
- **Utilities and Service Systems**
    - Potential impacts to the existing sewer system.
- **Other Topics**
    - The potential for the project to affect the rights to release water from Emerald Lake into the ephemeral stream.
    - Access to the stream for California Department of Water Resources inspections related to the Emerald Lake Dam.

Prior to the EIR scoping meeting and initiation of the CEQA process, the County facilitated a pre-application workshop for the proposed project on August 4, 2016. Concerns over the project were the same as those listed above.

1.4 KEY AREAS OF ENVIRONMENTAL CONCERN

The scope of the EIR includes an analysis of all potential environmental impacts associated with the project and alternatives for the project. The EIR includes an analysis of the following resource areas:

- Aesthetics
- Agriculture and Forestry
- Air Quality
- Biological Resources
- Cultural Resources (including Tribal Cultural Resources)
- Energy
- Geology and Soils
- Greenhouse Gases
- 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
- Wildfire

1.5 EIR CONTENTS

The EIR is divided into the following major sections:

Executive Summary. Provides a brief summary of the project background, description, impacts, and mitigation measures.

Introduction. Provides the purpose of the EIR, as well as scope, content, and the use of the document.

Project Description. Provides the general background of the project, objectives, a detailed description of the project characteristics, and a listing of necessary permits and government approvals.

Environmental Impacts Analysis. Discusses the environmental setting as it relates to the various issue areas, regulatory settings, thresholds of significance, impact assessment and methodology, project-specific impacts and mitigation measures. The EIR analyzes the potentially significant impacts to all resource topics identified in the 2018 amendments to the CEQA Guidelines.

Alternatives to the Project. Describes the objectives for the project and provides an evaluation of a reasonable range of alternatives that could feasibly avoid or lessen any significant environmental impacts consistent with project objectives.

Other CEQA Considerations. Describes cumulative and growth-inducing impacts resulting from implementation of the project, together with reasonably anticipated future projects that may have related or cumulative impacts. This chapter also describes any significant environmental effects that cannot be avoided and any significant irreversible environmental changes.

Appendices. Includes the NOP for this EIR, comments received in response to the NOP, project plans submitted by the Applicant, and background technical material.

1.6 CEQA LEAD AND RESPONSIBLE AGENCIES

San Mateo County will serve as the Lead Agency under CEQA and will prepare the EIR in its role as the principal agency responsible for approving the project (CEQA Statute Section 21067). The City of Redwood City and the San Mateo Local Agency Formation Commission (LAFCo) will serve as Responsible Agencies under CEQA. The City of Redwood City and LAFCo are responsible for authorizing and approving the City's eight-inch water line extension outside of the City's jurisdictional boundaries.

CHAPTER 2. PROJECT DESCRIPTION

2.1 BACKGROUND

2.1.1 Project Background

Canyon Lane was created as part of the Emerald Lake Park subdivision, as a private roadway easement, recorded in the County Office of the County Recorder in 1920. Construction of Canyon Lane was never completed and, as such, it is what is commonly referred to as a "paper street." In the early 1980s, the City of Redwood City (City) built George L Garrett Jr. Memorial Park (Garrett Park) on several publicly owned parcels located near the intersection of Glenwood Avenue and Canyon Lane, where the front portion of the Canyon Lane paper street had been established. This portion of the private roadway easement will be realigned to follow the portion of constructed gravel roadway south of Garrett Park that was a result of a sewer main the County installed in the late 1970s to early 1980s.

2.1.2 Project Location

2.1.2.1 Regional Setting

The project area is located within the Emerald Lake Hills area of San Mateo County (see Figure 2-1, Project Vicinity). San Mateo County (County) is situated along the central coast of California and encompasses approximately 554 square miles (including tidal waters) of the San Francisco Peninsula. The County's western border is on the Pacific Ocean and the eastern border is on the San Francisco Bay shoreline. The County is bounded by the City and County of San Francisco to the north and by Santa Cruz and Santa Clara Counties to the south and southeast, respectively.

The Santa Cruz Mountain Range traverses the County in a north-south direction, effectively dividing the County into two distinct regions: the Coastside and the Bayside. The Coastside is characterized by coastal terraces transitioning into gently sloping foothills of the Santa Cruz Mountains. The Bayside is characterized by low-lying mudflats, marshes, artificial fill, and broad, flat alluvial plains. Farther west, this low-lying region transitions into the foothills of the Santa Cruz Mountains, increasing in slope to 15 to 30 percent near its crest. The project area is located within the foothills of the Bayside of the Santa Cruz Mountains.

2.1.2.2 Local Setting

The project is located along Canyon Lane east of Lower Emerald Lake and west of Garrett Park (see Figure 2-2, Project Location). The project area encompasses approximately 3.8 acres of land and comprised of 12 privately owned parcels and a gated, dead-end gravel roadway (Canyon Lane). One parcel (APN 057-221-060) is located within the City and the 11 remaining parcels (APNs 057-221-070, 057-221-090, 057-221-100, 057-221-110, 057-222-210, 057-222-220 & 230, 057-222-240 & 250, 057-222-260, 057-222-270, 057-222-280, 057-222-290 & 300) are located within unincorporated San Mateo County. Other private ownership parcels located adjacent to Canyon Lane are not included in the project area as they have either already been developed with single-family residences or they are City-owned parcels associated with Garrett Park, and as such their development is not a reasonably foreseeable result of approval of the subject application. The project area includes construction staging areas and vehicle parking areas, as well as a single-span bridge along Canyon Lane that would facilitate emergency vehicle turnaround. The project area boundary is depicted in Figure 2-3, Proposed Project.

Lower Emerald Lake sits on a 5-acre parcel and includes a swimming lake created by an earthen dam. The swimming lake is fed by seasonal creeks. Water released from the lake is discharged into an intermittent creek (the Emerald Branch) that flows parallel to Canyon Lane where it eventually reaches Garrett Park, a 6.9-acre park with playground facilities, picnic areas, and barbeque facilities to the east of the project area.

The project is located within the Emerald Lake Park subdivision, which was recorded in the County Office of the County Recorder in 1920. The subdivision includes 59 residential lots bounded by Oak Knoll Drive to the north, Vista Drive to the south, Glenwood Avenue to the east, and Lower Emerald Lake to the west.

The project area is situated within a hillside canyon, surrounded by single-family residential homes scattered throughout the adjacent hillsides. The project area, minus the gravel roadway, is undeveloped and consists of oak forest, grassland, and the intermittent Emerald Branch that runs parallel to Canyon Lane. None of the 12 parcels have been extensively graded or developed and thus maintain the natural slope and vegetation of the hillside canyon.

Canyon Lane is an approximately 10-foot-wide gravel roadway that begins at Glenwood Avenue (an improved public roadway located within the City) and extends west approximately 550 feet before crossing into the jurisdictional boundary of the County. The gravel road continues for approximately 0.19 mile to its terminus. Currently, a gate blocks vehicles from entering the unimproved roadway.

The project area is zoned RH/DR (Residential Hillside/Design Review) for portions within the County and RH (Residential Hillside) for portions within the City. The project area has a General Plan land use designation of Low-Density Residential within the County. The 12 parcels range in size from approximately 5,790 to 19,370 square feet, as shown in Table 2-1, Parcel Size.

Table 2-1. Parcel Size

Assessor Parcel Number	*Approximate Square Footage*
057-221-060	6,419
057-221-070	9,285
057-221-090	6,604
057-221-100	5,790
057-221-110	6,057
057-222-210	8,534
057-222-220 & 230	17,760
057-222-240 & 250	19,370
057-222-260	10,570
057-222-270	12,183
057-222-280	11,156
057-222-290 & 300	16,673

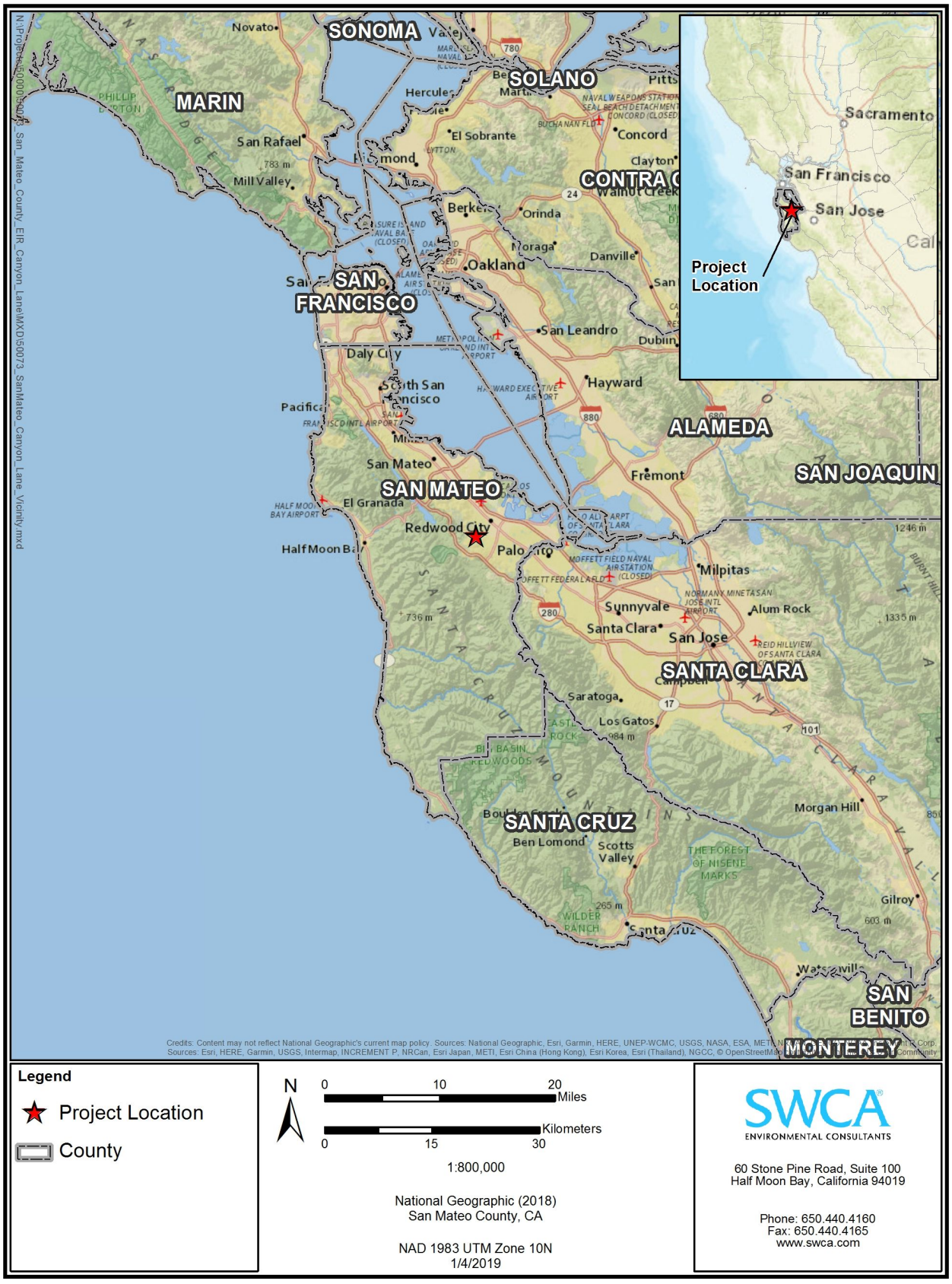


Figure 2-1. Project Vicinity

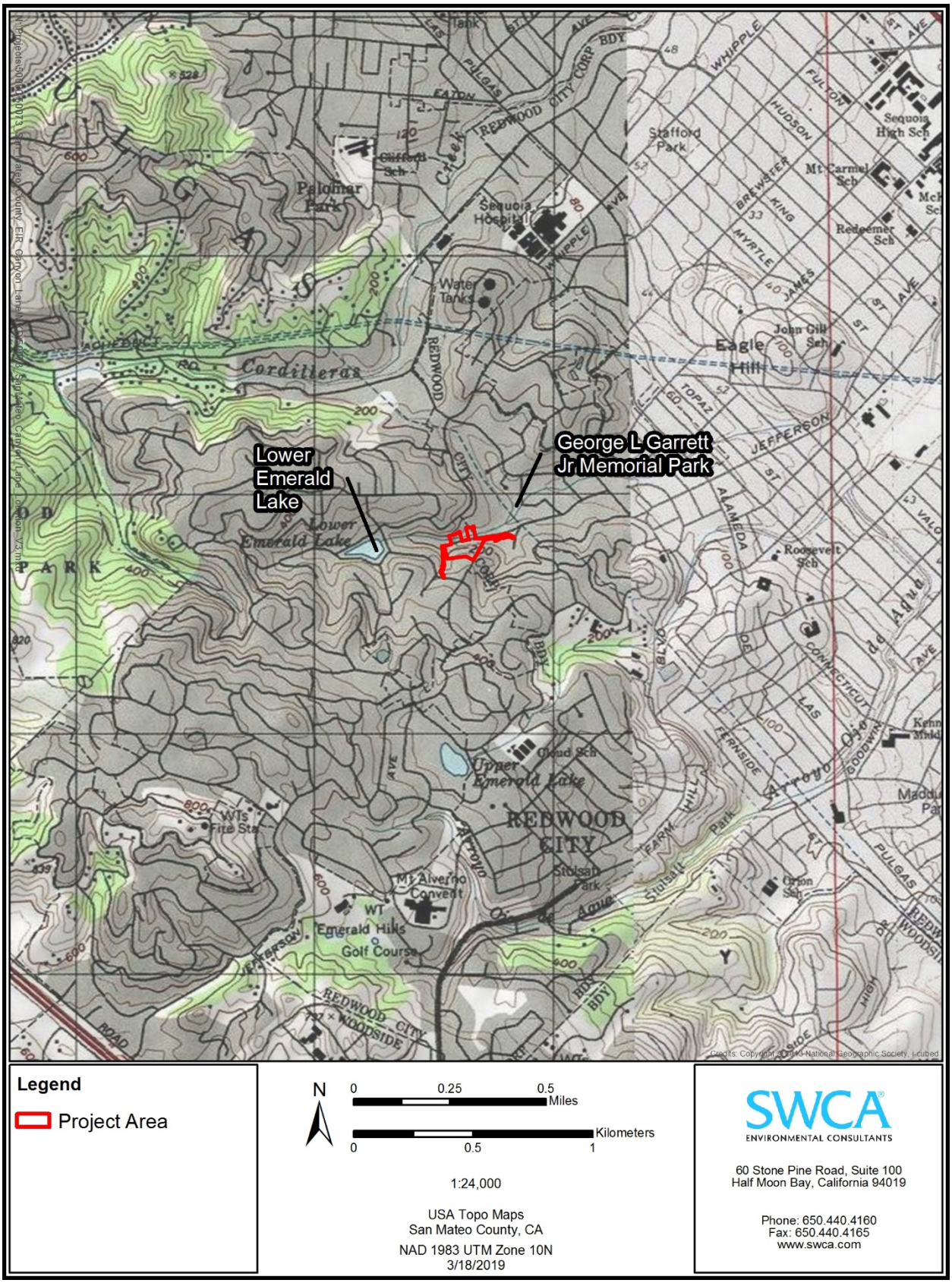


Figure 2-2. Project Location Map

2.2 PROPOSED PROJECT

2.2.1 Canyon Lane Improvements

The proposed project involves the realignment and improvement of Canyon Lane and the construction of a single-family residence on one parcel. The road improvements would support the future development of the 11 remaining parcels, which are currently undeveloped.

Construction activities associated with the improvement of Canyon Lane would involve regrading and paving the existing gravel roadway into a 20-foot-wide paved roadway. To achieve the roadway improvements, the project would disturb slightly less than 1 acre of land and would result in a road grade ranging from 0.5 to 12.1 percent. The Canyon Lane improvements would involve approximately 1,145 cubic yards of cut and 60 cubic yards of fill. Approximately 22,000 square feet of impervious roadway surface would be created.

Improvements to Canyon Lane would include adding a stitch pier wall along the south side of the roadway, a turnaround for emergency vehicles, and a single-span bridge that would cross the intermittent Emerald Branch that traverses the project area. The stitch pier wall would extend on the southside of Canyon Lane from Glenwood Avenue to the end of the roadway improvements. An easement for an emergency vehicle turnaround would be recorded on two parcels (APNs 057-222-240 & 250 and 057-222-260). The emergency vehicle turnaround would meet the specifications provided in the California Fire Code and County Road standards for a 120-foot hammerhead turnaround. The bridge would be constructed and maintained in accordance with the American Association of State Highway and Transportation Officials Standard HB-17, which provides design specifications and maintenance requirements for bridges and elevated surfaces used as part of a fire apparatus access road.

As depicted in Figure 2-3, Proposed Project, improvements would also include the construction of a minimum 8-inch water line that would extend approximately 1,050 linear feet to connect the water mains at Glenwood Avenue and Vista Drive to provide water service and fire protection to the 12 parcels. A trench would be excavated to support the installation of the water line. The water line would be installed within an existing 15-foot-wide easement. The water line extension would require authorization and approval by the City and the San Mateo Local Agency Formation Commission (LAFCo), as water service would be supplied by the City Water Department. Once the water line has been installed, the trench would be backfilled with on-site soils and replanted with native vegetation.

Stormwater on the roadway would be conveyed through a storm drain that runs east along the south side of Canyon Lane. Four catch basins with 9-inch side openings would be installed along the storm drain to facilitate drainage. Stormwater would flow into an approximately 161-foot-long biotreatment swale that would be installed near the base of Canyon Lane. The biotreatment swale would include an 18-inch layer of bioretention soil designed to treat runoff before it infiltrates into groundwater.

Construction activities associated with the roadway improvements would remove 34 existing trees (25 trees within the County and 9 trees within the City). (The trees slated for removal and protection are identified in the Applicant-prepared Arborist Reports [Appendix A].) Tree protections, such as straw waddles wrapped around tree trunks to a height of 6 feet and orange barrier fences installed around tree bases, would be installed prior to any grading activities at trees along the outer boundary of the disturbed area. A total of 84 trees would be planted following construction (75 within the County and 9 within the City), per Section 12, 024 of the County Municipal Code and the City's Tree Preservation Ordinance. These trees would be caged for the first year to protect them from herbivores, and irrigated until established as evidenced by vigorous top growth in the spring.

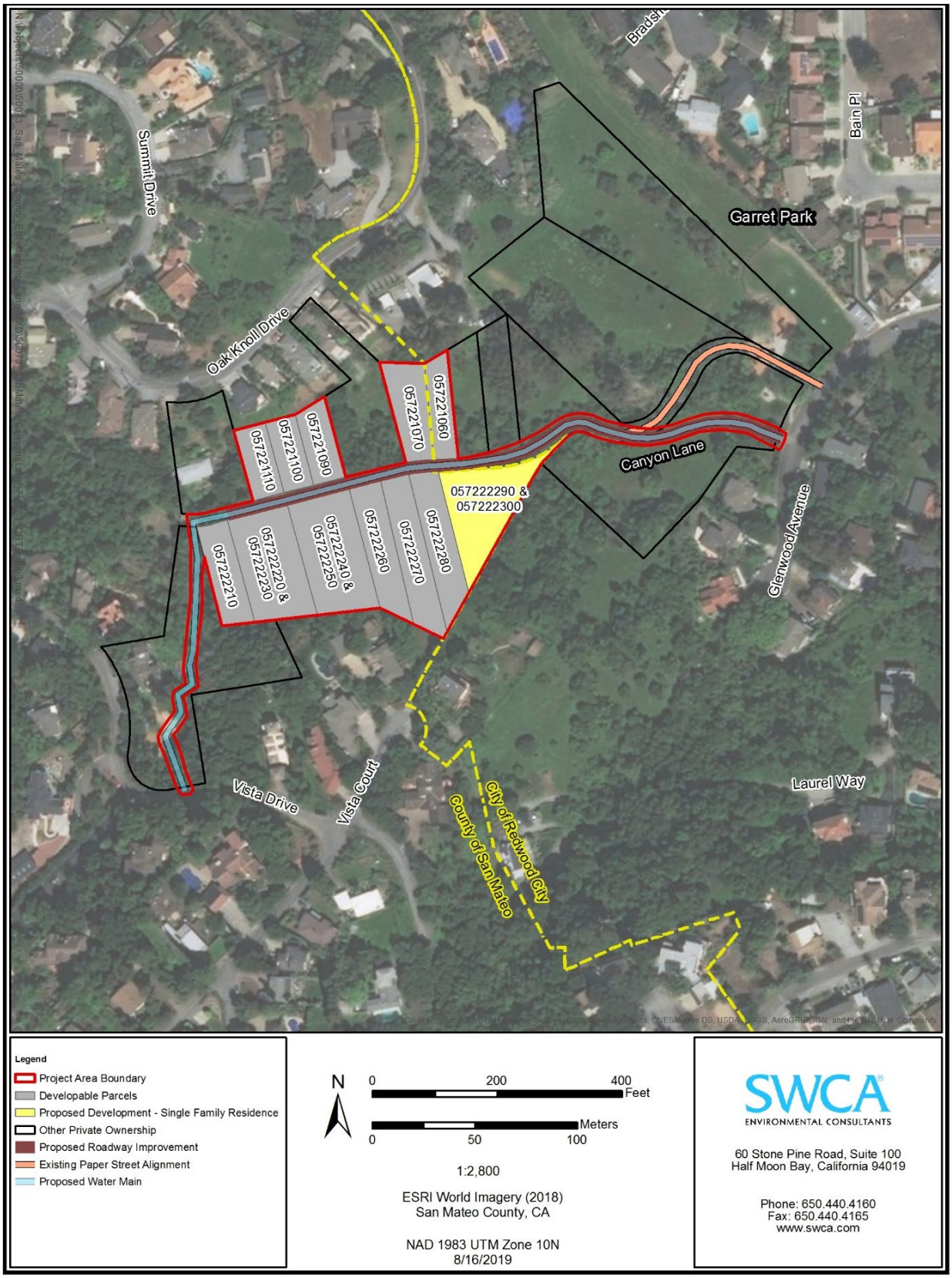


Figure 2-3. Proposed Project

A stabilized construction entrance would be established along Canyon Lane immediately adjacent to Glenwood Avenue to reduce the amount of sediment tracked onto public roadways. The entrance would be established before any grading activities begin. It would be composed of a stone pad at least 12 inches thick and would measure approximately 20 feet wide, or wide enough to encompass the full width of all points of ingress and egress. The entrance would be top dressed with additional stone, as needed.

A temporary parking area for construction crew vehicles would be established on site directly north of Canyon Lane and approximately 150 feet west of Glenwood Avenue, and temporary staging areas would be established directly west of the parking area. No crew parking or material staging areas would be located outside of designated areas or along public roadways adjacent to the project area.

2.2.2 Proposed Single-Family Residence

The project would involve the construction of an approximately 3,847-square-foot single-family residence on a merged parcel (APN 057-222-290 & 300) of approximately 16,151 square feet. Approximately 2,560 cubic yards of soil would be excavated. All of the grading would be cut and transported off site. The proposed residence would have a lot coverage of no more than 25 percent, Floor Area Ratio (FAR) of no more than 30 percent, and would comprise three levels: a garage level, a main level, and an upper level. The garage would be sized to accommodate two vehicles and would measure approximately 609 square feet. The main level would be approximately 1,889 square feet and would include a dining room, great room, living room, and bathroom. The upper level would be approximately 1,349 square feet and would include four bedrooms and three bathrooms. A driveway connecting Canyon Lane to the garage would also be constructed and would accommodate an additional two vehicles for guest parking. A site plan of the single-family residence is provided in Figure 2-4, Site Plan for Single-Family Residence. Elevation schematics are provided in Figures 2-5 and 2-6.

Stormwater runoff collected on the property would be conveyed along new storm drains installed within the sideyards to the east and west of the residence that would convey stormwater to the stormwater system along Canyon Lane, which is described in Section 2.2.1, Canyon Lane Improvements. Two catch basins with 9-inch side openings would be installed along the stormwater drain.

Sewer services would be provided to the property by a new lateral that would connect the property to the existing 6-inch sewer main beneath Canyon Lane. Water would be provided by a new lateral that would connect to the proposed water line beneath Canyon Lane. Electricity would be provided by a new underground 12 kilovolt (kV) distribution line that would underlie Canyon Lane.

Construction of the single-family residence would result in the removal of 11 trees. (The trees slated for removal and protection are identified in the Applicant-prepared Arborist Reports [Appendix A].) A total of 33 trees would be planted following construction, per Section 12, 024 of the County Municipal Code. These trees would be caged for the first year to protect them from herbivores, and irrigated until established as evidenced by vigorous top growth in the spring.

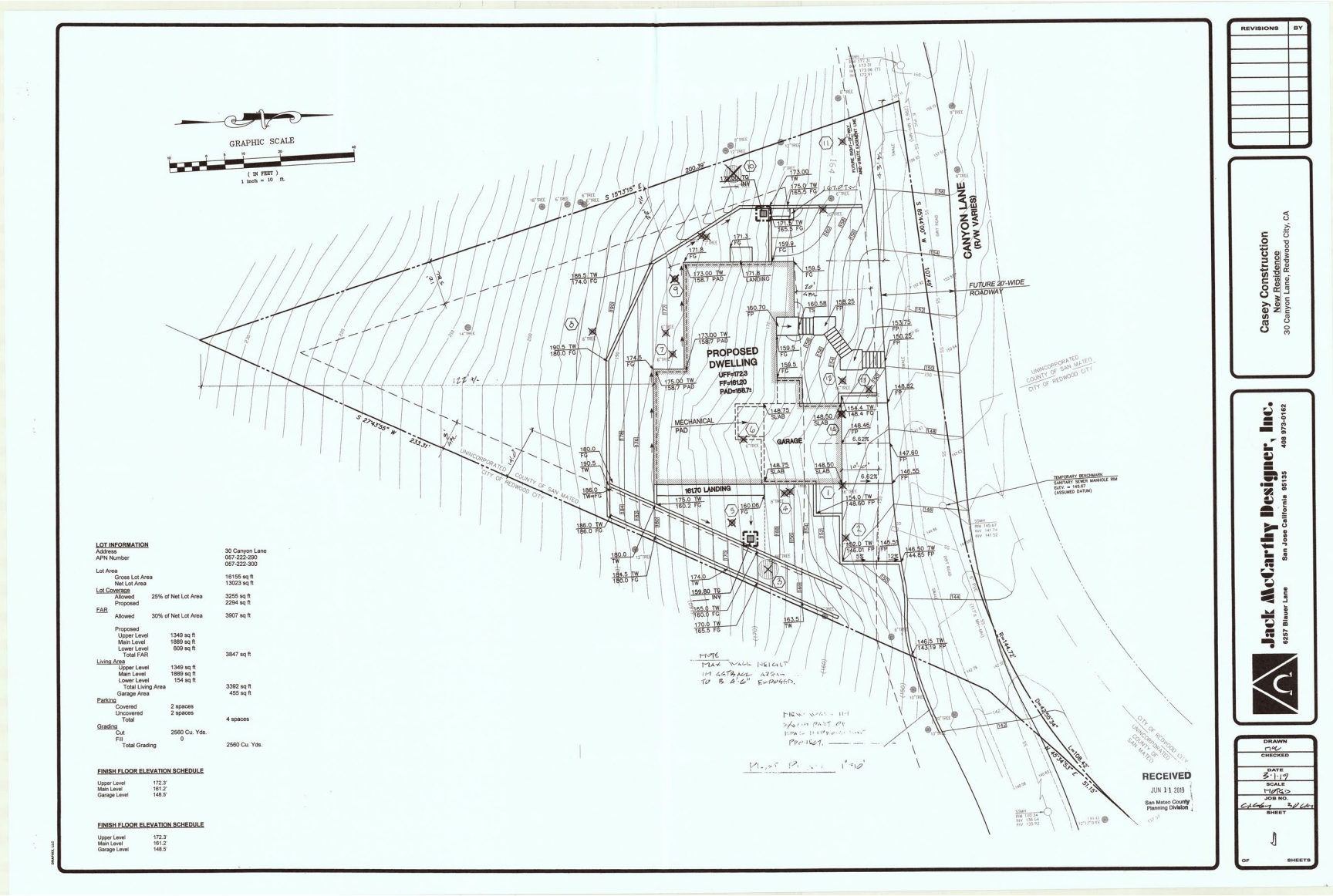


Figure 2-4. Site Plan for Single-Family Residence

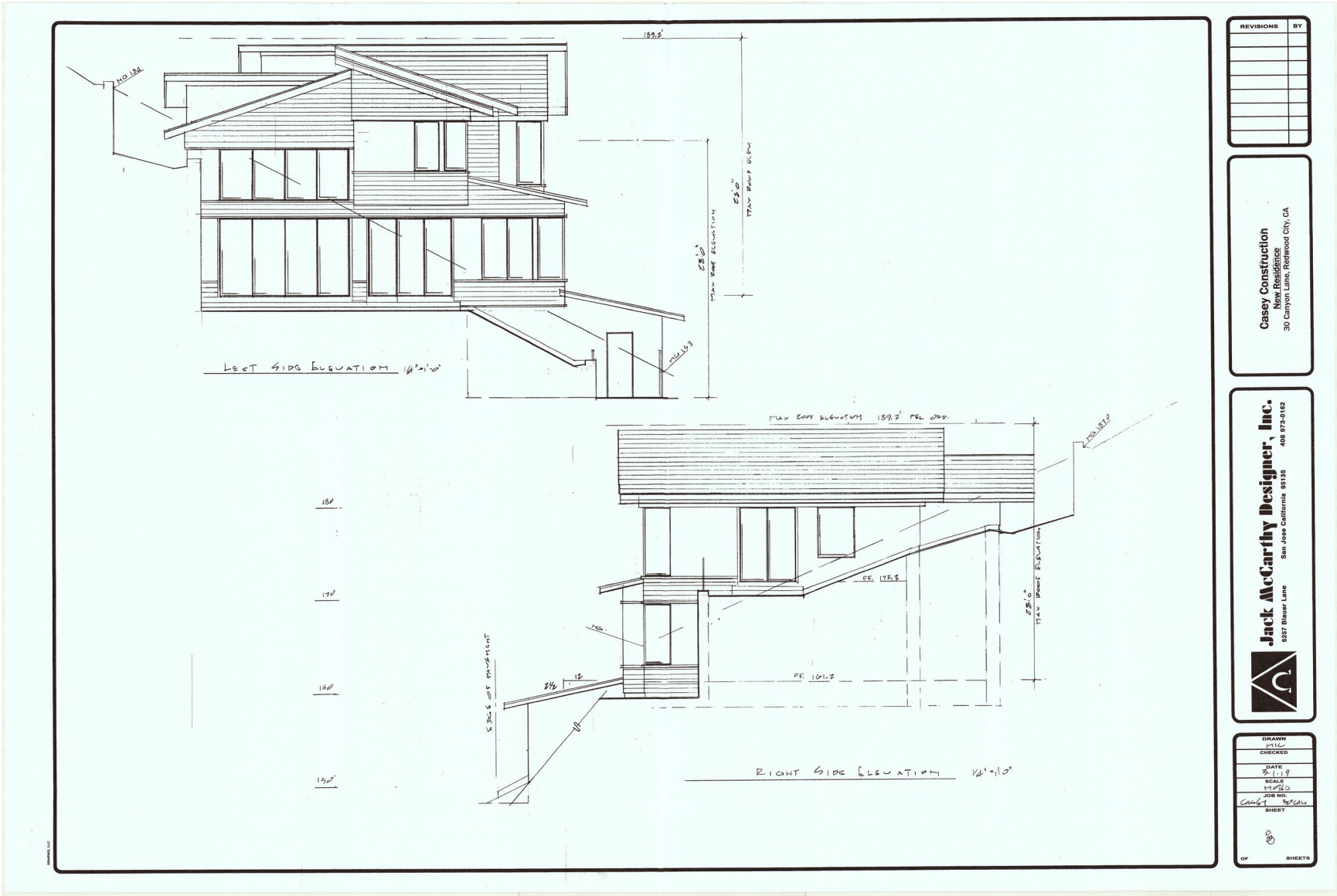


Figure 2-5. Side Elevation for Single-Family Residence

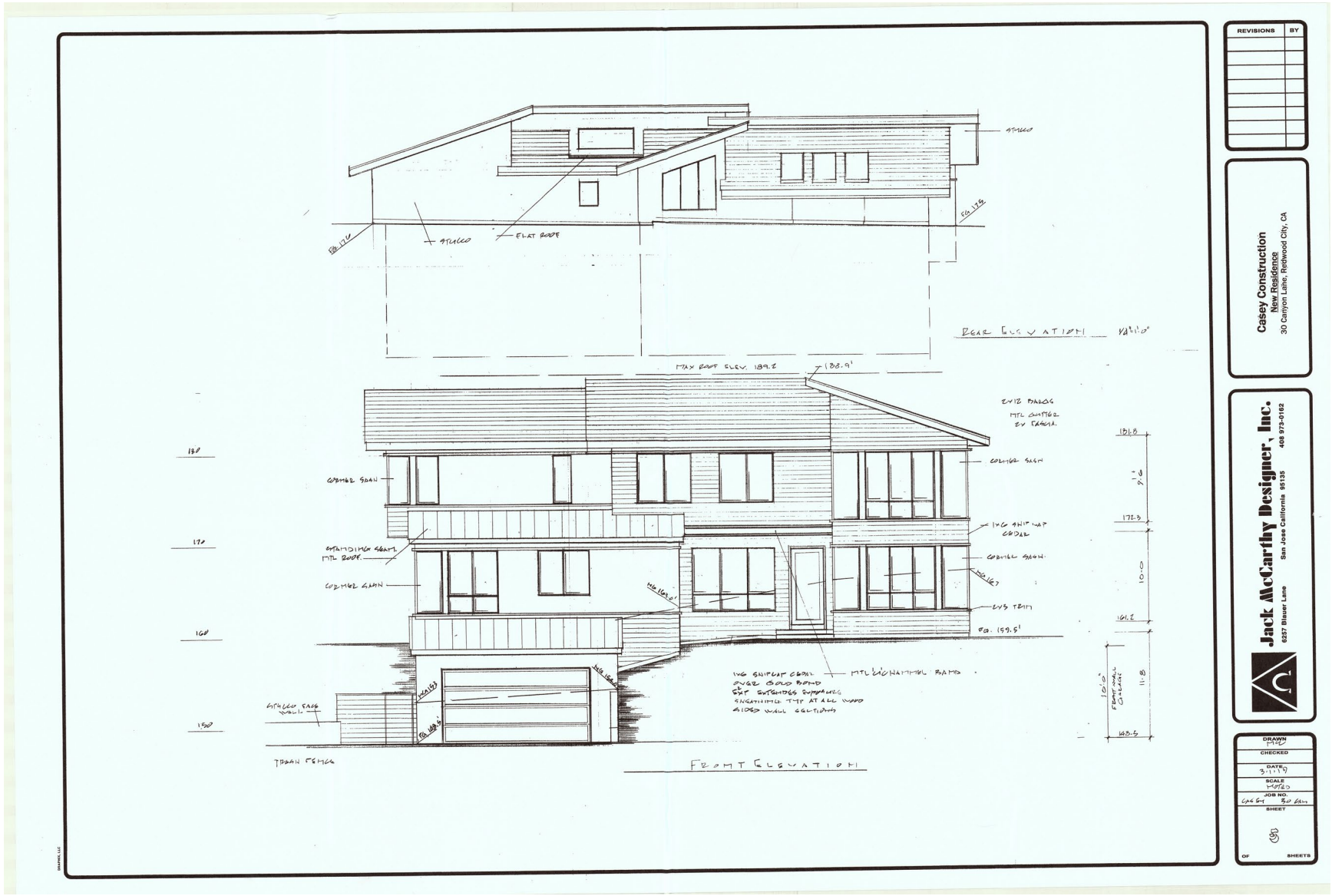


Figure 2-6. Front and Rear Elevation for Single-Family Residence

2.2.3 Developable Parcels

The improvements to Canyon Lane would facilitate the future development of the 11 remaining parcels; however, no development is currently proposed for these parcels. As required under CEQA Guidelines Section 15126.2(d), future development of these parcels is analyzed in the EIR as a growth-inducing and reasonably foreseeable impact as a result of the project. The future development of the 11 remaining parcels would each require a Grading Permit and Design Review approval, therefore, would be subject to additional CEQA review to determine whether all potential impacts were adequately analyzed in this EIR, if it qualifies for a Categorical Exemption, or if additional environmental review is warranted.

As described above, the 12 developable parcels are currently zoned RH/DR in the County and RH in the City. For the purposes of the analysis, it is assumed that the remaining 11 developable parcels would be developed within the current zoning designations of the respective jurisdiction. The developable parcels are shown in Figure 2-3, Proposed Project.

2.3 CONSTRUCTION WORKFORCE, EQUIPMENT, AND SCHEDULE

Project construction activities would occur over an approximate nine-month period commencing in April 2020 and terminating in December 2020. Construction activities would be composed of five distinct phases. These phases and associated durations are described in more detail in Table 2-2, Construction Schedule. Construction activities would generally occur Monday to Friday from 7:00 AM to 6:00 PM. Weekend and off-hour work would be avoided. Construction activities associated with the roadway improvements and utilities are anticipated to represent approximately 40 percent of the total construction timeline, and those associated with the single-family residence would occupy the remaining 60 percent.

Different phases of the construction process would require varying numbers of construction personnel. On a typical workday, up to five workers would be required during Phase 1, up to 10 workers during Phases II and III, and up to 8 workers during Phase IV and V. The estimated equipment, duration of work, and personnel requirements by construction activity are presented in Table 2-3, Construction Workforce and Equipment Use.

The haul route would be from the project area to Glenwood Avenue, Canyon Road, Cordilleras Road, and Edgewood Road to Interstate 280.

Table 2-2. Construction Schedule

Construction Phase	Construction Activity	Estimated Work Dates
Phase I. Tree Removal/ Protection Erosion Control and Construction Entrance	Lay down construction entrances	2 weeks
	Remove pre-selected trees	
	Install fencing to protect remaining trees	
	Install erosion control and site fencing	
Phase II. Roadway Construction	Surveying	4 weeks
	Excavate and off-haul to sub-grade level base rock	
	Construct headwalls and install pre-fabricated bridge	
Phase III. Utility Work	Hydro static testing, flushing, and watermain connection	6 weeks
	Install joint trench	
Phase IV. Building Site Work	Excavate and off-haul to subgrade	5.75 months
	Site wall structures and foundation work	
	Framing, roofing and finish work	
	Utility rough in/site work; plumbing electrical and mechanical	
	Building finish, interior work and landscaping	
Phase V. Final Pavement	Prepare and fine tune roadway base-rock to grade	1 week
	Place roadway stripping after adequate cure time	
	Remove Phase I temporary fencing and erosion control	

Table 2-3. Construction Workforce and Equipment Use

Construction Phase	Average Daily Workers	Equipment	Equipment Quantity
Phase I. Tree Removal/ Protection Erosion Control and Construction Entrance	1 to 5	½-Ton Pick-Up Truck	1
		1-Ton Crew Truck	1
		10-Wheel Dump Truck	1
		8-Ton Rubber Tracked Excavator	1
Phase II. Roadway Construction	5 to 10	½-Ton Pick-Up Truck	1
		1-Ton Crew Truck with Water Buffalo	1
		15-Ton Rubber Tracked Excavator	1
		10 Wheel Dump Trucks	4
		5-Ton Sheep Foot Compactor	1
		Crane	1
Phase III. Utility Work	5 to10	½-Ton Pick-Up Truck	1
		1-Ton Crew Truck with Water Buffalo	1
		8-Ton Rubber Tracked Excavator.	1
		8-Ton Excavator with Compaction Wheel	1
		Backhoe	1
		10-Wheel Super-Dump	2

Construction Phase	Average Daily Workers	Equipment	Equipment Quantity
Phase IV. Building Site Work	5 to 8	½-Ton Truck	1
		Backhoe	1
		Water Buffalo	1
		Site Delivery Truck	1
		10-Wheeler Dump Truck	1
		Concrete Truck	1
		Semi-Truck Flat Bed	1
Phase V. Final Pavement	4 to 8	Mechanical Asphalt Levelling Equipment	1
		10-Ton Mechanical Roller	1
		10-Wheel Super-Dump	3
		½-Ton Pick-Up Truck	1
		1-Ton Crew Truck	1
		Striping Equipment	1

2.4 PROJECT OBJECTIVES

CEQA Guidelines Section 15124(b) specifies that an EIR should include:

> *"A statement of the objectives sought by the proposed project. A clearly written statement of objectives will help the lead agency develop a reasonable range of alternatives to evaluate in the EIR and will aid the decision makers in preparing findings or a statement of overriding considerations, if necessary. The statement of objectives should include the underlying purpose of the project."*

A lead agency must not give a project's purpose an artificially narrow definition; however, a lead agency may structure an EIR analysis around a reasonable definition of a project's underlying purpose. The objectives (underlying purpose) identified for the project include those put forth by the Applicant as well as the County.

The project objectives are as follows:

- To improve Canyon Lane in order to facilitate routine and emergency access to 12 parcels that would become developable. The objectives of the individual property owners may vary, but, assuming project approval, owners of the lots could construct single-family homes in accordance with zoning restrictions, with any necessary subsequent environmental review, and after approval of all necessary planning and building permits.
- To provide housing, and the opportunity for future housing on lots associated with the project, on a site that is currently zoned for single-family housing.
- Assist in maximizing housing opportunities in San Mateo County, while maintaining the predominantly single-family character of the neighborhood.

2.5 REQUESTED ACTION AND REQUIRED PERMITS

This EIR provides environmental information and analysis in compliance with CEQA, which is necessary for County decision makers to be able to adequately consider the effects of the proposed project. The County, as lead agency, has approval authority and responsibility for considering the environmental effects of the project as a whole. The City and LAFCo will serve as Responsible Agencies under CEQA. The City and LAFCo are responsible for authorizing and approving the City's 8-inch water line extension outside of the City's jurisdictional boundaries. The EIR will be used for the following discretionary approvals:

- Approval of a Grading Permit by the Planning Commission for the improvement of Canyon Lane, the construction of a single-span bridge across an unnamed creek at the north side of the roadway as part of a required turnaround area for emergency vehicles, and construction of one single-family residence;
- Design review approval by the Planning Commission;
- Variance approval by the Planning Commission for grading associated with a single-family residence where the grading quantity will exceed 1,000 cubic yards in the County's RH/DR Zoning District;
- Approval of an Outside Service Agreement by LAFCo and the City to extend Redwood City water service outside of City jurisdictional boundaries for a new (minimum) 8-inch water line..

CHAPTER 3. ENVIRONMENTAL IMPACT ANALYSIS

Chapter 3 of the EIR evaluates the potential of the proposed project to result in impacts to the environment as a result of construction and operation of the proposed project. This chapter provides a full scope of environmental analysis in conformance with the CEQA Guidelines. The environmental resources are assessed in this chapter in accordance with Appendix G of the CEQA Guidelines. Table 3-1, Summary of Environmental Impacts Analysis, lists the environmental resource areas analyzed and summarizes the levels of significance of the impacts identified.

Table 3-1. Summary of Environmental Impacts Analysis

Environmental Resource	No Impact	Less-than-Significant Impact	Significant but Mitigable Impact	Significant, Unavoidable, Adverse Impact
Aesthetics			X	
Agriculture and Forestry Resources	X			
Air Quality			X	
Biological Resources				X
Cultural Resources (including Tribal Cultural Resources)			X	
Energy		X		
Geology and Soils			X	
Greenhouse Gas Emissions			X	
Hazards and Hazardous Materials			X	
Hydrology and Water Quality				X
Land Use and Planning		X		
Mineral Resources	X			
Noise			X	
Population and Housing		X		
Public Services		X		
Recreation		X		
Transportation and Traffic		X		
Utilities and Service Systems		X		
Wildfire			X	

Each environmental issue area discussed in this chapter has been divided into the following subsections:

- **Existing Conditions:** The description of the physical environmental conditions in the vicinity of the project, as they exist at the time of the established baseline physical conditions.
- **Regulatory Setting:** The regulations in force at the time the NOP is published. These are the applicable regulations governing each environmental topic (e.g., California Endangered Species Act and its requirements for protecting rare and endangered species). This is not an exhaustive analysis of the regulations; rather, the information presented is intended to assist the reader in understanding the potential impacts of the project from a regulatory perspective. This section also includes an analysis of the project's consistency with applicable goals, policies, and regulatory compliance measures specific to the particular environmental topic.

- **Thresholds of Significance:** The thresholds used to evaluate each environmental topic are based on Appendix G of the CEQA Guidelines.
- **Impact Assessment Methodology:** Methodology used to determine the impacts associated with the project, such as measurements or field investigative processes.
- **Impact Assessment and Mitigation Measures:** These include the significant environmental effects of the proposed project, as further defined below. The impacts are identified, and, for impacts found to be significant, applicable mitigation measures are described. Mitigation measures must be enforceable and feasible. Where more than one mitigation measure could be used to reduce a significant effect, each is discussed and rationale given for determining the preferable mitigation measure. In addition, as specified in Section 15126.4 of the CEQA Guidelines, there must be an essential nexus between the mitigation measure and a legitimate governmental interest, and the mitigation measure also must be "roughly proportional" to the impacts of the project.

The term "significant" is used throughout the EIR to characterize the magnitude of the projected impact. For the purpose of this EIR, a significant impact is a substantial or potentially substantial change to resources in the proposed project area or the area adjacent to the proposed project. In the discussions of each issue area, thresholds are identified that are used to distinguish between significant and less-than-significant impacts. To the extent feasible, distinctions are also made between local and regional significance and short-term versus long-term duration. Where possible, measures have been identified to reduce project impacts to less-than-significant levels. CEQA states that public agencies should not approve projects as proposed if there are feasible mitigation measures available that would substantially lessen the environmental effects of such projects (Public Resources Code Section 21002). Included with each mitigation measure are the plan requirements needed to ensure that the mitigation is included in the plans and construction of the project and the required timing of the action (e.g., prior to development of final construction plans, prior to commencement of construction, prior to operation, etc.).

3.1 AESTHETICS

This section discusses impacts associated with the potential for the project to degrade the existing visual character or quality of the project area and its surroundings through changes in the existing landscape. Potential effects are evaluated relative to important visual features (e.g., scenic highways, scenic features) and the existing visual landscape and its users. Degradation of the visual character of a site is usually addressed through a qualitative evaluation of the changes to the aesthetic characteristics of the existing environment, and the project-related modifications that would alter the visual setting.

3.1.1 Existing Conditions

Visual Setting

The project area is comprised of a gated, dead-end gravel roadway. The project area is situated within a hillside canyon, surrounded by single-family residential homes scattered throughout the adjacent hillsides. The project area, minus the gravel roadway, is undeveloped and consists of oak forest, grassland, and an intermittent creek (Emerald Branch) that runs parallel to Canyon Lane. The project area has not been extensively graded or developed and thus maintains the natural slope and vegetation of the hillside canyon.

The project area is most exposed to public views from Garrett Park (see Figure 3.1-1, View looking southwest from Garrett Park with the project area in the background) as well as views from local roadways adjacent to the project area, including Vista Drive, Oakview Way, Oak Knoll Drive (see Figure 3.1-2, Southeast-facing view of the project area from Oak Knoll Drive), and Glenwood Avenue. Longer range public views of the project area are constrained by the area's steep topography, existing structures, and vegetation. The project area is also exposed to private views from surrounding residences. However, CEQA only addresses public views accessible to many people, not private views that will affect particular persons.[1]

Visual Character

Designated State Scenic Highways

The major transportation corridors in the region include Highway 101 and Interstate 280 (I-280), which are located approximately 2.4 and 1.6 miles east and west of the project area, respectively. Several Officially Designated State Scenic Highway are recognized in the region, including portions of I-280, Highway 35 (located approximately 4 miles west of the project area), and Highway 1 (located approximately 10 miles west of the project area).[2]

[1] Obstruction of a few private views in a project's immediate vicinity is not generally regarded as a significant environmental impact. (*See Ocean View Estates Homeowners Assn., Inc. v. Montecito Water Dist*., 116 Cal. App. 4th 396, 402 (2004) (that a project affects "only a few private views" suggests that its impact is insignificant); *Mira Mar Mobile Community v. City of Oceanside*, 119 Cal. App. 4th 477, 492-493 (2004) (distinguishing public and private views; "[u]nder CEQA, the question is whether a project will affect the environment of persons in general, not whether a project will affect particular persons").



Figure 3.1-1. View looking southwest from Garrett Park with the project area in the background.



Figure 3.1-2. Southeast-facing view of the project area from Oak Knoll Drive.

Viewsheds

A viewshed is defined as the geographic area that is visible from a given location or viewpoint. A viewshed includes all items that are visible in the foreground and background but excludes items beyond the horizon or are obstructed or geographic features, terrain, or the built environment (e.g., buildings).

The viewshed at the project area is shaped by steep vegetated canyon slopes and the intermittent Emerald Branch running parallel to the north side of Canyon Lane. Figure 3.1-3, East-facing view of Canyon Lane and Parcel 057-222-290 & 300, and Figure 3.1-4, East-facing view of Canyon Lane and the Emerald Branch, illustrate the viewshed as seen from Canyon Lane. The viewshed also includes Garrett Park and a residential neighborhood to the east and an earthen dam supporting a roadway to the west. Also visible are residences that are interspersed near the rim of the canyon. Topographic features and a dense tree overstory largely obstruct longer range views of residences that are scattered throughout the surrounding hillsides of Emerald Hills, as well as regional views of the Santa Cruz Mountain Range and the San Francisco Bay shoreline.

Scenic Quality within the Viewshed

Scenic quality is a measure of the visual appeal of a given tract of land. Several factors influence a site's visual appeal, including landform, water, color, adjacent scenery, cultural modifications, and scarcity. The project area is undeveloped (minus the gravel roadway) and consists of oak forest, grassland, and the Emerald Branch. Due to the relatively undeveloped nature of the project area, the scenic quality for most viewers would be high.

Sensitive Viewers

Viewer sensitivity is a measure of a viewer's adverse response to changes in scenic quality. Viewer sensitivity is shaped by viewing proximity, duration of views, activity, and overall viewing context. In observing the typical activities of potential viewers in the area, generalizations can be made about their likely perceptions and awareness of the project. Residents of the surrounding neighborhood would likely be the viewer group most sensitive to changes in the visual landscape. Viewers who live near the project area may see the project from their residence or frequent sites that have views of the project such as Garrett Park and adjacent local roadways. As such, nearby residences of the adjacent neighborhood may generally be more aware of the visual resources due to their personal interest and sense of ownership of the project area.

Light and Glare

Light pollution is defined as any adverse effect caused by point-source lighting or glare resulting in a noticeable spill-over effect into the nighttime sky, increasing the ambient light over the region. The primary source of light in the project vicinity is from the surrounding neighborhood. The light and glare near the project area is low and characteristic of a suburban, wooded neighborhood



Figure 3.1-3. East-facing view of Canyon Lane and Parcel 057-222-290 & 300



Figure 3.1-4. East-facing view of Canyon Lane and the Emerald Branch

3.1.2 Regulatory Setting

Federal

No applicable Federal regulations, policies, or programs are relevant to the project.

State

The California State Scenic Highway Program was created in 1963 by the California Legislature with the purpose of preserving and protecting scenic highway corridors against changes that diminish the aesthetic value of adjacent lands. The program includes a list of highways that are eligible for designation or are designated a scenic highway. Criteria used when designating a scenic highway include the spatial extent of the natural landscape that can be seen by travelers, the quality of the landscape, and the extent to which development intrudes on the traveler's enjoyment of the view.[3] As discussed previously, there are no designated State scenic highways within, or in the immediate vicinity of, the project area.

Local

City of Redwood City General Plan

The following City General Plan (2010) policies and programs are relevant to the project:

Built Environment Element−Urban Form and Land Use

- **Policy BE-1.9:** Carefully consider new shade, shadow, light, and glare effects from proposed development projects and comprehensive plans.
- **Policy BE-5.1:** Require that new construction, additions, renovations, and infill development be sensitive to neighborhood context, historic development patterns, and building form and scale (for example, second stories, detached garages, setbacks, enhanced front entrances).
- **Policy BE-5.2:** Require that residential units be designed to sustain the high level of architectural design quality that characterizes Redwood City's Historic Influence Low Density Neighborhoods.
- **Policy BE-5.3:** Strengthen neighborhood identity with new development that is architecturally compatible with surrounding structures.
- **Policy BE-8.1**: Minimize the visual and environmental impact of development upon sensitive hillside areas.

Natural Resources Element

- **Program NR-45:** Require removed trees, whether on public or private property, to be replaced with a new tree or trees in the closest appropriate planting site to mitigate loss, as feasible.

County of San Mateo General Plan

The following County General Plan (1986) policies and goals are relevant to the project:

[3] Caltrans. 2018. The California Scenic Highway Program. Available online at http://www.dot.ca.gov/dist3/departments/mtce/scenic.htm. Accessed on October 8, 2019.

Visual Quality

- **Goal 4.1a:** Protect and enhance the natural visual quality of San Mateo County.
- **Goal 4.1b:** Encourage positive visual quality for all development and minimize adverse visual impacts.
- **Goal 4.3:** Minimize the removal of visually significant trees and vegetation to accommodate structural development.
- **Policy 4.27b:** Discourage structures which would adversely impact the appearance of a stream and associated riparian habitat.
- **Policy 4.27c:** Discourage the alteration of streams and other natural drainage systems which would affect their appearance, reduce underground water recharge, or cause drainage, erosion or flooding problems.
- **Policy 4.29b:** Replace vegetation and trees removed during construction wherever possible. Use native plant materials or vegetation compatible with the surrounding vegetation, climate, soil, ecological characteristics of the region and acceptable to the California Department of Forestry.
- **Policy 4.36a:** Maintain and, where possible, improve upon the appearance and visual character of development in urban areas.
- **Policy 4.36b:** Ensure that new development in urban areas is designed and constructed to contribute to the orderly and harmonious development of the locality.

3.1.3 Thresholds of Significance

The significance of potential aesthetics impacts is based on thresholds identified within Appendix G of the CEQA Guidelines, shown below.

Impacts would be considered significant if the project would:

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. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality.

d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

3.1.4 Impact Assessment and Methodology

In general, the potential aesthetic, light, and glare impacts associated with projects are evaluated on a qualitative basis. This visual impact assessment identifies and assesses any potential long-term adverse visual impacts on aesthetics and visual resources that might result from implementation of the project. In the absence of State or local assessment practices for evaluating potential aesthetic resource impacts, SWCA's approach to the analysis consisted of the following steps:

- Defined the project and its visual setting by assessing the project proponent's submitted project application materials, including plans and descriptions, and reviewing Google Earth Pro aerial photographs and street-level photography, County and City Geographic Information System topographic and land use data, and USGS topographic data.
- Conducted a site visit (in January 2019) for the purposes of:
    - Surveying the on-site and surrounding uses to identify sensitive viewers and viewpoints for assessment of potential aesthetic impacts; and
    - Analyzing the baseline visual quality and character of the identified views.
- Assessed the project's impacts to sensitive views in comparison to their baseline visual quality and character.
- Identified proposed methods to mitigate any potentially significant visual impacts.

3.1.5 Project-Specific Impacts and Mitigation Measures

Impact 3.1-1: Potential to have a substantial adverse effect on a scenic vista – No Impact

Canyon Lane Improvements, Proposed Single-Family Residence, Developable Parcels

The project is not located within or adjacent to a scenic vista. [4] Further, the project area is visibly limited to local adjacent roadways and nearby residences. Views eastward towards the San Francisco Bay would remain unobstructed. As a result, the project would not introduce incompatible scenic elements within a field of view containing a scenic vista. Therefore, no impacts to scenic vistas would occur.

Impact 3.1-2: Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway – No Impact

Canyon Lane Improvements, Proposed Single-Family Residence, Developable Parcels

The project would require the removal of 45 trees (36 trees within the County and 9 trees within the City). The 45 trees would be replaced at ratios required by the City and County tree removal ordinances, respectively. As described in Mitigation Measure BIO/mm-8.3 a total of 117 replacement trees (108 trees within the County and 9 within the City) would be planted, or as otherwise directed by the County and/or City Arborist or Community Development Director. Section 3.4, Biological Resources, provides additional details regarding the regulatory requirements associated with tree mitigation. In addition, the project is not located within or adjacent to a scenic corridor or designated scenic highway.[5,6] As a result, the project would not remove scenic resources within a designated scenic corridor or highway. Therefore, no impacts to scenic resources would occur.

[4] County of San Mateo General Plan. 1986. Visual Quality. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on January 30, 2019.
[5] County of San Mateo General Plan. 1986. Visual Quality. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on January 30, 2019.
[6] Caltrans. 2017. List of eligible and officially designated Scenic Highways. Available online at http://www.dot.ca.gov/design/lap/livability/scenic-highways/. Accessed on October 8, 2018.

Impact 3.1-3: Potential to substantially degrade the existing visual character or quality of public views of the site and its surroundings or conflict with applicable zoning and other regulations governing scenic quality – Less than Significant with Mitigation

Canyon Lane Improvements

Construction

Construction activities associated with the Canyon Lane improvements would require construction vehicles, heavy equipment and materials, and construction crews. As described in Chapter 2, Project Description, construction activities would require the excavation of a trench to support the installation of utility lines and a water line, as well as moderate to significant grading (approximately 1,145 cubic yards of cut and 60 cubic yards of fill) to widen the width of the existing roadway prism from approximately 10 to 20 feet. The existing roadway would be widened along its southern flank to avoid potential impacts to the Emerald Branch that runs parallel to the north of the roadway.

Visual impacts from construction activities would result from the presence of construction vehicles, heavy equipment and materials, and construction crews. Visual impacts would also result from fugitive dust generated by grading and earth-moving activities. Fugitive dust could obscure visibility and leave a film of dust on nearby surfaces. Fugitive dust impacts would be reduced with the implementation of Mitigation Measure AQ/mm-1.

Project construction activities would alter the use of the project area, increase the level of vehicle activity, and introduce new features and equipment at the project area. Project activities would be most visible from local roadways adjacent to the project area (i.e., Vista Drive, Oakview Way, Oak Knoll Drive, and Glenwood Avenue), Garrett Park, and residences located along the north and south rim of the canyon. Existing trees, vegetation, and other topographic features would continue to shield longer range views of the project area. Visual impacts associated with construction of the Canyon Lane improvements would be intermittent and temporary, lasting approximately 3 months. As a result, impacts would be less than significant.

Operation

Canyon Lane would be paved and widened by approximately 10 feet along its southern flank to avoid potential impacts to the Emerald Branch that runs parallel along the north side of the roadway. A stitch pier wall would also be installed along the southern flank of the roadway. To facilitate the Canyon Lane improvements, 34 trees would be removed (25 within the County and 9 within the City). The removal of these trees would increase the project's exposure to nearby sensitive viewers and decrease the visual quality of the project area. However, the Applicant would implement Mitigation Measure BIO/mm-8.3, which would require that the 25 trees subject to removal within the County be replaced at a 3:1 ratio and the 9 trees subject to removal in the City be replaced at a 1:1 ratio, for a total of 84 new trees (or as otherwise directed by the County/City Arborist or Community Development Director). Section 3.4, Biological Resources, provides additional details regarding the regulatory requirements associated with tree mitigation. In addition, the Applicant would implement Mitigation Measure AE/mm-1, presented below, which would require the development of a Landscaping Plan. The Landscaping Plan would show how the proposed landscaping would replace the existing vegetation and landscaping removed for construction in accordance with all applicable standards specified in Section 6565.21 of the County Zoning Regulations, which includes standards for the protection of trees and vegetation. The Landscaping Plan would also comply with the tree replacement program described in Program NR-45 of the City's

General Plan Natural Resource Element, which requires removed trees to be replaced with a new tree or trees in the closest appropriate planting site to mitigate loss, as feasible. As described in Section 3.4, Biological Resources, replacement trees would be planted on site if feasible (as determined by a qualified restoration ecologist), or the trees would be planted off site or in a combination of on site and off site. As such, the portion of the project within the County would also comply with Program NR-45 of the City's General Plan Natural Resource Element.

The improved roadway and associated components would represent a visual change to sensitive viewers. However, the roadway would be representative of other paved roadways in the area, and would only be expanded by approximately 10 feet in width from the existing roadway prism. Additionally, the 84 replacement trees that would be planted as part of Mitigation Measure BIO/mm-8.3 would provide screening to help shield the roadway from public viewpoints and nearby residents, and would add to the scenic quality of the project area as the trees continue to mature over time. In addition, the Applicant would implement Mitigation Measure AE/mm-1, which would require the development of a Landscaping Plan. With implementation of Mitigation Measures BIO/mm-8.3 and AE/mm-1, post-construction impacts would be less than significant and would not conflict with any County or City Zoning Ordinance or policy governing scenic quality.

Aesthetics Mitigation Measures	
AE/mm-1	*The Applicant shall submit a detailed Landscaping Plan for review and approval by the City and County Planning Division and/or Arborist prior to issuance of a Grading Permit. The Plan shall indicate how the project landscaping shall screen the single-family residence from view from the surrounding neighborhood. The Landscaping Plan shall also indicate how the proposed landscaping would replace the existing vegetation and landscaping that would be removed for construction in accordance with Section 6565.21 of the County Zoning Regulations. The Landscaping Plan would also comply with the tree replacement program described in Program NR-45 of the City's General Plan Natural Resource Element.*

Proposed Single-Family Residence

Construction

Similar to construction of the Canyon Lane improvements, construction of the proposed single-family residence would require construction vehicles, heavy equipment and materials, and construction crews. Construction of the single-family residence would convert an undeveloped parcel and require substantial grading and excavation (approximately 2,560 cubic yards) due to its hillside location. Visual impacts associated with construction equipment and fugitive dust would be largely the same as those described for the Canyon Lane improvements. Visual impacts associated with construction of the residence would be intermittent and temporary, lasting approximately 6 months. With implementation of Mitigation Measure AQ/mm-1, construction impacts would be less than significant and would not conflict with any other applicable County Zoning Regulations or policy governing scenic quality.

Operation

As described in Chapter 2, Project Description, the project would involve the construction of a 3,847-square-foot single-family residence on an approximately 16,151-square-foot parcel. The residence would comprise three levels, including a garage level that would accommodate two cars. A driveway would also be constructed that connects to Canyon Lane.

The residence would result in the removal of 11 trees. The removal of these trees would increase the project area's exposure to viewers and residences that surround the project area and would decrease the

visual quality of the project area. However, the Applicant would implement Mitigation Measure BIO/mm-8.3, which would require that the 11 trees subject to removal within the County be replaced at a 3:1 ratio, for a total of 33 new trees (or as otherwise directed by the County and/or City Arborist or Community Development Director). Section 3.4, Biological Resources, provides additional details regarding the regulatory requirements associated with tree mitigation. In addition, the Applicant would implement Mitigation Measure AE/mm-1, which would require the development of a Landscaping Plan, residential landscaping would screen the single-family residence to the extent possible from the surrounding neighborhood. The Landscaping Plan shall also indicate how the proposed landscaping addresses the existing vegetation and landscaping that would be removed for construction consistent with all applicable standards specified in Section 6565.21 of the County Zoning Regulations, which includes standards for the protection of trees and vegetation. The Landscaping Plan would also comply with the tree replacement program described in Program NR-45 of the City's General Plan Natural Resource Element.

The single-family residence design would be consistent with the design standards provided in Section 6565.15 of the County Zoning Regulations for development within Emerald Lake Hills.[7] The residence would be constructed partially below grade and would be set into the downslope of the hillside to respect and conform to the natural topography of the project area. The residence would include a pitched roof design and a brown color scheme to blend with the natural setting of the immediate area. The residence would measure approximately 28 feet in height, have a front setback of approximately 20 feet, and side setbacks of approximately 14 and 22 feet, which is consistent with the County Zoning Regulations for areas zoned RH/DR. The proposed residence would have a lot coverage of no more than 25 percent and a FAR of no more than 30 percent, which is consistent with the County Zoning Regulations for areas zoned RH/DR.[8]

The presence of one new residence would have a permanent impact on sensitive viewers and would alter the visual character and quality of the project area. The project would convert the generally undeveloped nature of the project area into a developed site. However, the single-family residence would be consistent with the suburban characteristics of the surrounding neighborhood. The project would meet the specific design standards of the Emerald Lake Hills area and would be reviewed by the Emerald Lake Hills Design Review Officer to ensure that new development is compatible with the physical setting of the project area and visual character of the community. As a result, visual impacts would be less than significant and would not conflict with any applicable County Zoning Regulation or policy governing scenic quality. Implementation of Mitigation Measure AE/mm-1 would further reduce these already less-than-significant impacts.

The residence would be located within the base of a canyon and would not cast a shadow on surrounding properties along the canyon's rim. In fact, the canyon's ridgeline could cast a shadow over the residence during certain hours of the day, which would supersede any localized shadow effects caused by the residence. As a result, no impacts would result from shadow casting.

Developable Parcels

Construction of residences on the developable parcels would require the removal of existing trees. In the absence of site plans or residential design specifications, the exact number of trees that would need to be removed is not known. However, because trees are fairly uniformly distributed throughout the canyon and the sizes of the future homes would likely be similar to the proposed single-family residence, it is

[7] County of San Mateo. 2018. *Zoning Regulations.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC_Zoning_Regulations.pdf. Accessed on January 31, 2019.
[8] County of San Mateo. 2018. *Zoning Regulations.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC_Zoning_Regulations.pdf. Accessed on January 31, 2019.

anticipated that the number of trees that would be removed on each parcel would be similar to that for the proposed single-family residence. The removal of these trees would increase the project area's exposure to viewers and residences that surround the project area and would decrease the visual quality of the area. However, the Applicant would be required to mitigate any removed significant tree at ratios defined by the City and County tree removal ordinances and described under Mitigation Measure BIO/mm-8.3.

No construction is currently proposed on the developable parcels and no site plans or residential design specifications have been submitted to the County or City at the time of this EIR's publication. As such, it is not possible to provide residential design specifications. However, the residences would need to be consistent with all applicable design standards provided in Section 6565.15 of the County Zoning Regulations for residential development within Emerald Lake Hills[9] and Article 5 of the City Zoning Ordinances for residential development within the Residential Hillside zone.[10] Similar to the single-family residence, the individual residences would be reviewed by the Emerald Lake Hills Design Review Officer for visual compatibility with the neighborhood. As a result, visual impacts would be less than significant and would not conflict with any applicable County or City zoning regulation or policy governing scenic quality. Implementation of Mitigation Measure AE/mm-1 would include preparation of a Landscaping Plan. The Landscaping Plan would be submitted to the County for approval prior to issuance of a Grading Permit for each developable parcel. The Landscaping Plan would specify how future landscaping would screen the residences from nearby sensitive viewers to the extent practicable, and document consistency with Section 6565.21 of the County Zoning Regulations and the City's General Plan Natural Resource Element. With the implementation of Mitigation Measure AE/mm-1, aesthetic impacts from the developable parcels would be less than significant.

Impact 3.1-4: Potential to create a new source of substantial light or glare which would adversely affect day or nighttime views in the area – Less than Significant with Mitigation

Canyon Lane Improvements

Construction

Construction activities associated with the Canyon Lane improvements would occur during daylight hours. No lighting would be required. As a result, no lighting impacts would occur. Construction vehicles, equipment, and materials with reflective surfaces have the potential to create glare, particularly in the early morning and later afternoon time periods. However, any glare impacts during construction would be temporary. Further, project activities would occur within a vegetated canyon, which would help to minimize any glare created by construction vehicles, material, and equipment. As a result, glare impacts during construction would be less than significant.

Operation

The roadway would not include street lighting or any materials or surfaces with the potential to create glare. Therefore, the roadway would not result in any glare or lighting impacts.

[9] County of San Mateo. 2018. *Zoning Regulations.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC_Zoning_Regulations.pdf. Accessed on January 31, 2019.
[10] City of Redwood City. 2019. *Article 5 of the Zoning Ordinances.* Available online at https://library.municode.com/ca/redwood_city/codes/zoning?nodeId=ART5RHREILREINMIDI. Accessed on January 31, 2019

Proposed Single-Family Residence

Construction

Light and glare construction impacts associated with the single-family residence would be the same as those described above for the Canyon Lane improvements.

Operation

The single-family residence would include interior and exterior lighting that would create an additional source of illumination in the area. Vehicle headlights traveling to and from the residence would also illuminate the area. The 11 trees removed during construction would increase the project area's exposure, potentially subjecting viewers along adjacent public roadways and nearby residences to a slight increase in ambient light levels. However, this increase would not be substantial because the project area is located in a suburban area that is already illuminated from nearby residential uses at night, and the project's lighting levels would be compatible with surrounding uses. Further, the Applicant would implement Mitigation Measure AE/mm-2, which would require the development and implementation of a Light Fixture Plan. This plan would ensure that all exterior lighting would be directed downwards to minimize lighting impacts on nearby residences and viewers from adjacent public roadways. With the implementation of Mitigation Measure AE/mm-2, lighting impacts would be less than significant.

The residence would include reflective materials such as glass and windows that have the potential to create glare, particularly in the early morning and late afternoon. The 11 trees removed during construction would increase the exposure of viewers along adjacent public roadways and private residences to any potential glare impacts. However, the residence would comply with all applicable design standards specified in Section 6565.15 of the County Zoning Regulations for development within Emerald Lake Hills to reduce glare, including refraining from designing reflective façades and using types of building materials similar to those that currently characterize other residences in the area.[11] As a result, any potential glare impacts would be less than significant.

Aesthetics Mitigation Measures	
AE/mm-2	*The Applicant shall submit a Light Fixture Plan to the County Planning Department for review and approval prior to construction. The plan shall include the use of shielded light fixtures that direct light downward, prevent direct glare to nearby residences, and otherwise minimize lighting impacts on residential properties.*

Developable Parcels

Construction

Light and glare construction impacts associated with the developable parcels would be the same as those described above for the Canyon Lane improvements.

Operation

Similar to the single-family residences, the construction of new residences on the developable parcels would slightly increase ambient light levels in the vicinity. However, the increase would not be substantial because the project area is located in a suburban area that is already illuminated from nearby

[11] County of San Mateo. 2018. *Zoning Regulations.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC_Zoning_Regulations.pdf. Accessed on January 31, 2019.

residential uses at night, and the project's lighting levels would be compatible with surrounding uses. Further, the Applicant would implement Mitigation Measure AE/mm-2, which would require the development and implementation of a Light Fixture Plan. This Plan would ensure that all exterior lighting would be directed downwards to minimize lighting impacts on nearby residences and viewers from adjacent public roadways. With the implementation of Mitigation Measure AE/mm-2, lighting impacts would be less than significant.

The residences would include reflective materials such as glass and windows that have the potential to create glare, particularly in the early morning and late afternoon. However, the residences would be consistent with all applicable design standards provided in Section 6565.15 of the County Zoning Regulations for residential development within Emerald Lake Hills[12] and Article 5 of the City Zoning Ordinances for residential development within the Residential Hillside zone.[13] The residences would not be composed of reflective façades and would generally include types of building materials similar to those that currently characterize other residences in the area. As result, any potential glare impacts from the developable parcels would be less than significant.

[12] County of San Mateo. 2018. *Zoning Regulations.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC_Zoning_Regulations.pdf. Accessed on January 31, 2019.
[13] City of Redwood City. 2019. *Article 5 of the Zoning Ordinances.* Available online at https://library.municode.com/ca/redwood_city/codes/zoning?nodeId=ART5RHREILREINMIDI. Accessed on January 31, 2019.

3.2 AGRICULTURE AND FORESTRY

This section describes existing conditions and the potential impacts to agricultural and forestry resources as a result of the implementation of the project. "Agricultural land" is defined as Prime Farmland, Farmland of Statewide Importance, or Unique Farmland.

3.2.1 Existing Conditions

Regional Setting

Agricultural land in the County is primarily located in the coastal areas of the County. The unique microclimate in the coastal terraces and valleys is ideal for raising a variety of crops. The crops include vegetables, flowers, field crops, flower and vegetable seeds, fruit, and nuts. Agricultural land in the Santa Cruz Mountain and the foothills east of the Coastal Plain is used for grazing livestock. The types of livestock include cattle and calves, sheep and lambs, hogs and pigs, and poultry. Some of the livestock products produced in the County include wool, honey, and beeswax. Approximately 55,000 acres of County land falls under the Planned Agricultural District (PAD).[1] Farmland identified in the California Department of Conservation land use inventory of 2016 for the County includes areas mapped as Prime Farmland (1,946 acres), Farmland of Statewide Significance (141 acres), Unique Farmland (2,149 acres), Farmland of Local Importance (716 acres), and Grazing Land (49,122 acres).[2] The closest agricultural parcel to the project area is located approximately 6 miles from the project boundary.

Forestry areas in the County are primarily referred to in the General Plan as Timber Production Lands. A small portion of these lands is being harvested. Conifers such as redwood and Douglas fir are found in the mountains east of the Coastal Plain and south of State Route 92. Hardwoods such as oak, eucalyptus, and madrone are found in mixed woodland and oak savanna communities in the foothills and ridge areas of rural land. Christmas trees, one of the most profitable timber operations, are located throughout the County in rural areas. Timber harvesting was a major industry in the County during the 1860's but has declined with time. There are approximately 29,000 acres of land in the County-designated Timberland Preserve (Production) Zone District (TPZ) and Timberland Preserve (Production) Zone District/Coastal Zone (TPZ/CZ).[3] The closest timberland area is approximately 4 miles from the project area.

Local Setting

The project area comprises approximately 3.8 acres and is surrounded by low- to medium-low-density single-family homes in an urban/suburban location. The project area is situated on an undeveloped hillside with no opportunities for crop cultivation or timber harvesting within the project area or immediate vicinity. The closest land in agricultural or forest production is located approximately 6 and 4 miles from the project area, respectively.

[1] County of San Mateo County. November 1986. San Mateo County *General Plan Overview & Background Issues, Chapter 9: Rural Land Uses.* Page 9.18-9.24. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on March 2, 2019.

[2] California Department of Conservation. *Table A-32 San Mateo County 2014-2016 Land Use Conversion.* Available online at https://www.conservation.ca.gov/dlrp/fmmp/Pages/SanMateo.aspx. Accessed on March 6, 2019.

[3] County of San Mateo County. November 1986. San Mateo County *General Plan Overview & Background Issues, Chapter 9: Rural Land Uses.* Pages 9.20, 9.28-9.29. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on March 2, 2019.

3.2.2 Regulatory Setting

Federal

There are no applicable Federal agriculture or forestry regulations for the project area.

State

WILLIAMSON ACT

The California Land Conservation Act, better known as the Williamson Act (California Government Code Section 51200 et seq.), is designed to preserve agricultural and open space land. It establishes a program of private landowner contracts that voluntarily restrict land to agricultural and open space uses. The program is a two-step process involving the establishment of an agricultural preserve by the local legislative body and then approval of a land conservation contract. In return, Williamson Act parcels receive a lower property tax rate consistent with their actual use instead of their market rate value. The project area does not contain any lands that are subject to the Williamson Act provisions.[4]

FARMLAND MAPPING AND MONITORING PROGRAM

The California Department of Conservation, under the Division of Land Resource Protection, has established the Farmland Mapping and Monitoring Program (FMMP) to monitor the conversion of the State's farmland to and from agricultural use. Land is rated based on the land capability classification system, California's Revised Storie Index, and recent land use.[5]

FMMP designations include Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, Grazing Land, Urban and Built-Up Land, Other Land, and Water. The project is designated under the FMMP as Urban/Built-Up Land.[6]

Local

Agricultural lands and Forestry/Timberlands fall under the Rural Land Use Section of the County General Plan. Agricultural zones within the County are labeled PAD and Resource Management District/Coastal Zone. Most of the agricultural land in the County is found in the Coastal Zone and falls into one of two major categories described in Chapter 9 of the General Plan:[7]

1. Agriculture: Cultivated Lands – Lands which are currently under cultivation, including both irrigated and non-irrigated croplands and pastures, orchards, groves, vineyards, ornamental horticultural areas, greenhouses, confined feeding operations and other agricultural lands.

2. Agriculture: Grazing Lands – Lands which are currently being grazed by livestock, or which contain vegetative material that is suitable for the grazing or browsing of livestock.

[4] California Department of Conservation. *Williamson Act Program Overview.* Available online at https://www.conservation.ca.gov/dlrp/wa/Pages/wa_overview.aspx. Accessed on March 6, 2019.
[5] California Department of Conservation. *Program Overview.* Available online at https://www.conservation.ca.gov/dlrp/fmmp/Pages/Program_Overview.aspx. Accessed on March 7, 2019.
[6] California Department of Conservation. 2004. *A Guide to the Farmland Mapping and Monitoring Program.* Page 6-7. Available online at https://www.conservation.ca.gov/dlrp/fmmp/Documents/fmmp_guide_2004.pdf. Accessed on March 7, 2019.
[7] County of San Mateo County. November 1986. San Mateo County *General Plan Overview & Background Issues, Chapter 9: Rural Land Uses.* Page 9.4 and 9.20. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on March 2, 2019.

Timber Production is described in the General Plan as "Lands being harvested for timber or production as Christmas tree farms or wood fuel harvesting operations."[8] The Timberland TPZ contains 21,452 acres in the rural zoning districts and the TPZ/CZ has 7,787 acres in the rural zoning districts. There are three timber harvesting categories in the San Mateo County General Plan: coniferous forests, hardwoods, and Christmas tree farms. [9]

REDWOOD CITY URBAN FOREST

The City of Redwood City General Plan describes the City's urban forest. The urban forest includes a street tree system, trees in parks, trees on other public lands, and trees on private properties. The urban forest throughout Redwood City enhances the quality of life for residents and provides environmental benefits. The City strives to preserve existing trees, minimize tree removal, and implement measures to care for the urban forest. The City works to plant more trees every year than the number removed. The City's Street Tree Ordinance protects trees on public property adjacent to roadways. The Tree Preservation Ordinance protects trees with trunks that have more than a 38-inch circumference between 6 and 36 inches above grade on private properties.[10]

3.2.3 Thresholds of Significance

The significance of impacts on agriculture and forestry is based on thresholds identified within Appendix G of the CEQA Guidelines, shown below.

The project would result in a significant impact if it would:

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 nonagricultural use.

b. Conflict with existing zoning for agricultural use, or a Williamson Act contract.

c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g)).

d. Result in the loss of forest land or conversion of forest land to non-forest use.

e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use.

[8] County of San Mateo County. November 1986. San Mateo County *General Plan Overview & Background Issues, Chapter 9: Rural Land Uses.* Page 9.4. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on March 2, 2019

[9] County of San Mateo County. November 1986. San Mateo County *General Plan Overview & Background Issues, Chapter 9: Rural Land Uses.* Page 9.4 and 9.20. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on March 2, 2019.

[10] City of Redwood City. Redwood City General Plan, Natural Resources. Page NR-49- NR-50. Available online at https://www.redwoodcity.org/home/showdocument?id=5111. Accessed on March 15, 2019.

3.2.4 Impact Assessment and Methodology

The County General Plan, Department of Conservation website, Geographical Information System and aerial mapping were reviewed and referenced in assessing the impacts of the project on agriculture and forestry. Given the location of the project in a primarily residential setting, the project would not convert farmland to nonagricultural use, nor would it conflict with existing zoning for agriculture use or with a Williamson Act contract. The project would not result in loss of forest land or conversion of forest land to non-forest use nor would it involve changes in the existing environment that would result in the conversion of agriculture to non-agricultural use or forest to non-forest use.

3.2.5 Project-Specific Impacts and Mitigation Measures

Impact 3.2-1: The potential to result in the conversion of Prime Farmland, Unique Farmland or Farmland of Statewide Importance; conflict with existing agricultural zoning or Williamson Act contracts; or involve other changes to the environment that could result in conversion of farmland to non-agricultural uses – No Impact

The project includes improvements to Canyon Lane and development of a single-family residence on one parcel, and provides for future development of residences on 11 additional parcels. The project area is located in an existing urban/suburban area zoned for residential use. The project area is not used for agricultural purposes or subject to a Williamson Act contract. Therefore, the project would not involve the conversion of agricultural land to another use, conflict with existing agricultural zoning or Williamson Act contract, or convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to a non-agricultural use. Therefore, no impact to agricultural resources would occur.

Impact 3.2-2 Conflict with zoning of forest land or timber land; result in the loss or conversion of forest land to non-forest uses; or involve other changes to the environment that could result in conversion of forest land to non-forest uses – No Impact

The project includes improvements to Canyon Lane and development of a single-family residence on one parcel and provides for future development of residences on 11 additional parcels. The project area is located in an existing urban/suburban area zoned for residential use. The project area is not used for timber production or managed for forest resources. Therefore, the project would not conflict with existing zoning of forest land or timber land or result in the loss or conversion of forest land to a non-forest use. As such, no impacts would occur.

3.3 AIR QUALITY

This section provides an analysis of potential air quality impacts to regional and local air quality resulting from construction and operation of the project. It summarizes the overall regulatory framework for air quality management in the San Francisco Bay Area Air Basin (SFBAAB) and describes existing air quality conditions in the project vicinity, the criteria used to evaluate the significance of potential impacts, the methods used to evaluate these impacts, and the results of the impact assessment.

3.3.1 Existing Conditions

Air Basin

The project is located within the SFBAAB under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). The SFBAAB is comprised of the following nine counties: Contra Costa, Alameda, Santa Clara, San Mateo, San Francisco, Marin, Napa and the southern portions of Solano and Sonoma. Air basins are determined by grouping together geographic areas with similar topographic and meteorological features. Political boundaries also factor into the creation of air basins.[1]

The SFBAAB ranges in elevations from sea level along the coast and bay shore to over 4,000 feet in the Diablo Mountain Range. Airflow patterns within the SFBAAB are strongly influenced by persistent northwesterly winds that are especially dominant in the spring and summer. These air flow patterns tend to move fog and low clouds inland through the Golden Gate and through various gaps in the coastal mountain ranges. In the fall, pressure gradients reduce, and northwest wind speed tends to attenuate, resulting in less prevalent fog conditions. In the fall, offshore wind events often occur and can become moderate to strong over coastal waters below coastal ridges and canyons. In the winter, the strongest wind events occur as winter storm events approach the coast from the north and blow from the west or northwest.[2]

Climate

The climate within the SFBAAB can be characterized as Mediterranean, with mild wet winters and dry hot summers. Over 80 percent of the region's rain falls between November and March. The SFBAAB's varied topography and maritime surrounding of the San Francisco Bay combine with California's unique Mediterranean climate to produce various micro climates. Along the coast, rainfall can exceed 20 inches per year, with average summer high temperatures between 60 and 70 degrees Fahrenheit and average summer low temperatures between 50 and 55 degrees Fahrenheit. Average winter high temperatures along the coast are between 55 and 60 degrees Fahrenheit, and average winter low temperatures are between 45 and 50 degrees Fahrenheit. Further inland, average annual precipitation is around 15 inches. In the summer, the temperature difference in inland areas can be as high as 35 degrees Fahrenheit during the day and less than 10 degrees Fahrenheit during the night when compared to the coast. In the winter, this extreme temperature difference reverses, but to a far lesser degree.[3]

[1] BAAQMD. 2017. CEQA Air Quality Guidelines. Available online at http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed March 18, 2019.
[2] J, Null. 1995. National Weather Service Forecast Office. Climate San Francisco. Available online at https://www.wrh.noaa.gov/mtr/sfd_sjc_climate/sfd/SFD_CLIMATE3.php. Accessed March 18, 2019.
[3] J, Null. 1995. National Weather Service Forecast Office. Climate San Francisco. Available online at https://www.wrh.noaa.gov/mtr/sfd_sjc_climate/sfd/SFD_CLIMATE3.php. Accessed March 18, 2019.

Baseline Air Quality

The Environmental Protection Agency (EPA) has identified air pollutants that endanger public health and the environment, are widespread throughout the United States, and come from a variety of sources. These pollutants are called "criteria" air pollutants. National Ambient Air Quality Standards (NAAQS) have been established for each of them to meet specific public health and welfare standards. The EPA has established NAAQS for the following six criteria pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM), and lead (Pb). The California Air Resources Board (CARB) has set California Ambient Air Quality Standards (CAAQS) for the same six pollutants, as well as four additional pollutants: sulfates, hydrogen sulfide, vinyl chloride, and visibility reducing particles.[4] Criteria pollutants that are a concern in the SFBAAB are described below.

Ozone

O_3 is a respiratory irritant that can cause severe ear, nose, and throat irritation and increase susceptibility to respiratory infections. It is also an oxidant that can cause extensive damage to plants through leaf discoloration and cell damage. It can cause substantial damage to other materials as well, such as synthetic rubber and textiles. O_3 is not emitted directly into the air but is formed by a photochemical reaction in the atmosphere. O_3 is what is known as a photochemical pollutant and unlike other pollutants, O_3 is created by sunlight acting on other air pollutants (the precursors), specifically nitrogen oxides (NO_X) and reactive organic gases (ROG). ROG and NO_X are mainly emitted by mobile sources, stationary combustion equipment, dry-cleaning solutions, solvents, and paint.

Particulate Matter

PM pollution consists of very small liquid and solid particles floating in the air, which can include smoke, soot, dust, salts, acids, and metals. The particles vary in shape, size, and composition. PM_{10} refers to particles less than or equal to 10 microns in aerodynamic diameter, and $PM_{2.5}$ refers to particles less than or equal to 2.5 microns in aerodynamic diameter. Stationary PM sources include combustion for electrical utilities, residential space heating, industrial processes, construction and demolition, wood products processing, mills, and land erosion. Mobile sources are from vehicle exhaust and road dust. PM also forms when gases emitted from industries and motor vehicles undergo chemical reactions in the atmosphere. $PM_{2.5}$ and PM_{10} pose a greater health risk than larger-size particles. Short-term exposure can cause irritation of the nose, throat, and eyes; coughing; shortness of breath and chest tightness; asthma attacks; and acute bronchitis. Long-term exposure can permanently reduce lung function and cause chronic bronchitis and changes in lung morphology. Extreme cases may result in death.

Air Quality Monitoring

The EPA, CARB, and local air districts classify geographic areas based on monitored ambient air quality conditions. Areas that meet both the primary and secondary standards of a pollutant subject to NAAQS and CAAQS are classified as being in attainment for that pollutant. Areas that do not meet the NAAQS or CAAQS for a pollutant are designated as being in nonattainment for that pollutant. Areas that cannot be classified based on available information for a pollutant are designated as being unclassified. An area's attainment status is designated separately for each criteria pollutant; one area may have all three classifications. Previously designated nonattainment areas for one of the pollutants that have since met the NAAQS and CAAQS standards are referred to as attainment areas with a maintenance plan.

[4]CARB. 2019. Common Air Pollutants. Available online at https://ww2.arb.ca.gov/resources/common-air-pollutants. Accessed March 16, 2019.

Air quality monitoring is rigorously controlled by Federal and State quality assurance and control procedures to ensure data validity. The BAAQMD and CARB maintain and operate a regional monitoring network that measures the ambient concentrations of criteria pollutants. Existing air quality conditions in the project area can be characterized by monitoring data collected in the BAAQMD. The closest BAAQMD ambient air quality monitoring station to the project area that monitors O_3 and $PM_{2.5}$ is the Redwood City monitoring station (located at 897 Barron Avenue, Redwood City, CA 94063), approximately 3.2 miles northwest of the project area.[5] The closest monitoring station for PM_{10} is the San Francisco monitoring station (located at 10 Arkansas Street, Suite N, San Francisco, CA 94107), approximately 22 miles north of the project area.[6] The data collected at these stations are considered generally representative of the air quality experienced in the vicinity of the project. Recent air quality monitoring results from these stations are summarized in Table 3.3-1, Ambient Air Quality Data.

Table 3.3-1. Ambient Air Quality Data

Concentration or Exceedances	Units	Air Quality Standard	2014	2015	2016	2017
Ozone (O_3) Redwood City, California, Monitoring Station						
Maximum 1-hour concentration	ppm	0.09 (CAAQS)	0.086	0.086	0.075	0.115
Number of days exceeding State standard	days		0	0	0	2
Maximum 8-hour concentration	ppm	0.07 (CAAQS)	.065	0.071	0.060	0.086
	ppm	0.07 (NAAQS)				
Number of days exceeding State standard*	days		0	1	0	2
Number of days exceeding Federal standard*	days		0	1	0	2
Coarse Particulate Matter (PM_{10}) San Francisco, California, Monitoring Station						
Maximum 24-hour concentration	µg/m^3	50 (CAAQS)	36	47	29	77
	µg/m^3	150 (NAAQS)				
Estimated Number of days exceeding State standard (Measured)*	days		0	0	0	2
Estimated Number of days exceeding Federal standard (Measured)*	days		0	0	0	0
Annual concentration (State method)	µg/m^3	20 (CAAQS)	17	19.2	17	22
Fine Particulate Matter ($PM_{2.5}$) Redwood City, California, Monitoring Station						
Maximum 24-hour concentration	µg/m^3	35 (NAAQS)	35	34.6	19	60.8
Estimated Number of days exceeding federal standard (Measured)*	days		0	0	0	6
Annual concentration	µg/m^3	12 (CAAQS)	7.1	5.7	8.3	9.1
	µg/m^3	12.0 (NAAQS)				

Source: BAAQMD. 2017. CEQA Air Quality Guidelines. Available online at http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed March 18, 2019.
Notes: ppm = parts per million, µg/m^3 = micrograms per cubic meter, CAAQS = California Ambient Air Quality Standards, NAAQS = National Ambient Air Quality Standards.
* Number of days exceeding the standards is a mathematical estimate of the number of days concentrations would have been greater than the level of the standard had each day been monitored.

[5] BAAQMD. 2018. 2017 Air Monitoring Network Plan. Meteorological and Measurement Division. Available online at http://www.baaqmd.gov/~/media/files/technical-services/2017_network_plan_20180701-pdf.pdf. Accessed March 16, 2019.

[6] AAQMD. 2018. 2017 Air Monitoring Network Plan. Meteorological and Measurement Division. Available online at http://www.baaqmd.gov/~/media/files/technical-services/2017_network_plan_20180701-pdf.pdf. Accessed March 16, 2019.

Attainment Status

The current attainment designations for the SFBAAB with respect to the NAAQS and CAAQS are shown in Table 3.3-2, Attainment Status for the San Francisco Bay Area Air Basin.

Table 3.3-2. Attainment Status for the San Francisco Bay Area Air Basin

Pollutant	Attainment Designation	
	State	Federal
Ozone (O_3)1-hour	Nonattainment	--
Ozone (O_3) 8-hour	Nonattainment	Nonattainment
Nitrogen dioxide (NO_2) Annual Arithmetic Mean	--	Unclassified/Attainment
Nitrogen dioxide (NO_2) 1-hour	Attainment	--
Carbon monoxide (CO) 1-hour	Attainment	Unclassified/Attainment
Carbon monoxide (CO) 8-hour	Attainment	Unclassified/Attainment
Sulfur dioxide (SO_2) 24-hour	Attainment	Attainment
Sulfur dioxide (SO_2) 3-hour	--	Attainment
Sulfur dioxide (SO_2) 1-hour	Attainment	Attainment
Sulfur dioxide (SO_2) Annual Arithmetic Mean	---	Attainment
Coarse Particulate Matter (PM_{10})	Nonattainment	Unclassified
Fine Particulate Matter ($PM_{2.5}$)	Nonattainment	Unclassifiable/Attainment
Lead (Pb)	--	--
Hydrogen sulfide (H_2S)	Unclassified	No Standard
Vinyl chloride	--	No Standard
Sulfates	Attainment	No Standard

Source. BAAQMD. 2017. CEQA Air Quality Guidelines. Available online at http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed March 18, 2019.

Sensitive Receptors

Individuals who are more sensitive to exposure to pollutants than the general population are considered sensitive receptors. Typical sensitive receptors include children, the elderly, and persons with preexisting respiratory or cardiovascular illness. Such receptors may reside at hospitals, residences, convalescent facilities, and schools.

Proximate sensitive receptors to the project area include residential land uses, with the closest residential structures located immediately south of the intersection of Canyon Lane and Glenwood Avenue and north and south of Canyon Lane along the canyon ridge. Users of Garrett Park (located directly east of the project area) could also be considered sensitive receptors.

3.3.2 Regulatory Setting

Federal

Clean Air Act and National Ambient Air Quality Standards

Since 1963, the Clean Air Act (CAA) and subsequent amendments in 1970, 1977, and 1990 have provided the authority and framework for EPA regulation of air emission sources. Regulations have been promulgated pursuant to the CAA to serve as requirements for the monitoring, control, and documentation of activities that will affect ambient concentrations of pollutants that may endanger public health or welfare.

Title I of the CAA requires the EPA to establish NAAQS for pollutants considered harmful to public health and the environment. The EPA established NAAQS for six common principal pollutants found all over the United States: NO_2, CO, SO_2, O_3, Pb, and PM, including PM_{10} and $PM_{2.5}$.

The CAA identifies two types of NAAQS: primary and secondary. Primary standards provide public health protection, including protecting the health of sensitive populations such as children, the elderly, and individuals suffering from asthma and other chronic lung conditions. Secondary standards were set to provide protection to the natural environment and to the public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. These standards are defined in terms of threshold concentration measured as an average for specified periods of time.

Hazardous Air Pollutants

Air pollutants that did not meet the specific criteria for development of a NAAQS are categorized as Hazardous Air Pollutants (HAPs). HAPs include certain volatile organic chemicals (VOCs), pesticides, herbicides, and radionuclides that are suspected to cause cancer or other serious health effects such as reproductive health or birth defects, or adverse environmental impacts, based on scientific studies of exposure to humans and other mammals.

Section 112 of the CAA lists 187 HAPs to be regulated by National Emission Standards for Hazardous Air Pollutants (NESHAPs). The EPA approaches HAPs with control technologies rather than set standards because developing risk-based standards for each HAP is a difficult task. Therefore, NESHAPs regulate emissions from specific emission units and source types.

State

Under the provisions of the CAA, any state can have requirements that are more stringent than those of the national program. In addition to the NAAQS established by the EPA, California has additional ambient air quality standards that apply.

The CARB is the State agency responsible for air quality management, including establishment of CAAQS and mobile source emission standards, as well as oversight of regional air quality districts and preparation of implementation plans, including regulations for stationary sources of air pollution.

The CAAQS developed by CARB are listed in 17 California Code Regulation Section 70200. National and California standards for ambient air are shown in Table 3.3-3, Ambient Air Quality Standards.

Table 3.3-3. Ambient Air Quality Standards.

Pollutant	Averaging Time	National Standards		California Standards
		Primary Standards	Secondary Standards	Secondary Standards
Carbon monoxide (CO)	1 hour	35 ppm	–	20 ppm
	8 hours	9 ppm	—	9 ppm
Lead (Pb)	3 months (rolling average)	0.15 µg/m^3	Same as primary	—
Nitrogen dioxide (NO_2)	Annual 1 hour	0.053 ppm 0.100 ppm	Same as primary —	0.03 ppm 0.18 ppm
Ozone (O_3)	8 hours	0.07 ppm	Same as primary	0.07 ppm
	1 hour	—	—	0.09 ppm
Coarse Particulate Matter (PM_{10})	24 hours	150 µg/m^3	Same as primary	50 µg/m^3
	Annual	—	—	20 µg/m^3
Fine Particulate Matter ($PM_{2.5}$)	24 hours	35 µg/m^3	Same as primary	—
	Annual	12 µg/m^3	15 µg/m^3	12 µg/m^3
Nitrogen dioxide (NO_2)	1 hour	0.075 ppm	—	0.025 ppm
	3 hours	—	0.5 ppm	—
	24 hours	—	—	0.04 ppm
	Annual	—	—	—
Hydrogen sulfide (H_2S)	1 hour	—	—	0.03 ppm
Vinyl chloride	24 hours	—	—	0.01 ppm
Sulfates	24 hours	—	—	25 g/m^3

Notes: — = not available; µg/m^3 = micrograms per cubic meter; ppm = parts per million.
Source: Ambient Air Quality Standards. 2016. Available online at https://www.arb.ca.gov/research/aaqs/aaqs2.pdf. Accessed March 16, 2019.

Assembly Bill 2588 Air Toxics "Hot Spots" Program

The Air Toxic “Hot Spots” Information and Assessment Act (Assembly Bill [AB] 2588) identifies toxic air contaminant (TAC) hot spots where emissions from specific sources may expose individuals to an elevated risk of adverse health effects, particularly cancer or reproductive harm. TACs are also referred to as HAPs. The act requires that a business or other establishment identified as a significant source of toxic emissions provide the affected population with information about health risks posed by the emissions.

California Health and Safety Code Section 41700

Section 41700 of the Health and Safety Code states, “no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property.”

Diesel Risk Reduction Plan

The CARB Diesel Risk Reduction Plan (DRRP) focuses on improvements to the quality of diesel fuel, tightened restrictions on new diesel engines, and reducing emissions from both new and existing diesel-

fueled engines and vehicles. The goal of the DRRP is to reduce Diesel PM emissions and the associated health risk by 75 percent in 2010 and by 85 percent by 2020.

Local

Bay Area Air Quality Management District

The project is located within the SFBAAB under the jurisdiction of the BAAQMD.[7] The BAAQMD regulates air pollutant emissions, enforces regulations, administers permits governing stationary sources, inspects stationary sources, monitors air quality and meteorological conditions, and assists local governments in addressing climate change.

The 2017 Bay Area Clean Air Plan[8] was adopted in April 2017 and updated the 2010 Clean Air Plan. The updated plan includes strategies to reduce emissions of O_3 precursors and emissions of fine particulate matter TACs. The plan also provides a framework for long-term planning efforts to reduce greenhouse gas emissions 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.

3.3.3 Thresholds of Significance

The significance of potential air quality impacts is based on thresholds identified within Appendix G of the CEQA Guidelines, shown below.

Impacts would be considered significant if the project would:

a. Conflict with or obstruct implementation of the applicable air quality plan.

b. 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.

c. Expose sensitive receptors to substantial pollutant concentrations.

d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

The BAAQMD established emissions-based thresholds of significance for criteria air pollutants, which are shown in Table 3.3-4, BAAQMD CEQA Significance Thresholds for Criteria Pollutants.

[7] BAAQMD. 2017. CEQA Air Quality Guidelines. Available online at http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed March 18, 2019.

[8] BAAQMD. 2017. Clean Air Plan. Available online at http://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf?la=en. Accessed March 16, 2019.

Table 3.3-4. BAAQMD CEQA Significance Thresholds for Criteria Pollutants

Pollutant	Average Daily Construction Emissions (pounds per day)	Average Daily Operation Emissions (pounds per day)	Average Annual Operation Emissions (tons per year)
Reactive organic gases (ROG)	54	54	10
Nitrogen oxides (NO_X)	54	54	10
Coarse Particulate Matter (PM_{10})	82	82	15
Fine Particulate Matter ($PM_{2.5}$)	54	54	10
Carbon monoxide (CO)	None	9.0 ppm (8-hour average), 20.0 ppm (1-hour average)	

Source: BAAQMD. 2017. CEQA Air Quality Guidelines. Available online at http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed March 18, 2019.

3.3.4 Impact Assessment and Methodology

The County has not established significance criteria for air pollutants. As a result, the significance of project emissions impacts was evaluated using the 2017 BAAQMD Air Quality Guidelines.

Emission estimates for the project were generated using the California Emissions Estimator Model (CalEEMod) version 2016.3.1.[9] CalEEMod was designed in collaboration with the South Coast Air Quality Management District and other California air districts to calculate air and greenhouse gas emissions associated with land use projects. This program analyzes both construction (short-term) and operational (long-term) emissions by utilizing both default values for specific geographic areas and typical land use projects, as well as project-specific values such as construction schedules and equipment rosters. Emission estimates generated by CalEEMod were compared against the BAAQMD's established thresholds of significance for criteria air pollutants. Criteria air pollutant emissions exceeding established thresholds were considered significant.

Local CO concentrations were not estimated for the project. According to the BAAQMD CEQA Guidelines, if the preliminary screening procedure for a pollutant impact is followed and all screening criteria are met, the project is assumed to result in a less-than-significant impact to CO concentrations. The screening criteria for local CO concentration are based on traffic volumes at nearby intersections, which were quantified as part of the Traffic Study conducted for the proposed project, the results of which are included in Appendix B and described in Section 3.17, Transportation and Traffic. The screening criteria are also based on conformity with the applicable congestion management program, which is described in Section 3.17.

To assess potential impacts of project emissions on sensitive receptors, the scope of the assessment included a 1,000-foot radius from the project, as recommended by the BAAQMD CEQA Guidelines. To evaluate potential odor impacts, a qualitative evaluation was conducted taking into account the nature of the project construction and operation.

[9] California Emissions Estimator Model. Developed for the California Air Pollution Control Officers Association in Collaboration with California Air Districts. The model can be downloaded from: http://caleemod.com/. Accessed March 21, 2019.

3.3.5 Project-Specific Impacts and Mitigation Measures

Impact 3.3-1: Potential to conflict with or obstruct implementation of the applicable air quality plan – Less than Significant with Mitigation

Canyon Lane Improvements, Proposed Single-Family Residence, Developable Parcels

Construction

Project construction would generate ROG, NO_X, PM_{10}, and $PM_{2.5}$ emissions from mobile and stationary construction equipment exhaust, on-road vehicle (workers and trucks) exhaust, dust from clearing the land, and exposed soil eroded by wind. On-site sources of criteria air pollutant emissions would include off-road equipment and fugitive dust, and off-site sources would include hauling and vendor trucks and worker vehicles. Fugitive dust results from the exposure of earth surfaces to wind from the direct disturbance and movement of soil, resulting in PM_{10} and $PM_{2.5}$ emissions.

As provided in Table 3.3-5, Estimated Maximum Daily Construction Criteria Air Pollutant Emissions, and construction of the project would not generate pollutant emissions above applicable thresholds provided in the 2017 BAAQMD CEQA Guidelines (see Appendix C for CalEEMod output results). Therefore, construction of the project would not conflict with or obstruct implementation of the applicable air quality plan, and impacts would be less than significant.

Although construction criteria pollutant emissions would not exceed any applicable threshold values, the BAAQMD recommends implementation of Basic Construction Mitigation Measures, regardless of whether or not construction-related emissions exceed applicable thresholds. Implementation of the Basic Construction Mitigation Measures would help to reduce fugitive dust emissions. Therefore, the Applicant would implement Mitigation Measure AQ/mm-1.1, which would require implementation of the Basic Construction Mitigation Measures.

Table 3.3-5. Estimated Maximum Daily Construction Criteria Air Pollutant Emissions

	ROG	NOx	PM_{10}	$PM_{2.5}$
	Pounds per Day			
Construction Emissions	16.0	40.9	1.7	1.6
BAAQMD Threshold	54	54	82	54
Threshold Exceeded?	No	No	No	No

Source: CalEEMod version 2016.3.1 (see Appendix C)

Operation

Operation of the 12 developable parcels would lead to the generation of vehicular trips, which are the primary source of airborne emissions. Wood-burning fireplaces or stoves are an additional source of criteria pollutant emissions. In the event that wood stoves or fireplaces would be installed in any of the residences, the project would comply with the BAAQMD's Regulation 6, Rule 3, which requires that only EPA-certified wood-burning fireplaces and pellet stoves be constructed.

As provided in Table 3.3-6, Estimated Maximum Daily Operation Criteria Air Pollutant Emissions, post-construction occupancy would not generate pollutant emissions above applicable thresholds provided in the 2017 BAAQMD CEQA Guidelines (see Appendix C for CalEEMod output results). Therefore, operation of the project would not conflict with or obstruct implementation of the applicable air quality plan, and impacts would be less than significant.

In addition, the project would result in the development of 12 single-family residences, which is below the screening criteria of 325 dwelling units provided in Table 3-1 of the 2017 BAAQMD CEQA Guidelines. Residential projects that have fewer than 325 dwelling units would not result in the generation of operational-related criteria air pollutants that exceed applicable thresholds. Therefore, operation of the project would have less-than-significant impacts.

Table 3.3-6. Estimated Maximum Daily Operation Criteria Air Pollutant Emissions

	ROG	NOx	PM_{10}	$PM_{2.5}$
	Pounds per Day			
Operational Emissions	1.7	0.08	0.19	0.19
BAAQMD Threshold	54	54	82	54
Threshold Exceeded?	No	No	No	No

Source: CalEEMod version 2016.3.1

Air Quality Mitigation Measures		
AQ/mm-1.1	*a.*	*All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.*
	b.	*All haul trucks transporting soil, sand, or other loose material off site shall be covered.*
	c.	*All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.*
	d.	*All vehicle speeds on unpaved roads shall be limited to 15 mph.*
	e.	*All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.*
	f.	*Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of the California Code of Regulations). Clear signage shall be provided for construction workers at all access points.*
	g.	*All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.*
	h.	*Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.*

Impact 3.3-2: 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 – Less than Significant

Canyon Lane Improvements, Proposed Single-Family Residence, Developable Parcels

As described in Table 3.3-2, SFBAAB is designated non-attainment for O_3, PM_{10}, and $PM_{2.5}$. As previously described, O_3 is a photochemical pollutant and is created by sunlight acting on other air pollutants (the precursors), specifically NO_X and ROGs. As provided in Table 3.3-5 and Table 3.3-6, the project would not exceed applicable thresholds for NO_X and ROG. Therefore, the project would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment. Impacts would be less than significant.

Impact 3.3-3: Expose sensitive receptors to substantial pollutant concentrations – Less than Significant

Canyon Lane Improvements, Proposed Single-Family Residence, Developable Parcels

Construction

The 2017 BAAQMD CEQA Guidelines recommend assessment of risks and hazards on sensitive receptors within 1,000 feet of the project. Sensitive receptors within this radius include numerous residences scattered about the adjacent hillsides and Garrett Park located directly east of the project area. Construction of the project would generate emissions that could expose these sensitive receptors to pollutant concentrations. However, as provided in Table 3.3-5, Estimated Maximum Daily Construction Criteria Air Pollutant Emissions, project construction emissions would not exceed applicable emissions thresholds. Therefore, construction of the project would not expose sensitive receptors to substantial pollutant concentrations, and impacts would be less than significant.

Operation

Operation of the project would expose sensitive reports within 1,000 feet of the project to pollutant concentrations. Operation pollutant emissions would primarily be associated with vehicle sources. However, as provided in Table 3.3-6, Estimated Maximum Daily Operation Criteria Air Pollutant Emissions, project operational emissions would not exceed applicable emissions thresholds. Further, as described in Section 3.17, Transportation and Traffic, the project would have less-than-significant impacts to traffic flow and the project would not substantially increase the number of vehicles and associated air pollutant concentrations. Therefore, impacts associated with the release of pollutant emissions on sensitive receptors would be less than significant.

TACs (also referred to as HAPs) could be released inside the residences following installation of certain construction materials. For example, pressed wood products and carpeting could release TACs such as formaldehyde. As previously described, HAPs are generally regulated with control technologies rather than through the use of emission thresholds. As such, there is no threshold of significance for the release of such compounds. Nevertheless, formaldehyde concentrations associated with these construction materials would occur for a short duration immediately following installation. Further concentrations of formaldehyde once released into the atmosphere would quickly disperse and would not occur in

concentrations sufficient to cause irritation to people with sensitivity to this compound. Therefore, impacts associated with the release of TACs on sensitive receptors would be less than significant.

Impact 3.3-4: Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people – Less than Significant

Canyon Lane Improvements

Construction

Construction of the Canyon Lane improvements would involve the use of asphalt for paving the roadway surface, which would result in temporary emission of odors. In addition, project construction would involve the operation of mobile sources of air quality emissions including off-road construction equipment and on-road mobile sources resulting from worker and vendor trips, both of which may emit objectionable odors due to the combustion of diesel fuel. However, the odor impacts associated with these activities would be temporary. Any odor impacts associated with paving activities would last approximately one week. Any odor impacts associated with the operation of mobile sources of air quality emissions would occur intermittently throughout the 13-week construction period. Given the limited duration of any odor emissions and relatively small area that would be paved, it is unlikely that project construction would contribute to ambient odors affecting a substantial number of people. Therefore, impacts would be less than significant.

Operation

Operation of the roadway would not create any objectionable odors beyond those associated with vehicular activity. Any odor impacts would be negligible, and impacts would be less than significant.

Proposed Single-Family Residence, Developable Parcels

Construction

Construction of the single-family residence and developable parcels would use exterior and interior paints that could create objectionable odors. Additionally, construction activities would involve the operation of mobile sources of air quality emissions including off-road construction equipment and on-road mobile sources resulting from worker and vendor trips, both of which may emit objectionable odors due to the combustion of diesel fuel. However, any odor impacts would be temporary and would occur intermittently throughout the 5.75-month construction period. Given the limited duration of any odor emissions and relatively small scale of the project, it is unlikely that project construction would contribute to ambient odors affecting a substantial number of people. Therefore, impacts would be less than significant.

Operation

The residences would be connected to an existing sewer line that underlies Canyon Lane. Because the sewer line is underground, wastewater generated during operation of the residences would not generate any odors. Other operational odors would be associated with typical household uses (vehicles, barbecues, etc.) that are already common to the area. As a result, operation of the project would not contribute to ambient odors affecting a substantial number of people. Therefore, impacts would be less than significant.

3.4 BIOLOGICAL RESOURCES

This section evaluates potential impacts to biological resources resulting from implementation of the project. Th evaluation of biological resources is based on a biological resources report prepared in 2016, two arborist reports (see Appendix A), a peer review of these documents including an update to the biological resources evaluation in 2019 (see Appendix D) and a technical memorandum summarizing the results of two rare plant field surveys (Appendix E). A summary of these reports is included in Section 3.4.1 below.

3.4.1 Existing Conditions

The proposed project is located on the boundary of the City of Redwood City and unincorporated San Mateo County. The project area consists of an approximately 3.8-acre site, located to the north and south of an existing unpaved road known as Canyon Lane. Canyon Lane runs generally east to west through a small forested canyon. The land use surrounding the project area is residential, with homes constructed in about the 1960s.

Site elevation ranges from approximately 130 feet at Glenwood Avenue to approximately 300 feet at Vista Drive. Soils on the project area are Urban land-orthents, cut and fill complex, 5 to 75 percent slopes; and Orthents, cut and fill-urban land complex, 5 to 75 percent slopes.[1] The climate conditions for this area include a 30-year normal of 24.11 inches of annual precipitation, an average maximum temperature of 70.5°F and an average minimum temperature of 48.1°F.[2]

Field Studies

The following section is based on a biological resources report prepared in 2016; two arborist reports prepared in 2012 and 2016 and revised in 2019 and 2017, respectively; a peer review of these documents and biological evaluation update performed in 2019; and a technical memorandum summarizing the results of two rare plant field surveys. The arborists reports are provided in Appendix A, the revised biological resource report and peer review report is included in Appendix D, and the rare plant survey technical memorandum is provided in Appendix E of this EIR.

2016 Biological Resources Report

A reconnaissance-level field survey was conducted on November 2, 2016, to provide a project-specific impact assessment for the widening and improvement of Canyon Lane. Specifically, the surveys were conducted to assess existing biotic habitats and plant and animal communities on the project area, to assess the area for its potential to support special-status species and their habitats, and to identify potential jurisdictional habitats, although a formal wetland delineation was not conducted. During this survey, biologists also conducted focused surveys for San Francisco dusky-footed woodrat middens, evidence of raptor nesting activity, and bat roosting habitat.[3]

[1] Natural Resources Conservation Service (NRSC). 2019. Web Soil Survey for San Mateo County. Available at: http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx Accessed February 8, 2019.
[2] PRISM Climate Group. 2016. Online PRISM Data Explorer. Oregon State University, Corvalis, OR. Accessed December 2016.
[3] H.T. Harvey and Associates. 2016. Canyon Lane Project Biological Resources Report. Prepared for Casey Construction, Inc. December 13, 2016.

Arborist Report November 2016 (Revised March 2017)

The Arborist Report prepared in November 2016 (revised March 2017)[4] included an assessment of trees that could be impacted by the expansion and paving of Canyon Lane. A total of 54 trees were identified within the project area.

Arborist Report April 2012 (Revised January 2019)

The Arborist Report prepared in April 2012[5] (revised January 2019[6]) included an assessment of trees that could be impacted by the construction and development of a single-family residence on merged parcel APN 057-222-290 & 300. The original 2012 report included a total of 18 trees; this total was revised in 2019 to include only 14 trees.

2019 Biological and Arborist Report Peer Review

At the request of the County, SWCA conducted a third-party review of the 2016 Canyon Lane Project Biological Resources Report and the 2016 and 2012 Arborist Reports to provide comment on these reports in the context of technical adequacy for assessing impacts under the California Environmental Quality Act. The 2016 Canyon Lane Project Biological Resources Report included analysis for widening and improvement of Canyon Lane. However, the proposed project description was expanded to include the development of a single-family residence on a merged parcel (057-222-290 & 300) and the potential future development of 11 parcels. Therefore, SWCA also conducted a biological resources analysis for portions of the project area that were not covered under the previously prepared Biological Resources Report and Arborist Reports.

A reconnaissance-level field survey was conducted by SWCA Biologists on January 22, 2019, and a follow-up survey was conducted on February 6, 2019. The biological survey area included areas identified as the proposed Canyon Lane road expansion area, the proposed utility installation area, the single-family residence development, and 11 future development parcels.

2019 Rare Plant Technical Memorandum

SWCA biologists conducted rare plant surveys for the Bent-flowered fiddleneck and Wooly sunflower on May 21 and June 13, 2019. These seasonally-timed rare plant surveys were conducted as a follow up to the reconnaissance-level surveys performed on January 22 and February 6, 2019.

The biologists visited reference sites for the bent-flowered fiddleneck prior to each round of surveys in order to determine the bloom status and to calibrate the field team to identifying the species. The survey area included the Canyon Lane roadway improvement area, single-family residence, and the 11 developable parcels. The biological survey area was surveyed by walking meandering transects to identify potential special-status species. The surveyors referred to The Jepson Manual[7] to verify plant identification. Surveys were conducted in May and June following a season of good rainfall (approximately 114 percent of normal),[8] providing optimal conditions for the detection of rare plants. The

[4] Mayne Tree Expert Company. 2016. Arborist report. Prepared for Casey Construction November 1, 2016.
[5] Mayne Tree Expert Company. 2012. Arborist report. Prepared for Jack McCarthy Designer, Inc. April 11, 2012.
[6] Mayne Tree Expert Company. 2019. Arborist report. Prepared for Casey Construction, Inc. January 7, 2019.
[7] Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken (eds.) 2012. *The Jepson Manual: Vascular Plants of California*. 2nd Edition. University of California Press, Berkeley.
[8] National Oceanic and Atmospheric Administration (NOAA). 2019. Climate Station Precipitation Summary. Available at: https://www.cnrfc.noaa.gov/awipsProducts/RNOWRKCLI.php. Accessed July 2019.

surveys were conducted over a range of bloom periods to capture the flowering period of all special-status plants with a likelihood for occurrence in the biological survey area.

Vegetation and Wildlife

Dominant Vegetation

The proposed project area is characterized as a mixture of seven general biotic habitat/land use types: coast live oak forest, developed, disturbed, California annual grassland, riparian coast live oak forest, ephemeral drainage, and intermittent drainage. Table 3.4-1, Habitat Acreages on the Project Area, provides a summary of the habitat acreages on the site.

Table 3.4-1. Habitat Acreages on the Project Area

Habitat	Area (acres)	Percentage of Project Area
Coast live oak forest	2.417	63
Developed	0.260	7
California annual grassland	0.278	7
Riparian coast live oak forest	0.697	18
Disturbed	0.066	2
Intermittent drainage	0.067	2
Ephemeral drainage	0.016	1
TOTAL	**3.801**	**100**

Wildlife Habitat

Coast live oak forest habitat areas within the project area are limited in extent and surrounded by residential development. Therefore, this fragmented habitat type is not anticipated to support a large number of woodland-associated species. However, a variety of common wildlife species are expected to occur within coast live oak forest. Leaf litter and fallen logs within the project area provide cover for species such as California slender salamander (*Batrachoseps attenuates*), western fence lizards (*Sceloporus occidentalis*), and northern alligator lizards (*Elgaria coerulea*). The trees and shrubs provide suitable nesting habitat for a variety of avian species such as Bewick's wren (*Thryomanes bewickii*), chestnut-backed chickadee (*Poecile rufescens*), Anna's hummingbird (*Calypte anna*), California scrub jay (*Aphelocoma californica*), Steller's jay (*Cyanocitta stelleri*), oak titmouse (*Baeolophus inornatus*), Hutton's vireo (*Vireo huttoni*), and western screech owl (*Megascops kennicottii*). Coast live oak forest may also support many wintering avian species such as hermit thrush (*Catharus guttatus*), ruby-crowned kinglet (*Regulus calendula*), dark-eyed junco (*Junco hyemalis*), and Townsends's warbler (*Setophaga townsendi*). Mammals such as racoon (*Procyon lotor*), Eastern gray squirrel (*Sciurus carolinensis*), Eastern fox squirrel (*Sciurus niger*), and mule deer (*Odocoileus hemionus*) are also expected to be found within coast live oak forest.

Riparian coast live oak forest habitat areas on the project area are also limited in extent and are surrounded by residential development. Therefore, this fragmented habitat type is not anticipated to support a large number of woodland-associated species. Wildlife use of this habitat type is expected to be similar to that described for coast live oak forest.

California annual grassland habitat areas on the project area are also limited in extent, have relatively simple vegetation structure, and are isolated from more extensive grasslands. Therefore, these areas

provide relatively low-quality habitat for wildlife. Some generalist species such as the American crow (*Corvus brachyrhynchos*), house finch (*Haemorhous mexicanus*), and mourning dove (*Zenaida macroura*) may forage in the grassland habitat. California towhee (*Melozone crissalis*), white-crowned sparrow (*Zonotrichia leucophrys*), and golden-crowned sparrows (*Zonotrichia atricapilla*) are species that may be attracted to the seed availability within this habitat. Few reptile species are anticipated to occur in the California annual grassland areas due to the small size and fragmented nature of the habitat. However, western fence lizards (*Sceloporus occidentalis*) and gopher snakes (Pituophis catenifer) were observed within California annual grassland areas.[9]

Intermittent and ephemeral drainage features within the project area do not provide suitable habitat for fish and most aquatic wildlife species because the features were narrow (ranging from 2 to 8 feet wide) and relatively shallow (water observed was 4 to 12 inches deep). The intermittent drainage found within the project area, a tributary to Arroyo Ojo de Agua, runs underground from a large culvert inlet to the northeast of the project area and through a series of pipes towards Redwood Creek. Due to the fact that this feature runs subsurface, it does not provide suitable aquatic dispersal habitat for fish or aquatic wildlife species. However, the intermittent drainage may provide a water source for wildlife species in adjacent habitats, which may use the drainages on the project area for drinking or bathing, as well as temporary aquatic refuge for western pond turtle that may disperse through the area. The two ephemeral drainages found on the project area may provide a seasonally present water source for wildlife species in adjacent habitats, which may use the drainages on site for drinking or bathing.[10]

Wildlife Movement Corridors

Wildlife movement corridors are linear features that connect large patches of natural open space and provide avenues for the migration and dispersal of animals. These corridors contribute to population viability by ensuring continual exchange of genes between populations, providing access to adjacent habitat areas for foraging and mating, and providing routes for recolonization of habitat after local extirpation or ecological catastrophes.[11]

Although the project is largely surrounded by residential and urban development, numerous small drainages and one large intermittent drainage feature intersect the project area. These drainage features provide small habitat corridors through the project area and allow wildlife to disperse through the hills adjacent to residential and urban development. Based on a query of the California Essential Habitat Connectivity Project, there are no regional migratory wildlife corridors that have been identified by the County or State resource agencies that overlap with the project area.[12]

Communities of Special Concern

No formal wetland delineation was conducted for the project; however, features considered potentially jurisdictional under Sections 404 and 401 of the Clean Water Act and under Section 1602 of the California Fish and Game Code were observed on the project area. Riparian habitats along stream and drainage corridors often offer unique habitat resources to wildlife. Riparian habitat on the project area likely to be considered jurisdictional by the California Department of Fish and Wildlife (CDFW) under

[9] H.T. Harvey and Associates. 2016. Canyon Lane Project Biological Resources Report. Prepared for Casey Construction, Inc. December 13, 2016.
[10] SWCA Environmental Consultants. 2019. Biological and Arborist Report Peer Review. Prepared for the County of San Mateo Planning and Building Department. March 12, 2019.
[11] Dudek. 2018. *Biological Technical Report. South Lake Solar and Energy Storage Project*. Fresno, California. Prepared for South Lake Solar LLC. September 2018.
[12] California Department of Fish and Wildlife (CDFW). 2018. BIOS California Essential Habitat Connectivity Viewer. Available at: https://map.dfg.ca.gov/bios/?bookmark=648. Accessed March 6, 2019.

Section 1602 of the California Fish and Game Code includes the intermittent and ephemeral drainage features on the project area, the areas below top of bank of these features, and areas extending to the outer canopy edge of all of the trees in the riparian coast live oak forest. All three drainage features may be considered waters of the U.S. based on evidence of ordinary high water marks and potential connectivity to navigable waterways.

No CDFW sensitive communities occur on the project area.

Special-Status Wildlife and Habitat

For the purposes of this EIR, "special-status species" is a term synonymous with "sensitive species," and is defined as plants and animals that are:

- Species afforded protection under the Federal Endangered Species Act (FESA) and/or California Endangered Species Act (CESA);
- Species proposed for listing under the FESA and/or CESA;
- Species afforded protection under sections of the California Fish and Game Code;
- Birds afforded protection under the Migratory Bird Treaty Act (MBTA) of 1918;
- Species considered California Special Concern species or Special Animals (CDFW) in the California Natural Diversity Database (CNDDB);
- Plants considered sensitive by the California Native Plant Society (CNPS);
- Species that meet the definitions of rare or endangered species under CEQA; and,
- Species considered sensitive by local resource groups/agencies or the scientific community.

Special-Status Plant Species

Eighty-six special-status plants were reviewed for potential to occur on the project area using current CNPS (2019)[13] and CNDDB (2019)[14] records. Based on a review of suitable habitat, soils, elevation, and other environmental factors, it was determined that thirteen of the 86 species identified during the records search had potential to occur. Based on field surveys and a lack of suitable microhabitat conditions observed in the field, five species were determined to be absent from the project area. Eight plant species were determined to have a limited potential to occur on the project area.[15] A brief description of these eight species and their potential to occur on the project area is presented in Table 3.4-2, Special-Status Plant Species with Potential to Occur on the Project Area.

[13] California Native Plant Society (CNPS). 2019. Inventory of rare and endangered plants (online edition). California Native Plant Society. Sacramento, CA.
[14] California Department of Fish and Wildlife (CDFW). 2019. California natural diversity database (CNDDB). California Department of Fish and Game, Sacramento, CA.
[15] SWCA Environmental Consultants. 2019. Biological and Arborist Report Peer Review. Prepared for the County of San Mateo Planning and Building Department. March 12, 2019.

Table 3.4-2. Special-Status Plant Species with Potential to Occur on the Project Area

Species Name	Habitat and Distribution	Flower Season	Legal Status Federal/ State/CNPS	Rationale for Expecting Presence or Absence
Bent-flowered fiddleneck *Amsinckia lunaris*	Annual herb that occurs in coastal bluff scrub, cismontane woodland, and valley and foothill grassland. Elevation 3–500 meters.	May-June	--/--/1B.2	**Limited potential to occur.** Potentially suitable habitat for this species is located within coast live oak forest and California annual grassland habitat on the project area. However, two seasonally-timed rare plant surveys were conducted at the project site, and bent-flowered fiddleneck was not identified. Therefore, this species only has limited potential to occur.
Oakland star tulip *Calochortus umbellatus*	Perennial bulbiferous herb that occurs in broadleafed upland forest, chaparral, cismontane woodland, lower montane coniferous forest, and valley and foothill grassland habitats. This species is often found on serpentinite soils. Elevation 100–700 meters.	March-May	--/--/4.2	**Limited potential to occur.** Potentially suitable habitat for this species is located within both the grassland and coast live oak forest habitats on the project area.
California bottle-brush grass *Elymus californicus*	Perennial herb that occurs in broadleafed upland forest, cismontane woodland, North Coast coniferous forest, and riparian woodland habitats. Elevation 15–470 meters.	May-August (November)	--/--/4.3	**Limited potential to occur.** Potentially suitable habitat for this species is located within both the riparian coast live oak forest and coast live oak forest habitats on the project area.
San Mateo woolly sunflower *Eriophyllum latilobum*	Perennial herb that occurs in cismontane woodland (often serpentinite, on roadcuts), coastal scrub and lower montane coniferous forest. Elevation 45–330 meters.	May-June	FE/CE/1B.1	**Limited potential to occur.** Potentially suitable habitat for this species is located within the coast live oak forest habitat on the project area. However, two seasonally-timed rare plant surveys were conducted at the project site, and San Mateo wooly sunflower was not identified. Therefore, this species only has limited potential to occur.
Bristly leptosiphon *Leptosiphon acicularis*	Annual herb that occurs in chaparral, cismontane woodland, coastal prairie, and valley and foothill grassland habitats. Elevation 55–.1500 meters.	April-June	--/--/4.2	**Limited potential to occur.** Potentially suitable habitat for this species is located within the coast live oak forest and California annual grassland habitats on the project area.

Species Name	Habitat and Distribution	Flower Season	Legal Status Federal/ State/CNPS	Rationale for Expecting Presence or Absence
Serpentine leptosiphon *Leptosiphon ambiguus*	Annual herb that usually occurs on serpentinite soils, in cismontane woodland, coastal scrub, and valley and foothill grassland habitats. Elevation: 120–1130 meters	March-June	--/--/4.2	**Limited potential to occur.** Potentially suitable habitat for this species is located within the coast live oak forest habitat on the project area; however, this species is presumed absent from the California annual grassland habitat due to the fact that the grassland habitat is not on serpentine soils. However, two seasonally timed rare plant surveys were conducted at the project site, and serpentine leptosiphon was not identified. Therefore, this species only has limited potential to occur.
woodland woollythreads *Monolopia gracilens*	An annual herb associated with serpentine soil. Often found in openings within broadleafed upland forest, chaparral, cismontane woodland, north coast coniferous forest, and valley and foothill grassland. 100–1200 meters	February - July	--/--/1B.2	**Limited potential to occur.** Potentially suitable habitat for this species is located within the coast live oak forest and California annual grassland habitat on the project area.
Michaels rein orchid *Piperia michaelii*	Perennial herb that occurs in coastal bluff scrub, closed-cone coniferous forest, chaparral, cismontane woodland, coastal scrub, and lower montane coniferous forest habitats. Elevation 3–915 meters	April-August	--/--/4.2	**Limited potential to occur**. Potentially suitable habitat for this species is located within the coast live oak forest habitat on the project area.

[1]List of plant species based on CNPS and CNDDB searches of the following USGS 7.5-minute quadrangles: Woodside, Palo Alto, Mindego Hill, La Honda, San Gregorio, Half Moon Bay, Montara Mountain, San Mateo and Redwood Point.

[2]Listing status based on CNDDB and CNPS data.

[3]Habitat associations and blooming periods based on the Jepson Online Interchange for California Floristics (Queried in February 2019).

*Occurrences recorded within 5 miles of the project.

Status Codes

-- = No status

FE = Federally listed endangered; FT = Federally listed threatened; FC = Federal candidate for listing; SE = California State-Listed Endangered ; ST = California State-Listed Threatened ; SCE = California Candidate Endangered

California Rare Plant Ranking:

1A = Plants presumed extirpated in California and either rare or extinct elsewhere
1B = Plants rare, threatened, or endangered in California and elsewhere
2A = Plants presumed extirpated in California, but common elsewhere
2B = Plants rare, threatened, or endangered in California, but more common elsewhere

CRPR Threat Ranks:

0.1 = Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
0.2 = Moderately threatened in California (20-80% of occurrences threatened / moderate degree and immediacy of threat)
0.3 = Not very threatened in California (less than 20% of occurrences threatened / low degree and immediacy of threat)

Table 3.4-3. Special-Status Animal Species with Potential to Occur on the Project Area

Species Name	Habitat and Distribution	Legal Status Federal/ State	Rationale for Expecting Presence or Absence
Western pond turtle *Emys marmorata*	Found in ponds, lakes, rivers, streams, creeks, marshes and irrigation ditches with abundant vegetation. Prefers aquatic features with exposed banks, rocks or logs for basking. Typically found in woodland, forest, and grassland habitats. Typically between March and June turtles will leave the water and travel overland to search for food, better habitat, a mate, or nesting habitat.	--/SSC	**Limited potential to occur.** SWCA agreed with the assessment made by H.T. Harvey's 2016 report that western pond turtle may occur, although infrequently, within the project area. Although the project area lacks suitable high-quality aquatic habitat and basking sites for this species, the intermittent drainage feature may provide suitable temporary aquatic cover for vagrant individuals.
yellow warbler *Setophaga petechia*	Occurs in bushes, swamp edges, streams and gardens. Yellow warblers nest in a variety of habitats including woods and thickets along the edges of streams, lakes, swamps and marshes, particularly in willows, alders and other moisture-loving plants.		**Potential to Occur. Unlikely to nest.** SWCA agreed with the assessment made by H.T. Harvey's 2016 report that this species is unlikely to nest within the project area but may occur on the project area as a spring or fall migrant.
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*	Occurs in grasslands, scrub and wooded areas throughout the San Francisco bay area. This species builds large stick houses in trees or tree cavities as well as on the ground against logs, or in dense brush.	--/SSC	**Present.** SWCA agreed with the assessment made by H.T. Harvey's 2016 report that suitable habitat for San Francisco dusky-footed woodrat occurs throughout the project area within coast live oak forest and riparian coast live oak forest habitat. SWCA identified four woodrat middens during the reconnaissance level surveys.
pallid bat *Antrozous pallidus*	Occurs in semi-arid and arid landscapes in western North America, primarily in grasslands, shrub-steppe and desert environments with rocky-outcrops. This species can also be found in dry open oak forest, ponderosa forest, or open farmland. Roosts are most commonly in rock crevices; however, buildings, bridges, live trees, and snags may also be suitable roosts for pallid bat.	--/SSC	**Potential to occur.** Although no suitable large crevices are present within the project area for large maternity colonies, rocky outcrops within the future developable parcels located on the north side of the intermittent drainage feature may provide suitable roosting habitat for individual roosting and small groups of maternity roosting pallid bats.
western red bat *Lasiurus blossevillii*	Occurs in forests and woodlands from sea level up through mixed conifer forests, with grasslands, shrublands, open woodlands, forests and croplands nearby for foraging. This species roosts primarily in trees, and sometimes in shrubs. Roost sites are typically located adjacent to streams, fields, or urban areas.	--/SSC	**Potential to occur.** Trees and shrubs throughout the project area may provide suitable roosting habitat for individual roosting and small groups of maternity roosting Western red bats.

[1]List of animal species based on CNDDB searches of the following USGS 7.5-minute quadrangles: Woodside, Palo Alto, Mindego Hill, La Honda, San Gregorio, Half Moon Bay, Montara Mountain, San Mateo and Redwood Point.
[2]Listing status based on CDFW CNDDB State & Federally Listed Endangered & Threatened Animals of California List, November 2018.

Status Codes
-- = No Status
FE = Federally Listed Endangered; FT = Federally Listed Threatened; FC = Federal Candidate for Listing; SE = California State-Listed Endangered; ST = California State-Listed Threatened; SCE = California Candidate Endangered; DL = Delisted; FP = CDFW Fully Protected; SSC = CDFW Species of Special Concern

Special-Status Wildlife Species

Fifty-eight special-status animal species were reviewed for potential to occur in the project area using current CNDDB (2019) records, and USFWS species records. The project may contain suitable habitat for five of the 58 species that were identified during the records search. The determination that species do not have potential to occur was made based on lack of suitable habitat in the project area and vicinity. Although there were no western red bat (*Lasiurus blossevillii*) occurrences noted during the CNDDB record search, this species also has the potential to occur in the project area as it could use available trees for roosting. The five special-status species determined to have potential to occur on the project area are described in Table 3.4-3, Special-Status Animal Species with Potential to Occur on the Project Area.

3.4.2 Regulatory Setting

Federal

Endangered Species Act

The federal Endangered Species Act (FESA) of 1973 (United States Code [U.S.C.] Title 16, Sections 1531–1544), as amended, protects plants, fish, and wildlife that are listed as endangered or threatened by the U.S. Fish and Wildlife Service (USFWS) or the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries). Section 9 of the FESA prohibits the "take" of listed fish and wildlife, where "take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in such conduct" (Code of Federal Regulations [CFR] Title 50, Section 17.3). For plants, this statute prohibits removing, possessing, maliciously damaging, or destroying any listed plant under federal jurisdiction and removing, cutting, digging up, damaging, or destroying any listed plant in knowing violation of State law (16 U.S.C. 1538).

The FESA allows for issuance of incidental take permits to private parties either in conjunction with a Habitat Conservation Plan (HCP) or as part of a Section 7 consultation (which is discussed in the following paragraph). Under Section 10 of the FESA, a private party may obtain incidental take coverage by preparing an HCP to cover target species within the project area, identifying impacts to the covered species, and presenting the measures that will be undertaken to avoid, minimize, and mitigate such impacts.

Under Section 7 of the FESA, federal agencies are required to consult with USFWS and/or NOAA Fisheries, as applicable, if their actions—including permit approvals or funding—may affect a federally listed species (including plants) or designated critical habitat. If the project is likely to adversely affect a species, the federal agency will initiate formal consultation with USFWS and/or NOAA Fisheries and issue a biological opinion as to whether a proposed agency action(s) is likely to jeopardize the continued existence of a listed species (jeopardy) or adversely modify critical habitat (adverse modification). As part of the biological opinion, USFWS may issue an incidental take statement allowing take of the species that is incidental to an otherwise authorized activity, provided that the action will not jeopardize the continued existence of the species or adversely modify designated critical habitat.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703–711) protects all migratory birds, including active nests and eggs. Birds protected under the MBTA include all native waterfowl, shorebirds, hawks, eagles, owls, doves, and other common birds such as ravens, crows, sparrows, finches, swallows, and others, including their body parts (for example, feathers and plumes), active nests, and

eggs. A complete list of protected species can be found in 50 CFR 10.13. Enforcement of the provisions of the federal MBTA is the responsibility of USFWS.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 U.S.C. 668) specifically protects bald and golden eagles and their nests from intentional harm or trade in parts of these species. The 1972 amendments increased penalties for violating provisions of the BGEPA or regulations issued pursuant thereto and strengthened other enforcement measures. Rewards are provided for information leading to arrest and conviction for violation of the BGEPA.

Clean Water Act

The purpose of the Clean Water Act (CWA) (33 U.S.C. 1251 et seq.) is to "restore and maintain the chemical, physical, and biological integrity of the nation's waters." Waters of the United States include rivers, streams, estuaries, the territorial seas, ponds, lakes, and wetlands. Wetlands are defined as those areas "that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3).

The U.S. Environmental Protection Agency (USEPA) and U.S. Army Corps of Engineers (USACE) have recently released a new rule that would revise this definition and clarify which bodies of water are covered by the CWA. However, on October 9, 2015, the U.S. Court of Appeals for the 6th Circuit granted a nationwide stay on the rule, and the previous interpretations and guidance remain in effect until further notice.

USACE issues permits for work in wetlands and other waters of the United States based on guidelines established under Section 404 of the CWA. Section 404 of the CWA prohibits the discharge of dredged or fill material into waters of the United States, including wetlands, without a permit from USACE. USEPA also has authority over wetlands and may, under Section 404(c), veto a USACE permit.

Section 401 of the CWA requires all Section 404 permit actions to obtain a State Water Quality Certification or waiver.

State

California Environmental Quality Act

CEQA (California Public Resources Code, Section 21000 et seq.) was established by the State legislature to inform both State and local governmental decision-makers and the public about significant environmental effects of proposed activities (including impacts on biological resources), to identify ways to avoid or reduce significant adverse effects on the environment, and to disclose the reasons why a project is approved if significant environmental impacts would result.

California Endangered Species Act

Sections 2050–2098 of the California Fish and Game Code (the California Endangered Species Act [CESA]) prohibit the take of State-listed endangered and threatened species unless specifically authorized by the CDFW. The State definition of "take" is to hunt, pursue, catch, capture, or kill a member of a listed species or attempt to do so. CDFW administers the CESA and authorizes take through permits or memorandums of understanding issued under Section 2081 of the CESA, or through a consistency determination issued under Section 2080.1. Section 2090 of the CESA requires State agencies to comply

with threatened and endangered species protection and recovery and to promote conservation of these species.

Fully Protected Species Under the California Fish and Game Code

The California Fish and Game Code designates certain fish and wildlife species as "fully protected" under Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish). Fully protected species may not be taken or possessed at any time, and no permits may be issued to project proponents for incidental take of these species.

California Species of Special Concern

Species of Special Concern (SSC) is a category conferred by CDFW to fish and wildlife species that meet the State definition of threatened or endangered, but have not been formally listed (e.g., Federally or State-listed species), or are considered at risk of qualifying for threatened or endangered status in the future based on known threats. SSC is an administrative classification only, but these species should be considered "special-status" for the purposes of the CEQA analysis (see the Significance Criteria section of this document).

Protection for Birds: California Fish and Game Code

California Fish and Game Code Section 3503 et seq. state that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. Section 3503.5 makes it unlawful to take, possess, or destroy any birds in the orders of Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird.

California Native Plant Protection Act

The California Native Plant Protection Act (California Fish and Game Code, Sections 1900–1913) and the Natural Communities Conservation Planning Act provide guidance on the preservation of plant resources. Vascular plants that have no designated status or protection under State or Federal endangered species legislation but are listed as rare or endangered by the CNPS are defined as follows:

1. Rank 1A: Plants presumed extirpated in California and either rare or extinct elsewhere.
2. Rank 1B: Plants rare, threatened, or endangered in California and elsewhere.
3. Rank 2A: Plants presumed extirpated in California, but common elsewhere.
4. Rank 2B: Plants rare, threatened, or endangered in California, but more common elsewhere.
5. Rank 3: Plants about which more information is needed – a review list.
6. Rank 4: Plants of limited distribution – a watch list.

Generally, plants with CNPS Ranks 1A, 1B, 2A, 2B, or 3 are considered to meet the criteria for endangered, threatened, or rare species as outlined by Section 15380 of the CEQA Guidelines. Additionally, plants with CNPS Ranks 1A, 1B, 2A, 2B, or 3 also meet the definition of Section 1901, Chapter 10 (Native Plant Protection Act), and Sections 2062 and 2067 (CESA) of the California Fish and Game Code.

Porter-Cologne Water Quality Control Act

The State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCB) have jurisdiction over all surface water and groundwater in California, including wetlands, headwaters, and riparian areas. SWRCB or the applicable RWQCB must issue waste discharge requirements for any activity that discharges waste that could affect the quality of waters of the State, as described in more detail in Section 4.10, Hydrology and Water Quality.

Lake and Streambed Alteration Agreement Under the California Fish and Game Code

In addition to listed and special-status species, CDFW regulates activities under California Fish and Game Code Sections 1600–1616 that require a streambed alteration agreement permit. Fish and Game Code Section 1602 requires an entity to notify CDFW prior to commencing any activity that may do one or more of the following:

- Substantially divert or obstruct the natural flow of any river, stream, or lake.
- Substantially change or use any material from the bed, channel, or bank of any river, stream, or lake.
- Deposit debris, waste, or other materials that could pass into any river, stream, or lake.

Local

Redwood City Tree Preservation Ordinance

According to Redwood City's Tree Preservation Code, Chapter 35, a tree is any woody plant with a single trunk of 38 inches in circumference (12 inches in diameter) or more measured at any point between 6 and 36 inches from the ground level. The Redwood City Tree Preservation Ordinance protects trees on private property. The Park and Recreation Commission may declare any tree regardless of size to be a heritage tree if said tree is healthy and has adapted well to the climatic conditions of the area, if said tree is visually accessible from a public right-of-way, and if the Commission finds that at least one of the following conditions exist: (1) that said tree has historical significance; (2) that said tree is indigenous to the area, or (3) that said tree is one of a group of trees and that each is dependent on the other tree for survival. The tree preservation code makes it unlawful for anyone to cut any tree without first obtaining a permit from the Parks and Recreation Director.[16]

Generally, it is the practice of Redwood City to require the replacement of trees at a 1:1 ratio.

Redwood City General Plan

According to Program NR-22, Sensitive Species Identification, for development applications proposed for sensitive biological resource areas, qualified biologists must identify and map all sensitive biological resources on the project area, including local, State, and Federally sensitive, rare, threatened, and endangered plant, fish, and wildlife species and their habitats using methods and protocols in accordance with the USFWS, CDFW, and CNPS; and make recommendations for avoiding sensitive biological resources to the maximum extent feasible and pursuant to Program BE-2 in the Urban Form and Land

[16] H.T. Harvey and Associates. 2016. Canyon Lane Project Biological Resources Report. Prepared for Casey Construction, Inc. December 13, 2016.

Use Chapter of the Build Environment Element. These requirements shall be satisfied prior to the approval of any development proposal for the project area.[17]

San Mateo County Heritage Tree Ordinance

According to the Heritage Tree Ordinance of San Mateo County (Ordinance No. 2427), a permit is required for the removal, destruction, or trimming of any Heritage Tree on public or private property, with Heritage Trees defined as follows: (a) Class 1 – trees designated by the Board of Supervisors and (b) Class 2 – any one of 17 designated species of trees of specified diameter at breast height (dbh) (28-inch dbh.[18]

San Mateo County Significant Tree Ordinance

According to the Significant Tree Ordinance of San Mateo County, a permit is required for the removal or destruction of any Significant Tree within Design Review Districts or Scenic Corridors. A Significant Tree is any tree over 38 inches in circumference (12-inch diameter) measured at 4-1/2 feet above the ground or immediately below the lowest branch. In zoning areas for residential hillside/design review districts (RH/DR), the definition of a Significant Tree is any tree over 19 inches in circumference (6-inch diameter). In the RH/DR zone, permits are required for trimming indigenous trees (native to San Mateo County) as well as cutting trees. This ordinance is not the same as the Heritage Tree Ordinance and is listed separately in the General Plan for San Mateo County (1986).[19]

Section 12,024 of the County Municipal Code requires the replacement of significant indigenous and exotic trees at a 3:1 ratio within the RH/DR.[20]

3.4.3 Thresholds of Significance

Impacts to biological resources were evaluated by determining the sensitivity, significance, or rarity of each resource that would be adversely affected (either directly or indirectly) by the proposed project, and by using thresholds of significance to determine if the impact constitutes a significant impact. The significance threshold may be different for each habitat or species and is based upon the rarity or sensitivity of the resource and the level of impact that would result from the proposed project. Guidance for determining significance thresholds is based on Appendix G of the CEQA Guidelines and local/regional general plans and ordinances. Using these guidelines, implementation of the proposed project would have a significant impact on biological resources if it would:

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.

[17] H.T. Harvey and Associates. 2016. Canyon Lane Project Biological Resources Report. Prepared for Casey Construction, Inc. December 13, 2016.
County of San Mateo. Part Three of Division VIII of the San Mateo County Ordinance Code. Available at: https://planning.smcgov.org/sites/planning.smcgov.org/files/documents/files/Significant%20Tree%20Ordinance.pdf. Accessed August 16, 2019.
[19] County of San Mateo. Part Three of Division VIII of the San Mateo County Ordinance Code. Available at: https://planning.smcgov.org/sites/planning.smcgov.org/files/documents/files/Significant%20Tree%20Ordinance.pdf. Accessed August 16, 2019.
[20] County of San Mateo. Part Three of Division VIII of the San Mateo County Ordinance Code. Available at: https://planning.smcgov.org/sites/planning.smcgov.org/files/documents/files/Significant%20Tree%20Ordinance.pdf. Accessed August 16, 2019.

b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service.

c. Have a substantial adverse effect on State or Federally protected wetlands (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.

3.4.4 Impact Assessment and Methodology

Potential impacts are expected to occur where proposed construction activities and the day-to-day operations of the project would result in temporary or permanent modification of habitats that could be used by special-status species or are otherwise subject to regulatory law. The effect of the project on biological resources depends in part on specific design and placement of proposed structures and roads. Analysis of impacts to biological resources is based on the proposed location of the project and design plans prepared by the Applicant. Impacts to biological resources within the project footprint were evaluated by determining the sensitivity, significance, or rarity of each resource that would be adversely affected by the project, and thresholds of significance were applied to determine if the impact constituted a significant impact. The significance threshold may be different for each habitat or species and is based on the resource's rarity or sensitivity, and the level of impact that would result from the project. Where potential project-related impacts to sensitive resources were identified, measures for avoiding or minimizing adverse effects to these resources were recommended.

3.4.5 Project-Specific Impacts and Mitigation Measures

Impact 3.4-1: Potential to have an 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 Wildlife or U.S. Fish and Wildlife Service – Significant and Unavoidable

Special-Status Plants

Bent-Flowered Fiddleneck

Bent-flowered fiddleneck is known to occur in San Mateo County on steep hillsides in shaded understory on north-facing slopes. This locality is very similar to the conditions observed within the project area.

Suitable habitat for bent-flowered fiddleneck may be present in coast live oak forest or California annual grassland.

Although the project area is relatively small, the bent-flowered fiddleneck type locality is known from a habitat very similar to the existing site conditions. Although potential impacts on coast live oak habitat and California annual grassland as a result of the project would be limited in extent, the loss of bent-flowered fiddleneck individuals or populations could be significant given the rarity of this species.

Bent-flowered fiddleneck was not observed within the survey area during the 2019 surveys. Surveys were conducted in May and June following a season of good rainfall (approximately 114 percent of normal),[21] providing optimal conditions for the detection of rare plants. The surveys were conducted over a range of bloom periods to capture the flowering period of all special-status plants with a likelihood for occurrence in the biological survey area.

Although bent-flowered fiddleneck was not observed during the field surveys, potentially suitable habitat for this species is present within the project area. Due to the presence of potentially suitable habitat for this species, it is recommended that an additional preconstruction survey be conducted prior to the commencement of construction to ensure avoidance of bent-flowered fiddleneck, per BIO/mm-1.1. If bent-flowered fiddleneck is observed during preconstruction surveys, then the Applicant shall implement BIO/mm-1.2.

While the probability of occurrence of bent-flowered fiddleneck is relatively low, direct or indirect impacts from the project on 20 percent or more of the bent-flowered fiddleneck plants in the population found in the project area could endanger continued persistence of this population and would be considered significant based on its limited occurrence in the County. Implementation of the following mitigation measures would reduce these impacts to a less-than-significant level.

Avoidance is the preferred form of mitigation for this species. Project impacts (including impacts within the designated buffer) on up to a maximum of 20 percent of the individuals of the population on the project area would not result in significant impacts to bent-flowered fiddleneck. If more than 20 percent of the individuals of this species were to be impacted by project implementation, then the impact would be considered significant and require further mitigation as described in Mitigation Measure BIO/mm-1.3.

Biological Resources Mitigation Measures	
BIO/mm-1.1	***Conduct Focused Preconstruction Surveys**. Prior to construction, a focused survey in the appropriate blooming season for bent-flowered fiddleneck (March-June) will be conducted within the coast live oak forest and California annual grassland.*
BIO/mm-1.2	***Avoid Populations of Bent-Flowered Fiddleneck**. To the extent practicable, the Applicant will avoid impacts on bent-flowered fiddleneck if any individuals are identified during the surveys described in BIO/mm-1.1. All plants are to be avoided and will be protected by a buffer zone established prior to site grading, trenching, or road widening. The buffer will be established 50 feet from the perimeter of the population or the individual plants, or as otherwise determined by a qualified botanist. Additional protective measures may be required by the qualified botanist to protect the plants from all impacts; for example, use of silt fencing or temporary shielding from work areas using tarps or similar to protect any individuals from dust deposition.* *Avoidance is the preferred form of mitigation for this species. Project impacts (including impacts within the designated buffer) on up to a maximum of 20 percent of the individuals of the population on the project area would not result in significant impacts to bent-flowered fiddleneck. If more than*

[21] National Oceanic and Atmospheric Administration (NOAA). 2019. Climate Station Precipitation Summary. Available at: https://www.cnrfc.noaa.gov/awipsProducts/RNOWRKCLI.php. Accessed July 2019.

	20 percent of the individuals of this species were to be impacted by project implementation, then the impact would be considered significant and require further mitigation as described in BIO/mm-1.3
BIO/mm-1.3	***Preservation, Enhancement, and Management**. If avoidance of bent-flowered fiddleneck is not feasible, and more than 20 percent of individuals in the project area population would be impacted, mitigation will be provided via the preservation, enhancement, and management of occupied habitat for this species. Habitat that currently supports the species will be preserved in perpetuity. The mitigation habitat will be of equal or greater habitat quality compared to the impacted areas, as determined by a qualified botanist, in terms of soil features, extent of disturbance, vegetation structure, and dominant species compositions, and will contain at least as many individuals of the bent-flowered fiddleneck as are impacted by project activities. The permanent protection and management of mitigation lands will be ensured through an appropriate mechanism, such as a conservation easement or fee title purchase. A Habitat Mitigation and Monitoring Plan (HMMP) will be developed and implemented for mitigation lands. That plan will include at a minimum the following information:* • *A summary of habitat impacts and the proposed mitigation* • *A description of the location and boundaries of the mitigation site and descriptions of existing site conditions* • *A description of measures to transplant individual plants or seeds from the impact area to the mitigation site, if appropriate (which will be determined by a qualified botanist)* • *Proposed management activities to maintain high-quality habitat conditions for the focal species* • *A description of habitat and species monitoring measures on the mitigation site, including specific objective final and performance criteria, monitoring methods, data analysis, reporting requirement, monitoring schedule, etc.* • *Contingency measures for mitigation elements that do not meet performance criteria* *The HMMP will be prepared by a qualified biologist, and the City and/or County will need to approve the HMMP prior to the impact.*

San Mateo Woolly Sunflower

San Mateo woolly sunflower is a Federally and State listed endangered plant species. Conservation of any population of this species is important because of its extreme rarity and the potential for populations of any size to contribute to preserving the genetic resources for the species and ensuring its persistence. Suitable habitat for San Mateo woolly sunflower may be present in coast live oak forest habitat.

San Mateo woolly sunflower was not observed within the survey area during the 2019 surveys. Surveys were conducted in May and June following a season of good rainfall (approximately 114 percent of normal),[22] providing optimal conditions for the detection of rare plants. The surveys were conducted over a range of bloom periods to capture the flowering period of all special-status plants with a likelihood for occurrence in the biological survey area.

Because the San Mateo woolly sunflower was not observed during the field surveys, the project would not endanger continued persistence of this population and would result in less than significant impacts.

Although San Mateo woolly sunflower was not observed during the field surveys, potentially suitable habitat for this species is present within the project area. Due to the presence of potentially suitable habitat for this species, it is recommended that an additional preconstruction survey be conducted prior to

[22] National Oceanic and Atmospheric Administration (NOAA). 2019. Climate Station Precipitation Summary. Available at: https://www.cnrfc.noaa.gov/awipsProducts/RNOWRKCLI.php. Accessed July 2019.

the commencement of construction to ensure avoidance of San Mateo woolly sunflower, per BIO/mm-2.1. If San Mateo woolly sunflower is observed during preconstruction surveys, than project construction could adversely affect this species. Although the potential impacts on the coast live oak habitat resulting from the project is relatively small, the loss of San Mateo woolly sunflower individuals or populations, should any losses occur, could be significant due to the rarity of this species. Implementation of Mitigation Measures BIO/mm-2.1 and BIO/mm2.2 would reduce impacts to a less-than-significant level.

If San Mateo woolly sunflower cannot be avoided, mitigation sufficient to reduce impacts to this species below a level of significance would require that at least two additional populations be known (aside from the two currently known populations). In addition, one of these populations would need to be of at least the same size as the population that is impacted by the project. The Applicant would need to acquire the land supporting this population, and preserve and manage it in perpetuity through the development of an HMMP as described in Mitigation Measure BIO/mm-1.3, above. Based on the very limited occurrences of this species, this would likely not be feasible.

If all San Mateo woolly sunflower individuals can be avoided, the project's impacts on this species would be less than significant with implementation of Mitigation Measures BIO/mm-2.1 and BIO/mm-2.2, shown below. However, if impacts to San Mateo woolly sunflower individuals cannot be avoided, then this impact would be significant and unavoidable because the mitigation would likely not be feasible.

Biological Resources Mitigation Measures	
BIO/mm-2.1	***Conduct Focused Preconstruction Surveys**. Prior to construction, a focused survey in the appropriate blooming season for San Mateo woolly sunflower (May-June) will be conducted within the coast live oak forest, including the proposed water line area with serpentine geology.*
BIO/mm-2.2	***Avoid Populations of San Mateo woolly sunflower**. To the extent practicable, the Applicant will avoid impacts on San Mateo woolly sunflower if any individuals are identified during the surveys described in Mitigation Measure BIO/mm-2.1. All plants are to be avoided and will be protected by a buffer zone established prior to site grading, trenching, or road widening. The buffer will be established 50 feet from the perimeter of the population or the individual plants, or as otherwise determined by a qualified botanist. Additional protective measures may be required by the qualified botanist to protect the plants from all impacts; for example, use of silt fencing or temporary shielding from work areas using tarps or similar to protect any individuals from dust deposition.*

Other Special-Status Plant Species

Eighty-six special-status plants were reviewed for potential to occur on the project area using current CNPS (2019)[23] and CNDDB (2019)[24] records. Based on a review of suitable habitat, soils, elevation, and other environmental factors, it was determined that thirteen of the 86 species identified during the records search had potential to occur. Of these, five species were determined to be absent from the project area due to a lack of suitable microhabitat conditions. Eight plant species were determined to have a limited potential to occur on the project area. Of these eight plant species, impacts to six of these plant species (Oakland start-tulip, California bottle-brush grass, bristly leptosiphon, serpentine leptosiphon, Michael's rein orchid, and woodland woollythreads) were determined to be less than significant. No additional mitigation for special-status plants is required.

[23] California Native Plant Society (CNPS). 2019. Inventory of rare and endangered plants (online edition). California Native Plant Society. Sacramento, CA.
[24] California Department of Fish and Wildlife (CDFW). 2019. California natural diversity database (CNDDB). Sacramento, CA.

Special-Status Wildlife

San Francisco Dusky-Footed Woodrat

Four San Francisco dusky-footed woodrat nests were identified on the project area in 2016, and five San Francisco dusky-footed woodrat nests were identified on the project area in 2019. Proposed activities may result in injury or mortality of dusky-footed woodrats due to project vehicle traffic, equipment use, and worker foot traffic, particularly if disturbance occurs when woodrats are taking refuge in their stick nests. Movement within individual home ranges may be temporarily affected during activities as a result of disturbance of habitat, and project-related disturbances may cause woodrats to flee their nests, exposing them to a greater risk of predation. Such impacts would be temporary in nature, occurring only during construction activities.

San Francisco dusky-footed woodrats are relatively common in suitable habitat regionally and have high reproductive capabilities. As a result, project impacts on dusky-footed woodrats would not have a substantial effect on regional populations. However, woodrats are very important ecologically in that they provide important prey resources for raptors and for predatory mammals. In addition, their nests provide habitat for a wide variety of small mammals, reptiles, and amphibians. As a result, the loss of multiple woodrat nests would be considered a significant impact. Implementation of the following mitigation measures would reduce such impacts to a less-than-significant level.

Biological Resources Mitigation Measures	
BIO/mm-3.1	***Preconstruction survey.*** *No more than one week prior to initial ground disturbance, a preconstruction survey for woodrat nests will be conducted within the project area by a qualified biologist. The survey will consist of walking the project limits and all areas within the project area looking for woodrat nests.*
BIO/mm-3.2	***Disturbance-Free Buffers.*** *Dusky-footed woodrats are year-round residents. Therefore, avoidance mitigation is limited to designing the project to avoid direct impacts on woodrat nests to the extent feasible. Ideally, a minimum 10-foot buffer should be maintained between project construction activities and each nest to avoid disturbance. In some situations, a smaller buffer may be allowed if in the opinion of a qualified biologist removing the nest would be a greater impact than that anticipated due to project activities.*
BIO/mm-3.3	***Relocation of Nest Materials.*** *If active woodrat nests are found within the project boundary during the preconstruction survey and avoidance is not feasible, the woodrats will be evicted from their nests prior to the removal of the nests and onset of ground-disturbing activities to avoid injury or mortality of the woodrats. A qualified biologist will disturb and slowly dismantle the woodrat nest to the degree that all woodrats leave the nest and seek refuge outside of the project activity area. If dependent woodrat young are observed within the nest during dismantling, the biologist will stop dismantling, and install a buffer to allow additional time for the adults and young to disperse offsite. Once adults and young have dispersed offsite, the biologist will then complete dismantling of the nest. Subsequently, the nest sticks will be relocated; these materials will be piled at the base of a nearby tree or shrub outside of the activity area. The spacing between relocated nests will not be less than 20 feet, unless a qualified biologist has determined that the habitat can support higher densities of nests.*

Western Pond Turtle

The project area lacks high-quality aquatic habitat for western pond turtle; however, because adults may travel overland considerable distances, often far from suitable habitat, this species presence on the project area cannot be ruled out. The proposed project would not result in the permanent or temporary loss of aquatic habitat for turtles and the number of western pond turtles that could occur on the project area is

low. However, should construction activities proceed while turtles are present, injury or mortality of individual western pond turtles may occur. Therefore, construction related impacts on western pond turtles are potentially significant. Implementation of Mitigation Measure BIO/mm-4.1would reduce impacts to a less-than-significant level.

With the implementation of Mitigation Measure BIO/mm-4.1, residual impacts would be less than significant.

Biological Resources Mitigation Measures	
BIO/mm-4.1	***Preconstruction survey.*** *No more than 24 hours prior to initial ground disturbance, a preconstruction survey for the western pond turtle will be conducted by a qualified biologist. The survey will consist of walking along the riparian corridor looking for turtles along the drainage features. If an adult or juvenile western pond turtle is found, project activities near the turtle will cease until the individual has been captured and relocated to suitable habitat outside of the activity area by a qualified biologist.*

Nesting Birds

Construction disturbance during the nesting season (February 1 through August 31 for most species) could result in the incidental loss of eggs or nestlings, either directly through the destruction or disturbance of active nests or indirectly by causing the abandonment of nests. This type of impact would not be significant under CEQA for species that could potentially nest in the project area due to the local and regional abundances of these species and/or the low magnitude of the potential impacts of the project on these species (i.e., the project is only expected to impact one or two individual pairs of any given species, which would not be a significant impact to regional populations). However, the following measures should be implemented to ensure that project activities comply with the MBTA and the California Fish and Game Code.

Biological Resources Mitigation Measures	
BIO/mm-5.1	***Avoidance.*** *To the extent feasible, construction activities should be scheduled to avoid the nesting season. If construction activities are scheduled to take place outside the nesting season, all impacts to nesting birds protected under the MBTA and California Fish and Game Code will be avoided. The nesting season for most birds in San Mateo County extends from February 1 to August 31.*
BIO/mm-5.2	***Preconstruction/Pre-disturbance Surveys.*** *If it is not possible to schedule construction activities between September 1 and January 31, then pre-construction surveys for nesting birds should be conducted by a qualified ornithologist to ensure that no nests will be disturbed during project implementation. We recommend that these surveys be conducted no more than seven days prior to the initiation of construction activities. During this survey, the ornithologist will inspect all trees and other potential nesting habitats (e.g., shrubs, California annual grasslands, and buildings) in and immediately adjacent to the impact areas for nests. If an active nest is found sufficiently close to work areas to be disturbed by these activities, the ornithologist should determine the extent of a construction-free buffer zone to be established around the nest (300 feet for raptors, 100 feet for non-raptors) to ensure that no nests of species protected by the MBTA and California Fish and Game Code will be disturbed during project implementation.*
BIO/mm-5.3	***Inhibition of Nesting.*** *If construction activities will not be initiated until after the start of the nesting season, all potential nesting substrates that are scheduled to be removed by the project should be removed prior to the start of nesting seasons. This will preclude the initiation of nests in this*

Biological Resources Mitigation Measures	
	vegetation, and prevent the potential delay of the project due to the presence of active nests in these substrates.

Roosting Bats

The project could result in the loss of bat roosting habitat, including potential roosting habitat for pallid bat and western red bat, through the removal of onsite trees and impacts to rocky outcrops during construction. Loss of individual bats, bat colonies, or their habitat could occur if active bat roosts are present within trees or rocky outcrops, particularly if construction activities take place during the maternal roosting period season when young bats cannot yet fly or, for crevice-roosting bats, during hibernation when bats may be hard to rouse. Implementation of the following mitigation measure would reduce this potentially significant impact on special-status bat species and roosting bats to a less-than-significant level by ensuring tree removal activities are seasonally timed where active bat roosts occur, and mitigation is provided for the loss of identified bat roosts.

With the implementation of Mitigation Measure BIO/mm-6.1, residual impacts would be less than significant.

Biological Resources Mitigation Measures	
BIO/mm-6.1	***Pre-Construction Bat Survey.*** *Prior to tree removal or grading of rocky outcrops, a qualified bat biologist shall conduct a visual and acoustic survey of the project area to identify if bats are roosting within trees or rocky outcrops within the project area. Sensitive habitat areas and roost sites should be avoided to the maximum extent possible. If no roosting sites or bats are observed during the survey, a letter report detailing the survey observations shall be sent to the CDFW and no further mitigation is necessary.* *If roosting bats or indications of bat roosts are observed within the project area and cannot be avoided, CDFW will be consulted to determine if bat roost replacement is required. If required, roost replacement will be implemented before construction activities begin. Roost replacement, if required, will be implemented using suggested mitigation strategies such as those described in the Caltrans' California Bat Mitigation Techniques, Solutions, and Effectiveness report[25] and will be based on species-specific roosting requirements. Roost replacement will be conducted on site to the extent feasible.* *If roosting bats or indications of bat roosts are observed within project trees to be removed, tree removal shall be conducted between September 1 and March 30 to avoid impacts to maternal bat roosts. During tree removal and where potential bat roosts were identified, a qualified bat biologist shall be present and tree removal will begin with portions of the tree that do not provide suitable roost habitat (e.g., low limbs lacking forage). Trees will be disassembled at a speed in coordination with the on-site qualified bat biologist that allows any roosting bats to vacate the tree.*

Invasive Weeds

Invasive weeds can occur in all habitat types and can be difficult to eradicate. One of the characteristics of some invasive species that make them successful is that many non-native, invasive plants produce seeds that germinate readily following disturbance. In addition, newly disturbed areas are highly susceptible to colonization by non-native invasive species that occur locally, or whose propagules are brought in by personnel, vehicles, and other equipment. A limited amount, approximately 500 square feet, of invasive

[25] Johnston D., G. Tatarian, E. Pierson. 2004. California Bat Mitigation Techniques, Solutions, and Effectiveness. Prepared for California Department of Transportation and California State University Sacramento Foundation. December 29, 2004.

French broom occurs within the project area along the existing corridor road. Thus, areas of temporary ground disturbance associated with project activities could serve as areas promoting invasion by this non-native species, which could degrade habitat values for and threaten special-status species and sensitive habitats; this would be considered a significant impact. As a result of the proposed project, a portion of the upland habitats on the project area would be subject to soil disturbance because of construction access routes, tree removal, or grading. Activities such as trampling, equipment staging, and understory vegetation removal are all factors that contribute to disturbance. Implementation of the following mitigation measures would reduce impacts from invasive weeds to a less-than-significant level.

With the implementation of Mitigation Measure BIO/mm-7.1, residual impacts would be less than significant.

Biological Resources Mitigation Measures	
BIO/mm-7.1	***Prevent Spread of Weeds and Invasive Species**. The project proponent will employ the following Best Management Practices (BMPs) for weed control to avoid and minimize the spread of invasive plant species:* • *Prior to grading or soil disturbance, infestation of French broom within areas of direct permanent or temporary disturbance will be removed and all vegetative material will be incinerated off-site or disposed of in a high-temperature composting facility that can compost using methods known to kill weed seeds, taking care to prevent any seed dispersal during the process by bagging material or covering trucks transporting such material from the project area.* • *Following project construction, native seed from a local source will be planted on all disturbed ground that will not be landscaped and maintained. This will prevent the germination of the majority of seeds from non-native, invasive plant species.* • *Non-invasive landscaping plantings will be established in areas to be landscaped, and native species should be used in landscaping to the extent practicable.* • *Heavy equipment used in the project activity area will be washed prior to and following work at the site, before the equipment is used in other ground-disturbing activities, to prevent spread of weed seeds.*

Impact 3.4-2: Potential to have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service – Less than Significant with Mitigation

Riparian habitat quality can be quantified based upon wildlife habitat values such as the presence/absence and the density of the overstory vegetation, the presence or absence of native species, and the complexity of vegetation structure (e.g., presence of tree, shrub, and herbaceous layers). The existing riparian habitat on the project area is a mixture of mature native species and includes coast live oaks, California bay (*Umbellularia californica*), and red willow (*Salix laevigata*), and can be considered moderately high quality. Because riparian communities are limited in extent in the State, are considered sensitive habitats, and provide a wide range of biological functions for wildlife, such as nesting habitat for birds, any tree loss in riparian habitats may be considered significant. The removal of riparian trees or loss of habitat at the project area would have a significant impact on wildlife because the trees are native species located in a riparian setting. Riparian areas are sensitive habitats with important ecological values for common

wildlife species, and project-specific impacts to the riparian coast live oak forest habitat would be significant if not mitigated.

Project implementation would result in permanent impacts to 0.103 acre of existing riparian coast live oak forest in the project area from tree removal, road widening, road paving, and bridge installation. In addition, some of the proposed project roadwork in the developed habitat is proposed to occur under overhanging riparian canopy. The project will remove several trees that are either in poor health or are located on the project area. Tree loss resulting from project implementation is described in the project tree reports, and mitigation for the loss of these trees is described below.

Based on the extent of canopy overhang, the area of riparian forest subject to permanent impacts is 0.103 acre. Several trees in the riparian forest would be removed during project implementation to accommodate the new road width. In addition, there would be up to 0.144 acre of temporary impacts to the riparian canopy. Tree removal and riparian habitat impacts may result in bank destabilization, which could in turn reduce water quality. Therefore, measures are required to reduce the potential for bank destabilization. New riparian trees are unlikely to establish in some of the disturbed areas because of the road widening and development of a single-family residence. In addition, the disturbance may cause expansion of the invasive French broom (*Genista monspessulana*) population at the project area. Project-specific permanent impacts to 0.103 acre and temporary impacts to 0.144 acre of riparian coast live oak forest habitat would be significant if not mitigated.

Within the County, the proposed project would result in the removal of 25 significant trees along Canyon Lane and within the proposed water line installation area. Mitigation for the removal of these trees per the guidance in Mitigation Measure BIO/mm-8.3 requires re-planting of 75 trees. The construction of the single-family residence would result in the removal of 11 significant trees. Mitigation for the removal of these trees per the guidance in Mitigation Measure BIO/mm-8.3 requires re-planting of 33 trees. As previously described in Section 3.4.2, Regulatory Setting, the mitigation ratio is based on Section 12,024 of the County Municipal Code.

Within the City, the proposed project would result in the removal of 9 significant trees. Mitigation for the removal of these 9 trees per the guidance in Mitigation Measure BIO/mm-8.3 requires re-planting of 9 trees. As previously described in Section 3.4.2, Regulatory Setting, it is the general practice of the City to require a 1:1 mitigation ratio, per the City's Tree Preservation Ordinance.

Additional arborist reports will be required to determine potential tree impacts for the 11 developable parcels at such time development is proposed on any of those parcels.

Implementation of the following mitigation measures would reduce impacts to riparian and significant trees to less than significant.

Biological Resources Mitigation Measures	
BIO/mm-8.1	***Avoidance of Riparian Impacts**. To the extent feasible, impacts to the riparian habitat will be avoided. Removal of riparian vegetation and trees will be limited to the minimum extent required to construct the project.*
BIO/mm-8.2	***Revegetate Impacted Riparian Habitat.** Wherever temporary impacts within riparian habitat would remove vegetation from the ground surface, the areas will be reseeded with a native seed mix to stabilize soils, prevent the growth of weed infestations, and maintain water quality functions within the riparian corridor.*
BIO/mm-8.3	***Provide Compensatory Mitigation to Replace Lost Trees**. The project will comply with the Redwood City and/or San Mateo County tree removal ordinances, as applicable, and obtain a tree*

Biological Resources Mitigation Measures
removal permit for ordinance-sized trees. Trees to remain in place will have tree protection zones established around the canopy drip line zone to avoid serious injury or loss. Compensation for all riparian tree removal will be provided. *All significant trees subject to removal in the County shall be mitigated at a 3:1 ratio, as required by Section 12,024 of the County Municipal Code, or as otherwise directed by the County Arborist or Community Development Director.* *All trees subject to removal in the City shall be mitigated at a 1:1 ratio in accordance with City requirements, or as otherwise directed by the City Arborist.* *Tree mitigation may occur on site if feasible for the area (as determined by the Community Development Director), or the mitigation may be located off site in a location deemed reasonably equivalent to the project site, or in a combination of on site and off site. For any replacement trees that cannot be reasonably placed on or off site, the Community Development Director shall require an in-lieu payment in accordance with County standards.* *An open space or conservation easement, or other similar instrument, will be recorded on property associated with the mitigation lands to protect the created habitats and associated plant and wildlife resources in perpetuity. A Riparian Mitigation & Monitoring Plan (RMMP) for riparian habitat creation and tree planting will be prepared by a qualified restoration ecologist and will provide, at a minimum, the following:* • *Habitat impacts summary and proposed habitat mitigation actions.* • *Goals of the restoration to achieve no net loss.* • *The location of the mitigation sites and existing site conditions.* • *Mitigation design including:* - *Proposed site construction schedule* - *Description of existing and proposed soils, hydrology, geomorphology, and geotechnical stability* - *Site preparation and grading plan* - *Invasive species eradication plan, if applicable* - *Soil amendments and other site preparation* - *Planting plan (plant procurement/propagation/installation)* - *Maintenance plan* - *Monitoring measures, performance and success criteria* - *Monitoring methods, duration and schedule* - *Contingency measures and remedial actions* - *Reporting measures* *The RMMP will be prepared by a qualified biologist, and the County will need to approve the RMMP prior to the impact.*

The proposed project would result in 0.562 acre of permanent impacts, and 0.545 acre of temporary impacts to non-riparian habitats: coast live oak forest and California annual grassland. Habitat within the proposed project has been disturbed and fragmented by surrounding residential development and activity. Permanent impacts on these habitats during construction would reduce the extent of habitat on the project area and reduce the abundance of some of the common plant and wildlife species that use the project area. However, these habitat types are abundant and widespread, are not particularly sensitive, and do not necessarily provide important plant or wildlife habitat, nor are they an exemplary occurrence of these habitat types. The project impacts would not substantially reduce regional populations of common plant

and wildlife species. Thus, impacts to non-riparian coast live oak forest and California annual grassland habitat do not meet the CEQA standard of having a substantial adverse effect, and would be considered less than significant. No mitigation is required.

Impact 3.4-3: Potential for the project to have a substantial adverse effect on State or Federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means – Less than Significant with Mitigation

A total of approximately 0.083 acre (0.067 acre intermittent drainage, 0.016 acre ephemeral drainage) of aquatic habitat occurs on the project area. Approximately 0.006 acre (0.005 acre intermittent drainage, 0.001 acre ephemeral drainage) of aquatic habitat would be permanently impacted, and 0.008 acre (0.005 acre intermittent drainage, 0.003 acre ephemeral drainage) of aquatic habitat would be temporarily impacted. Project-related activities would cause permanent and temporary impacts on aquatic features from road widening, culvert lengthening, bio-swale installation, or shading from bridge installation. It is assumed that the project would comply with the State and local requirements for construction and post-construction water quality and stormwater control, including the local National Pollutant Discharge Elimination System (NPDES) Municipal Regional Stormwater Permit (MRP), which will reduce deleterious impacts to water quality from construction disturbance and post-construction changes in runoff to a less-than-significant level. The new bridge structure is assumed to require no work in aquatic habitat and therefore it is unlikely to significantly alter the amount of shading on the project area, compared to existing conditions, because there is an extensive riparian canopy that creates an intermittent to closed canopy over the intermittent drainage feature on the north side of Canyon Lane.

The drainage features could be indirectly affected by the increased hardscape in upland habitats that could lead to an increase in runoff, a decrease in infiltration and groundwater recharge, and possible introduction of anthropogenic contaminants such as petrochemicals, herbicides, and fertilizers into regulated habitats. Project activities such as grading, trenching, paving, tree and plant removal, and other soil disturbances can increase the potential for soil erosion on site. These construction activities could increase the amount of soil and sediments entering waterways, thereby negatively impacting aquatic habitats and contributing to significant water quality impacts. New hardscape from paving may alter the project area runoff characteristics and create erosional features or slumping of riparian banks.

The drainage features are potentially regulated habitats that are considered sensitive natural communities as waters of the U.S./State and impacts on these features are considered significant. Implementation of the following mitigation measures would mitigate such impacts to a less-than-significant level. However, any work within waters of the U.S. and any work within waters of the State, such as lengthening of the culvert that carries the eastern drainage swale beneath Canyon Lane, may require a CWA Section 404 fill discharge permit from the USACE, Section 401 Water Quality Certification from the RWQCB, and a Section 1602 Lake and Streambed Alteration Agreement from CDFW.

Biological Resources Mitigation Measures	
BIO/mm-9.1	***Avoidance and Minimization.*** *Project activities will be conducted in a way that minimizes and avoids fill placement within the regulated drainage swales on site. A clear span bridge with abutments placed outside the top of bank may be used to avoid construction impacts to the unnamed tributary of Arroyo Ojo de Agua (intermittent drainage).*
BIO/mm-9.2	***Compensate for Permanent Impacts on Drainage Swales.*** *Potential impacts within the regulated habitats on site include both temporary and permanent effects. Temporary impacts may*

Biological Resources Mitigation Measures	
	occur as part of construction access, grading, staging, or stockpiling of materials. Direct, permanent fill impacts may include road widening, culvert lengthening, and placement of a bio-swale feature in the existing minor drainage features. *Direct permanent fill impacts on aquatic habitat below the ordinary high water mark of the drainage features will be mitigated at a ratio of 1:1. This mitigation will be described in detail and included in the RMMP discussed in BIO/mm-8.3. No mitigation is required for temporary impacts that occur only over one dry season period (May 1 to September 30) and that are seeded, returned to original contours, or landscaped prior to the next rainy season. Direct impacts from culvert lengthening can be mitigated by use of an open-bottom culvert such that a native bottom can return to the drainage feature.*

Impact 3.4-4: Potential for the project to 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 – Less than Significant

Based on a query of the California Essential Habitat Connectivity Project, there are no regional migratory wildlife corridors that have been identified by the County or State resource agencies that overlap with the project area.

The project area is largely surrounded by residential and urban development and does not provide a linkage between larger habitat areas. Small drainages and one large intermittent drainage feature (tributary of Arroyo Ojo de Agua) intersect the project area, which may provide small habitat corridors through the project area and allow wildlife to disperse through the hills adjacent to residential and urban development. However, the intermittent drainage enters a drainage inlet to the northeast of the project area and then runs subsurface through a series of pipes until it reaches Redwood Creek. Due to the fact that the intermittent drainage runs subsurface through pipes, this feature does not provide suitable fish or aquatic wildlife dispersal habitat within the project area. The riparian coast live oak habitat associated with the intermittent drainage also ends where this feature enters the drainage inlet. Therefore, the intermittent drainage and associated riparian habitat does not provide a connection from one large habitat area to another.

Although construction activities may temporarily deter wildlife from passing through the project area, due to noise and other disturbances, these impacts would only occur for a short period of time, and would not lead to any permanent changes in wildlife migration. The neighborhood surrounding the project area contains other small patches of open space, including Garrett Park and Lower Emerald Lake, which may provide alternate pathways for wildlife migration to persist during construction activities.

As a result, construction impacts to migration and wildlife corridors would be less than significant. No mitigation is required.

Impact 3.4-5: Potential for the project to conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance – Less than Significant with Mitigation

Protected trees, as defined by the Redwood City Tree Preservation Ordinance and the San Mateo County Significant Tree Ordinance, occur in the project area. The 2016 Mayne Tree Expert Company arborist report recommended the removal of 34 trees (25 trees within the County and 9 trees within the City) due to poor tree condition or because trees would be impacted by Canyon Lane road improvements activities. The 2019 Mayne Tree Expert Company arborist report identified 11 trees to be removed due to poor tree condition or because trees project would be impacted by development of the single-family residence. The removal of 45 total trees and trimming of additional trees in the coast live oak forest habitat would not have a significant impact on wildlife because such trees are not regionally limited. Nevertheless, the loss or trimming of a protected tree would be considered a significant impact under CEQA because the action would conflict with local ordinances.

Road widening, paving, grading, or water line trenching may cause tree damage or even death to adjacent trees through indirect impacts. Activities that compact soil, trench through roots, or pile soil up around the base of trees may adversely affect the health of these trees. Most tree species develop problems from root collar burial, including early decline and increased susceptibility to attack by pests.[26] Soil added above a tree's root collar creates low oxygen conditions, which can reduce root growth and increase disease severity. Excess soil also intercepts rainfall, which can reduce soil water content in the root zone. Oaks, particularly coast live oaks, are at least five times more likely to experience structural failure as a result of grade change within a tree's drip line than are trees with undisturbed soil[27,28]. Severe trimming may also damage trees. Implementation of the following measures would reduce impacts to protected trees to a less-than-significant level by bringing the project into compliance with all local ordinances.

Biological Resources Mitigation Measures	
BIO/mm-10.1	***Tree Protection Zones**. Trees that are intended to remain in the project area will be protected during project construction to the extent feasible. Protection will include the establishment of Tree Protection Zones (TPZs), which at a minimum will include the installation of a fence around the drip line of ordinance-sized trees, restructured construction activity within the dripline, and the posting of appropriate signage on the fence. These measures create an area of protection around the trees and reduce the threat of damage. Ordinance-sized trees that are subject to ground-disturbing construction activities within any portion of their dripline will be considered lost, unless a certified arborist determines that the tree is unlikely to be severely damaged or killed by such activities.*
BIO/mm-10.2	***Tree Protection Plan (TPP).** All ordinance-sized trees to be removed, avoided, or protected will be depicted on project plans. A TPP will be generated by a certified arborist to include all trees that are to be avoided or protected in the study area.*
BIO/mm-10.3	***Tree Destruction Permit and Tree Replacement.** The project proponent will comply with the local ordinances and submit permit applications for removal, trimming, damage, or relocation of all trees covered by the ordinance. Any trees to be removed may require replacement according to the discretion of the local authority. Typically, replacement trees within the County are to be*

[26] Smiley, E. Thomas. 1999. Technical report: Root collar disorders. Charlotte: Bartlett Tree Research Laboratories.

[27] Edberg, R. and A. Berry. 1999. Patterns of structural failures in urban trees: Coast Live Oak (Quercus agrifolia). Journal of Arboriculture 25(1):48-55.

[28] Day, S.D.G. Watson, P.E. Wiseman, and J.R. Harris. 2009. Causes and consequences of deep structural roots in urban trees: From nursery production to landscape establishment. Arboriculture & Urban Forestry 34(4):182-91.

California native species, planted as near as possible to the original location, with a minimum of 5-inch box size, as required by Section 12,024 of the County Municipal Code, or as otherwise directed by the County and/or City Arborist. Replacement trees within the City are to be California native species, typically planted as near as possible to the original location, with a 24-inch box size for trees greater than 18 inches in diameter (measured between 6 and 36 inches above grade) and a minimum 5-inch box size (approximately 15 gallons) for trees less than 18 inches (measured between 6 and 36 inches above grade). The replacement trees will be planted on site to the extent feasible and the project proponent will comply with all other replacement requirements imposed by the local authority. If replacement on site is not feasible, the Applicant will conduct the alternative mitigation for the tree loss, such as in lieu fee payment, as acceptable to the local authority.

Impact 3.4-6: Potential for the project to conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan – No Impact

There are no adopted Habitat Conservation Plans, Natural Community Conservation Plans, or other approved local, State, or Federal conservation plans that the project would conflict with or impact. Therefore, no impacts would occur.

3.5 CULTURAL AND TRIBAL CULTURAL RESOURCES

This section identifies cultural resources in the project area, discusses applicable significance thresholds, assesses the project's impacts to these resources and their significance, and recommends measures to avoid, reduce, or mitigate any effects found to be potentially significant.

Cultural resources are defined as any object or specific location of past human activity, occupation, or use that is identifiable through historical documentation, inventory, or oral evidence. Cultural resources can be separated into three categories: archaeological, building/structural, and traditional resources. Archaeological resources include prehistoric and historic remains of human activity. Prehistoric resources can be composed of lithic scatters, ceramic scatters, quarries, habitation sites, temporary camps/rock rings, ceremonial sites, and trails. Historic-era resources are typically those that are 50 years or older. Historic archaeological resources can consist of structural remains (e.g., concrete foundations), historic objects (e.g., bottles and cans), features (e.g., refuse deposits or scatters), and sites (e.g., resources that contain one or more of the aforementioned categories). Built environment resources range from historic buildings to canals, historic roads and trails, bridges, ditches, cemeteries, and electrical infrastructure, such as transmission lines, substations, and generating facilities. A traditional cultural resource is a resource associated with the cultural practices, traditions, beliefs, lifeways, arts, crafts, or social institutions of a living community. They are rooted in a traditional community's history and are important in maintaining the continuing cultural identity of the community.

3.5.1 Existing Conditions

Prehistoric Setting

The project area lies in what generally is described as the San Francisco Bay Region, which is one of eight arbitrary organizational divisions of the state.[1] This archaeological region includes all of today's San Mateo and Marin Counties, and western, northern, or southern portions of Alameda, Contra Costa, Napa, Santa Clara, Santa Cruz, Solano, and Sonoma Counties bordering the Bay Area. The prehistory of this region is divided into six periods: Early Holocene (Lower Archaic, 8,000-3,500 B.C.), Early period (Middle Archaic, 3,500 to 500 B.C.), Lower Middle period (Initial Upper Archaic, 500 B.C. to A.D. 430), Upper Middle period (Late Upper Archaic, A.D. 430 to 1050), Initial Late Period (Lower Emergent, A.D. 1050 to 1550), and Terminal Late Period (A.D. 1550 to 1776).[2] The San Francisco Bay area is "the meeting ground of two different systems for organizing the archaeological record;" therefore, the discussions below mention a variety of period names.

EARLY HOLOCENE/LOWER ARCHAIC (8000-3500 B.C.)

Occupation in the San Francisco Bay area during the Prehistoric Period may have occurred as early as 8,000 years ago, when sea levels were some 15–20 meters lower than today, but the earliest archaeological sites in the project area date to only 6,000 years ago during the Middle Holocene.[3] It is

[1] Moratto, Michael. 1984. California Archaeology. New York: Academic Press.

[2] Milliken, Randall, Richard T. Fitzgerald, Mark G. Hylkema, Randy Groza, Tom Origer, David G. Bieling, Alan Leventhal, Randy S. Wiberg, Andrew Gottsfield, Donna Gillette, Viviana Bellifemine, Eric Strother, Robert Cartier, and David A. Fredrickson. 2007. Punctuated Culture Change in the San Francisco Bay Area. In California Prehistory: Colonization, Culture, and Complexity, edited by Terry L. Jones and Kathryn A. Klar. Altamira Press, Lanham, New York, Toronto. p. 101, 114-118.

[3] Bickel, P. M. 1978. Changing Sea Levels along the California Coast: Anthropological Implications. p. 20.

likely that Holocene alluvial deposits buried many prehistoric sites in this area.[4,5] The few Bay Area sites include two in the Santa Clara Valley (CA-SCL-65 and CA-SCL-178) and one on the peninsula coast of Santa Cruz County (CA-SCR-7).[6] The artifact assemblages in these Bay Area sites have large numbers of handstones and milling slabs, as well as core and flake tools.

EARLY PERIOD/MIDDLE ARCHAIC (3500-500 B.C.)

Sites characteristic of the Early period/Middle Archaic in the San Mateo area date to as early as 5,500 years ago and as late as 2,500 years ago (3500-500 cal B.C.). The University Village site (CA-SMA-77) in San Mateo County and the lower levels of the West Berkeley site (CA-ALA-307) in Alameda County may represent an Early Bay culture contemporaneous with Early Period sites in Central California attributed to the Windmiller Pattern.[7] It is believed that the Early Bay culture had more in common with southern California coastal cultures rather than the Windmiller Pattern diagnostic of the Early Horizon in the Delta area. Additional artifact assemblages, such as from CA-SCL-354 in the Los Altos foothills, imply that characteristics of Windmiller assemblages were present on the South Bay peninsula.[8]

LOWER MIDDLE PERIOD/INITIAL UPPER ARCHAIC (500 CAL B.C. TO CAL A.D. 430)

People inhabiting the San Francisco Bay region during the Lower Middle period (also known as Berkeley period) practiced a maritime hunting and gathering economy. Large accumulations of shellfish remains, or "shell mounds," formed over hundreds, or even thousands, of years through accretion at village sites fronting the Bay that were reused seasonally or year-round.[9] Numerous shell mounds contain hundreds of burials as well as ceremonial items, house floors, hearths, and storage pits, indicating they were used as burial, ceremonial, and residential places.[10,11]

[4] Ragir, Sonia. 1972. The Early Horizon in Central California Prehistory. Contributions of the University of California Archaeological Research Facility, No. 15. Berkeley.
5 Moratto, Michael. 1984. California Archaeology. New York: Academic Press. p. 277.
[6] Hylkema, Mark B. 2002. Tidal Marsh, Oak Woodlands, and Cultural Florescence in the Southern San Francisco Bay Region. In Catalysts to Complexity: Late Holocene Societies of the California Coast, edited by Jon M. Erlandson and Terry L. Jones, Perspectives in California Archaeology, Vol. 6. Cotsen Institute of Archaeology, University of California, Los Angeles. pp.233–262.
[7] Gerow, Bert A. (with Roland W. Force) 1968. An Analysis of the University Village Complex, with a Reappraisal of Central California Archaeology. Stanford University Press, Palo Alto, California.
[8] Hylkema, Mark B. 2002. Tidal Marsh, Oak Woodlands, and Cultural Florescence in the Southern San Francisco Bay Region. In Catalysts to Complexity: Late Holocene Societies of the California Coast, edited by Jon M. Erlandson and Terry L. Jones, Perspectives in California Archaeology, Vol. 6. Cotsen Institute of Archaeology, University of California, Los Angeles. p. 244.
[9] Lightfoot, Kent G. 1997. Cultural Construction of Coastal Landscapes: A Middle Holocene Perspective from San Francisco Bay. In Archaeology of the California Coast During the Middle Holocene, edited by Jon M. Erlandson and Michael A. Glassow, pp. 129-141. Perspectives in California Archaeology, Vol. 4. Institute of Archaeology, University of California, Los Angeles. p. 135.
[10] Lightfoot, Kent G. 1997. Cultural Construction of Coastal Landscapes: A Middle Holocene Perspective from San Francisco Bay. In Archaeology of the California Coast During the Middle Holocene, edited by Jon M. Erlandson and Michael A. Glassow, pp. 129-141. Perspectives in California Archaeology, Vol. 4. Institute of Archaeology, University of California, Los Angeles. pp. 131–136.
[11] Lightfoot, Kent G., and Edward M. Luby. 2002. Late Holocene in the San Francisco Bay Area: Temporal Trends in the Use and Abandonment of Shell Mounds in the East Bay. In Catalysts to Complexity: Late Holocene Societies of the California Coast, edited by Jon M. Erlandson and Terry L. Jones, pp. 263-281. Perspectives in California Archaeology, Vol. 6. Cotsen Institute of Archaeology, University of California, Los Angeles. pp. 276–277.

UPPER MIDDLE PERIOD/LATE UPPER ARCHAIC (CAL A.D. 430 TO 1050)

The Upper Middle Period/Late Upper Archaic period is marked by the collapse of the *Olivella* saucer bead trade network at cal A.D. 430 around the Bay Region.[12] The period is also evidenced by a number of changes in subsistence, foraging, and land use patterns that begin to reflect the use pattern known from Historic Period Native American groups in the area. A substantial increase in the intensity of subsistence exploitation, including fishing, hunting, and gathering (particularly the acorn), evidenced in the archaeological record, correlates directly with population growth.[13] Bow and arrow technology, the use of harpoons, and tubular tobacco pipes appear during this period. However, a greater emphasis is placed on the procurement and processing of vegetal foods, especially acorns, as evidenced in the increase of milling tools, especially the mortar and pestle. Both coiled and twined basketry were used as domestic and ceremonial items. Population size and the number of settlements increased during this period, although the large shell mound villages of the Lower Middle Period were apparently no longer favored residential places.[14] There is an increase in grave goods, particularly during the Upper Middle period, compared to few grave goods identified during the Lower Middle period in Bay Area sites.

INITIAL LATE PERIOD/LOWER EMERGENT (CAL A.D. 1050 TO 1550)

The Late period ushers in a time of status differentiation and the rise of secret societies and cults and associated traits. Exchange networks, with the use of clamshell disk beads as a form of currency, expanded during this period. Compared to the Middle Period, the use and occurrence of shell beads with burials blossomed.[15] Partial cremation appears or reappears during this time and also reveal differences in individual status, with the diversity of grave goods included in the wealthiest of graves.[16]

During the Late Period in the peninsula coast, site assemblages indicate there is an increase in the diet of birds and marine species, especially sea otters. At the same time, there is a decrease in terrestrial fauna in the archaeological record.[17] Further inland at large residential, upland meadows sites in Santa Cruz County (CA-SCR-9 and CA-SCR-20), both dense shell and abundant deer and elk bone are present, suggesting these areas were continuously reoccupied on a seasonal basis.

[12] Milliken, Randall, Richard T. Fitzgerald, Mark G. Hylkema, Randy Groza, Tom Origer, David G. Bieling, Alan Leventhal, Randy S. Wiberg, Andrew Gottsfield, Donna Gillette, Viviana Bellifemine, Eric Strother, Robert Cartier, and David A. Fredrickson. 2007. Punctuated Culture Change in the San Francisco Bay Area. In California Prehistory: Colonization, Culture, and Complexity, edited by Terry L. Jones and Kathryn A. Klar. Altamira Press, Lanham, New York, Toronto. p.116.

[13] Moratto, Michael. 1984. California Archaeology. New York: Academic Press. pp. 211-214.

[14] Lightfoot, Kent G., and Edward M. Luby. 2002. Late Holocene in the San Francisco Bay Area: Temporal Trends in the Use and Abandonment of Shell Mounds in the East Bay. In *Catalysts to Complexity: Late Holocene Societies of the California Coast*, edited by Jon M. Erlandson and Terry L. Jones, pp.263-281. Perspectives in California Archaeology, Vol. 6. Cotsen Institute of Archaeology, University of California, Los Angeles. pp. 264, 277.

[15] Milliken, Randolph T., and James A. Bennyhoff. 1993. Temporal Changes in Beads as Prehistoric California Grave Goods. In *There Grows a Green Tree: Papers in Honor of David A. Fredrickson*, edited by Gregory White, Pat Mikkelsen, William R. Hildebrandt, and Mark E. Basgall, pp. 381–395. Center for Archaeological Research at Davis, Publication 11. University of California, Davis.

[16] Milliken, Randall, Richard T. Fitzgerald, Mark G. Hylkema, Randy Groza, Tom Origer, David G. Bieling, Alan Leventhal, Randy S. Wiberg, Andrew Gottsfield, Donna Gillette, Viviana Bellifemine, Eric Strother, Robert Cartier, and David A. Fredrickson. 2007. Punctuated Culture Change in the San Francisco Bay Area. In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar. Altamira Press, Lanham, New York, Toronto. p. 217.

[17] Hylkema, Mark B. 2002. Tidal Marsh, Oak Woodlands, and Cultural Florescence in the Southern San Francisco Bay Region. In Catalysts to Complexity: Late Holocene Societies of the California Coast, edited by Jon M. Erlandson and Terry L. Jones, Perspectives in California Archaeology, Vol. 6. Cotsen Institute of Archaeology, University of California, Los Angeles. pp. 254-255.

TERMINAL LATE PERIOD/PROTOHISTORIC AMBIGUITIES (CAL A.D. 1550 TO 1776)

During this period and before the Spanish arrived in full force, a cultural shift was occurring. The North Bay began to take a more dominant role in the production of new technology and trade items including, clamshell disk beads, harpoons, hopper mortar, corner-notched projectile points, and magnesite tube beads. The precise reason for this cultural shift is unknown, but could have been driven by conflict between groups or the spread of European diseases northward from Mexico prior to 1776.[18]

Ethnographic Setting

The current project area is within the historically known territory of the Ohlone, from the Costanoan language family. Speakers of the various Costanoan languages occupied an area extending from the northern San Francisco Bay area to the southern Monterey Bay and lower Salinas River areas. Ethnographic information for Costanoan speakers comes from early Spanish explorers and mission documents as well as the works of modern ethnographers and linguists and Ohlone descendants.

Political organization of the Ohlone consisted of a patrilineal head-man or chief whose daily functions were mostly ceremonial. However, in times of war, the head-man's leadership was considered absolute. This role was not limited to men, and women were permitted to become chiefs if a suitable male heir was not available. Their political organization also comprised a council of elders, official speakers, shamans, and inter-tribal groupings of deer and bear clans.[19,20] The Ohlone interacted with their neighboring groups through intermarriage, trade, and warfare. Intermarriage usually occurred between tribes with directly adjacent territory,[21] and trade between tribes was extensive. Both marital and trade issues were affected by warfare, as well as the reverse[22] and warfare has been documented since the time of Spanish contact.[23,24,25,26]

The Ohlone occupied several semi-permanent camps and villages in response to the seasonal changes in resources. Their primary dwellings were dome-shaped, with pole frameworks and thatch for the roof and walls. Other structures within Ohlone villages include acorn granaries, sweat houses, menstrual houses,

[18] Milliken, Randall, Richard T. Fitzgerald, Mark G. Hylkema, Randy Groza, Tom Origer, David G. Bieling, Alan Leventhal, Randy S. Wiberg, Andrew Gottsfield, Donna Gillette, Viviana Bellifemine, Eric Strother, Robert Cartier, and David A. Fredrickson. 2007. Punctuated Culture Change in the San Francisco Bay Area. In California Prehistory: Colonization, Culture, and Complexity, edited by Terry L. Jones and Kathryn A. Klar. Altamira Press, Lanham, New York, Toronto. pp. 117-118.
[19] Harrington, J. P. 1933. Report of Fieldwork on Indians of Monterey and San Bernardino Counties. 49th Annual Report of the Bureau of American Ethnology for the Years 1931-1932. Bureau of American Ethnology, Washington, D.C.
[20] Harrington, J. P. 1942. Culture Element Distributions, XIX: Central California Coast. University of California Anthropological Records 7(1):1-46. Stanford University Press, Palo Alto, California.
[21] Milliken, R. T., J. G. Costello, C. Johnson, G. A. Laffey, A. Sayers and P. Orozco. 1993. Archaeological Test Excavations at Fourteen Sites Along Highway 101 and 152, Santa Clara and San Benito Counties, California, Volume 2: History, Ethnohistory, and Historic Archaeology. Report S-15442. Report on file with Northwest Information Center, Sonoma State University, Rohnert Park, California.
[22] Heizer, R. F. (editor). 1974. The Costanoan Indians. Volume 18: California History Center at De Anza College, Cupertino, California. WB Associates, Mountain View, California.
[23] Broadbent, S. M. 1972. The Rumsen of Monterey: an Ethnography from Historical Sources. University of California Archaeological Research Facility Contributions 14. University of California Archaeological Research Facility, Berkeley.
[24] Fages, P. 1937 A Historical, Political and Natural Description of California, By Pedro Fages, Soldier of Spain [1775]. Translated by Herbert I. Priestly. University of California, Berkeley.
[25] Langsdorff, G. H. v. 1968. Voyages and Travels in Various Parts of the World during the Years 1803, 1804, 1805, 1806, and 1807 [1813-1814]. Biblioteca Australiana 41. 2 vols. De Capo Press, New York.
[26] Mason, J. A. 1912. The Ethnology of the Salinan Indians. University of California Publications in American Archaeology and Ethnology 10(4): 97-240.

dance houses, and the assembly house. The latter two were often located in the center of the village.[27] The Ohlone collected their resources from the surrounding mountains, valleys and sloughs. The resources exploited by the Ohlone for food included seeds, nuts, berries, grasses, corms, roots, insects, and terrestrial mammals.[28] Reeds and grasses were also collected for basketry and rafts, and raw lithics were collected for stone tool production. Marine resources which were also utilized included sea birds, fish, shellfish, and sea mammals.

The material cultural representative of the Ohlone include the following: several types of baskets; flaked stone artifacts, made from both locally available chert, quartzite, metamorphic, and igneous rocks and obsidian obtained through trade; ground stone and milling tools including bedrock mortars, portable mortars, hopper mortars, stone bowls, pipe bowls, sinkers, and shaft straighteners; bone awls and wedges; wooden arrows shafts, hafted handles, mortars, pestles, food-stirrers and combs. Special adornments were made from materials such as steatite, serpentine, bone and abalone, as well as feathers, grass, and flowers.

After the establishment of the Spanish missions in the region, the Ohlone tribes interacted extensively with them. The resulting missionization had a profound effect on the life ways of the tribes. Analysis of mission baptismal records show that the last Ohlone Costanoan tribes living a completely aboriginal existence had disappeared by 1810.[29] Today the Ohlone still maintain many aspects of their traditional culture and are represented by many groups, including the Pajaro Valley Ohlone Indian Council, Mutsun Band of Costanoan Indians, Amah Mutsun Band of (mission) Ohlone Indians, and many Ohlone descendants.

Historic Setting

Post-contact history for the state of California generally is divided into three periods: the Spanish period (1769–1822), the Mexican period (1822–1848), and the American period (1848–present). Although there were brief visits by Spanish, Russian, and British explorers from 1529 to 1769, the beginning of Spanish settlement in California occurred in 1769 with a settlement at San Diego and the first (Mission San Diego de Alcalá) of 21 missions established from 1769 to 1823. Word of Mexican victory after a decade of revolt against the Spanish crown reached California in 1822, marking the beginning of the Mexican period. This period was marked by an extensive era of land grants, most of which were in the interior of the state, and by exploration by American fur trappers west of the Sierra Nevada Mountains.

With the signing of the Treaty of Guadalupe Hidalgo in 1848, ending the Mexican-American War, California became a territory of the United States. The discovery of gold in 1848 at Sutter's Mill near Sacramento and the resulting Gold Rush influenced the history of the state and the nation. The rush of tens of thousands of people to the goldfields also had a devastating impact on the lives of indigenous Californians, with the introduction and concentration of diseases, the loss of land and territory (including traditional hunting and gathering locales), violence, malnutrition, and starvation. Thousands of settlers and immigrants continued to pour into the state, particularly after the completion of the transcontinental railroad in 1869.

[27] Broadbent, S. M. 1972. The Rumsen of Monterey: an Ethnography from Historical Sources. University of California Archaeological Research Facility Contributions 14. University of California Archaeological Research Facility, Berkeley.
[28] Levy, R. S. 1978. Costanoan. In Handbook of North American Indians, Volume 8: California, R. F. Heizer (ed.), pp. 485-495. Smithsonian Institution, Washington D.C.
[29] Levy, R. S. 1978. Costanoan. In Handbook of North American Indians, Volume 8: California, R. F. Heizer (ed.), pp. 485-495. Smithsonian Institution, Washington D.C.

Project Location

The current project area was passed by various Spanish expeditions in the late 18th century. In 1769, Gaspar de Portolá and Father Juan Crespi, missing their intended destination of Monterey, first sighted San Francisco Bay from Sweeney Ridge in Pacifica. A campsite of the Portolá Expedition is a registered Historic Property in nearby Woodside. While the party never traversed Redwood City itself, they did interact with a group of natives on nearby San Francisquito Creek.[30,31] They were followed in 1774 by Fernando Javier Rivera and Father Francisco Palou, who advocated for the establishment of a mission at Palo Alto. This recommendation was passed over in favor of San Francisco due to the lack of a suitable harbor on the Peninsula. Colonel Juan Bautista de Anza and Father Pedro Font scouted this location two years later, journeying from Monterey. In an instance of particular potential interest to the project area, Font described a shell mound on lower Redwood Creek writing: "… there was a great pile of mussels… for which one village often fights another."[32]

Mission San Francisco de Asís was founded on October 9, 1776, and the resident fathers soon proved to be highly successful in converting the region's Native Americans and concentrating them at the site. Overcrowding became an issue and some natives were relocated to rancherias on the Peninsula where better agricultural prospects obtained.[33,34,35,36] One of these was Rancho Las Pulgas, extending from present-day San Mateo to Palo Alto. This rancho nacional of the San Francisco Presidio was formally granted to Luis Argüello by Governor Pablo Vicente on November 27, 1835. After California became a territory of the United States, Rancho Las Pulgas was patented to Luis' heir, María de la Soledad Ortega de Argüello, by the Supreme Court on October 2, 1857.[37,38,39]

Variously known by the names Los Palos Colorados, Arroyo Salinas, Red Woods Embarcadero, Pulgas Ranch Embarcadero, Steinbergers and Mezesville, Redwood City became a center of timber extraction during the Spanish Period and this industry intensified with the advent of the Gold Rush.[40,41] Logs harvested in the hills above the city were brought down Redwood Ravine to the Embarcadero where they were lashed together and set adrift for San Francisco. Mills, lumberyards, and wharfs characterized Redwood City of the 1850s; there were at least ten documented sawmills in the environs of the City in 1853. Following intervals as Mezesville, after the Argüello's attourney, and Steinbergers, after a stage

[30] Beck, W.A. and Y.D. Hasse. 1974. Historical Atlas of California (Third Printing). University of Oklahoma Press, Norman. p. 317.
[31] Nelson, Nels C. 1909. Shellmounds of the San Francisco Bay Region. University of California Publications in American Archaeology and Ethnology Vol. 7, No. 4. Berkeley. p. 347.
[32] Milliken, R.T. 1983. The Spatial Organization of Human Population on Central California's San Francisco Peninsula at the Spanish Arrival. Unpublished M.A. Thesis, Department of Inter-Disciplinary Studies, Sonoma State University, Rohnert Park. p. 87.
[33] Beck, W.A. and Y.D. Hasse. 1974. Historical Atlas of California (Third Printing). University of Oklahoma Press, Norman.
[34] Hart, J.D. 1987. A Companion to California (Revised and Expanded). Oxford University Press, New York.
[35] Hynding, A. 1982. From Frontier to Suburb, The Story of The San Mateo Peninsula. Star Publishing Company, Belmont.
[36] Stevens, T.S. 1856. Plat of the Pulgas Rancho finally confirmed to Maria de la Soledad Ortega de Arguello et al. Surveyed under the Orders of the U.S. Surveyor General by T.S. Stevens Dep[uty] Sur[veyor]. November 1856. Containing 35240/42 acres. Approved December 19th 1856. Map on file, #148 California State Office, Bureau of Land Management, Sacramento.
[37] Beck, W.A. and Y.D. Hasse. 1974. Historical Atlas of California (Third Printing). University of Oklahoma Press, Norman. p. #30.
[38] Hendry, G.W. and J.N. Bowman. 1940. The Spanish and Mexican Adobes and Other Buildings in the Nine San Francisco Bay Counties, 1776 to about 1850. MS on file, Bancroft Library, University of California, Berkeley. pp. 1031-1038.
[39] Hoover, M.B., H.E. Rensch, E.G. Rensch and W.N. Abeloe. 1966. Historic Spots in California (Third Edition, revised by William N. Abeloe). Stanford University Press, Palo Alto. pp. 404-406.
[40] Brown, A.K. 1975. Place Names of San Mateo County. San Mateo County Historical Association, College of San Mateo Campus, San Mateo. p. 76.
[41] Gudde, Edwin G. 1998. California Place Names: The Origin and Etymology of Current Geographical Names. Fourth Edition, revised and enlarged by William Bright. University of California Press, Berkeley. p. 313.

stop owner, Redwood City acquired its current appellation in September of 1856.[42,43,44,45,46] That same year, the southern portion of San Francisco County became San Mateo County and the County Seat was moved to Redwood City in 1857.[47,48,49]

Emerald Lake Hills, where the project area and Canyon Lane are located, was a popular vacation destination in the 1920s, and many of the original vacation homes have become permanent residences.[50] Fed by a creek, Lower Emerald Lake had been constructed by 1940, according to a topographic map from the same year, Lower Emerald Lake was present, fed by a creek. One home was situated southeast of the lake, between Canyon Lane and Vista Drive, and one structure was sandwiched between Canyon Lane and Oak Knoll Drive. The aerial imagery from 1948 reveals moderate tree coverage along unimproved Canyon Lane and the adjacent creek, with the addition of one home south of the road. Sparse agricultural use can be seen in some parcels in the surrounding area, but much of the land remained undeveloped. At this time, the dirt road extended from Glenwood Avenue nearly all the way to Lower Emerald Lake, paralleling the creek. By 1954, Canyon Lane clearly curved towards its termination at Vista Drive. Aerial imagery from 2002 shows increased development surrounding Canyon Lane, approximating the current residential density north and south of the road.

Canyon Lane is an historic linear cultural resource dating to the 1940s; the unimproved road is visible on aerial imagery as early as 1948. A linear cultural resource is one that extends in a line, such as an historic-age railroad, canal, transmission line, or road.

Although no known cultural resources are present within the project area aside from Canyon Lane, areas adjacent to creeks and other natural water sources are considered to have higher potential for prehistoric and historic cultural resources. The project area includes an ephemeral creek that runs parallel to Canyon Lane. The east-west-running canyon within which the project is located would have provided a natural travel corridor between the foothills and lowlands, including the alluvial plain, wetlands, and bay.

3.5.2 Regulatory Setting

Assembly Bill 52 of 2014 (AB 52) adds Sections 21074 (a)(b)(c) to the Public Resources Code, which address tribal cultural resources, cultural landscapes, and historical resources. Tribal cultural resources are defined as one of the following:

[42] Brown, A.K. 1975. Place Names of San Mateo County. San Mateo County Historical Association, College of San Mateo Campus, San Mateo. pp. 75-76.
[43] Hoover, M.B., H.E. Rensch, E.G. Rensch and W.N. Abeloe. 1966. Historic Spots in California (Third Edition, revised by William N. Abeloe). Stanford University Press, Palo Alto. pp. 407-408.
[44] Hynding, A. 1982. From Frontier to Suburb, The Story of The San Mateo Peninsula. Star Publishing Company, Belmont. pp. 37, 90.
[45] Richards, Gilbert. 1973. Crossroads: People and Events of the Redwoods of San Mateo County. Gilbert Richards Publications, Woodside.
[46] Stanger, Frank M. 1963. South from San Francisco: San Mateo County, California: Its History and Heritage. San Mateo County Historical Association, San Mateo, California. pp. 53-54.
[47] Coy, W.C. 1973. California County Boundaries: A Study of the Division of the State into Counties and the Subsequent Changes in their Boundaries (Revised Edition). California Historical Survey Commission, Valley Publishers, Fresno. pages 238-239.
[48] Hart, J.D. 1987. A Companion to California (Revised and Expanded). Oxford University Press, New York. p. 410.
[49] Hoover, M.B., H.E. Rensch, E.G. Rensch and W.N. Abeloe. 1966. Historic Spots in California (Third Edition, revised by William N. Abeloe). Stanford University Press, Palo Alto. p. 389.
[50] Department of Environmental Management. 1986. General Plan as approved by the Board of Supervisors, November 18, 1986. Prepared by the Department of Environmental Management, Environmental Services Agency, Planning and Building Division, San Mateo County, California. Electronic document. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed March 19, 2019. page 8.10.

- Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following:
    - Included or determined to be eligible for inclusion in the California Register of Historical Resources.
    - Included in a local register of historical resources as defined in Subdivision (k) of Section 5020.1.
- A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe.

Additionally, Public Resources Code Section 21074 (b) and (c) include in the definition of a tribal cultural resource the following:

- A cultural landscape that meets the criteria of subdivision (s)…to the extent that the landscape is geographically defined in terms of the size and scope of the landscape (Public Resources Code Section 21074 [b]); and
- A historical resource described in Section 21084.1, a unique archaeological resource as defined in subdivision (g) of Section 21083.2, or a "nonunique archaeological resource" as defined in subdivision (h) of Section 21083.2…if it conforms with the criteria of subdivision (a) (Public Resources Code Section 21074 [c]).

Impacts to tribal cultural resources should be considered under CEQA. Public Resources Code Section 21080.3.2 states that parties may propose mitigation measures "capable of avoiding or substantially lessening potential significant impacts to a tribal cultural resource or alternatives that would avoid significant impacts to a tribal cultural resource." Further, if a California Native American tribe requests consultation regarding project alternatives, mitigation measures, or significant effects to tribal cultural resources, the consultation shall include those topics. The environmental document and the mitigation monitoring and reporting program (where applicable) shall include any mitigation measures that are adopted.

AB 52 Tribal Consultation

California Native American tribes are defined in AB 52 as any Native American tribe located in California that is on the contact list maintained by the NAHC, whether or not they are federally recognized. AB 52 specifies that California Native American tribes traditionally and culturally affiliated with a geographic area may have expertise concerning their tribal cultural resources. Once an application for a project is completed or a public agency makes a decision to undertake a project, the lead agency has 14 days to send formal notification to Native American tribes designated by the NAHC as having traditional and cultural affiliation with a given project area and previously requested in writing to be notified by the lead agency. The notification shall include a brief description of the proposed project, the location, contract information for the agency contact, and notice that the tribe has 30 days to request, in writing, consultation. Consultation must be initiated by the lead agency within 30 days of receiving any California Native American tribe's request for consultation. Furthermore, consultation must be initiated prior to the release of a negative declaration, mitigated negative declaration, or environmental impact report for a project.

Consultation may include discussion concerning the type of environmental review necessary, the significance of the project's impacts on the tribal cultural resources, and, if necessary, project alternatives

or the appropriate measures for preservation and mitigation that the California Native American tribe may recommend to the lead agency. The consultation shall be considered concluded when either the parties agree to measures to mitigate or avoid a significant effect, if one exists, on a tribal cultural resource; or a party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached.

Pursuant to Government Code Sections 6254 and 6254.10, and PRC Section 21082.3(c), information submitted by a California Native American tribe during consultation under AB 52 shall not be included in the environmental document or otherwise disclosed to the public by the lead agency, project applicant, or the project applicant's agent, unless written permission is given. Exemptions to the confidentiality provisions include any information already publicly available, in lawful possession of the project applicant before being provided by the tribe, independently developed by the project applicant or the applicant's public agent, or lawfully obtained by a third party.

3.5.3 Thresholds of Significance

The following sections describe significance criteria for impacts related to cultural resources from Appendix G of the CEQA Guidelines. Impacts would be considered significant if the proposed project would:

a. Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5.

b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5.

c. Disturb any human remains, including those interred outside of formal cemeteries.

In addition, this chapter includes CEQA questions related to Tribal Cultural Resources.

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or

b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

3.5.4 Impact Assessment and Methodology

SWCA conducted a Cultural Resources Assessment for the project, including a records search, review of historic maps and aerial imagery, and pedestrian survey. The technical report detailing the methods employed is appended to this EIR as Appendix F.

Cultural Resources Records Search and Map Review

On January 17, 2019, SWCA requested a records search of the California Historical Resources Information System (CHRIS) from the Northwest Information Center (NWIC), located at the Sonoma State University, Rohnert Park. The NWIC responded to SWCA's records search request on January 24, 2019 providing data drawn from the following sources, along with official maps and records:

- National Register of Historic Places – Listed Properties;
- California Register of Historical Resources;
- California Inventory of Historical Resources;
- California State Historical Landmarks;
- California Points of Historical Interest; and,
- California Office of Historic Preservation Historic Property Directory and Determinations of Eligibility.

Historic maps and aerial photographs were also reviewed to identify historic linear resources and historic built environment resources within the project area.

PRIOR CULTURAL RESOURCES STUDIES

The NWIC records search revealed that five cultural resources studies have been conducted within a 0.5-mile radius of the project area. Two of these five studies encompassed all or a portion of the project area. A study titled *Cultural Resources Evaluation of the Emerald Lake Hills Sanitation Facilities Project, San Mateo County, California,*[51], concluded that no known archaeological or historic resources are located in the then-proposed sanitation facilities' service area on the basis of an archival review and a surface reconnaissance in the field. The author concluded that no discernable adverse impacts to cultural resources would result from the planned expansion of the facilities. The author does caution that the field reconnaissance conducted was far from complete as a substantial portion of the area was not inspected because it was situated on private property, on steep slopes or obscured by dense vegetation.

PREVIOUSLY RECORDED CULTURAL RESOURCES

The NWIC records search revealed two previously recorded prehistoric archaeological sites (CA-SMA-304 and CA-SMA-394) and one unrecorded site within a 0.5-mile radius of the project area; all three sites are located outside of the project area. Sites CA-SMA-304 and CA-SMA-394 were officially recorded in 1976 by the Redwood City Planning Department. Artifacts and features present include habitation debris, hearths, pits and, at CA-SMA-394, burials. The nature of the unrecorded site within the 0.5-mile radius (discovered in 1987) is presently unknown.

Built Environment Desktop Review

SWCA reviewed historic maps provided by the NWIC, as well as other historic maps and aerial photographs available online. This desktop review resulted in the identification of one historic-age road within the project area (Canyon Lane) and one historic-age building located on a parcel adjacent to the project area.

[51] Chavez, David. 1977. Cultural Resources Evaluation of the Emerald Lake Hills Sanitation Facilities Project, San Mateo County, California. Report S-3044 on file with the Northwest Information Center, Sonoma State University, Rohnert Park.

CANYON LANE (TEMPORARY SITE NUMBER CL-01)

Canyon Lane is an historic linear cultural resource dating to the 1940s; the unimproved road is visible on aerial imagery as early as 1948. Canyon Lane falls within the lands of the former Rancho Las Pulgas, southwest of present-day Whipple Avenue. The 1856 Plat of Pulgas Rancho shows the area south of Whipple's Road among the tributaries of Redwood Creek, where Canyon Lane is now located, as undeveloped. Emerald Lake Hills, where the project area and Canyon Lane are located, was a popular vacation destination in the 1920s, and many of the original vacation homes have become permanent residences.[52] Fed by a creek, Lower Emerald Lake was constructed by 1940. One home was situated southeast of the lake, between the modern alignments of Canyon Lane and Vista Drive, and one structure was situated between the modern alignments of Canyon Lane and Oak Knoll Drive. However, Canyon Lane itself is not depicted on the 1940 topographic map. The aerial imagery from 1948 reveals moderate tree coverage along unimproved Canyon Lane and the adjacent creek, with the addition of one home south of the road. Sparse agricultural use can be seen in some parcels in the surrounding area, but much of the land remained undeveloped. At this time, the dirt road extended from Glenwood Avenue nearly all the way to Lower Emerald Lake, paralleling the creek. By 1954, Canyon Lane clearly curved towards its termination at Vista Drive. Aerial imagery from 2002 shows increased development surrounding Canyon Lane, approximating the current residential density north and south of the road.

3339 OAK KNOLL DRIVE

One privately-owned parcel (APN 057-221-130; 3339 Oak Knoll Dr., San Mateo County) located outside of the project area but adjacent to the proposed water line and roadway improvements, contains a building constructed in 1938, according to County of San Mateo Assessor's Office records.[53] Although not formally recorded as such, this building is considered a historic built environment resource based on its age (over 50 years).

Pedestrian Survey

SWCA conducted an intensive pedestrian survey on February 6, 2019 of the proposed Canyon Lane improvements, including the locations of the proposed roadway improvements and water line, as well as the merged parcel currently proposed for the development as a single-family residence. A total of 2.68 acres were surveyed using pedestrian transects spaced at a maximum of 10 meters. The cultural resources survey area included three main components: the Canyon Lane roadway with a 30-foot buffer on either side; a triangular merged parcel (057-222-290 / 057-222-300) proposed for a single family residence; and a 70-foot wide corridor where a subsurface water pipeline is proposed. Only those portions of the project where ground disturbance is proposed were subjected to pedestrian survey; the remaining 11 "developable parcels" were excluded from the pedestrian survey. One resource was identified during the survey: Canyon Lane (temporary site number CL-01), recorded as a historic linear resource. No other resources were observed within the project area.

CANYON LANE

Canyon Lane (temporary site number CL-01) is a historic period road constructed between 1940 and 1948, identified through desktop review of historic maps and aerial imagery, and recorded during the pedestrian survey. Canyon Lane is an approximately 10-foot-wide gravel roadway that begins at

[52] Department of Environmental Management. 1986. General Plan as approved by the Board of Supervisors, November 18, 1986. Prepared by the Department of Environmental Management, Environmental Services Agency, Planning and Building Division, San Mateo County, California. Electronic document. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed March 19, 2019. page 8.10.

[53] County of San Mateo Assessor's Office. 2019. Personal Communication with Nelson White (SWCA). March 20.

Glenwood Avenue (an improved public roadway located within the City of Redwood City) and extends west approximately 550 feet before crossing into the jurisdictional boundary of the County. The total length of the road within the project area is approximately 1,000 feet. The research potential of this resource has been exhausted by its recording during the Cultural Resources Technical Study conducted for the project, and few conclusions can be drawn from further study. The resource does not appear to meet the minimum criteria to be considered eligible for the California Register of Historical Resources (CRHR) under Criteria 1 through 4 and does not represent a unique archaeological resource.

Canyon Lane is not associated with events that have made a significant contribution to the broad patters of California's history and cultural heritage (Criterion 1), nor is it associated with the lives of persons important in our past (Criterion 2). The road does not embody the distinctive characteristics of a type, period, region or method of installation, nor does it represent the work of an important creative individual, or possess high artistic values (Criterion 3). Canyon Lane has not yielded, nor is it likely to yield, information important in prehistory or history (Criterion 4). As such, Canyon Lane is not considered an 'historical resource' for the purposes of CEQA.

Canyon Lane does not meet the definition of a 'unique archaeological resource', as it does not contain information needed to answer important scientific research questions, lacks a special or particular quality such as being the oldest of its type or the best available example of its type, and is not directly associated with a scientifically recognized important prehistoric or historic event or person.

Therefore, Canyon Lane is considered ineligible for listing in the CRHR and no further work is required. Resources that neither meet any of the criteria for listing on the CRHR nor qualify as a unique archaeological resource under CEQA PRC Section 21083.2 are viewed as not significant. Under CEQA, "A nonunique archaeological resource need be given no further consideration, other than the simple recording of its existence by the lead agency if it so elects" (PRC Section 21083.2[h]).

Native American Heritage Commission and Tribal Correspondence

Assembly Bill (AB) 52 formalizes the lead agency–tribal consultation process, requiring the lead agency to initiate consultation with California Native American groups that are traditionally and culturally affiliated with the project area, including tribes that may not be federally recognized.

The San Mateo County Planning and Building Department (County) contacted the California Native American Heritage Commission (NAHC) requesting a review of the Sacred Lands File. The NAHC responded on January 10, 2019, indicating that the results of the search were negative. The NAHC identified six local tribal contacts of the following affiliations:

- Amah Mutsun Tribal Band
- Amah Mutsun Tribal Band of Mission San Juan Bautista
- Costanoan Rumsen Carmel Tribe
- Indian Canyon Mutsun Band of Costanoan
- Muwekma Ohlone Indian Tribe of the San Francisco Bay Area
- The Ohlone Indian Tribe

The County mailed a letter to each of the contacts, plus one additional contact from the Amah Mutsun Tribal Band, on January 24, 2019, describing the project and including a map of the project location. The letters invited the tribal representatives to consult with the County, asked if they have any concerns about

the project, and inquired if they would like any additional information regarding resources in the area. The County received no response from this outreach.

3.5.5 Project-Specific Impacts and Mitigation Measures

Impact 3.5-1: Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5 – Less than Significant

CANYON LANE IMPROVEMENTS, PROPOSED SINGLE-FAMILY RESIDENCE, DEVELOPABLE PARCELS

No previously recorded cultural resources were identified within the project area by the NWIC during the CHRIS records search. One unrecorded historic built environment resource (building constructed in 1938), identified through review of historic maps and aerial imagery, is present within one of the privately-owned parcels outside, but adjacent to, the project area. Although the proposed water line would be constructed adjacent to the southern boundary of this parcel, no project-specific indirect impacts to this resource are anticipated. The parcel on which the proposed single-family residence would be constructed is approximately 350 feet east of the historic building; no project-specific indirect impacts to this resource are anticipated. The developable parcels to the east are separated from the parcel with the historic building by an undeveloped, privately-owned parcel that is not part of the project area. No project-specific indirect impacts to this resource are anticipated. Existing trees and vegetation will screen any construction noise and dust. The historic building would be formally recorded and evaluated for CRHR eligibility prior to design of the adjacent developable parcels, once those plans have been finalized.

The cultural resources pedestrian survey resulted in the recording of the existing Canyon Lane as a historic linear resource, based on its presence on historic maps and aerial photographs as early as 1948. This linear resource has been evaluated for eligibility for the CRHR and recommended ineligible for listing, as it does not meet any of the four eligibility criteria. As such, Canyon Lane is not a historical resource for the purposes of CEQA.

Based on the above, impacts to historic resources would be less than significant.

Impact 3.5-2: Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5 – Less than Significant with Mitigation

CANYON LANE IMPROVEMENTS, PROPOSED SINGLE-FAMILY RESIDENCE, DEVELOPABLE PARCELS

No previously recorded cultural resources were identified within the project area by the NWIC during the CHRIS records search. One archaeological resource was identified within the project area and newly recorded during the cultural resources survey – Canyon Lane. Existing Canyon Lane was recorded as a historic linear archaeological resource, based on its presence on historic maps and aerial photographs as early as 1948. However, Canyon Lane has been evaluated for eligibility for the CRHR and recommended ineligible for listing, as it does not meet any of the four eligibility criteria, nor does it meet the definition of a unique archaeological resource. As such, Canyon Lane is not an archaeological resource for the purposes of CEQA.

The proposed Canyon Lane improvements and single-family residence would require ground disturbance. The proposed developable parcels would ultimately require ground disturbance as well. The developable parcels would be surveyed for cultural resources, once those plans have been finalized. It is possible that unanticipated discoveries of archaeological resources may occur during ground-disturbing activities associated with project construction. The project location, adjacent to a creek, is considered to have higher potential for buried archaeological resources than other locations that are not adjacent to sources of fresh water and riparian resources, both vitally important to prehistoric peoples. Potential impacts to archaeological resources would be considered less than significant with the implementation of mitigation measure CUL/mm-1.1.

Impact 3.5-3: Disturb any human remains, including those interred outside of formal cemeteries – Less than Significant with Mitigation

CANYON LANE IMPROVEMENTS, PROPOSED SINGLE-FAMILY RESIDENCE, DEVELOPABLE PARCELS

No human remains were identified within the project area. No previously recorded cultural resources were identified within the project area by the NWIC during the CHRIS records search. Prehistoric peoples of the Bay Area typically interred their dead in midden deposits within or adjacent to habitation sites. No prehistoric habitation or other sites are known to exist within or immediately adjacent to the project area. Therefore, the likelihood of finding human remains on site is considered low; however, it is possible that unanticipated discoveries of human remains may occur during ground-disturbing activities associated with project construction. However, potential impacts to human remains would be considered less than significant with the implementation of Mitigation Measure CUL/mm-1.2.

Cultural and Tribal Resources Mitigation Measures	
CUL/mm-1.1	*In the event that archaeological resources are exposed during construction, work in the immediate vicinity of the find must stop until a qualified archaeologist can evaluate the significance of the find. Construction activities may continue in other areas. If the discovery proves significant under the provisions of CEQA, additional work such as testing or data recovery may be warranted.*
CUL/mm-1.2	*In the event that human remains are exposed during construction; State of California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to California PRC Section 5097.98. The San Mateo County Coroner must be notified of the find immediately, and all work shall cease in the immediate vicinity of the find. If the human remains are determined to be ancient or likely Native American, the coroner will notify the NAHC, which will designate and notify a Native American Most Likely Descendant (MLD). The MLD shall complete the inspection of the site within 48 hours of notification and may recommend scientific removal and non-destructive analysis of human remains and items associated with Native American burials.*

3.5.6 Tribal Cultural Resources

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k) – Less than Significant with Mitigation

CANYON LANE IMPROVEMENTS, PROPOSED SINGLE-FAMILY RESIDENCE, DEVELOPABLE PARCELS

No known tribal cultural resources are located within the project area. The NAHC Sacred Lands File search of the project area was negative. The County has not received any responses to the letters mailed to the six NAHC-listed and one additional tribal contacts. No prehistoric or Native American archaeological sites that could be considered tribal cultural resources were identified by the CHRIS records search or intensive pedestrian survey within or immediately adjacent to the project area. Therefore, the project would not cause a substantial adverse change to a tribal cultural resource and impacts would be less than significant, with implementation of mitigation measures CUL/mm-1.1 and CUL/mm-1.2, as outlined above.

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1 – No Impact

CANYON LANE IMPROVEMENTS, PROPOSED SINGLE-FAMILY RESIDENCE, DEVELOPABLE PARCELS

No known tribal cultural resources are located within the project area. The NAHC Sacred Lands File search of the project area was negative. The County has not received any responses to the letters mailed to the six NAHC-listed and one additional tribal contacts. No prehistoric or Native American archaeological sites are located within or immediately adjacent to the project area. As a result, no impact would occur.

3.6 ENERGY

In order to ensure that energy implications are considered in project decisions, Appendix F of the California Environmental Quality Act (CEQA) requires that EIRs include a discussion of potential energy impacts, with a particular emphasis on avoiding or reducing inefficient, wasteful and unnecessary consumption of energy.[1] The goal of conserving energy implies a wise and efficient use of energy. The means of achieving this goal include decreasing overall per capita energy consumption, decreasing reliance of fossil fuels, increasing reliance on renewable energy, or a combination thereof. This section presents an overview of energy services that would be provided to the project area, and discusses applicable Federal, state, regional, and local energy regulations. This section also discusses the proposed project's energy use and evaluates the potential energy impacts.

3.6.1 Fundamentals of Energy

Energy is the ability to do work and comes in different forms. Forms of energy include heat (thermal), light (radiant), motion (kinetic), electrical, chemical, nuclear, and gravitational. Heat (thermal) energy can be used to heat homes and businesses directly, generate electrical energy, or make vehicles run. Electricity and natural gas are used in homes, businesses, and industry for heat and to perform work. Electricity can come from heat energy (natural gas, coal, biomass and geothermal energy), light energy (solar power), kinetic energy (wind, hydroelectric, wave and tidal generation), and nuclear power plants. Transportation also uses various sources of energy such as petroleum (mined as crude oil and refined into gasoline, diesel fuel, and jet fuel), ethanol or biodiesel (made from carbon sources such as corn), electricity (stored in car batteries) and hydrogen fuel cells.[2]

Energy sources can be categorized into renewable and nonrenewable. Both can be used as primary energy sources to produce useful energy such as heat or to produce secondary energy sources such as electricity. Renewable energy sources can be easily replenished and include solar energy from the sun, geothermal energy from heat inside the earth, wind energy, biomass from plants, and hydropower from flowing water. Nonrenewable energy sources include fossil fuels (petroleum products, natural gas, hydrocarbon gas liquids [including propane], and coal) and nuclear energy. Crude oil, natural gas, and coal are called fossil fuels because they were formed millions of years ago by the action of heat from the earth's core and pressure from rock and soil on the remains of dead plants and creatures. Nuclear energy is produced from uranium, a nonrenewable energy source whose atoms are split to create heat and electricity.[3]

The British thermal unit (Btu) is a measure of the heat content of fuels or energy sources. It is defined as the amount of heat required to raise the temperature of one pound of water by 1 degree Fahrenheit. Energy or heat content can be used to compare energy sources or fuels on an equal basis. Fuels can be converted from physical units of measure, such as weight or volume, to a common unit of measurement of the energy of the heat content of that fuel. Btu are often used to express the conversion efficiency of heat into electrical energy in power plants. When used as a unit of power, Btu per hour is the correct unit. Some conversion factors include:

[1] California Public Resources Code §21100(B)(3). 1970. Available online at https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=21100.&lawCode=PRC. Accessed March 22, 2019.
[2] U.S. Energy Information Administration. 2019. What is Energy? Energy Explained. Available online at https://www.eia.gov/energyexplained/index.php?page=about_home. Accessed March 25, 2019.
[3] U.S. Energy Information Administration. 2019. What is Energy? Energy Explained. Available online at https://www.eia.gov/energyexplained/index.php?page=about_home. Accessed March 25, 2019.

- 1 standard cubic foot of natural gas yields 1,030 Btu (between 1,010 Btu and 1,070 Btu depending on the quality when burned);
- 1 kilowatt hour of electricity equals 3,412 Btu;
- 1 gallon of motor gasoline generates approximately 120,429 Btu; and
- 1 gallon of diesel fuel generates 137,381 Btu.[4]

Carbon-based energy sources include nonrenewable petroleum products, natural gas, and coal, as well as renewable sources such as wood, biomass waste, and biofuels. Burning carbon-based materials to create energy emits carbon dioxide (CO_2) and other greenhouse gases (GHG) into the atmosphere, which in turn contribute to climate change.

3.6.2 Existing Conditions

Project Area

The project is located in the San Francisco Bay Area, in the hills of unincorporated San Mateo County and the City of Redwood City. San Mateo County has a Mediterranean climate with warm dry summers and cool wet winters. Average temperatures range from 74 degrees Fahrenheit in summer to 44 degrees Fahrenheit in winter, and rarely drop below 38 degrees or rise above 84 degrees Fahrenheit. Rainfall occurs mostly between November and April and averages proximately 17 inches per year. The project is located in PG&E's Climate Zone 3.[5] Climate Zone 3 varies greatly with elevation and the amount of coastal influence. Areas with more coastal influence experience moderate temperatures year-round. More inland areas have less fog and wind and higher summer temperatures. According to PG&E's climate zone descriptions, the need for heating in Climate Zone 3 is the dominant design concern, but the climate is mild enough that energy consumption is relatively low.[6]

The existing project area is undeveloped and does not consume any electricity or natural gas.

Energy Profile

In 2017, the United States consumed a total of 97.7 quadrillion Btu. Of these, 11 percent came from renewable sources, 37 percent from petroleum, 29 percent from natural gas, 14 percent from coal, and 9 percent from nuclear power.[7]

California has the highest population of any state in the nation. In 2019, California had a population of approximately 40 million, approximately 12 million more than the next most populous state. California's total energy consumption is the second-highest in the nation due to the size of the population, but in 2016 the State's per capita energy consumption ranked 48th, due in part to its mild climate and its energy

[4] U.S. Energy Information Administration. 2019. Energy Units and Calculators Explained. Available online at https://www.eia.gov/energyexplained/index.php?page=about_btu. Accessed March 25, 2019.
[5] This is different from the climate zones defined by the Air Quality Management District. For purposes of the Air Quality Management District and CalEEMod analysis, the project is in Climate Zone 5. Available online at http://www.aqmd.gov/docs/default-source/caleemod/climatezonesmap.pdf. Accessed on April 2, 2019.
[6] Pacific Gas & Electric. 2019. California Climate Zone 3. Available online at https://www.pge.com/includes/docs/pdfs/about/edusafety/training/pec/toolbox/arch/climate/california_climate_zone_03.pdf. Accessed April 2, 2019.
[7] U.S. Energy Information Administration. 2019. Available online at https://www.eia.gov/energyexplained/index.php?page=about_btu. Accessed March 25, 2019.

efficiency programs. The transportation sector is the largest energy consumer in California, at nearly 40 percent of total energy consumption, with more registered vehicles that any other state and among the longest work commute times in the nation. Residential uses account for approximately 18 percent of total energy consumption, commercial uses consume approximately 19 percent, and industrial uses consume approximately 24 percent of total energy.[8]

Electricity

California relies on a regional power system composed of a diverse mix of natural gas, renewable, hydroelectric, and nuclear generation resources. Approximately 71 percent of the electrical power needed to meet California's demand is produced in the State; the balance, approximately 29 percent, is imported from the Pacific Northwest and the Southwest through the Western Electricity Coordinating Council, or the Western Interconnect.[9] In 2017, California's 292,039 gigawatts of in-State electricity was derived from natural gas (43 percent), coal (0.15 percent), large hydroelectric resources (18 percent), nuclear sources (9 percent), and renewable resources that include geothermal, biomass, small hydroelectric resources, wind, and solar (30 percent). California's non-CO_2 emitting electric generating categories (nuclear, hydroelectric, and renewable) accounted for more than 56 percent of total in-State generation for 2017, compared to 50 percent in 2016.[10] In 2017, California ranked second in the nation in hydroelectric generation, and first as a producer of electricity from solar, geothermal, and biomass resources. Electricity supplied from out-of-State coal-fired power plants has decreased following the enactment of Senate Bill (SB) 1368, Emissions Performance Standards, in late 2006. SB 1368 requires California utilities to limit new long-term investments to power plants that meet California emissions performance standards. Essentially all of California's imports of coal-fired generation will end by 2026.[11]

Natural Gas

Natural gas supplies the largest portion of California's electricity market; natural gas-fired power plants in California meet approximately 42 percent of the in-State electricity demand. In addition to the generation of electricity, natural gas is also widely used for industrial, commercial, and residential heating. Most of the natural gas consumed in California comes from the Southwest, the Rocky Mountains, and Canada, while the remainder is produced in California. Although contractually California can receive natural gas from any producing region in North America, it can only take supplies from the three producing regions due to the current configuration of gas transmission pipelines. Natural gas is measured in terms of cubic feet. In 2017, 431,005 cubic feet of natural gas, equating to approximately 444 million Btu, was delivered to residential customers in California.[12]

Transportation Fuels

The energy consumed by the transportation sector accounts for the major portion, roughly 40 percent, of California's petroleum demand and is the single largest source of GHG emissions in the State. According

[8] U.S. Energy Information Administration. 2019. California. State Profile and Energy Estimates. Available online at https://www.eia.gov/state/?sid=CA. Accessed March 22, 2019.
[9] CEC. 2019. 2017 Total System Electric Generation in Gigawatt Hours. Available online at https://www.energy.ca.gov/almanac/electricity_data/total_system_power.html. Accessed March 22, 2019.
[10] CEC. 2019. 2017 Total System Electric Generation in Gigawatt Hours. Available online at https://www.energy.ca.gov/almanac/electricity_data/total_system_power.html. Accessed March 22, 2019.
[11] U.S. Energy Information Administration. 2019. California. State Profile and Energy Estimates. Available online at https://www.eia.gov/state/?sid=CA. Accessed March 22, 2019.
[12] U.S. Energy Information Administration. 2019. Natural Gas Consumption by End Use. Available online at https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_SCA_a.htm. Accessed April 2, 2019.

to the California Energy Commission (CEC), the State relies on petroleum-based fuels for 96 percent of its transportation needs. Gasoline and diesel, both derived from petroleum, are the two most common fuels used for vehicular travel, although electricity is rapidly approaching significance as a transportation fuel. The transportation sector, including on-road and rail transportation but excluding aviation, accounts for 96 percent of motor gasoline use, at roughly 350 million barrels in 2017. As a whole, California is the third largest consumer of gasoline in the world, behind China and the United States.[13] California requires that all motorists use, at a minimum, a specific blend of motor gasoline called CaRFG (California Reformulated Gasoline) as part of an overall program to reduce emissions from motor vehicles.

Gasoline and diesel fuel sold in California for motor vehicles is refined in California to meet State-specific formulations required by the California Air Resources Board (CARB). Major petroleum refineries in California are concentrated in three counties: Contra Costa County, in northern California; Kern County, in central California; and Los Angeles County, in southern California. In the Bay Area, Valero, Tesoro, Phillips, Shell, and Chevron operate refineries in Contra Costa County and adjacent Solano County.[14]

Under the California Clean Energy Act of 2017 (SB 100), California has a goal to get 250,000 vehicle charging stations and 1.5 million zero-emission vehicles on the roads by 2025 and 5 million zero-emission vehicles by 2030 to meet the net zero energy goal. Approximately 18,000 existing light-duty charging stations are currently available.[15] In the first half of 2017, 10 percent of new vehicles sold in California had batteries. These included hybrid cars with no electrical plug-in capabilities, plug-in hybrids that run on a combination of gas and electricity, and pure electric cars with no combustion engine.[16] In 2018, 92,447 cars (approximately 5.66 percent of all new cars) registered in California were fully electric.[17]

Electric vehicle charging stations may be located at home, work, or in public places. There are three different levels of electric charging stations for vehicles. Level 1 equipment provides charging through a 120-volt, alternating-current (AC) plug and requires a dedicated circuit. Level 1 charging stations generally take 8 to 12 hours to charge a battery and are frequently found in homes. Level 2 equipment offers charging through a 240-volt AC plug and generally takes 4 to 8 hours to fully charge a battery. Level 2 chargers are commonly found in residences, public parking areas, places of employment, and commercial settings. Levels 1 and 2 chargers are compatible with all electric vehicles. There are two types of Level 3 chargers. Level 3 equipment is commonly known as DC fast charging equipment and charges through a 480-volt, direct current (DC) plug. Most Level 3 chargers provide an 80 percent charge in approximately 30 minutes. The technologies determine the configuration of the charging plug, and not all plugs are compatible with all vehicles. There is currently no industry standard for this level of charging; however, Level 3 chargers are being deployed across the United States in public or commercial settings.

[13] U.S. Energy Information Administration. 2019. *Table F3.* Motor gasoline consumption, price, and expenditure estimates, 2017 Available online at https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_fuel/html/fuel_mg.html&sid=US. Accessed March 31, 2019.

[14] Association of Bay Area Governments. 2017. Plan Bay Area 2040. Draft Environmental Impact Report. pp. 2.4-1. Available online at http://2040.planbayarea.org/sites/default/files/2017-07/PBA%202040%20DEIR_0_1.pdf. Accessed April 1, 2019.

[15] California Public Utilities Commission. 2019. Zero-Emission Vehicles. Available online at http://www.cpuc.ca.gov/General.aspx?id=5597. Accessed April 1, 2019.

[16] Bloomberg. 2018. Electric Vehicles' Day Will Come, and It Will Come Suddenly. Available online at https://www.bloomberg.com/opinion/articles/2018-08-31/electric-vehicles-in-california-their-day-will-come-suddenly. Accessed March 25, 2019.

[17] The Mercury News. 2019. Tesla's Model 3 drives growth in California's electric car sales. Available online at https://www.mercurynews.com/2019/03/05/teslas-model-3-drives-growth-in-californias-electric-car-sales/. Accessed March 25, 2019.

Energy Service Providers

Electricity

San Mateo County is served through Peninsula Clean Energy (PCE), a joint-powers, community-choice energy program, which is a collaboration between San Mateo County and all 20 of its cities. PCE purchases electricity from PG&E as well as through direct power purchase agreements with renewable energy providers. PCE is the default electric generation provider for all of the County's residents and businesses. PCE provides electricity to residents and businesses in San Mateo County, while PG&E continues to maintain the electrical wires and other infrastructure, and PG&E meters customers' electricity usage and sends customers' bills. PCE's customers receive one bill from PG&E which includes the charges from PCE and the charges for PG&E's delivery costs as well as their natural gas usage. New customers in San Mateo County are automatically enrolled in PCE, but may voluntarily opt out and return to PG&E for their electric service.

PCE plans for and secures commitments from a diverse portfolio of energy-generating resources to reliably serve the electric energy requirements of its customers over the near-, mid-, and long-term planning horizons. PCE's strategic goals are to design a power portfolio that is:

- 100 percent GHG free by 2021;
- 100 percent California Renewable Portfolio Standard (RPS)-eligible by 2025; and
- Minimum of 20 megawatts (MW) of new local power by 2025.[18]

PCE has existing contracts and has signed new power purchase agreements with specific generators to procure power from renewable sources. To the extent that PCE's energy needs are not fulfilled by renewable or GHG-free energy sources, additional supply is sourced from system energy consisting primarily of natural-gas-generating technologies.

Natural Gas

PG&E is the primary supplier of natural gas to businesses and residents. PG&E's service area extends from Eureka to Bakersfield (north to south), and from the Sierra Nevada to the Pacific Ocean (east to west). PG&E obtains its energy supplies from natural gas fields in California, and from natural gas purchased outside its service area and delivered through gas pipelines.

Transportation Fuels

Gas stations that supply fuel for light-duty cars and trucks are found throughout San Mateo County. The use and purchase of zero emission (electric) vehicles is growing rapidly in the Bay Area, including San Mateo County. The purchase of new electric vehicles increased by 21 percent in the City of Redwood City and 23 percent in the City of San Mateo between 2016 and 2017.[19] There are publicly accessible

[18] Peninsula Clean Energy. 2018. Peninsula Clean Energy 2018 Integrated Resource Plan. pp. 7-8. Available online at https://www.peninsulacleanenergy.com/wp-content/uploads/2018/01/PCE-FINAL-2017-IRP-Updated.pdf. Accessed March 22, 2019.

[19] The International Council of Clean Transportation. 2018. California's continued electric vehicle market development. Available online at https://www.theicct.org/sites/default/files/publications/CA-cityEV-Briefing-20180507.pdf. Accessed April 2, 2019.

electric vehicle charging stations throughout San Mateo County, including 15 existing County-operated stations (13 Level 2 and 2 Level 3 stations) at six locations in Redwood City.[20]

3.6.3 Regulatory Setting

Federal

ENERGYSTAR Program

The ENERGY STAR program was established by the Environmental Protection Agency (EPA) in 1992, under the authority of the Clean Air Act Section 103(g). Section 103(g) of the Clean Air Act directs EPA to "develop, evaluate, and demonstrate nonregulatory strategies and technologies for air pollution prevention…including end-use efficiency, and fuel-switching to cleaner fuels."[21]

In 2005, Congress enacted the Energy Policy Act. Section 131 of the Act amends Section 324 of the Energy Policy and Conservation Act, and directed the EPA and the Department of Energy (DOE) to implement "a voluntary program to identify and promote energy-efficient products and buildings in order to reduce energy consumption, improve energy security, and reduce pollution. The Act further directs EPA and DOE to work jointly to "(1) promote ENERGY STAR compliant technologies as the preferred technologies in the marketplace for (A) achieving energy efficiency; (B) and reducing pollution."[22]

State

Warren-Alquist Act

The 1975 Warren-Alquist Act established the California Energy Resources Conservation and Development Commission, now known as the CEC. The Act established a State policy to reduce wasteful, uneconomical, and unnecessary uses of energy.

State of California Integrated Energy Policy – Senate Bill 1389

In 2002, the Legislature passed SB 1389, which required the CEC to develop an integrated energy plan biannually for electricity, natural gas, and transportation fuels, for the California Energy Report. The plan calls for the State to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the plan identifies a number of strategies, including urban designs that reduce vehicle miles traveled and accommodate pedestrian and bicycle access. The plan also requires California utilities to limit new long-term investments to power plants that meet California emissions performance standards.

An overarching goal of the Integrated Energy Policy Report (IEPR) is to achieve the statewide GHG reduction targets, with the main focus on improving overall energy efficiency. The IEPR is the State's chief program intended to provide a comprehensive statewide energy strategy to guide energy investments, energy-related regulatory efforts, and GHG reduction measures. Strategies and programs identified in the most recent 2017 IEPR Update include requirements and incentives for rooftop solar,

[20] City of Redwood City Public Works Department. 2019. Electric Vehicles. Available online at https://www.redwoodcity.org/departments/public-works/streets/ev-charging-stations/how-to-use-a-chargepoint-card. Accessed April 1, 2019.
[21] 42 U.S. Code Section 7403.
[22] 42 U.S. Code Section 6294(a).

efficiency standards for buildings and appliances, expanding charging and refueling infrastructure for zero emission vehicles, and increasing renewable energy procurement.

Global Warming Solutions Act of 2006 – Assembly Bill 32

Assembly Bill (AB) 32, the Global Warming Solutions Act of 2006, provides a statewide directive to achieve 1990 GHG emissions levels by 2020, equivalent to a 15 percent reduction below baseline 2005–2008 emissions levels. The Bay Area Air Quality Management District (BAAQMD) has developed minimum standards of a Qualified GHG Reduction Strategy that are consistent with AB 32 goals.

Clean Energy & Pollution Reduction Act – Senate Bill 350

SB 350 was signed into law in 2015. It established new clean energy, air, and GHG reduction goals for 2030 and beyond. It was one of Governor Edmund G. Brown Jr.'s Climate Change Pillars in his strategy to address climate change. SB 350 established California's 2030 GHG reduction target of 40 percent below 1990 levels. To achieve this goal, SB 350 set ambitious targets for energy efficiency and renewable electricity, requiring retail energy sellers to acquire 25 percent of energy from renewable sources by 2016, 33 percent by 2020, 40 percent by 2024, and 50 percent by 2030. SB 350 requires the State to double statewide energy efficiency savings in electricity and natural gas end uses by 2030. Along with annual reduction goals, this bill called for updating the AB 758: Existing Buildings Energy Efficiency Action Plan, which was updated in 2016.

California Global Warming Solutions Act of 2006 – Assembly Bill 398

In July 2017, California's state legislature passed AB 398 to reauthorize the State's economy-wide GHG reduction program and extend it until 2030.

California Clean Energy Act of 2017 – Senate Bill 100

SB 100 was passed into law in September 2018 and goes into effect January 2019. The legislation establishes an overall State target of 100 percent clean energy for California by 2045 by directing the California Public Utilities Commission (CPUC), CEC, and CARB to adopt policies and requirements to achieve total reliance on renewable energy and zero carbon resources by that date. In addition, the law accelerates SB 350's 50 percent mandate for clean renewable energy from 2030 to 2026 and establishes a new Renewable Portfolio Standard benchmark of 60 percent by 2030 to ensure more clean energy in the California grid sooner.

SB 100 obliges California to meet 50 percent of its energy needs with clean power by 2025 and 60 percent by 2030 before ramping up to 100 percent by 2045. Legislation had previously set a goal of reaching 50 percent carbon-free energy by 2030. Technologies considered clean power include solar, wind, geothermal, biomass, small hydropower, and renewable gas projects, as well as wave, ocean current, and waste conversion energy projects. Nuclear power and large hydropower projects are not considered clean energy under the law.

Carbon Neutrality Executive Order, 2018

In September 2018, Governor Brown signed the Carbon Neutrality Executive Order, requiring California to achieve carbon neutrality "as soon as possible, and no later than 2045." Under the order, all policies and programs undertaken to achieve carbon neutrality shall seek to improve air quality and support the health and economic resiliency of urban and rural communities and support climate adaptation. The order recognizes that the California legislature has required the State to double the rate of energy efficiency savings in buildings, among other steps taken to reduce GHGs.

Residential Energy Efficiency Legislation

Net Zero Energy Goal

In 2007, the CPUC created a framework for long-term strategic planning to implement California's ambitious energy efficiency and greenhouse gas reduction goals. The plan was most recently updated in 2011.[23]

As spelled out in the California Energy Efficiency Strategic Plan, the State has ambitious goals for the development of zero net energy buildings. The plan includes the following goals:

- All new residential construction will be zero net energy (ZNE) by 2020.
- All new commercial construction will be ZNE by 2030.
- 50 percent of commercial buildings will be retrofit to ZNE by 2030.
- 50 percent of new major renovations of State buildings will be ZNE by 2025.

Under the Action Plan, a ZNE home "employs a combination of energy efficiency design features, efficient appliances, clean distributed generation, and advanced energy management systems to result in no net purchases of energy from the grid."[24]

The CPUC has set a goal of achieving ZNE performance for all new low-rise homes constructed in or after 2020, and for all new commercial buildings constructed in or after 2030. A ZNE building is defined as an energy efficient building where, on a source energy basis, the actual consumed energy is less than or equal to the on-site renewable generated energy.

Title 24, Part 6. Energy Efficiency Standards for Residential and Non-residential Buildings

Title 24, the California Building Code, was established in 1978 in response to a legislative mandate to create uniform building codes. It includes a broad set of requirements for energy conservation, green design, construction and maintenance, fire and life safety, and accessibility. Title 24 was published by the California Building Standards Commission and applies to all buildings in California. Part 6, the Energy Efficiency Standards, are a subset of the California Building Code and intended to reduce California's energy consumption and provide energy efficiency standards for residential and non-residential buildings. The Building Energy Efficiency Standards were first adopted in 1978 and have been updated periodically since then as directed by statute. The standards are updated on an approximately three-year cycle to allow consideration and possible incorporation of new efficient technologies and methods.

New buildings are becoming increasingly energy efficient, due to progressive building standards. The standards contain energy and water efficiency requirements (and indoor air quality requirements) for newly constructed buildings, and additions and alterations to existing buildings. Public Resources Code Sections 25402 subdivisions (a)-(b) and 25402.1 emphasize the importance of building design and construction flexibility by requiring the CEC to establish performance standards, in the form of an "energy budget" in terms of the energy consumption per square foot of floor space.

[23] California Public Utilities Commission. 2011. California Energy Efficiency Strategic Plan. January 2011 Update. Available online at http://www.cpuc.ca.gov/general.aspx?id=4125. Accessed April 1, 2019.
[24] California Public Utilities Commission. 2011. California Energy Efficiency Strategic Plan. January 2011 Update, p. 13. Available online at http://www.cpuc.ca.gov/general.aspx?id=4125. Accessed April 1, 2019.

2016 Building Energy Efficiency Standards

In 2016, the California Building Standards Commission updated Title 24 Standards with more stringent requirements effective January 1, 2017. The 2016 update to the Building Energy Efficiency Standards focuses on several key areas to improve the energy efficiency of newly constructed buildings and additions and alterations to existing buildings. The most significant efficiency improvements to the residential standards include improvements for attics, walls, water heating, and lighting. The CEC Impact Analysis for California's 2016 Building Energy Efficiency Standards estimates that the 2016 standards are 28 percent more efficient than the previous 2013 standards for residential buildings and 5 percent more efficient for non-residential buildings.[25] These standards will apply to the project if the building permit applications are submitted to San Mateo County before January 1, 2020.

2019 Building Energy Efficiency Standards

In 2019, the California Building Standards Commission updated Title 24, Part 6 standards with more stringent requirements effective January 1, 2020. The 2019 update to the Building Energy Efficiency Standards focuses on several key areas to improve the energy efficiency of newly constructed buildings and additions and alterations to existing buildings. The most significant efficiency improvements to the residential standards include the introduction of photovoltaic cells into the prescriptive package, and improvements for attics, walls, water heating, and lighting.[26] A home built under the recently adopted 2019 standards will use 53 percent less energy than a home built under the 2016 standards.[27]

The standards are conceptually divided into three basic sets. First, there is a basic set of mandatory requirements that apply to all buildings. Second, there is a set of performance standards – the energy budgets – that vary by climate zone (of which there are 16 in California) and building type; thus the standards are tailored to local conditions, and provide flexibility in how energy efficiency in buildings can be achieved. Finally, the third set constitutes an alternative to the performance standards, which is a set of prescriptive packages that provide a recipe or a checklist compliance approach.[28] The 2019 Standards will go into effect on January 1, 2020, for building permit applications submitted on or after that date.[29] These standards would apply to the project if the building permit applications are submitted to San Mateo County after January 1, 2020, and would apply to future construction of the developable parcels between January 2020 and adoption of the next efficiency standard update.

Solar Roofs – Senate Bill 71

SB 71 requires installation of solar panels on any new residential or commercial construction subject to the "solar-ready" requirements of Title 24 of the California Code of Regulations, generally single-family

[25] CEC. 2015. 2016 Building Energy Efficiency Standards Adoption Hearing. Available online at http://www.energy.ca.gov/title24/2016standards/rulemaking/documents/2015-06- 10_hearing/2015-06-10_Adoption_Hearing_Presentation.pdf. Accessed: April 1, 2019.

[26] CEC. 2015. 2016 Building Energy Efficiency Standards Adoption Hearing. Available online at http://www.energy.ca.gov/title24/2016standards/rulemaking/documents/2015-06- 10_hearing/2015-06-10_Adoption_Hearing_Presentation.pdf. Accessed: April 1, 2019.

[27] California Energy Commission. 2018. 2018 Integrated Energy Policy Report. Available online at https://www.energy.ca.gov/2018publications/CEC-100-2018-001/CEC-100-2018-001-V1_pages.pdf. Accessed April 1, 2019.

[28] California Energy Commission. 2019. 2019 Building Energy Efficiency Standards for Residential and Nonresidential Buildings. CEC-400-2018-020-CMF. Available online at https://www.energy.ca.gov/2018publications/CEC-400-2018-020/CEC-400-2018-020-CMF.pdf. Accessed March 22, 2019.

[29] California Energy Commission. 2019. 2019 Building Energy Efficiency Standards. Available online at http://2040.planbayarea.org/cdn/farfuture/u_7TKELkH2s3AAiOhCyh9Q9QlWEZIdYcJzi2QDCZuIs/1510696833/sites/default/files/2017-11/Final_Plan_Bay_Area_2040.pdf. Accessed March 27, 2019.

homes, low-rise multi-family buildings and commercial buildings of 10 stories or less. The bill requires the CEC to consider requiring the installation of a cost-effective rooftop solar electric or solar thermal energy generation system on all new buildings. The Solar Roofs Bill will go into effect on January 1, 2020, for building permit applications submitted on or after that date.[30] This bill would apply to the proposed project if the building permit applications are submitted to San Mateo County after January 1, 2020, and would apply to future construction of the developable parcels.

Local

Plan Bay Area 2040 – Regional Transportation Plan and Sustainable Communities Strategy

Adopted in 2013 and updated in 2017 by the Association of Bay Area Governments (ABAG) in response to SB 375, the Regional Transportation Plan and Sustainable Communities Strategy, known as Plan Bay Area 2040, integrates future land use patterns with transportation planning to reduce greenhouse gas emissions and provide adequate housing for future growth.[31]

For the Bay Area, the CARB has set a per capita reduction in GHG emissions of 10 percent by 2020 and 16 percent by 2035.[32] To achieve this goal, the plan includes required and voluntary performance measures for the region. The most pertinent performance measures include providing housing and transportation affordability, climate protection (GHGs target), adequate housing, healthy and safe communities, mobility and accessibility (travel and equitable access), and transportation system effectiveness.

San Mateo County General Plan – Energy and Climate Change Element

The Energy and Climate Change Element[33] of the General Plan establishes San Mateo County's commitment to achieve energy efficiency and mitigate its impact on climate change by reducing GHG emissions consistent with State legislation. It establishes goals, policies, and implementation measures to sustain the long-term health of the natural and built environments, achieve effective and meaningful reductions in GHGs, and increase the resiliency to the impacts of climate change in the unincorporated county. The following policies of the Energy and Climate Change Element are relevant to the project:

- **Goal 2:** Maximize energy efficiency in new and existing development.
- **Implementing Strategy 2.5A:** Continue to require the participation of new development and significant remodels in green certification programs or standards that reduce energy use, such as the LEED program, GreenPoint Rated, or CALGreen Tier 1 and Tier 2.
- **Goal 3:** Promote the expansion of the use of renewable energy supplies.

[30] California Energy Commission. 2019. 2019 Building Energy Efficiency Standards. Available online at https://www.energy.ca.gov/title24/2019standards/. Accessed March 22, 2019.
[31] Association of Bay Area Governments and Metropolitan Transportation Commission 2017. Plan Bay Area 2040. Available online at http://2040.planbayarea.org/. Accessed March 16, 2019.
[32] Metropolitan Transportation Commission and Association of Bay Area Governments. 2019. Plan Bay Area 2040, Performance Chapter. Available online at https://www.planbayarea.org/sites/default/files/pdfs_referenced/5-performance.pdf. Accessed March 16, 2019.
[33] San Mateo County Planning and Building Department. 2013. San Mate County General Plan, Chapter 17. Energy and Climate Change Element. Final Draft. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/documents/files/Energy%20&%20Climate%20Change%20Element.pdf. Accessed March 26, 2019.

- **Policy 3.1:** Identify opportunities for new and existing development to incorporate on-site distributed energy resources into project design and construction.
- **Implementing Strategy 3.1A:** Incorporate standards for new development to provide pre-wiring for renewable energy systems, such as solar photovoltaic systems or solar water heaters.
- **Implementing Strategy 3.1C:** Promote financing opportunities and rebates for installation of on-site renewable energy systems.
- **Goal 4:** Promote and implement policies and programs to reduce vehicle miles traveled by all vehicles traveling in the unincorporated county.
- **Policy 4.1:** Expand transit-oriented and mixed-use development that reduces reliance on vehicular travel.
- **Implementing Strategy 4.1A:** As new development occurs, encourage new development to locate in proximity to transit corridors.
- **Policy 4.2:** Promote non-motorized and alternative travel.
- **Implementing Strategy 4.2A:** Require project applicants to evaluate and identify appropriate measures to achieve Complete Streets and promote alternative travel, such as pedestrian paths/sidewalks or traffic calming improvements.
- **Implementing Strategy 4.2D:** Establish design criteria for the assessment of Complete Streets and pedestrian-oriented design in new development, recognizing the unique considerations of urban, suburban, and rural communities.
- **Implementing Strategy 5.2A:** Require new development to provide accessible exterior electrical outlets to support the use of electric powered lawn and garden equipment.
- **Implementing Strategy 5.2B:** Support both the use of low-emissions construction equipment and reduced equipment idling in construction activities through the plan review process, such as through permit requirements or conditions of approval.

San Mateo County – Energy Efficiency Climate Action Plan

The Energy Efficiency Climate Action Plan (EECAP)[34] provides a path for achieving local energy efficiency and reductions in GHGs by 2020. The EECAP will function as an implementation tool of the General Plan, working as a shorter-term plan that will be updated on a more regular basis. The EECAP contains goals to improve residential, commercial and transportation energy efficiency, and promote the use of renewable energy and alternative fuels to achieve the County's reduction target of 17 percent below 2005 GHG emissions by 2020.

Redwood City General Plan – Built Environment

The City General Plan's Urban Form and Land Use Element contains policies and programs to reduce GHG emissions from new development. The following City General Plan policies and programs are relevant to the project:

[34] San Mateo County Planning and Building. 2013. Energy Efficiency Climate Acton Plan. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/documents/files/SanMateoCounty_EECAP_FINAL_06-04-2013.pdf. Accessed March 26, 2109.

- **Policy BE-22.2:** Development must incorporate sustainability features, including features that minimize energy and water use, limit carbon emissions, provide opportunities for local power generation and food production, and provide areas for recreation.
- **Program BE-26:** Implement a citywide green building program that requires innovative measures to create buildings that are more energy efficient, less water and resource intensive, and healthier for occupants through the Green Building Ordinance and other mechanisms.

Redwood City General Plan – Natural Resources

The City General Plan's Natural Resources Element contains policies and programs to reduce GHG emissions from new development. The following City General Plan policies and programs are relevant to the project:

- **Policy NR-4.1:** Support energy efficiency through the City's Municipal Code Green Building Ordinance.
- **Program NR-13:** Promote sustainable building and energy conserving design, construction, and operations through the Green Building Ordinance. Encourage owners of existing building to conduct energy and water conservation retrofits.

3.6.4 Thresholds of Significance

The significance of potential energy impacts is based on thresholds identified within Appendix G of the CEQA Guidelines, which provide the following thresholds for determining impact significance with respect to energy.

Impacts would be considered significant if the project would:

a. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.

b. Conflict with or obstruct a State or local plan for renewable energy or energy efficiency.

3.6.5 Impact Assessment and Methodology

This section identifies impacts related to energy use and efficiency that could occur from the implementation of the project. Impacts related to energy use were analyzed based on an examination of the project area and published information regarding energy use and regulation in the project area.

Air emission estimates for the project were generated using the California Emissions Estimator Model (CalEEMod) version 2016.3.1. CalEEMod was designed in collaboration with the South Coast Air Quality Management District and other California Air Districts to calculate air and GHG emissions associated with land use projects. This program uses estimates of construction equipment and schedule as well as operational energy use and vehicle trips to analyze both construction (short-term) and operational (long-term) emissions. These CalEEMod inputs were used to analyze construction and operational energy use. The project was analyzed assuming compliance with the Title 24 State Building Efficiency Standards, San Mateo County Climate Action Plan, and San Mateo County General Plan Energy and Climate Change Element.

There are no established significance criteria for evaluating energy efficiency under CEQA. The most closely related significance criteria come from the BAAQMD, which has established significance criteria

for operational GHG emissions. As discussed in Section 3.8.4, the BAAQMD project size screening criterion for GHG emissions is 56 single-family dwelling units. However, this section evaluates the project's energy usage and efficiency against the State and local standards listed in the Regulatory Framework, above.

3.6.6 Project-Specific Impacts and Mitigation Measures

Impact 3.6-1: Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation – Less than Significant Impact

Construction

Canyon Lane Improvements, Single-Family Residence, and Developable Parcels

Energy use during project construction would be short term and temporary. Construction of the project would require the use of construction equipment and worker vehicles that would use energy. As previously described, there are no established thresholds of significance for construction-related energy use; therefore, energy use during construction activities was not estimated. As discussed in Section 3.8.5, Greenhouse Gases, the project would implement the following Best Management Practices (BMPs) to reduce construction-related GHG emissions, which would also improve energy efficiency:

- Local suppliers would supply at least 10 percent of building materials; and,
- At least 50 percent of all construction waste or demolition material would be recycled.

Sourcing at least 10 percent of building supplies locally would reduce vehicle miles traveled for the construction phase. Recycling construction waste would reduce the amount of energy used in the production of new materials.

Due to the absence of established construction-related energy consumption thresholds and relatively small scale and short duration of construction activities, the project would not result in the wasteful, inefficient, or unnecessary consumption of energy resources, and impacts would be less than significant, The project would implement Mitigation Measure AQ/mm-1, shown in Section 3.3, Air Quality, and Mitigation Measures GHG/mm-1, GHG/mm-2, and GHG/mm-3, shown in Section 3.8.5. These measures would further improve energy efficiency and further reduce already less than significant impacts. Measure AQ/mm-1(g) would require all construction equipment to be maintained, properly tuned, and checked by a certified mechanic prior to use. Measure GHG/mm-1 would require construction workers living outside of the County to meet at designated areas and carpool to the project area to the extent feasible. Measure GHG/mm-2 would limit construction vehicle and equipment idling to the extent feasible. Measure GHG/mm-3 would require all off-road construction engines meet Tier 2 California Emission Standards for Off-Road Compression Ignition Engines. Measure GHG/mm-1 supports Goal 4 in the San Mateo County General Plan to reduce vehicle miles traveled in the unincorporated county. Measures AQ/mm-1(g), GHG/mm-2, and GHG/mm-3 would comply with Implementing Strategy 5.2B of the San Mateo County General Plan, which requires projects to support both the use of low-emissions construction equipment and reduced equipment idling in construction.

Operation

Canyon Lane Improvements

Operation of Canyon Lane would not result in energy usage as Canyon Lane itself, including stormwater and other improvements, would not use energy. No impact would occur.

Proposed Single-Family Residence

Operation of the proposed single-family residence would result in approximately 100 vehicle miles traveled (VMT) per day (10 daily trips with an average 10 miles per trip).[35] Trips may be made by a mix of gasoline and electricity-powered vehicles. The proposed single-family residence would generate an increase in traffic and VMT, as discussed in Section 3.17, Transportation and Traffic; however, the increase in VMT would be negligible compared to the County and region as a whole. The proposed single-family residence is an infill development in an urbanized, developed area. It is close to major freeways (2.8 miles from both Interstate 280 and Highway 101) as well as shopping areas (2 miles from El Camino Real shopping centers). The proposed single-family residence is located approximately 1.5 miles from the Redwood City Caltrain Station and approximately 0.45 mile from a San Mateo County Transit District (SamTrans) bus stop at Jefferson Avenue and Altamont Way. The SamTrans bus stop services the 274, 275, and 278 bus routes, which all provide transit to the Redwood City Transit Center. As the project would only minimally increase VMT and is located within an urbanized area, transportation-related energy usage would be less than significant.

The proposed single-family residence is estimated to use approximately 7,763 kilowatt hours per year of electricity and approximately 42,324,000 Btu per year (equating to approximately 41 cubic feet) of natural gas. By comparison, in 2017, 431,005 cubic feet of natural gas, equating to approximately 444 million Btu, was delivered to residential customers in California. In 2018, PG&E delivered 79,774 gigawatt hours (1 gigawatt equals 1,000,000 kilowatts) of electricity to its customers.[36] The proposed project would use less than 0.001 percent of PG&E's delivered electricity and less than 0.001 percent of California's natural gas usage. Therefore, the amount of energy used by project operation would be minimal.

Prior to issuance of a building permit, the San Mateo County Planning and Building Department would review and verify that project plans demonstrate compliance with either the 2016 or 2019 Building and Energy Efficiency Standards, depending on whether the application is submitted before or after January 1, 2020, Compliance with the Title 24, Part 6, Building Energy Efficiency Standards and San Mateo would ensure that the project would not result in wasteful, inefficient, or an unnecessary consumption of energy resources. Therefore, impacts related to operational energy use would be less than significant.

Developable Parcels

The developable parcels would result in approximately 1,200 VMT (120 daily trips with an average of 10 miles per trip).[37] As discussed in Section 3.14.5, Transportation and Traffic, the increase in VMT would be negligible compared to the County and region as a whole. Similar to the single-family residence, the developable parcels are an infill development in an urbanized, developed area that is close to major

[35] Kittelson. 2019. San Mateo County EIR for Canyon Lane Improvements – Peer Review. March 18.

[36] Pacific Gas & Electric. 2019. Energy deliveries by PG&E Corporations' from FY2013 to FY 2018 (in gigawatt hours). Available online at https://www.statista.com/statistics/591953/energy-deliveries-us-power-company-pg-and-e-corporation/. Accessed April 2, 2019.

[37] Kittelson. 2019. San Mateo County EIR for Canyon Lane Improvements – Peer Review. March 18.

freeways and community-serving uses. Therefore, impacts from VMT and transportation-related energy usage would be less than significant.

Assuming all of the developable parcels are developed with single-family homes, the estimated energy use would be approximately 85,393 kilowatt hours per year of electricity and approximately 465,564 kilo Btu per year (equating to approximately 452 cubic feet) of natural gas under current regulations. The new development would be required to comply with the 2019 Building Energy Efficiency Standards if the planning application is submitted before January 1, 2020, or possibly with future revisions of the Title 24 Energy Efficiency Standards depending on the date of development. As discussed above, a home built under the 2019 standards would use 53 percent less energy than a home built under the 2016 standards. Homes that would be built under future standards would likely be even more efficient and could use less energy than those built under 2019 standards.

Prior to issuance of a building permit, the San Mateo County Planning and Building Department would review the project plans and verify that the plans demonstrate compliance with either the 2019 or applicable future Building Energy Efficiency Standards, depending on when the application is submitted, or other County legislation reflecting energy efficiency measures.[38] Future construction must comply with all required State and local energy efficiency measures. Therefore, the project would not use energy in a wasteful or inefficient manner. Impacts would not result in inefficient, wasteful, or unnecessary energy consumption. Therefore, impacts related to operational energy use from the developable parcels would be less than significant.

Impact 3.6-2: Conflict with or obstruct a State or local plan for renewable energy or energy efficiency – No Impact

Canyon Lane Improvements, Proposed Single-Family Residence, Developable Parcels

The project is required to be consistent with the Title 24, Part 6, Building Energy Efficiency Standards, and energy efficiency policies of the County and City General Plans, as well as BAAQMD's BMPs to reduce construction-related emissions. Peninsula Clean Energy, the electricity supplier to the project, is developing a power portfolio that will be 100 percent GHG free and sourced by California Renewable Power by 2025, and will be compliant with SB 100. SB 71 requires installation of solar panels on new residential construction for permit applications submitted after January 1, 2020. Under the proposed project, any new residences for which applications are submitted after that date will be required to install rooftop solar panels. In addition, any new residences for which applications are submitted after January 1, 2020 may be required to install level 1 or 2 charging stations to contribute towards the goals of SB 100. Therefore, the project would not conflict with or obstruct a State or local plan for renewable energy or energy efficiency. No impact would occur.

[38] San Mateo County. 2019. Building Requirements. Available online at https://planning.smcgov.org/building-permit-requirements. Accessed April 2, 2019.

3.7 GEOLOGY AND SOILS

This section evaluates the potential for construction and operation of the project to result in adverse impacts associated with geologic hazards, soil hazards, and seismic hazards, along with paleontological resources. The analysis is based on review of available geologic and geotechnical maps and reports of the project area and vicinity, including reports and information published by the United Stated Geological Survey (USGS) and the California Geological Survey (CGS), the County General Plan, the City General Plan, and three project-specific geotechnical site investigations, which are provided in Appendix G. A paleontological resources records search was conducted for the project.

3.7.1 Existing Conditions

Topography

Regional Setting

The project area is located within the Coast Ranges Geomorphic Province of California. The Coast Ranges comprise a series of relatively low mountain ranges (typically between 2,000 to 4,000 feet in elevation) and extends north from Point Conception to the California/Oregon border. The topography associated with the Coast Ranges is dominated by irregular rock outcrops of the landslide-prone rocks of the Franciscan Complex. The San Andreas fault system runs nearly the entire length of the Coast Ranges and has influenced their orientation.[1]

Local Setting

The project area is located within hillside terrain along the northeast flank of the northwest-trending Santa Cruz Mountain Range within the Coast Ranges. Terrain within the project area consist of soil and rock hillside. A large rock outcrop of Franciscan sandstone is located on a ridge on the north side of Canyon Lane, indicative of an abandoned quarry within the project vicinity.[2] Project area elevation ranges from approximately 130 feet at Glenwood Avenue to approximately 300 feet at Vista Lane.

Geology

Regional Setting

The San Francisco Bay region is underlain by complex and active geology that is composed of basement rocks consisting of tectonically mixed Cretaceous- and Jurassic-age rocks of the Franciscan Complex. Younger sedimentary and volcanic rocks overlay the basement rocks. Overlaying these soil types are younger surficial deposits that reflect geologic conditions for about the last million years.

The project area is located within the Bayside foothills of the Santa Cruz Mountains. The foothills are underlain by alluvial fan deposits, stream channel deposits, and bedrock of the Franciscan sandstone. The Franciscan sandstone (undivided) consists of sandstone and lithic rock with interbedded siltstone and shale and local conglomerate.

[1] California Geological Survey, Department of Conservation. 2015. *Geologic Gems of California State Parks: Coast Ranges Geomorphic Province*. Available online at https://www.parks.ca.gov/pages/734/files/GeoGem%20Note%203%20Coast%20Ranges%20Geomorphic%20Province.pdf. Accessed March 21, 2019.

[2] See Appendix G (Connelly, S.F. 2017. Applicant's Geologic Investigation for the Proposed Road and Water Main, p. 6).

Local Setting

The geotechnical site investigations found that the roadway and proposed single-family residence site appear to be underlain by alluvial deposits and resistant weathered bedrock of the Franciscan Complex at relatively shallow depth of 11 feet or less. The Canyon Lane area is predominately underlain by graywacke[3] sandstone and sheared rock of the Franciscan Complex.[4] Bedrock of the Whiskey Hill Formation, composed of coarse-grained sandstone and silty claystone, is mapped in the area of the proposed water line alignment. These rock units are separated by old inactive fault traces. Stream channel deposits are within the drainage channel adjacent to Canyon Lane, an intermittent stream that is a tributary of Arroyo Ojo De Agua. Older alluvial fan deposits are identified in the low-lying terrain at the eastern end of Canyon Lane.

On the proposed site for single-family residential development, the natural slopes are relatively flat to gentle slopes and show generally good site stability. Geologic materials are Franciscan sandstone (undivided), which consists of sandstone and lithic rock with interbedded siltstone and shale and local conglomerate. The upper soils at the residential project site are generally cohesive with grass roots and are relatively resistant to erosion. Soils at greater depths at the site are cohesionless and are prone to erosion. Erodible surface materials may be exposed locally.

Seismicity

Seismicity is the geographic and historical distribution of earthquakes, including their frequency, intensity, and distribution. Seismic hazards include surface rupture, ground shaking, liquefaction, landslides, subsidence, expansive soils, and soil erosion.

Faults are fractures in the crust of the earth along which land on one side has moved relative to land on the other side. Most faults are the result of repeated displacements over a long period of time. A fault trace is the line on the earth's surface defining the fault. Faults are classified as active, potentially active, and inactive based on criteria developed by the CGS. An active fault is generally one that has experienced surface displacement within the Historic period (within the last 150 years) or within the Holocene period (within the last 11,000 years). A potentially active fault is one that has experienced displacement within the Quaternary period (during the last 1.6 million years), which includes the categories Late Quaternary and Undifferentiated Quaternary. Inactive faults are those that have not experienced movement in the last 1.6 million years.

The project is located within a region characterized by high seismic activity. The San Andreas Fault dominates tectonic activity in the region. The San Andreas Fault system is approximately 40 feet wide in the Bay Area and extends nearly 800 miles long from the Salton Sea in Imperial County to Cape Mendocino in Humboldt County. Other notable faults in the region include the Hayward and Calaveras faults, which have caused earthquakes within the County. Table 3.7-1, Active and Potentially Active Faults within 20 Miles of the Project Area, provides the active and potentially active faults within 20 miles of the project area. Figure 3.7-1 illustrates the active and potentially active faults within 20 miles of the project area. There are two active faults within 20 miles of the project area. The Hayward fault is 16.3 miles east, and the San Andreas fault is 2.1 miles west. There are two additional faults categorized as Latest Quaternary within 20 miles of the project area: Monte Vista-Shannon (7 miles southeast of the project area) and San Gregorio (10.5 miles west of the project area).

[3] Graywacke sandstone is characterized by sedimentary grains of different sizes in a matrix with clays and silts.

[4] See Figure 2, Regional Geologic Map in Appendix G (Connelly, S.F. 2017. Applicant's Geologic Investigation for the Proposed Road and Water Main).

Table 3.7-1. Active and Potentially Active Faults within 20 Miles of the Project Area

Fault Name	Age	Distance from Project Area (Miles)
Berrocal fault	Undifferentiated Quaternary[5]	6.9
Butano	Undifferentiated Quaternary	13.4
Cascade	Undifferentiated Quaternary	11.3
Chabot fault	Undifferentiated Quaternary	17.1
Frenchman Road fault	Undifferentiated Quaternary	6.1
Hanover fault	Undifferentiated Quaternary	6.5
Hayward fault	Historic[6] / Latest Quaternary / Undifferentiated Quaternary	16.3 / 17.9 / 18.1
Hermit fault	Undifferentiated Quaternary	4
Mission fault	Undifferentiated Quaternary	16.6
Monte Vista-Shannon fault	Latest Quaternary / Late Quaternary[7]	7 / 6.4
Pilarcitos fault	Undifferentiated Quaternary	4.1
Pulgas fault	Undifferentiated Quaternary	1.3
San Andreas fault	Historic / Latest Quaternary / Undifferentiated Quaternary	2.1 / 1.6 / 1.5
San Gregorio fault	Latest Quaternary / Late Quaternary / Undifferentiated Quaternary	10.5 / 12.6 / 11.7
San Jose fault	Undifferentiated Quaternary	3.2
Serra fault	Late Quaternary	13.1 / 9.9
Silver Creek fault	Undifferentiated Quaternary	16.4
Stanford fault	Undifferentiated Quaternary	1
Zayante-Vergeles fault	Undifferentiated Quaternary	19.7

Source: USGS and CGS 2019, Quaternary fault and fold database for United States. Available online at USGS website: https://earthquake.usgs.gov/hazards/qfaults/. Accessed March 15, 2019.

[5] Faults falling within the Undifferentiated Quaternary time show evidence of displacement sometime during the past 1.6 million years.

[6] Faults falling within the Historic time show evidence of displacement sometime during the past 200 years.

[7] Faults falling within the Late Quaternary time show evidence of displacement during the past 11,000 years.

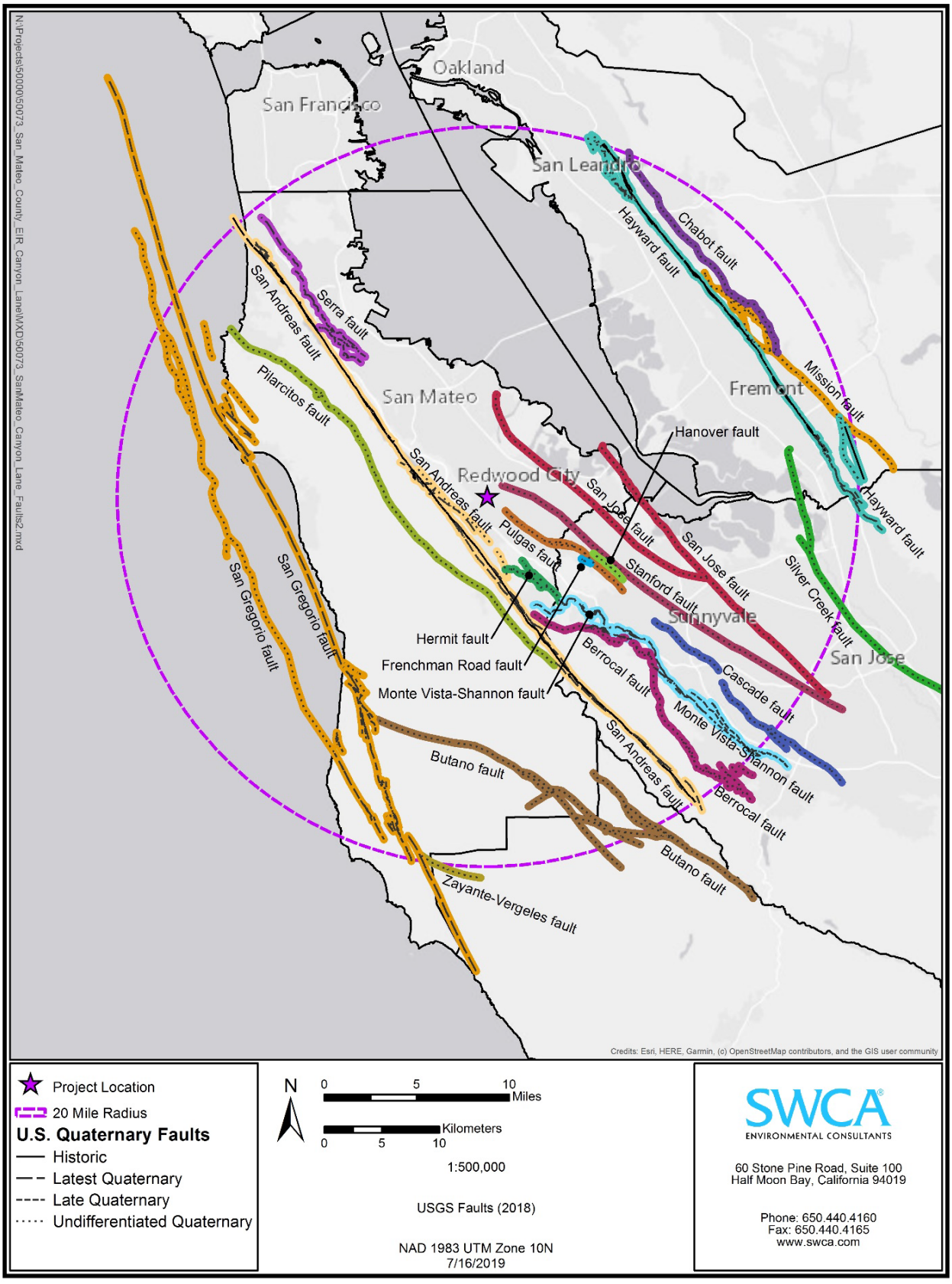


Figure 3.7-1. Active and Potentially Active Faults

Fault Rupture

Fault (surface) ruptures are generally considered to be more likely along active faults (faults with observed displacement in the last 11,000 years). Alquist-Priolo Fault Zones are buffers around historically active faults that have been determined to be especially prone to surface fault rupture.[8] CGS policy is to delineate a boundary from 200 to 500 feet wide on each side of the known fault trace based on the location precision, complexity, or regional significance of the fault. If a proposed building site lies within an Alquist-Priolo Earthquake Fault Zone, a geologic fault rupture investigation must be performed. The investigation must demonstrate that the site is not threatened by surface displacement from the fault before development permits can be issued.

The nearest active fault to the project area is the San Andreas fault located approximately 2.1 miles west of the project area. The project area is not located within the Alquist-Priolo Fault Zone.[9] Therefore, the potential for surface rupture at the project area is considered low.

Ground Shaking

During a seismic event, the project area may be subjected to high levels of ground shaking due to the proximity of active faults in the region.[10] All active faults in the vicinity of the project area are capable of generating significant ground shaking during a seismic event. Several parameters control the extent of ground shaking, including the magnitude and intensity of the earthquake, distance from the epicenter, and local geologic conditions. Table 3.7-2, Probability of at Least One Earthquake Greater than Magnitude 6.7 by 2045, lists the probability of at least one earthquake greater than magnitude 6.7 by the year 2045, for each of the fault systems within 20 miles of the project area. There is a 6 percent chance of a magnitude 6.7 or greater earthquake on the San Andreas fault system, the nearest fault, by 2045.

Soft soils amplify ground shaking by amplifying the shear waves (S-waves). Shaking amplification is higher in rock or soil that transmits shear waves at lower shear wave velocities. USGS's National Earthquake Hazards Reduction Program defines 5 soil categories based on shear-wave velocity (Vs): Soil Type A (Vs less than 1500 meters per second [m/sec]), Soil Type B (Vs between 750 and 1500 m/sec), Soil Type C (Vs between 350 and 750 m/sec), Soil Type D (Vs between 200 and 250 m/sec), and Soil Type E (Vs less than 200 m/sec).

The project area soils have shear wave velocity categories mapped by USGS as generally greater than 750 m/sec, or Soil Type B.[11,12] Soil Type B does not contribute greatly to shaking amplification. Additional project area soils have shear wave velocities of greater than 350 m/sec, or Soil Type C. The California Department of Conservation maps the project area as having shear wave velocities in the upper 30 meters of surficial geology as approximately 733.4 m/sec and 468.4 m/sec, which is comparable to the USGS

[8] California Department of Conservation. 2018. The Alquist-Priolo Earthquake Fault Zone. Available online at https://www.conservation.ca.gov/cgs/alquist-priolo. Accessed March 21, 2019.
[9] California Department of Conservation. 2019. Earthquake Zones of Required Investigation. Available online at https://maps.conservation.ca.gov/cgs/EQZApp/app/. Accessed March 21, 2019.
[10] Branum, D., C. M. Petersen, and C. Wills. 2016. *Earthquake Shaking Potential for California*. Copyright 2016 California Department of Conservation, California Geological Survey. Available online at https://www.conservation.ca.gov/cgs/Documents/Publications/MS_48.pdf. Accessed March 21, 2019.
[11] USGS. 2019. Soil Type and Shaking Hazard in the San Francisco Bay Area. Available online at https://earthquake.usgs.gov/hazards/urban/sfbay/soiltype/. Accessed March 21, 2019.
[12] USGS. 2019. Soil Type and Shaking Hazard in the San Francisco Bay Area (Map). Available online at https://earthquake.usgs.gov/hazards/urban/sfbay/soiltype/map/. Accessed March 21, 2019.

Table 3.7-2. Probability of at Least One Earthquake Greater than Magnitude 6.7 by 2045

Fault	Probability* of at Least One Earthquake Greater than Magnitude 6.7 by 2045 (%)
Monte Vista - Shannon	<1%
San Andreas	**6%**
Pilarcitos	<1%
San Gregorio	3%
Butano	<1%
Silver Creek	<1%
Hayward	**19%**
Mission	1%

* Average probability of segments that are within 20 miles of the project area.

Source: Uniform California Earthquake Rupture Forecast Version 3. 2013. Available online at https://www.conservation.ca.gov/cgs/Pages/PSHA/UCERF3.aspx and KMZ from http://www.wgcep.org/UCERF3. Accessed March 19, 2019.

categorizations.[13] Potential shaking is stronger when the shear wave velocities are lower, such as Soil Type D (Vs between 200 and 250 m/sec), which includes muds, sands, gravels, or silts, or Soil Type E (Vs less than 200 m/sec), which includes water-saturated mud and artificial fill. Therefore, ground shaking at the project area would not be exacerbated by the existing soil types.

Liquefaction

Liquefaction occurs when saturated, loose materials (e.g., sand or silty sand) are weakened and transformed from a solid to a near-liquid state due to increased pore water pressure. The increase in pressure is caused by strong ground motion from an earthquake. The susceptibility to liquefaction is a function of depth, density, groundwater level, and magnitude of an earthquake. Liquefaction-related phenomena can include lateral spreading, ground oscillation, flow failure, loss of bearing strength, subsidence, and buoyancy effects.

For liquefaction to occur, the soil must be saturated (i.e., shallow groundwater) and be relatively loose. Liquefaction more often occurs in areas underlain by young alluvium where the groundwater table is higher than 50 feet below ground surface. The project area is located in an unevaluated area for liquefaction, according to the CGS.[14] According to preliminary CGS mapping, the lower elevations of the canyon along the creek channel are within a potential liquefaction hazard zone.[15] However, the project area is located within the "Very Low" liquefaction susceptibility area as shown in the Seismic Hazards map, in the Redwood City General Plan Public Safety Element,[16] and in the "Low" or "Very Low" liquefaction susceptibility area in the Liquefaction Susceptibility map from Association of Bay Area Governments map (ABAG).[17]

[13] California Department of Conservation. 2019. MS48: Shear-wave Velocity in Upper 30m of Surficial Geology (Vs30), Data Viewer. Available online at https://maps.conservation.ca.gov/cgs/DataViewer/. Accessed March 21, 2019.

[14] California Department of Conservation. 2019. Earthquake Zones of Required Investigation. Available online at https://maps.conservation.ca.gov/cgs/EQZApp/app/. Accessed March 21, 2019.

[15] California Geological Survey. 2018. Preliminary Seismic Hazard Zones Map for the Woodside Quadrangles, San Mateo County, California, Scale 1:24,000; Released: October 4.

[16] City of Redwood City. 2010. Redwood City General Plan: Public Safety Element. Available online at http://www.redwoodcity.org/home/showdocument?id=5109. Accessed March 21, 2019.

[17] ABAG. 2019. Resilience Program, Hazards (online map). Available at: http://gis.abag.ca.gov/website/Hazards/?hlyr=liqSusceptibility. Accessed March 29, 2019

Subsidence

Land subsidence is the gradual, local setting or shrinking of the earth's surface with little or no horizontal motion, or the sudden collapse of the ground forming a depression. Subsidence is normally the result of gas, oil, or water extraction or hydro compaction. Subsidence can also be caused by earthquakes, erosion, or sinkhole formation.

Regional subsidence caused by a differential vertical movement along a fault takes place over large areas. In the event of such a movement on the San Andreas fault, the project area would probably respond as a unit, not fracturing locally. Damage from this phenomenon is unlikely.[18] There are no gas, oil, or water extraction facilities within or near the project area and these activities have not historically occurred locally.

Groundwater was not encountered during the borings associated with the geotechnical site investigation of the subject property. It is estimated that groundwater levels are approximately 20 feet below existing grade and at the bottom of the existing ephemeral creek.[19] Groundwater was not encountered during the borings associated with the geotechnical site investigation of the proposed Canyon Lane improvements. It is estimated that the highest groundwater levels occur at the bottom of the existing ephemeral creek.[20]

Expansive Soils

Expansive soils generally result from specific clay minerals that expand in volume when saturated and shrink in volume when dry. The presence of this soil type can damage structures when expansion and contraction of soil cracks rigid building materials (i.e., concrete, wood, drywall, etc.), if the potentially expansive soils were not considered during project design and during construction.

According to the Natural Resources Conservation Service, soils in the project area are mapped as Orthents, cut and fill-Urban land complex, 5 to 75 percent slopes; and Urban land-Orthents, cut and fill complex, 5 to 75 percent slopes. These soil types are generally well drained and have a depth of more than 80 inches to the water table.[21] Site-specific investigations are described below.

Canyon Lane Improvements

Seven test borings were excavated along Canyon Lane in 2014. Test borings were excavated to depths between 5 and 10 feet. The soil profile encountered during the excavations were composed of silty clay to mottled silty sand and siltstone bed layer. The expansion potential of the soils encountered during excavations on Canyon Lane was classified as Low.[22]

Proposed Single-Family Residence

Three test borings were excavated in 2019 within the parcels associated with the proposed single-family residence. Test borings were excavated to depths between 5 and 10 feet. The soil profile encountered during the excavations were composed of silty clay between approximately 5 and 10 feet overlaid by

[18] See Appendix G (Yang, J.H. 2019 Geotechnical Site Investigation for the Proposed Single-Family Residence, p. 3).
[19] See Appendix G (Yang, J.H. 2019 Geotechnical Site Investigation for the Proposed Single-Family Residence, p. 5).
[20] See Appendix G (Yang, J.H. 2014 Geotechnical Site Investigation for the Proposed Road and Waterline, p. 5).
[21] USDA NRCS. 2019. Web Soil Survey (online interactive map). Available at https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed March 21, 2019.
[22] See Appendix G (Yang, J.H. 2014 Geotechnical Site Investigation for the Proposed Road and Waterline, p. 2 and Appendix AA).

approximately 5 feet of sandy clay and clay (topsoil). The expansion potential of the soils encountered during the excavations on the residential development parcels was classified as Low.[23]

Slope Stability and Landslides

Landslides are defined as the movement of rock, debris, or earth masses down a slope. Landslide events include rock falls, topples, slides, spreads, and debris flows. Causes of landslides include rainfall, earthquakes, volcanic activity, groundwater changes, and alteration of a slope by man-made construction activities.

The project area is located within an unevaluated area for landslide hazards, according to the CGS.[24] According to a preliminary CGS map, the upper slopes of the canyon, above the project area, are within a large area susceptible to seismically induced landslides.[25] However, regional landslide mapping does not identify any landsliding in the project vicinity.[26,27] According to Redwood City General Plan's Seismic Hazards Map in the Public Safety Element, there are no earthquake-induced landslides in the project area.[28] Additionally, the Existing Landslide Distribution from ABAG identifies the area as having "Few Landslides".[29]

Based upon the site-specific geologic investigations, there was no evidence of landslide activity at the property associated with the proposed single-family residence or roadway improvements. However, as depicted in Figure 3.7-2, Landslide Deposit, one shallow active landslide was identified along the proposed waterline, near Vista Drive. Observations of cracking of the roadway surface along Vista Drive suggests recent and ongoing landslide activity in the location of a portion of the proposed waterline. As a result, three test pits were excavated to assess soil, bedrock, and landslide conditions along the proposed water line alignment. The test borings were excavated immediately north of Vista Drive.[30]

Test pit 1, just north of Vista Drive, identified a slightly undulating landslide deposit occurring at a depth of approximately 5 feet. Based on this test pit, it is estimated that the landslide deposit extends approximately 8 feet below the surface.[31] As depicted in Figure 3.7-2, the landslide is limited to an area just north of Vista Drive in the location of the proposed waterline. The soils in the active landslide deposit are dark-colored organic materials that appear to have been previous colluvial deposits. The active landslide deposit is underlain by highly weathered bedrock of the Whiskey Hill Formation composed of moist to wet, dense to hard, clayey silt with siltstone rock fragments. Moderately hard to hard siltstone of the Whiskey Hill Formation was encountered at a depth of about 8 feet.

[23] See Appendix G (Yang, J.H. 2019 Geotechnical Site Investigation for the Proposed Single-Family Residence, Appendix A).

[24] California Department of Conservation. 2019. Earthquake Zones of Required Investigation. Available online at https://maps.conservation.ca.gov/cgs/EQZApp/app/. Accessed March 21, 2019.

[25] California Geological Survey. 2018. Preliminary Seismic Hazard Zones Map for the Woodside Quadrangles, San Mateo County, California, Scale 1:24,000; Released: October 4.

[26] Brabb, E. E., and E. H. Pampeyah. 1972. Preliminary Map of Landslide Deposits in San Mateo County, California. Miscellaneous Field Studies, Map MF-344. Available online at https://pubs.usgs.gov/mf/0344/plate-1.pdf. Accessed March 21, 2019.

[27] See Appendix G (Connelly, S.F. 2017. Applicant's Geologic Investigation for the Proposed Road and Water Main, Figure 3, County Geologic Hazards Map).

[28] Redwood City. 2009. Seismic Hazards Map (2006 data). In the Public Safety Element, Redwood City General Plan. Available online at http://www.redwoodcity.org/home/showdocument?id=5109. Accessed Marsh 21, 2019.

[29] ABAG. 2019. Resilience Program, Hazards (online map). Available at: http://gis.abag.ca.gov/website/Hazards/?hlyr=liqSusceptibility. Accessed March 29, 2019.

[30] See Appendix G (Connelly, S.F. 2017. Applicant's Geologic Investigation for the Proposed Road and Water Main, Figure 5, Waterline Geologic Map).

[31] See Appendix G (Connelly, S.F. 2017. Applicant's Geologic Investigation for the Proposed Road and Water Main, Figures 4 and 5, and Photograph 8).

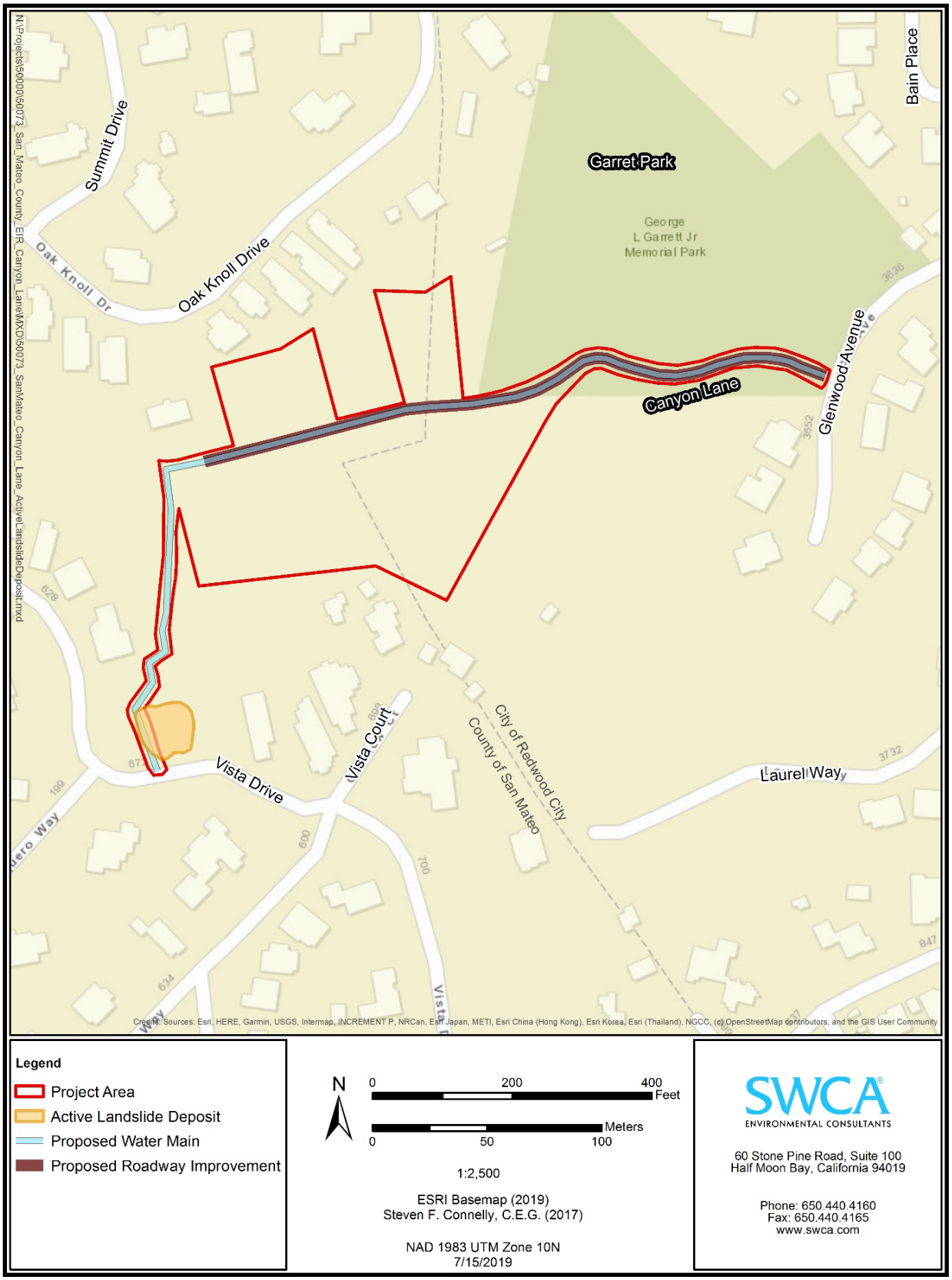


Figure 3.7-2. Landslide Deposit

Cracking to the outer half of Vista Drive indicates that the landslide has impacted the roadway and may affect the existing underlying water line.

Test pits 2 and 3 were excavated north of test pit 1.[32] These two test pits did not identify evidence of landslides.

Paleontological Resources

Paleontology is a multidisciplinary science that combines elements of geology, biology, chemistry, and physics to understand the history of life on earth. Paleontological resources, or fossils, are the remains, imprints, or traces of once-living organisms preserved in rocks and sediments. These include mineralized, partially mineralized, or un-mineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains. Paleontological resources include not only the fossils themselves, but also the physical characteristics of the fossils' associated sedimentary matrix.

In order to assess any potential impacts the proposed project may have on paleontological resources, a museum records search was requested from the Natural History Museum of Los Angeles County (LACM), the online records database of the University of California Museum of Paleontology (UCMP), and a review of the relevant scientific literature was conducted. These data were used to assess the potential of each geologic unit present in the project area to preserve fossil resources, following the paleontological potential rankings of the Society of Vertebrate Paleontology (SVP).[33] The determination of this assessment is as follows:

> **Older alluvial fan deposits**. These sediments date from the Pleistocene (over 11,700 years old) and are therefore of an age to preserve fossil resources. The San Francisco Bay area has a rich history of Pleistocene fossils from alluvial sediments of this age.[34] Most famously, the fossil beds used to define the Irvingtonian North American Land Mammal Age are from the Irvington District of Fremont, California.[35,36] Iconic Ice Age fossils such as mammoths, horses, saber-toothed cats, and wolves, as well as smaller animals such as rodents, reptiles, fish, and birds are known from Pleistocene alluvium in this area.[37,38,39,40] The UCMP online database search returned 522 fossil specimens collected from 28 localities in San Mateo County. The bulk of

[32] See Appendix G (Connelly, S.F. 2017. Applicant's Geologic Investigation for the Proposed Road and Water Main, Figure 5, Waterline Geologic Map).

[33] Society of Vertebrate Paleontology (SVP). 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impact to Paleontological Resources. Electronic document http://vertpaleo.org/Membership/Member-Ethics/SVP_Impact_Mitigation_Guidelines.aspx.

[34] Jefferson, G. T. 1991. A catalogue of Late Quaternary Vertebrates from California: Part One, nonmarine lower vertebrate and avian taxa, and Part Two, Mammals. Natural History Museum of Los Angeles County Technical Report No. 5 and Technical Report No. 7, respectively.

[35] Stirton, R. Cenozoic mammal remains from the San Francisco Bay region. University of California Publications, Bulletin of the Department of Geological Sciences 24: 339-409. 1939.

[36] Savage, D. Late Cenozoic vertebrates of the San Francisco Bay region. University of California Publications, Bulletin of the Department of Geological Sciences 28:215-314. 1951.

[37] Baskin, J. and R. Thomas. 2016. A review of Camelops (Mammalia, Artiodactyla, Camelidae), a giant llama from the Middle and Late Pleistocene (Irvingtonian and Rancholabrean) of North America. Historical Biology 28: 120-127.

[38] Bell, C. and G. Bever. 2006. Description and significance of the Microtus (Rodentia: Arvicolinae) from the type Irvingtonian Fauna, Alameda County, California. Journal of Vertebrate Paleontology 26: 371-380.

[39] Bell, C., E. Lundelius, A. Barnosky, R. Graham, E. Lindsay, D. Ruez, H. Semken, S. Webb, and R. Zakrzewski. 2004. The Blancan, Irvingtonian, and Rancholabrean Mammal Ages. In Woodburne, M., ed. Late Cretaceous and Cenozoic Mammals of North America: Biostratigraphy and Geochronology. Columbia University Press: 232-313.

[40] Casteel, R. and D. Adam. 1977. Pleistocene fishes from Alameda County, California. U.S. Geological Survey Journal of Research 5: 209-215.

these fossils are mollusks, but some plant localities and vertebrates such as bison, camel, and mastodon have also been collected. The closest locality known to the LACM is northeast of the project area near Martinez, California, where a fossil horse specimen was collected and identified as the holotype of a new species, *Equus pacificus.*[41,42] Given the documented record of significant fossil preservation in Pleistocene alluvial fan deposits, this unit is assigned high paleontological sensitivity.

Whiskey Hill Formation. The Whiskey Hill Formation dates to the Eocene (roughly 33 – 56 million years ago), and does not appear to have a record of preserving significant fossil resources. A search of the relevant scientific literature did not return any reports of significant fossils. The search results of the LACM did not indicate any known localities in the region,[43] and the search of the UCMP online database indicated only microfossils such as forams have been collected from the unit.[44] However, the Whiskey Hill is a marine sandstone with silty lenses,[45] a lithology consistent with the possibility of fossil preservation. Therefore, the Whiskey Hill Formation is assigned low paleontological sensitivity.

Franciscan Complex, sandstone. Sandstones of the Franciscan Complex have been known to rarely preserve fossil resources in the San Francisco Bay area, however these discoveries are limited to invertebrate fossils such as mollusks.[46,47] The LACM did not have any records of fossil localities in the Franciscan in the vicinity of the project area, and the UCMP had a single invertebrate locality recorded in San Mateo County.[48,49] Given the small number of commonly recovered fossils, sandstone of the Franciscan Complex is assigned low paleontological sensitivity.

Franciscan Complex, mélange. The Franciscan mélange records deposition of volcanic and clastic sediments into a subduction zone during the Mesozoic era, followed by subsequent metamorphism.[50] This metamorphism has highly altered the rocks in this unit, and would most likely have destroyed any fossils preserved. Therefore, Franciscan mélange has no paleontological sensitivity.

[41] Leidy, J. 1868. Notice of remains of some horses. Proceedings of the Academy of Natural Sciences of Philadelphia 20:195.
[42] McLeod, S. 2019. LACM records search. Letter response to A. Bell on March 13, 2019.
[43] McLeod, S. 2019. LACM records search. Letter response to A. Bell on March 13, 2019.
[44] University of California Museum of Paleontology. Available online at https://ucmp.berkeley.edu/collections/databases/. Accessed March 18, 2019.
[45] Brabb, E. E., R. W. Graymer, and D. L. Jones. 2000. Geologic map and map database of the Palo Alto 30' X 60' quadrangle, California. U.S. Geological Survey, Miscellaneous Field Studies Map MF-2332.
[46] Elder, William. 2015. Mesozoic molluscan fossils from the Golden Gate National Recreation Area and their significance to Franciscan Complex terrane reconstructions, San Francisco Bay area, California. In National Park Service Paleontological Research: National Park Service Technical Report NPS/NRGRD/GRDTR-98/01, edited by V. L. Santucci and L. McClelland, pp. 90–94. December.
[47] Hilton, Richard P. 2003. Dinosaurs and Other Mesozoic Reptiles of California. Berkeley. University of California Press. p. 356.
[48] McLeod, S. 2019. LACM records search. Letter response to A. Bell on March 13, 2019.
[49] University of California Museum of Paleontology. Available online at https://ucmp.berkeley.edu/collections/databases/. Accessed on May 13, 2019.
[50] Wakabayashi, John. 2015. Anatomy of a subduction complex: Architecture of the Franciscan Complex, California, at multiple length and time scales. International Geology Review. 57. p. 1-78.

3.7.2 Regulatory Setting

Federal

Clean Water Act

Under Clean Water Act (CWA) Section 402 (33 U.S.C. 1251 et seq.), the National Pollutant Discharge Elimination System (NPDES) controls water pollution (including from soil and sediment erosion) by regulating sources of pollution to waters of the United States. The CWA is implemented on a State and local level in California primarily by the State Water Resources Control Board and the nine Regional Water Quality Control Boards (RWQCBs), collectively. The San Mateo Countywide Water Pollution Prevention Program is a partnership of the City/County Association of Governments, each incorporated city and town in the County, and the County of San Mateo, which share a common NPDES permit. The Municipal Regional Stormwater NPDES Permit was issued by the San Francisco Bay RWQCB in compliance with Basin Plan and the NPDES system.[51] Participating agencies (including San Mateo County and the City of Redwood City) must comply with the provisions of the Countywide permit by ensuring that new development and redevelopment mitigate, to the maximum extent practicable, water quality impacts to storm water runoff both during construction and operation periods of projects. Projects disturbing more than 1 acre of land during construction are also required to file a Notice Of Intent with the RWQCB to be covered under the State NPDES General Construction Permit for discharges of storm water associated with construction activity. A Storm Water Pollution Prevention Plan (SWPPP) must be developed and implemented for each site covered by the general permit, and includes Best Management Practices (BMPs) that would reduce impacts to surface water quality from soil erosion. Additionally, private or public projects that create and/or replace 10,000 or more square feet of impervious surface must implement Low Impact Development (LID) treatment measures to control stormwater.

For more information about the NPDES Permit, see State Regulations and Local Regulations in Section 3.10.2 Regulatory Setting within Chapter 3.10, Hydrology and Water Quality.

State

Seismic Hazard Mapping Act

In accordance with Public Resources Code (PRC) Chapter 7.8, Division 2, the California Department of Conservation, CGS is directed to delineate Seismic Hazard Zones through the Seismic Hazards Zonation Program. The purpose of the act is to reduce the threat to public health and safety and to minimize the loss of life and property by identifying and mitigating seismic hazards, such as those associated with strong ground shaking, liquefaction, landslides, other ground failures, or other hazards caused by earthquakes.

Cities, Counties, and State agencies are directed to use seismic hazard zone maps developed by CGS in their land use planning and permitting processes. In accordance with the Seismic Hazards Mapping Act, site-specific geotechnical investigations must be performed prior to permitting most urban development projects within seismic hazard zones.

[51] California Regional Water Quality Control Board. San Francisco Bay Region. 2015. *Municipal Regional Stormwater NPDES Permit.* Order No. R2-2015-0049. NPDES Permit No. CAS612008. November 19, 2015. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/documents/files/R2-2015-0049_Adopted_0.pdf. Accessed February 12, 2019.

Water Quality Control Plan for the San Francisco Bay Region

Under CWA Section 402 (33 U.S.C. 1251 et seq.), the National Pollutant Discharge Elimination System (NPDES) controls water pollution by regulating sources of pollution to waters of the United States. Under the NPDES Permit, construction projects must develop an Erosion and Sediment Control Plan (ESCP) and have it approved by the local land agency prior to issuance of grading or building permits. The ESCP must include BMPs necessary to prevent erosion of unstable or denuded areas and stabilize disturbed bare earth areas.

The Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 regulates development and construction of buildings intended for human occupancy to avoid the hazard of surface fault rupture. In accordance with this law, the CGS maps active faults and designates Earthquake Fault Zones along mapped faults. This Act groups faults into categories of active, potentially active, and inactive. Historic and Holocene age faults are considered active, Late Quaternary and Quaternary age faults are considered potentially active, and pre-Quaternary age faults are considered inactive. These classifications are qualified by the conditions that a fault must be shown to be "sufficiently active" and "well defined" by detailed site-specific geologic explorations in order to determine whether building setbacks should be established.

Any project that involves the construction of buildings or structures for human occupancy, such as residential units, is subject to review under the Alquist-Priolo Earthquake Fault Zoning Act, and any structures for human occupancy must be located at least 50 feet from any active fault.

California Building Code

The State of California provides minimum standards for building design through the California Building Code. The California Building Code is based on the International Building Code, which is used widely throughout the United States (generally adopted on a state-by-state or district-by-district basis) and has been modified for conditions within California. In 2016, a revised version of the California Building Code took effect. Chapter 16 of the California Building Code contains definitions of seismic sources and the procedure used to calculate seismic forces on structures. Chapter 18 provides requirements for conducting geotechnical site investigations including investigations of soils, water table, rock strata, excavation sites, seismic design, grading and filling hazards, and foundation drainage.

Public Resources Code Section 5097.5

Requirements for paleontological resource management are included in the PRC Division 5, Chapter 1.7, Section 5097.5, and Division 20, Chapter 3, Section 30244, which states:

> No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.

Local

San Mateo County General Plan

The1986 San Mateo County General Plan includes the chapter Soil Resources, which discusses the existing soil resources and opportunities to protect soil resources. The County periodically updates goals and polices to support the 1986 General Plan and provides them on the San Mateo County Planning Department website.[52] The current list of updated goals and policies that are relevant to soils and geology are:

- **Goal 2.2 Minimize Soil Erosion:** Minimize soil erosion through application of appropriate conservation practices.
- **Policy 2.17 Regulate Development to Minimize Soil Erosion and Sedimentation:** Regulate development to minimize soil erosion and sedimentation; including, but not limited to, measures which consider the effects of slope, minimize removal of vegetative cover, ensure stabilization of disturbed areas and protect and enhance natural plant communities and nesting and feeding areas of fish and wildlife.
- **Policy 2.23 Regulate Excavation, Grading, Filling, and Land Clearing Activities Against Accelerated Soil Erosion:** Regulate excavation, grading, filling, and land clearing activities to protect against accelerated soil erosion and sedimentation.
- **Policy 2.25 Regulate Topsoil Removal Operations Against Accelerated Soil Erosion:** Regulate topsoil removal operations to protect against accelerated soil erosion and sedimentation through measures which ensure slope stabilization and surface drainage control.

Updated goals and polices that are related to geotechnical hazards are:

- **Policy 15.9 Designation of Geotechnical Hazard Areas:** Designate as Geotechnical Hazard Areas those areas that meet the definition of geotechnical hazards, including but not limited to:

    a. The areas illustrated on the Natural Hazards map as Alquist-Priolo Fault Zones, Tsunami and Seiche Flooding Areas, Coastal Cliff Stability Areas, and Areas of High Landslide Susceptibility.

    b. Any additional area delineated by other investigations, mapped in greater detail, and/or considered to be hazardous by the County Department of Public Works, including but not limited to areas delineated on the Geotechnical Hazards Synthesis maps, maps prepared by USGS and other appropriate sources

- **Policy 5.12 Locating New Development in Areas Which Contain Natural Hazards:**

    a. As precisely as possible, determine the areas of the County where development should be avoided or where additional precautions should be undertaken during review of development proposals due to the presence of natural hazards.

    b. Give preference to land uses that minimize the number of people exposed to hazards in these areas.

    c. Determine appropriate densities and development.

[52] County of San Mateo, Planning and Building. 2019. *Goals for Implementation of the General Plan.* Available at https://planning.smcgov.org/documents/general-plan-policies. Accessed Marsh 21, 2019.

d. Require detailed analysis of hazard risk and design of appropriate mitigation when development is proposed in these areas, including assessment of hazardous conditions expected to be exacerbated by climate change, such as increased risks of fire, flooding, and sea level rise.

- **Policy 15.20 Review Criteria for Locating Development in Geotechnical Hazard Areas:**

  a. Avoid the siting of structures in areas where they are jeopardized by geotechnical hazards, where their location could potentially increase the geotechnical hazard, or where they could increase the geotechnical hazard to neighboring properties.

  b. Wherever possible, avoid construction in steeply sloping areas (generally above 30%).

  c. Avoid unnecessary construction of roads, trails, and other means of public access into or through geotechnical hazard areas.

  d. In extraordinary circumstances when there are no alternative building sites available, allow development in geotechnically hazardous and/or steeply sloping areas when appropriate structural design measures to ensure safety and reduce hazardous conditions to an acceptable level are incorporated into the project.

- **Policy 15.21, Requirement for Detailed Geotechnical Investigations:**

  a. In order to more precisely define the scope of the geotechnical hazards, the appropriate locations for structures on a specific site and suitable mitigation measures, require an adequate geotechnical investigation for public or private development proposals located: (1) in an Alquist-Priolo Fault Zone, or (2) in any other area of the County where an investigation is deemed necessary by the County Department of Public Works.

  b. In order to minimize economic impacts on applicants for development and avoid duplication of information, use the existing information base when the Department of Public Works or appropriate County agency determines that it is adequate.

The San Mateo County General Plan (1986) includes paleontological resources in the chapter "Historical and Archaeological Resources Policies." Goals and policies that are relevant to paleontological resources are:

- **Goal 5.3, Protection of Archaeological/Paleontological Sites:** Protect archaeological/paleontological sites from destruction in order to preserve and interpret them for future scientific research, and public educational programs.

The General Plan goes on to identify methods necessary for the protection of paleontological resources to be applied to the regulation of development:

- **5.20 Site Survey:** Determine if sites proposed for new development contain archaeological/paleontological resources. Prior to approval of development for these sites, require that a mitigation plan, adequate to protect the resource and prepared by a qualified professional, be reviewed and implemented as a part of the project.

- **5.21 Site Treatment:**

  a. Encourage the protection and preservation of archaeological/paleontological sites.

b. Temporarily suspend construction work when archaeological/paleontological sites are discovered. Establish procedures which allow for the timely investigation and/or excavation of such sites by qualified professionals as may be appropriate.

c. Cooperate with institutions of higher learning and interested organizations to record, preserve, and excavate sites.

Redwood City General Plan

The City of Redwood City General Plan includes a Public Safety Element, which discusses geologic and seismic hazards in the Hazards Management Chapter.[53] The following policies and programs apply to geology and soils in the project area:

- **Policy PS-6.1:** Identify structural types, land uses, and sites that are highly sensitive to earthquake activity and other geological hazards, and seek to abate or modify them to achieve acceptable levels of risk.
- **Policy PS-6.3:** Work to ensure that structures and the public in Redwood City are exposed to reduced risks from seismic and geological events.
- **Program PS-24**, **Geotechnical Analysis:** Require a geotechnical analysis for construction in areas with potential geological hazards, and implement appropriate mitigation recommendations.
- **Program PS-25, International Building Code:** Continue to implement the International Building Code seismic safety standards for construction of new buildings, and update the City's codes as needed to respond to new information, standards, and technology.
- **Program PS-26, Geological Hazard Mapping:** Use appropriate geological hazard mapping techniques to evaluate potential seismic and slope stability hazards associated with proposed new development.

3.7.3 Thresholds of Significance

The following section describe significance criteria for impacts related to soil stability, seismic hazards, and paleontological resources from Appendix G of the CEQA Guidelines. According to Section 15002(g) of the CEQA Guidelines, "a significant effect on the environment is defined as a substantial adverse change in the physical conditions which exist in the area affected by the proposed project." The significance of potential impacts associated with soil stability and seismic hazards are based on thresholds identified within Appendix G of the CEQA Guidelines, which provide the following thresholds for determining impact significance with respect to geology and soils. Impacts would be considered significant if the proposed project would:

a. Directly or indirectly cause 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

[53] City of Redwood City. 2010. General Plan, Public Safety Element. Available online at: https://www.redwoodcity.org/home/showdocument?id=5109. Accessed February 12, 2019.

iii. Seismic-related ground failure, including liquefaction

iv. Landslides

b. Result in substantial soil erosion or the loss of topsoil.

c. Be located on a geologic unit 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 (1994), creating substantial direct or indirect risks to life or property.

e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water.

f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

3.7.4 Impact Assessment and Methodology

Geologic and seismic information for the project area was derived from various sources and compiled in this chapter to develop a comprehensive understanding of the potential constraints and hazards associated with project construction and operation. Sources of pertinent information include regional geologic and hazards maps prepared by the CGS, USGS, Natural Resources Conservation Service (NRCS), Redwood City, and California Department of Conservation, all of which reflect the most up-to-date understanding of the regional geology and seismicity.

In addition, geologic and seismic analysis relied on project-specific geotechnical site investigations prepared and a project-specific engineering geologic investigation, which are provided in Appendix G. The analysis also considers existing regulations that apply to geotechnical design and construction, including the California Building Code. Through compliance with the existing codes and ordinances, the Applicant would be required to demonstrate that the proposed area uses are compatible with the subsurface geology and local seismic conditions prior to issuance of building permits.

In the future, site-specific geotechnical analysis of the developable parcels would be required prior to the issuance of building permits. For the purposes of the analysis, the developable parcels are assumed to contain similar geological conditions as those identified during investigations for the proposed Canyon Lane improvement and the proposed single-family residence.

3.7.5 Project-Specific Impacts and Mitigation Measures

Impact 3.7-1: Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

Impact 3.7-1 (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 – Less than Significant

Canyon Lane Improvements, Proposed Single-Family Residence, and Developable Parcels

San Mateo County is located within a seismically active area; however, there are no known active faults within the immediate project vicinity and the project is not located in an area identified as being at high risk of fault rupture. As identified in Table 3.7-1, the closest active fault is the San Andreas Fault, which is located approximately 1.5 miles from the project. Additionally, the project is not located within an Alquist-Priolo Fault Zone. Therefore, the potential for surface rupture at the project area is considered low, and impacts would be less than significant.

Impact 3.7-1 (ii) Strong seismic ground shaking – Less than Significant with Mitigation

Canyon Lane Improvements, Proposed Single-Family Residence, and Developable Parcels

Active faults in the region have the potential to generate high levels of seismic ground shaking, should an earthquake occur. However, the design and construction of the project is required to comply with the California Building Code. Among many seismic requirements, the California Building Code requires foundations and structures to be designed and constructed to withstand the ground motions (i.e., peak ground accelerations) that have a 10 percent chance of being exceeded in 50 years (equivalent to a 1/475 annual chance of being exceeded). The 2016 California Building Code and standard geotechnical engineering practice requires identification of seismic design parameters to inform all earthwork requirements, foundation designs, retaining walls, and concrete/building material specifications. Seismic design parameters and recommendations for the project are described in the project-specific geotechnical site investigations provided in Appendix G. The Applicant would be required to implement these seismic design parameters and recommendations per GEO/mm-1.1, which include, but are not limited to, the following:

- Removing the top 1.5 feet of soil to receive non expansive fill.
- Removing and replacing all soft soil deposits with compacted fill.
- Compacting all fill to at least 90 percent relative compaction at moisture contents 3 to 5 percent above optimum. The upper 24 inches pavement right-of-way should be compacted to at least 95 percent relative compaction.

- Import fill, if required, shall be approved by the Soil Engineer, and shall have soil properties equivalent to or better than the natural soil. Import fill shall not contain rocks larger than 4 inches in diameter.
- Limiting cut and fill slopes to no steeper than 2:1 (horizontal to vertical).
- Installing foundation piers associated with the single-family residence at minimum depth of 14 feet from the bottom of the grade beam.
- Installing foundation piers associated with the retaining wall at a minimum depth of 13 feet from the bottom of the wall base slab.

Compliance with the California Building Code and implementation of GEO/mm-1.1 would ensure the project would not directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking, and impacts would be less than significant with mitigation.

Impact 3.7-1 (iii) Seismic-related ground failure, including liquefaction – Less than Significant

Canyon Lane Improvements, Proposed Single-Family Residence, and Developable Parcels

The project area is located within the "Very Low" liquefaction susceptibility area in the Redwood City General Plan, and in the "Low" or "Very Low" liquefaction susceptibility area in the Association of Bay Area Governments Resilience Program Map.[54] Contrary to these two maps, the preliminary CGS liquefaction maps[55] shows the lower elevation areas of the roadway to be in a liquefaction zone. However, the site-specific geotechnical investigations for the roadway and water line included borings and test pits that indicate that the impact of liquefaction is not likely to be significant.[56][57] Therefore, the potential for seismic-related ground failure related to liquefaction is considered low, and impacts would be less than significant.

Impact 3.7-2 (iv) Landslides – Less than Significant

Canyon Lane Improvements, Proposed Single-Family Residence, and Developable Parcels

The project area has one identified relatively shallow active landslide located in the location of a portion of the proposed waterline just north of Vista Drive. The landslide could cause potential substantial adverse effects, including the risk of loss, injury, or death in the event that an earthquake triggered a slide. The landslide could compromise the integrity of the waterline, causing it to rupture, resulting in the inundation of the downslope properties and roadway. Additionally, the landslide could damage downslope property and their occupants by generating debris and rocks slides. However, the Applicant would implement GEO/mm-2, which would require the removal and replacement of the landside deposit

[54] ABAG. 2019. Resilience Program, Hazards (online map). Available at: http://gis.abag.ca.gov/website/Hazards/?hlyr=liqSusceptibility. Accessed March 29, 2019.
[55] California Geological Survey. 2018. Preliminary Seismic Hazard Zones Map for the Woodside Quadrangles, San Mateo County, California, Scale 1:24,000; Released: October 4. As cited in: Ninyo and Moore. 2019.
[56] See Appendix G (Yang, J.H. 2014 Geotechnical Site Investigation for the Proposed Road and Waterline, Appendix AA).
[57] See Appendix G (Connelly, S.F. 2017. Applicant's Geologic Investigation for the Proposed Road and Water Main, Appendix A).

with engineered fill. Prior to the issuance of a grading permit, the Applicant would be required to submit for approval final engineering plans depicting how the landslide material would be removed and replaced. If the Applicant elects to pursue another mitigation strategy, the Applicant would be required to submit for approval additional engineering plans to ensure an appropriate factor of safety is achieved. With implementation of GEO/mm-1.2, the risk associated with the landslide would be mitigated to less than significant levels.

Geology and Soils Mitigation Measures	
GEO/mm-1.1	*The project shall be constructed in accordance with the seismic design criteria provided in the Geotechnical Site Investigations for the Canyon Lane Roadway Improvements and Single-Family Residence. Building and engineering plans will be reviewed by San Mateo County prior to issuance of a building permit to ensure that the plans meet the requirements of the California Building Code.*
GEO/mm-1.2	*The Applicant shall mitigate the active landslide by removing and replacing the landside deposit with engineered fill. Prior to the issuance of a building permit, the Applicant shall submit for approval final engineering plans depicting how the landslide material would be removed and replaced. If the Applicant elects to pursue another mitigation strategy, the Applicant shall submit for approval additional engineering plans to ensure an appropriate factor of safety is achieved.*

Impact 3.7-2: Result in substantial soil erosion or the loss of topsoil – Less than Significant with Mitigation

Canyon Lane Improvements, Proposed Single-Family Residence, and Developable Parcels

Construction

Construction of the project would increase impervious surfaces by approximately 22,000 square feet for the roadway improvements, approximately 4,660 for the single-family residence, and an undetermined amount for the developable parcels. The addition of impervious surfaces would prevent surface water infiltration into the ground surface and increase the stormwater runoff volume and rate compared to existing conditions. However, the Applicant would be required to implement a County and City-approved ESCP and SWPPP, per the requirements of the San Francisco Bay RWQCB Municipal Regional Stormwater NPDES Permit and the San Mateo Countywide Stormwater Pollution Prevention Program. These plans would include BMPs to control erosion and sedimentation impacts and stabilize disturbed bare earth areas. Section 3-10, Hydrology and Water Quality, provides additional information about ESCP and Municipal Regional Stormwater NPDES requirements and related permits.

The upper soils along the roadway and at the proposed property for the single-family residence are cohesive with grass roots and are relatively resistant to erosion. However, if left unplanted, the materials could erode if subjected to fast flowing runoff. As a result, the Applicant would implement all erosion control measures and revegetation requirements provided in the geotechnical site investigation, which are included in Appendix G, per GEO/mm-1.3. Erosion control measures provided in Appendix G include, but are not limited to, the following:

- Grading areas adjacent to tops of slopes away from the slope and into established drainage patterns.
- Establishing slope vegetation before the next rainy season after grading.
- Installing subdrains to reduce soil saturation and subsequent surface runoff.

With implementation of the ESCP, NPDES, and GEO/mm-1.3, construction of the project would not result in substantial soil erosion or the loss of topsoil, and impacts would be less than significant with mitigation.

Operation

The addition of impervious surfaces could increase the stormwater runoff volume and rate compared to existing conditions, which could in turn accelerate soil erosion and loss of topsoil if stormwater was conveyed onto adjacent undeveloped land. However, as described in Section 3-10, Hydrology and Water Quality, runoff generated along Canyon Lane would be redirected into permanent drainage improvements, including a storm drain on the south side of Canyon Lane with four catch basins with 9-inch side openings. The stormwater would flow into an approximately 161-foot-long bioretention swale that would include an 18-inch layer of bioretention soil designed to treat runoff before infiltrating groundwater. The bioretention swale would meet the requirements of the Municipal Regional Stormwater NPDES Permit and would be designed to retain the majority of runoff created by the new impermeable surfaces.

Runoff generated by the single-family residence would include a storm drain and bioretention facility meeting the requirements of the Municipal Regional Stormwater NPDES Permit. The storm drain for the residence would empty into the proposed Canyon Lane storm drain and swale.

Runoff generated by the developable parcels would be minimized by implementing all site-specific designs stipulated in future geotechnical site investigation recommendations, and complying with the future Municipal Regional Stormwater NPDES Permit, as applicable. As a result, operation of the developable parcels would not result in substantial soil erosion or the loss of topsoil, and impacts would be less than significant.

Because the project would include a system of swales and drainage facilities that are designed to control and redirect runoff away from undeveloped surfaces subject to erosion, operation of the project would not result in substantial soil erosion or the loss of topsoil, and impacts would be less than significant.

Geology and Soils Mitigation Measures	
GEO/mm-1.3	*The Applicant shall implement all erosion control measures and revegetation requirements provided in the Geotechnical Site Investigations.*

Impact 3.7-3: Be located on a geologic unit 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 – Less than Significant with Mitigation

Canyon Lane Improvements

A significant impact related to an unstable geologic unit or soil may occur if a project is built in an unstable area without proper site preparation or design features that provide adequate building foundations, thus posing a hazard to life and property. With the exception of the landslide deposit that exists immediately north of Vista Drive (see Figure 3.7-2) and in the location of the proposed waterline, the geotechnical site investigation provided in Appendix G found that the soils underlying Canyon Lane are composed largely of very dense alluvial deposits and resistant weathered bedrock of the Franciscan

Complex, which do not suggest a high potential for sliding.[58] Therefore, the potential for on or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse along Canyon Lane is considered low.

Soils near the proposed waterline and in the shallow landslide were found to range between soft and very hard densities and are composed of moist highly plastic clay.[59] Relatively resistant weathered bedrock of the Whiskey Hill Formation occurs below the landslide deposit.[60] The soils comprising the landslide deposit suggest a high potential for sliding and instability. To mitigate this potentially significant impact, the Applicant would implement Mitigation Measure GEO/mm-1.2, which would require the removal and replacement of the landside deposit with engineered fill. With the removal of the landslide deposit and the introduction of engineered fill, the waterline would not be located on soil that is unstable or that would become unstable as a result of the project, potentially resulting in on or off-site landslide, lateral spreading, subsidence, liquefaction or collapse. Therefore, impacts would be less than significant with mitigation.

Excavation and grading activities associated with the construction of the stitch wall have the potential to destabilize geological and soil resources. However, the retaining wall would be constructed in compliance with the California Building Code and all applicable design criteria provided in the geotechnical site investigations for the Canyon Lane Improvements (see Appendix G), per GEO/mm-1.1. Applicable design criteria include, but are not limited to, the following:

- Designing retaining walls to resist lateral pressures exerted from a media having an equivalent fluid weight of 55 pound-force per cubic foot.
- Providing subdrains within valleys or swales behind retaining walls to collect and discharge the subsurface seepage flow.
- Installing 4-inch diameter perforated pipes in drainage behind retaining walls.

Compliance with the California Building Code and implementation of GEO/mm-1.1 would ensure that construction of the retaining wall would not cause soils to be unstable, and impacts would be less than significant with mitigation.

Proposed Single-Family Residence

A significant impact may occur if a project is built in an unstable area without proper site preparation or design features that provide adequate building foundations, thus posing a hazard to life and property. The soils comprising the property are of Franciscan Sandstone, which consist of sandstone and lithic rock with interbedded siltstone and shale and local conglomerate. The soils comprising the property associated with the proposed single-family residence have relatively gentle slopes and show adequate site stability that exhibit shear resistance to sliding.[61] As a result, the potential for on or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse along Canyon Lane is considered low. Impacts would be less than significant.

Excavation and grading activities associated with the construction of the retaining wall have the potential to destabilize geologic and soil resources. However, the retaining wall would be constructed in compliance with the California Building Code and all applicable design criteria provided in the Geotechnical Site Investigations for the Canyon Lane Improvements (see Appendix G), per GEO/mm-1.1

[58] See Appendix G (Yang, J.H. 2014 Geotechnical Site Investigation for the Proposed Road and Waterline, Appendix AA).
[59] See Appendix G (Connelly, S.F. 2017. Applicant's Geologic Investigation for the Proposed Road and Water Main, p.5, Log Test Pit 1-3.)
[60] See Appendix G (Connelly, S.F. 2017. Applicant's Geologic Investigation for the Proposed Road and Water Main, p.10)
[61] See Appendix G (Yang, J.H. 2019 Geotechnical Site Investigation for the Proposed Single-Family Residence, p. 4).

(see discussion of Canyon Lane Improvements associated with Impact 3.7-3 for a subset of the design criteria to be implemented). Compliance with the California Building Code and implementation of GEO/mm-1.1 would ensure that construction of the retaining wall would not cause soils to be unstable, and impacts would be less than significant with mitigation.

Developable Parcels

The improvements to Canyon Lane would allow for the development of 11 parcels west of the proposed single-family residence. For the purposes of the analysis, it is assumed that the remaining 11 developable parcels would be developed within the current zoning designations (Residential Hillside within the City and Residential Hillside/Design Review within the County). A significant impact may occur if a project is built in an unstable area without proper site preparation or design features that provide adequate building foundations, thus posing a hazard to life and property. Future development on the developable parcels would require detailed site-specific geotechnical investigation to determine the potential for being located on a geologic unit or soil that is unstable, or that would become unstable as a result of the future development. The site-specific geotechnical investigation would identify and mitigate, if necessary, any potential geologic hazards during the future development and design of the developable parcels

Impact 3.7-4: Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property – No Impact

Canyon Lane Improvements, Proposed Single-Family Residence, Developable Parcels

A significant impact would occur if a project is built or operated on expansive soils without proper site preparation or design features that provide adequate foundations for project buildings, thus posing a hazard to life and property. The site-specific geotechnical study determined that the expansion potential of the soils encountered during the excavations along the roadway and within the property associated with the proposed single-family residence were classified as Low.[62] [63] Therefore, the project is not located on an expansive soil creating substantial risk to life or property, and no impact would occur.

Soils characteristics comprising the future developable parcels are likely similar to those found along the roadway and within the property associated with the single-family residence. However, future development on the developable parcels would include a detailed geotechnical investigation to determine the potential for expansive soils prior to the issuance of a grading permit. Impacts would be determined and mitigated, if necessary, during the future development and design of the developable parcels.

Impact 3.7-5: Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water – No Impact

Canyon Lane Improvements, Proposed Single-Family Residence, Developable Parcels

The project area is located within an urban area, and the proposed single-family residence and developable parcels would be able to tie into existing wastewater infrastructure that underlies Canyon

[62] See Appendix G (Yang, J.H. 2014 Geotechnical Site Investigation for the Proposed Road and Waterline, Appendix AA).
[63] See Appendix G (Yang, J.H. 2019 Geotechnical Site Investigation for the Proposed Single-Family Residence, Appendix A).

Lane via a new lateral. The proposed project would not require the use of septic or other alternative disposal wastewater systems. Therefore, there would be no impact.

Impact 3.7-6: Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature – Less than significant with mitigation

Canyon Lane Improvements, Proposed Single-Family Residence, Developable Parcels

Construction

Project related ground disturbance, such as grading, in previously undisturbed sediments could result in a significant impact to paleontological resources if construction were to impact sediments with high paleontological sensitivity. In the project area, the Pleistocene-aged alluvial fan deposits have been identified as having high paleontological sensitivity, while the other geologic units have low (Whiskey Hill Formation and sandstone of the Franciscan Complex) or no (Franciscan mélange) paleontological sensitivity. Mitigation measures GEO/mm-1.4 and GEO/mm-1.5 are proposed to reduce these impacts to less than significant levels through the design and implementation of a Paleontological Resources Monitoring and Mitigation Plan (PRMMP) that meets the standards of the Society of Vertebrate Paleontology (SVP) and includes worker training, paleontological resources monitoring, and the salvage and curation of any significant fossils that are encountered. Therefore, impacts on paleontological resources would be less than significant with mitigation.

Given the presence of geologic units with high paleontological sensitivity in the project area, future development of the developable parcels should include a paleontological resources assessment in order to evaluate the potential impacts to fossil resources.

Operation

Operation would not entail further ground disturbance, and therefore would not impact paleontological resources.

Geology and Soils Mitigation Measures	
GEO/mm-1.4	*A professional paleontologist meeting the standards of the Society of Vertebrate Paleontology (SVP) should be retained to develop a project-specific Paleontological Resources Monitoring and Mitigation Plan (PRMMP) that includes the following provisions:* *1. Worker Environmental Awareness Program (WEAP) training. Prior to the commencement of ground-disturbing activities the qualified paleontologist or their designee will provide a briefing to construction crews with information on regulatory requirements for the protection of paleontological resources and proper procedures to follow should unanticipated paleontological resources discoveries be made during construction.* *2. Monitoring for Paleontological Resources. Prior to ground disturbance a qualified paleontological monitor shall be retained to monitor ground disturbing activities in geologic formations with high paleontological sensitivity (Pleistocene-aged alluvial fan deposits). The purpose of the monitor will be to identify any fossil material that may be encountered, document and determine its significance, and, if significant, supervise the salvage of the specimens. Significant specimens should then be curated with an accredited institution, such as the University of California Museum of Paleontology (UCMP), following the procedures established by the SVP (SVP 2010).*

Geology and Soils Mitigation Measures	
GEO/mm-1.5	*In the event that paleontological resources are exposed during project work, regardless of the location or geologic units in which the fossils occur, work in the immediate vicinity of the find must stop until a qualified paleontologist can evaluate the significance of the find. Ground disturbing activities may continue in other areas outside an appropriate buffer, usually 50 feet. If the paleontologist determines the discovery to be significant, the fossil(s) should be salvaged.*

3.8 GREENHOUSE GASES

This section describes greenhouse gases (GHGs) and presents the current legislation and programs addressing climate change in California. It also analyzes GHG emissions associated with the project.

3.8.1 Existing Conditions

Natural and anthropogenic sources emit GHGs. GHGs allow high-frequency solar radiation to enter the earth's atmosphere and trap outgoing infrared radiation. This phenomenon is known as the greenhouse effect and plays a critical role in regulating the earth's temperature. While natural sources emit GHGs (e.g., forest fires, volcanic activity, decomposition, etc.), elevated concentrations of GHGs generated from anthropogenic activities are thought to be linked to global climate change, such as rising surface temperatures, melting icebergs and snowpack, rising sea levels, and the increasing frequency and magnitude of severe weather. Primary anthropogenic sources of GHGs include industrial processes, landfills, and the consumption of fossil fuels for power generation, transportation, heating, and cooking

GHGs include carbon dioxide (CO_2), methane, ozone, water vapor, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexaflouride. Carbon dioxide is the most abundant GHG. Other GHGs are less abundant, but have higher global warming potential than CO_2. Thus, emissions of other GHGs are frequently expressed in the equivalent mass of CO_2, denoted as CO_2e.

Continued emissions of GHGs will cause further warming of the planet and have serious social and environmental impacts. In California, average annual maximum daily temperature is projected to increase by 5.6 to 8.8 degrees Fahrenheit by 2100, leading to more heat-related deaths. Climate forecasts predict that hotter conditions will lead to a reduction in the State's snowpack, water shortages, declining soil moisture in agricultural regions, increased frequency and intensity of wildfires, significant erosion of beaches, flooding of transportation infrastructure, and stresses to the electrical systems as electricity demand increases.[1]

3.8.2 Regulatory Setting

Federal

U.S. Environmental Protection Agency "Endangerment" and "Cause or Contribute" Findings.

On December 7, 2009, the Administrator of the U.S. Environmental Protection Agency signed the following two findings regarding GHGs under Section 202(a) of the Clean Air Act:[2]

- **Endangerment Finding.** The current and projected concentrations of six key GHGs – CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride – threaten the public health and welfare of current and future generations.

[1] State of California. 2018. California's Fourth Climate Change Assessment. Available online at http://www.climateassessment.ca.gov/. Accessed March 16, 2019.
[2] Environmental Protection Agency. 2019. Greenhouse Gas Emissions. Available online at https://www.epa.gov/ghgemissions/endangerment-and-cause-or-contribute-findings-greenhouse-gases-under-section-202a-clean. Accessed March 16, 2019.

- **Cause or Contribute Finding.** The combined emissions of the above GHGs from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare.

State

Governors Executive Orders

Executive Order S-3-05 was signed in 2005 and established GHG reduction targets, which included reducing GHG emissions to 2000 levels by 2010, reducing GHG emissions to 1990 levels by 2020, and reducing GHG emissions to 80 percent below 1990 levels by 2050. As discussed below, the 2020 reduction was codified in 2006 as Assembly Bill (AB) 32.[3]

Executive Order B-30-15 was signed in 2015 and established a Statewide GHG reduction target of 40 percent below 1990 levels by 2030. The order directed State agencies with jurisdiction over GHG emissions to implement measures to achieve the GHG reduction target by 2030. As discussed below, Senate Bill (SB) 32 was signed in 2016, which codified the 2030 reduction.[4]

Executive Order B-55-18 was signed in 2018 and commits the State to achieve carbon neutrality no later than 2045. The order is intended to serve as an addition to existing Statewide GHG reduction targets (e.g., Executive Order B-30-15 and SB 32).[5]

Global Warming Solutions Act of 2006

The Global Warming Solutions Act of 2006 (AB 32) designates the California Air Resources Board (CARB) as the State agency charged with monitoring and regulating GHG emissions. CARB is required to adopt rules in order to achieve a reduction in GHGs to 1990 levels by 2020. Pursuant to AB 32, CARB also adopted a Scoping Plan in 2008, which detailed a strategy for achieving the maximum technologically feasible and cost-effective reductions in GHG emissions from sources or categories of sources of GHGs by 2020. The Scoping Plan is required to be updated at least every five years. The latest Scoping Plan update was adopted in December 2017 and addressed the 2030 GHG reduction target set by SB 32. SB 32 was signed in 2016 and expanded upon the GHG reduction targets set by AB 32. Specifically, SB 32 requires a reduction in GHGs by 40 percent below 1990 levels by 2030.

Senate Bill 605

SB 605 directs CARB to complete a comprehensive strategy to reduce emissions of short-lived climate pollutants in the State by January 1, 2016. Short-lived climate pollutants are defined as "an agent that has a relatively short lifetime in the atmosphere, from a few days to a few decades, and a warming influence on the climate that is more potent than that of carbon dioxide."[6] To develop the strategy for reducing short-lived climate pollutants, CARB inventoried sources of short-lived emissions based on available data, identified research needs, identified existing and potential new emission control technologies and

[3] State of California. 2019. California Climate Change Executive Orders. Available online at https://www.climatechange.ca.gov/state/executive_orders.html. Accessed March 16, 2019.
[4] State of California. 2019. California Climate Change Executive Orders. Available online at https://www.climatechange.ca.gov/state/executive_orders.html. Accessed March 16, 2019.
[5] State of California. 2018. Executive Order B-55-18. Available online at https://www.gov.ca.gov/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf. Accessed March 16, 2019.
[6] Senate Bill 605, Chapter 523. Available online at https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB605. Accessed March 16, 2019.

measures, and prioritized the development of new measures for reducing short-lived emissions that offered co-benefits by improving water quality or other air pollutants for disadvantaged communities.[7]

Senate Bill 375

SB 375 was passed in 2008 and requires the incorporation of a sustainable communities strategy into regional transportation plans developed by the State's 18 metropolitan planning organizations. The intention of the sustainable community strategy is to align regional transportation planning efforts, regional GHG emissions reduction targets, and land use policies to help achieve AB 32 GHG reduction targets.[8]

Renewables Portfolio Standards

The State's Renewable Portfolio Standards was created in 2002 by SB 1078, which required that 20 percent of the State's energy be procured from eligible renewable sources. Renewable Portfolio Standards goals have been accelerated over time, most recently with SB 100, which was signed in 2018 and requires 100 percent clean energy procurement by 2045.[9]

Local

Bay Area Air Quality Management District

The Bay Area Air Quality Management District (BAAQMD) is the primary agency responsible for ensuring attainment of the National and California Ambient Air Quality Standards in its jurisdiction. The BAAQMD jurisdiction includes Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara Counties, and the southern portions of Solano and Sonoma Counties.

The 2017 BAAQMD Air Quality Guidelines are intended to assist lead agencies in evaluating air quality impacts (including GHG emissions) of projects and plans proposed within the San Francisco Bay Air Basin. The Guidelines contain instructions on how to evaluate, measure, and mitigate air quality impacts generated from project construction and operation activities. The Guidelines also established thresholds of significance for impacts related to GHG emissions.[10]

The Energy Efficiency Climate Action Plan

The County Energy Efficiency Climate Action Plan (EECAP) reflects the County's commitment to reducing GHG emissions. The EECAP provides a path for energy efficiency and GHG reduction goals by 2020. The plan includes an inventory of baseline GHG emissions for the year 2005 and presents a suite of GHG reduction strategies to meet State and County GHG reductions targets. The EECAP also serves to

[7] Senate Bill 605, Chapter 523. Available online at https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB605. Accessed March 16, 2019.
[8] Senate Bill 375, Chapter 728. Available online at https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200720080SB375. Accessed March 16., 2019.
[9] K. Poloncarz and J, Levine. 2018. Governor Jerry Brown Signs SB 100 and Executive Order to Achieve Carbon neutrality by 20145. Available online at https://www.insideenergyandenvironment.com/2018/09/governor-jerry-brown-signs-sb-100-and-executive-order-to-achieve-carbon-neutrality-by-2045/. Accessed March 16, 2019.
[10] Bay Area Air Quality Management District. 2017. California Environmental Quality Act Air Quality Guidelines. Available online at http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed March 16, 2019.

streamline future environmental reviews of development projects and meets the BAAQMD expectations for a Qualified GHG Reduction Strategy.[11]

Regional Transportation Plan and Sustainable Communities Strategy

Adopted in 2013 and updated in 2017 by the Association of Bay Area Governments (ABAG) in response to SB 375, the Regional Transportation Plan and Sustainable Communities Strategy, known as Plan Bay Area, integrates future land use patterns with transportation planning. The intention is that by integrating land use and transportation planning, GHG emissions from the transportation sector can be reduced. For the Bay Area, the CARB has set a per capita reduction in GHG emissions of 10 percent by 2020 and 16 percent by 2035.[12] To achieve this goal, the plan includes required and voluntary performance measures for the region. The most pertinent performance measures include providing housing and transportation affordability, climate protection (GHGs target), adequate housing, healthy and safe communities, mobility and accessibility (travel and equitable access), climate protection (greenhouse gas emissions target), and transportation system effectiveness.

San Mateo County General Plan—Energy and Climate Change

The County General Plan's Energy and Climate Change Element contains policies to reduce GHGs from new development projects. The following County General Plan policies are relevant to the project:

- **Policy 1.2:** Evaluate the GHG emissions impacts of development projects as part of plan review.
- **Policy 2.3:** Develop a program for unincorporated communities to reduce heat gain in buildings and sequester greenhouse gases through tree planting and other "cooling" strategies.
- **Policy 2.5:** Continue implementation of green building standards that exceed state energy efficiency standards.
- **Policy 3.1:** Identify opportunities for new and existing development to incorporate on-site distributed energy resources into project design and construction.

Redwood City General Plan—Built Environment

The City General Plan's Urban Form and Land Use Element contains policies and programs to reduce GHG emissions from new development. The following City General Plan policies and programs are relevant to the project:

- **Policy BE-22.2:** Development must incorporate sustainability features, including features that minimize energy and water use, limit carbon emissions, provide opportunities for local power generation and food production, and provide areas for recreation.
- **Program BE-26:** Implement a citywide green building program that requires innovative measures to create buildings that are more energy efficient, less water and resource intensive, and healthier for occupants through the Green Building Ordinance and other mechanisms.

[11] San Mateo County. 2013. Energy Efficiency Climate Action Plan. Available online at https://www.smcsustainability.org/download/climate-change/Energy-Efficiency-Climate-Action-Plan.pdf. Accessed March 16, 2019.

[12] Metropolitan Transportation Commission and Association of Bay Area Governments. 2019. Plan Bay Area 2040, Performance Chapter. Available online at https://www.planbayarea.org/sites/default/files/pdfs_referenced/5-performance.pdf. Accessed March 16, 2019.

Redwood City General Plan—Natural Resources

The City General Plan's Natural Resources Element contains policies and programs to reduce GHG emissions from new development. The following City General Plan policies and programs are relevant to the project:

- **Policy NR-4.1:** Support energy efficiency through the City's Municipal Code Green Building Ordinance.
- **Program NR-13:** Promote sustainable building and energy conserving design, construction, and operations through the Green Building Ordinance. Encourage owners of existing building to conduct energy and water conservation retrofits.

3.8.3 Thresholds of Significance

The significance of potential greenhouse gas impacts is based on thresholds identified within Appendix G of the CEQA Guidelines, shown below.

Impacts would be considered significant if the project would:

a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment, based on any applicable threshold of significance.

b. Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

The BAAQMD established emissions-based thresholds of significance for GHG emissions. If a project were to generate GHG emissions in excess of this threshold, the project would be considered to contribute substantially to a cumulative impact, and would be considered significant. The BAAQMD established a threshold of significance for GHG emissions associated with land use development projects. For land use development projects, the project must not conflict with a qualified GHG Reduction Strategy or have annual emissions greater than 1,100 metric tons per year (MT/yr) during operation. The BAAQMD does not establish a GHG threshold of significance for construction-related emissions. Land use development projects include residential, commercial, industrial, and public land uses and facilities.[13]

The BAAQMD also established screening criteria for operational GHG emissions. If the construction of single-family residential projects includes less than 56 dwelling units, then the project would not result in the generation of operational-related GHG emissions that exceed the 1,100 MT of CO2e/yr GHG threshold of significance for projects other than permitted stationary sources.

3.8.4 Impact Assessment and Methodology

The City and County have not established significance criteria for GHG emissions. As a result, the significance of project GHG impacts was evaluated using the 2017 BAAQMD Air Quality Guidelines. The BAAQMD's approach to developing GHG thresholds of significance for CEQA evaluations involved identifying an emission level for which a project would not substantially conflict with existing State legislation aimed at reducing GHG emissions. The GHG impacts do not vary by project component, and as a result, have been combined in the impacts sections that follow.

[13] Bay Area Air Quality Management District. 2017. California Environmental Quality Act Air Quality Guidelines. Available online at http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed March 16, 2019.

The potential for the project to conflict with an applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of GHGs was evaluated by examining any potential conflicts with GHG reduction measures related to AB 32, the San Mateo County EECAP, and Regional Transportation Plan and Sustainable Communities Strategy.

3.8.5 Project-Specific Impacts and Mitigation Measures

Potential Impact 3.8-1: The potential to generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment, based on any applicable threshold of significance – Less than Significant with Mitigation

Construction

Construction of the project would require the use of construction equipment and worker vehicles that would generate GHG emissions. As previously described, the BAAQMD has not established thresholds of significance for construction-related GHG emissions. Therefore, GHG emissions during construction activities was not estimated. The project would implement the following Best Management Practices (BMPs) to reduce construction-related GHG emissions, as recommended by the BAAQMD:

- Alternative fuel (e.g., biodiesel, electric) will be used on at least 15 percent of construction vehicles/equipment;
- Local suppliers will supply at least 10 percent of building materials; and,
- At least 50 percent of all construction waste or demolition material will be recycled.

In addition, the project would implement Mitigation Measures GHG/mm-1.1 through GHG/mm-1.3, shown below, which would further reduce construction-related GHG emissions. Measure GHG/mm-1 would require construction workers living outside of the County to meet at designated areas and carpool to the project area to the extent feasible. Measure GHG/mm-2 would limit construction vehicle and equipment idling to the extent feasible. Measure GHG/mm-3 would require all off-road construction engines meet Tier 2 California Emission Standards for Off-Road Compression Ignition Engines. With implementation of BMPs and GHG/mm-1 through GHG/mm-3, construction-related GHG emissions would be less than significant.

GHG Mitigation Measures	
GHG/mm-1.1	*To the extent feasible, construction workers living outside San Mateo County shall meet at designated areas and be transported (in carpools) to the project area.*
GHG/mm-1.2	*Idling of construction vehicles and equipment shall be minimized to the extent feasible. Construction foremen shall include briefing crews on vehicle use as part of pre-construction conferences. These briefings shall include discussion of "common sense" vehicle use.*
GHG/mm-1.3	*All off-road construction diesel engines shall meet Tier 2 California Emission Standards for Off-Road Compression-Ignition Engines.*

Operation

Operation of the project would generate GHG emissions primarily from vehicle travel to and from the site. Indirect GHG emissions resulting from the project would include offsite generation of electricity. Operation of the project would generate 16.19 MT/yr of CO_2e emissions, which is well below the BAAQMD threshold of 1,100 MT/yr (see Appendix C for CalEEMod results). Furthermore, the project would involve the construction of one residence, which is below the BAAQMD GHG screening criteria of 56 dwelling units for single-family residences. Similarly, the future 11 residences would not exceed the BAAQMD GHG screening criteria of 56 dwelling units for single-family residences. As a result, operational project GHG emission impacts would be less than significant.

Potential Impact 3.8-2: The potential to conflict with any applicable plan, policy, regulation or an agency adopted for the purpose of reducing the emissions of greenhouse gases – Less than Significant

The project would be in compliance with all applicable GHG reduction measures provided in the San Mateo County EECAP. The residence would be required to incorporate energy efficiency features in compliance with the state building and energy efficiency standards. The project would implement Mitigation Measure BIO/mm-8.3 (described in Section 3.4, Biological Resources), which would require that the 32 riparian trees subject to removal be replaced at a ratio dependent on the size class and species type of the removed trees, for a total of 103 new trees. These 71 net new trees would help to mitigate the urban heat island effect[14] and reduce the residents' electricity consumption over time (thereby reducing indirect GHG emissions).

The project would not conflict with any required performance measures provided in the Regional Transportation Plan and Sustainable Communities Strategy for the San Francisco Bay Area 2013–2040. The project would occur within an urbanized area and would increase population density in the area. The project would also contribute to the region's housing stock without displacing existing residents.

As above, the net emissions associated with the project would be well below the BAAQMD thresholds, and the project would not conflict with plans, policies, or regulations for GHG reduction. The project is consistent with the Bay Area Regional Transportation Plan and Sustainable Communities Strategy, San Mateo County EECAP, and GHG reduction policies of the County and City General Plans. Therefore, the project would not result in substantial impacts to GHG emissions in relation to violation of any applicable plan, policy, or regulation related to GHG reduction, and impacts would be less than significant.

[14] The urban heat island effect is a phenomena that describes an urban environment that is warmer than its surrounding rural area due to human activities and modifications of landforms.

3.9 HAZARDS AND HAZARDOUS MATERIALS

This section provides an analysis of potential hazards and hazardous materials that currently exist within the project area or that could exist as a result of project implementation. This section summarizes the overall regulatory framework for hazardous materials management through the County Environmental Health Services, State, and Federal regulatory requirements and describes existing conditions in the project vicinity, the criteria used to evaluate the significance of potential impacts, the methods used to evaluate these impacts, and the results of the impact assessment.

3.9.1 Existing Conditions

Fire Hazards

The project is located within the urban wildland interface in the Emerald Lake Hills community of the County. Emerald Lake Hills is identified in the San Mateo–Santa Cruz Unit Strategic Fire Plan as a community at risk.[1] As described in Section 3.19, Wildfire, a portion of the project area falls within a State Responsibility Area (SRA) within a designated Very High Fire Hazard Severity Zone rating. The remaining portion of the project area falls within a Local Responsibility Area within a designated Very High Fire Hazard Severity Zone rating. Fire hazard severity zone ratings are based on the degree of fire risk and reflect the history and intensity of wildfires in the area, size and type of vegetation in the area, and proximity to extinguishing resources.

According to the historic fire records contained within CAL FIRE's Fire and Resource Assessment Program[2] database, there have been three large wildfires in the project vicinity since 1962. The reason for the previous lack of fire activity has been attributed to weather impacts, changes in forest management, extended fire regimes, aggressive firefighting, and other reasons.[3]

The San Mateo-Santa Cruz CAL FIRE unit responded to 246 ignitions in 2017 in San Mateo and Santa Cruz Counties. Approximately 98 percent of these ignitions were kept to less than 10 acres in size. The top four causes of these 2017 wildfires are listed as undetermined, electrical power, miscellaneous, and debris burning.[4]

A site-specific Wildfire Assessment was conducted for the project. This assessment classified vegetation within the project area into fuel models based on the fire behavior that they are expected to exhibit during a wildfire. In the event of an ignition, the fuels identified within the project area are predicted to burn with a low to moderate intensity. Additional information regarding wildfire hazards is provided in Section 3.19, Wildfire, and Appendix I, Wildfire Assessment.

[1] CAL FIRE. 2018 San Mateo-Santa Cruz Unit Strategic Plan. Available online at http://cdfdata.fire.ca.gov/pub/fireplan/fpupload/fpppdf1618.pdf. Accessed on March 12, 2019.
2 CAL FIRE. 2018. Fire and Resource Assessment Program-California's Forests and Rangelands: 2017 Assessment. Available online at http://frap.fire.ca.gov/assessment2017/index. Accessed on March 7, 2019.
3 San Mateo County. 2015. San Mateo County Hazard Vulnerability Assessment. Available online at https://hsd.smcsheriff.com/sites/default/files/downloadables/2%20-%20Hazard%20Vulnerability%20Assessment.pdf. Accessed on March 7, 2019.
4 CAL FIRE. 2018. San Mateo-Santa Cruz Unit Strategic Plan. Available online at http://cdfdata.fire.ca.gov/pub/fireplan/fpupload/fpppdf1618.pdf. Accessed on March 12, 2019.

Hazardous Materials

Under California Code of Regulations (CCR) Title 22, the term "hazardous substance" refers to both hazardous materials and hazardous wastes. Both of these are classified according to four properties: (1) toxicity, (2) ignitability, (3) corrosiveness, and (4) reactivity (CCR Title 22, Chapter 11, Article 3). A hazardous material is defined in CCR Title 22 as:

> …A substance or combination of substances which, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of or otherwise managed (CCR Title 22, Section 66260.10).

Chemical and physical properties that cause a substance to be considered hazardous, including the properties of toxicity, ignitability, corrosivity, and reactivity, are defined in 22 CCR Sections 66261.20–66261.24. Factors that influence the health effects of exposure to hazardous materials include the dose to which the person is exposed, the frequency of exposure, the exposure pathway, and individual susceptibility.

Public health hazards from hazardous materials may also occur through contamination of soils or groundwater, or through airborne releases of vapors, fumes, or dust. Exposure to hazardous materials and wastes could cause various short-term or long-term health effects. The health effects would be specific to each substance or combination of substances.

Regional Public Health and Hazardous Materials and Waste Sites

Government Code Section 65962.5, commonly referred to as the "Cortese List," was enacted in 1985, effective 1992. The Cortese List was a consortium of various regulatory databases listing hazardous material sites provided by numerous Federal, State, and local agencies. Changes in web-based information availability since 1992 have rendered consolidation of this list no longer necessary. The databases listing hazardous material sites are now maintained on an individual basis by the responsible agencies. These databases and the agencies responsible for maintaining these lists are described in the subsections that follow.

Leaking Underground Storage Tank Sites

The California State Water Resources Control Board (SWRCB) maintains an online database system—Geotracker—that contains Statewide environmental data for Leaking Underground Storage Tank (LUST) sites.[5] LUSTs can cause significant public health and safety impacts due to contamination of drinking water aquifers, exposure to contaminated soil, and inhalation of vapors. The closest recorded LUST is located approximately 0.5 mile east of the project. The LUST was discharging gasoline into the groundwater. The site has undergone remediation and is currently being monitored on an annual basis to determine the potential for a rebound in contaminant concentrations.

Hazardous Waste and Substance Sites

The California Department of Toxic Substances Control (DTSC) maintains an online database system—Envirostar—that allows for the tracking and cleanup, permitting, enforcement, and investigation efforts at

[5] SWRCB. 2018. Geotracker. Available online at https://calepa.ca.gov/sitecleanup/corteselist/. Accessed March 16, 2019.

hazardous waste facilities and sites with known or suspected contamination issues.[6] Six hazardous waste and substance sites are located within the County; however, none are located within the unincorporated areas of the County or within the City. The closest hazardous waste facility is located within the City of Menlo Park, approximately 4 miles southeast of the project. The site was previously used for dry cleaning operations and potentially leaked contaminants (1,2-Dichloroethylene, tetrachloroethylene, trichloroethylene, and vinyl chloride) into the groundwater. Remediation is currently underway and is expected to continue into 2020.

Solid Waste Disposal Sites

The SWRCB compiles a list of solid waste disposal sites with waste constituents above hazardous waste levels.[7] No sites are located within the County or City.

Cease and Desist Orders and Cleanup Abatement Orders

The SWRCB compiles a list of active Cease and Desist Orders and Cleanup Abatement Orders that do not concern the discharge of hazardous material wastes. Many of the listed orders concern discharges of domestic sewage, food processing wastes, and sediment.[8] Forty-one listed orders are located within the County, the closest of which is located within the City, approximately 1.8 miles northeast of the project area.

Schools

The closest school to the project area is the Sequoia Preschool and Kindergarten, which is located approximately 0.6 mile northwest of the project area.

Airports

The closest airport to the project area is the San Carlos Airport, which is located approximately 3 miles northeast of the project area.

3.9.2 Regulatory Setting

Federal

United States Environmental Protection Agency

The United States Environmental Protection Agency (EPA) was established in 1970 to consolidate in one agency a variety of Federal research, monitoring, standard-setting, and enforcement activities to ensure environmental protection. The EPA's mission is to protect human health and to safeguard the natural environment—air, water, and land—upon which life depends. The EPA works to develop and enforce regulations that implement environmental laws enacted by Congress, is responsible for researching and setting national standards for a variety of environmental programs, and delegates to states and tribes the

[6] DTSC. 2019. Hazardous Waste and Substances Site List. Available online at https://www.dtsc.ca.gov/SiteCleanup/Cortese_List.cfm. Accessed March 16, 2019.
[7] SWRCB. 2019. Sites Identified with Waste Constituents Above Hazardous Waste Levels Outside the Waste Management Unit. Available online at https://calepa.ca.gov/wp-content/uploads/sites/6/2016/10/SiteCleanup-CorteseList-CurrentList.pdf. Accessed March 16, 2019.
[8] SWRCB. 2019. Cease and Desist Orders and Cleanup Abatement Orders. Available online at https://calepa.ca.gov/sitecleanup/corteselist/. Accessed March 16, 2019/

responsibility for issuing permits and for monitoring and enforcing compliance. Where national standards are not met, the EPA can issue sanctions and take other steps to assist the states and tribes in reaching the desired levels of environmental quality.

Federal Toxic Substances Control Act / Resource Conservation and Recovery Act / Hazardous and Solid Waste Act

The Federal Toxic Substances Control Act of 1976 and the Resource Conservation and Recovery Act (RCRA) of 1976 established a program administered by the USEPA for the regulation of the generation, transportation, treatment, storage, and disposal of hazardous waste. The RCRA was amended in 1984 by the Hazardous and Solid Waste Act (HSWA), which affirmed and extended the "cradle to grave" system of regulating hazardous wastes.

Comprehensive Environmental Response, Compensation, and Liability Act / Superfund Amendments and Reauthorization Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was enacted by Congress on December 11, 1980. This law provides broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA establishes requirements concerning closed and abandoned hazardous waste sites; provides for liability of persons responsible for releases of hazardous waste at these sites; and establishes a trust fund to provide for cleanup when no responsible party can be identified. The CERCLA also enables the revision of the National Contingency Plan (NCP). The NCP provides the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, and/or contaminants. The NCP also established the National Priorities List (NPL). The NPL is the list of sites of national priority among the known releases or threatened releases of hazardous materials. These priority sites are listed on the DTSC Envirostar database. CERCLA was amended by the Superfund Amendments and Reauthorization Act (SARA) on October 17, 1986. SARA requires the EPA to assess the degree of risk to the public and environment associated with on sites on the NPL. It also increased the Superfund trust fund by $9.5 billion.

Clean Water Act / Spill, Prevention, Control, and Countermeasure Rule

The Clean Water Act (formally the Federal Water Pollution Control Act of 1972) was enacted with the intent of restoring and maintaining the chemical, physical, and biological integrity of the waters of the United States. As part of the CWA, the USEPA oversees and enforces the Oil Pollution Prevention regulation contained in Title 40 of the CFR, Part 112 (40 CFR Part 112), which is often referred to as the "SPCC [Spill, Prevention, Control, and Countermeasure] rule" because the regulations describe the requirements for facilities to prepare, amend, and implement SPCC plans. A facility is subject to SPCC regulations if a single oil storage tank has a capacity greater than 660 gallons, or the total above ground oil storage capacity exceeds 1,320 gallons, or the underground oil storage capacity exceeds 42,000 gallons, and if, due to its location, the facility could reasonably be expected to discharge oil into or upon the "navigable waters" of the U.S.

Other Federal regulations overseen by the EPA relevant to hazardous materials and environmental contamination include Title 40 CFR Chapter 1, Subchapter D – Water Programs and Subchapter I – Solid Wastes. Title 40 CFR Chapter 1, Subchapter D, Parts 116 and 117 designate hazardous substances under the CWA. Title 40 CFR Part 116 sets forth a determination of the reportable quantity for each substance that is designated as hazardous. Title 40 CFR Part 117 applies to quantities of designated substances equal to or greater than the reportable quantities that may be discharged into waters of the U.S.

Occupational Safety and Health Administration

The mission of the Occupational Safety and Health Administration (OSHA) is to ensure the safety and health of America's workers by setting and enforcing standards; providing training, outreach, and education; establishing partnerships; and encouraging continual improvement in workplace safety and health. OSHA staff establishes and enforces protective standards and reaches out to employers and employees through technical assistance and consultation programs. OSHA standards are listed in Title 29 CFR Part 1910.

National Weather Service

Under extreme fire weather conditions, the National Weather Service (NWS) issues Red Flag Warnings for all affected areas. A Red Flag Warning means that any ignition could result in a large-scale, damaging wildfire. Red Flag conditions reflect sustained wind speed lasting more than 8 hours, low relative humidity, and dry vegetation.

State

California Environmental Protection Agency

The California Environmental Protection Agency (Cal/EPA) was created in 1991, which unified California's environmental authority in a single cabinet-level agency and brought the CARB, SWRCB, RWQCBs, California Department of Resources Recycling and Recovery (CalRecycle), DTSC, Office of Environmental Health Hazard Assessment, and Department of Pesticide Regulation under one agency. These agencies were placed within the Cal/EPA "umbrella" for the protection of human health and the environment and to ensure the coordinated deployment of State resources. Their mission is to restore, protect, and enhance the environment, to ensure public health, environmental quality, and economic vitality.

The DTSC is a department of Cal/EPA and is the primary agency in California that regulates hazardous waste, cleans up existing contamination, and looks for ways to reduce the hazardous waste produced in California. DTSC regulates hazardous waste in California primarily under the authority of RCRA and the California Health and Safety Code. Other laws that affect hazardous waste are specific to handling, storage, transportation, disposal, treatment, reduction, cleanup, and emergency planning. Several key laws pertaining to hazardous wastes are discussed below.

Hazardous Waste Control Act

The Hazardous Waste Control Act (HWCA) created the State hazardous waste management program, which is similar to but more stringent than the Federal RCRA program. The HWCA is implemented by regulations contained in CCR Title 26, which describes aspects for the proper management of hazardous waste. These regulations list more than 800 materials that may be hazardous and establish criteria for identifying, packaging, and disposing of such waste. Under the HWCA and CCR Title 26, the generator of hazardous waste must complete a manifest that accompanies the waste from generator to transporter to the ultimate disposal location. Copies of the manifest must be filed with the DTSC.

California Office of Emergency Services

In order to protect the public health and safety and the environment, the California Office of Emergency Services (OES) is responsible for establishing and managing Statewide standards for business and area plans relating to the handling and release or threatened release of hazardous materials. Basic information

on hazardous materials handled, used, stored, or disposed of (including location, type, quantity, and the health risks) needs to be available to firefighters, public safety officers, and regulatory agencies and needs to be included in business plans in order to prevent or mitigate the damage to the health and safety of persons and the environment from the release or threatened release of these materials into the workplace and environment. These regulations are covered under Chapter 6.95 of the California Health and Safety Code Article 1 – Hazardous Materials Release Response and Inventory Program (Sections 25500–25520) and Article 2 – Hazardous Materials Management (Sections 25531–25543.3).

CCR Title 19, Public Safety, Division 2, OES, Chapter 4 – Hazardous Material Release Reporting, Inventory, and Response Plans, Article 4 (Minimum Standards for Business Plans) establishes minimum Statewide standards for Hazardous Materials Business Plans (HMBPs). These plans shall include the following: (1) a hazardous material inventory in accordance with Sections 2729.2–2729.7; (2) emergency response plans and procedures in accordance with Section 2731; and (3) training program information in accordance with Section 2732. Business plans contain basic information on the location, type, quantity, and health risks of hazardous materials stored, used, or disposed of in the State. Each business shall prepare a HMBP if that business uses, handles, or stores a hazardous material or an extremely hazardous material in quantities greater than or equal to the following:

- 500 pounds of a solid substance;
- 55 gallons of a liquid;
- 200 cubic feet of compressed gas;
- A hazardous compressed gas in any amount; or,
- Hazardous waste in any quantity.

California Occupational Safety and Health Administration

California Occupational Safety and Health Administration (Cal/OSHA) is the primary agency responsible for worker safety in the handling and use of chemicals in the workplace. Cal/OSHA standards are generally more stringent than Federal regulations. The employer is required to monitor worker exposure to listed hazardous substances and notify workers of exposure (8 CCR Sections 337–340). The regulations specify requirements for employee training, availability of safety equipment, accident-prevention programs, and hazardous substance exposure warnings.

Public Resources Code Sections 4201-5 (Chapter 806, Statutes of 1982)

Public Resources Code Sections 4201-5 requires CAL FIRE to zone all SRAs according to the degree of fire hazard severity. Designation of these zones are based on fuel loading, slope, critical weather, and other relevant factors. CAL FIRE produces maps of each County that identifies SRAs and associated FHSZs. CALFIRE periodically reviews the fire hazard severity zones and updates when appropriate.

Government Code Sections 51175-89 (Chapter 1118, Statutes of 1992)

Government Code Sections 51175-89 requires CAL FIRE to make recommendations for very high fire hazard severity zones to local responsibility areas for adoption via local ordinance. It also provides guidance on ways that local jurisdictions can reduce wildfire risks and minimize the loss of wildfire damage to life, property, or resources.

Local

San Mateo County General Plan—Natural Hazards

The County General Plan contains goals and policies to minimize the risks that wildfires pose to people and property. The wildfire related goals policies relevant to the project are provided in Chapter 3.19, Wildfire.

San Mateo County General Plan—Man-Made Hazards

The County General Plan contains goals, policies, and programs to minimize threats of hazardous materials. The following goals policies, and programs related to hazardous materials are relevant to the project:

- **Goal 16.47:** Strive to protect public health and safety, environmental quality, and property from the adverse effects of hazardous materials through adequate and responsible management practices.
- **Goal 16.48:** Strive to ensure that hazardous waste generated within San Mateo County is stored, treated, transported and disposed of in a legal and environmentally safe manner so as to prevent human health hazard and/or ecological disruption.
- **Goal 16.49:** Strive to reduce public exposure to hazardous materials through programs which: (1) promote safe transportation, (2) prevent accidental discharge, and (3) promote effective incident response, utilizing extensive inventory and monitoring techniques.
- **Goal 16.50:** Strive to reduce public exposure to hazardous waste through programs which: (1) emphasize decreased generation of hazardous waste, (2) promote increased disposal capability for small generators of hazardous waste, including households and small businesses, (3) promote safe transportation of hazardous waste, (4) promote treatment and processing techniques as alternatives to landfill disposal of hazardous waste, and (5) prevent illegal disposal of hazardous waste.
- **Policy 16.53:** Regulate the location of uses involving the manufacture, storage, transportation, use, treatment, and disposal of hazardous materials to ensure community compatibility. Provide adequate siting, design, and operating standards.
- **Policy 16.55:** Encourage fire protection agencies serving the unincorporated area to adopt and enforce existing Uniform Fire Code provisions which authorize fire agency issuance of hazardous material storage permits so as to: (1) assure proper hazardous material storage, (2) prevent accidental discharge or spill, and (3) provide necessary inventory information beneficial to timely and efficient incident response and containment. Assure that relevant hazardous material inventory information is referred to the County, and made available to the public.
- **Goal 16.68:** Strive toward safe building construction and full elimination of hazardous conditions.
- **Policy 16.70:** Regulate building construction practices to prevent hazardous structures and assure structural safety. Measures may include required conformance to an accepted set of construction standards, and authority to inspect suspected 16.13P dangerous buildings, halt improper construction activities, and eliminate hazardous conditions.

City of Redwood City General Plan—Public Safety

The City General Plan contains programs and policies to minimize wildfire threats to public safety. The wildfire related goals and policies relevant to the project are provided in Chapter 3.19, Wildfire. The City General Plan Public Safety Element also contains programs and policies aimed at minimizing threats from hazardous materials.

- **Policy PS-8.1:** Establish policies to regulate and reduce hazardous waste within Redwood City that are consistent with the County's Hazardous Waste Management Plan and other County regulatory programs.
- **Policy PS-8.4:** Encourage the use of green building practices to reduce potentially hazardous materials in construction materials.

County of San Mateo Emergency Operations Plan

The County Emergency Operations Plan provides policies and procedures to govern the effective management of emergency operations within the San Mateo County Operational Area (SMCOA). The plan also assigns roles and responsibilities to County agencies involved in managing emergency operations. The SMCOA is comprised of all local governments within the geographic area of the County, special districts, unincorporated areas, and participating non-governmental entities. The primary objective of the plan is to provide for the "effective coordination of response forces and resources in preparing for and responding to situations associated with natural disasters, technological incidents and national security emergencies."[9] The Plan defines the roles and responsibilities of various agency departments in aiding in various emergency operational functions, including fire and rescue and emergency evacuation.

The San Carlos Airport Land Use Compatibility Plan

The San Carlos Airport Land Use Compatibility Plan (ALUCP) identifies an Airport Influence Area, which is broken down into Area A and Area B.[10] Area A requires real estate disclosure of the presence of the airport. Area B requires new plans and projects to demonstrate consistency with the goals and policies of the ALUCP. The project area is located within Area A.

3.9.3 Thresholds of Significance

The significance of potential hazards and hazardous materials impacts are based on thresholds identified within Appendix G of the CEQA Guidelines, shown below.

Impacts would be considered significant if the project would have:

a. The potential to create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.

b. The potential to 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.

[9] County of San Mateo Emergency Operations Plan Basic Plan. 2015. Available online at https://hsd.smcsheriff.com/sites/default/files/downloadables/1%20-%20Emergency%20Operations%20Plan.pdf. Accessed on March 16, 2019.

[10] ESA. 2015. Final Comprehensive Airport Land Use Compatibility Plan For the Environs of San Carlos Airport. Available online at http://ccag.ca.gov/wp-content/uploads/2015/11/SQL_FinalALUCP_Oct15_read.pdf. Accessed March 16, 2019.

c. The potential to emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.

d. The potential to be located on a site which is included on a list of hazardous materials sites complied pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment.

e. The potential 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, where the project could result in a safety hazard or excessive noise for people residing or working in the project area.

f. The potential to impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

g. The potential to expose individuals or structures, either directly or indirectly, to a significant risk of loss due to wildfires.

3.9.4 Impact Assessment and Methodology

This impact analysis focuses on potential effects associated with the project related to Hazards and Hazardous Materials. The analysis is based on an assessment of existing conditions at the project area; a review of relevant environmental databases; applicable statutes, regulations and guidelines; and City and County General Plan polices and plans. Impacts related to whether the project would expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires is based on a Wildfire Hazards Analysis conducted for the project (see Appendix I**)**. Wildfire impacts are briefly discussed in this section and more thoroughly evaluated in Section 3.19, Wildfire.

3.9.5 Project-Specific Impacts and Mitigation Measures

Impact 3.9-1. Potential to create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials – Less than Significant with Mitigation

Canyon Lane Improvements, Proposed Single-Family Residence, Developable Parcels

Construction

Construction of the project would involve the routine use, transport, storage, and disposal of hazardous materials, including quantities of gasoline, oil, grease. These materials would be used to operate and maintain construction equipment and machinery used during the construction process for the Canyon Lane improvements, construction of the single-family residence, and any potential future residences on the developable parcels. Paint would also be used on interior and exterior surfaces of the single-family residence and future residences. As described in Chapter 2, Project Description, construction activities would be temporary, lasting approximately 9 months. These temporary construction activities involving the use, transport, storage, and disposal of hazardous materials would be conducted in compliance with all health and safety requirements such as the County and City General Plan policies, CCR Sections 337–340, and Chapter 6.95 of the California Health and Safety Code Article 1 and CCR Title 19, Public Safety, Division 2 (if required). Further, the Applicant would implement HAZ/mm-1.1, which would require the development and implementation of a Construction Safety Plan. This Plan would minimize the

exposure of the public, construction workers, and the environment to potentially hazardous materials during all project construction phases. Because the Applicant would implement HAZ/mm-1.1 and construction activities would be conducted in compliance with applicable regulations and laws pertaining to the transport, storage, use, and disposal of potentially hazardous materials, the exposure of the public, construction workers, and the environment to hazardous materials would be less than significant.

Operation

Post-construction of the project would not result in the routine transport, use, storage, or disposal of hazardous materials except those involved in normal household activities, such as automobile fluids, cleaning products, and paints. Therefore, post-construction activities would not create a significant health or environmental hazard, and impacts would be less than significant.

Hazardous Materials Mitigation Measures	
HAZ/mm-1.1	*Prior to the issuance of a grading permit, the Applicant shall submit a construction safety plan to the County and City Planning Departments for review and approval. The purpose of the plan would be to minimize the exposure of the public, environment, and construction workers to potentially hazardous materials during all phases of project construction. The plan shall require implementing appropriate control methods and approved containment and spill-control practices (e.g. spill control plan) for construction chemicals and materials used and stored on site.*

Impact 3.9-2: Potential to 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 – Less than Significant

Canyon Lane Improvements, Proposed Single-Family Residence, Developable Parcels

Construction

As described in response to Impact 3.9-1, construction would involve the routine use, transport, storage, and disposal of hazardous materials, including quantities of gasoline, oil, grease, and paint. Construction activities have the potential to expose the public, construction workers, and the environment to hazardous materials, whether through direct contact or through environmental means (e.g. water contamination from spills). However, construction would be conducted in compliance with all applicable Federal, State, and local safety requirements. Further, the Applicant would implement HAZ/mm-1.1, which would minimize the exposure of the public, construction workers, and the environment to potentially hazardous materials during all project construction phases.

The project is located approximately 0.5 mile from a LUST. However, the LUST has undergone remediation and is currently being monitored on an annual basis to determine the potential for a rebound in contaminant concentrations. In the event a rebound in contaminants occurred, the project area would not expose project occupants and construction workers to pollutants, as the project area is located upstream of the contaminated groundwater associated with the LUST. In addition, the exposure of existing contaminants to future project occupants and workers falls outside of CEQA's scope, barring a situation where the project could exacerbate those environmental hazards or conditions that already

exist.[11] Due to the completion of remediation efforts and distance from the project area, the project would not exacerbate the environmental hazards associated with the LUST. Therefore, with implementation of HAZ/mm-1.1, exposure of the public, construction workers, and the environment to hazardous materials would be less than significant.

Operation

Post-construction of the project would not result in the routine transport, use, storage, or disposal of hazardous materials except those involved in normal household activities, such as such as automobile fluids, cleaning products, paints, and fertilizers. Given the relatively small scale of the project, these materials would be used in small quantities. Therefore, the project would not 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, and the impact would be less than significant.

Impact 3.9-3. Potential to emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school – No Impact

No existing or proposed schools are located within one-quarter mile of the project. Therefore, project construction would not have the potential to emit hazardous emissions or acutely hazardous materials, substances, or wastes within one-quarter mile of an existing or proposed school, and no impact would occur.

Impact 3.9-4: Potential to be located on a site which is included on a list of hazardous materials sites complied pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment – No Impact

The project area is not located on or in the vicinity of a hazardous materials site list compiled pursuant to Government Code Section 65962.5 (Cortese List). Therefore, no impacts would occur.

Impact 3.9-5: The potential 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, where the project could result in a safety hazard or excessive noise for people residing or working in the project area – Less than Significant

The project is located approximately three miles from the nearest airport—the San Carlos Airport. The project falls within Area A of the San Carlos ALUCP Airport Influence Area. Area A requires disclosure of the location and operation of the airport for real estate purposes. Development proposed within Area A does not require demonstration of consistency with the goals and policies of the ALUCP and would not result in a safety hazard with respect to airport operations. Because the project is located within Area A, construction workers and occupants would be subject to noise associated with the airport; however; given the distance of the project area from the airport, noise impacts would be less than significant.

[11] California Building Industry Association v. Bay Area Air Quality Management District (2015) 62 Cal.4th 369, Case No. S213478.

Impact 3.9-6: The potential to impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan – No Impact

Canyon Lane Improvements

Construction

Canyon Lane is an unimproved gravel roadway that is currently inaccessible to emergency vehicles. Construction activities would involve regrading and paving the unimproved roadway into a 20-foot-wide paved roadway to enable emergency vehicle access. The roadway would incorporate an emergency vehicle turnaround apparatus and would be designed and maintained in accordance with the American Association of State Highway and Transportation Officials Standard HB-17. Further, the roadway would be designated as a fire lane, and no street parking would be permitted. The entire roadway would be marked and posted in accordance with Section 22500.1 of the California Vehicle Code. Because the project would provide emergency vehicle access and would comply with all applicable design and maintenance provisions, the project would not impair any adopted emergency response or evacuation plan, and no impacts would occur.

Proposed Single-Family Residence and Developable Parcels

The proposed single-family residence and any future residences located on the developable parcels would not alter or impair any existing road networks used for emergency response or evacuation purposes. Therefore, the project would not conflict with an adopted emergency response plan or emergency evacuation plan, and no impact would occur.

Impact 3.9-7: The potential to expose individuals or structures, either directly or indirectly, to a significant risk of loss due to wildfires – Less than Significant

Canyon Lane Improvements

Construction

As described in Section 3.19, Wildfire, construction of the project would introduce potential ignition sources to the project area. However, fire safety controls would be implemented during all construction activities, as required by WF/mm-1.1 through WF/mm-1.3. These measures would mitigate the exposure of individuals or structures to a significant risk of loss due to wildfires, and impacts would be less than significant.

Operation

As described in Section 3.19, Wildfire, the roadway would be designated as a fire lane, and no street parking would be permitted. The entire roadway would be marked and posted in accordance with Section 22500.1 of the California Vehicle Code. The project would establish a roadside fuel break, which would be maintained in accordance with the CWPP. As a result, operation of the roadway would not expose individuals or structures to a significant risk or loss due to wildfires. Impacts would be less than significant.

Proposed Single-Family Residence and Developable Parcels

Construction

As described in Section 3.19, Wildfire, construction of the project would introduce potential ignition sources to the project area. However, fire safety controls would be implemented during all construction activities, as required by WF/mm-1.1 through WF/mm-1.3. Further, construction of the project would comply with the ignition-resistive construction requirements of Chapter 49 of the California Fire Code, all applicable sections of Title 24, Part 2, 701A3.2 of the California Code of Regulations, California Government Code 51182 and Public Resources Code Sections 4290 and 4291 (see Section 3.19, Wildfire). Compliance with these regulations and implementation of WF/mm-1.1 through WF/mm-1.3 would mitigate the exposure of individuals or structures to a significant risk of loss due to wildfires, and impacts would be less than significant.

Operation

As described in Section 3.19, Wildfire, post-construction activities would comply with California Government Code 51182 and Public Resources Code Sections 4290 and 4291. These regulations require the establishment of a minimum 30-foot home defense zone and a 100-foot fuel reduction zone around buildings or structures constructed within adjoining mountainous areas, forest-covered lands, brush-covered lands, grass-covered lands, or land that is covered with flammable material. Compliance with these regulations would mitigate the exposure of individuals or structures to a significant risk of loss due to wildfires, and impacts would be less than significant.

HYDROLOGY AND WATER QUALITY

This section provides the hydrologic setting and potential impacts to water quality from the construction and operation of the project. Dam inundation information and analysis is based on the Dam Failure Inundation Hazard Analysis Memorandum provided in Appendix G.

3.10.1 Existing Conditions

Climate

San Mateo County has a Mediterranean climate characterized by cool wet winters, with an average of 21 inches of rain per year, and relatively warmer dry summers. The average temperature range in summer is between approximately 55 and 74 degrees Fahrenheit and the average temperature range in winter is approximately 46 to 61 degrees.[1,2]

Surface Water

The project is located in San Mateo County, on a peninsula between the Pacific Ocean and San Francisco Bay in the San Francisco Bay Hydrologic Region. Its dominant feature is the San Francisco Bay Estuary, which covers 1,100 square miles and conveys the waters of the Sacramento and San Joaquin rivers to the Pacific Ocean. In addition to these two rivers, many other small creeks and rivers convey freshwater to the Bay system. San Francisco Bay is located approximately 10 miles east of the project area and the Pacific Ocean approximately 14 miles west of the project area. Water on the eastern side of the Santa Cruz Mountain drains to the Bay, while water on the western side drains to the Pacific Ocean.

The project area is located along the upper reach of a steep drainage near the eastern margin of the Santa Cruz Mountains, and therefore surface water eventually drains to San Francisco Bay. Runoff water from the project area flows to Redwood Creek, which is the largest watershed in San Mateo County. It covers approximately 11.8 square miles and includes portions of Redwood City, the Town of Woodside, and portions of unincorporated San Mateo County. The major tributary of Redwood Creek is known as Arroyo Ojo de Agua. Other branches include Emerald Branch, Stulsaft Branch, Kensington Branch, and Jefferson Branch. Redwood Creek originates in an area immediately west of I-280 and flows northerly towards San Francisco Bay. Emerald Branch issues from Lower Emerald Lake[3] as an intermittent drainage channel and enters Arroyo Ojo de Agua in Redwood City. Arroyo Ojo de Agua joins Redwood Creek in the vicinity of Jefferson Avenue and Middlefield Road in Redwood City. The combined flows enter San Francisco Bay via Redwood Slough.[4] The Redwood Creek system is shown in Figure 3.10-1, Redwood Creek System Landscape.

[1] Weatherspark.com. 2019. *Average Weather in Redwood City.* Available online at https://weatherspark.com/y/550/Average-Weather-in-Redwood-City-California-United-States-Year-Round. Accessed February 12, 2019.
[2] All temperatures are presented in degrees Fahrenheit.
[3] City of Redwood City. 2010. *A New General Plan for Redwood City. Draft Environmental Impact Report. Chapter 4.8. Hydrology and Water Quality.* May 2010. Available online at https://www.redwoodcity.org/home/showdocument?id=5033. Accessed February 12, 2019.
[4] *Ibid*

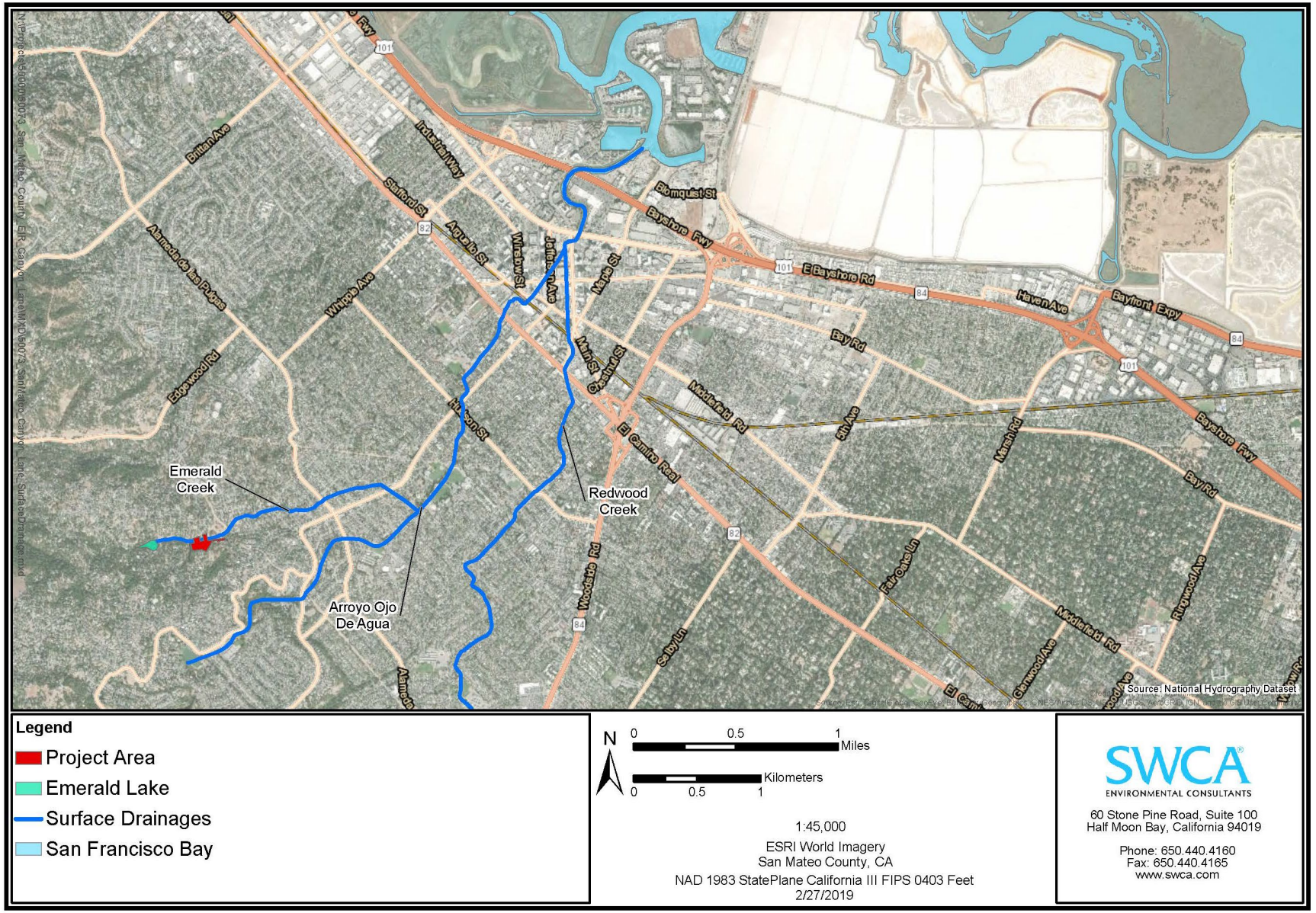


Figure 3.10-1. Redwood Creek System

Site Drainage

The project area is located downslope and to the east of Lower Emerald Lake Dam. Emerald Branch, an existing intermittent drainage channel, flows eastward, parallel to and on the north side of the existing Canyon Lane.

The site is currently undeveloped except for a 10-foot-wide dirt and gravel roadway (the existing Canyon Lane) that traverses the site. Site drainage occurs as overland flow to Emerald Branch that flows eastward parallel to and north of the gravel road. Emerald Branch has a defined bed 3 to 8 feet wide. Water depths of between approximately 3 and 24 inches were observed on three site visits, in fall 2016, January 2019, and February 2019.[5,6,7] The bed lacks emergent vegetation and is composed of cobble and rock, indicating a likely groundwater connection and substantial seasonal flows. Bank incision depths vary in the channel depending on location; however, incised banks commonly rise approximately 6 feet above the stream bed. Wetlands are not present because the tree canopy shades the bed.

On the west side of Glenwood Avenue, Emerald Branch is joined by an ephemeral storm drainage channel. The combined flows enter a culvert under George L Garrett Jr. Memorial Park (Garrett Park) and Bain Place and flow through engineered channels the rest of the way to the confluence with the stream Arroyo Ojo de Agua in Redwood City. This drainage feature is smaller than Emerald Branch in capacity, has incised banks of approximately 1 foot, and crosses under the existing Canyon Lane gravel road through an existing 30-inch culvert that is 20 feet long. During site visits on January 22, 2019 and February 6, 2019, water was actively flowing in this ephemeral drainage feature. Water was observed at approximately 4 to 6 inches in depth due to recent rain events.[8,9]

Two ephemeral drainages were observed on the south side of Canyon Lane. One was flowing downslope in the vicinity of the proposed single-family residence site. Water was flowing in this feature during both site visits. A second drainage, originating from a series of culverts, starting on the southwestern side of the project area near Vista Lane, was flowing downslope on the south side of Canyon Lane in between the westernmost parcel proposed for future development and the location of the proposed water line. Water was flowing in this feature during both site visits.[10,11] Water was observed at approximately 6 inches in depth due to recent rain events. Water from this ephemeral drainage flows northeast across Canyon Lane to enter Emerald Branch. Drainages onsite are shown in Figure 3.10-2, Onsite Drainages.

[5] H.T. Harvey & Associates. 2016. *Canyon Lane Project Biological Resources Report.* December 13.
[6] SWCA Environmental Consultants. 2019. Site Visit by Jessica Henderson-McBean, Biologist. January 22.
[7] SWCA Environmental Consultants. 2019. Site Visit by Jessica Henderson-McBean, Biologist. February 6.
[8] SWCA Environmental Consultants. 2019. Site Visit by Jessica Henderson-McBean, Biologist. January 22.
[9] SWCA Environmental Consultants. 2019. Site Visit by Jessica Henderson-McBean, Biologist. February 6.
[10] SWCA Environmental Consultants. 2019. Site Visit by Jessica Henderson-McBean, Biologist. January 22.
[11] SWCA Environmental Consultants. 2019. Site Visit by Jessica Henderson-McBean, Biologist. February 6.

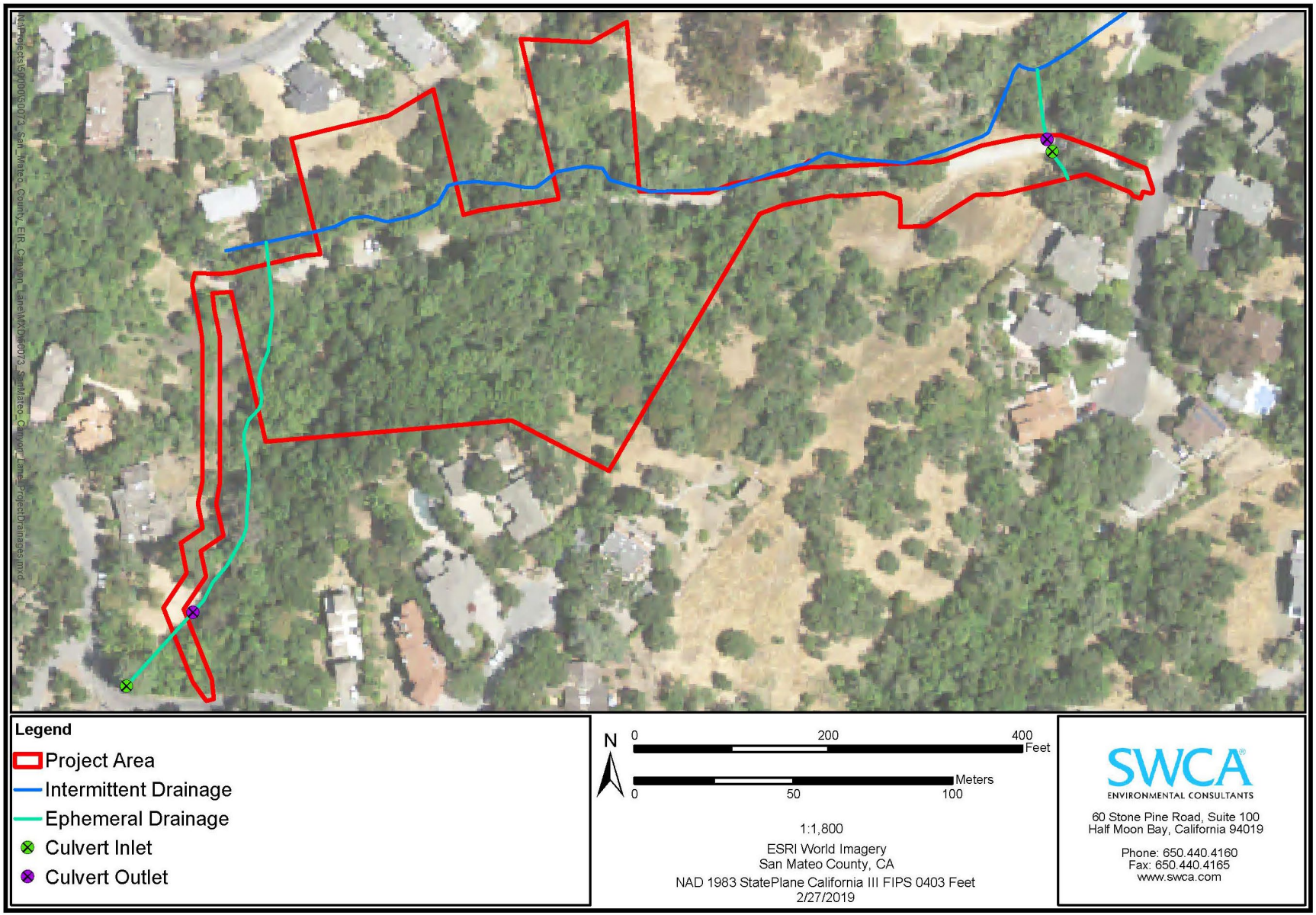


Figure 3.10-2. Onsite Drainages

Flooding

The project area is not located in a Federal Emergency Management Agency (FEMA) flood hazard zone. There are no known issues with flooding in the project area.[12,13] The project area is identified as Zone X; Zone X identifies areas of 0.2 percent annual flood hazard (once every 500 years) or areas of 1 percent annual flood hazard (once every 100 years) with average depths of less than 1 foot or with drainage areas less than one square mile.[14]

Groundwater

The project area is located in the foothills of the Santa Cruz Mountains. It is not located in a groundwater basin but is approximately 0.2 mile west of the San Mateo Plain Subbasin of the Santa Clara Valley Groundwater Basin, to which some groundwater and surface water in the project area may drain. The San Mateo Plain Subbasin occupies a structural trough at the southwestern end of San Francisco Bay. The trough is sub-parallel to the Coast Ranges and is bound by the Westside Basin to the north, San Francisquito Creek to the south, the Santa Cruz Mountains to the west, and San Francisco Bay to the east. The water-bearing formations of the San Mateo Plain Subbasin are comprised of the Santa Clara Formation of Plio-Pleistocene age and the Quaternary age alluvial deposits. The Quaternary alluvium constitutes the most important water-bearing formation of this basin. Historically, groundwater resources were developed to meet irrigation needs in the area. Maximum groundwater overdrafts generally occurred in 1965. After 1965, increases in surface water deliveries from the Hetch Hetchy system and the State Water Project were used to reduce demand for groundwater, restoring groundwater levels to pre-1960 conditions. Imported surface water currently meets approximately 90 percent of the demand in San Mateo County.[15] Groundwater Basins are shown in Figure 3.10-3, Groundwater Basins.

Water Quality

Surface Water

Existing sources of pollutants may include both point and nonpoint sources. Point sources, those discharging from discrete points, are subject to prohibitions by regulatory agencies, water quality requirements, periodic monitoring, annual reporting, and other requirements designed to protect the overall water quality. Nonpoint pollutant sources are sources that do not have a single, identifiable discharge point but are a combination of many sources. Rain carries pollutants and sediments from various parts of a watershed into surface water bodies such as storm drains, streams, rivers, reservoirs, and marshes during periods of wet weather.

[12] Federal Emergency Management Agency. 2012. *Flood Insurance Rate Map, San Mateo County, California,* Panel 285 of 510, Map Number 06081C0285E. Available online at https://msc.fema.gov/portal/advanceSearch#searchresultsanchor. Accessed March 7, 2019.
[13] Federal Emergency Management Agency. 2012. *Flood Insurance Rate Map, San Mateo County, California,* Panel 282 of 510, Map Number 06081C0282E. Available online at https://msc.fema.gov/portal/advanceSearch#searchresultsanchor. Accessed March 7, 2019.
[14] Federal Emergency Management Agency. 2012. *Flood Insurance Rate Map, San Mateo County, California,* Panel 301 of 510, Map Number 06081C0301E. Available online at https://msc.fema.gov/portal/advanceSearch#searchresultsanchor. Accessed March 7, 2019.
[15] DWR (California Department of Water Resources). 2004. *Santa Clara Valley Groundwater Basin, San Mateo Subbasin. California's Groundwater Bulletin 118.* February 27, 2004. Available online at https://water.ca.gov/LegacyFiles/groundwater/bulletin118/basindescriptions/2-09.03.pdf. Accessed February 12, 2019.

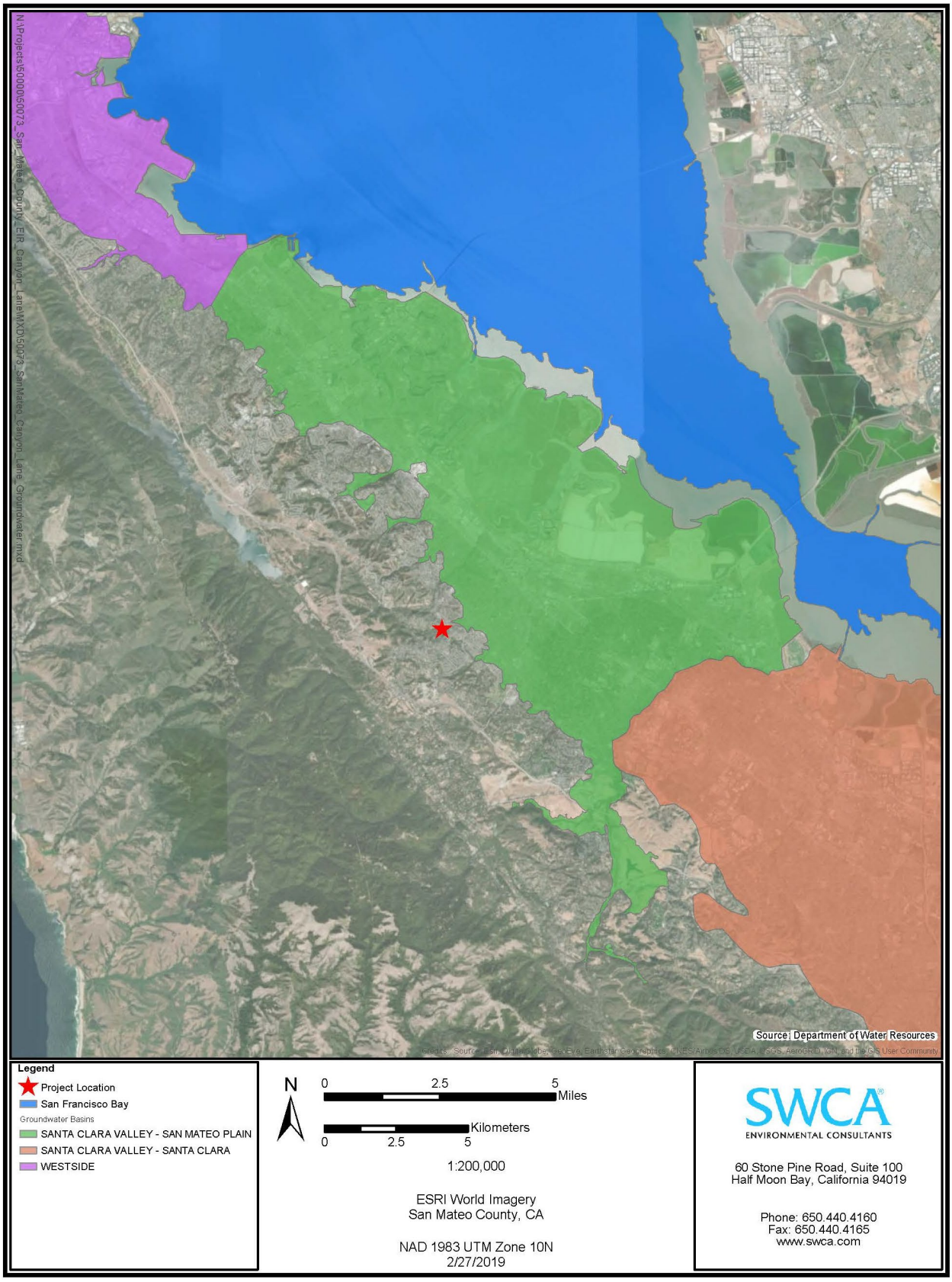


Figure 3.10-3. Groundwater Basins

Surface water drainage patterns in urban settings have typically been highly altered. Stormwater runoff and non-storm discharges (such as irrigation water, accidental spills, and washdown water) transport sediments and contaminants into surface water and groundwater (discussed below). Surface water pollutants may originate from exposed soil, parking lots, and roads.

Urban runoff can contribute pollutants to Emerald Branch, Arroyo Ojo de Agua, Redwood Creek, and eventually to San Francisco Bay. Pollutants of concern typically found in urban runoff include sediments, nutrients, pathogens, plant debris, animal wastes, petroleum hydrocarbons, heavy metals, toxic pollutants, litter, and yard wastes. Urban runoff includes sediment and other pollutants discharging from construction sites due to improper erosion control measures. Pesticide and herbicide application to landscaping and agriculture also contributes significantly to nutrient loading in surface waters.[16] The *San Francisco Bay Basin Plan* has established beneficial uses for both surface and groundwaters in the Basin. Beneficial uses for Arroyo Ojo de Agua, Redwood Creek, Redwood Slough, and San Francisco Bay include the following: [17]

- Arroyo Ojo de Agua and Redwood Creek: Warm Freshwater Habitat, Wildlife Habitat, Water Contact Recreation, Noncontact Water Recreation
- Redwood Slough: Estuarine Habitat, Preservation of Rare and Endangered Species, Wildlife Habitat, Water Contact Recreation, Noncontact Water Recreation, and Navigation
- San Francisco Bay Lower: Industrial Service Supply, Commercial and Sport Fishing, Shellfish Harvesting, Estuarine Habitat, Fish Migration, Preservation of Rare and Endangered Species, Fish Spawning, Wildlife Habitat, Water Contact Recreation, Noncontact Water Recreation, and Navigation

Groundwater

According to a report prepared by the California Department of Water Resources (DWR) in 2004, groundwater in the San Mateo Plain groundwater subbasin is slightly alkaline and characterized as calcium magnesium carbonate bicarbonate waters, based on a study conducted by the US Geological Survey in 1997 with the Town of Atherton, located approximately 2 miles south of Redwood City. [18] Calcium carbonate concentrations averaged 471 milligrams per liter (mg/L), which resulted in water classified as "very hard."

Also noted in the DWR Bulletin 118[19] report is that some wells produce water that can cause soil problems if used for irrigation, because of high concentrations of sodium and nitrates. One groundwater sample showed a nitrate-nitrogen concentration of 12 mg/L, exceeding the primary maximum contaminant level set by the California Department of Health Services and the EPA. Nitrate-nitrogen concentrations in excess of 10 mg/L are considered hazardous and can result in methemoglobinemia

[16] City of Redwood City. 2010. *Redwood City General Plan. Natural Resources Element.* Pg. NR-7. Available online at https://www.redwoodcity.org/home/showdocument?id=5111. Accessed February 12, 2019. page NR-37

[17] California Regional Water Quality Control Board. San Francisco Bay Region. 2017. *Water Quality Control Plan. San Francisco Bay Basin.* Available online at https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/planningtmdls/basinplan/web/docs/BP_all_chapters.pdf. Accessed February 12, 2019. Table 2-1.

[18] DWR (California Department of Water Resources). 2004. *Santa Clara Valley Groundwater Basin, San Mateo Subbasin. California's Groundwater Bulletin 118.* February 27, 2004. Available online at https://water.ca.gov/LegacyFiles/groundwater/bulletin118/basindescriptions/2-09.03.pdf. Accessed February 12, 2019

[19] *Ibid.*

(blue-baby syndrome), a condition where the oxygen-carrying capacity of the blood is decreased, in small children.[20] Groundwater is not currently used as a source of municipal water supply in the area.[21]

Existing beneficial uses for the San Mateo Plain groundwater subbasin include Municipal and Domestic Water Supply, Industrial Process Water Supply, and Industrial Service Water Supply. Agricultural Water Supply is identified as a potential beneficial use.[22]

A geotechnical site investigation was performed for the Canyon Lane roadway site by J. Yang and Engineers in 2014 with an updated concurrent letter on May 5, 2017. Groundwater was not observed down to a depth of 10 feet at the time but was assumed to exist at approximately the level of the bottom of the Emerald Branch (Appendix G). [23]

Dam Inundation

Lower Emerald Lake Dam was constructed in 1885 and re-built in 1929. It is an earthen embankment 57 feet in height and has a capacity of 45 acre-feet. It has been identified as one of 13 dams in San Mateo County that is large enough to endanger life and property in the event of a major uncontrolled release or catastrophic failure. Dam failure in San Mateo County is considered to have a low probability of occurrence, but a high impact if it occurs.[24]

The Lower Emerald Lake Dam is inspected annually by the California Department of Water Resources, Division of Safety of Dams. Inundation maps are required to be updated at 10-year intervals. The Lower Emerald Lake Dam was inspected and the flood inundation zone mapped in January 2019. Based on the 2019 inspection, the dam is in satisfactory condition and judged safe for continued use. Based on the new inundation map, the dam's downstream hazard risk was reclassified from "high" to "extremely high,"[25] defined as, in the event of a catastrophic failure, it is expected that there would be considerable loss of life as well as major impacts to critical infrastructure or property.[26] The project area is located approximately 850 feet downstream of the Lower Emerald Lake Dam and is in the dam inundation zone.[27]

[20] DWR (California Department of Water Resources). 2004. *Santa Clara Valley Groundwater Basin, San Mateo Subbasin. California's Groundwater Bulletin 118.* February 27, 2004. Available online at https://water.ca.gov/LegacyFiles/groundwater/bulletin118/basindescriptions/2-09.03.pdf. Accessed February 12, 2019.

[21] City of Redwood City 2010. *Redwood City General Plan. Natural Resources Element.* Pg. NR-7. Available online at https://www.redwoodcity.org/home/showdocument?id=5111. Accessed February 12, 2019

[22] California Regional Water Quality Control Board. San Francisco Bay Region. 2017. *Water Quality Control Plan. San Francisco Bay Basin.* Available online at https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/planningtmdls/basinplan/web/docs/BP_all_chapters.pdf. Accessed February 12, 2019. Table 2-2.

[23] J. Yang and Engineers. 2014. *Geotechnical Site Investigation. Proposed Roadway Improvement at Canyon Lane, Redwood City, California.* December 28, 2014. (Appendix G)

[24] San Mateo County Sheriff's Office. Homeland Security Division, Office of Emergency Services. 2015. *County of San Mateo Hazard Vulnerability Assessment. Appendix to the Emergency Operations Plan.* January 2015. Available online at https://hsd.smcsheriff.com/sites/default/files/downloadables/2%20-%20Hazard%20Vulnerability%20Assessment.pdf. Accessed February 14, 2019.

[25] Tapia, Sharon K. Chief. Division of Safety of Dams. 2019. Letter and Inspection Report to Boudin. Andre. Manager. Emerald Lake Country Club. February 11, 2019.

[26] California Department of Water Resources. Division of Safety of Dams. 2017. *Dams Within Jurisdiction of the State of California.* September 2017. Available online at https://water.ca.gov/LegacyFiles/damsafety/docs/Dams%20by%20Dam%20Name_Sept%202017.pdf. Accessed February 14, 2019. page 29.

[27] City of Redwood City. 2010. *Redwood City General Plan. Public Safety Element.* Pages PS-35-36. Available online at https://www.redwoodcity.org/home/showdocument?id=5109. Accessed February 2019.

The inundation zone resulting from the catastrophic failure of the Lower Emerald Lake Dam is shown in Figure 3.10-4, Lower Emerald Lake Dam Inundation Zone. Figure 3.10-4 also includes two cross sections along Canyon Lane, which provide hydrological information (i.e., leading edge arrival time, peak travel time, peak water surface elevation, and peak velocity) associated with floodwaters in the event of a catastrophic dam failure.

3.10.2 Regulatory Setting

Federal

National Flood Insurance Program

The Federal Emergency Management Agency (FEMA) is responsible for determining flood elevations and floodplain boundaries based on U.S. Army Corps of Engineers (USACE) studies. FEMA is also responsible for distributing the Flood Insurance Rate Maps used in the National Flood Insurance Program (NFIP) (United States Code [U.S.C.] Title 42, Chapter 50, Section 4102). These maps identify the locations of special flood hazard areas, including 100-year floodplains. FEMA allows non-residential development in the floodplain; however, FEMA has criteria to "constrict the development of land which is exposed to flood damage where appropriate" and "guide the development of proposed construction away from locations which are threatened by flood hazards." Federal regulations governing development in a floodplain are set forth in Code of Federal Regulations (CFR) Title 44, Part 60, enabling FEMA to require municipalities that participate in the NFIP to adopt certain flood hazard reduction standards for construction and development in 100-year floodplains. The project area is not located in a mapped FEMA flood hazard zone.

Clean Water Act Section 404

Section 404 of the Federal Clean Water Act (CWA) (33 U.S.C. 1251 et seq.) requires a permit from USACE to discharge dredged or fill material into "waters of the United States," which include rivers, streams, estuaries, the territorial seas, ponds, lakes, and wetlands. Wetlands are defined as those areas "that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3 7b). The limits of non-tidal waters extend to the Ordinary High Water Mark or to the limit of adjacent wetlands. The U.S. Environmental Protection Agency (USEPA) also has authority over wetlands and may veto a USACE permit under CWA Section 404(c).

Clean Water Act Section 303(D)

CWA Section 303(d) (33 U.S.C. 1313) requires states, territories, and authorized tribes to develop a list of waters within its boundaries that do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law further requires that these jurisdictions establish priority rankings for water on the lists and develop action plans, called Total Maximum Daily Loads (TMDLs), to improve water quality.[28] The Regional Water Quality Control Boards (RWQCBs) and State Water Resources Control Board (SWRCB) implement this Federal regulation in California.

[28] State Water Resource Control Board (SWRCB). 2008. *Proposed Statewide Policy on Compliance Schedules in National Pollutant Discharge Elimination System Permits. Final Staff Report*. Available online at https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2008/rs2008_0025.pdf. Accessed February 12, 2019.

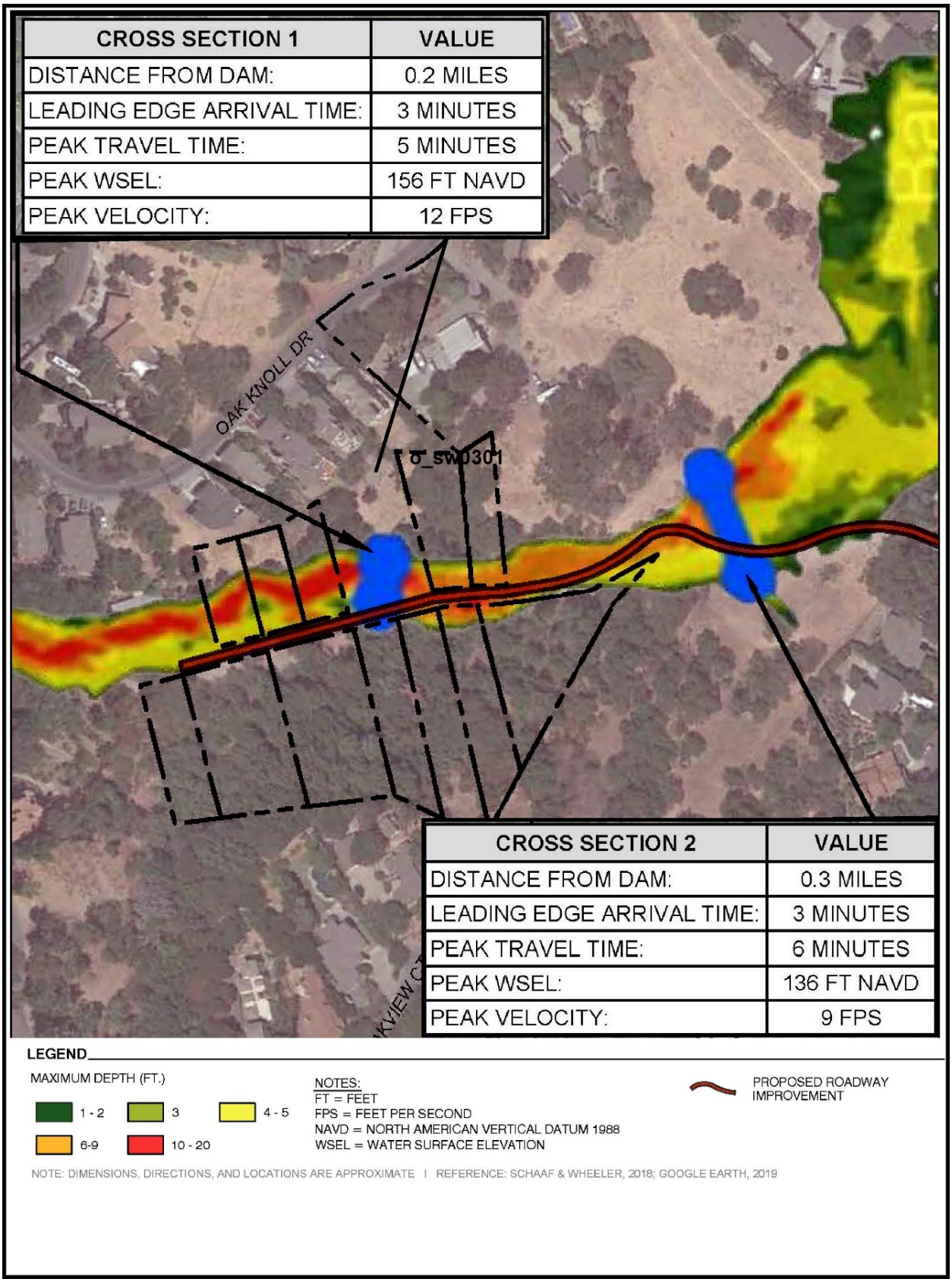


Figure 3.10-4. Lower Emerald Lake Dam Inundation Zone

State Regulations

Clean Water Act Section 402

Under CWA Section 402 (33 U.S.C. 1251 et seq.), the National Pollutant Discharge Elimination System (NPDES) controls water pollution by regulating sources of pollution to waters of the United States. The CWA is implemented on a State and local level in California primarily by SWRCB and the nine RWQCBs, collectively. Whereas the Federal NPDES program mostly pertains to point source control, current focus and regulation is shifting to non-point source pollution control under the authority of RWQCBs. Projects that disturb 1 or more acres of soil are required to obtain coverage under the State NPDES General Permit for Stormwater Discharges from Construction Activities. A Stormwater Pollution Prevention Plan (SWPPP) must be developed and implemented for each project covered by the general permit. The SWPPP must include Best Management Practices (BMPs) that are designed to reduce potential impacts to surface water quality during project construction and operation.

Porter-Cologne Water Quality Control Act (California Water Code, Division 7)

Under this State law, SWRCB has authority over State waters and water quality. "Waters of the state" are defined as "any surface water or groundwater, including saline waters, within the boundaries of the state" (Water Code Section 13050[e]). This definition differs from the CWA definition of waters of the United States by its inclusion of groundwater and waters outside the Ordinary High Water Mark. Examples include, but are not limited to, rivers, streams, lakes, bays, marshes, mudflats, unvegetated and seasonally ponded areas, drainage swales, sloughs, wet meadows, natural ponds, vernal pools, diked baylands, seasonal wetlands, and riparian woodlands. RWQCBs have local and regional authority. The San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) has authority in the project area. RWQCBs prepare and periodically update Basin Plans (water quality control plans), which establish:

- Beneficial uses of water designated for each protected water body;
- Water quality standards for both surface water and groundwater; and,
- Actions necessary to maintain these water quality standards.

Projects that discharge waste to waters of the State must file a report of waste discharge with the appropriate RWQCB, if the discharge could affect the quality of waters of the State (California Water Code, Article 4, Section 13260). RWQCB will issue waste discharge requirements or a waiver of the waste discharge requirements for the project. The requirements will implement any relevant water quality control plans that have been adopted, and must take into consideration the beneficial uses to be protected and the water quality objectives reasonably required for that purpose (Article 4, Section 13263).

Water Quality Control Plan for the San Francisco Bay Region

The State Water Board administers water rights, water pollution control, and water quality functions for the State as part of the California Environmental Protection Agency (Cal/EPA). The Regional Water Boards conduct planning, permitting, and enforcement activities. The State Water Board shares authority for implementation of the Federal Clean Water Act and the State Porter-Cologne Act with the Regional Water Boards.

The San Francisco Bay Regional Water Quality Control Board (Regional Board) regulates surface water and groundwater quality in the region. The area under the Regional Board′s jurisdiction comprises all of the San Francisco Bay segments extending to the mouth of the Sacramento-San Joaquin Delta (Winter Island near Pittsburg).

The Water Quality Control Plan (Basin Plan) for the San Francisco Bay Basin presents the beneficial uses that the Regional Board has specifically designated for local aquifers, streams, marshes, and rivers, as well as the water quality objectives and criteria that must be met to protect these uses. Beneficial uses identified for Redwood Creek include wildlife habitat, warm freshwater habitat, water contact recreation, and non-water contact recreation. Beneficial uses for Redwood Slough include all of the above plus estuarine habitat, preservation of rare and endangered species. and navigation.[29]

Runoff water quality is regulated by the NPDES Program (established through the CWA, as described above). The objective of the NPDES program is to control and reduce pollutant discharge to bodies of water. The SWRCB recently adopted a Statewide policy on compliance schedules in NPDES permits that would require a discharger seeking a compliance schedule to provide the following documentation:[30]

- Diligent efforts made to quantify pollutant levels in the discharge and the sources of the pollutant in the waste stream, and the results of those efforts;
- Source control efforts that are currently underway or completed;
- A proposed schedule for additional source control measures or waste treatment;
- Data demonstrating current treatment facility performance;
- The highest discharge quality that can reasonably be achieved until final compliance is attained;
- A proposed schedule that is as short as practicable; and
- Additional information and analyses as determined by the SWRCB on a case-by-case basis.

Under the NPDES Permit, construction projects must develop an Erosion and Sediment Control Plan (ESCP) and have it approved by the local land agency prior to issuance of grading or building permits. The ESCP must include BMPs necessary to delineate areas of work, prevent erosion of unstable or denuded areas, plan for construction staging and storage logistics, and construct stabilized access points, and include proper containment measures for construction materials and waste.

Projects disturbing more than 1 acre of land during construction are also required to file a Notice of Intent (NOI) with the RWQCB to be covered under the State NPDES General Construction Permit for discharges of storm water associated with construction activity. A Storm Water Pollution Prevention Plan must be developed and implemented for each site covered by the general permit, and includes BMPs that would reduce impacts to surface water quality.[31]

The project area is located in the hydromodification control area designated by the San Francisco Bay RWQCB in the Municipal Regional Stormwater NPDES Permit Order R2-2015-0049. The Permit establishes Hydromodification Management requirements within the C.3 provisions for water quality and quantity control contained in NPDES Municipal Stormwater Permit. The map of hydromodification

[29] California Regional Water Quality Control Board. San Francisco Bay Region. 2017. *San Francisco Bay Basin Water Quality Control Plan.* May 4, 2017. Available online at https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/planningtmdls/basinplan/web/docs/BP_all_chapters.pdf. Accessed February 12, 2019.

[30] State Water Resources Control Board., 2008. *Policy for Compliance Schedules in National Pollutant Discharge Elimination System.* Title 23 Waters. Division 3, Chapter 22, §2918. Available online at https://govt.westlaw.com/calregs/Document/I670E81D0D45B11DEA95CA4428EC25FA0?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default). Accessed February 12, 2019.

[31] California Regional Water Quality Control Board. San Francisco Bay Region. 2015. *Municipal Regional Stormwater NPDES Permit.* Order No. R2-2015-0049. NPDES Permit No. CAS612008. November 19, 2015. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/documents/files/R2-2015-0049_Adopted_0.pdf. Accessed February 12, 2019

control areas is provided in Appendix J of the C.3 Technical Guide.[32] According to the provisions, new developments in the control area that create more than 1 acre of impervious area are required to meet these standards. Although the Permit states that areas discharging to engineered channels or structures can be exempted from hydromodification requirements, that exemption would not apply to this project area because there are natural channels both on site and downstream. The C.3 requirements and hydromodification areas are subject to change based on current NPDES Standards at the time building permits are submitted for consideration.

Fish and Game Code Section 1602

This section of California law protects the natural flow, bed, channel, and bank of any river, stream, or lake under the jurisdiction of the California Department of Fish and Wildlife (CDFW). Project plans must be submitted to CDFW that are sufficient to indicate the nature of a project for construction if the project would:

- Substantially divert, or obstruct the natural flow of a jurisdictional river, stream, or lake;
- Substantially change or use material from the bed, channel, or bank; or,
- Result in the disposal or deposition of debris, waste, or other material containing crumbed, flaked, or ground pavement where it can flow into a river, stream, or lake.

For projects substantially impacting the bed, bank, or flow of waters under CDFW jurisdiction, applicants must submit a Notification of Lake or Streambed Alteration to CDFW so that the department may issue an agreement if staff determines that the activity may substantially adversely affect fish and wildlife resources.

Local Regulations

San Mateo Countywide Stormwater Pollution Prevention Program

The San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) is a partnership of the City/County Association of Governments (C/CAG), each incorporated city and town in the County, and the County of San Mateo, which share a common NPDES permit. The Municipal Regional Stormwater NPDES Permit was issued by the SFBRWQCB[33] in compliance with the Basin Plan and the NPDES Program. Participating agencies (including San Mateo County and the City of Redwood City) must comply with the provisions of the Countywide permit by ensuring that new development and redevelopment mitigate, to the maximum extent practicable, water quality impacts to storm water runoff both during construction and operation periods of projects. Required permit provisions are detailed in RWQCB Order R2-2015-0049 (NPDES Permit No. CAS612008). Requirements are further described in several bulletins from the SMCWPPP, including:

- Current Stormwater Quality Control Requirements (July 2016);[34]

[32] San Mateo City/County Association of Governments. 2013. *C.3 Stormwater Technical Guidance. Version 3.2.* Available online at https://www.flowstobay.org/files/privatend/MRPsourcebk/Section4/C3TechGuidanceJan2013.pdf. Accessed March 1, 2019.

[33] California Regional Water Quality Control Board. San Francisco Bay Region. 2015. *Municipal Regional Stormwater NPDES Permit.* Order No. R2-2015-0049. NPDES Permit No. CAS612008. November 19, 2015. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/documents/files/R2-2015-0049_Adopted_0.pdf. Accessed February 12, 2019.

[34] San Mateo Countywide Stormwater Pollution Prevention Program. 2016. *Current Stormwater Quality Control Requirements.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/C3%20Flyer%20July%202016%20final.pdf. Accessed February 12, 2019.

- Hydromodification Management Requirements (July 2016);[35]
- Update on Stormwater Treatment Requirements for New Development and Redevelopment Projects (July 2016);[36]
- Requirements for Road Projects in the Municipal Regional Stormwater Permit (July 2016);[37] and
- Requirements for Architectural Copper (February 2012).[38]

Provision C.3.c establishes thresholds at which new development and redevelopment projects must comply with Provision C.3. Private or public projects that create and/or replace 10,000 or more square feet of impervious surface are C.3 Regulated Projects. C.3 Regulated Projects must implement Low Impact Development (LID) treatment measures to control stormwater. LID measures consist of evapotranspiration, infiltration, rainwater harvesting and use, and/or biotreatment of the amount of stormwater runoff specified in Municipal Regional Stormwater Permit Provision C.3.d. Under C.3.d, treatment systems that use a combination of flow and volume capacity shall be sized to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data.[39]

County of San Mateo General Plan

The *Vegetative, Water Fish and Wildlife Resource Policies*[40] establish goals, policies, and implementation measures for the conservation and protection of important natural resources such as water quality.

- **Goal 1.1:** The County will Conserve, Enhance, Protect, Maintain and Manage Vegetative, Water, Fish and Wildlife Resources by promoting the conservation, enhancement, protection, maintenance and managed use of the County's Vegetative, Water, Fish and Wildlife Resources.
- **Policy 1.26: Protect Water Resources.** Ensure that development will: (1) minimize the alteration of natural water bodies, (2) maintain adequate stream flows and water quality for vegetative, fish and wildlife habitats; (3) maintain and improve, if possible, the quality of groundwater basins and recharge areas; and (4) prevent to the greatest extent possible the depletion of groundwater resources.

[35] San Mateo Countywide Stormwater Pollution Prevention Program. 2016. *Hydromodification Management Requirements.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/HM%20Flyer%20July%202016%20final.pdf. Accessed February 12, 2019.

[36] San Mateo Countywide Stormwater Pollution Prevention Program. 2016. *Update on Stormwater Treatment Requirements for New Development and Redevelopment Projects.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/Notice%20to%20Applicants%20July%202016%20final.pdf. Accessed February 12, 2019.

[37] San Mateo Countywide Stormwater Pollution Prevention Program. 2016. *Requirements for Road Projects in the Municipal Regional Stormwater Permit (MRP).* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/Road%20Projects%20fact%20sheet%20July%202016%20final.pdf. Accessed February 12, 2019.

[38] San Mateo Countywide Stormwater Pollution Prevention Program. 2016. *Requirements for Architectural Copper.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/Architectural_copper_BMPs_FINAL.pdf. Accessed February 12, 2019.

[39] California Regional Water Quality Control Board. San Francisco Bay Region. 2015. *Municipal Regional Stormwater NPDES Permit.* Order No. R2-2015-0049. NPDES Permit No. CAS612008. pages 12-49. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/documents/files/R2-2015-0049_Adopted_0.pdf. Accessed February 12, 2019.

[40] San Mateo County. 1986. San Mateo County General Plan. *Vegetative, Water, Fish and Wildlife Resources Policies.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/documents/files/GP%20Ch%2001-VegWaterFish&Wildlife%20Policies.pdf. Accessed February 12, 2019.

The *Natural Hazards Policies*[41] establish goals, policies, and implementation measures to minimize risks to people and property from natural hazards.

- **Policy 15.45: Abatement of Flooding Hazards.** Support measures for the abatement of flooding hazards, including but not limited to: (1) removal or relocation of development from flood hazard areas; (2) construction of impoundments or channel diversions provided that adequate mitigation of environmental impacts can be demonstrated; and (3) debris clearance and silt removal programs conducted in a manner so as not to disrupt existing riparian communities.
- **Policy 15.47: Review Criteria for Locating Development in Areas of Special Flood Hazard.**
    b) When development is proposed in areas of special flood hazards, require any structure to be safely elevated above the base flood elevation and not contribute to the flooding hazard to surrounding structures.
    c) Promote subdivision design to avoid areas of special flood hazard when possible, and identify these areas on the approved subdivision map.

City of Redwood City General Plan

The *Natural Resources Element* of the *Redwood City General Plan*[42] establishes goals, policies, and implementation measures for the conservation and protection of important natural resources such as water quality. The *Natural Habitat and Open Space Goals, Policies and Programs* contain the following:

- **Goal NR-5:** Protect, restore, and maintain creeks, sloughs, and streams to ensure adequate water flow, prevent erosion, provide for viable riparian plant and wildlife habitat and, where appropriate, allow for recreation opportunities.
- **Policy NR-5.1:** Restore, maintain, and enhance Redwood City's creeks, streams, and sloughs to preserve and protect riparian and wetland plants, wildlife and associated habitats, and where feasible, incorporate public access.
- **Policy NR-5.2:** Limit construction activities to protect water quality in creeks and streams.
- **Policy NR-5.3:** Except for floating home communities, marinas, and the infrastructure necessary for the communities and marinas, prohibit building and development activities to establish a creek buffer zone, based on the site and floodplain characteristics and/or where sensitive species, communities, or habitats occur within the creek or 100-year floodplain, unless construction methods or other methods can substantially minimize damage from potential flooding.
- **Policy NR-5.4:** In conjunction with new development located along existing creeks and streams and where appropriate, incorporate daylighting for culverted portions or other bank naturalizing approaches for channeled sections as a means of creek and stream restoration.
- **Policy NR-5.5:** Except for floating home communities, marinas, and infrastructure necessary for the communities and marinas, regulate, and perhaps restrict, new development, grading, fills, and other land disturbances located immediately adjacent to a creek, stream, or in a 100-year floodplain, unless construction methods or other methods to minimize potential damage from flooding are implemented.
- **Policy NR-5.6:** Promote natural stream channel function.

[41] San Mateo County. 1986. San Mateo County General Plan. *Natural Hazards Policies.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/documents/files/GP%20Ch%2015-Natural%20Hazards%20Policies.pdf. Accessed February 12, 2019.

[42] City of Redwood City 2010. *Redwood City General Plan. Natural Resources Element.* Available online at https://www.redwoodcity.org/home/showdocument?id=5111. Accessed February 12, 2019. page NR-44

- **Policy NR-5.7:** Preserve and protect riparian vegetation including non-native vegetation that functions to shade the creek and provide wildlife habitat.
- **Policy NR-6-5:** Take steps to reduce urban runoff into creeks and the Bay.
- **Goal NR-7:** Reduce pollution from stormwater runoff in our creeks and the San Francisco Bay.
- **Policy NR -7.1:** Support appropriate stormwater pollution mitigation measures.
- **Policy NR -7.2:** Encourage the use of site and landscape designs that minimize surface runoff and retain or detain stormwater runoff, minimizing volume and pollutant concentrations.
- **Policy NR -7.3:** Promote continued maintenance, restoration, and daylighting of creeks in Redwood City through ecologically enhancing methods and any future enhancement ordinance.
- **Program NR-25, Creek Improvements:** Wherever a new development or redevelopment project occurs on property containing or adjacent to an existing creek, require the project developer to improve and enhance the portion of the creek on or adjacent to the property, including daylighting and creek restoration wherever feasible. Permitted uses within creek buffer zones should be limited to habitat restoration, native riparian plantings, appropriate erosion control, trails, and flood control. Consider implementing a land banking system for critical open space areas along creek corridors.
- **Program NR-26, Creek Enhancement Ordinance:** To minimize unfiltered stormwater runoff, reduce flooding risks, and preserve creek areas for natural restoration, establish a Creek Enhancement Ordinance that will allow the City to: Enforce protection of reasonable setback areas along existing creeks and streams from encroachment by buildings, pavement, or other impervious surfaces, and other inappropriate uses, and create adequate room for maintenance and potential public recreational use.
- **Program NR-27, Creek Property Owner Incentives:** Consider offering incentives to property owners along creeks to correct and/or improve creek banks. Incentives may include rebates, classes/seminars, technical assistance, among others.
- **Program NR-30, SMCWPPP:** Implement the San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) performance standards in the protection of creeks, streams, and watersheds.
- **Program NR-31, Water Quality Improvement:** Require the integration of water quality protection/improvement techniques (e.g., use of vegetated swales or landscaping for water drainage along streets and for expansive parking lots) for new development. As feasible, incorporate water quality techniques when completing street improvements.

The *Public Safety Element* of the *Redwood City General Plan*[43] establishes goals, policies, and implementation measures related to storm drainage and flood control. The *Hazard Management Goals, Policies and Programs* contain the following:

- **Goal PS-7:** Provide adequate and appropriately-designed storm drainage and flood control facilities to meet current and future needs and minimize the risk of flooding.
- **Program PS-52, Creekside Property Owner Education:** Educate creekside property owners in low-cost, ecologically enhancing methods to maintain and improve creek bank stability, habitat restoration, and prevent bank erosion.

[43] City of Redwood City. 2010. *Redwood City General Plan. Public Safety Element.* Available online at https://www.redwoodcity.org/home/showdocument?id=5109. Accessed February 12, 2019.

City of Redwood City Municipal Code

As part of **Chapter 27A. Stormwater Management and Discharge Control Program,** the City of Redwood City has developed codes to ensure watercourse protection. Codes that pertain to the proposed project include the following:

- **Section 27A.8, Best Management Practices for New Developments and Redevelopments:** Any construction contractor performing work within the City shall not permit or cause to be permitted rinse and wash down water from the cleaning of tools, equipment or trucks to enter the stormwater drainage system and shall endeavor, whenever possible, to provide filter materials at the catch basin to retain any debris and dirt flowing into the City's stormwater drainage system. The City may establish controls on the volume and rate of stormwater runoff from new developments and redevelopments as may be appropriate to minimize the discharge and transport of pollutants.
- **Section 27A.9, Compliance with Best Management Practices:** Where best management practices guidelines or requirements have been adopted by the City for any activity, operation, or facility which may cause or contribute to stormwater pollution or contamination, illicit discharges, and/or discharge of non-stormwater to the City stormwater drainage system, every person undertaking such activity or operation, or owning or operating such facility, shall comply with such guidelines or requirements (as may be identified by the City Manager or authorized designee).
- **Section 27A.10, Notification of Intent and Compliance with General Permits:** Each industrial discharger, discharger associated with construction activity, or other discharger, described in any general stormwater permit addressing such discharges as may be adopted by the United States Environmental Protection Agency, the State Water Resources Control Board, or the California Regional Water Quality Control Board, San Francisco Bay Region, shall provide notice of intent, comply with, and undertake all other activities required by any general stormwater permit applicable to such discharges.
- Each discharger identified in an individual NPDES permit relating to stormwater discharges shall comply with and undertake all activities required by such permit.
- **Section 27A.11, Application:** All applications for the permit required by the preceding Section shall be made to City's Director and/or his/her designee accompanied by such evidence, including a plan of the proposed construction or alteration, sufficient to enable City's Director and/or his/her designee to determine whether or not the proposed construction within, or alteration of, any creek, ditch or natural stormwater drainage channel, storm drainage easement or public utility easement adjacent to, abutting or adjoining any creek, ditch or natural stormwater drainage channel within the City is of a substantial nature or may constitute a permanent potential obstruction to the flow of stormwaters within such creek, ditch, natural stormwater drainage channel, or storm drainage easement.
- **Section 27A.15, Watercourse Protection:** Every person owning property through which a watercourse passes, or such person's lessee or tenant, shall keep and maintain that part of the watercourse within the property reasonably free of trash, debris, excessive vegetation, and other obstacles which would pollute, contaminate, or significantly retard the flow of water through the watercourse; shall maintain existing privately owned structures within a watercourse so that such structures will not become a hazard to the use, function, or physical integrity of the watercourse; and shall not remove healthy bank vegetation beyond that actually necessary for the maintenance, nor remove said vegetation in such a manner as to increase the vulnerability of the watercourse to erosion.

- **Section 27A.16, Prohibition; Permit:** No person shall permit or cause to be committed any of the following acts in any creek ditch, natural stormwater drainage channel, storm drainage easement or public utility easement adjacent to, abutting and adjoining any creek, ditch or natural stormwater drainage channel in the City, unless a written permit has first been obtained from the City Engineer or his/her designee:
    A. Discharge into or connect any pipe or channel to a watercourse;
    B. Modify the natural flow of water in a watercourse;
    C. Carry out development within thirty feet (30′) of the center line of any creek or twenty feet (20′) of the top of a bank;
    D. Deposit in, plant in, or remove any material from a watercourse including the banks, except as required for necessary maintenance;
    E. Construct, alter, enlarge, connect to, change, or remove any structure in a watercourse; or
    F. Place any loose or unconsolidated material along the side of or within a watercourse or so close to the side as to cause a diversion of the flow, or to cause a probability of such material being carried away by stormwaters passing through such watercourse.

3.10.3 Thresholds of Significance

The significance of potential impacts on hydrology and water quality is based on thresholds identified in Appendix G of the CEQA Guidelines, shown below.

Impacts would be considered significant if the project would:

a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality.

b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.

c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:
    i. result in substantial erosion or siltation on- or off-site;
    ii. substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;
    iii. create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or
    iv. impede or redirect flood flows.

d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation.

e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

3.10.4 Impact Assessment and Methodology

Hydrologic and water quality information for the project area was derived from various sources and compiled in this chapter to develop a comprehensive understanding of the potential constraints and hazards associated with project construction and operation. Sources of pertinent information include the Department of Water Resources, State Water Resources Control Board, and San Francisco Bay Regional Water Quality Control Board which reflect the most up-to-date understanding of the regional hydrology and water quality of the San Francisco Bay region.

The analysis also considers the various existing State and local regulations that apply to stormwater controls for construction and operation, which include the Municipal Regional Stormwater Permit and the San Mateo County requirements for Provision C.3 LID. Through compliance with the existing ordinances, the Applicant would be required to demonstrate that the proposed site uses will maintain existing water quality and runoff characteristics prior to issuance of building permits.

3.10.5 Project-Specific Impacts and Mitigation Measures

Project impacts related to hydrology and water quality were evaluated against the CEQA significance criteria, as discussed below. This section evaluates potential project impacts from the Canyon Lane improvements, development of the proposed single-family residence, and the developable parcels. The discussion of each of the three project components is further broken out into their construction and operation phases. The three phases of the project are discussed individually unless impacts are the same for all phases. For impacts to Federally protected wetlands and other sensitive natural communities, refer to Section 3.4, Biological Resources.

Canyon Lane Improvements. As described in Chapter 2, Project Description, the Canyon Lane roadway improvements portion of the project includes regrading and paving the existing gravel roadway into a 20-foot-wide paved roadway. The existing roadway would be widened along its southern flank to avoid potential impacts to Emerald Branch that runs parallel to the north of the roadway. Roadway improvements include adding a retaining wall, turnaround for emergency vehicles, and single-span bridge that would cross Emerald Branch to accommodate the turnaround. A new 8-inch, approximately 1,050-foot-long water line would extend down the hill to the southeast from Vista Drive and would be installed in a trench under the roadway. A joint utilities trench would also be created for electrical, gas, and fiberoptic lines. A storm drain would be installed along the south side of Canyon Lane with four catch basins and an approximately 161-foot-long biotreatment swale would be constructed at the base of Canyon Lane. Construction activities would also remove 32 trees. Excavation would include moderate to significant grading (approximately 1,145 cubic yards of cut and 60 cubic yards of fill). In addition to the new permanent facilities, temporary workspaces and disturbances will be required to facilitate construction of the project. The temporary footprint of the project includes a graveled construction entrance, temporary parking area for construction crew vehicles on the north side of Canyon Lane, and temporary staging areas directly west of the parking area, and open cut trenching on the hillside for installation of the water line. Improvements are shown on Figure 2-3.

Single-Family Residence. As described in Chapter 2, Project Description, construction activities would involve the construction of an approximately 3,847-square-foot single-family residence on a 16,673-square-foot (0.39 acre) parcel. To achieve the construction of the residence, approximately 2,500 cubic yards of excavation would be required and 11 trees would be removed. The residence would require construction of a retaining wall, a driveway accessing Canyon Lane, landscaping, and a new storm drain system with a bioretention system. This part of the project would use the construction access and temporary workspaces established for the Canyon Lane improvements. Construction activities for the single-family dwelling would occur during Phase 4 and last approximately 5.75 months.

Future Development. The improvements made to Canyon Lane would allow for the development of the 11 remaining parcels in the project area. The square footage of the remaining parcels is shown in Table 2.1, Parcel Size, in Chapter 2, Project Description. The total square footage of the remaining parcels is 113,728 square feet or approximately 2.61 acres. All of the developable parcels include steep terrain and would require cut and fill techniques and retaining walls. Three of the four parcels on the north side of Canyon Lane would require bridges over Emerald Branch for access. The fourth parcel would be able to access the property using the bridge installed as part of the Canyon Lane improvements.

Impact 3.10-1: Potential to violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality – Less than Significant

Canyon Lane Improvements

Construction

Project activities associated with construction of Canyon Lane improvements could result in violation of waste discharge requirements under the San Mateo County Municipal Regional Stormwater NPDES Permit from contaminated runoff entering Emerald Branch. This impact would be significant.

Increased erosion caused by construction activities and increased runoff could result in the sedimentation of receiving waters. The Emerald Branch tributary to Redwood Creek is located on the north side of the existing Canyon Lane. Planned tree removal, earthwork, and grading activities for the proposed Canyon Lane improvements could result in an increase in erosion and sedimentation from the project area into the Emerald Branch, Redwood Creek drainage, and San Francisco Bay. Hillside excavation to remove existing unstable soils and install the 8-inch water line between Vista Drive and the new roadway could also result in an increase in erosion and sedimentation, as the water line is adjacent to an existing ephemeral drainage swale. Sedimentation can lead to a degradation of water quality because sediment can carry nitrogen, phosphorus, petroleum, and other organic contaminants, pesticides and herbicides, and trace metals. Sediment can also accumulate at the entrance of downstream storm drain system inlets and reduce drainage capacity.

Construction activities associated with the Canyon Lane improvements would require the presence of construction vehicles, heavy equipment and materials, and construction crews. In addition to stormwater runoff and potential resulting water quality and sedimentation impacts, there is the potential for hazardous materials, including petroleum products associated with diesel vehicle and equipment use, and contaminants from paving materials, concrete mixing, pouring and washout, and sanitary facilities, to enter Emerald Branch and the Redwood Creek system. Following vegetation clearing, tree removal, and grading, excavation would occur for roadbed improvements, and foundations and concrete would be poured to facilitate installation of the retaining wall and bridge. All of these activities have the potential to contribute pollutants to Emerald Branch (particularly turbidity and high-pH washwater) that could affect water quality and may violate water quality standards if left uncontrolled.

Construction activities for the proposed water line would occur during Phase 3. A geotechnical investigation of the alignment identified a shallow active landslide deposit located just below Vista Drive. As described in Section 3.7, Geology and Soils, the landslide deposit would be removed and replaced with engineered fill. Impacts related to the existing landslide are further discussed in Section 3.7, Geology and Soils. Excavation and replacement of unstable soils on the hillside in the vicinity of the drainage swale could result in increased erosion and runoff entering Emerald Branch during construction. However, the project would be required to implement an ESCP and SWPPP under the Municipal Regional Stormwater Permit and the San Mateo Countywide Stormwater Pollution Prevention Program.

The ESCP must include BMPs that are designed to prevent runoff from construction areas to reduce potential impacts to surface water quality during project construction. The SWPPP will also include design elements and BMPs for construction areas such as fueling and equipment washing areas, and trash and hazardous material storage areas.

The San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) is a partnership of the City/County Association of Governments (C/CAG), each incorporated city and town in the county, and the County of San Mateo, which share a common NPDES permit. The Municipal Regional Stormwater NPDES Permit was issued by the SFBRWQCB[44] in compliance with the Basin Plan[45] and the NPDES Program. Participating agencies (including San Mateo County and the City of Redwood City) must comply with the provisions of the Countywide permit by ensuring that new development and redevelopment mitigate, to the maximum extent practicable, water quality impacts from storm water runoff during both construction and operation periods of projects.

Prior to issuance of grading permits or approval of improvement plans, the Applicant shall submit a detailed ESCP to the County of San Mateo Planning and Building Department and the Director of Public Works of Redwood City for review and approval. The purpose of the ESCP shall be to mitigate erosion and sedimentation impacts during the construction period. The detailed ESCP shall meet the requirements of both San Mateo County and the City of Redwood City. It shall be accompanied by a written narrative and shall include, at a minimum, the following:

a. Proposed schedule of grading activities, monitoring, and infrastructure milestones in chronological format. An anticipated construction schedule and/or construction duration (in weeks or months) shall be provided.

b. Separate plan sheets for measures to be implemented at the grading stage and the construction stage.

c. Delineation of work areas including protection of surface waters, storm drain inlets, sensitive areas, and buffer zones.

d. A separate Tree Protection Plan.

e. All proposed retaining walls, including areas that will be used for stockpiling and storing construction materials.

f. Indicate location and method of stabilizing disturbed bare earth areas. Use seeding and/or mulching and the following, as necessary: (i) For slopes less than 3:1, provide silt fencing or fiber rolls along contour lines; (ii) For slopes greater than 3:1, anchored erosion blankets (rice, straw, or coconut) and fiber rolls or silt fencing at the crest are required. Jute netting is preferred when used with seeding.

g. Use diversion berms to divert water from unstable or denuded areas (e.g., top and base of a disturbed slope, grade breaks where slopes transition to a steeper slope).

h. Direct water from construction areas to designated temporary filtration/detention areas. Show any temporary detention areas for stormwater and stabilization of those areas.

[44] California Regional Water Quality Control Board. San Francisco Bay Region. 2015. *Municipal Regional Stormwater NPDES Permit.* Order No. R2-2015-0049. NPDES Permit No. CAS612008. November 19, 2015. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/documents/files/R2-2015-0049_Adopted_0.pdf. Accessed February 12, 2019.

[45] California Regional Water Quality Control Board. San Francisco Bay Region. 2017. *San Francisco Bay Basin Water Quality Control Plan.* May 4, 2017. Available online at https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/planningtmdls/basinplan/web/docs/BP_all_chapters.pdf. Accessed February 12, 2019.

i. Show location of office trailer(s), storage sheds, temporary power pole, scaffold footprint, and other temporary installations on the Erosion and Sediment Control Plan. Show how they will be accessed and show protection of the access routes.

j. Show location of utility trenches, indicate utility types, and identify timing of installation.

k. Use stabilized designated access points for entrance onto the property using 4- to 6-inch fractured aggregate over geo-textile fabric over the first 20 feet of the property. If using an existing paved driveway, identify on EC Plan. Where vehicles or equipment will travel from an existing paved driveway to unpaved areas within the property, a stabilized transition point is required that meets the above standards.

l. Provide designated area(s) for parking of construction vehicles, using aggregate over geo-textile fabrics required that meets the above standards.

m. Show all access roads/ramps and access points used by excavation equipment, trucks, or fork lifts/crane access (second floor construction). For unpaved routes, use ridges running diagonally across the road that run to a stabilized outlet. The type of materials used for stabilization and their locations shall be indicated on the Erosion and Sediment Control Plan. Materials for this purpose are required to be stored on-site.

n. Show location, installation, and maintenance of a concrete/stucco mixer, washout, and pits. No concrete, mortar, or stucco washout is allowed to be placed directly on the soil/ground. Specify the method used to contain the washout.

o. Show location of portable toilets away from surface water locations and storm drain inlets.

p. Show storage location and containment of construction materials during work, as well as after-hours/weekends. Show the location of lumber, gravel, and materials storage areas on the Erosion and Sediment Control Plan. Show how they will be accessed and show protection of the access routes.

q. Show areas and proposed protection of temporary stockpiles using anchored-down plastic sheeting in dry weather. The use of plastic sheeting during the wet season, October 1 through April 30, is not allowed, unless the stockpile is also protected with fiber rolls containing the base of the stockpile. Alternatively, in wet weather, or for longer storage, use seeding and mulching, soil blankets or mats.

r. Indicate the location of refuse piles and debris box locations on the Erosion and Sediment Control Plan. Show how they will be accessed and show protection of the access routes.

s. Identify an Erosion Control Point of Contact, including name, title/qualification, email, and phone number. The Erosion Control Point of Contact will be the County's main point of contact if Erosion and Sediment Control or Tree Protection corrections are required.

The ESCP shall also contain the following standard comments:

- Perform clearing and earth-moving activities only during dry weather. Measures to ensure adequate erosion and sediment control shall be installed prior to earth-moving activities and construction.
- Measures to ensure adequate erosion and sediment control are required year-round. Stabilize all denuded areas and maintain erosion control measures continuously between October 1 and April 30.
- Use sediment controls or filtration to remove sediment when dewatering site and obtain Regional Water Quality Control Board (RWQCB) permit(s) as necessary.

- Avoid cleaning, fueling, or maintaining vehicles on-site, except in a designated area where wash water is contained and treated.
- Limit and time applications of pesticides and fertilizers to prevent polluted runoff.
- Limit construction access routes to stabilized, designated access points.
- Avoid tracking dirt or other materials off-site; clean off-site paved areas and sidewalks using dry sweeping methods.
- Train and provide instruction to all employees and subcontractors regarding the Watershed Protection Maintenance Standards and Construction BMPs.
- List the locations where placement of erosion materials is required on weekends and during rain events.
- The areas delineated on the plans for parking, grubbing, storage, etc., shall not be enlarged or "run over."
- Construction sites are required to have erosion control materials on-site during the "off-season."
- Dust control is required year-round.
- Erosion control materials shall be stored on-site.
- Use of plastic sheeting between October 1 and April 30 is not acceptable, unless for use on stockpiles where the stockpile is also protected with fiber rolls containing the base of the stockpile.
- Tree protection shall be in place before any demolition, grading, excavating or grubbing is started.

Prior to issuance of grading permits or approval of improvement plans, the Applicant shall also submit evidence to both the San Mateo County Planning and Building Department and the City Engineer of Redwood City showing that coverage under the Statewide General Construction Activities Stormwater Permit (General Permit) has been obtained.

The Applicant shall comply with the NPDES General Construction Activities Storm Water Permit Requirements established by the CWA. The Applicant can obtain coverage under the General Permit by filing a Notice of Intent (NOI) with the State Water Resource Control Board's (SWRCB) Division of Water Quality. The filing shall describe erosion control and storm water treatment measures to be implemented during and following construction and provide a schedule for monitoring performance. These BMPs shall serve to control point and non-point source pollutants in stormwater and constitute the project's SWPPP for construction activities. While the SWPPP will include several of the same components of the ESCP, the SWPPP shall also include BMPs for preventing the discharge of other non-point source pollutants besides sediment (such as paint, concrete, etc.) to downstream waters.

Implementation of the ESCP and SWPPP, as required by law, would prevent construction of the Canyon Lane improvements from violating any water quality standards or waste discharge requirements or otherwise substantially degrading surface or ground water quality, and would reduce potentially significant impacts to a less-than-significant level.

Operation

Operational impacts of the Canyon Lane improvements could result in contaminated runoff entering Emerald Branch and could come from three sources: 1) erosion and sedimentation in Emerald Branch

may temporarily increase post-construction because of soils that have been loosened and changes in drainage patterns; 2) pollutants from roadway use by vehicles, including contaminants such as hydrocarbons, lead, zinc, and copper, could enter Emerald Branch; and 3) improper maintenance of the roadway and/or stormwater retention facilities could result in contaminants entering Emerald Branch in stormwater runoff. This would be a significant impact. However, implementation of the SWPPP described above would reduce post-construction erosion and sedimentation impacts to a less-than-significant level.

Post-construction erosion and sedimentation impacts would be controlled by implementation of long-term SWPPP BMPs as required by law. Prior to issuance of a grading permit, the Applicant shall submit a long-term SWPPP to the County Engineer for San Mateo County and the City Engineer for Redwood City for review and approval. The purpose of this SWPPP shall be to protect storm water quality after the construction period.

The Canyon Lane improvements would create approximately 22,000 square feet (0.51 acre) of impervious roadway surface, as well as a retaining wall, an emergency turnaround over Emerald Branch, and a single span bridge over Emerald Branch. Approximately half of this acreage is the existing unpaved road which, although not paved, is mostly impermeable. Stormwater from the roadway would be conveyed through a storm drain that runs east along the south side of Canyon Lane. Four catch basins would be installed in a storm drain on the south side of the roadway to contain runoff. Stormwater would flow into an approximately 161-foot-long bioretention swale that would be installed near the base of Canyon Lane. The bioretention swale would include an 18-inch layer of bioretention soil designed to treat runoff before infiltrating into groundwater.

The Municipal Regional Stormwater Permit requires implementation of LID Requirements/Stormwater Treatment Measures for projects that create more than 10,000 square feet of impervious surface to reduce stormwater runoff and mimic a site's predevelopment hydrology. LID treatment options may include infiltration, evapotranspiration, rainwater harvesting and use, and biotreatment.[46] The proposed project would be a Provision C.3 Project and would be required to implement post-construction stormwater controls. The term "post-construction stormwater control" encompasses LID, which reduces water quality impacts by preserving and re-creating natural landscape features, minimizing imperviousness, and using stormwater as a resource, rather than a waste product. Stormwater treatment measures must be sized to treat runoff from "relatively small sized storms that comprise the vast majority of storms." The bioretention swale must be designed to meet the requirements of the Municipal Regional Stormwater Permit and treat at least 80 percent of the total runoff over the life of the project. Compliance with the Municipal Regional Stormwater Permit would reduce operational stormwater impacts to a less-than-significant level.

The San Mateo County Planning and Building Department requires that the Applicant submit a drainage plan for the project prior to approval of permits. Project approval by the County will require the following:

> Prior to the issuance of the Building permit or Planning permit (for Provision C3 Regulated Projects), the Applicant shall have prepared, by a registered civil engineer, a drainage analysis of the proposed project and submit it to the Planning and Building Department for review and approval. The drainage analysis shall consist of a written narrative and a plan. The plan shall include the following:

[46] San Mateo Countywide Stormwater Pollution Prevention Program. 2016. *Current Stormwater Quality Control Requirements.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/C3%20Flyer%20July%202016%20final.pdf. Accessed February 12, 2019

1. The flow of the stormwater onto, over, and off of the property shall be detailed on the plan and shall include adjacent lands as appropriate to clearly depict the pattern of flow.

2. The routine and overflow drainage from the Emerald Lakes Reservoir shall be included in the design of the drainage facilities, biotreatment areas, and bridge crossings on Canyon Lane.

3. The analysis shall detail the measures necessary to certify adequate drainage. Post-development flows and velocities shall not exceed those that existed in the pre-developed state.

4. Recommended measures shall be designed and included in the improvement plans and submitted to the Planning and Building Department for review and approval.

In addition, the Applicant shall, at his expense, record documents which address future maintenance responsibilities of any private drainage and/or roadway facilities which may be constructed. Prior to recording these documents, they shall be submitted to the County of San Mateo Planning and Building Department for review and approval.[47]

San Mateo County requires of all C.3 Projects that the Applicant or Homeowners Association must be responsible for proper maintenance of drainage structures, the bioretention swale and equipment on the project area. The Applicant must submit an Operation and Maintenance Agreement to the San Mateo County Planning and Building Department for review and approval. At a minimum, the Operation and Maintenance Agreement must include the following:

- The contact information for the property owner(s) or responsible party;
- Identification of the number, type and location of all stormwater treatment measures on site;
- A list of specific, routine maintenance tasks and the intervals that they will be conducted; and
- An inspection checklist specific to the measures, which indicates the items that will be reviewed during regular maintenance inspections.

For bioretention areas, the following inspections must be required: [48]

- Inspect monthly for obstructions and trash.
- Inspect monthly for ponded water. If ponded water does not drain in 5 days, take the appropriate action. If mosquito larvae are observed, contact the San Mateo County Mosquito Abatement District.
- Inspect monthly for channels, exposure of soils, or other evidence of erosion. Clear any obstructions and remove any accumulation of sediment.
- Inspect biannually for health of plants and remove dead and diseased vegetation.
- Treat and maintain vegetation and irrigation system. Minimize use of pesticides and quick-release synthetic fertilizers.
- Inspect and replace mulch as needed before wet season.

[47] San Mateo County Planning and Building Department. 2017. Conditions of Approval Letter. PLN2017-00010. APN: 057221090.

[48] City/County Association of Governments. 2013. *C.3 Stormwater Technical Guidance. Version 3.2.* pages 126-128. Available online at https://www.flowstobay.org/files/privatend/MRPsourcebk/Section4/C3TechGuidanceJan2013.pdf. Accessed March 6, 2019.

Implementation of required maintenance measures would reduce operational impacts to water quality related to the Canyon Lane improvements to a less-than-significant level. In addition, the County would require, as a condition of approval, that the following measure be added to the Operation and Maintenance Agreement, which would further reduce less than significant impacts:

- The Project Applicant shall enter into an agreement with San Mateo County, the City of Redwood City, or other street sweeping contractor to provide regular street sweeping. Proper maintenance of paved areas can eliminate the majority of litter and debris washing into storm drains and entering local waterways. Regular sweeping is a simple and effective BMP aimed at reducing the amount of litter in storm drain inlets (to prevent clogging) and public waterways (for water quality).

Single-Family Residence

Construction

Project activities associated with construction of the single-family residence could cause a violation of waste discharge requirements under the San Mateo County Municipal Regional Stormwater NPDES Permit from contaminated runoff entering Emerald Branch, downstream drainage facilities, and Redwood Creek. This would result in a significant impact.

Increased erosion caused by construction activities and increased runoff could result in the sedimentation of receiving waters. Planned tree removal and excavation into the hillside for the foundation and retaining walls could result in an increase in erosion and sedimentation from the project area into the Emerald Branch, Redwood Creek drainage, and San Francisco Bay. Sedimentation can lead to a degradation of water quality because sediment can carry nitrogen, phosphorus, petroleum and other organic contaminants, pesticides and herbicides, and trace metals. Sediment can also accumulate at the entrance of downstream storm drain system inlets and reduce drainage capacity. Construction materials and construction waste, such as wood, wallboard, insulation, paint and other debris, could also enter Emerald Branch and the stormwater system if not properly used and stored.

Construction activities associated with the single-family residence would require the presence of construction vehicles, heavy equipment and materials, and construction crews. In addition to stormwater runoff and potential resulting water quality and sedimentation impacts, there is the potential for hazardous materials, including petroleum products associated with diesel vehicle and equipment use, and contaminants from paving materials, concrete mixing, pouring and washout, and sanitary facilities, to enter Emerald Branch and the Redwood Creek system. Following vegetation clearing, tree removal and grading, excavation of approximately 2,500 cubic yards would occur and concrete would be poured for the foundation and retaining walls. All of these activities have the potential to contribute pollutants to Emerald Branch (particularly turbidity and high-pH washwater) that can affect water quality and may violate water quality standards if left uncontrolled. Construction activities for the single-family dwelling would occur during Phase 4.

The SMCWPPP, discussed above under construction activities for the roadway improvements, would also apply to construction of the single-family residence. The Applicant must submit an ESCP and SWPPP to the County and City prior to approval of grading permits. San Mateo County and the City of Redwood City must comply with the provisions of the Countywide permit by ensuring that new development mitigates, to the maximum extent practicable, water quality impacts from storm water runoff during both construction and operation periods of projects. Implementation of the ESCP and SWPPP, as required by law, would prevent construction of the proposed single-family residence from violating any water quality standards or waste discharge requirements or otherwise substantially degrading surface water or groundwater quality, and would reduce potentially significant impacts to a less-than-significant level.

Operation

The single-family residence would create approximately 3,847 square feet, or approximately 0.10 acre, of impervious surface. As described in Section 2.4.1.2, Proposed Single-Family Residence, stormwater runoff collected on the property would be conveyed along a new storm drain installed within the backyard to the south of the residence. The storm drain would traverse the property, traveling from the western edge to the eastern edge of the property and would include a bioretention system near the western end of the storm drain. The stormwater would then be conveyed to the stormwater system along Canyon Lane. Seven catch basins with 9-inch side openings would be installed along the stormwater line.

Erosion and sedimentation may temporarily increase post-construction because of soils that have been loosened and changes in drainage patterns. Development of the single-family residence could result in an increase in the levels of urban pollutants and litter entering Emerald Branch, downstream drainage facilities, and eventually Redwood Creek. Pollutants from the proposed project would likely be consistent with suburban low/medium-density residential areas, parking lots, and roads. It is anticipated that the proposed development would result in an increase in total phosphorus and nitrogen concentrations (from fertilizer use), biological oxygen demand, lead, zinc, and copper. An increase in these pollutants could have adverse effects on wildlife, fauna, and human health. This would be a significant impact.

As for the Canyon Lane improvements, the single-family residence would implement post-construction stormwater controls that comply with the Municipal Regional Stormwater Permit and LID Requirements/Stormwater Treatment Measures for C.3 Projects to reduce stormwater runoff and mimic the site's predevelopment hydrology.[49] The future homeowner would be responsible for inspecting and maintaining the storm drain retention system.

The bioretention system must be designed to meet the requirements of the Municipal Regional Stormwater Permit and treat at least 80 percent of the total runoff over the life of the project. Compliance with the Municipal Regional Stormwater Permit will reduce operational stormwater impacts to a less-than-significant level.

As discussed above for the Canyon Lane improvements, San Mateo County requires of all C.3 Projects that the Applicant or Homeowners Association must be responsible for proper maintenance of drainage structures and bioretention facilities on the project area. The Applicant must submit an Operation and Maintenance Agreement to the San Mateo County Planning and Building Department, as discussed above. Implementation of required maintenance measures would reduce operational impacts to water quality related to the single-family residence to a less-than-significant level. In addition, the County would require, as a condition of approval, that the following measures be added to the Operation and Maintenance Agreement, which would further reduce less than significant impacts:

- The Applicant shall prepare informational literature and guidance on residential BMPs to minimize pollutant contributions from the proposed development. The information shall be distributed to all future residents at the project area.
    - Proper disposal of household and commercial chemicals;
    - Proper use of landscaping chemicals;
    - Clean-up and appropriate disposal of yard cuttings and leaf litter;
    - Prohibition of any washing and dumping of materials and chemicals into storm drains; and,

[49] San Mateo Countywide Stormwater Pollution Prevention Program. 2016. *Current Stormwater Quality Control Requirements.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/C3%20Flyer%20July%202016%20final.pdf. Accessed February 12, 2019.

- Proper maintenance of bioswales and a discussion of why the bioswales are in place and how they are important to maintaining the project area.

Developable Parcels

Construction

Construction of residences on each of the remaining parcels would be expected to have impacts similar to construction of the proposed single-family residence, causing contaminants to run off into Emerald Branch. This could result in violation of waste discharge requirements under the San Mateo County Municipal Regional Stormwater NPDES Permit and would be a significant impact.

Under the San Mateo Countywide Water Pollution Prevention Program and General Construction Activities Stormwater Permit, all potential future construction activities would be required to develop and implement ESCPs and SWPPPs (if applicable) as described above for the Canyon Lane improvements. A SWPPP would be required if construction activities disturb one or more acres of soil. Implementation of ESCPs and SWPPPs would reduce any significant impacts to less-than-significant levels.

Operation

The 11 developable parcels would be required to implement erosion control measures and stormwater controls under the Municipal Regional Stormwater Permit and Low Impact Development Requirements/Stormwater Treatment Measures to reduce stormwater runoff and mimic the site's predevelopment hydrology.[50] Stormwater runoff would be required to be collected and retained on the property before it could enter the stormwater system along Canyon Lane. Each lot would be required to implement LID measures to reduce stormwater runoff and mimic a site's predevelopment hydrology. LID treatment options may include infiltration, evapotranspiration, rainwater harvesting and use, and biotreatment. If a bioretention system is used, it must be designed to meet the requirements of the Municipal Regional Stormwater Permit and treat at least 80 percent of the total runoff over the life of the project. Potential future homeowners would be required to inspect and maintain their stormwater systems and submit annual reports to either San Mateo County or the City of Redwood City.

Erosion and sedimentation may temporarily increase post-construction because of soils that have been loosened and changes in drainage patterns. The developable parcels would result in an increase in the levels of urban pollutants and litter entering Emerald Branch, downstream drainage facilities, and eventually Redwood Creek. Pollutants from the proposed project would be expected to be consistent with suburban low/medium-density residential areas, parking lots, and roads. It is anticipated that the proposed development would result in an increase in total phosphorus and nitrogen concentrations (from fertilizer use), biological oxygen demand, lead, zinc, and copper. An increase in these pollutants could have adverse effects on wildlife, fauna, and human health. This would be a significant impact. However, compliance with the Municipal Regional Stormwater Permit would reduce operational stormwater impacts to a less-than-significant level.

[50] San Mateo Countywide Stormwater Pollution Prevention Program. 2016. *Current Stormwater Quality Control Requirements.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/C3%20Flyer%20July%202016%20final.pdf. Accessed February 12, 2019.

Impact 3.10-2: Potential to substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin – No Impact

Canyon Lane Improvements, Single-Family Residence, and Developable Parcels

Construction

Construction of all aspects of the proposed project would require a minimal amount of water for dust control and slurry mixing. Water would be obtained from the Redwood City Municipal Water Department, which obtains its entire supply from the Hetch Hetchy regional water system operated by the San Francisco Public Utilities Commission. Water for dust control would be transported to the project area by truck. The project would not use groundwater supplies.[51] No impact would occur.

Operation

The post-construction Canyon Lane road improvements would not require water. The proposed single-family residence and the residences associated with the 11 developable parcels would obtain water from the Redwood City Municipal Water District, as described in Section 3.19, Utilities and Service Systems. Project operation would not result in groundwater use or otherwise decrease groundwater supplies. No impact would occur.

The proposed project would result in an increase in impervious surface area. Impervious surfaces prevent the infiltration of runoff into the underlying soil and can interfere with groundwater recharge. As shown in Figure 3.10-3, Groundwater Basins, the proposed project is not located in a groundwater basin and the area does not serve as an important location for groundwater recharge, although runoff may enter the groundwater table downstream of the project area. According to a geotechnical report performed for the project, soils are relatively shallow and resistant materials were identified at relatively shallow depths.[52] The majority of additional runoff created by the new impermeable surfaces would be retained in a bioretention swale as required by the Municipal Regional Stormwater Permit, which would allow for percolation into the groundwater table. The project would not substantially interfere with groundwater recharge. No impact would occur, and no mitigation is necessary.

[51] City of Redwood City. 2015. *2016 Urban Water Management Plan for the City of Redwood City.* pages 46-49 Available online at https://www.redwoodcity.org/home/showdocument?id=8091. Accessed February 22, 2019.

[52] Yang and Engineers. 2014. *Geotechnical Site Investigation. Proposed Roadway Improvement at 0 Canyon Lane, Redwood City, California.* December 28, 2014.

Impact 3.10-3: Potential to substantially alter the existing drainage pattern of the site or area, including through alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner which would:

Impact 3.10-3(i): Result in substantial erosion or siltation on- or off-site – Less than Significant

Canyon Lane Improvements, Proposed Single-Family Residence, and Developable Parcels

Construction

Planned earthwork and grading activities on the project site would involve a total cut and fill of approximately 3,705, cubic yards: 1,205 cubic yards for the Canyon Lane Improvements and 2,500 cubic yards for the proposed single-family residence. It has been conservatively estimated for purposes of this analysis that all of the single-family residential site, which measures 16,151 square feet, could be disturbed during the project activities. Potential future earthwork and grading activities on the 11 developable parcels would involve grading for each parcel. It has been conservatively estimated for purposes of this analysis that all of the 11 parcels, which measure approximately 113,728 square feet (2.61 acres), could be disturbed during potential future project activities. Some grading on each parcel would occur on moderate to steep slopes; therefore, the potential future development would present a threat of water erosion from soil disturbance by subjecting unvegetated areas to the erosional forces of runoff.

Vegetative cover and trees, which act to stabilize the soil, would be removed from areas where earthwork and grading activities would occur. It has been conservatively estimated for purposes of this analysis that all of the project area could be disturbed during the project activities. The proposed project would present a threat of water erosion from soil disturbance by subjecting unvegetated areas to the erosional forces of runoff because some grading would occur on moderate to steep slopes.

The proposed work may also include temporary diversion of water flow in the drainage swale that parallels Glenwood Drive, if grading for and construction of the new roadbed and culvert is performed during the wet season. Water flowing through the drainage at the time of construction would be temporarily dammed upstream of the work area, and water flow would be diverted through a pipe to a location downstream of the work zone.

Increased erosion caused by construction activities and increased runoff could result in the sedimentation of receiving waters. Sedimentation can lead to a degradation of water quality because sediment can carry nitrogen, phosphorus, petroleum and other organic contaminants, pesticides and herbicides, and trace metals. Sediment can also accumulate at the entrance of downstream storm drain system inlets and reduce drainage capacity. This would be a significant impact.

Under the Municipal Regional Stormwater Permit, the Applicant must submit an ESCP and SWPPP to the County and City prior to approval of grading permits for the Canyon Lane improvements and proposed single-family residence. Applicant(s) for potential future development would also be required to submit a ESCP and SWPPP (if applicable) for review and approval. A SWPPP would be required if construction activities disturb one or more acres of soil. San Mateo County and the City of Redwood City must comply with the provisions of the Countywide permit by ensuring that new development mitigates, to the maximum extent practicable, water quality impacts from stormwater runoff during both

construction and operation periods of projects. Implementation of the ESCP and SWPPP, as required by law, would prevent substantial erosion and siltation from construction activities on or off site, and would reduce potentially significant impacts to a less-than-significant level.

Operation

For the Canyon Lane improvements, erosion and sedimentation may temporarily increase post-construction because of soils that have been loosened and changes in drainage patterns. In addition, the total impermeable surface area of the site would increase due to new pavement, and runoff from Canyon Lane would be redirected into permanent drainage improvements, including a storm drain on the south side of Canyon Lane with four catch basins with 9-inch side openings. The stormwater would flow into an approximately 161-foot-long bioretention swale that would include an 18-inch layer of bioretention soil designed to treat runoff before infiltrating groundwater. Without proper maintenance, stormwater flows associated with operation of the roadway improvements could result in siltation to Emerald Branch of the Redwood Creek system off site. This would be a significant impact.

The total impermeable surface area of the single-family residential site would increase due to the new single-family residence footprint and associated driveway and paths, and runoff would be redirected into permanent drainage improvements, including a storm drain installed in the backyard on the south side of the property with two catch basins with 9-inch square grates. The stormwater would flow into a bioretention system near the western end of the storm drain, which would be conveyed to the Canyon Lane storm drain system.

The total impermeable surface area of the developable parcels would increase due to each potential new single-family residence footprint and associated driveways and paths, and runoff would be redirected into permanent drainage improvements. Erosion and siltation could occur as a result of the additional impermeable surface area. These would be significant impacts.

Implementation of long-term BMPs and proper maintenance of the individual storm drains, stormwater LID facilities and the bioretention swale over the life of the project, as required under the Municipal Regional Stormwater Permit for all C.3 Projects, would reduce the potential for erosion or siltation from increased stormwaters to a less than significant level.

Impact 3.10-3(ii): Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite – Less than Significant

Canyon Lane Improvements, Single-Family Residence, and Developable Parcels

Construction

Stormwater runoff would likely increase temporarily during construction activities as ground cover is removed, which could cause a significant increase in peak discharge at downstream drainage facilities, assuming no ground cover would be replaced before the rainy season. Without mitigation, significant flooding in the seasonal creek on site could occur temporarily. Under the ESCP and the SWPPP described under Impact 3.10-1, stormwater must be directed from construction areas to designated temporary filtration/detention areas. Implementation of these required measures would reduce construction impacts related to flooding on and off site to a less-than-significant level.

It is not expected that the volume of water used during construction would be substantial and under the required SWPPP, no runoff would be allowed from construction activities. Therefore, water used during

construction would not result in a substantial increase in the amount of runoff and no mitigation would be needed.

Operation

Canyon Lane improvements would result in an increase in impervious surface area of approximately 22,000 square feet. Development of the single-family residence would result in an increase in impervious surface area of approximately 4,660 square feet, or 0.10 acre. The 11 parcels developable parcels would each result in an increase in impervious surface area.

An increase in impervious surface area could result in an increase in peak runoff at downstream drainage facilities and could potentially cause downstream flooding problems. For the Canyon Lane improvements, the project would install a storm drain and bioretention swale designed to meet the requirements of the Municipal Regional Stormwater Permit and contain and treat at least 80 percent of the total runoff over the life of the project. The proposed single-family residence would include a storm drain and bioretention facility meeting C.3 requirements. The storm drain for the residence would empty into the Canyon Lane storm drain and swale. For the developable parcels, the developer of each parcel would be required to implement LID measures to reduce stormwater runoff and mimic a site's predevelopment hydrology. LID treatment options may include infiltration, evapotranspiration, rainwater harvesting and use, and biotreatment. If a bioretention system is used, it must be designed to contain and treat at least 80 percent of the total runoff over the life of the project. Homeowners would be responsible for storm system maintenance. Compliance with the Municipal Regional Stormwater Permit would reduce operational stormwater impacts to a less-than-significant level.

Impact 3.10-3(iii): Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff – Less than Significant

Canyon Lane Improvements, Proposed Single-Family Residence, and Developable Parcels

Construction

Planned earthwork and grading activities on the project area for the roadway improvements would involve removal (cut) of approximately 1,145 cubic yards of soil and fill of approximately 60 cubic yards. Planned earthwork and grading activities on the single-family residence site would involve excavation of approximately 2,500 cubic yards. Earthwork and grading activities for potential future residences on the 11 developable parcels would involve excavation and grading, as all 11 parcels are on moderate to steep terrain. It has been conservatively estimated for purposes of this analysis that all of the 11 parcels, which measure 113,728 square feet (2.61 acres), could be disturbed during potential future project activities.

Vegetative cover and trees, which act to stabilize the soil, would be removed from areas where earthwork and grading activities would occur, which would increase the rate and amount of runoff and contribute sediment and pollutants to the downstream system. It has been conservatively estimated for purposes of this analysis that all of the project area could be disturbed during the project activities.

Runoff from the project area enters an intermittent drainage on the west side of Glenwood Avenue, which enters a culvert under Bain Place, and flows through engineered channels the rest of the way to its confluence with the Redwood Creek system and San Francisco Bay. Increased runoff caused by

construction activities could contribute to runoff water that exceeds the capacity of the downstream storm drain system. Without implementation of corrective measures, this would be a significant impact.

Development and implementation of the required ESCP and SWPPP described under Impact 3.10-1 would reduce construction-related stormwater impacts to downstream drainage channels to less-than-significant levels. The ESCP and SWPPP would include measures to reduce stormwater runoff to the drainage system. For example, The ESCP may require water to be directed from construction areas to designated temporary/detention areas. The SWPPP would include some of the same stormwater reduction components of the ESCP but would also include additional BMPs to prevent discharges of pollutants to downstream waters.

Operation

The roadway improvements would result in an increase in impervious surface area of approximately 22,000 square feet. The proposed single-family residence would create approximately 4,660 square feet, or approximately 0.10 acre, of impervious surface. Future potential development would create impervious surface, including the footprints of the houses and garages, along with driveways, patios, and walkways.

An increase in impervious surface area could result in an increase in peak runoff at downstream drainage facilities, could potentially cause downstream flooding problems, and could result in a significant impact. The Canyon Lane improvements and proposed single-family residence would install storm drains biotreatment facilities, and a bioretention swale designed to meet the requirements of the Municipal Regional Stormwater Permit and contain and treat at least 80 percent of the total runoff over the life of the project. Construction of future residences would require the Project Applicant(s) to develop individual storm drain and retention facilities for each lot. The Project Applicant for the existing project and future development must also submit a detailed drainage analysis to the San Mateo County Planning and Building Department, as described below. San Mateo County requires that no additional runoff caused by a proposed project cross property lines. The drainage analysis must include: [53]

- A written analysis which includes the delineation of drainage basins, description of proposed drainage system, discussion of rationale used to design system, discussion of methods and/or calculations, description of how excess drainage will be detained, and a description of how discharge will be controlled.
- A hydrologic analysis based on an appropriate design storm for the site-specific conditions and project. For a project bounding an existing drainage course located on or adjacent to the property, the design shall be based on a 100-year storm.
- A hydraulic analysis demonstrating the post-development discharge will be controlled and peak flow and velocity will not exceed pre-development values, and that all storm drainage facilities have sufficient capacity to carry anticipated peak flows.
- Complete plans of storm drainage contours and elevations, storm drain facilities and lines, utility crossings, and construction materials.

Analyses, calculations, and plans must be signed and stamped by a registered civil engineer.

For the developable parcels, ten of the parcels are located in unincorporated San Mateo County and one parcel is located in the City of Redwood City. The Applicant for each site would be required to submit a drainage analysis to either the County of San Mateo or the City of Redwood City as a condition for

[53] San Mateo County. ___. *San Mateo County Guidelines for Drainage Review.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/documents/files/DPW%20Drainage%20Policy.pdf. Accessed March 7, 2019.

approval of each developable parcel. Both San Mateo County and the City of Redwood City are signatories to the Municipal Regional Stormwater Permit, and require that no additional runoff caused by a project may cross property lines. Compliance with the Municipal Regional Stormwater Permit and San Mateo County Planning and Building Department requirements would reduce operational stormwater impacts to a less-than-significant level. In addition, implementation of the two required conditions of approval discussed under Impact 3.10-1 (i.e., street sweeping and homeowner education) would further reduce less-than-significant impacts.

Impact 3.10-3(iv): Impede or redirect flood flows – No Impact

Canyon Lane Improvements, Proposed Single-Family Residence, and Developable Parcels

FEMA identifies flood hazards, assesses flood risks, and partners with states and communities to provide accurate flood hazard and risk data to guide them to mitigation actions. The project area is not located in an identified flood hazard zone[54] and there are no known local flooding issues on the site. Therefore, the proposed project would not impede or redirect flood flows. No impact would occur, and no mitigation is necessary.

Impact 3.10-4: In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation – Significant and Unavoidable

Canyon Lane Improvements, Proposed Single-Family Residence, and Developable Parcels

The project area is located approximately 0.15 mile downstream of Emerald Lake Lower Dam and is in the dam inundation zone. This is an earthen dam that was construction in 1885 and is owned by the Emerald Lake Country Club. It is approximately 57 feet high and 280 feet long and may retain up to 45 acre-feet (14.6 million gallons) of water. Dams are rated by the California Department of Water Resources, Division of Safety of Dams (DOSD). The DOSD has determined that the dam is in satisfactory condition and a risk of catastrophic failure is low. This risk level is defined by the DOSD as follows: "There are no recognized existing or potential dam safety deficiencies, and acceptable performance is expected under all loading conditions (Static, hydrologic and seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines."[55] However, the downstream hazard is rated as extremely high,[56] which means that in the event of a catastrophic failure, it is expected that there would be considerable loss of life as well as major impacts to critical infrastructure or property.[57, 58] As shown in Figure 3.10-5, Emerald Lake Dam Inundation Zone, portions of the Canyon Lane roadway and future

[54] City of Redwood City. 2019. *Redwood City Community GIS. Online Database.* Available online at http://webgis.redwoodcity.org/community/. Accessed February 4, 2019.

[55] California Department of Water Resources, Division of Safety of Dams, 2017 *Dams Within the Jurisdiction of the State of California.* Available online at https://water.ca.gov/LegacyFiles/damsafety/docs/Dams%20by%20Dam%20Name_Sept%202017.pdf. Accessed February 14, 2019.

[56] Tapia, Sharon K. Chief. Division of Safety of Dams. 2019. Letter and Inspection Report to Boudin. Andre. Manager. Emerald Lake Country Club. February 11, 2019.

[57] California Department of Water Resources, Division of Safety of Dams, 2017 *Dams Within the Jurisdiction of the State of California.* Available online at https://water.ca.gov/LegacyFiles/damsafety/docs/Dams%20by%20Dam%20Name_Sept%202017.pdf. Accessed February 14, 2019.

[58] City of Redwood City. 2010. *Redwood City General Plan. Public Safety Element.* Available online at https://www.redwoodcity.org/home/showdocument?id=5109. Accessed February 12, 2019

development parcels could be inundated by up to 20 feet of water in the event of a catastrophic dam failure. Parcels on the north side of Canyon Lane would receive more water than parcels south of the Canyon Lane roadway. The leading edge of flood flow would reach the project area approximately three minutes after dam failure.

Although the risk of dam failure is rated as low, the project area is located approximately 1.6 miles northeast of the Peninsula segment of the San Andreas Fault Zone.[59] This fault exhibits a 2.1 percent chance of producing an earthquake with a magnitude of 8.0 and a 5.7 percent chance of producing an earthquake with a magnitude of 7.5 or greater in the next 30 years.[60] Although the risk of dam failure is low, in the event of a catastrophic dam failure (e.g., one in which all the water is released), the majority of the project area would be inundated, resulting in flooding of the Canyon Lane roadway and residences in the canyon. Flooding would continue downstream to cover an area approximately eight blocks wide and terminating at the CalTrain railroad line near El Camino Real. Flooding of Canyon Lane would cause pollutants to be released and enter the Redwood Creek system, and eventually San Francisco Bay.

The Applicant and the current and future property owners of the developable parcels along Canyon Lane would not have the ability or authority to make any improvements to the dam that would ensure that the dam would not fail in an earthquake, or to otherwise prevent the release of pollutants in the event of inundation of the project area. Therefore, this impact would be significant and unavoidable.

Impact 3.10-5: Potential to conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan – No Impact

Canyon Lane Improvements, Proposed Single-Family Residence, and Developable Parcels

The proposed project would abide by all requirements of the San Mateo Countywide Water Pollution Prevention Program and the Municipal Regional Stormwater NPDES Permit issued by the SFBRWQCB.[61] The project would not conflict with the Water Quality Control Plan for the San Francisco Bay Basin because it would comply with all applicable requirements of the Countywide permit. The project area is not located in a groundwater basin and would not use groundwater; therefore, it would not conflict with or obstruct implementation of a sustainable groundwater management plan. No impact would occur, and no mitigation is necessary.

[59] California Department of Conservation, California Geological Survey. 2019. *Earthquake Zones of Required Investigation Interactive Map.* Available online at https://maps.conservation.ca.gov/cgs/EQZApp/. Accessed March 6, 2019.
[60] U.S. Geological Survey. 2015. *UCERF3: A New Earthquake Forecast of California's Complex Fault System.* Fact Sheet 2015-3009. Available online at https://pubs.usgs.gov/fs/2015/3009/pdf/fs2015-3009.pdf. Accessed March 6, 2019.
[61] San Francisco Bay Regional Water Quality Control Board. 2015. *Municipal Regional Stormwater NPDES Permit.* Order No. R2-2015-0049. NPDES Permit No. CAS612008. Available online at https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/R2-2015-0049.pdf. Accessed February 12, 2019

3.11 LAND USE AND PLANNING

This section describes existing land uses in the project vicinity, identifies regulatory requirements, and assesses potential project-related impacts on land use. The section includes an analysis of the project's compatibility with land use and/or habitat plans.

3.11.1 Existing Conditions

The project area is in the Emerald Lake Hills community of the unincorporated County, with a portion of the project area situated in the City. The 3.8-acre project area consists of 12 undeveloped parcels and a gated, dead-end gravel road (Canyon Lane). One parcel is within the City and the remaining 11 parcels are within the County. The undeveloped parcels consist of oak forest, grassland, and an intermittent creek that runs parallel to Canyon Lane. The project area currently maintains the natural slope and vegetation of the hillside canyon and is surrounded by single-family residences. The project is located east of Lower Emerald Lake and west of Garrett Park.

Regional Land Uses

San Mateo County

The County is situated along the central coast of California and encompasses approximately 554 square miles (including tidal waters) of the San Francisco Peninsula. The County's western border is on the Pacific Ocean and the eastern border is on the San Francisco Bay shoreline. The County is bordered by the City and County of San Francisco to the north, Santa Cruz County to the south, and Santa Clara County to the southeast. The County is roughly 42 miles in length and varies from 7 to 20 miles in width.[1] Geographically, the County can be divided into distinctive urban and rural subregions: (1) the urban Bayside, (2) the rural Skyline area, and (3) the rural Coastside. Approximately 20 percent of the County is urbanized and 80 percent is used for agriculture, timber harvesting, recreation and open space.[2]

Redwood City

Redwood City is located within the County of San Mateo, approximately 25 miles south of San Francisco and 27 miles north of San Jose. The City has a land area of approximately 19 square miles with a mean elevation of 15 feet above sea level. The City extends from the San Francisco Bay shoreline to the hillsides of the Santa Cruz Mountains and includes residential, industrial, and commercial uses in an urban setting. [3]

Land uses within the City and Sphere of Influence (Unincorporated) are comprised of the following:[4]

- Residential (single-unit and multi-unit): 4,248 acres (17 percent);

[1] County of San Mateo County. November 1986. San Mateo County *General Plan Overview & Background Issues, Overview: General Plan Functions.* Page 13. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on March 7, 2019.

[2] County of San Mateo County. November 1986. San Mateo County *General Plan Overview & Background Issues, Chapter 7: General Land Uses.* Page 7.3. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on March 2, 2019.

[3] Redwood City. Redwood City California – *About the City, Location*. Available online at https://www.redwoodcity.org/about-the-city/location. Accessed March 15, 2019.

[4] City of Redwood City. October 2010. *Redwood City General Plan- Urban Form and Land Use - The Built Environment.* Page BE-10. Available online at https://www.redwoodcity.org/home/showdocument?id=15378. Accessed on March 2, 2019.

- Commercial: 1,050 acres (4.3 percent);
- Industrial: 483 acres (2 percent);
- Public and Quasi-Public (uses operated for public benefit): 472 acres (1.9 percent);
- Open Space, Water, and Recreation: 14,685 acres (60.4 percent);
- Salt Harvesting: 1,466 acres (6 percent);
- Vacant: 69 acres (0.3 percent); and
- Other (Streets, Rail Lines): 1,882 acres (7.7 percent).

Land Uses and Zoning in the Project Area

San Mateo County

The portion of the project within the County is located within the Emerald Lake Hills community, which is bordered by the City, the Incorporated Town of Woodside, Unincorporated Palomar Park, and Edgewood County Park.[5] The project is surrounded by low and mid-low density single-family residential development. The Emerald Lake Hills area consists of single-family homes in a setting characterized by steep slopes and prominent ridgelines. The community is zoned low-density residential at 0.3–2.3 dwelling units per acre. The project is located approximately 780 feet east of Lower Emerald Lake. (Lower Emerald Lake is discussed in Section 3-16, Recreation.)

The project includes 11 parcels located within the County. These parcels are zoned Residential Hillside/Design Review (RH/DR) and have a General Plan land use designation of Low Density Residential. Land uses within the project vicinity are illustrated in Figure 3.11-1, San Mateo County General Plan Land Use Designations.

Redwood City

The project includes one privately owned parcel located within the City. This parcel is zoned Residential Hillside (RH) and falls under the General Plan Land Use category of Residential-Low with a maximum allowable density of seven dwelling units per acre.[6] The City Zoning Code promotes a semi-rural environment with sloped lots and curvilinear streets. The RH zone allows for single-family dwelling units, accessory dwelling units, room and board (two persons or fewer), small family child care homes, large family child care homes (with conditional use permit), child care centers in conjunction with public or quasi- public uses (with conditional use permit), and parking (with conditional use permit and under guidelines relevant to adjacent industrial or commercial zones).[7] City land uses within the project vicinity are illustrated in Figure 3.11-2, City of Redwood City General Plan Land Use Designations.

An additional land use in the City is George L Garrett Jr Memorial Park (Garrett Park), which is located approximately 165 feet from the project boundary. (Garrett Park is discussed in Section 3.16, Recreation.)

[5] County of San Mateo County. November 1986. San Mateo County *General Plan Overview & Background Issues, Chapter 8: Urban Land uses.* Page 8.10. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on March 2, 2019.

[6] City of Redwood City. October 2010. *Redwood City General Plan-Urban Form and Land Use- The Built Environment.* Page BE-42. Available online at https://www.redwoodcity.org/home/showdocument?id=15378. Accessed on March 2, 2019.

[7] City of Redwood City. June 2016. Redwood City, California Zoning Code, *Article 5- RH (Residential-Hillside) and R-1(Residential-Single-Family) Districts.* Adopted June 13, 2016. Available online at https://library.municode.com/ca/redwood_city/codes/zoning?nodeId=ART5RHREILREINMIDI. Accessed on March 2, 2019.

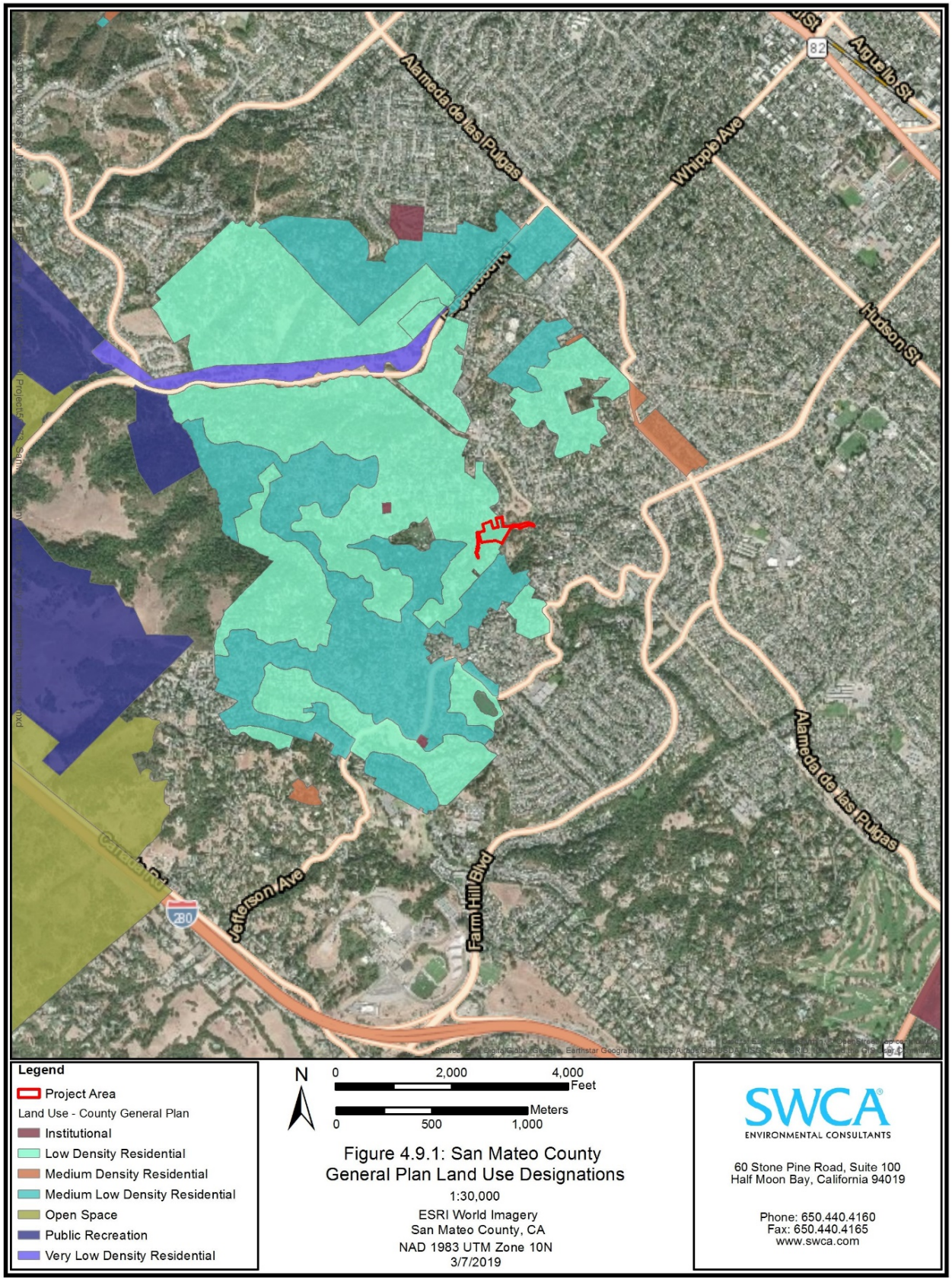


Figure 3.11-1. San Mateo County General Plan Land Use Designations

3.11.2 Regulatory Setting

Federal

There are no applicable Federal land use or planning regulations for the proposed project.

State

There are no applicable State land use or planning regulations for the proposed project.

Local

San Mateo County

San Mateo County General Plan (1986)

The portion of the project area in the County of San Mateo has a General Plan land use designation of Low Density Residential. Low Density Residential allows 0.3–2.3 dwelling units per acre.

San Mateo County Zoning Regulations (May 2018) Chapter 35 "RH" (Residential Hillside) District

The 11 parcels located within the County are zoned Residential Hillside and Design Review (RH/DR) per the County Zoning Regulations (May 2018). Section 6802 of the County Zoning regulations allow the following uses in the RH zone: One Family Dwelling, Second Dwelling Units, Residential Accessory Structures, Keeping of Pets, Urban Residential Animal Keeping, Small Hostelries, Residential Community Care Facilities, Neighborhood Institutional Facilities, Parks, Outdoor Sports and Golf Facilities, and Neighborhood Solid Waste Recycling Facilities. The minimum building site in the RH zone is determined by the contour interval and the average percent of slope.[8]

[8] County of San Mateo County. May 2018. *Section 6565.1, San Mateo County Zoning Regulations: Chapter 35. "RH" District Residential Hillside District.* Page 35.8-35.11. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC_Zoning_Regulations.pdf. Accessed on March 2, 2019.

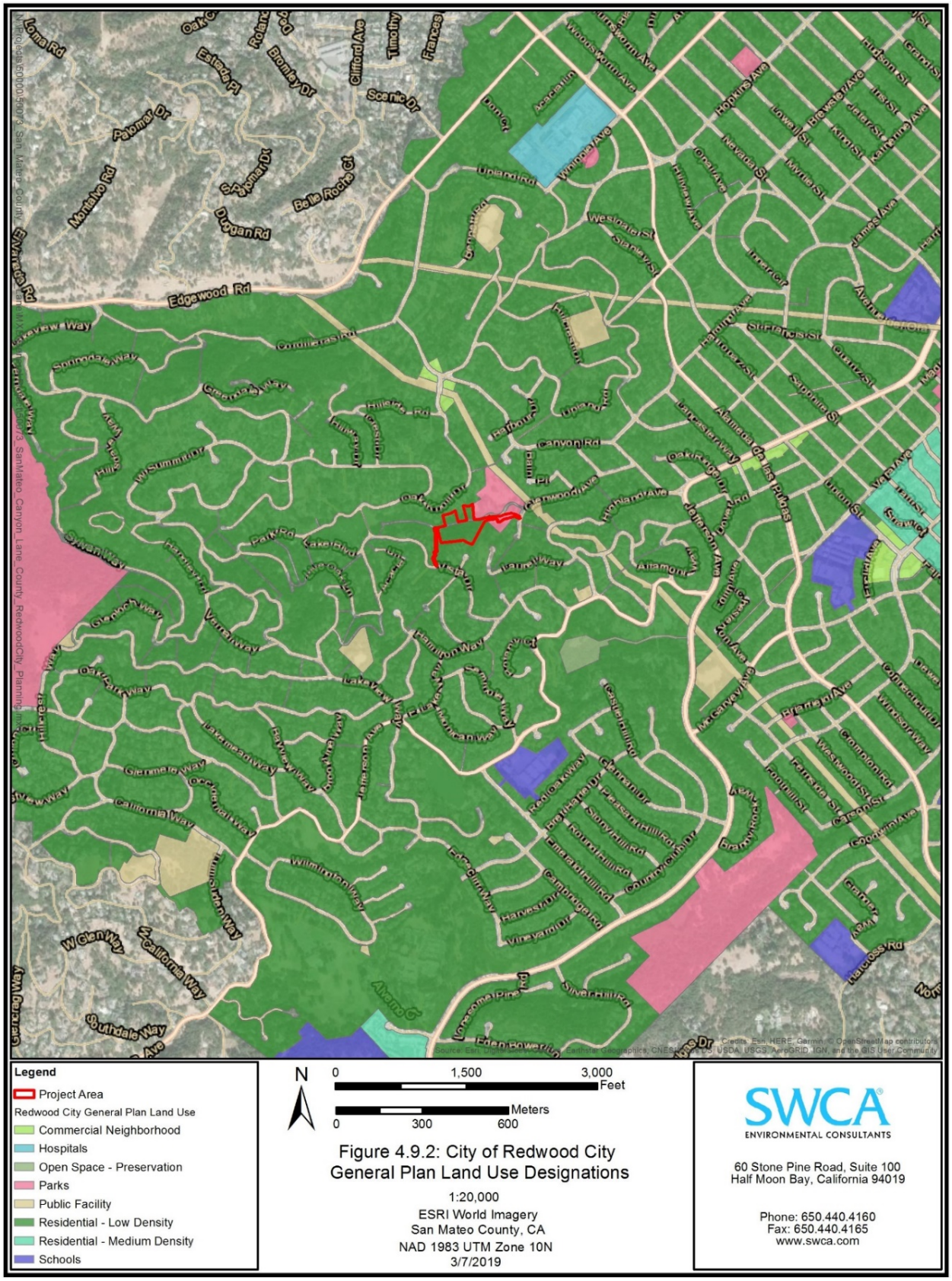


Figure 3.11-2. City of Redwood City General Plan Land Use Designations

Section 6800 of the County Zoning Regulations state:[9]

> "The purposes of Residential Hillside District are to:
>
> 1. Provide residential areas intended primarily for the location of one-family dwellings, accessory structures and uses on hillside parcels;
> 2. Accommodate a compatible mix of institutional and recreational land uses to serve the needs of residential areas;
> 3. Protect the health, safety and welfare of residential inhabitants by restricting incompatible land uses;
> 4. Encourage architectural design and site planning which will preserve the natural character of hillside areas, particularly with respect to topography, vegetation and scenic qualities: and
> 5. Implement the policies of the San Mateo County General Plan, especially those concerning development in hillside areas."

Section 6804 requires that all buildings be located at least 20 feet from the front and rear property lines, and a combined side setback of 20 feet with a minimum of 7½ feet on any side.[10]

Section 6805 states that the building height shall not exceed 28 feet. Equipment such as chimneys, pipes, mechanical equipment, and other facilities may extend beyond the building but no higher than 36 feet.[11]

Section 6804 allows a lot coverage of no more than 25 percent.

Section 6808 states that the floor area of all stories of all buildings and accessory buildings shall not exceed 30 percent or 2,400 square feet, whichever is greater, of the total area of the site.[12]

City of Redwood City

Redwood City General Plan

The City General Plan designates the parcel within the City as Residential Low (0 to 7 dwelling units per acre with a maximum height of two stories). This low-density zoning allows for mostly detached residential homes with private yards, private parking, and accessory units. Goal BE-8 of the General Plan for this area is to "preserve the scenic beauty and quality homes that define Hillside Neighborhoods." The policies under this goal include:[13]

[9] County of San Mateo County. May 2018. *Section 6565.1, San Mateo County Zoning Regulations: Chapter 35. "RH" District Residential Hillside District.* Page 35.1. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC_Zoning_Regulations.pdf. Accessed on March 2, 2019.
[10] County of San Mateo. May 2018. *Section 6805., San Mateo County Zoning Regulations: Chapter 35. "RH" District Residential Hillside District.* Page 35.13. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC_Zoning_Regulations.pdf. Accessed on March 19, 2019.
[11] County of San Mateo. May 2018. *Section 6805., San Mateo County Zoning Regulations: Chapter 35. "RH" District Residential Hillside District.* Page 35.13-35.14. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC_Zoning_Regulations.pdf. Accessed on March 19, 2019.
[12] County of San Mateo. May 2018. *Section 6805., San Mateo County Zoning Regulations: Chapter 35. "RH" District Residential Hillside District.* Page 35.14. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC_Zoning_Regulations.pdf. Accessed on March 19, 2019.
[13] City of Redwood City. October 2010. *Redwood City General Plan- Urban Form and Land Use - The Built Environment.* Page BE-66. Available online at https://www.redwoodcity.org/home/showdocument?id=15378. Accessed on March 2, 2019.

- **Policy BE-8.1:** Minimize the visual and environmental impact of development upon sensitive hillside areas.
- **Policy BE-8.2:** Provide connections to commercial uses, schools, trails, and local parks.
- **Policy BE-8.3:** Address oversized and out-of-scale residential development, including appropriate neighborhood building scale and compatibility.

Redwood City Zoning Code

Article 5- RH (Residential-Hillside) and R-1 (Residential- Single Family) Districts states the following guidelines for Residential Hillside development:[14]

- Lot Area: Minimum lot area of 10,000 square feet.
    - Greater minimums may be established if the district designation includes a number (example – RH-20 would require a minimum lot area of 20,000 square feet).
    - Sloping sites may require greater lot areas.
- Lot width: Minimum average lot width is 60 feet.
- Lot Coverage: 40 percent of lot area and no more than 50 percent of rear yard can be covered by any combination of accessory building or accessory dwelling unit.
- Building Height: Maximum building height is 28 feet and 2.5 stories.
- Setbacks:
    - Front: Lot areas of less than 10,000 square feet have a 20-foot setback, and lot areas of more than 10,000 square feet have a 25-foot setback.
    - Side:
        - First-story side setbacks shall be 7 feet from one side and a total of 15 feet for both sides.
        - Upper stories shall be 7 feet for 25 percent of lot depth or 35 feet, whichever is less.
        - Remaining portions of upper stories shall have a minimum setback of one-half the height of the building face measured at the plateline or ridge beam, whichever is highest.
    - Rear: Rear setback for RH is 25 feet.

The City Zoning code has additional regulations for sloping lots to ensure that homes are well designed, feature a variety of architectural styles, and have natural features. A sloping lot within the RH Zoning District is defined as any lot with an average slope of 15 percent or more. Structural safety and fire safety are incorporated into the design and ensure that the homes are integrated with the hillside slope, compatible with the neighborhood, and built to accommodate diverse family and multi-generational needs.[15]

[14] City of Redwood City. June 2016. Redwood City, California Zoning Code, *Article 5- RH (Residential-Hillside) and R-1(Residential-Single-Family) Districts.* Adopted June 13, 2016. Available online at https://library.municode.com/ca/redwood_city/codes/zoning?nodeId=ART5RHREILREINMIDI. Accessed on March 2, 2019.
[15] City of Redwood City. June 2016. Redwood City, California Zoning Code, *Article 5- RH (Residential-Hillside) and R-1(Residential-Single-Family) Districts.* Adopted June 13, 2016. Available online at https://library.municode.com/ca/redwood_city/codes/zoning?nodeId=ART5RHREILREINMIDI. Accessed on March 2, 2019.

There is a parking front setback adjustment that allows required parking to be as close as 5 feet to the street property line (at the Director of Community Development's discretion) provided that all other structures comply with base zoning setback requirements. This adjustment reduces grading on RH projects.[16]

Homes within this zoning district must comply with the stormwater requirements in the Municipal Code. The pervious requirements for this zone specify that 40 percent of each lot and a minimum of 60 percent of the required front yard shall be pervious. If a lot is less than 50 feet wide, no more than a 20-foot-wide driveway or parking area is permitted.[17]

Local Agency Formation Commission

The Local Agency Formation Commission (LAFCo) has jurisdiction over changes in organization and boundaries of cities and special districts, including annexations, detachments, incorporations, and formations.[18] As part of the project, a water line would be constructed to connect the water mains at Glenwood Avenue and Vista Drive to provide water service and fire protection to the 12 parcels. The water line would be installed within an existing 15-foot-wide easement and would require authorization and discretionary approval of an Outside Service Agreement by the City and LAFCo, as water service would be supplied by the City Water Department.

3.11.3 Thresholds of Significance

The significance of impacts on land use and planning is based on thresholds identified within Appendix G of the CEQA Guidelines, shown below.

The project would result in a significant impact if it would:

a. Physically divide an established community.

b. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.

3.11.4 Impact Assessment and Methodology

The General Plans and Zoning Regulations for the County and City were reviewed for consistency with the designated land uses. Geographic Information System data were used to confirm the land uses in the project area. The project would not physically divide an established community during construction or operation. It would provide additional single-family housing within the regulatory guidelines of the County and City. The impacts would be less than significant, and no mitigation would be required. No land use incompatibilities or conflicts with existing plans or policies would result from the proposed project.

[16] City of Redwood City. June 2016. Redwood City, California Zoning Code, *Article 5- RH (Residential-Hillside) and R-1(Residential-Single-Family) Districts.* Adopted June 13, 2016. Available online at https://library.municode.com/ca/redwood_city/codes/zoning?nodeId=ART5RHREILREINMIDI. Accessed on March 2, 2019.
[17] City of Redwood City. June 2016. Redwood City, California Zoning Code, *Article 5- RH (Residential-Hillside) and R-1(Residential-Single-Family) Districts.* Adopted June 13, 2016. Available online at https://library.municode.com/ca/redwood_city/codes/zoning?nodeId=ART5RHREILREINMIDI. Accessed on March 2, 2019.
[18] LAFCo. *History and Role of LAFCo.* Available online at https://lafco.smcgov.org/history-and-role-lafco. Accessed on March 6, 2019.

3.11.5 Project-Specific Impacts and Mitigation Measures

Impact 3.11-1: The potential to physically divide an established community – No Impact

Canyon Lane Improvements

The rerouting and construction of the Canyon Lane improvements would grant access to the proposed single-family residence and future access to the other 11 developable parcels. Canyon Lane is located within a suburban community surrounded by residential uses. Neither the construction of the road improvements nor the completed improvements would physically divide an established community.

Proposed Single-Family Residence and Developable Parcels

The single-family residence and developable parcels are surrounded by low-density single-family homes. The development of these parcels would be consistent with the community character. Neither the construction nor the occupation of the proposed single-family home or developable parcels would physically divide an established community.

Impact 3.11-2: Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect? – Less than Significant Impact

Canyon Lane Improvements

The Canyon Lane improvements would be implemented in accordance with established land use plans, policies and regulatory requirements. A grading permit would be required for the construction. As a result, no impacts to any land use plan, policy, or regulation would occur.

Proposed Single-Family Residence

The proposed single-family residence on merged parcel (057-222-290 & 300) is approximately 16,151 square feet. The home would be approximately 3,847 square feet with a lot coverage of no more than 25 percent, and Floor Area Ratio (FAR) of no more than 30 percent. With the exception of the grading limits, the proposed single-family residence meets the zoning regulations established for a site designated Residential Hillside in the San Mateo County Zoning Regulation. It has been designed to comply with established land use plans, policies, and regulatory requirements. The County has a grading limit of 1,000 cubic yards for residences constructed within the zoning designation associated with the project. Because construction of the single-family residence would require approximately 2,560 cubic yards of grading, the County would issue a variance to allow relief from the grading restrictions. As a result, less than significant impacts to any land use plan, policy, or regulation would occur.

Developable Parcels

The developable parcels are currently zoned RH/DR in the County and RH in the City. For the purposes of analysis, it is assumed that the remaining developable parcels would be developed within their respective current zoning designations and would be designed to comply with the established land use plans, policies, and regulatory requirements. The Applicant would be required to obtain a variance if

grading volumes exceed the maximum allowable volume (1,000 cubic yards). As such, less than significant impacts to any land use plan, policy, or regulation would occur.

3.12 MINERALS

This section addresses the existing conditions and potential impacts to mineral resources as a resulting implementation of the project. It describes the environmental and regulatory setting, the methods of evaluation, and the results of the assessment.

3.12.1 Existing Conditions

Regional Minerals

The County General Plan identifies 13 mineral resources found within the County: chromite, clay, expansible shale, gemstones, limestone and shells, mercury, mineral water, oil and gas, salines, sand and gravel, sands (specialty), stone (crushed and broken), and stones (dimension).[1] The minerals in the County are considered beneficial resources that have primarily been used as low-cost construction materials and a source of energy. Mineral resources are classified into four categories: (1) occurrence, not likely to be used, (2) small resource, or useable only at a high price, (3) significant resource being used, and (4) significant resource being used, but likely to be exhausted, seriously depleted, or uneconomic in 20 years.

Minerals in the Project Area

There are no known mineral resources within the immediate vicinity of the project location. The closest mineral resource, a mercury deposit, is located approximately 0.92 mile south of the project area at the Redwood Quicksilver Prospect site. The mercury deposit at the Redwood Quicksilver Prospect site is not considered to be of world-class significance.[2]

3.12.2 Regulatory Setting

Federal

No Federal laws or regulations related to minerals apply to the proposed project.

State

The Surface Mining and Reclamation Act of 1975

The Surface Mining and Reclamation Act of 1975 (SMARA) requires that mineral resources be classified into Mineral Resource Zones (MRZ) and that deposits of regional or State-wide significance be designated. SMARA was passed by the California state legislature in response to the loss of significant mineral resources due to urban expansion, the need by land use decision-makers for current information concerning the location and quantity of essential mineral deposits, and to ensure adequate reclamation of mined lands. The objective of the SMARA classification-designation process is to ensure, through appropriate local lead agency policies and procedures, that mineral materials will be available when

[1] County of San Mateo County. November 1986. San Mateo County *General Plan Overview & Background Issues, Chapter 3: Mineral Resources.* Pages 3.3-3.4. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on March 5, 2019.

[2] The Diggings. "*Redwood Quicksilver Prospect" in San Mateo, CA.* Available online at https://thediggings.com/mines/usgs10116678. Accessed on March 5, 2019.

needed and do not become inaccessible as a result of inadequate information during the land use decision-making process. The minerals are divided into the following four MRZ categories according to known or inferred mineral potential of the land:[3]

- MRZ-1: Areas where geologic information indicates no significant mineral deposits are present;
- MRZ-2: Areas that contain identified mineral resources;
- MRZ-3: Areas of undetermined mineral resource significance; and
- MRZ-4: Areas of unknown mineral resource potential.

Local

San Mateo County

San Mateo County General Plan Conservation and Open Space Element

The County General Plan Conservation and Open Space Element provides background information and guidelines for the conservation and utilization of mineral resources and the following policies that address mineral resources:[4]

- Seek to identify and protect significant existing and potential mineral resource areas from encroachment by urban development;
- Plan for the rehabilitation and reuse of mineral extraction areas;
- Give general guidance for providing consistent extractive and land use controls which would minimize conflicts between mineral extraction activities and urbanization; and
- Seek to minimize the impact of mineral extraction activities on the surrounding natural environment.

City of Redwood City

The Redwood City General Plan, General Plan EIR, and Zoning Code were reviewed for documentation regarding mineral resources. No laws or regulations regarding minerals apply to the proposed project.

3.12.3 Thresholds of Significance

The significance of potential mineral resource impacts is based on thresholds identified within Appendix G of the CEQA Guidelines, shown below.

Impacts would be considered significant if the project would:

a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State; or

[3] California Department of Conservation (CDOC). 2000. California Surface Mining and Reclamation Policies and Procedures, Guidelines for Classification and Designation of Mineral Lands. Page 3. Available online at https://www.conservation.ca.gov/smgb/Guidelines/Documents/ClassDesig.pdf. Accessed on March 5, 2019.

[4] California Department of Conservation (CDOC). 2000. California Surface Mining and Reclamation Policies and Procedures, Guidelines for Classification and Designation of Mineral Lands. Page 3.16. Available online at https://www.conservation.ca.gov/smgb/Guidelines/Documents/ClassDesig.pdf. Accessed on March 5, 2019.

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.

3.12.4 Impact Assessment and Methodology

Information on mineral resources was compiled from SMARA via the Department of Conservation, the County General Plan, and publicly available GIS data.

3.12.5 Project-Specific Impacts and Mitigation Measures

Impact 3.12-1: Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State – No Impact

Research demonstrates that there are no known mineral resources within the project area. The project area is categorized MRZ-4: Areas of unknown mineral resource potential. As such, the project would not result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State nor would it 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.

Impact 3.12-2: 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 – No Impact

The Canyon Lane improvements, development of the single-family parcel, and future development of the 11 additional residential parcels do not contain and would not affect any known mineral resources that would be considered locally important or of value to the region. The closest mineral deposit for mercury is 0.92 mile away from the project. As a result, the project will have no impact on mineral resources.

3.13 NOISE

The Noise section discusses the fundamentals of sound and noise measurements; describes the existing noise environment at the project area; presents applicable Federal, State, and local noise guidelines and policies; and evaluates potential noise impacts that would result from the proposed project.

3.13.1 Sound Fundamentals

Noise is sometimes defined as unwanted sound. The human ear responds to a very wide range of sound intensities. The decibel (dB) scale used to describe sound is a logarithmic rating system that accounts for the large differences in audible sound intensities. When addressing the effects of noise on people, it is necessary to consider the frequency response of the human ear, or those frequencies that people hear the best. Noise measuring instruments are therefore often designed to "weight" noises based on the way people hear. The frequency weighting most often used to evaluate environmental noise is "A weighting" because it best reflects how humans perceive noise. Measurements from instruments using this system, and associated noise levels, are reported in "A-weighted decibels," or dBA.

Using this scale, a change in noise level of 3 dBA is perceived as barely perceptible, 5 dBA is perceived as readily perceptible, and 10 dBA is perceived as a doubling or halving of noise loudness[1]. Therefore, a 70-dB sound level will sound about twice as loud as a 60-dB sound level. People generally cannot detect differences of 1 to 2 dB in a complex acoustical environment.

On this scale, a doubling of sound-generating activity (i.e., a doubling of the sound energy) causes a 3-dB increase in average sound produced by that source, not a doubling of the perceived loudness of the sound (which requires a 10-dB increase). For example, if traffic on a road is causing a 60-dB sound level at a nearby location, a doubling of the number of vehicles on this same road would cause the sound level at this same location to increase to 63 dB.[2]

For any noise source, several factors affect the efficiency of noise transmission traveling from the source, which in turn affects the potential noise impact at off-site locations. Important factors include distance from the source, frequency of the noise, absorbency and roughness of the intervening ground (or water) surface, the presence or absence of obstructions and their absorbency or reflectivity, and the duration of the noise. Table 3.13-1, Representative Environmental Noise Levels, presents typical noise levels of some familiar noise sources and activities.

Sound propagation (i.e., the passage of sound from a noise source to a receiver) is influenced by geometric spreading, ground absorption, atmospheric effects, and shielding by natural and/or built features. Sound levels attenuate (or diminish) at a rate of approximately 6 dBA per doubling of distance from an outdoor point source due to the geometric spreading of the sound waves. Atmospheric conditions such as humidity, temperature, and wind gradients can also temporarily alter sound levels. In general, the greater the distance the receiver is from the source, the greater the potential for variation in sound levels due to atmospheric effects. Structures can provide noise reduction by breaking the line of sight between source and receiver and by insulating interior spaces from outdoor noise. When just breaking the line of site between a source and a receiver, approximately 5 dB of attenuation can be expected. Typical Caltrans

[1] California Department of Transportation (Caltrans). 2013. *Technical Noise Supplement to Traffic Noise Analysis Protocol: A Guide for Measuring, Modeling, and Abating Highway Operation and Construction Noise Impacts.* Available online at http://www.dot.ca.gov/env/noise/. Accessed February 8, 2019.
[2] *Ibid*

noise barriers provide approximately 10 dB of noise reduction. An upper limit for sound reduction because of added wall barriers is approximately 20 dB.[3]

Table 3.13-1. Representative Environmental Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Band
Jet Fly-over at 100 feet		
	100	
Gas Lawnmower at 3 feet		
	90	
Diesel Truck going 50 mph at 50 feet		Food Blender at 3 feet
	80	Garbage Disposal at 3 feet
Noise Urban Area during Daytime		
Gas Lawnmower at 100 feet	70	Vacuum Cleaner at 10 feet
Commercial Area		Normal Speech at 3 feet
Heavy Traffic at 300 feet	60	
		Large Business Office
Quiet Urban Area during Daytime	50	Dishwasher in Next Room
Quiet Urban Area during Nighttime	40	Theater, Large Conference Room (background)
Quiet Suburban Area during Nighttime		
	30	Library
Quiet Rural Area during Nighttime		Bedroom at Night, Concert Hall (background)
	20	
		Broadcast/Recording Studio
	10	
	0	

Source: California Department of Transportation (Caltrans). 2013. Technical Noise Supplement to Traffic Noise Analysis Protocol: A Guide for Measuring, Modeling, and Abating Highway Operation and Construction Noise Impacts. Available online at: http://www.dot.ca.gov/env/noise/. Accessed February 8, 2019

Although a measured A-weighted noise level will adequately indicate the level of environmental noise at any instant in time, noise levels in populated communities typically vary by time. Several noise descriptors have been developed to characterize community noise by the total acoustical energy content of the noise over defined periods of time or by characterizing the loudest noise levels over a given time interval. Noise metrics used in this analysis are as follows:

- **Community Noise Equivalent Level (CNEL):** Due to human sensitivity to noise increases during the evening and at night (as excessive noise interferes with the ability to sleep), 24-hour average noise level descriptors have been developed that incorporate artificial noise weighting factors. The Community Noise Equivalent Level (CNEL) is the average dBA noise level during a

[3] California Department of Transportation (Caltrans). 2009. *Technical Noise Supplement.* November 2009. Available online at http://www.dot.ca.gov/hq/env/noise/pub/tens_complete.pdf. Accessed February 8, 2019.

24-hour day. To allow for the increased sensitivity that occurs at night, the noise levels obtained between 7:00 P.M. to 10:00 P.M. have an additional 5 dB added to them, and noise levels obtained between 10:00 P.M. to 7:00 A.M. have an additional 10 dB added to them. The different weighting factors added to the noise levels apply to day, evening, and nighttime periods. The weighted CNELs take into account that individuals are more sensitive to noise in the late hours than in daytime hours.

- **L_{eq}:** The equivalent sound level is the sound level corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given sample period. An L_{eq} is a single number representing the level of a constant sound containing the same amount of sound energy as the varying sound levels over a specific period. Thus, the L_{eq} is the "energy average" noise level for the measurement time interval.
- **L_{dn}:** A 24-hour sound level metric similar to a 24-hour L_{eq}, except the L_{dn} includes an additional 10 dBA added to sound levels in each hour between 10:00 p.m. and 7:00 a.m. to account for increased sensitivity to noise during times when people are typically trying to sleep.
- **L_{90}:** The sound level exceeds 90 percent of a specified time interval, often one hour. The L_{90} may be used as a conservative representation of ambient sound levels.
- **L_{max}:** The instantaneous maximum noise level measured during a defined time interval.

3.13.2 Effects of Noise on People

The effects of noise on people can be placed into the following categories:

- Interference with activities such as speech, sleep, and learning: The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating.[4] Outdoors, the thresholds for speech interference are higher, generally by about 15 dBA, or 70 dBA. Interior residential standards for multi-family dwellings are set by the Federal government at 45 dB L_{dn}[5] (24 CFR 51 101 [a][9]). The State standard is designed for sleep and speech protection and the same criterion is applied to all residential uses. According to the World Health Organization, sleep disturbance can occur when continuous indoor noise levels exceed 30 dBA (L_{eq}) or when intermittent interior noise levels reach or exceed 45 dBA (L_{max}), particularly if background noise is low. With a bedroom window slightly open (which would provide a 15 dB reduction of noise from outside to inside), the World Health Organization criteria would suggest exterior continuous (ambient) nighttime noise levels should be 45 dBA (L_{eq}) or below, and short-term events should not generate noise in excess of 60 dBA (L_{max}). The organization also notes that maintaining noise levels within the recommended levels during the first part of the night is believed to be effective for the ability to fall asleep. Exposure to noise levels greater than 85 dBA for 8 hours or longer can cause permanent hearing damage.[6]
- Subjective effects of annoyance, nuisance, and dissatisfaction: The main causes for annoyance are interference with speech, radio and television, and house vibrations (vibration is discussed in the next section). The L_{dn} as a measure has been found to provide a valid correlation of noise level and the percentage of people annoyed. Three aspects of community noise are most important in

[4] World Health Organization (WHO). 1999. *Guidelines for Community Noise. Chapter 4. Guideline Values.* Available online at https://www.who.int/docstore/peh/noise/Commnoise4.htm. Accessed February 8, 2019

[5] 24 CFR §101(a)(9). (1996). Available online at https://www.law.cornell.edu/cfr/text/24/51.101. Accessed March 28, 2019.

[6] *Ibid*

determining subjective response: the level of sound, the frequency composition or spectrum of the sound, and the variation of sound level with time.[7]

- Physiological effects: Physiological effects include interference with sleep and rest, as well as hypertension and heart disease (after many years of constant exposure, often by workers, to high noise levels).[8]
- Hearing loss: Hearing loss occurs mainly due to chronic exposure to excessive noise, but may be due to a single event such as an explosion. Natural hearing loss associated with aging may be exacerbated by a single event such as an explosion and may also be accelerated from chronic exposure to loud noise.[9] Sounds of less than 75 dB, even after long exposure, are unlikely to cause hearing loss. However, long or repeated exposure to sounds at or above 85 dB can cause hearing loss. The louder the sound, the shorter amount of time it takes for hearing loss to happen.[10]

3.13.3 Fundamentals of Groundborne Vibration

Vibration is defined as the motion of ground transmitted into a structure. It can be described in terms of displacement, velocity, or acceleration. Vibration levels are expressed in decibels (VdB) and are a measure of how tall the wave is or how much the ground is moving. The vibration frequency is expressed in Hertz (Hz) where 1 Hz means that one wave happens each second, and 20 Hz means that 20 waves happen each second.

Equipment that creates blows or impacts on the ground surface produces vibrational waves, called groundborne vibration, that radiate along the surface of the earth and downward into the earth, potentially resulting in effects that range from annoyance to structural damage. As vibrations travel outward from the source, they excite the particles of rock and soil through which they pass and cause them to oscillate by a few ten-thousandths to a few thousandths of an inch. Differences in subsurface geologic conditions and distance from the source of vibration will result in different vibration levels characterized by different frequencies and intensities. Vibration levels decrease with increasing distance. The maximum rate or velocity of particle movement is the commonly accepted descriptor of the vibration "strength." This is referred to as the peak particle velocity (PPV) and is typically measured in inches per second.

Vibration energy spreads out as it travels through the ground, causing the vibration level to diminish with distance away from the source. High-frequency vibrations reduce much more rapidly than low frequencies, so that low frequencies tend to dominate the spectrum as distance from the source increases. Discontinuities in the soil strata can also cause diffractions or channeling effects that affect the propagation of vibration over long distances. When vibration encounters a building, the transfer of vibration from ground to the building foundation (referred to as "ground-to-foundation coupling") will usually reduce the overall vibration level; however, under certain circumstances, the ground-to-foundation coupling may also amplify the vibration level due to structural resonances of the floors and walls. High levels of vibration can damage fragile buildings or interfere with the operation of sensitive equipment. Depending on the age of the structure and type of vibration (transient, continuous, or frequent intermittent sources), vibration levels as low as 0.5 to 2.0 inches per second PPV can damage a structure.

[7] World Health Organization (WHO). 1999. *Guidelines for Community Noise. Chapter 4. Guideline Values.* Available online at https://www.who.int/docstore/peh/noise/Commnoise4.htm. Accessed February 8, 2019.
[8] *Ibid*
[9] *Ibid*
[10] National Institute of Deafness and Other Communication Disorders. 2019. *Noise-Induced Hearing Loss Webpage*. Available online at https://www.nidcd.nih.gov/health/noise-induced-hearing-loss. Accessed March 20, 2019.

Human response to vibration is difficult to quantify. Vibration can be felt or heard well below a level that would result in damage to a structure. Except for long-term occupational exposure, vibration levels rarely affect human health. Instead, most people consider vibration to be an annoyance that can affect concentration or disturb sleep. People may tolerate infrequent, short-duration vibration levels, but human annoyance to vibration becomes more pronounced if the vibration is continuous or occurs frequently. Human response to vibration often is described as the root-mean-square velocity level and is denoted in the decibel scale, or VdB. The typical background level in residential areas is about 50 VdB; most people cannot detect levels below about 65 VdB and generally do not consider levels below 70 VdB, which is the equivalent of approximately 0.1 PPV, to be an annoyance.[11] However, the duration of a vibration event has an effect on human response, as does its frequency. Generally, as the duration of a vibration event increases, the potential for adverse human response increases, particularly if the vibration event disturbs sleep. In addition, while people have varying sensitivities to vibrations at different frequencies, in general they are most sensitive to low-frequency vibration.

Vibration in buildings caused by construction activities may be perceived as motion of building surfaces or rattling of windows, items on shelves, and pictures hanging on walls. Vibration of building components can also take the form of an audible low-frequency rumbling noise, which is referred to as groundborne noise. Groundborne noise is usually only a problem when the originating vibration spectrum is dominated by frequencies in the upper end of the range of vibration frequencies (i.e., 60 to 200 Hertz); when the structure and the construction activity are connected by foundations or utilities, such as sewer and water pipes; or when the airborne noise path is blocked, such as during tunneling activities.

3.13.4 Existing Noise Conditions

The project area is located at the bottom of a canyon in a rural, residential area. Garrett Park is located to the east, at the entrance to Canyon Lane. The existing Canyon Lane is an unimproved dirt and gravel road with an intermittent creek (Emerald Branch) parallel to and north of the road. The canyon is undeveloped and the road and creek are surrounded primarily by oak woodland and grassland. The project area is surrounded by hilltop residences along Oak Knoll Drive to the north, and Glenwood Avenue and Oakview Way to the south. The majority of the existing residences are at a higher elevation, between 40 and 100 feet above the unimproved Canyon Lane roadbed.

Noise on the project area is dominated by natural sounds, including creek flow, wind, vegetation movement, and bird song. Other noises result from aircraft and occasional traffic on roads at the top of the canyon.[12]

Acoustical measurements were taken for the *Laurel Hill Planned Development EIR*, which is located less than 200 feet south of the proposed project.[13] Noise measurements were made at three locations close to the project area and are similar to the noise environment of the project area. These are shown in Figure 3.13-1, Noise Measurement Locations.

[11] FHWA (Federal Highway Administration). 2006. *FHWA Roadway Construction Noise Model: User's Guide. Final*. FHWA-HEP-05-054. DOT-VNTSC-FHWA-05-01. Cambridge, Massachusetts: U.S. Department of Transportation, Research and Innovative Technology Administration. Available online at https://www.fhwa.dot.gov/Environment/noise/construction_noise/rcnm/rcnm.pdf. Accessed February 7, 2019.

[12] SWCA, 2019. Site visit by Juliet Bolding, Planner. February 6, 2019.

[13] City of Redwood City, 2010. *Laurel Way Planned Development. Draft Environmental Impacts Report.* Prepared by RMT, Inc.

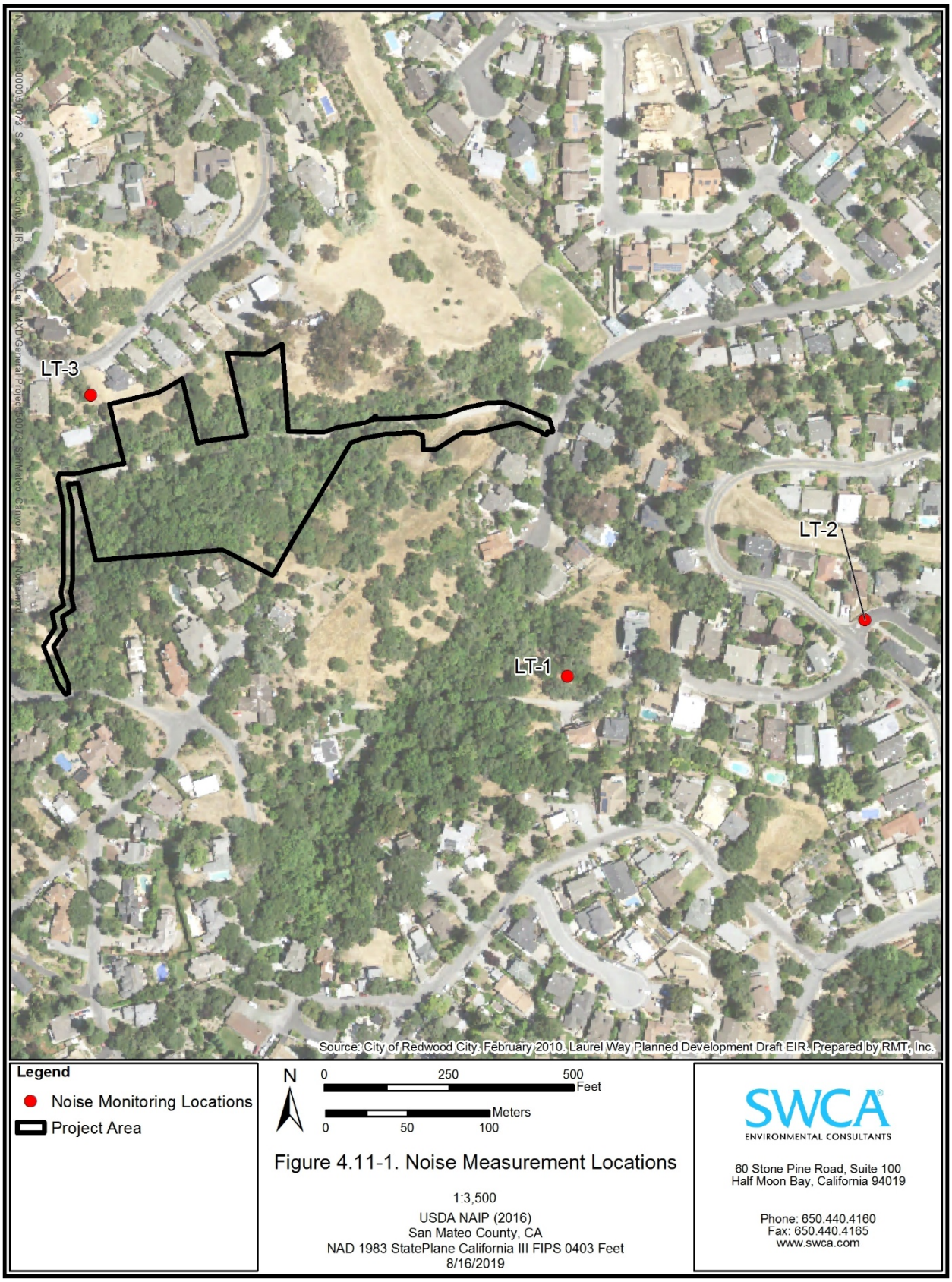


Figure 3.13-1. Noise Measurement Locations

Measurement location LT-1 was undeveloped and the acoustical environment was very quiet, composed primarily of "natural sounds such as birds and wind." Airplanes were noticeable and generated a maximum noise level of 48 dBA L_{max}. This noise environment is similar to the environment in the canyon, although the measurements do not include the sound of running water from the creek that is on the project area. Location LT-2 was on Laurel Way near Highland Drive and is indicative of neighborhood traffic noise in the area. Location LT-3 was approximately 30 feet south of Oak Knoll Drive. This location is approximately 180 feet upslope from the existing Canyon Lane and 50 feet upslope of parcel 057-221-110, the northwesternmost parcel in the proposed project. This site is representative of sensitive receptors including residences on Oak Knoll Drive as well as those on Glenwood Avenue and Oakview Way to the south. The canyon may act as a sound amplifier for the proposed project or could absorb project noise, depending on the location of the receiver.

Daytime hourly noise equivalent levels (Leq) ranged from 42 to 68 dBA in the surrounding areas. The CNEL among all noise monitoring locations ranged from 49 to 62 dBA. The data presented in Table 3.13-2, Ambient Noise Measurements, serve as the environmental baseline for ambient noise in the project vicinity.

Table 3.13-2. Ambient Noise Measurements

Monitoring Locations	Daytime L_{eq} (dBA)	Nighttime L_{eq} (dBA)	CNEL (dBA)
LT-1 (3737 Laurel Way)	42-50	39-45	49
LT-2 (Laurel Way and Highland Drive)	53-61	40-53	58-61
LT-3 (Oak Knoll Drive)	56-68	42-55	61-62

Source: Laurel Way Planned Development Draft EIR, February 2010

The residential uses surrounding the project area represent the majority of the sensitive receptors to the proposed project. Additional sensitive receptors would be the recreational visitors to the George L. Garrett Junior Memorial Park (Garrett Park).

Sensitive receptors along the route for construction traffic include users of Garrett Park, single-family residences, the St. Matthias Catholic Church and Pre-school at 1685 Cordilleras Road, and the Cordilleras Mental Health Facility at 200 Edmonds Road, approximately 260 feet north of Edgewood Road.

3.13.5 Regulatory Setting

Federal

U.S. Federal Transit Administration

The U.S. Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment established general methodology guidelines and impact criteria for assessment of noise from construction activities. Guidelines are provided for both general assessments and detailed assessments of construction noise.[14]

The general assessment of construction noise impacts includes the following major elements:

[14] FHWA (Federal Highway Administration). 2006. *FHWA Roadway Construction Noise Model: User's Guide. Final*. FHWA-HEP-05-054. DOT-VNTSC-FHWA-05-01. Cambridge, Massachusetts: U.S. Department of Transportation, Research and Innovative Technology Administration. Available online at https://www.fhwa.dot.gov/Environment/noise/construction_noise/rcnm/rcnm.pdf. Accessed February 7, 2019.

- Predictions of construction noise are based on the two noisiest pieces of equipment expected to be used during each phase of the four-phase construction program.
- Equipment is assumed to operate at full power for an hour or more.
- Construction equipment is assumed to operate in the center of the construction site.
- Construction noise levels are to be calculated as hourly L_{eq}.

When using this method to estimate construction sound levels, the FTA provides guidelines for assessing the potential for adverse community reaction. In general, no substantial adverse reaction would be expected if the calculated hourly L_{eq} were to remain at or below 90 dBA at residential receptors during daytime hours and below 80 dBA at night.

State

California Government Code Section 65302 requires each local government entity to implement a noise element as part of its general plan.[15] In addition, the California Governor's Office of Planning and Research has developed guidelines for preparing noise elements, which include recommendations for evaluating the compatibility of various land uses as a function of community noise exposure. The guidelines define the purpose of the noise element as "to ensure that a local planning area limits the exposure of the community to excessive noise levels in noise-sensitive areas and at noise-sensitive times of day."

California Department of Transportation

The California Department of Transportation (Caltrans) has published several documents characterizing assessment procedures and impact criteria related to traffic noise and groundborne vibration. Caltrans published the Technical Noise Supplement to the Traffic Noise Analysis Protocol in September 2013, which describes the measurement, modeling, and noise impact assessment procedures for evaluating noise from traffic. The document states, "Changes in noise levels are perceived as follows: 3 dBA as barely perceptible, 5 dBA as readily perceptible, and 10 dBA as a doubling or halving of noise."[16]

Caltrans has also provided guidance on the evaluation and impact criteria related to groundborne vibration, as documented in the Transportation and Construction Vibration Guidance Manual.[17] Table 3.13-3, Vibration Guidelines for Annoyance, summarizes the Caltrans manual guidelines to assess the potential for annoyance, which can range from barely perceptible to severe, based on vibration PPV levels, with the potential for annoyance based on whether the vibration is transient (i.e., single, isolated vibration events, such as blasting or a dropped ball) or continuous or frequent (i.e., sources such as impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment). Table 3.13-4, Vibration Guidelines for Potential Damage to Structures, summarizes the Caltrans manual guidelines to assess the potential for damage to structures, based on vibration PPV levels, with the potential for damage based on building types (i.e., the fragility or strength of a building structure) and whether the vibration is transient or continuous or frequent.

[15] California Government Code. 2017. Title 7, Division 1, Chapter 3, Section 65302(f)(1). June 27, 2017. Available online at https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=GOV&division=1.&title=7.&part=&chapter=3.&article=5. Accessed May 25, 2018.

[16] California Department of Transportation (Caltrans). 2013. *Technical Noise Supplement to Traffic Noise Analysis Protocol: A Guide for Measuring, Modeling, and Abating Highway Operation and Construction Noise Impacts.* Available online at http://www.dot.ca.gov/env/noise/. Accessed February 8, 2019.

[17] California Department of Transportation (Caltrans). 2013. *Transportation and Construction Vibration Manual*. Available online at http://www.dot.ca.gov/hq/env/noise/pub/TCVGM_Sep13_FINAL.pdf. Accessed May 25, 2018.

Table 3.13-3. Vibration Guidelines for Annoyance

Human Response	Maximum Peak Particle Velocity (PPV) (in/sec)	
	Transient Sources [1]	Continuous/Frequent Intermittent Sources [2]
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.90	0.10
Severe	2.00	0.10

Notes: in/sec = inches per second

[1] Transient sources create a single, isolated vibration event, such as blasting or drop balls.

[2] Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Source: California Department of Transportation (Caltrans). 2004. *Transportation- and Construction-Induced Vibration Guidance Manual*. June 2004. Prepared by Jones & Stokes. Sacramento, California: Jones & Stokes.

Table 3.13-4. Vibration Guidelines for Potential Damage to Structures

Structure Type and Condition	Maximum Peak Particle Velocity (PPV) (in/sec)	
	Transient Sources [1]	Continuous/Frequent Intermittent Sources [2]
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Notes: in/sec = inches per second

[1] Transient sources create a single, isolated vibration event, such as blasting or drop balls.

[2] Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Source: California Department of Transportation (Caltrans). 2004. *Transportation- and Construction-Induced Vibration Guidance Manual*. June 2004. Prepared by Jones & Stokes. Sacramento, California: Jones & Stokes.

Local

San Mateo County Noise Control Ordinance

The San Mateo County Noise Control Ordinance contains noise measurement criteria as well as exterior noise standards. The ordinance states that noise measurements shall be made using an A-weighted network (scale) at slow meter response, and exterior noise levels shall be measured within 50 feet of an affected residence, school, hospital, church, or public library, but in no case beyond the property line. Section 4.88.330, Exterior Standards, includes maximum levels as shown in Table 3.13-5, San Mateo County Maximum Exterior Noise Limits.

Table 3.13-5. San Mateo County Maximum Exterior Noise Limits

Cumulative Number of Minutes in Any 1-Hour Time Period	Noise Level Standards, dBA	
	Daytime 7:00 a.m. to 10:00 p.m.	Nighttime 10:00 p.m. to 7:00 a.m.
30	55	50
15	60	55
5	65	60
1	70	65
0	75	70

Source: San Mateo County. 2019. *San Mateo County Code of Ordinances. Title 4. Sanitation and Health. Chapter 4.88. Noise Control.* Available online at: http://smc-ca.elaws.us/code/coor_title4_ch4.88. Accessed February 7, 2019.

Section 4.88.360, Exemptions (e), states construction noise sources are exempt provided they do not take place before 7:00 a.m. or after 6:00 p.m. on weekdays, between 9:00 a.m. and 5:00 p.m. on Saturdays, or at any time on Sundays, Thanksgiving, or Christmas.

City of Redwood City Noise Regulation Ordinance

Chapter 24, Division 3, of Redwood City's Noise Regulation Ordinance addresses construction noise and sets limits for excessive and unreasonable noise levels as well as time limits for construction activities. The following sections of the ordinance apply to the project:

Section 24.30 – Excessive and Unreasonable Noise

The following are deemed to be excessive and unreasonable noises:

A. Noise levels generated by construction activities, including demolition, alteration, repair or remodeling of or to existing structures and construction of new structures on property within the City, at more than 110 dB measured at any point within a residential district of the City and outside of the plane of said property;

B. Noise levels generated by an individual item of machinery, equipment or device used during construction activities, including demolition, alteration, repair or remodeling of or to existing structures and construction of new structures on property within the City, at more than 110 dB measured within a residential district of the City at a distance of twenty-five feet (25′) from said machinery, equipment or device. If said machinery, equipment or device is housed within a structure on the property, then the measurement shall be made at a distance as near to twenty-five feet (25′) from said machinery, equipment or device as possible.

Section 24.31. Prohibited Noise Levels

It shall be unlawful for any person to suffer or allow noise levels to be generated by:

A. Construction activities, including demolition, alteration, repair or remodeling of or to existing structures and construction of new structures on property within the City, at more than 110 dB measured at any point within a residential district of the City and outside of the plane of said property; or

B. An individual item of machinery, equipment or device used during construction activities, including demolition, alteration, repair or remodeling of or to existing structures and construction of new structures on property within the City, at more than 110 dB measured within a residential district of the City at a distance of twenty-five feet (25′) from said machinery, equipment or device. If said machinery, equipment or device is housed within a structure on the property, then the measurement shall be made at a distance as near to twenty-five feet (25′) from said machinery, equipment or device as possible.

Section 24.32. Time Limitations

Notwithstanding the provisions in this Division to the contrary, it shall be unlawful for any person to engage in construction activities, including demolition, alteration, repair or remodeling of or to existing structures and the construction of new structures on property in a residential district or within five hundred feet (500′) of a residential district in the City, between the hours of eight o'clock (8:00) P.M. and seven o'clock (7:00) A.M. the following day, Monday through Friday of any week or at any time on Saturdays, Sundays or holidays if the noise level generated by any such activity exceeds the local ambient measured at any point within the residential district and outside of the plane of said property.

Section 24.33. Construction Site Notice

A. Generally: The owner of any property in a residential district of the City or of any property located within five hundred feet (500′) of any such district upon which construction activities, including demolition, alteration, repair or remodeling of or to existing structures, and construction of new structures are proposed to occur, shall post a sign at all entrances to the work site prior to commencement of the work for the purpose of informing all contractors and subcontractors, their employees, agents, materialmen and all other persons at the property of the basic limitations upon noise and construction activities provided in this Division. Said sign(s) shall be posted at least five feet (5′) above ground level and shall be on a white background with black lettering, which lettering shall be a minimum of one and one-half inches (1 ½″) in height.

B. Sign Text: Said sign(s) shall read as follows:

NOISE LIMITATIONS UPON WORK ON PROPERTIES IN OR NEAR RESIDENTIAL DISTRICTS

(Includes any and all deliveries)

NOISE PROHIBITED

MONDAYS through FRIDAYS	8:00 p.m. to 7:00 a.m.
SATURDAYS, SUNDAYS and HOLIDAYS	ALL DAY

During the foregoing periods, no noise above the local ambient level in Residential Districts shall be generated by construction work or activities.

WORK NOISE LIMITS AT ALL OTHER TIMES:

1. No individual item of machinery, equipment, or device used in or near a residential district shall produce sound in excess of 110 dBA, measured twenty five feet (25′) from such machinery, equipment, or device;

2. Work noise level at any point outside of the construction site property plane shall not exceed 110 dBA within any part of a residential district.

The foregoing provisions are requirements of the Noise Regulations of the City, violations of which are punishable pursuant to the provisions of this Chapter.

City of Redwood City General Plan, Public Safety Element

- **Goal PS-13:** Minimize the impact of point-source noise and ambient level noise levels throughout the community.
    - **Policy PS-13.3:** Consider noise impacts as part of the development review process, particularly the location of parking, ingress/egress/loading, and refuse collection areas relative to surrounding residential development and other noise-sensitive land uses.
    - **Policy PS-13.6:** Require all exterior noise sources (construction operations, air compressors, pumps, fans, and leaf blowers) to use available noise suppressions devices and techniques to bring exterior noise down to acceptable levels that are compatible with adjacent land uses.
    - **Policy PS-13.8:** Implement appropriate standard construction noise controls for all construction projects.
    - **Policy PS-13.9:** Require noise created by new non-transportation noise sources to be mitigated so as not to exceed acceptable interior and exterior noise level standards.
- **Program PS-63, Enforcing Construction and Maintenance Noise Regulations:** Minimize noise from property maintenance equipment, construction activities, and other non-transportation noise sources by enforcing construction and maintenance hours, including vehicle start-up and preparation. Enforce standard construction noise controls such as:
    - Control noise from construction workers' radios to the point where they are not audible at existing residences that border the project site.
    - Equip all internal combustion engine-driven equipment with mufflers that are in good condition and appropriate for the equipment.
    - Utilize quiet models of air compressors and other stationary noise sources where technology exists.
    - Locate stationary noise-generating equipment as far as possible from sensitive receptors when sensitive receptors adjoin or are near a construction project area.
    - Prohibit unnecessary idling of internal combustion engines.
    - Notify residents adjacent to the project site of the construction schedule in writing.

The General Plan Public Safety Element also identifies flexible noise levels for various land uses in mixed-use districts. Guidelines for the land uses surrounding the proposed project are shown in Table 3.13-6, Community Noise Level Equivalents for Various Land Uses. These guidelines simplify land uses and reduce the acceptability categories to four: normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable. These categories translate to a noise environment for a particular use that would be acceptable without additional mitigation measures, an intermediate category where the application of available mitigation measures would normally result in an acceptable noise environment, a noise environment that could potentially be unacceptable even after the application of available mitigation measures, and a noise environment that is never acceptable.

Table 3.13-6. Community Noise Level Equivalents for Various Land Uses

Land Use Category	Community Noise Equivalent Level (CNEL), dB			
	Normally Acceptable[1]	Conditionally Acceptable[2]	Normally Unacceptable[3]	Clearly Unacceptable[4]
Residential – Low-Density	Less than 55	55 to 60	60 to 75	Over 75
Hospital	Less than 65	65 to 75	75 to 80	Over 80
Public Facilities /Schools	Less than 55	55 to 65	65 to 70	Over 70
Open Space/Recreation	Less than 75	n/a	75 to 80	Over 80

Notes:
[1] Specified land use is satisfactory, assuming buildings are of conventional construction.
[2] New development should be undertaken only after detailed analysis of noise reduction requirements are made.
[3] New development should be generally discouraged, if not, a detailed analysis of noise reduction requirements must be made.
[4] New development should generally not be undertaken.
SOURCE: Redwood City General Plan. Public Safety Element, Figure PS-10: Redwood City Noise Guidelines for Land Use Planning

3.13.6 Thresholds of Significance

The significance of potential noise impacts is based on thresholds identified in Appendix G of the CEQA Guidelines, which provide the following thresholds for determining significance with respect to noise.

Impacts would be considered significant if the project would:

a. Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

b. Generate excessive groundborne vibration or groundborne noise levels.

c. For a project located within the vicinity of a private airstrip or 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.

3.13.7 Impact Assessment and Methodology

A noise technical investigation was performed for the Laurel Way Improvement Project in 2009. Since the Laurel Way Project is adjacent to the southern border of the proposed project, the noise measurement points are also useful for this analysis. In order to assess existing noise levels, this analysis used existing noise levels identified for the Laurel Way Improvement Project Draft Environmental Impact Report. The project construction noise and vibration impacts were estimated using sources from the Environmental Protection Agency, Federal Highway Administration, and Caltrans typical measured noise and vibration levels for construction activities and equipment. Noise and vibration impacts were analyzed for sensitive receptors out to 800 feet from the project.

3.13.8 Project-Specific Impacts and Mitigation Measures

Project impacts related to noise were evaluated against the CEQA significance criteria, as discussed below. This section evaluates potential project impacts from the Canyon Lane improvements, proposed single-family residence, and the potential future development of 11 parcels. The discussion is further broken out into the construction and post-construction phases of the project. The three phases of the project are discussed individually unless impacts are the same for all phases.

The project would have a significant impact if it would exceed the exterior noise standards identified in the San Mateo County Noise Control Ordinance or the Redwood City Noise Regulation Ordinance outside of allowable construction hours identified in both noise ordinances (see Section 3.13.5, Regulatory Setting, , above); or if an individual piece of equipment ever exceeded 110 dB at a distance of 25 feet from the equipment.

Canyon Lane Improvements. As described in Chapter 2, Project Description, the Canyon Lane Roadway improvements portion of the project includes regrading and paving the existing gravel roadway into a 20-foot-wide paved roadway. The existing roadway would be widened along its southern flank to avoid potential impacts to the Emerald Branch that runs parallel to the north of the roadway. Roadway improvements include adding a retaining wall, a turnaround for emergency vehicles, and a single-span bridge that would cross Emerald Branch to accommodate the turnaround. A new minimum 8-inch, approximately 1,050-foot-long water line would extend down the hill to the southwest from Vista Drive and would be installed in a trench under the roadway. A joint utilities trench would also be created for electrical, gas, and fiberoptic lines. A storm drain would be installed along the south side of Canyon Lane with four catch basins, and an approximately 161-foot-long biotreatment swale would be constructed at the base of Canyon Lane. Construction activities would also remove 32 trees. Excavation would include moderate to significant grading (approximately 1,145 cubic yards of cut and 60 cubic yards of fill). In addition to the new permanent facilities, temporary workspaces and disturbances will be required to facilitate construction of the project. The temporary footprint of the project includes a graveled construction entrance, temporary parking area for construction crew vehicles on the north side of Canyon Lane, and temporary staging areas directly west of the parking area, and open cut trenching on the hillside for installation of the water line. Improvements are shown on Figure 2-3.

Single-Family Residence. As described in Chapter 2, Project Description, construction activities would involve the construction of an approximately 3,847-square-foot single-family residence on a 16,673-square-foot (0.39-acre) parcel. To achieve the construction of the residence, approximately 2,500 cubic yards of excavation would be required, and 11 trees would be removed. The residence would require construction of a retaining wall, a driveway accessing Canyon Lane, landscaping, and a new storm drain system with a bioretention system. This part of the project would use the construction access and temporary workspaces established for the Canyon Lane improvements. Construction activities for the single-family dwelling would occur during Phase 4 and last approximately 5.75 months.

Future Development. The improvements made to Canyon Lane would allow for the development of the 11 remaining parcels in the project area. The square footage of the remaining parcels is shown in Table 2.1. Parcel Size. The total square footage of the remaining parcels is 113,728 square feet, or approximately 2.61 acres. All of the developable parcels include steep terrain and would require cut and fill techniques and retaining walls. Three of the four parcels on the north side of Canyon Lane would require bridges or culverts over Emerald Branch for access. The fourth parcel would be able to access the property using the bridge installed as part of the Canyon Lane improvements.

Project construction activities are expected to take place in five phases. Phase I of the project would include removing 32 trees for the roadway improvements, creating the construction entrance, and installing fencing and erosion control measures. Phase II would include surveying and excavation for roadway construction, and construction of the headwalls and bridge. Phase III would involve the utility work, including trenching and connection to the water main. Work on the residence would occur in Phase IV, including removal of 11 trees, excavation, foundation, framing, finishing, and roofing. Phase V would complete the roadway and would include the addition of base rock, paving, and striping. Construction is expected to occur Monday through Friday from 7:00 AM to 6:00 PM.

Impact 3.13-A. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies – Less than Significant with Mitigation

Canyon Lane Improvements and Proposed Single-Family Residence

Construction

The Redwood City Noise standards for excessive and unreasonable noise prohibit construction noise and noise generated by any single piece of equipment in excess of 110 dBA. This project would not be expected to generate noise levels up to 110 dBA. No impact related to this standard would occur.

The amplification of noise with multiple sources of construction noise is complex. Noise is calculated on a logarithmic scale, not an arithmetic scale. Therefore, when noises from multiple sources are added together, there is an increase of 3 dBA for each additional source of noise (when noise levels are the same). In other words, if two pieces of equipment generate noise levels of 80 dBA side-by-side, when added together the total noise experienced would be 83 dBA.

The highest noise levels during the construction of the project would be generated during earthmoving activities, with lower noise levels occurring during building framing and finishing. Table 3.13-7, Typical Range of Noise Levels at Construction Sites, and Table 3.13-8, Typical Construction Equipment Noise Levels, describe typical A-weighted average and instantaneous equivalent noise levels expected during various project construction activities.

The noise levels generated by construction equipment would vary greatly, depending on factors such as the type and specific model of the equipment, the operation being performed, and the condition of the equipment. The average sound level of the construction activity also depends on the amount of time that the equipment operates, the number of heavy equipment operating simultaneously at any given time, and the intensity of the construction during periods of activity.

Table 3.13-7. Typical Range of Noise Levels at Construction Sites, L_{eq} in dBA.

	Domestic Housing		Public Works, Roads & Highways, Sewers and Trenches	
Phase[1]	**I**	**II**	**I**	**II**
Ground Clearing	83	83	84	84
Excavation	88	75	88	78
Erection	81	65	79	78
Finishing	88	72	84	84

Note:
[1] Phase I – All pertinent equipment present at site; Phase II – Minimum required equipment present at site.

SOURCE: U.S. Environmental Protection Agency. 1973. *Legal Compilation on Noise*, Vol.1, p.2-104. Available online at: https://nepis.epa.gov/Exe/ZyPDF.cgi/2001517N.PDF?Dockey=2001517N.PDF. Accessed February 25, 2019.

Table 3.13-8. Typical Construction Equipment Noise Levels

Equipment	L_{max} at 50 feet*	Equipment	L_{max} at 50 feet*
Pickup truck	75	Roller	80
Dump truck	76	Generator	81
Compressor (Air)	78	Flatbed truck	74
Excavator	81	Concrete mixer truck/Concrete pump truck)	79/81
Compactor (ground)	83	Paver	77
Crane	81	Chainsaw	84
Excavator	81	Woodchipper	75
Backhoe	78		

Note:

*Actual measured L_{max} at 50 feet (dBA) Samples Averaged

SOURCE: The reference sound level for a wood chipper is based on sound levels provided in Berger, Neitzel, and Kladden 2010. All others are from FHWA (Federal Highway Administration). 2006. *FHWA Roadway Construction Noise Model: User's Guide. Final.* Available online at: https://www.fhwa.dot.gov/Environment/noise/construction_noise/rcnm/rcnm.pdf. Accessed February 22, 2019.

Construction activities associated with the Canyon Lane improvements would occur in four of the five phases. As shown in Table 2-2, Construction Schedule, Phases I, II and V would involve removing 32 trees; regrading, expanding, and paving the existing gravel roadway; and installing a retaining wall, turnaround for emergency services, single-span bridge, and storm drains. Tree removal during Phase I would require chain saws, woodchipper, and haul trucks. Excavation during Phase II would involve 1,205 cubic yards (CY) of grading, including 1,145 CY of cut and 60 CY of fill. It is unknown if soils will be balanced on site. If excavated soil can supply all of the fill, then 1,085 CY of soil will be hauled from the site, requiring approximately 109 two-way haul trips. If soil needs to be imported for engineered fill, then a maximum of 121 two-way haul trips would be required. Phase III would include trenching for and installing the 8-inch water main, and underground electrical line. Construction activities would generally occur Monday to Friday from 7:00 AM to 6:00 PM. Weekend and off-hour work would be avoided, as stated in Section 2.3 of Chapter 2, Project Description.

Construction vehicles and equipment used during the Canyon Lane improvements would include standard equipment such as ½ ton pickup trucks, 1-ton crew trucks, dump trucks, excavators, sheep foot compactors, crane, roller, backhoes, dump trucks, water trucks, portable generators, asphalt leveling equipment, and striping equipment. The maximum noise levels for various pieces of construction equipment at a distance of 50 feet are presented in Table 3.13-8. These levels are from the Federal Highway Administration.[18] The maximum noise levels at 50 feet for typical equipment would be up to 84 dBA for the type of equipment normally used for this type of project. The typical operating cycles for construction equipment involve 1 or 2 minutes of full-power operation followed by 3 or 4 minutes at lower-power settings.

Construction of the single-family residence would occur during Phase IV of the project and is expected to last approximately 5.75 months. The highest noise levels during the construction of the single-family residence would be generated during excavation and earthmoving activities. Grading for the single-family residence would require excavation and hauling of approximately 2,500 cubic yards of soil and is

[18] FHWA (Federal Highway Administration). 2006. *FHWA Roadway Construction Noise Model: User's Guide. Final*. FHWA-HEP-05-054. DOT-VNTSC-FHWA-05-01. Cambridge, Massachusetts: U.S. Department of Transportation, Research and Innovative Technology Administration. Available online at https://www.fhwa.dot.gov/Environment/noise/construction_noise/rcnm/rcnm.pdf. Accessed February 7, 2019.

expected to take approximately 10 days. There are two methods to estimate construction noise levels: by average noise levels generated per phase or by average noise levels generated by types of equipment.

Construction-related noise levels during building framing, finishing, and landscaping phases are normally lower than those produced during site preparation. Maximum hourly average construction noise levels generated during busy periods of home building would be between 81 to 88 dBA at 50 feet from the center of construction activities. However, under more common conditions, home building activities would produce maximum hourly average noise levels of between about 65 to 81 dBA at this distance.

Construction vehicles and equipment used during construction of the single-family residence would include standard equipment such as ½ ton trucks, backhoes, dump trucks, concrete trucks, semi-truck flatbed trucks, water trucks, portable generators, and air compressors. The maximum noise level ranges for various pieces of construction equipment at a distance of 50 feet are presented in Table 3.13-8. These levels are from the Federal Highway Administration.[19] The maximum noise levels at 50 feet for typical equipment would range up to 84 dBA for the type of equipment normally used for this type of project. The typical operating cycles for construction equipment involve 1 or 2 minutes of full-power operation followed by 3 or 4 minutes at lower-power settings.

Construction of the proposed project would temporarily increase ambient noise levels in the project vicinity. The highest noise levels during the construction of the project would be generated during excavation and earthmoving activities required in Phase II and Phase IV. These phases would include excavation and grading of the roadway and excavation for the single-family residence, and, as shown in Table 3.13-7, noise levels at 50 feet would likely be between approximately 78 and 88 dBA based on multiple pieces of equipment operating simultaneously. Noise levels during Phase I would be highest during tree removal and wood chipping and would likely be approximately 84 dBA at 50 feet.

Noise levels during all phases of construction activity would be substantially above the ambient noise level at existing homes immediately adjacent to the project area and those nearby with clear views of the project area. The topography of the project area and surrounding areas would also result in fairly complex exposure to construction noise for residences surrounding the project area. Construction noise levels typically drop off at a rate of about 6 dBA per doubling of distance between the noise source and receptor where a direct view of the construction activities exist. Where acoustical shielding from buildings and/or intervening terrain blocks views of construction, an additional 5 to 10 decibels of attenuation can occur. Noise volumes for both the maximum and the average noise generation per phase and attenuation with distance for line of sight are shown in Table 3.13-9, Construction Noise and Attenuation with Distance by Construction Phase.

Table 3.13-9. Construction Noise and Attenuation with Distance by Construction Phase

	Noise Level Range, dBA				
	50 feet	**100 feet**	**200 feet**	**400 feet**	**800 feet**
Phase I	84	78	72	66	60
Phase II	78-88	72-82	66-76	60-70	54-64
Phase III	78-88	72-82	66-76	60-70	54-64
Phase IV	65-88	59-82	53-76	47-70	41-64
Phase V	84	78	72	66	60

[19] *Ibid*.

Construction of the proposed project would temporarily increase ambient noise levels in the project vicinity and expose existing residents, particularly those on Oakview Way, Oak Knoll Drive, Vista Drive, and Glenwood Avenue, to elevated levels of noise from construction. Since the project is located at the bottom of a canyon, residences at the top of the surrounding hills with a direct view of construction activities would experience the most noise. Where terrain or building shielding occurs, the noise increase due to construction would be lower. Based on a review of the placement of existing buildings in the area along with the topography of the project area and the surrounding area, noise from project construction activities would generally be higher at residences north of the project area on Oak Knoll Drive, south of the project area on Vista Drive and Oakview Way, and on Glenwood Avenue near the entrance to Canyon Lane. One home on Oak Knoll Drive is located approximately 40 feet from the west end of the Canyon Lane construction area and one home on Glenwood Avenue is located approximately 55 feet from the east end of the Canyon Lane construction area. These homes would receive the greatest noise exposure. In addition, Garrett Park is located approximately 40 feet northeast of the entrance to Canyon Lane and would also experience higher noise levels. Sound levels would be lower at homes within 800 feet on Summit Drive, Bain Place, Danford Court, Canyon Road, Bradshaw Terrace, and Vaquero Way due to terrain and building shielding. Recreational facilities at Emerald Lake are located approximately 850 feet west of the project area and would experience lower noise levels.

Existing daytime hourly noise equivalent levels (Leq) ranged from 42 to 68 dBA in the project and surrounding areas. The CNEL among all noise monitoring locations in Table 3.13-2 ranged from 49 to 62 dBA. Construction of the Canyon Lane improvements would temporarily increase ambient noise levels in the project vicinity and expose users of Garrett Park and existing residents, particularly those on Oak Knoll Drive, Vista Drive, Oakview Way, and Glenwood Avenue, to elevated levels of noise from construction. Substantial noise increases would occur intermittently for up to approximately 9 months. Therefore, impacts on neighboring residences and Garrett Park related to construction noise would be potentially significant. However, all construction activities would be confined to the exemption hours for construction noise sources for both San Mateo County (7:00 AM to 6:00 PM Monday through Friday, and 9:00 AM to 5:00 PM Saturdays) and the City of Redwood City (7:00 AM to 8:00 PM Monday through Friday). Mitigation Measures NOI/mm-1.1 and NOI/mm-1.2 would reduce the impacts of construction noise to a less-than-significant level.

Construction truck traffic would access the project area through Glenwood Avenue, Canyon Road, Cordilleras Road, and Edgewood Road. The peak of construction traffic for Canyon Lane Roadway improvements would occur during Phase II, which is expected to last for 4 weeks. Excavation and fill during Phase II, totaling 1,205 CY of material, would require a total of approximately 121 haul trucks, or an average of 6 haul trucks per day. The peak of construction traffic for the single-family residence would happen during Phase IV and is expected to last for 10 days. Assuming haul trucks holding 10 cubic yards (CY), excavation for the single-family residence would require approximately 250 two-way haul truck trips during the grading portion of Phase IV, or an average of 25 haul trips per day (approximately 3 haul trips per hour).

Noise from individual trucks would be clearly audible and would temporarily elevate noise levels along the roadway as each truck passes; however, the truck traffic would cause no measurable change in daily average or annual average noise levels along these roadways. With the implementation of Mitigation Measures NOI /mm-1.1 and NOI/mm-1.2, this impact would be less than significant.

Noise Mitigation Measures	
NOI/mm-1.1	*The Applicant shall incorporate the following conditions in all related construction contract agreements to reduce construction noise impacts in both San Mateo County and City of Redwood City:*

	i. Muffle and maintain all equipment used on site. All internal combustion engine driven equipment shall be fitted with mufflers, which are in good condition. Good mufflers shall result in non-impact tools generating a maximum noise level of 80 dB when measured at a distance of 50 feet. *ii. Utilize quiet models of air compressors and other stationary noise sources where technology exists.* *iii. Locate stationary noise-generating equipment as far as possible from sensitive receptors when sensitive receptors adjoin or are near a construction project area.* *iv. Prohibit unnecessary idling of internal combustion engines.* *v. Control noise from construction workers' radios to the point where they are not audible at existing residences that border the project area.* *vi. Notify residents adjacent to the project area of the construction schedule in writing.*
NOI/mm-1.2	*Post a sign at the construction entrance to inform all contractors and subcontractors of the basic limitations upon noise and construction activities.*

Operation

The proposed Canyon Lane improvements would result in a paved road replacing the existing dirt road. The noise generated from the paved road would be the result of a potential increase in traffic on the roadway. Canyon Road is a dead-end road; therefore, traffic would be limited to automobiles and light trucks such as delivery trucks, and would be similar in character and level to current noises in surrounding neighborhood streets. The completed roadway and accompanying traffic would increase noise levels from existing levels, but would not generate noise levels in excess of those in surrounding neighborhoods. Projected roadway noise levels would likely be similar to measured ambient noise levels at LT-2 in Table 3.13-2 (at Laurel Way and Highland Drive), which had an average daytime noise level of between 53 and 61 dBA primarily attributed to traffic. These noise levels are also not in excess of San Mateo County maximum exterior noise limits detailed in Table 3.13-5. Therefore, no significant permanent noise level impacts would occur from the Canyon Lane improvements. This impact would be less than significant.

The proposed project would construct one single-family residence. The noise generated from the proposed house upon completion and occupation would be similar in character and level to existing noises in the surrounding residential neighborhoods. The completed project would operate in accordance with the City of Redwood City's and San Mateo County's noise thresholds for residential use. No adverse impacts are expected to occur from noise levels in excess of Redwood City's or San Mateo County's established standards. No mitigation is required. No impact will occur.

Developable Parcels

Construction

The improvements made to Canyon Lane would allow for the development of the 11 remaining parcels; however, no construction on these parcels is currently proposed. Noise resulting from the construction of each future single-family residence would likely be similar in scale to the construction of the one proposed single-family residence, described above. Given the terrain, all residences would require grading and excavation. As discussed above, in general, construction-related noise levels during building framing, finishing, and landscaping phases are normally lower than those produced during site preparation. Maximum hourly average construction noise levels generated during busy periods of home building would likely be between 81 to 88 dBA at 50 feet from the center of construction activities;

however, under more common conditions, home building activities would produce maximum hourly average noise levels of between about 65 to 81 dBA at this distance.

Construction activities would be required to conform to the requirements of the Redwood City and/or San Mateo County noise ordinances and general plan requirements. If combined, these would limit construction hours to between 7:00 AM and 6:00 PM Monday to Friday. Weekend and off-hour work would be avoided. The haul route for future project activities would likely be from the project area to Glenwood Avenue, Canyon Road, Cordilleras Road, and Edgewood Road to Interstate 280.

Typical construction equipment used during future project construction would likely include standard equipment such as ½ ton trucks, backhoes, dump trucks, concrete trucks, semi-truck flatbed trucks, water trucks, portable generators, and air compressors. The maximum noise level ranges for various pieces of construction equipment at a distance of 50 feet are presented in Table 3.13-8. The maximum noise levels at 50 feet for typical equipment would range up to 84 dBA for the type of equipment normally used for this type of project.[20]

Noise levels during future residential construction would likely be similar to those for the proposed single-family residence, and substantially above the ambient noise level at existing homes immediately adjacent to, or with clear views of, the project area. Noise volumes for both the maximum and the average noise generation per phase and attenuation with distance for line of sight, are shown in Table 3.13-9.

Since the project is located at the bottom of a canyon, residences at the top of the surrounding hills with a direct view of construction activities, as well as any future residences on Canyon Lane will likely experience the most noise. Where terrain or building shielding occurs, the noise increase due to construction would be lower. Based on a review of the placement of existing buildings in the area along with the topography of the project area and the surrounding area, noise from project construction activities would generally be higher at residences north of the project area on Oak Knoll Drive, south of the project area on Vista Drive and Oakview Way, and on Glenwood Avenue near the entrance to Canyon Lane.

Potential future construction would temporarily increase ambient noise levels in the project vicinity and expose users of Garrett Park and existing residents, particularly those on Oak Knoll Drive, Vista Drive, Oakview Way, and Glenwood Avenue, to elevated levels of noise from construction. Therefore, impacts on neighboring residences and Garrett Park related to construction noise would be potentially significant. However, Applicants for future construction activities would be required to confine construction hours to the hours of 7:00 AM to 6:00 PM Monday to Friday to comply with the exemption hours for construction noise sources for both San Mateo County (7:00 AM to 6:00 PM Monday through Friday, and 9:00 AM to 5:00 PM Saturdays) and the City of Redwood City (7:00 AM to 8:00 PM Monday through Friday). Mitigation Measures NOI/mm-1.1 through NOI/mm-1.2 should be implemented to reduce the impacts of construction noise to a less-than-significant level.

Construction truck traffic would access the project area through Glenwood Avenue, Canyon Road, Cordilleras Road, and Edgewood Road. Future construction would require excavation and haul trucks to remove excavated soil.

Noise from individual trucks would be clearly audible and would temporarily elevate noise levels along the roadway as each truck passes; however, the truck traffic would not be likely to cause a measurable

[20] FHWA (Federal Highway Administration). 2006. *FHWA Roadway Construction Noise Model: User's Guide. Final*. FHWA-HEP-05-054. DOT-VNTSC-FHWA-05-01. Cambridge, Massachusetts: U.S. Department of Transportation, Research and Innovative Technology Administration. Available online at https://www.fhwa.dot.gov/Environment/noise/construction_noise/rcnm/rcnm.pdf. Accessed February 7, 2019.

change in daily average or annual average noise levels along these roadways. With the implementation of Mitigation Measures NOI /mm-1.1 and NOI/mm-1.2, this impact would be less than significant.

Operation

The existing residential setting surrounding the 11 developable parcels is compatible with the potential construction of single-family residences. The noise generated from the proposed houses upon completion and occupation would likely be similar in character and level to current noises in surrounding neighborhoods. Completed future homes would be required to operate in accordance with the City of Redwood City's and San Mateo County's noise thresholds for residential use. No adverse impacts are expected to occur from noise levels in excess of Redwood City's or San Mateo County's established standards. No mitigation is required. No impact will occur.

The completed project and the accompanying traffic would increase traffic noise on Canyon Lane but, as the project would generate local traffic which would primarily consist of automobiles and light trucks, would not generate a significant change in noise levels; therefore, no significant permanent noise level impacts would occur from the development of this project. This impact would be less than significant.

Impact 3.13-B. Generation of Excessive Levels of Groundborne Vibration or Groundborne Noise Levels – Less than Significant

Canyon Lane Improvements and Proposed Single-Family Residence

Construction

The results from vibration can range from no perceptible effect at the lowest vibration levels, to low rumbling sounds and perceptible vibration at moderate levels, to slight damage at highest levels. Groundborne vibration from construction activities rarely reach levels that damage structures. Potential groundborne-vibration-inducing construction activities at the project are expected to include site preparation work, excavation of below-grade levels, foundation work, and the construction of new residences. No pile driving is expected as part of construction activities for this project.

In order to determine structural damage to buildings caused by groundborne vibration, the California Department of Transportation uses a vibration limit of 12.7 millimeters per second (mm/sec) (0.5 inches/sec), peak particle velocity (PPV), for buildings that are structurally sound and designed to modern engineering standards, 5 mm/sec (0.2 inches/sec), PPV, for buildings that are found to be structurally sound but where structural damage is a major concern, and a conservative limit of 2 mm/sec (0.08 inches/sec), PPV, for historic buildings or buildings that are documented to be structurally weakened (see Table 3.13-4, p. 3.13-9).

Construction activities, such as drilling and other high-power or vibratory tools, excavation, and grading and rolling stock equipment (tracked vehicles, compactors, etc.) may generate groundborne vibration in the immediate vicinity of construction activities. Construction vehicles and equipment used during the Canyon Lane improvements would include standard equipment such as ½ ton pickup trucks, 1-ton crew trucks, dump trucks, excavators, sheep foot compactors, crane, mechanical roller, backhoes, dump trucks, water trucks, portable generators, asphalt leveling equipment, and striping equipment. Table 3.13-10, Typical Vibration Velocities for Project Construction Equipment, lists the expected vibration levels produced by various construction activities likely associated with the project. These vibration measurements are all estimated to be at a distance of 25 feet from the vibration-producing activity.

Table 3.13-10. Typical Vibration Velocities for Project Construction Equipment

Construction Activity	Vibration Levels at 25 feet (in inches/sec, PPV)
Ground Drilling and Excavation	0.09
Bulldozers	0.003 to 0.09
Trucks Bearing Heavy Loads	0.08

SOURCE: Illingworth and Rodkin 2009

The closest sensitive receptor is a residence approximately 40 feet from the western end of the Canyon Lane improvements. Groundborne vibration resulting from proposed construction activities would not be expected to exceed 0.09 PPV at 25 feet. Levels of 0.09 PPV could be caused by ground drilling, excavation, and bulldozer use in Phase II for the Canyon Lane improvements and Phase IV for the single-family residence. Based on Caltrans guidelines for potential damage to structures from vibration, this level of vibration is below the 0.2 PPV threshold for structural damage and would not cause structural damage to the existing single-family residence.

Groundborne vibration levels decrease rapidly with distance from the source of the vibration. The vibration levels at the adjacent uses would vary depending on project conditions such as distance from source, soil conditions, construction methods, and specific equipment used. Vibration guidelines for annoyance are listed in Table 3.13-3. According to this table, vibrations from continuous or frequent, intermittent sources are distinctly perceptible at 0.04 PPV and strongly perceptible at 0.10 PPV. The closest sensitive receptors to the Canyon Lane improvements include one residence 40 feet west, Garrett Park 40 feet northeast, and one residence on Glenwood Avenue 55 feet to the east. The closest sensitive receptor to the single-family residence is a home approximately 130 feet south on Oakview Way. If the strongest vibration is 0.09 PPV at 25 feet, it would be considerably less at the closest sensitive receptors 40 and 55 feet from the project. Depending on site characteristics, vibratory effects at these sensitive receptors could reach 0.40 PPV, which is identified at distinctly perceptible. As some individuals may be annoyed at barely perceptible levels of vibration, depending on the activities in which they are participating, groundborne vibration could cause annoyance to a few individuals. However, the project would not cause excessive levels of groundborne vibration or groundborne noise; therefore, this impact would be less than significant. Implementation of Mitigation Measures NOI/mm-1.1 through NOI/mm-1.2 will further reduce this less-than-significant impact.

Operation

Canyon Lane is a dead-end road; therefore, traffic on the new roadway would be limited to neighborhood traffic, primarily automobiles and light trucks travelling to and from the single-family residence. Automobiles and light trucks do not create substantial vibrations and the improved roadway would not carry substantial numbers of heavy trucks. No noise or vibration impacts would result. No mitigation is required. No impact would occur.

Developable Parcels

Construction

Potential groundborne-vibration-inducing construction activities at the developable parcels are expected to include site preparation work, excavation of below-grade levels, foundation work, and the construction of new residences. No pile driving is expected as part of construction activities for future homes.

Construction activities would likely be similar to those for the proposed single-family residence, discussed above, and could include drilling and other high-power or vibratory tools, excavation, and grading equipment (tracked vehicles, compactors, etc.) which may generate groundborne vibration in the immediate vicinity of construction activities. Table 3.13-10 lists the expected vibration levels produced by various construction activities likely associated with the project. These vibration measurements are all estimated to be at a distance of 25 feet from the vibration-producing activity.

The vibration levels at the adjacent uses would vary depending on project conditions such as soil conditions, construction methods, and specific equipment used. Depending on site characteristics, vibratory effects at these sensitive receptors could reach perceptible levels, but would be unlikely to reach strongly perceptible levels. Therefore, future construction would not be likely to cause excessive levels of groundborne vibration or groundborne noise, and this impact would be less than significant. Implementation of Mitigation Measures NOI/mm-1.1 through NOI/mm-1.2 would further reduce this less-than-significant impact.

Operation

Post-construction activities associated with private residences would not result in any excessive groundborne vibration or noise. No noise or vibration impacts would result. No mitigation is required. No impact would occur.

Impact 3.13-C. For a project located within the vicinity of a private airstrip or 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 – No Impact

The project area is located more than 10 miles from the San Francisco International Airport and about three miles from the San Carlos Airport. The project area is not located within the vicinity of a private airstrip but is within Influence Area A of the San Carlos Airport Land Use Plan.[21] Influence Area A requires real estate disclosure that the area is subject to aviation noise. The project area is outside of the Noise Impact Area for the airport, which is defined as the 60 dB noise contour.[22] No impacts related to airport noise would occur. No mitigation is necessary.

[21] City/County Association of Governments Land Use Committee. 2004. *Revised Airport Influence Boundary for San Carlos Airport.* Available online at http://ccag.ca.gov/wp-content/uploads/2014/07/2004-sc-airport-influence-ab-map1.pdf. Accessed March 20, 2019.

[22] City/County Association of Governments Land Use Committee. 2015. *Final Comprehensive Land Use Compatibility Plan for the Environs of the San Carlos Airport.* Available online at http://ccag.ca.gov/wp-content/uploads/2015/11/SQL_FinalALUCP_Oct15_read.pdf. Accessed March 21, 2019.

3.14 POPULATION AND HOUSING

This section analyzes potential impacts related to population and housing that may result from implementation of the project.

3.14.1 Existing Conditions

Population

The population within the County has increased by approximately 7.8 percent between 2010 and 2018, increasing on average by approximately 0.9 percent per year. The population has grown from 718,451 people in 2010 to 774,155 people in 2018.[1] Table 3.14-1, Annual Population Growth for San Mateo County, summarizes the County's population growth during this eight-year time period.

Table 3.14-1. Annual Population Growth for San Mateo County

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Population	718,451	726,326	735,206	745,799	752,700	760,343	766,589	770,256	774,155
% Growth	--	1.1%	1.2%	1.4%	0.9%	1.0%	0.8%	0.5%	0.5%

Source: State of California. 2018. Department of Finance, E-4 Population Estimates for Cities, Counties, and the State, 2011-2018, with 2010 Census Benchmark. Sacramento, California. May. Available at: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/. Accessed February 4, 2019.

The population within unincorporated areas of the County (where portions of the project are located) has increased by approximately 6.8 percent between 2010 and 2018, increasing on average by approximately 0.8 percent per year. The population has grown from 61,611 people in 2010 to 65,828 people in 2018.[2] Table 3.14-2, Annual Population Growth for Unincorporated San Mateo County, summarizes the unincorporated areas of the County's population growth during this eight-year time period.

Table 3.14-2. Annual Population Growth for Unincorporated San Mateo County

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Population	61,611	62,730	63,326	64,203	64,539	64,925	65,282	65,450	65,828
% Growth	--	1.8%	1.0%	1.4%	0.5%	0.6%	0.5%	0.3%	0.6%

Source: State of California. 2018. Department of Finance, E-4 Population Estimates for Cities, Counties, and the State, 2011-2018, with 2010 Census Benchmark. Sacramento, California. May. Available at: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/. Accessed February 4, 2019.

The population within the City has increased by approximately 12 percent between 2010 and 2018, increasing on average by approximately 0.8 percent per year. The population has grown from 76,815

[1] State of California. 2018. Department of Finance, E-4 Population Estimates for Cities, Counties, and the State, 2011-2018, with 2010 Census Benchmark. Sacramento, California. May. Available at: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/. Accessed February 4, 2019.

[2] State of California. 2018. Department of Finance, E-4 Population Estimates for Cities, Counties, and the State, 2011-2018, with 2010 Census Benchmark. Sacramento, California. May. Available at: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/. Accessed February 4, 2019.

people in 2010 to 86,380 people in 2018.[3] Table 3.14-3, Annual Population Growth for the City of Redwood City, summarizes the City's population growth during this eight-year time period.

Table 3.14-3. Annual Population Growth for the City of Redwood City

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Population	76,815	78,351	79,843	81,248	82,775	84,204	86,079	86,271	86,380
% Growth	--	2.0%	1.9%	1.8%	1.9%	1.7%	2.2%	0.2%	0.1%

Source: State of California. 2018. Department of Finance, E-4 Population Estimates for Cities, Counties, and the State, 2011-2018, with 2010 Census Benchmark. Sacramento, California. May. Available at: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/. Accessed February 4, 2019.

Existing Housing Stock

The County has approximately 275,109 housing units, of which 261,796 units, or approximately 95 percent, are occupied.[4] The average household size in the County is 2.8. Unincorporated areas of the County contain 22,762 housing units, of which 21,264 units, or approximately 93 percent, are occupied. The average household size in unincorporated areas of the County is approximately 2.9.[5]

The City has approximately 30,898 housing units, of which 30,088 units, or approximately 97 percent, are occupied.[6] The average household size in the City is approximately 2.8.

Population Projections

The Association of Bay Area Governments produced population projections for each jurisdiction within the San Francisco Bay region. The most recent projections cover a period between 2010 and 2040. Population projections for the San Francisco Bay region over this time period show that the population is expected to grow by 2.1 million. Population projections for the unincorporated areas of the County and City are provided in Table 3.14-4, Projected Population Growth 2020-2040.

Table 3.14-4. Projected Population Growth 2020-2040

	2020	2025	2030	2035	2040
Unincorporated County of San Mateo	67,500	70,500	73,900	77,500	81,200
City of Redwood City	84,000	87,800	91,900	96,300	100,800
Total	**151,500**	**158,300**	**165,800**	**173,800**	**182,000**

Source: Association of Bay Area Governments. 2014. Plan Bay Area Projections 2013. San Francisco Bay Area 2010-2040. Page 84.

[3] State of California. 2018. Department of Finance, E-4 Population Estimates for Cities, Counties, and the State, 2011-2018, with 2010 Census Benchmark. Sacramento, California. May. Available at: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/. Accessed February 4, 2019.

[4] U.S. Census Bureau. 2018. American Community Survey 2013-2017, 5-year estimates. Available at: http://www.dof.ca.gov/Reports/Demographic_Reports/American_Community_Survey/. Accessed February 4, 2019.

[5] State of California. 2018. California Department of Finance, E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011-2018, with 2010 Census Benchmark. Sacramento, California. January. Available at: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/E-5/. Accessed February 4, 2019.

[6] U.S. Census Bureau. 2018. American Community Survey 2013-2017, 5-year estimates. Available at: http://www.dof.ca.gov/Reports/Demographic_Reports/American_Community_Survey/. Accessed February 4, 2019.

Housing Needs

The Regional Housing Need Allocation (RHNA) is a State-manded process that allocates the total number of housing units by income level that each jurisdiction must accommodate in its Housing Element as part of its General Plan. Within the San Francisco Bay Area, the California Department of Housing and Community Development (HCD) identifies the total housing need for an eight-year period between 2015 and 2023. The housing needs identified for the City and County are shown in Table 3.14-5, Housing Needs Allocation by Income Level 2015-2023.

Table 3.14-5. Housing Needs Allocation by Income Level 2015-2023

	No. of Units by Income Level				Total Units
	Very Low	Low	Moderate	Above Moderate	
Unincorporated County of San Mateo	153	103	102	555	**913**
City of Redwood City	706	429	502	1,152	**2,789**
Total	**859**	**532**	**604**	**1,707**	**3,702**

Source: Association of Bay Area Governments. 2015. Regional Housing Needs Plan, San Francisco Bay Area 2015-2023. Page 25. Available online at https://abag.ca.gov/planning/housingneeds/pdfs/2015-23_RHNA_Plan.pdf. Accessed on March 13, 2019.

HCD sets income limits for each of the four RHNA income categories for every county in California. The income categories are defined relative to each county's Area Median Income (AMI). Very Low Income units are affordable to households with income up to 50 percent of AMI, Low Income units are affordable to households with income between 51 and 80 percent of AMI, Moderate Income units are affordable to households with income between 81 and 120 percent of AMI and Above Moderate units are affordable to households with income above 120 percent of AMI.

3.14.2 Regulatory Setting

Regional

Regional Housing Need Plan

As previously described, the RHNA is a process that allocates the housing supply that each jurisdiction in California must accommodate across income levels. The HCD identifies total housing need for each region in the State. The Association of Bay Area Governments distributes the housing needs to local governments in the region. Once a jurisdiction receives the RHNA, the Housing Element of its General Plan is updated to reflect the housing allocations. The RHNA for the San Francisco Bay Area is 187,990 new housing units between 2015 and 2023.[7] Table 3.14-5 provides the RHNA for the County and City.

[7] Association of Bay Area Government. 2015. Regional Housing Needs Plan. San Francisco Bay Area 2015-2023. p. 5. Available online at https://abag.ca.gov/planning/housingneeds/pdfs/2015-23_RHNA_Plan.pdf. Accessed on March 13, 2019.

Local

City of Redwood City General Plan – Housing Element

The Housing Element of the City General Plan provides goals, policies, and programs to promote housing supply to meet a growing population of diverse needs. The Housing Element guides City housing policy through the 2015-2023 planning period.

County of San Mateo General Plan – Housing Element

The County General Plan Housing Element[8] includes policies to protect existing affordable housing stock, support new housing for low- and moderate-income households, promote sustainable communities and equal housing opportunities, and promote energy efficiency and resource conservation.

3.14.3 Thresholds of Significance

The significance of potential impacts to population and housing is based on thresholds identified within Appendix G of the CEQA Guidelines, shown below.

Impacts would be considered significant if the project would:

a. Induce substantial unplanned 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 people or housing, necessitating the construction of replacement housing elsewhere.

3.14.4 Impact Assessment and Methodology

This evaluation of population and housing impacts associated with the project is based on current U.S. Census Bureau Data and statistics, and review of the Bay Area Plan population projections 2013, RHNA, and the County and City General Plans. The focus of this population and housing analysis is on the potential for the project to induce substantial population growth or displace existing people or housing.

[8] County of San Mateo. 2015. General Plan Housing Element. Available at https://planning.smcgov.org/sites/planning.smcgov.org/files/documents/files/SMCo%20Adopted%20Housing%20Element%202014-2022%20(12-29-15).pdf. Accessed February 4, 2019.

3.14.5 Project-Specific Impacts and Mitigation Measures

Impact 3.14-1: Potential to induce substantial unplanned 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) – Less than Significant

Canyon Lane Improvements

Construction

Construction of Canyon Lane would require up to 10 daily construction personnel. These 10 construction job opportunities would not represent any substantial population growth in the area. The work requirements of most construction projects are highly specialized, so construction workers remain at a job site only as long as their specific skills are needed. Additionally, the construction workers would likely be supplied from the region's labor pool. Construction workers would not be likely to relocate their household as a consequence of working on the project, and as such, significant housing or population impacts would not result from construction of the project. Therefore, construction-related population growth impacts would be less than significant.

Operation

The improvements to Canyon Lane would indirectly induce population growth by extending the roadway and utilities to allow for the development of the area. Impacts on population and housing from the proposed single-family residence and the future residences on the developable parcels are discussed below.

Proposed Single-Family Residence

Construction

Construction of the single-family residence would require up to eight construction personnel. Similar to the Canyon Lane improvements, these eight construction job opportunities would not represent any substantial population growth in the area. The work requirements of most construction projects are highly specialized so that construction workers remain at a job site only as long as their specific skills are needed. Additionally, the construction workers would likely be supplied from the region's labor pool. Construction workers would not be likely to relocate their household as a consequence of working on the project, and as such, significant housing or population impacts would not result from construction of the project. Therefore, construction-related population growth impacts from the single-family residence would be less than significant.

Operation

The single-family residence would directly contribute to the County's growing population trend. Based on the current average household size in the County, the single-family residence would be expected to generate a population increase of up to three people. As provided in Table 3.14-2, the increase of 3 additional people to the unincorporated areas of County is well below the rate of population increase over the past 8 years, and well below the net addition of 378 people that occurred between 2017 and 2018. This net increase is within the County's expected population growth (see Table 3.14-4) and would not constitute a substantial increase in population growth. In addition, the construction of the residence

contributes to overall housing supply within the County. Because the population growth associated with the project is consistent with the rate of growth from previous years and is accounted for in the Regional Housing Needs Plan, the project would not induce substantial unplanned population growth; as a result, impacts would be less than significant.

Developable Parcels

The future residences on the 11 developable parcels would directly contribute to the County's and City's growing population trend. Based on the current average household size in the County and City, the construction of 11 new single-family residences would be expected to generate a population increase of 33 people (30 in the unincorporated areas of the County and 3 in the City). As provided in Tables 3.14-2 and 3.14-3, the increase of 30 additional people to the unincorporated areas of the County and 3 people to the City is well below the rate of population increase over the past 8 years in each respective jurisdiction. The increase in population is also well below the net addition of 378 people and 109 people and that occurred between 2017 and 2018 in the unincorporated County and City, respectively. This net increase is within the County's and City's expected population growth (see Table 3.14-4) and would not constitute a substantial increase in population growth. In addition, the construction of the 11 developable parcels would help to meet the RHNA for the County and City, as identified in Table 3.14-5. Because the population growth associated with the project is consistent with the rate of growth from previous years and is accounted for in the Regional Housing Needs Plan, the project would not induce substantial unplanned population growth; as a result, impacts would be less than significant.

Impact 3.14-2: Potential to displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere – No Impact

The project would result in the improvement of an existing roadway and the construction of one single-family residence on an undeveloped parcel, and may result in the future construction of 11 new single-family residences on previously undeveloped parcels. Construction and operation of the project would not displace any housing units or people. Therefore, no impact would occur.

3.15 PUBLIC SERVICES

The Public Services section assesses the impacts of the project on fire and police protection, public schools, parks, hospitals, and libraries, and is based on comparisons of project service needs to the existing or anticipated levels of service. Given the project area's location in both the City and County, both jurisdictions would provide public services to future project occupants. This section evaluates the project service area's ability to accommodate future development based on existing public services, infrastructure and resources.

3.15.1 Existing Conditions

Fire Protection

The San Mateo County Fire Department (County Fire) contracts with the California Department of Forestry and Fire Protection (CAL FIRE) to provide fire protection and emergency response services to many unincorporated areas of the County, including Emerald Lake Hills, the area in which the project is located. County Fire/CAL FIRE operates four paid substations within the County boundaries, the closest of which is Station 18 approximately 1.5 miles northwest of the project area.[1] County Fire/CAL FIRE also operates three volunteer fire stations, the closest of which is Station 57, approximately 4.5 miles southwest of the project area.

County Fire/CAL FIRE responds to over 2,000 emergency incidents a year, of which between 500 and 600 are received by Station 18. Station 18 operates one engine and is staffed with a captain and two firefighters and one firefighter/paramedic.[2] County Fire has established a response time goal of 7 minutes. Between 2012 and 2017, a response time of 7 minutes or less was achieved 90 percent of the time, except for 2017, where response times of 7 minutes or less were achieved 71 percent of the time.[3]

The Redwood City Fire Department (RCFD) provides fire protection and emergency response services to the City, including portions of the project area (eastern segment of Canyon Lane and APN 057-221-060). RCFD operates seven stations (including headquarters). The closest fire station is Station 12, which is located approximately 0.24 mile southeast of the project area.[4] Station 12 is staffed with a captain, a firefighter, and a firefighter/paramedic and houses an engine and patrol vehicle. RCFD operates seven engines, one truck, and one battalion chief and currently has over 90 staff members.[5] In 2015, RCFD responded to over 10,000 emergency incidents. RCFD set a response time goal of 5 minutes. Between 2014 and 2015, the average response time was 5 minutes or less, except for 2014, where the average response time was 5.06 minutes.[6]

[1] California Department of Forestry and Fire Protection. 2012. San Mateo County Fire. Available online at http://www.fire.ca.gov/CZU/SanMateo_Division. Accessed on February 12, 2019.
[2] P. Claudis, personal communication, March 19, 2019.
[3] County of San Mateo. 2017. County Fire: Fire Protection Services. Available online at https://performance.smcgov.org/reports/Fire. Accessed on February 12, 2019.
[4] Redwood City General Plan. 2010. Public Safety Element. Available online at https://www.redwoodcity.org/home/showdocument?id=5109. Accessed on February 12, 2019.
[5] City of Redwood City. 2019. Fire Stations. Available online at https://www.redwoodcity.org/departments/fire-department/about-the-department/fire-stations#Twelve. Accessed on February 12, 2019.
[6] Stevenson, Melisa. 2016. Recommended Fiscal year 2016-2017 Budget Approach. Available online at http://www.redwoodcity.org/home/showdocument?id=7967. Accessed on February 12, 2019.

Police Protection

The San Mateo County Sheriff's (County Sheriff) Office provides law enforcement services for more than 70 percent of the unincorporated County, including the project area. The County Sheriff also provides contracted law enforcement services to numerous incorporated cities within the County. The County Sheriff employs 800 employees and consists of seven divisions: administration, homeland security, support, patrol, investigations, multi-jurisdictional, and corrections. The closest County Sheriff's office to the project area is the headquarters' office, located approximately 2 miles northeast of the project area. In 2017, the County Sheriff's Office responded to 111,163 incidences. The County Sheriff set an internal response time goal of 8 minutes. Since 2014, average response times have ranged between 4.53 minutes and 5.55 minutes, well below the response time target.[7]

The City of Redwood City Police Department (RCPD) provides law enforcement services for the City. The RCPD is composed of three divisions: administration, investigations, and patrol. The RCPD employs 136 employees (96 sworn officers, 36 civilian employees, 4 reserve officers) and 25 volunteers, and responded to over 95,000 calls between June 2016 and June 2017.[8] The closest RCPD station is the Redwood City Police Station located approximately 2.6 miles northwest of the project area. The RCPD has a 5-minute response time goal for priority 1 calls.[9] Between 2013 and 2015, the average response time ranged between 2.28 and 3.12 minutes for priority 1 calls, which is well below the 5-minute response time goal.[10]

Public Schools

The County has 23 school districts serving more than 94,000 students, including 17 elementary school districts, 3 high school districts, and 3 unified school districts. The County also has 20 charter schools that operate within its boundaries.[11] The Roy Clouds Elementary School (grades kindergarten through 8th) and Woodside High School would serve the project area.[12,13] For the 2018-2019 academic year, the Roy Clouds Elementary School has a student enrollment of 751 students and the Woodside High School has an enrollment of 1,964 students. [14,15]

[7] County of San Mateo. 2017. Sheriff's Office. Available online at https://performance.smcgov.org/stories/s/Sheriff-s-Office-3000B-/vrpz-z8sp/. Accessed on February 12, 2019.
[8] City of Redwood City. 2019. Redwood City Police Department. Available online at https://www.redwoodcity.org/departments/police-department. Accessed on February 12, 2019.
[9] A priority 1 call is an emergency call which requires immediate emergency response to address an immediate threat to life.
[10] City of Redwood City. 2016. Recommended Fiscal Year 2016-17 Budget Approach. Available online at http://www.redwoodcity.org/home/showdocument?id=7967. Accessed on February 12, 2019.
[11] San Mateo County Office of Education. 2019. About San Mateo County Office of Education. Available online at http://www.smcoe.org/about-smcoe/. Accessed on February 12, 2019.
[12] Redwood City School District. 2019. School Locator. Available online at https://betalocator.decisioninsite.com/?StudyID=171996. Accessed March 18, 2019.
[13] Sequoia Union High School District. 2019. School Year Boundary Lookup. Available online at http://www.schfinder.com/Lookup.aspx?DistrictID=0636390_2015. Accessed March 18, 2019.
[14] California Department of Education. 2018. 2018-2019 Enrollment by Grade, Roy Clouds Elementary Report. Available online at https://dq.cde.ca.gov/dataquest/dqcensus/enrgrdlevels.aspx?agglevel=School&year=2018-19&cds=41690056044432. Accessed on April 1, 2019.
[15] California Department of Education. 2018-2019 Enrollment by Grade, Woodside High Report. Available online at https://dq.cde.ca.gov/dataquest/dqcensus/enrgrdlevels.aspx?agglevel=School&year=2018-19&cds=41690624138053. Accessed on April 16, 2019.

The Redwood City School District is composed of the following16 schools: [16]

- Four pre-kindergarten through 5th grade schools;
- Three pre-kindergarten through 8th grade schools;
- Two transitional kindergarten through 8th grade schools;
- Three kindergarten through 5th grade elementary schools;
- One kindergarten through 8th grade school;
- One 3rd through 8th grade school; and
- Two 6th through 8th grade middle schools.

The closest school to the project area is the Sequoia Preschool and Kindergarten, which is located approximately 0.6 mile northwest of the project area.

Health Services

Numerous hospitals serve San Mateo County, including Kaiser Permanente, Mills-Peninsula Health Services, San Mateo Medical Center, Sequoia Hospital, and Seton Medical Center. The closest hospital to the project area is Sequoia Hospital, which is located approximately 0.9 mile northwest of the project area. Sequoia Hospital is a full-service medial facility that also offers emergency services to the City and County.[17] Sequoia Hospital has 208 beds and is served by more than 900 employees, 500 of whom are physicians.

Libraries

San Mateo County Libraries was established as a Joint Powers Authority in 1999 and comprises the cities of Atherton, Belmont, Brisbane, East Palo Alto, Foster City, Half Moon Bay, Millbrae, Pacifica, Portola Valley, San Carlos, Woodside, and the unincorporated areas of the County. In 2018, County Libraries received more than 2.8 million visitors over their 12 library locations.[18] The closest County library is the San Carlos library, which is located approximately 2.5 miles north of the project area.[19]

The City operates four libraries, including the Redwood City Public Library, Fair Oaks Branch Library, Schaberg Branch Library, and the Redwood Shores Branch Library. In 2017, the City's libraries received over 754,000 visits across its four library locations.[20] The closest City library is the Schaberg Branch Library, which is located approximately 0.8 mile west of the project area.

[16] Redwood City School District. 2019. Redwood City School District Facts. Available online at https://www.rcsdk8.net/domain/2477. Accessed on February 12, 2019.
[17] Dignity Health Sequoia Hospital. 2019. Medical Services. Available online at https://www.dignityhealth.org/bayarea/locations/sequoia/services. Accessed on February 12, 2019.
[18] San Mateo County Libraries. 2019. About Us. Available online at https://smcl.org/about-us/. Accessed on February 12, 2019.
[19] Dignity Health. 2018. Sequoia Hospital Community Health Implementation Strategy. Available online at https://www.dignityhealth.org/-/media/cm/media/documents/Implementation-Strategies/2016-Implementation-Sequoia.ashx?la=en&hash=4E11CE10B497195FBC19C4820DD9E379B55E30EA. Accessed on March 19, 2019.
[20] Redwood City Libraries. 2019. About Us. Available online at https://www.redwoodcity.org/departments/library/rcpl-info. Accessed March 16, 2019.

3.15.2 Regulatory Setting

Federal

No Federal regulation related to public services are relevant to the project.

State

California Occupational Safety and Health Administration

In accordance with the California Code of Regulations (CCR) Section 1270 "Fire Prevention" and Section 6773 "Fire Protection and Fire Equipment," the California Occupational Safety and Health Administration (Cal/OSHA) has established minimum standards for fire suppression and emergency medical services. The standards include, but are not limited to, guidelines on the handling of highly combustible materials, fire hose sizing requirements, restrictions on the use of compressed air, access roads, and the testing, maintenance, and use of all firefighting and emergency medical equipment.

California Fire Code

The California Fire Code (also referred to as the California Building Standards Code)[21] is provided in CCR Title 24, Part 9 and includes general safety provisions, building and equipment design standards, requirements for special occupancies and operations, and requirements for handling and storing hazardous flammable and non-flammable hazardous materials.

Local

City of Redwood City General Plan

The City General Plan (2010)[22] includes goals and policies to ensure public facilities and services are adequately available and accessible in a timely fashion to serve new development. The following City General Plan policies and goals are relevant to the project:

Public Safety Element

- **Policy PS-11.1:** Work with the Police Department to determine and meet community needs for law enforcement services.
- **Policy PS-11.2:** Work with the Fire Department to determine and meet community needs for fire protection and related emergency services.

Building Community Element

- **Policy BC-8.8:** Use development impact fees to fund library facilities, equipment, and programs that are needed as a result of new development projects.
- **Policy BC-1.2:** Maintain development fee programs to accumulate funds for the acquisition and improvement of parks and public/community places and facilities.

[21] California Building Standards Commission. 2016. California Fire Code, California Code of Regulations Title 24, Part 9. Available online at https://codes.iccsafe.org/content/document/662?site_type=public. Accessed on February 12, 2019.
[22] City of Redwood City. 2010. General Plan. Available online at https://www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/general-plan-precise-plans/general-plan. Accessed on January 31, 2019.

- **Program BC-3:** Continue to implement the land dedication program and in-lieu fees program to assist in the funding and development of new parks. Actively seek alternative funding sources such as State bonds and grants to supplement gaps in financing parkland acquisition and development.

County of San Mateo General Plan

Natural Hazards

- **Policy 15.15b:** Continue to work with public utilities, school districts, and other agencies supplying critical public services to ensure that they have incorporated structural safety and other measures to be adequately protected from natural hazards for both existing and proposed facilities and are prepared for potential disasters affecting these facilities.

Park and Recreation Resources

- **Policy 6.5:** Attempt to provide appropriate access and conveniences for all people in park and recreation facilities.
- **Policy 6.17a:** Regulate development to provide new or improved park and recreation facilities. Use one or a combination of the following techniques: (1) offer of dedication, (2) grant of fee interest, and (3) in lieu fees.
- **Policy 6.17c:** Base the requirements for the provision of park and recreation facilities on the: (1) size and type of development, (2) benefit to the developer, (3) burden to the public, and (4) within the Coastal Zone, priority given to the type of development under the Coastal Act.

3.15.3 Thresholds of Significance

The significance of potential impacts to public services are based on thresholds identified within Appendix G of the CEQA Guidelines, shown below.

Impacts would be considered significant if the project would:

a. Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, 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 the public services:
    - Fire protection
    - Police protection
    - Public schools
    - Health services
    - Libraries

3.15.4 Impact Assessment and Methodology

Public services in the project area were evaluated to determine whether they are adequate to provide needed services for construction and operation of the project, and to determine whether they would be adversely affected by the project. The evaluation is based on a thorough review of existing resources and

information, including City and County websites, public safety resources, hospital websites, and the City and County General Plans. The evaluation also included an analysis of project consistency with the goals and policies of the City and County General Plans, and the significance criteria established by Appendix G of the CEQA Guidelines.

3.15.5 Project-Specific Impacts and Mitigation Measures

Impact 3.15-1: Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, 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 fire protection, police protection, schools, parks, or other public facilities or services – Less than Significant

Canyon Lane Improvements

Construction

As described in Chapter 3.12, Population and Housing, construction of the Canyon Lane improvements would require up to 10 construction personnel. The construction workers would likely be supplied from the region's labor pool. Construction workers would not likely relocate their household as a consequence of working on the project, and, as such, no increase in population that would result in added demand for public services would occur. As a result, no new governmental facilities would need to be constructed or altered as a result of project construction. Therefore, no impacts would result.

Operation

A 120-foot hammerhead emergency vehicle turnaround has been incorporated into the project design of Canyon Lane. The 120-foot hammerhead emergency vehicle turnaround has been reviewed by County Fire and meets the California Fire Code and minimum County requirements for adequate turnaround for a dead-end street.[23] Canyon Lane and the proposed bridge for vehicle turnaround would be designed and maintained to support emergency vehicles. Therefore, operation of Canyon Lane would not impact police or fire response times.

Canyon Lane would indirectly induce population growth by providing vehicular access to previously undeveloped parcels. Growth inducing impacts are described in Section 3.15-7, Developable Parcels.

Proposed Single-Family Residence

Construction

As described in Section 3.12, Population and Housing, construction of the single-family residence would require up to eight construction personnel. The construction workers would likely be supplied from the region's labor pool and construction workers would not be likely to relocate their household as a consequence of working on the project. As such, no increase in population that would result in added

[23] International Fire Code Section 503.2.5.

demand for public services would occur. As a result, no new governmental facilities would need to be constructed or altered as a result of construction of the proposed-single family residence. Therefore, no impacts would result.

Operation

As described in Chapter 3.12, Population and Housing, the single-single family residence would be expected to increase the City and County population by approximately three people. This increase would not substantially increase the demand for public services. The increase in one residence would not induce substantial demand on fire or police protection. The project area is adequately served by existing police and fire stations that are meeting or exceeding their respective response times. Further, the single-family residence would also be built to meet applicable fire safety standards, including the California Building Code regulations for the Wildland-Urban Interface Fire Area. Therefore, impacts to fire and police protection would be less than significant.

Assuming the average household size of 2.88 [24], the proposed single-family residence would likely introduce one school-aged child to the project area. If the school-aged child attends public school, he or she would attend the Roy Clouds Elementary School and Woodside High School. The addition of one school-aged child to the Roy Clouds Elementary School and Woodside High School would result in an increase in student enrollment by less than 0.01 percent to both schools. This increase in student enrollment would not be sufficient to necessitate the construction of new or altered facilities. Therefore, impacts to public schools would be less than significant.

Due to the minimal population increase, implementation of the project would not result in the need for other new or physically altered governmental or public facilities such as libraries or hospitals. There are no known capacity limitations of the nearby libraries or hospitals. Therefore, impacts to these facilities would be less than significant.

Developable Parcels

The future residences on the 11 developable parcels would increase the demand for public services. Based on the current average household size in the County and City, the construction of 11 new single-family residences would be expected to generate a population increase of approximately 33 people. The increase of approximately 33 additional people would not substantially increase the demand for public services. The increase in 33 residences would not induce substantial demand on fire or police protection. The project area is adequately served by existing police and fire stations that are meeting or exceeding their respective response times. Further, the single-family residence would also be built to meet applicable fire safety standards, including the California Building Code regulations for the Wildland-Urban Interface Fire Area. Therefore, impacts to fire and police protection would be less than significant.

Assuming each of the 11 households introduced one school-aged child to the public-school system (for a total of 11 school-aged children), the school-aged children would attend the Roy Clouds Elementary School and Woodside High School. The addition of 11 school-aged children to the Roy Clouds Elementary School and Woodside High School would increase student enrollment at these schools by approximately 0.1 percent and less than 0.01 percent, respectively. This increase in student enrollment would not be sufficient to necessitate the construction of new or altered facilities. Therefore, impacts to public schools would be less than significant.

[24] State of California. 2018. California Department of Finance, E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011-2018, with 2010 Census Benchmark. Sacramento, California. January. Available at: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/E-5/. Accessed February 4, 2019.

Due to the minimal population increase, implementation of the project would not result in the need for other new or physically altered governmental or public facilities such as libraries or hospitals. There are no known capacity limitations of the nearby libraries or hospitals. Further, as described in Chapter 4-12, Population and Housing, this increase in population is within the population growth expectations of the County and City. No new governmental facilities would need to be constructed as a consequence of the 11 future residences, and impacts would be less than significant.

3.16 RECREATION

This section describes existing conditions and potential impacts on recreational facilities as a result of implementation of the project. Recreational areas are defined as a public or quasi-public site or facility that is used for recreation activities such as national, state, county, city, or private parks, bike paths, trails, open space preserves, cultural centers, museums, or campgrounds.

3.16.1 Existing Conditions

Regional Setting

The County contains a variety of Federal, State, and local recreational facilities, open spaces, and private recreational facilities such as the approximately 1,863-acre San Francisco Bay National Wildlife Refuge, the 23,000-acre Golden Gate National Recreation Area, and approximately 8,353 acres of recreational facilities associated with State parks, beaches, and marine preserves. The Park and Recreation Department also maintains and operates approximately 14,122 acres of recreational facilities that can be classified as park, recreation area and trail, natural preserve, wild area, linear park, and a historical site. Cities throughout the County, such as the City of Redwood City, own and/or operate active recreational facilities such as marinas, golf courses, and individual neighborhood parks. Special Districts, such as the Midpeninsula Region Open Space District and Peninsula Open Space Trust, also provide recreational facilities and opportunities within the County.[1]

In addition to public recreational facilities and opportunities, the County also supports privately owned campgrounds, golf courses, and Bayside marinas.[2]

Local Setting

Canyon Lane is a privately owned gravel roadway that is used as an informal trail by neighboring residents. The trail is not designated or managed as open space; however, due its undeveloped and wooded surroundings, it is used for hiking, walking, and biking.

The project is also located near several recreational facilities. The project is situated east of Lower Emerald Lake (approximately 780 feet from the project boundary) and directly west, and adjacent to, Garrett Park. Lower Emerald Lake sits on a 5-acre parcel and includes a swimming lake created by an earthen dam. The Emerald Lake Country Club is located at Lower Emerald Lake and offers summer membership for use of the lake.[3] The lake is filled by several seasonal creeks and water released from the lake is discharged into a seasonal creek that flows parallel to Canyon Lane where it eventually reaches Garrett Park. Garrett Park is a 6.9-acre park located in and maintained by the City of Redwood City. It contains playground facilities, picnic areas, and barbeque facilities. The project is also located near Stulsaft Park in the City and Edgewood Park and Natural Preserve in the County. Stulsaft Park is the largest park in Redwood City and is located on Farm Hill Boulevard. The 42.06-acre park offers

[1] San Mateo County. 1986. San Mateo County *General Plan Overview & Background Issues, Chapter 6: Park and Recreation Resources.* Page 6.3-6.9. November. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on March 2, 2019.

[2] San Mateo County. 1986. San Mateo County *General Plan Overview & Background Issues, Chapter 6: Park and Recreation Resources.* Page 6.9. November. Available online at; https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on March 2, 2019.

[3] Emerald Lake Country Club. *FAQ's*. Available online at https://www.emeraldlakecountryclub.com/history. Accessed on March 19, 2019.

barbeques, grass areas, hiking trails, off-leash dog trails, picnic areas, playgrounds, and a seasonal water feature.[4] Edgewood Park and Natural Preserve is located near Interstate 280 and Edgewood road. It consists of 467 acres of woodlands and grasslands, and offers trails for hiking, equestrian trails, and picnic areas.[5]

3.16.2 Regulatory Setting

Federal

No Federal laws or regulations related to recreation are applicable to the project.

State

No State laws or regulations related to recreation are applicable to the project.

Local

San Mateo County General Plan – Recreation Element

The County Park and Recreation chapter of the General Plan discusses Park and Recreational uses in San Mateo County. The Park and Recreation section of the General Plan includes two Elements: the Parks and Recreation Element (1978) and the 1973 Conservation and Open Space Element.[6]

The Parks and Recreation Element (1978) provided much of the information in the Park and Recreation chapter of the General Plan. The Element identified and addressed issues with park and recreation facilities, determined the County's role in providing facilities, identified how to select potential sites, and investigated agreements, acquisition techniques, operations, maintenance, and roles of the County and citizens. The Park and Recreation chapter of the General Plan, once adopted, would replace the 1978 Parks and Recreation Element.[7]

The 1973 Conservation and Open Space Element revised the acquisition of parks, designated park and open space land uses, and described new open space categories.[8] The Element established policies to preserve and enhance environmental quality, preserve natural resources, and encourage agriculture.[9] The Parks and Open Space Plan Map in the Element designated land uses for the County's open space and

[4] Redwood City Parks. *Stulsaft Park*. Available online at https://www.redwoodcity.org/Home/Components/FacilityDirectory/FacilityDirectory/47/1912?npage=2. Accessed on March 19, 2019

[5] San Mateo County. County of San Mateo Parks Department, *Edgewood Park & Natural Preserve*. Available online at https://parks.smcgov.org/edgewood-park-natural-preserve. Accessed on March 19, 2019.

[6] County of San Mateo County. November 1986. San Mateo County *General Plan Overview & Background Issues, Chapter 6: Park and Recreation Resources.* Page 6.1. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on March 19, 2019.

[7] County of San Mateo County. November 1986. San Mateo County *General Plan Overview & Background Issues, Chapter 6: Park and Recreation Resources.* Page 6.1-6.2, 6.16. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on March 19, 2019.

[8] County of San Mateo County. November 1986. San Mateo County *General Plan Overview & Background Issues, Chapter 6: Park and Recreation Resources.* Page 6.16. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on March 2, 2019.

[9] County of San Mateo County. November 1986. San Mateo County *General Plan Overview & Background Issues, Chapter: Rural Land Use.* Page 9.39. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on March 19, 2019.

some of the undeveloped urban areas. Some of the land use designations in the Element have become obsolete and many were superseded by subsequent General Plan designations. [10]

City of Redwood City General Plan

The Redwood City corporate City limits encompass an area of approximately 22,000 acres. Over 60 percent of this area consists of open space, water, and recreational land uses.[11]

The following policies address recreation and open space:

- **Policy BE-2.7:** Effectively integrate single-unit and multi-unit housing with local-serving convenience and neighborhood shopping centers, parks and recreation opportunities, child care, and other uses appropriate for neighborhoods.[12]
- **Policy BE-23.9:** Protect and enhance the natural environmental features in Redwood City. Preserve open space resources as visual, recreational, and habitat resources, finding creative ways to provide habitat areas and species protection.[13]

3.16.3 Thresholds of Significance

The significance of potential recreation impacts is based on thresholds identified within Appendix G of the CEQA Guidelines, shown below.

Impacts would be considered significant if the project would:

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 would be accelerated;

b. Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment; or,

c. Affect access to trails, parks, or other recreation opportunities.

3.16.4 Impact Assessment and Methodology

The San Mateo County General Plan, San Mateo County Zoning Regulations, Redwood City General Plan, Redwood City Zoning Ordinance, and Geographical Information System (GIS) and aerial mapping were reviewed and referenced in assessing the impacts of the proposed project on recreational facilities within the project area.

[10] County of San Mateo County. November 1986. San Mateo County *General Plan Overview & Background Issues, Chapter 8: Urban Land Use.* Page 8.1-8.2. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on March 19, 2019

[11] City of Redwood City. May 2018. City of Redwood City General Plan. *The Built Environment Urban Form and Land Use. Page BE-10.* Available online at https://www.redwoodcity.org/home/showdocument?id=15378. Accessed on March 19, 2019.

[12] City of Redwood City. May 2018. City of Redwood City General Plan. *The Built Environment Urban Form and Land Use. Page BE-63.* Available online at https://www.redwoodcity.org/home/showdocument?id=15378. Accessed on March 19, 2019.

[13] City of Redwood City. May 2018. City of Redwood City General Plan. *The Built Environment Urban Form and Land Use. Page BE-80.* Available online at https://www.redwoodcity.org/home/showdocument?id=15378. Accessed on March 19, 2019.

3.16.5 Project-Specific Impacts and Mitigation Measures

Impact 3.16-1: Potential to increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or would be accelerated; include recreational facilities or require the expansion or modification of recreational facilities that might adversely affect the environment; or affect access to trails, parks and other recreational opportunities – Less than Significant

Canyon Lane is currently a privately owned gravel roadway that is occasionally used by nearby residents as an informal trail. After Canyon Lane is constructed, the roadway would become part of the community and continue to be useable for walking. However, the park-like setting would be transformed into a more suburban environment for the users, and therefore Canyon Lane could potentially be less attractive for recreational use to some users. As Canyon Lane is not currently designated as a trail or part of a larger open space, this impact is not considered significant.

The project includes improvements to Canyon Lane and development of a single-family residence on one parcel, and provides for future development of residences on 11 additional parcels. The improvements to Canyon Lane would not affect access to Lower Emerald Lake or Garrett Park, the two closest recreational areas, as the proposed Canyon Lane improvements are intended to serve the development of the single-family parcel and the future developable parcels. In addition, the road improvements would not contribute to the increased use or degradation of these existing recreational facilities in the project area.

The development of the proposed single-family residence and the 11 future developable sites would increase the number of people served by the local and regional recreational facilities. However, considering the small increase in population, the project would not substantially increase the use of neighborhood and regional parks or other recreational facilities or require the expansion or addition of new recreational facilities. Therefore, impacts would be less than significant.

3.17 TRANSPORTATION

This section addresses the potential for the project to impact transportation and circulation. The setting and impact assessment information is based on the Traffic Study prepared for the project (Appendix B).

3.17.1 Existing Conditions

Regional Access

The project site is located within the Emerald Lake Hills area of unincorporated San Mateo County adjacent to the City of Redwood City. The major transportation corridors in the region include Highway 101 and Interstate 280 (I-280), which are located approximately 2.4 and 1.6 miles east and west of the project site, respectively. I-280 can be accessed via Jefferson Avenue, a minor arterial road. Other nearby highways are State Route 82 (SR 82), otherwise known as El Camino Real, and SR-84, which go through Redwood City and are both located approximately 1.8 miles east of the project site.

Existing Roadway Network

Primary access to the project area is through Glenwood Avenue. Glenwood Avenue may be accessed from Bain Place, Breeze Place, and Canyon Road. Glenwood Avenue dead-ends approximately 250 feet from the entrance of Canyon Lane.

Larger regional roads such as Jefferson Avenue, Farm Hill Boulevard, and Alameda de las Pulgas provide access to the adjacent Farm Hills, Emerald Lake Hills, and Woodside Plaza neighborhoods, respectively. Jefferson Avenue extends to the east as a four-lane arterial that provides access to downtown Redwood City, and to the west as a two-lane arterial with bike lanes that becomes Farm Hill Boulevard and provides access to I-280. Figure 3.17-1, Regional Transportation Network, shows the roadways in the project vicinity, and Figure 3.17-2, Local Transportation Network, shows the local roadways closer to the project area.

There are existing Class I, Class II, and Class III bikeways in Redwood City beyond the project area; however, there are no bicycle facilities on Canyon Lane or Glenwood Avenue.

Existing Traffic Conditions

The EIR analyzes the existing traffic flow from Canyon Lane in the following two locations on Glenwood Avenue: near Garrett Park and Canyon Road. The street segments were analyzed in accordance with the Traffic Infusion on Residential Environment (TIRE) Index, which is a representation of the effects on traffic safety, pedestrians, bicyclists, children playing near the street, and the ability to freely maneuver into and out of the driveways. The TIRE Index levels are shown in Table 3.17-1, TIRE Index Levels.

The TIRE Index is used to measure impacts of traffic on residential streets. A change in the TIRE Index by 0.1 or more indicates a visibly recognizable change in traffic. Traffic counts were performed in November 2016 on Glenwood Avenue and Canyon Road for the proposed project. Table 3.17-2, Existing Traffic Volumes and Traffic Index, shows traffic volume in vehicles per day (VPD) and the TIRE Index for the existing traffic condition for each road segment examined in the Traffic Study.

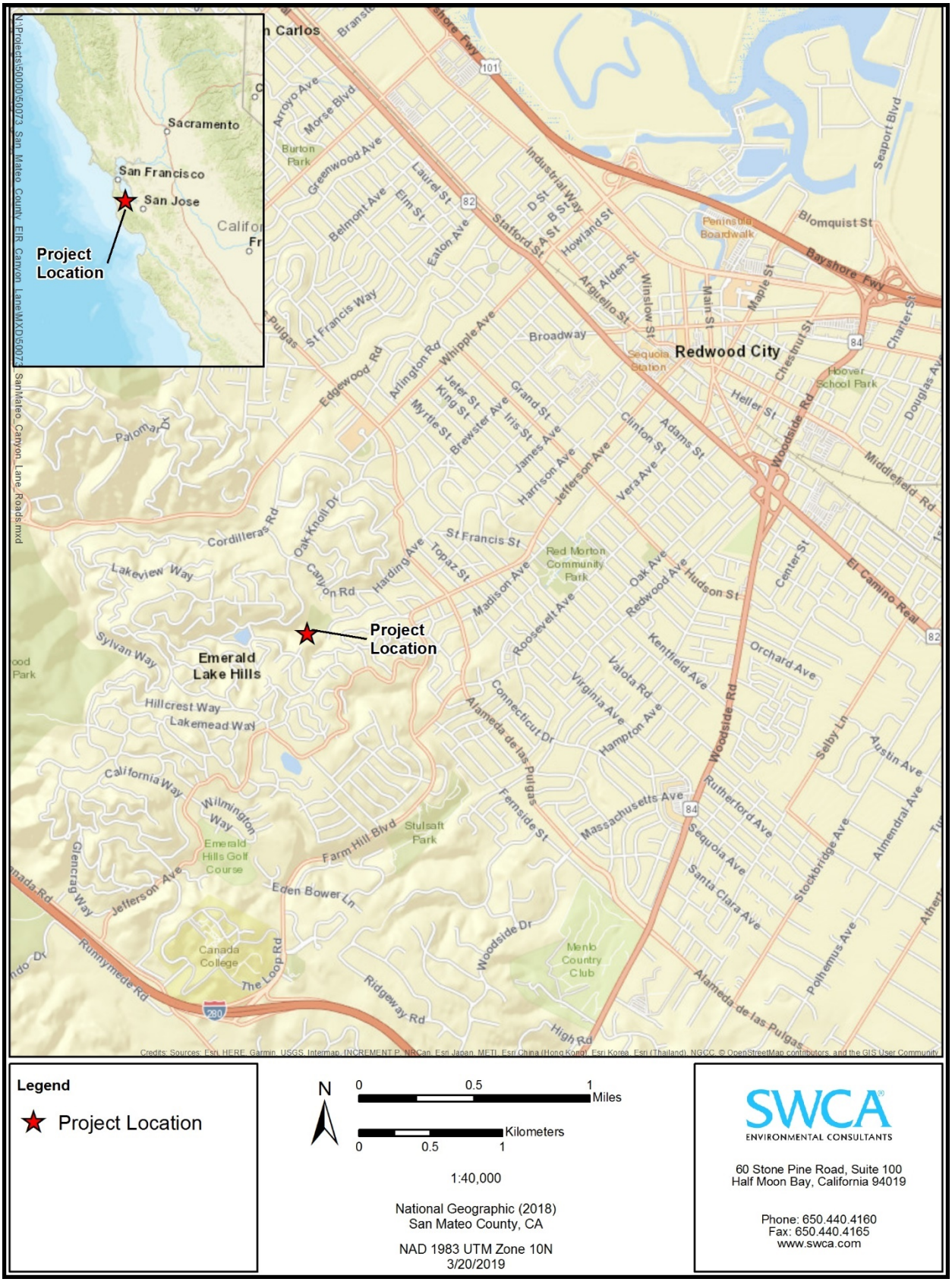


Figure 3.17-1. Regional Transportation Network

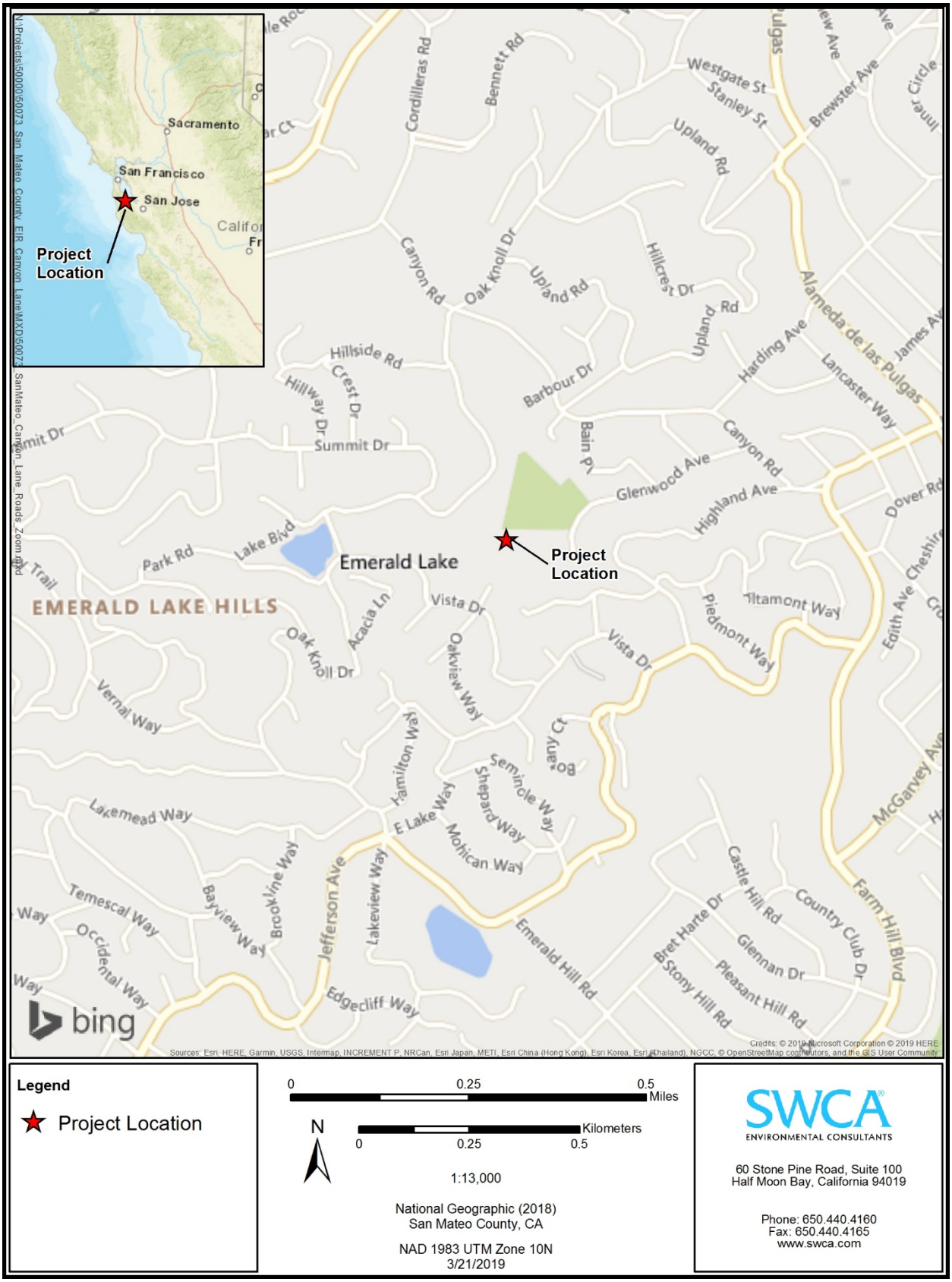


Figure 3.17-2. Local Transportation Network

Table 3.17-1. TIRE Index Levels

TIRE Index	Daily Traffic Volume	Residential Environment
0	1	
		A cul-de-sac street with one home
1	10	
		A cul-de-sac street with 2-15 homes
2	100	
		A 2-lane minor street
3	1,000	
		A 2-lane collector or arterial street
4	10,000	
		A 2 to 6-lane arterial street
5	100,000	

Source: Traffic Study (Appendix B)

Table 3.17-2. Existing Traffic Volumes and Traffic Index

Roadway	Traffic Volume (VPD)	TIRE Index
Glenwood Avenue near Garrett Park	140	2.15
Glenwood Avenue near Canyon Lane	480	2.68

Source: Traffic Study (Appendix B)

Note: VPD – vehicles per day

3.17.2 Regulatory Setting

Federal and State

There are no federal or state regulations that apply to transportation and traffic for this project.

Local

City/County Association of Governments of San Mateo County, Countywide Transportation Plan

The City/County Association of Governments of San Mateo County (C/CAG) Countywide Transportation Plan (CTP) 2010 was adopted by all of the cities within the County, the San Mateo County Transit District (SamTrans), and the San Mateo County Transportation Authority. The CTP 2010 is a planning document that envisions, directs, and prioritizes the transportation needs of the County by analyzing various transportation-related elements, such as roadways, transit services, land use, transportation systems management, and pricing. Specific goals of the CTP pertaining to the project include integrating transportation and land use plans and decisions in support of a more livable and sustainable San Mateo County and enhancing safety and efficiency on the countywide roadway network to foster comfortable, convenient, and multimodal mobility.

City/County Association of Governments of San Mateo County, Congestion Management Plan

Per the requirements of Propositions 111 and 108, every urban county within California designates a Congestion Management Agency (CMA) to prepare and implement a Congestion Management Program (CMP) that includes all jurisdictions within the County. The CMA is also responsible for updating the CMP at least every two years. In the County, the C/CAG was designated as the CMA. Passage of Assembly Bill (AB) 2419 allowed existing CMAs to opt to discontinue activities; however, the C/CAG voted to continue to participate in and adopt a CMP. The first CMP for the County was adopted by the C/CAG in 1991. It has continued to be updated and amended. The most recent version is 2017. If a project would add less than 100 peak hour trips to regional roads, no analysis under the CMP is required.

City/County Association of Governments of San Mateo County, San Mateo County Comprehensive Bicycle Route Plan

The San Mateo County Comprehensive Bicycle Route Plan (CBRP) is intended to coordinate and guide the provisions of all bicycle-related plans, programs, and projects within the County. As a Countywide Bicycle Plan, it focuses on providing bikeway connections between the incorporated cities, adjacent counties, and major regional destinations within the County. The CBRP also prioritizes recommended bikeway projects through the study area and serves as a guide to the incorporated cities regarding bikeway policies and design standards.

San Mateo County General Plan

The San Mateo County General Plan (County General Plan) was adopted in 1986 and serves as a guide for both land development and conservation within the unincorporated areas of the County. Policies within the County General Plan relevant to transportation and circulation and applicable to the project are as follows:

- **Additional Capacity:** When providing additional capacity for automobile traffic where needed, give priority to upgrading and expanding existing roads before developing new road alignments.
- **Urban Road Improvements:** In urban areas, where improvements are needed due to safety concerns or congestion, support the construction of interchange and intersection improvements, additional traffic lanes, turning lanes, redesign of parking, channelization, traffic control signals, or other improvements.
- **Financing Local Road Improvements:** Utilize all available techniques for funding local road improvements in unincorporated areas, including assessment districts, developer contributions, and County road funds. Ensure road improvements are consistent with adopted land use plans and area plans.
- **Local Circulation Policies:** In unincorporated communities, plan for providing:
    - Maximum freedom of movement and adequate access to various land uses;
    - Improved streets, sidewalks, and bikeways in developed areas;
    - Minimal through traffic in residential areas;
    - Routes for truck traffic which avoid residential areas and are structurally designed to accommodate trucks;
    - Access for emergency vehicles; and
    - Bicycle and pedestrian travel.

- **Local Road Standards:** Allow for modification of road standards for sub-areas of the County, which respond to local needs and conditions as identified in area plans.
- **Pedestrian Paths:** Encourage the provision of safe and adequate pedestrian paths in new development connecting to activity centers, schools, transit stops, and shopping centers.

3.17.3 Thresholds of Significance

The significance of potential transportation and traffic impacts is based on thresholds identified within Appendix G of the state CEQA Guidelines, as follows.

Impacts would be considered significant if the project would:

a. Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities.

b. Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b).

c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

d. Result in inadequate emergency access.

3.17.4 Impact Assessment and Methodology

This section identifies impacts to transportation and circulation that could occur from the implementation of the project. Impacts to transportation and circulation were analyzed based on an examination of the project site, published information regarding transportation and circulation within the vicinity of the project site, and existing and projected traffic conditions.

As discussed above, the TIRE Index was used to determine the impact of the project's traffic on the surrounding roadway system. This index is based on the idea that increases in traffic volume have a greater impact on the residential environment on a lower volume street than along a street with a much higher level of baseline traffic. A change in the TIRE Index by 0.1 or more indicates a visibly recognized change in traffic.

Traffic Impact Analysis

Table 3.17-3, Traffic Volumes and Traffic Index, shows the projected traffic volumes in vehicles per day, the existing and future TIRE Index, and changes from existing conditions. A change in the TIRE Index by 0.1 or more indicates a visibly recognized change in traffic. The changes in TIRE Index were calculated to be 0.27 on Glenwood Avenue and 0.10 on Canyon Road.

Table 3.17-3. Traffic Volumes and Traffic Index

Roadway	Traffic Volume (VPD)	TIRE Index	Change
Existing Glenwood Avenue near Garrett Park	140	2.15	0.27
Future Glenwood Avenue near Garrett Park	260	2.42	
Existing Glenwood Avenue near Canyon Road	480	2.68	0.10
Future Glenwood Avenue near Canyon Road	600	2.78	

Source: Applicant Traffic Study, May 22, 2017; RKH

Trip generation of the project is based on information compiled in the 10th Edition of the Institute of Transportation Engineers (ITE) *Trip Generation* manual.[1] It is assumed that all 12 of the developable parcels would be developed as single-family residential homes per the current zoning of the project site.

Existing and future daily and peak hour trips on Glenwood Avenue are summarized in Table 3.17-4, Trip Traffic. Table 3.17-5, Project Trip Generation, summarizes the daily and peak hour trip generation for the project. As summarized in Table 3.17-5, the project would generate 113 weekday daily trips, 9 AM peak hour trips, and 12 PM peak hour trips.

Table 3.17-4. Trip Traffic

Segment	Location	Existing	With Project
AM Peak Hour Trips			
Glenwood Avenue	Near Garrett Park	14	26
Glenwood Avenue	Near Canyon Road	48	60
PM Peak Hour Trips			
Glenwood Avenue	Near Garrett Park	14	26
Glenwood Avenue	Near Canyon Road	48	60

Source: Traffic Study (Appendix B)

Note: AM and PM peak hour counts derived by factoring daily trips by 10.

Table 3.17-5. Project Trip Generation

				Daily	AM Peak Hour Rate			PM Peak Hour Rate		
Land Use	**ITE Code**	**Unit**	**Size**	**Rate**	**Total**	**In**	**Out**	**Total**	**In**	**Out**
Single-Family Residential	210	Dwelling Units	12	9.44	0.74	25%	75%	0.99	63%	37%
				Daily	**AM Peak Hour Trips**			**PM Peak Hour Trips**		
Land Use	**ITE Code**	**Unit**	**Size**	**Trips**	**Total**	**In**	**Out**	**Total**	**In**	**Out**
Single-Family Residential	210	Dwelling Units	12	113	9	2	7	12	8	4

Source: ITE *Trip Generation* Manual, 10th Edition; Kittelson & Associates, 2019

Project trips would distribute onto Canyon Lane and Glenwood Avenue, and would then disburse throughout the local and regional roadway network. All departing trips would turn northbound left onto Glenwood Avenue, and all arriving trips would turn westbound right from Glenwood Avenue to Canyon Lane. Traffic would distribute mostly to Canyon Road and then to Highland Avenue. At Jefferson Avenue, it is estimated that traffic would about equally split turning left and right onto Jefferson Avenue.

[1] Institute of Transportation Engineers. 2018. *Trip Generation, 10th Edition*, Washington, D.C.

3.17.5 Project-Specific Impacts and Mitigation Measures

Impact 3.17-1: Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities – Less than Significant

Canyon Lane Improvements

Construction

Construction activities for the roadway improvements would take approximately one month. Construction activities associated with Canyon Lane improvements are estimated to represent approximately 40 percent of the construction timeline. Construction crews for the different construction phases would vary but crews are expected to be up to ten people during the Canyon Lane improvements. In addition, vendor trips are estimated to vary per construction phase, with up to 10 trips for Phase I (tree removal and erosion control), 20 for Phase II (roadway construction), and 16 for Phase VI (final paving). Construction activities would typically occur Monday to Friday from 7:00 AM to 4:00 PM. Off-hours and weekend work would be avoided.

The haul route for the project would be from the project site to Glenwood Avenue, Canyon Road, Cordilleras Road, and Edgewood Road to I-280. Construction would involve two types of vehicle traffic, including the moving of heavy construction equipment to and from the site, and daily commute traffic and vendor delivery traffic during construction.

The initial delivery of equipment for Phase I construction would include excavators, dump trucks, and several trucks for tree removal and erosion protection. Phase II roadway construction would require rollers, cranes, and a roller truck in addition to the Phase I equipment. The utility and drainage improvements would require a backhoe, excavator, dump trucks, and a water truck. The existing traffic volume at Glenwood Avenue near Garrett Park is 140 and 480 VPD near Canyon Lane. The additional trips required for equipment would be minimal and intermittent; therefore, the addition of these trips to daily traffic would not have a measurable impact on traffic flow conditions or pavement degradation, and impacts would be less than significant.

Roadway, utility, and drainage improvements would require approximately 1,205 cubic yards of grading, including 1,145 cubic yards of cut and 60 cubic yards of fill. The removal of grading materials would translate into approximately 20 truck trips per day during the duration of construction. The construction would require up to 10 employees on site during a typical day. These activities would generate up to 20 worker trips per day, 10 in-bound and 10 out-bound. The construction-related traffic would produce a 4 percent increase in traffic over the existing traffic volume per day on Glenwood Avenue at Canyon Lane and a 12 percent increase in existing traffic volume near Garrett Park. Due to the short construction period and the overall low volumes of traffic associated with construction of the Canyon Lane improvements, impacts would be less than significant.

Operation

Operation of Canyon Lane would not result in any additional trip generation. Growth-inducing impacts related to the developable parcels are presented below. The Canyon Lane improvements would not conflict with any applicable plan, ordinance, or policy establishing measures of effectiveness and would not conflict with an applicable CMP, therefore, no impact would occur.

Proposed Single-Family Residence

Construction

Construction activities for the single-family residence would take approximately 5.75 months and are estimated to represent approximately 60 percent of the construction timeline. Construction of the proposed single-family residence would involve crews accessing the property from Canyon Lane and parking in the temporary parking area established directly north of Canyon Lane and approximately 150 feet west of Glenwood Avenue. The highest level of construction traffic activity would occur during Phase IV of the project, construction of the residence.

The haul route for project grading would be from the project site to Glenwood Avenue, Canyon Road, Cordilleras Road, and Edgewood Road to I-280. Construction would involve two types of vehicle traffic, including the moving of heavy construction equipment to and from the site, and daily commute traffic and truck traffic during construction.

Construction of the single-family residence would require approximately 2,560 cubic yards of grading, all of which would be removed from the site. The removal of grading materials would translate into approximately 250 truck trips over a 10-day period, or 25 truck trips per day during the excavation period. The construction would require up to eight employees on site during a typical day. These activities would generate up to 16 worker trips per day, eight in-bound and eight out-bound. The construction-related traffic would produce a 26 percent increase in traffic over the existing traffic volume per day on Glenwood Avenue at Canyon Lane and an 8 percent increase in existing traffic volume near Garrett Park. Due to the short construction period and the overall low volumes of traffic associated with construction of the Canyon Lane improvements, impacts would be less than significant.

Operation

Operation of the project would result in approximately one vehicle trip during each of the AM and PM peak hours. The project would not increase traffic on roadway segments in the vicinity of the project site beyond acceptable capacities and therefore would not conflict with any applicable plan, ordinance, or policy establishing measures of effectiveness and would not conflict with an applicable congestion management program.

Developable Parcels

Construction

Construction activities for the developable parcels would be similar to those for the proposed single-family residences. It is likely the same haul route and similar construction equipment would be utilized. The level of development and construction time frame would dictate the estimated number of construction workers and construction trips, which at this time cannot be predicted. During the construction period, it is likely there would be a similar increase in construction-related traffic, resulting in less-than-significant impacts.

Operation

Given the low number of peak hour trips associated with the project (traffic increases from 14 to 26 vehicles per hour at location 1 in both directions, and from 48 to 60 vehicles per hour at location 2 in both directions, in both the AM and PM peak hours, respectively), it is not expected that these trips will create any level of service impacts to local roadways or intersections near the project under existing plus project conditions. As discussed in Section 3.17.4, the TIRE analysis indicated an increase of 0.27 and 0.1 along Glenwood Avenue. As noted above, a change in TIRE Index of 0.1 is considered an impact, and the

increase in traffic along Glenwood Avenue near Garrett Park is greater than 0.1. While this is a noticeable change in traffic, Glenwood Avenue would continue to be a dead-end street, and this would be consistent with current traffic use in the area. The project would add 9 AM and 12 PM peak hour trips. This would be an increase in traffic but would not conflict with plans and policies. Therefore, the impact is considered to be less than significant. The proposed development parcels would not increase traffic on the roadways or in the vicinity of the project site beyond acceptable capacities; would not conflict with any applicable plan, ordinance, or policy establishing measures of effectiveness; and would not conflict with an applicable CMP.

The project will not conflict with the C/CAG of San Mateo Countywide Transportation, CMP, nor other traffic-related policies or regulations. The San Mateo County General Pan local circulation policy allows for improved streets, sidewalks, and bikeways in developed areas in unincorporated communities. The traffic trips generated by future residences will not introduce any significant increase in vehicles on Canyon Lane and Glenwood Avenue, and thus will pose no significant safety impact to other vehicles, pedestrians, or bicycles.

Impact 3.17-2: Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b). – Less than Significant

Canyon Lane Improvements

Construction of the Canyon Lane improvements would result in temporary increases in VMT. However, given that project construction is of a relatively small scale and temporary, impacts would be less than significant. Operation of Canyon Lane would not result in additional VMT as Canyon Lane itself would not generate new trips. Therefore, the operation of Canyon Lane would not conflict or be inconsistent with CEQA Guidelines Section 15064.3.

Proposed Single-Family Residence

Similar to the construction of the Canyon Lane improvements, increases in VMT associated with construction of the single-family residence would be temporary, negligible, and less than significant. Operation of the proposed single-family residence would result in approximately 100 VMT per day (10 daily trips with an average 10 miles per trip).[2] The proposed single-family residence would generate an increase in traffic and VMT, as discussed above; however, the increase in VMT would be negligible compared to the County and region as a whole. As discussed in Section 3.14.5, the proposed single-family residence would result in a population increase of 3 people,[3] which is within the County's expected growth rate.[4] Furthermore, the proposed single-family residence is located approximately 1.5 miles from the Redwood City Caltrain Station and approximately 0.45 mile from a SamTrans bus stop at Jefferson Avenue and Altamont Way. The SamTrans bus stop services the 274, 275, and 278 bus routes, all of which provide transit to the Redwood City Transit Center. Therefore, the proposed single-family residence is located within an urbanized, developed area that is accessible to transit and would not conflict or be inconsistent with CEQA Guidelines Section 15064.3(b).

[2] Kittelson. 2019. San Mateo County EIR for Canyon Lane Improvements – Peer Review. March 18.

[3] The California Department of Finance estimates the average household size within the unincorporated County is approximately 3 people. The full citation can be accessed at the following: State of California. 2018. California Department of Finance, E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011-2018, with 2010 Census Benchmark. Sacramento, California. January. Available at: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/E-5/. Accessed February 4, 2019.

[4] Association of Bay Area Governments. 2014. Plan Bay Area Projections 2013. San Francisco Bay Area 2010-2040. p. 84.

Developable Parcels

The developable parcels would result in approximately 1,200 VMT (120 daily trips with an average of 10 miles per trip).[5] As discussed in Section 3.14.5, the developable parcels would be expected to generate a population increase of 33 people, which is within the County's expected growth rate.[6] As noted above, the developable parcels are accessible to public transit (SamTrans and Caltrain) and are within an urbanized, developed area. The associated increase in population and VMT would be negligible compared to the County and region as a whole. Therefore, the developable parcels would not result in an impact related to an increase in VMT and would not conflict or be inconsistent with CEQA Guidelines Section 15064.3(b).

Impact 3.17-3: Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment) – Less than Significant

Canyon Lane Improvements

Canyon Lane and Glenwood Avenue are both dead-end streets that serve local residents and have minimal existing traffic. There are no design features or incompatible uses associated with Canyon Lane that would substantially increase hazards. Similar to other streets in the area, cars traveling from Canyon Lane onto Glenwood Avenue would yield to crossing traffic. As a result, the project would not increase traffic hazards and the impact would be less than significant.

Proposed Single-Family Residence

The proposed single-family residence would include a driveway that connects to Canyon Lane. Given the minimal traffic and pedestrians that would use Canyon Lane, potential for hazards is low. Vehicles pulling into and leaving the driveway would be able to see any traffic or pedestrians on Canyon Lane. Therefore, the single-family residence would not substantially increase hazards or result in an incompatible use and the impact would be less than significant.

Developable Parcels

Similar to the proposed single-family residence, the developable parcels would include driveways that connect to Canyon Lane. The potential for conflicts and hazards from traffic and pedestrians would be low given that Canyon Lane is a dead-end street. Vehicles pulling into and leaving the driveways would be able to see any traffic or pedestrians on Canyon Lane. Therefore, the developable parcels would not substantially increase hazards or result in an incompatible use and the impact would be less than significant.

Impact 3.17-4: Result in inadequate emergency access – Less than Significant

Canyon Lane Improvements

Improvements made to Canyon Lane would include a retaining wall, a turnaround for emergency vehicles, and a single-span bridge that would cross the unnamed ephemeral creek that traverses the project site. All dead-end roadways that exceed 150 feet in length require an emergency vehicle

[5] Kittelson. 2019. San Mateo County EIR for Canyon Lane Improvements – Peer Review. March 18.

[6] Association of Bay Area Governments. 2014. Plan Bay Area Projections 2013. San Francisco Bay Area 2010-2040. p. 84.

turnaround. An easement for emergency vehicle turnaround would be recorded on two parcels (APNs 057-222-240 & 250 and 057-222-260). The outside and inside turning radius of the turnaround would be a minimum of 45 feet and a maximum of 22 feet, respectively. The emergency vehicle turnaround has been designed to ensure emergency vehicles can adequately ingress and egress the project area. The emergency vehicle turnaround has been reviewed by the City and County and was conditionally approved by San Mateo County Fire District. Furthermore, Canyon Lane, including the single-span bridge, would be graded and maintained to meet International Fire Code (IFC) Standards (IFC 503.2.3 - 503.2.6), which would allow access for a fire apparatus of up to 75,000 pounds. As the project site is currently not accessible to emergency vehicles, the Canyon Lane improvements would enhance emergency accessibility to the project site by providing adequate turnaround and a paved roadway that meets the needs of fire apparatuses. Improvements to Canyon Lane would not result in inadequate emergency access and the impact would be less than significant.

Proposed Single-Family Residence and Developable Parcels

The proposed single-family residence and developable parcels would be accessible to emergency vehicles via Canyon Lane. Improvements to Canyon Lane have been designed to meet the needs of emergency vehicles. Therefore, the project would not result in inadequate emergency access and the impact would be less than significant.

3.18 UTILITIES AND SERVICE SYSTEMS

3.18.1 Existing Conditions

Water

Water Demand and Distribution

The Redwood City Public Works Services Department operates the Redwood City water distribution system. The water distribution system provides water services to Redwood City, portions of San Mateo County including Cañada College and portions of the Emerald Lake Hills areas, as well as parts of the Town of Woodside and City of San Carlos. The City's service area covers approximately 17 square miles and is generally bounded by Interstate 280 in the west, Highway 101 and San Francisco Bay to the east, Whipple Avenue to the north, and Marsh Road to the south. The service area also includes the non-contiguous Redwood Shores area. The proposed project area is not in the service area, but it is contiguous to the service area.[1]

The water system serves approximately 87,000 people and supplied roughly 8,876 acre-feet per year (AFY) of potable water in 2015[2], 8,362 AFY in 2016, and 9,335 AFY in 2017, the most recent year for which complete data is available.[3] This water demand was down from a peak of 13,000 AFY in 2007, due primarily to successive droughts and resulting water conservation restrictions and awareness. As of March 2016, the City had achieved a 23 percent reduction in water demand relative to water demand in 2013. Single-family and multi-family residential water use accounts for approximately 68 percent of total water demand. The Redwood City 2015 Urban Water Management Plan projects a total water demand of 12,856 AFY by the year 2030 and 13,697 AFY by the year 2040.[4]

Redwood City's distribution system has 13 metered connections to five San Francisco Public Utilities Commission (SFPUC) pipelines, as well as eight active emergency interties with California Water Service Company, Mid-Peninsula Water District, and the City of Menlo Park. The potable water distribution system consists of approximately 259 miles of distribution mains, 12 storage reservoirs, and 10 pump stations. It currently has a total storage capacity of 21.2 million gallons and is in the process of constructing additional storage.[5] The Canyon Lane project area is not currently served by a water main. There are existing water mains in Vista Drive approximately 300 feet southwest of the project area, and in Glenwood Avenue east of the project area.

[1] City of Redwood City. 2016. *City of Redwood City 2015 Urban Water Management Plan.* Available online at https://www.redwoodcity.org/home/showdocument?id=8091. Accessed March 8, 2019.
[2] City of Redwood City. 2016. *City of Redwood City 2015 Urban Water Management Plan.* Available online at https://www.redwoodcity.org/home/showdocument?id=8091. Accessed March 8, 2019.
[3] State Water Resources Control Board. 2018. Archived Monthly Reports. June 2014-October 2018 Urban Water Supplier Dataset. Available online at: https://www.waterboards.ca.gov/water_issues/programs/conservation_portal/conservation_reporting.html#monthly_archive. Accessed August 12, 2019.
[4] City of Redwood City. 2016. *City of Redwood City 2015 Urban Water Management Plan.* Available online at https://www.redwoodcity.org/home/showdocument?id=8091. Accessed March 8, 2019.
[5] City of Redwood City. 2016. *City of Redwood City 2015 Urban Water Management Plan.* Available online at https://www.redwoodcity.org/home/showdocument?id=8091. Accessed March 8, 2019.

Water Supply

Redwood City currently receives all of its potable water supply from the Hetch Hetchy regional water system operated by the SFPUC as part of a Master Contract with the SFPUC's suburban wholesale customers. Approximately 85 percent of the Hetch Hetchy supply is from Sierra Nevada snowmelt and is delivered through aqueducts from the Hetch Hetchy reservoir to the San Francisco Bay Area. The remaining 15 percent of the water supply originates locally in the Alameda and Peninsula watersheds and is stored in reservoirs in Alameda and San Mateo counties. Redwood City has an individual supply guarantee of 10.93 million gallons per day (MGD) or approximately 12,243 AFY.[6] The SFPUC can meet the water demands of its retail and wholesale customers in wet and average years. Redwood City can meet maximum day water demands as long as the SFPUC pipelines are in service.[7] Hetch Hetchy Bay Division pipelines No. 3 and 4 pass through George L. Garrett Jr. Memorial Park, approximately 150 feet east of the project at its closest point. The Master Contract allows the SFPUC to reduce water deliveries during droughts, emergencies, and for scheduled maintenance activities. Redwood City consumed approximately 9,335 AFY of water in 2017, which is approximately 2,908 AFY under the supply assurance amount. The City is also exploring the potential for transfers of water entitlements from other Bay Area Water Supply and Conservation Agency[8] agencies during drought periods when mandatory rationing is in effect. Some Bay Area Water Supply and Conservation Agency agencies have the capacity to rely on groundwater or other sources during dry years and thus may be willing to transfer a portion of their wholesale water entitlement to other Bay Area Water Supply and Conservation Agency agencies.[9]

The City also supplies recycled water to its customers. To date, Phase II of the Recycled Water Project is underway and will serve downtown Redwood City.[10] Redwood City has a Recycled Water Project that uses recycled water for landscape irrigation. The program's goal is to augment the City's water supply by 227 AFY of drinking water. Phase I of the City's recycled water project constructed 2 tertiary treatment facilities, 2.2 million gallons of storage facilities, and distribution facilities to supply recycled water to 450 customers east of Highway 101. Phase II will extend the distribution system into central Redwood City.[11]

Wastewater

The project area is in the jurisdiction of the Emerald Lake Heights Sewer Maintenance District, operated by the County's Public Works Department. Sewers from this district drain into the Redwood City Sewer District. Wastewater from the Redwood City Sewer District flows to the Redwood City Pump Station, operated by Silicon Valley Clean Water (SVCW), that sends the wastewater through a force main to the SVCW sub-regional wastewater treatment plant (WWTP) located in Redwood Shores. The WWTP

[6] City of Redwood City. 2016. *City of Redwood City 2015 Urban Water Management Plan.* Available online at https://www.redwoodcity.org/home/showdocument?id=8091. Accessed March 8, 2019. page 47.

[7] City of Redwood City. 2016. *City of Redwood City 2015 Urban Water Management Plan.* Available online at https://www.redwoodcity.org/home/showdocument?id=8091. Accessed March 8, 2019. page 47.

[8] The Bay Area Water Supply and Conservation Agency includes Redwood City and 25 other water districts, cities and utilities (wholesale customers of the SFPUC) and represents the wholesale customers in negotiations and other coordination efforts with the SFPUC.

[9] City of Redwood City. 2016. *City of Redwood City 2015 Urban Water Management Plan.* Available online at https://www.redwoodcity.org/home/showdocument?id=8091. Accessed March 8, 2019. *pg. 76*

[10] City of Redwood City 2019. *Public Works Recycled Water Webpage.* Available online at https://www.redwoodcity.org/departments/public-works/water/recycled-water. Accessed March 9, 2019.

[11] U.S. Department of the Interior, Bureau of Reclamation, Mid-Pacific region. 2017. *Redwood City Recycled Water Project Phase II, California. Environmental Assessment.* 17-04-MP. Available online at 5-https://www.usbr.gov/mp/nepa/includes/documentShow.php?Doc_ID=31207. Accessed March 11, 2019. pages 5-6.

collects wastewater from the cities of Belmont, San Carlos, Redwood City, and the West Bay Sanitary District (the West Bay Sanitation District includes the cities of Menlo Park, Atherton, Portola Valley and portions of East Palo Alto, Woodside and unincorporated San Mateo and Santa Clara counties) for eventual treatment and discharge to San Francisco Bay.

There is an existing sewer main from the intersection of Vista Drive and Lake Boulevard that runs east under the existing unpaved Canyon Lane and empties into the sewer main at Glenwood Avenue.[12] This sewer main was installed in the late 1970s to early 1980 by the County. The City of Redwood City has completed the process of replacing 11,601 linear feet of sewer line under its 2017-2018 Sanitary Sewer Replacement Project. This sewer replacement project included the sewer main in Glenwood Avenue. The City systematically replaces sections of aging sanitary sewer infrastructure to ensure continued reliability of the system. The sanitary sewer replacement project was completed in 2019 and improved the condition and reliability of the sewer collection system by minimizing infiltration and inflow into the system.[13]

Wastewater from the City of Redwood City distribution system flows to the Redwood City Pump Station (located east of Maple Street and north of Highway 101, adjacent to the Redwood City Police Station) from which it is conveyed through an approximately 2.5-mile-long, 48-inch-diameter force main to the Silicon Valley Clean Water (SVCW) sub-regional wastewater treatment plant (WWTP). Existing flows from the Redwood City Pump Station range from 1.36 MGD at a minimum to 60 MGD peak wet weather flow. The current average daily flow is 7.7 MGD. SVCW is currently proposing a number of improvements to its conveyance systems and the WWTP. As part of these improvements, the Redwood City Pump Station would be replaced. A new Redwood City Pump Station would be built adjacent to the existing Redwood City Pump Station within the current pump station site boundaries; and the existing pump station building would be repurposed to house auxiliary equipment that supports the new Redwood City Pump Station. During peak rain events, this new pump station would pump both West Bay Sanitary District flows from the Menlo Park Pump Station and Redwood City's wastewater north to the WWTP. [14]

As part of the SVCW Conveyance System Master Plan, a 1.7-mile-long portion of the Redwood City force main was replaced in 2015. The remaining 0.8 mile of force main is the original pipeline. The SVCW is proposing to replace the force main with an 11-foot-diameter gravity pipeline on inner Bair Island to the WWTP and abandon both the new 48-inch force main and the remaining original force main.[15]

Wastewater treatment is provided by Silicon Valley Clean Water, which is run by a Joint Powers Authority between the cities of Belmont, San Carlos, and Redwood City and the West Bay Sanitary District (which serves the cities of Menlo Park, Atherton, and Portola Valley, and areas of East Palo Alto, Woodside and unincorporated San Mateo and Santa Clara counties[16]). The WWTP, located at 1400

[12] City of Redwood City. 2019. *Redwood City Community GIS Website.* Available online at http://webgis.redwoodcity.org/community/. Accessed February 12. 2019.

[13] City of Redwood City. 2019. *Infrastructure Projects Webpage*. Available online at https://www.redwoodcity.org/city-hall/current-projects/infrastructure-projects?id=90. Accessed March 9, 2019.

[14] Silicon Valley Clean Water. 2017. *Silicon Valley Clean Water Wastewater Conveyance System and Treatment Plant reliability Improvement Project. Final Integrated Environmental Impact report.* CIP No. 6006. SCH No. 2016022055. Available online at http://www.svcw.org/projects/SiteAssets/SitePages/CEQA%20Activities/Final%20Integrated%20Enviromental%20Impact%20Report.pdf. Accessed March 11, 2019. pages 46-48.

[15] Silicon Valley Clean Water. 2017. *Silicon Valley Clean Water Wastewater Conveyance System and Treatment Plant reliability Improvement Project. Final Integrated Environmental Impact report.* CIP No. 6006. SCH No. 2016022055. Available online at http://www.svcw.org/projects/SiteAssets/SitePages/CEQA%20Activities/Final%20Integrated%20Enviromental%20Impact%20Report.pdf. Accessed March 11, 2019. pages 4-7, 12.

[16] West Bay Sanitary District. 2019. *West Ba y Sanitary District webpage.* Available online at https://westbaysanitary.org/. Accessed March 11, 2019.

Radio Road at the northwest end of Redwood Shores, provides advanced two-stage biological treatment before discharge to San Francisco Bay under NPDES Permit No. CA0038369.[17] During the dry season, SVCW further treats some of its plant flow with coagulation and high disinfection for use as landscape irrigation water.[18] Under the National Pollutant Discharge Elimination System (NPDES) permit issued by the San Francisco Bay Regional Water Quality Control Board, discharge from the WWTP may not exceed 29 MGD average dry weather flow.[19] The WWTP currently has a peak wet weather flow capacity of 71 MGD. Under the proposed Wastewater Conveyance System and Treatment Plant Reliability Improvement Project, the peak wet weather flow capacity would be increased to 80 MGD.[20] Treated wastewater is conveyed through a 66-inch-diameter pipeline to a deep water discharge in San Francisco Bay approximately one mile offshore.[21]

Stormwater

Stormwater from the project area currently flows through the Emerald Branch of Redwood Creek, an intermittent drainage flowing west to east on the north side of the existing unpaved Canyon Lane. At Glenwood Avenue it is joined by an ephemeral storm drainage channel flowing north on the west side of Glenwood Avenue. The combined flows enter a culvert under Bain Place and flow through engineered channels the rest of the way to its confluence with Arroyo Ojo de Agua Creek in Redwood City. Arroyo Ojo de Agua Creek joins Redwood Creek in the vicinity of Jefferson Avenue and Middlefield Road in Redwood City. The combined flows enter San Francisco Bay via Redwood Slough.[22]

Several downstream concrete sections of Redwood Creek require improvements including lined channels and box culverts. Some of these concrete structures are showing signs of fatigue with increasing loads or debris from nearby trees, vegetation, and structures. Under the 2017-2018 Redwood Creek Improvement Project (Jefferson Branch), Redwood City is in the process of repairing and rehabilitating some concrete creek walls and channels along Redwood Creek. Repairing and rehabilitating these concrete creek walls and channels will help storm runoff to continue flowing unobstructed.[23]

Solid Waste

Solid waste pick-up is provided to the project area and surrounding Emerald Lake Hills unincorporated areas by Recology San Mateo County. Recology San Mateo County provides weekly pickup of compost,

[17] San Francisco Bay Regional Water Quality Control Board. *National Pollutant Discharge Elimination System Permit for Silicon Valley Clean Water Wastewater Treatment Plant.* Order No. R2-2018-005. NPDES No. CA0038369. Available online at http://www.svcw.org/departments/Maintenance%20and%20Operations/SVCW_Order%20No.%20R2-2018-0005.pdf. Accessed March 12, 2019.

[18] Silicon Valley Clean Water. 2019. *Silicon Valley Clean Water website.* Available online at Accessed March 11, 2019.

[19] San Francisco Bay Regional Water Quality Control Board. 2018. *Silicon Valley Clean Water Wastewater Treatment Plant. Tentative Order. R2-2018-00XX. NPDES No. CA0038369.* Available online at: https://www.waterboards.ca.gov/sanfranciscobay/board_info/agendas/2018/February/SiliconValley/SVCW_Tentative_Order.pdf. Accessed August 20, 2019.

[20] Silicon Valley Clean Water. 2017. *Silicon Valley Clean Water Wastewater Conveyance System and Treatment Plant reliability Improvement Project. Final Integrated Environmental Impact report.* CIP No. 6006. SCH No. 2016022055. Available online at http://www.svcw.org/projects/SiteAssets/SitePages/CEQA%20Activities/Final%20Integrated%20Enviromental%20Impact%20Report.pdf. Accessed March 11, 2019. pages 22, 32.

[21] Silicon Valley Clean Water. 2019. Silicon Valley Clean Water Discharge to SF Bay webpage. Available online at http://www.svcw.org/facilities/sitePages/discharge%20to%20sf%20bay.aspx. Accessed March 11, 2019.

[22] Silicon Valley Clean Water. 2019. Silicon Valley Clean Water Discharge to SF Bay webpage. Available online at http://www.svcw.org/facilities/sitePages/discharge%20to%20sf%20bay.aspx. Accessed March 11, 2019.

[23] City of Redwood City. 2019. *2017-2018 Redwood Creek Improvement Project (Jefferson Branch) Webpage*. Available online at https://www.redwoodcity.org/city-hall/current-projects/infrastructure-projects?id=103. Accessed March 9, 2019.

recycling and garbage, as well as motor oil, batteries and cell phones. They also have drop off locations for hazardous materials including medications and paint.[24]

Residential and commercial solid waste and recyclable materials are taken to Shoreway Environmental Center at 333 Shoreway Road, San Carlos, for processing and shipment. The facility is operated by South Bay Recycling under a 10-year contract with RethinkWaste as of January 1, 2011. Shoreway serves as a regional solid waste and recycling facility for the receipt, handling and transfer of refuse, recyclables, and organic materials collected from southern and central San Mateo County. It accepts household and business solid waste, clean green waste and wood, appliances, auto and truck tires, concrete and asphalt and like materials, clean fill dirt, mixed demolition debris, and other non-hazardous materials and items. From there, materials are consolidated and loaded into large transfer trailers for shipment offsite to the Ox Mountain Landfill and to recycling facilities for construction and demolition waste, and organics materials.[25]

The Corinda Los Trancos Ox Mountain Sanitary Landfill, located at 12310 San Mateo Road, is operated by Browning Ferris Industries of California, Inc. It accepts most kinds of waste with the exception of hazardous wastes and is permitted to receive 3,598 tons of waste per day. The most recent data on waste receives indicates the landfill received approximately 1,630 tons per day on the second quarter of 2018 which is approximately 45 percent of the permitted daily amount.[26] The anticipated closure date is 2034.[27] The Corinda Los Trancos Ox Mountain Landfill accepts loads of certain materials for reuse on site. These materials are asphalt, bricks, concrete, dirt, fines, rock, sand, soil, stone, untreated wood, and yard waste. However, a load with mixed inerts only (asphalt, brick, concrete, dirt, fines, rock, sand, soil and stone) or mixed green waste only (untreated wood and yard trimmings) will be accepted for Alternative Daily Landfill Cover.[28]

The San Mateo County Office of Sustainability requires construction projects to salvage, reuse, or recycle all inert solids and at least 65 percent of all the construction and demolition debris generated by a project.[29] A Waste Management Plan is required if the project includes "the construction of a new permitted structure as determined by the Building Official or designee."[30] Section One of the required Waste Management Plan is to be prepared before the start of construction and must include best estimates of the debris that will be generated and how it will be reused, recycled or disposed of in compliance with the County's Building Regulations. Section Two of the Waste Management Plan, detailing how debris was actually handled, must be submitted at the completion of a project and must be approved by the Office of Sustainability before final project approval. Projects whose Waste Management Plans are found not in compliance with the County's Building Regulations may be subject to a fine.[31]

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[24] Recology San Mateo County. 2019. *Recology San Mate County Website.* Available online at https://www.recology.com/recology-san-mateo-county/your-three-carts/. Accessed March 11, 2019.

[25] RethinkWaste. 2019. RethinkWaste Shoreway Facility website. Available online at https://www.rethinkwaste.org/shoreway-facility/about-shoreway. Accessed March 11, 2019.

[26] CalRecycle. 2018. *2018 Landfill Summary Tonnage Report.* Available online at https://www2.calrecycle.ca.gov/SWFacilities/Directory/41-AA-0002/Detail. Accessed August 20, 2019.

[27] CalRecycle. 2017. *SWIS Facility Detail. Corinda Los Trancos (Ox Mtn) (41-AA-0002).* Available online at https://www2.calrecycle.ca.gov/SWFacilities/Directory/41-AA-0002/Detail. Accessed March 11, 2019.

[28] San Mateo County. Office of Sustainability. 2017. *Construction, Deconstruction and Demolition Information. A Guide for Contractors and Home Owners.* Available online at: https://www.smcsustainability.org/download/waste-reduction/CD_2017-Web.pdf. Accessed March 12, 2019.

[29] San Mateo County Office of Sustainability. 2019. Construction and Demolition Webpage. Available online at https://www.smcsustainability.org/waste-reduction/construction-demolition/. Accessed March 11, 2019.

[30] San Mateo County office of Sustainability. 2019. Construction & Demolition Webpage. Available online at https://www.smcsustainability.org/waste-reduction/construction-demolition/. Accessed March 11, 2019.

[31] San Mateo County. Office of Sustainability. 2019. *Waste Reduction – Construction and Demolition webpage.* Available online at https://www.smcsustainability.org/waste-reduction/construction-demolition/. Accessed March 12, 2019.

Electrical and Natural Gas

San Mateo County and the City of Redwood City currently receive their electricity and natural gas from Peninsula Clean Energy (PCE) and Pacific Gas and Electric Company (PG&E). PCE is the default electric generation provider for all of the County's residents and businesses, and for any new or relocated customers. PCE provides electricity to residents and businesses in San Mateo County, while PG&E continues to maintain the electrical wires and other infrastructure, and PG&E meters customers' electricity usage and sends customers' bills. There are no existing electric or gas distribution lines in Canyon Lane. PG&E obtains electricity from different generation sources, including hydroelectric, fossil fuels, nuclear, solar, wind, and geothermal. PCE goals include obtaining 100 percent greenhouse gas-free electricity by 2021, 100 percent California Renewable Portfolio Standard-eligible renewable energy by 2025, and a minimum of 20 megawatts of new local power by 2025.

Telecommunications

Internet providers in the Emerald Lake Hills area include AT&T, Comcast Xfinity, HughesNet, ViaSat, Cyberonic, and Earthlink. Cable television providers include Comcast Xfinity and Mediacom. Satellite television providers include Dish Networks, DirecTV, and AT&T U-verse. Landline telephone service is provided by SBC.

Canyon Lane Improvements

Water Service

As depicted in Figure 2-3, Plan View Map, an eight-inch water line extending approximately 1,050 linear feet would be constructed to connect the water mains at Glenwood Avenue and Vista Drive to provide water service and fire protection to the 12 parcels. The water line extension would require authorization and discretionary approval of an Outside Service Agreement by the City of Redwood City and the San Mateo Local Agency Formation Commission (LAFCo), as water service would be supplied by the City of Redwood City Water Department. Water would be provided to the proposed single-family dwelling by installing a lateral that connects to the new water line underlying Canyon Lane. Water would be provided to the 11 future single-family dwellings by installing laterals that connect each future dwelling to the new water main underlying Canyon Lane. These laterals would be installed for each individual unit upon future individual approval.

Wastewater Service

Sewer services would be provided to the single-family dwelling by installing a lateral that connects the property to the existing sewer main underlying Canyon Lane. Sewer services would be provided to the 11 future single-family dwellings by installing laterals that connect the properties to the existing sewer main underlying Canyon Lane. These laterals would be installed for each individual unit upon future individual approval.

Stormwater Drainage

Stormwater on the roadway would be conveyed through a storm drain that runs east along the south side of Canyon Lane. Four catch basins with 9-inch side openings would be installed along the storm drain that would help facilitate drainage. Stormwater would flow into an approximately 161-foot-long biotreatment swale that would be installed near the base of Canyon Lane. The biotreatment swale would include an 18-inch layer of bioretention soil designed to treat runoff before infiltrating into groundwater. Stormwater from each residential parcel would be captured in individual drains and bioretention systems,

constructed at the time each parcel is developed, before being released to the Canyon Lane drainage system.

Electricity, Internet, Cable and Telephone

A joint trench would be installed under Canyon Lane that will house an underground 12 kilovolt (kV) electrical distribution line and a natural gas pipeline, along with fiberoptic lines for internet, cable, and telephone. Electricity, internet, cable, and telephone land lines would be provided to the proposed single-family dwelling by installing lateral connections to the lines that would underlie Canyon Lane. These lines would be provided to the 11 potential future single-family dwellings by installing lateral connections to the lines that would underlie Canyon Lane.

3.18.2 Regulatory Setting

Federal

There are no Federal regulations that pertain to this project.

State

National Pollutant Discharge Elimination System (NPDES)

The objective of the National Pollutant Discharge Elimination System (NPDES) program is to control and reduce discharges of pollutants to water bodies in surface water discharges. Under Section 402 of the Clean Water Act, the Regional Water Quality Control Boards (RWQCBs) have been delegated authority by the U.S. Environmental Protection Agency (USEPA) to implement and enforce the NPDES program within California. The County and City are required by Federal, State, and local laws to implement programs that reduce the discharge of pollutants to local storm drain systems.

The San Francisco Bay Regional Water Quality Control Board issues NPDES permits containing Waste Discharge Requirements (WDRs) for all point source dischargers to San Francisco Bay. The Silicon Valley Clean Water WWTP operates under Tentative Order No. R2-2018-00XX, NPDES Permit No. CA0038369.[32]

The State Water Resources Control Board (SWRCB) has adopted a Statewide NPDES general permit for stormwater discharges associated with construction activities (Construction General Permit; SWRCB Order No. 99-08-DWQ). To comply with the requirements of the NPDES Construction General Permit, developers are required to submit a site-specific plan called a stormwater pollution prevention plan (SWPPP) to minimize the discharge of pollutants during construction activities that disturb one acre or more of land. Coverage in San Mateo County is achieved under the Municipal Regional Stormwater Permit (Order No. R2-2015-0049, NPDES Permit NO. CAS12008).[33] The Applicant would be required to file a Notice of Intent for coverage under the General Permit.

[32] California Regional Water Quality Control Board. San Francisco Bay Region. 2018. *Tentative Order No.* R2-2018-00XX. NPDES Permit No. CA0038369. Available online at https://www.waterboards.ca.gov/sanfranciscobay/board_info/agendas/2018/February/SiliconValley/SVCW_Tentative_Order.pdf. Accessed March 12, 2019.

[33] California Regional Water Quality Control Board. San Francisco Bay Region. 2015. *Municipal Regional Stormwater NPDES Permit.* Order No. R2-2015-0049. NPDES Permit No. CAS612008. Available online at https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/R2-2015-0049.pdf. Accessed March 12, 2019.

Porter-Cologne Water Quality Act

The State of California's Porter-Cologne Water Quality Control Act (California Water Code, Sections 13000 et seq.) establishes the basis for water quality regulation within California. The act requires that a "report of waste discharge" be compiled for any discharge of waste (liquid, solid, or otherwise) to land or surface waters that may impair a beneficial use of surface water or groundwater of the State. The San Francisco Bay RWQCB has set water quality objectives for all surface waters in the region concerning bacteria, biostimulatory substances, color, dissolved oxygen, floating material, oil and grease, pH, pesticides, salinity, sediment, settleable material, suspended material, tastes and odors, temperature, toxicity, and turbidity. Water quality objectives for groundwater include standards for bacteria, chemical constituents, radioactivity, tastes and odors, and toxicity. The SWRCB and RWQCBs have permitting and enforcement authority to prevent and control waste discharges that could affect waters of the State through the issuance of NPDES permits and WDRs.

California Integrated Waste Management Act of 1989 (AB 939)

In 1989, Assembly Bill 939 (AB 939) established the Integrated Waste Management Board and required that each county, city, or other jurisdiction responsible for managing solid waste prepare an Integrated Waste Management Plan. According to AB 939, all cities and counties in California were required to divert 25 percent of all solid waste to recycling facilities from landfill or transformation facilities by January 1, 1995, and 50 percent by January 1, 2000. The California Integrated Waste Management Board's (CIWMB) Department of Resources Recycling and Recovery (now CalRecycle) is the State department designated to oversee, manage, and track California's 92 million tons of waste generated each year. The City achieved a 77 percent diversion rate for 2008, thereby surpassing the diversion goal established in the 2002 legislation.

Solid waste plans are prepared by each jurisdiction to explain how each city's AB 939 plan is integrated with its county plan. The plans must promote, in order of priority, source reduction, recycling and composting, and finally, environmentally safe transformation and land disposal.

CalGreen (CCR Title 24 Part 11)

First adopted in 2007, CALGreen is formally known as the California Green Building Standards Code (CCR Title 24, Part 11). CALGreen provisions under the jurisdiction of the California Department of Housing and Community Development (HCD) are for newly constructed residential structures, as well as additions and alterations to existing buildings which increase the building's "conditioned area, interior volume or size." Therefore, for the purposes of HCD, CALGreen applies to residential structures including single-family and two-family dwellings. CALGreen was adopted to address the five divisions of building construction:

- Planning and design;
- Energy efficiency;
- Water efficiency and conservation;
- Material conservation and resource efficiency; and
- Environmental quality.

The CalGreen standards are periodically updated based on the development of new technology. Under CalGreen, residential projects that begin after January 1, 2017 are required to comply with the 2016 California Green Building Standards: Residential[34].

Local

San Mateo Local Agency Formation Commission

The LAFCo is a State-mandated, independent agency with countywide jurisdiction over changes in organization and boundaries of cities and special districts including annexations, detachments, incorporations, and formations. LAFCos were created by the State Legislature in 1963 in response to the rapid growth and sporadic formation of cities and special districts in California in the years following World War II. The San Mateo LAFCo is an independent commission with jurisdiction over the boundaries of cities, independent special districts and county-governed special districts in San Mateo County. LAFCos have numerous powers under the Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000, but those of primary concern are the power to act on local agency boundary changes and to adopt spheres of influence for local agencies. Among the purposes of LAFCos are to discourage urban sprawl and to encourage the orderly formation and development of local agencies.

San Mateo Countywide Stormwater Pollution Prevention Program

The San Mateo Countywide Stormwater Pollution Prevention Program (SMCWPPP) is a partnership of the City/County Association of Governments (C/CAG), each incorporated city and town in the county, and the County of San Mateo, which share a common NPDES permit. The Municipal Regional Stormwater NPDES Permit was issued by the San Francisco Bay RWQCB[35] in compliance with the Basin Plan and the NPDES permitting system. Participating agencies (including San Mateo County and the City of Redwood City) must comply with the provisions of the Countywide permit by ensuring that new development and redevelopment mitigate, to the maximum extent practicable, water quality impacts to storm water runoff both during construction and operation periods of projects. Required permit provisions are detailed in RWQCB Order R2-2015-0049 (NPDES Permit No. CAS612008). Requirements are further described in several bulletins from the SMCWPPP including:

- Current Stormwater Quality Control Requirements (July 2016);[36]
- Hydromodification Management Requirements (July 2016);[37]

[34] California Department of Housing and Community Development. 2016. *Guide to the 2016 California Green Building Standards Code (Residential)*. ISBN 978-1-60983-663-4. Available online at https://codes.iccsafe.org/content/chapter/2504/?site_type=public. Accessed on August 30, 2019.

[35] California Regional Water Quality Control Board. San Francisco Bay Region. 2015. *Municipal Regional Stormwater NPDES Permit.* Order No. R2-2015-0049. NPDES Permit No. CAS612008. November 19, 2015. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/documents/files/R2-2015-0049_Adopted_0.pdf. Accessed February 12, 2019.

[36] San Mateo Countywide Stormwater Pollution Prevention Program. 2016. *Current Stormwater Quality Control Requirements.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/C3%20Flyer%20July%202016%20final.pdf. Accessed February 12, 2019.

[37] San Mateo Countywide Stormwater Pollution Prevention Program. 2016. *Hydromodification Management Requirements.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/HM%20Flyer%20July%202016%20final.pdf. Accessed February 12, 2019.

- Update on Stormwater Treatment requirements for New Development and Redevelopment Projects (July 2016);[38]
- Requirements for Road Projects in the Municipal Regional Stormwater Permit (July 2016);[39] and
- Requirements for Architectural Copper (February 2012).[40]

Provision C.3.c establishes thresholds at which new development and redevelopment projects must comply with Provision C.3. Private or public projects that create and/or replace 10,000 or more square feet of impervious surface are C.3 Regulated Projects. C.3 Regulated Projects must implement post-construction stormwater controls through Low Impact Development (LID) measures to control stormwater. LID measures consist of evapotranspiration, infiltration, rainwater harvesting and use, and/or biotreatment of the amount of stormwater runoff specified in Municipal Regional Stormwater Permit (MRP) Provision C.3.d. Under C.3.d, treatment systems that use a combination of flow and volume capacity shall be sized to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data.[41]

San Mateo County Ordinance 04099, Recycling and Diversion of Construction and Demolition Debris

Under the California Waste Management Act (California Public Resources Code Sections 40000 et seq.), each county is required to prepare, adopt, and implement a source reduction and recycling element to reach reduction goals, and is required to make substantial reductions in the volume of waste materials going to landfill. Debris from construction and demolition of buildings represents a significant portion of the volume of solid waste currently coming from the unincorporated area of the County, and much of this debris is particularly suitable for recycling. Under Ordinance 04099, construction projects in unincorporated San Mateo County must divert 100 percent of inert construction and demolition materials and at least 50 percent of remaining construction and demolition debris tonnage from landfill for recycling or reuse.

San Mateo County General Plan

San Mateo County General Plan Policies include policies related to utilities for Water Supply, Wastewater and Solid Waste.[42] General Plan policies include the following:

- **Policy 10.3 Water Conservation:** Promote the conservation and efficient use of water supplies.

[38] San Mateo Countywide Stormwater Pollution Prevention Program. 2016. *Update on Stormwater Treatment Requirements for New Development and Redevelopment Projects.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/Notice%20to%20Applicants%20July%202016%20final.pdf. Accessed February 12, 2019.

[39] San Mateo Countywide Stormwater Pollution Prevention Program. 2016. *Requirements for Road Projects in the Municipal Regional Stormwater Permit (MRP).* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/Road%20Projects%20fact%20sheet%20July%202016%20final.pdf. Accessed February 12, 2019.

[40] San Mateo Countywide Stormwater Pollution Prevention Program. 2016. *Requirements for Architectural Copper.* Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/Architectural_copper_BMPs_FINAL.pdf. Accessed February 12, 2019.

[41] California Regional Water Quality Control Board. San Francisco Bay Region. 2015. *Municipal Regional Stormwater NPDES Permit.* Order No. R2-2015-0049. NPDES Permit No. CAS612008. pages 12-49. Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/documents/files/R2-2015-0049_Adopted_0.pdf. Accessed February 12, 2109.

[42] San Mateo County. ___ *San Mateo County General Plan Policies.* Available online at https://planning.smcgov.org/documents/general-plan-policies. Accessed March 11, 2019.

- **Policy 10.13, Water Systems in Unincorporated Areas:** Support efforts to improve water distribution and storage systems in unincorporated neighborhoods and communities.
- **Policy 10.25b, Efficient Water Use:** Require the use of water conservation devices in new structural development.
- **Policy 10.25c, Efficient Water Use:** Encourage exterior water conservation.
- **Goal 11.4, Adequate Capacity for Unincorporated Areas:** Plan for the availability of adequate sewerage collection and treatment capacity for unincorporated urban areas.
- **Policy 11.16, Sewer Facilities in Unincorporated Areas:** In unincorporated areas where the County provides sewerage collection services, support the development of adequate sewerage facilities to serve the planned development of these areas. Work with sewerage authorities and cities to reserve capacity commensurate with the level of development planned for these areas.
- **Policy 13.5, Minimize Dependence on Landfills:** Reduce to a minimum the dependence on landfills by promoting recycling, resource recovery and reduction of residential and commercial wastes.
- **Policy 13.23, Promoting Curbside Recycling:** Promote the establishment of curbside recycling programs as a means to increase recycling.

Redwood City General Plan – The Built Environment, Infrastructure Element

The Built-Environment, Infrastructure Element[43] establishes goals, policies and implementation measures related to the City of Redwood City's infrastructure.

- **Goal BE-24:** Be a regional leader with regard to sustainable development practices.
    - **Policy BE-24.5:** Support land use, mobility, and business practices that enable Redwood City residents to minimize their need to travel via automobile and or/truck to obtain and/or deliver goods.
    - **Policy BE-42.1:** Require that improvements and maintenance to electric and gas transmission and distribution systems that are made to accommodate new growth be performed in a manner that maintains safety, reliability, and environmental compatibility.
    - **Policy BE-44.2:** Continue to require placement of utilities underground with new development.
    - **Policy BE-45.2:** Encourage recycling, composting, and source reduction by residential and non-residential sources in Redwood City.
    - **Policy BE-45.3:** Promote green building practices with respect to recycling material from building demolition and using recycled building materials in new construction.
- **Program BE-128, Future Wastewater Collection Agreements:** When parties outside of the service area seek wastewater collection and conveyance agreements, analyze capacity and consider potential future impact to the City. Ensure that adequate capacity is available for future development as identified in this General Plan.

[43] City of Redwood City. 2010. Redwood City General Plan. The Built Environment, Infrastructure. Available online at https://www.redwoodcity.org/home/showdocument?id=5105. Accessed March 11, 2019. pages BE-236-238.

3.18.3 Thresholds of Significance

Appendix G of the CEQA Guidelines provides the following thresholds for determining impact significance with respect to utilities and service systems.

Impacts would be considered significant if the project would:

a. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects.

b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years.

c. Result in a determination by the wastewater 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.

d. Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals.

e. Result in non-compliance with Federal, State, and local management and reduction statutes and regulations.

3.18.4 Impact Assessment and Methodology

Project impacts related to utilities and service systems were evaluated against the CEQA significance criteria, as discussed below. This section evaluates potential project impacts from the Canyon Lane improvements, proposed single-family residence, and the potential future development of 11 parcels. The discussion is further broken out into the construction and post-construction phases of the project. The three phases of the project are discussed individually unless impacts are the same for all phases.

General plans, area plans, management plans, and official websites for service providers in the project area, including San Mateo County and the City of Redwood City, were reviewed for information regarding wastewater collection and treatment, water supply, stormwater drainage, solid waste disposal, electricity and natural gas, and communications facilities and service systems. Potential impacts on these service systems resulting from project-related effects and increased demand were analyzed according to the thresholds in Appendix G of the CEQA Guidelines.

3.18.5 Project-Specific Impacts and Mitigation Measures

Impact 3.18-1: Potential to require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects – Less than Significant

Canyon Lane Improvements, Proposed Single-Family Residence, and Developable Parcels

Construction

Water

Water use during construction would be minimal and short-term. The Applicant would be required to obtain water for construction activities. Water would most likely be obtained from the Redwood City Municipal Water Department and would be trucked to the project site. The construction period is expected to last for approximately 9 months. During that period a minimal amount of water would be required for dust control and cement mixing and would not represent a significant increase in the amount of water supplied by Redwood City. Project construction would result in a less-than-significant impact on water treatment and supply infrastructure.

Construction of the Canyon Lane improvements would include extension of an 8-inch water line to provide water and fire service to the project. The water line would extend from an existing water main underneath Vista Drive down a north-trending drainage swale to Canyon Lane. Geotechnical investigation of the proposed water line route revealed a shallow (approximately 8 feet deep) active landslide present below Vista Drive. Cracking in the Vista Drive pavement suggests the landslide is recently active, has impacted the roadway and may have impacted the existing water main. The hillside portion of the new water line would require a trench approximately 2 feet wide by 4 feet deep by 1,500 feet long. The trench would be installed in a 15-foot-wide easement.. Hillside excavation for the water line would include ground disturbance and exposure of surfaces, increasing the potential for erosion and downstream sedimentation. Vegetation would need to be cleared or mowed to provide access for construction vehicles, increasing the potential for erosion. Eroded materials transported in stormwater have the potential to affect receiving surface waters through impairment of beneficial uses and exceedance of water quality objectives. As discussed in Section 3.10, Hydrology and Water Quality, implementation of the Erosion and Sediment Control Plan (ESCP), and the SWPPP (if applicable) would manage stormwater and reduce erosion and runoff from the project area. As a result, impacts from water line construction would be less than significant. Other construction-related impacts of installation of water conveyance facilities are addressed as part of the construction impacts discussions in the Air Quality, Noise, and Biological Resources sections in this chapter. Removal and replacement of unstable soils may have the beneficial effect of stabilizing part of Vista Drive.

At Canyon Lane, an approximately 2-foot-wide by 4-foot-deep trench would be excavated under the roadway to contain the water line. Laterals would be installed to serve proposed and future residences on Canyon Lane. At its downstream end, the water line would join the existing water main at Glenwood Avenue. Installation of the water line would be subject to the required ESCP and SWPPP which would direct stormwater from construction areas to designated temporary filtration/detention areas.

Implementation of these required plans would reduce construction impacts from the new water line to a less-than-significant level.

Wastewater

Wastewater generated during the construction phase would be minimal and temporary. Temporary restroom facilities, such as port-o-lets, would be used during the construction phase, and their use would not represent a significant increase in the amount of wastewater that would be treated by local facilities. Project construction would result in a less-than-significant impact on wastewater treatment facilities.

Storm Drainage

Stormwater on the project area is currently conveyed through the Emerald Branch to Redwood Creek. Stormwater runoff would likely increase during construction activities as ground cover is removed, which could cause a significant increase in peak discharge at downstream drainage facilities. Under the required ESCP and SWPPP, described in Section 3.10, Hydrology and Water Quality, stormwater would be directed from construction areas to designated temporary filtration/detention areas. Implementation of these required stormwater management plans would reduce construction impacts on storm drainage infrastructure to a less-than-significant level.

Electricity and Natural Gas

Project construction would require a minimal use of electricity to run power tools. It would not require use of natural gas. Project construction is expected to last for approximately 9 months and the electricity used would not represent a significant increase in the amount of power supplied to the area by PCE or PG&E. Project construction would result in a less-than-significant impact on electrical supply. Project construction would have no impact on natural gas.

The project would extend gas and electrical lines under Canyon Lane to serve proposed and future residences. The gas and electrical lines would be installed in a joint trench with fiberoptic cable under the roadway. Impacts of trench construction are included in the discussions of various impacts of construction of the roadway such as noise, air quality, hydrology and water quality, and biological resources. Where mitigation measures are identified for construction impacts, they would apply to construction of the joint trench. Extension of gas and electric services to up to 12 residences would not require development of new generation or transmission facilities. This impact would be less than significant.

Telecommunications

Project construction would not require the installation of telecommunications facilities. No impact would occur.

Operation

Canyon Lane Improvements

The Canyon Lane improvements would widen and pave an existing unpaved roadway. The roadway would not directly use water, energy or telecommunications facilities, or generate solid waste or wastewater. Canyon Lane has an existing 6-inch sewer line considered adequate beneath the existing

roadway to serve development of Canyon Lane[44]. No impact related to water, telecommunications, solid waste generation, or wastewater generation or disposal would occur.

Stormwater

The Canyon Lane improvements would create approximately 22,000 square feet of impervious roadway surface. New storm drainage facilities adjacent to the roadway would connect to City of Redwood City storm drains at Glenwood Avenue after passing through a bioretention swale designed to retain 80 percent of annual stormwater. As discussed in Section 3.10, Hydrology and Water Quality, the project is a C.3 project under the Municipal Regional Stormwater Permit and would be required to implement post-construction stormwater controls. As also discussed in that section, the Applicant would be required to comply with the Municipal Regional Stormwater Permit and submit long-term Best Management Practices as part of a SWPPP, as well as submit a maintenance plan for stormwater facilities to the County of San Mateo Planning and Building Department, and/or other designee. With proper maintenance of required stormwater control facilities, the addition of storm water from the Canyon Lane storm drain would not represent a significant increase in the amount of stormwater that would be conveyed by local facilities. Project operation would result in a less-than-significant impact on storm drainage facilities.

Proposed Single-Family Residence and Developable Parcels

Water

Extension of a water line to the proposed project would require discretionary approval of an Outside Service Agreement from San Mateo LAFCo, as it is outside of the Redwood City Water Department's service area. It is the intent of the Commission that properties that are contiguous to the city or district boundaries be annexed to the city or district in order to receive service.

Single-family dwellings in the project area have an estimated average water use of 264 gallons per day (GPD), but revealed an actual average water use of 221 GPD (or 0.248 acre-feet per year [AFY]) in 2015.[45] The proposed single-family residences would receive water from the Redwood City Municipal Water Department, which has an individual supply guarantee of 10.93 MGD (12,243 AFY) from the San Francisco Public Utilities Commission's Hetch Hetchy system.[46] In 2017, the City of Redwood City consumed approximately 9,335 AFY of water, which is approximately 2,908 AFY under the supply assurance amount.

Water-saving measures would be incorporated into the project. The project would be subject to the State CalGreen requirements, which include, but are not limited to, the following measures related to water conservation techniques:

- Outdoor irrigation systems must comply with the current California Department of Water Resources' Model Water Efficient Landscape Ordinance;
- High-efficiency toilets will not to exceed 1.28 gallons per flush;
- Lavatory faucets will not exceed 1.2 gallons per minute at 60 pounds per square inch (psi)

[44] County of San Mateo. Department of Public Works, Utilities-Flood Control-Watershed Protection. April 18, 2017. *Plan Review, Canyon Lane, Redwood City.*
[45] City of Redwood City. 2019. *City of Redwood City Water Webpage.* Available online at https://www.redwoodcity.org/residents/water. Accessed March 8, 2019.
[46] City of Redwood City. 2016. *City of Redwood City 2015 Urban Water Management Plan.* Available online at https://www.redwoodcity.org/home/showdocument?id=8091. Accessed March 8, 2019. page 47

- Kitchen faucets will not exceed 1.8 gallons per minute at 60 psi; and
- Shower heads will not exceed a maximum flow rate of 2.0 gallons per minute at 80 psi.

Redwood City supplied roughly 9,335 AFY of potable water to users in 2017 which is 2,908 AFY less than their guaranteed supply. Water use from the proposed single-family dwelling would represent 0.002 percent of the Redwood City Water District's guaranteed supply. Water use from the potential future development of 11 parcels would represent 0.20 percent of the guaranteed supply. Therefore, the Redwood City Water Department has adequate capacity to supply the project and no new facilities would be needed. This impact would be less than significant. Compliance with the State CalGreen requirements, particularly through the use of water-efficient fixtures and landscaping, would further reduce this less-than-significant impact.

Wastewater

Wastewater generated by single-family residences in the project area is assumed to be 95 percent of water used. Therefore, the proposed single-family residence would generate approximately 210 GPD (221 GPD * 0.95), and potential future development could generate up to 2,310 GPD. All parcels are located in the Emerald Lakes Hills Sewer Maintenance District, and wastewater would flow into the Redwood City Public Works sewer lines at Glenwood Avenue. Redwood City Public Works has allocated 0.5 MGD of capacity to flows from the Emerald Lake Hills Sewer Maintenance District. This capacity allocation accounts for the future wastewater flows generated by the single-family residence and all future developable parcels along Canyon Lane.

Wastewater from the City of Redwood City distribution system flows to the Redwood City Pump Station where it is conveyed to the Silicon Valley Clean Water (SVCW) sub-regional WWTP. The current average daily flow at the Redwood City Pump Station is 7.7 MGD and its current peak wet weather flow is at the pump station capacity of 60 MGD. SVCW is currently proposing a number of improvements to its conveyance systems and WWTP that would result in an increase in peak wet weather flow capacity from 60 to 80 MGD.[47] There is sufficient capacity at the existing collection system and Silicon Valley Clean Water WWTP to treat the wastewater that would be generated in the post-construction phase of the proposed project. No new facilities would be required, and impacts would be less than significant.

Storm Drainage

Stormwater on the project area is currently conveyed through the Emerald Branch to Redwood Creek. Stormwater from the proposed project would be retained in individual storm drains and bioretention facilities for each parcel before being released to the storm drain system in Canyon Lane. Those storm drains would, in turn, flow into an approximately 161-foot-long biotreatment swale that would be installed near the base of Canyon Lane. Both storm drain systems would be designed to retain and treat 80 percent of stormwater so that flows offsite would not be increased relative to existing conditions. Stormwater flows are conveyed to the Redwood Creek system, and eventually to San Francisco Bay. Under the 2017-2018 Redwood Creek Improvement Project (Jefferson Branch), some of the lined channels and box culverts downstream were repaired in 2018 to help stormwater continue to flow unobstructed. There are no downstream issues with stormwater in the Redwood Creek system. Therefore, stormwater drainage would not result in the need for expanded stormwater facilities. This impact would be less than significant. Under the Municipal Regional Stormwater Permit, the proposed storm water

[47] Silicon Valley Clean Water. 2017. *Silicon Valley Clean Water Wastewater Conveyance System and Treatment Plant reliability Improvement Project. Final Integrated Environmental Impact report.* CIP No. 6006. SCH No. 2016022055. Available online at http://www.svcw.org/projects/SiteAssets/SitePages/CEQA%20Activities/Final%20Integrated%20Enviromental%20Impact%20Report.pdf. Accessed March 11, 2019. pages 22, 32.

retention systems must be sized to retain 80 percent of wet weather flows. Homeowners would be required to inspect and maintain their stormwater systems and submit annual reports to either San Mateo County or the City of Redwood City. Implementation of required stormwater system maintenance plans would reduce operational impacts on storm drainage infrastructure to a less-than-significant level. The project would not result in an increase in peak wet weather runoff or create the need for new or expanded storm drainage infrastructure.

Electricity and Natural Gas

The proposed single-family residence and potential future residential development would receive gas and electric service from PCE and PG&E. The project would include construction of lateral connections to the new gas main and 12 kV electrical line under Canyon Lane. One PCE residential customer uses approximately 3,105 kWh of electricity in a year, which is 0.001 percent of average retail sales. [48] PG&E has over 260,000 natural gas customers in San Mateo County. The addition of 11 households, or 0.003 percent, to PG&E's customer base would have a vanishingly small effect on natural gas services. As discussed in Section 3.14, Population and Housing, the Canyon Lane project is accounted for in growth projections for San Mateo County. The addition of up to 11 homes would not result in a need for expanded electricity or gas infrastructure. This impact would be less than significant.

Telecommunications

Telecommunications would be provided through lateral connections to the fiberoptic cable installed as part of the Canyon Lane improvements. No impact would occur.

Impact 3.18-2: Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years – No Impact

Canyon Lane Improvements, Proposed Single-Family Residence, and Developable Parcels

Construction

Water use during construction would be minimal and temporary. Water would likely be obtained by the Applicant from the Redwood City Water Department. The construction period is expected to last for approximately 9 months. During that period a minimal amount of water would be required for dust control and cement mixing and would not represent a significant increase in the amount of water supplied by Redwood City. The City of Redwood City Water Department supplied roughly 8,876 AFY of potable water in 2015 and has an individual supply guarantee of 12,243 AFY from the San Francisco Public Utilities Commission. Water use during construction would not represent a significant increase in potable water demand and the City of Redwood City has sufficient water supplies available. No impact would occur.

[48] Peninsula Clean Energy. 2017. *PCE Integrated Resource Plan.* Available online at: https://www.peninsulacleanenergy.com/wp-content/uploads/2018/01/PCE-FINAL-2017-IRP-Updated.pdf. Accessed August 20, 2019.

Operation

The completed Canyon Lane roadway would not require the use of potable water supplies. No impact would occur.

Single-family dwellings in the project area have a projected average water use of 264 GPD, but data from 2015 indicated an actual average water use of 221 GPD (or 0.248 AFY).[49] The proposed single-family residence and potential future residential development would receive water from the Redwood City Water Department which has an individual supply guarantee of 10.93 MGD (12,243 AFY) from the San Francisco Public Utilities Commission's Hetch Hetchy system in normal years.[50] In single dry years the annual potable water supply available to the City is estimated at 11,418 AFY. In multiple dry years between 2020 and 2040, the supply is estimated at 9,467 AFY after the first year.[51] Beginning in 2020, it is projected that in single dry years potable water supplies will be insufficient to meet projected water demands. As shown in Table 3.18-1, Projected Water Supply and Demand in Multiple Dry Years Scenario, during single dry years in 2020, Redwood City's annual potable water demand is estimated to exceed the supply by 1 percent. In 2040, annual demand will exceed supply by 6 percent. During multiple dry years the demand would exceed supply by 15 percent in years two and three in 2020, and by 22 percent in years two and three by 2040.

During dry years, the City expects to meet these shortfalls using its Water Shortage Contingency Plan. This plan includes water cutbacks based on water needs rather than historical water use and focused on outdoor water use. The City has developed a five-stage response plan of restrictions and prohibitions which range from a 10 to 50 percent reduction in allowable water use in response to supply reductions from multiple drought years.[52]

Based on Table 3.18-1, assuming the water supply remains the same, the Redwood City Water Department would have an adequate potable water supply through 2040 in a normal year. In a drought scenario in 2040, the water district would experience a 6 percent shortfall in the first dry year, and 22 percent shortfalls in a second and third dry year. If another source of supply is not available, the City of Redwood City would be required to implement water restrictions to make up the deficit. Since the addition of approximately 0.248 AFY of water to the water demand is a small percentage of total 2040 demand (0.002 percent), this impact of 12 new residences would be less than significant.

[49] City of Redwood City. 2019. *City of Redwood City Water Webpage.* Available online athttps://www.redwoodcity.org/residents/water . Accessed March 8, 2019.
[50] City of Redwood City. 2016. *City of Redwood City 2015 Urban Water Management Plan.* Available online at https://www.redwoodcity.org/home/showdocument?id=8091. page 47.
[51] City of Redwood City. 2016. *City of Redwood City 2015 Urban Water Management Plan.* Available online at https://www.redwoodcity.org/home/showdocument?id=8091. page 47.
[52] City of Redwood City. 2016. *City of Redwood City 2015 Urban Water Management Plan.* Available online at https://www.redwoodcity.org/home/showdocument?id=8091. page 47.

Table 3.18-1. Projected Water Supply and Demand in Multiple Dry Years Scenario

	Estimated Supply and Demand (AFY)				
	2020	**2025**	**2030**	**2035**	**2040**
Normal Year					
Potable Water Supply	12,243	12,243	12,243	12,243	12,243
Potable Water Demand	11,167	11,478	11,605	11,801	12,086
Surplus or Deficit	1,076	765	638	442	157
Percent Shortfall	--	--	--	--	--
First Dry Year					
Potable Water Supply	11,418	11,418	11,418	11,418	11,418
Potable Water Demand	11,167	11,478	11,605	11,801	12,086
Surplus or Deficit	251	-60	-187	-383	-668
Percent Shortfall	--	1%	2%	3%	6%
Second Dry Year					
Potable Water Supply	9,467	9,467	9,467	9,467	9,467
Potable Water Demand	11,167	11,478	11,605	11,801	12,086
Surplus or Deficit	-1,700	-2,011	-2,138	-2,334	-2,619
Percent Shortfall	15%	18%	18%	20%	22%
Third Dry Year					
Potable Water Supply	9,467	9,467	9,467	9,467	9,467
Potable Water Demand	11,167	11,478	11,605	11,801	12,086
Surplus or Deficit	-1,700	-2,011	-2,138	-2,334	-2,619
Percent Shortfall	15%	18%	18%	20%	22%

SOURCE: City of Redwood City. 2016. *City of Redwood City 2015 Urban Water Management Plan.* Available online at https://www.redwoodcity.org/home/showdocument?id=8091. Accessed March 8, 2019. Table 6-2, p. 89 & Table 6-4. p. 91.

Impact 3.18-3: Result in a determination by the wastewater 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 – Less than Significant

Canyon Lane Improvements, Proposed Single-Family Residence, and Developable Parcels

Construction

Wastewater generated during the construction phase would be minimal and temporary. Temporary restroom facilities, such as port-o-lets, would be used during the construction phase, and their use would not represent a significant increase in the amount of wastewater that would be treated by local facilities. Silicon Valley Clean Water has adequate treatment capacity to serve the project's construction needs. No impact would occur.

Operation

The completed Canyon Lane roadway would not generate wastewater. No impact would occur.

A single-family residence in the project area generates approximately 210 GPD of wastewater. Potential future development of 11 parcels could generate up to 2,310 GPD. Wastewater from the City of Redwood City distribution system flows to the Redwood City Pump Station where it is conveyed to the SVCW sub-regional WWTP. The current average daily flow at the Redwood City Pump Station is 7.7 MGD and its current peak wet weather flow is at the pump station capacity of 60 MGD. Improvements underway at the Redwood City Pump Station and force main to the WWTP will increase capacity from a current peak wet weather flow of 60 MGD to a new peak wet weather flow capacity of 80 MGD. The addition of 210 GPD (0.0027 percent of 7.7 MGD) or 2,310 GPD (0.03 percent of 7.7 MGD) of wastewater flow from the proposed project would be a vanishingly small proportion of the total volume in the collection system and the total treatment capacity. This impact would be less than significant.

Impact 3.18-4: Potential to generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals – Less than Significant

Canyon Lane Improvements, Proposed Single-Family Residence, and Developable Parcels

Construction

Construction of the proposed Canyon Lane improvements would require soils excavation and grading resulting in approximately 1,205 cubic yards of excavation. Construction of the proposed single-family residence would involve approximately 2,560 cubic yards of excavation. This would result in up to 3,765 cubic yards of soil to be hauled off site for disposal. The project would be required to prepare and submit a Waste Management Plan to the San Mateo County Office of Sustainability for review and approval. Under the plan, the Applicant would be required to either reuse or divert 100 percent of clean excavated material for recycling and recovery. The Waste Management Plan must be approved by the San Mateo County Office of Sustainability prior to project construction. No later than 30 days following the completion of the construction project, and before final project approval, the contractor must submit documentation to the County that demonstrates compliance with the requirements of the plan. Therefore, impacts would be less than significant.

In addition to excavated soils, construction of the single-family residence and future potential dwellings would generate construction waste. Construction of a 2,000-square-foot residence generates approximately 50 cubic yards of waste. Estimated conservatively, construction of the 3,847-square-foot single-family residence would generate approximately 96 cubic yards of construction waste (50 CY * 1.9). Potential future construction of an additional 11 homes could be expected to generate a total of 1,238 cubic yards of waste. Under the required Waste Management Plan, each applicant would be required to either reuse or divert at least 65 percent of all construction debris generated by the construction of each residence. The Waste Management Plan must be approved by the San Mateo County Office of Sustainability prior to project construction.

The Ox Mountain Sanitary Landfill has a remaining capacity of approximately 45,000,000 cubic yards, and is expected to operate until 2034.[53] Ox Mountain will accept clean fill for daily cover. In the second quarter of 2018, the landfill received approximately 146,667 tons per day of solid waste.[54] The landfill would have adequate capacity to serve the construction phase of the project, because the construction phase of the project would be temporary and would generate a limited amount of solid waste. Development of the required Waste Management Plan would further reduce this less-than-significant impact.

Operation

The completed Canyon Lane roadway would not generate solid waste. No impact would occur.

The proposed residential development would be served by Recology San Mateo County, which provides weekly pickup of compost, recycling and garbage, as well as motor oil, batteries and cell phones.[55] Solid waste goes to the Corinda Los Trancos Ox Mountain Landfill for recycling, composting, and disposal. The Corinda Los Trancos Ox Mountain Sanitary Landfill is permitted to receive 3,598 tons of waste per day and has an anticipated closure date of 2034.[56] In the second quarter of 2018, the landfill received an average of 146,667 tons per day of solid waste. The average single-family residence generates approximately 12.23 pounds of waste per household per day, and this number includes waste for disposal, recycling, and composting.[57] Each household would generate approximately 4,465 pounds (2.23 tons) per year, or 0.008 percent of current volumes in Corinda Los Trancos Landfill.The proposed and potential future residences would not generate solid waste in excess of State and local standards or impair the attainment of solid waste reduction goals. This impact would be less than significant.

Impact 3.18-5: Potential to result in non-compliance with Federal, State, and local management and reduction statutes and regulations – No Impact

Canyon Lane Improvements, Proposed Single-Family Residence, and Developable Parcels

The Applicant would be required to comply with all State and local ordinances for water, energy and waste reduction and management, including but not limited to the State CalGreen requirements; San Mateo County Ordinance 04099, Recycling and Diversion of Construction and Demolition Debris; Waste Management Plan for construction debris; and Low Impact Development (LID) treatment measures to control stormwater. Therefore, the project would comply with all Federal, State, and local management and reduction statutes and regulations. No impact would occur.

[53] CalRecycle. 2017. *SWIS Facility Detail. Corinda Los Trancos (Ox Mtn) (41-AA-0002).* Available online at https://www2.calrecycle.ca.gov/SWFacilities/Directory/41-AA-0002/Detail. Accessed March 11, 2019.
[54] CalRcycle. 2018. *2018 Landfill Summary Tonnage Report.* Available online at: https://www2.calrecycle.ca.gov/LandfillTipFees/. Accessed August 19, 2019.
[55] Recology San Mateo County. 2019. *Recology San Mateo County Website.* Available online at https://www.recology.com/recology-san-mateo-county/your-three-carts/. Accessed March 11, 2019.
[56] CalRecycle. 2017. *SWIS Facility Detail. Corinda Los Trancos (Ox Mtn) (41-AA-0002).* Available online at https://www2.calrecycle.ca.gov/SWFacilities/Directory/41-AA-0002/Detail. Accessed March 11, 2019.
[57] City of Los Angeles. 2006. *City of Los Angeles CEQA Thresholds Guide.* Available online at http://planning.lacity.org/Documents/MajorProjects/CEQAThresholdsGuide.pdf. Accessed March 15, 2019.

3.19 WILDFIRE

This section evaluates potential impacts to wildfire hazards resulting from implementation of the project. The evaluation of wildfire impacts is based on a Wildfire Assessment prepared for the project (Appendix I).

3.19.1 Existing Conditions

Climate and Weather

The fire season for the region typically starts in June and lasts into October. Weather conditions play a critical role in determining the size and scope of fires that could occur within the region. California regularly experiences extreme fire weather, with periods of strong winds, usually accompanied by high heat and low humidity.

In general, relative humidity along the coast and within the project site is moderate to high throughout the year due to frequent ocean winds and fogs.[1] The ocean is a source of cool, humid, maritime air; relative humidity decreases at increasing distance from the ocean. Humidity decreases significantly during the passage of dry northeasterly air from the interior of the state. This decrease in humidity occurs during the fall months and results in reduced humidity.

The project site lies within the zone of the prevailing westerlies, meaning that winds blow out of the west/northwest for much of the year. However, during the fall, wind patterns shift from the prevailing west-northwest pattern in the summer to an east-northeast pattern as winds flow out of the Great Basin into the Central Valley, the Southwestern Desert Basin, and the South Coast.[2] This creates high pressure in Nevada and low pressure along the California coast, causing hot interior air to be drawn westward to the coast. These dry hot winds are known locally as the Diablo winds and are associated with strong surface speeds, with gusts often exceeding 100 miles per hour. Peak occurrence of these winds is in November, with a secondary peak in March.

Fire Hazards

The California Department of Forestry and Fire Protection (CAL FIRE) is an emergency response and resource protection department that protects California's people, property, and natural resources from wildfires.[3] CAL FIRE has a legal responsibility to provide fire protection and emergency services on all State Responsibility Area (SRA) lands. SRAs are designated based on an evaluation of an area's fuel loading, slope, critical weather, and other relevant factors. CAL FIRE identifies three types of fire threat based on degree of fire risk: Moderate, High, and Very High. CAL FIRE also maps Very High Hazard Severity Maps for Local Responsibility Areas (LRA), areas where the local government has responsibility for wildland fire protection.[4]

[1] Golden Gate Weather Services. 2002. Climate of San Francisco: Narrative Description.
[2] National Park Service, 2008. Operational Strategy for the Fire Management Plan. Golden Gate National Recreation Area. April 2008. Available at: https://www.nps.gov/goga/learn/management/upload/fire_fmp_op_strat.pdf. Accessed March 5th, 2019.
[3] CAL FIRE. 2018. What is Cal FIRE. Available online at https://calfire.ca.gov/communications/downloads/fact_sheets/WhatisCALFIRE.pdf. Accessed on March 5, 2019.
[4] Cal Fire. 2012. Wildland Hazard and Building Codes. Available online at http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_zones_maps. Accessed on March 5, 2019.

The project is predominately located within an SRA that has a Very High fire hazard severity zone (FHSZ) rating.[5] A portion of the project site (the eastern segment of Canyon Lane and parcel 057-221-060) is located within an LRA that has a Very High FHSZ rating.

Fuel Types

As described in Appendix I, the project area is comprised primarily of Coastal Live Oak Forest (2.49 acres), with smaller patches of California Annual Grassland (0.29 acre), Riparian Coast Live Oak Forest (0.69 acre), previously disturbed land (0.06 acre), and developed land (0.21 acre). As described in Appendix I, vegetation communities were classified into several grass, shrub, and timber litter fuel models, which are based on the fire behavior that they are expected to exhibit during a wildfire. The vegetation classifications/fuel models and associated wildfire behaviors identified for the project site are shown in Table 3.19-1, Fuel Model Vegetation Descriptions. Table 3.19-2, Vegetation Classifications, presents the relative percentages of the vegetation classifications/fuel models that make up the project site. The vegetation classifications/ fuel models were classified using the Scott and Burgan's (2005) Standard Fire Behavior Fuel Model classification system, which is based on the Rothermel surface fire spread equations.[6] These fire spread equations are mathematical models to predict how fire would spread throughout a particular landscape.

Table 3.19-1. Fuel Model Vegetation Descriptions

Fuel Model	Fire Behavior Description
NB 1 (Non-burnable)	Urban or suburban development; insufficient wildland fuel to carry wildland fire.
GS 1 (Grass-Shrub)	Shrubs are about 1 foot high, low grass load. Spread rate moderate (5–20 chains[1]/hour); flame length low (1–4 feet); fine fuel load 1.35 (tons/acre).
GS 2 (Grass-Shrub)	Shrubs are 1–3 feet high, moderate grass load. Spread rate high (20–50 chains/hour); flame length moderate (4–8 feet); fine fuel load 2.1 (tons/acre).
SH 2 (Shrub)	Moderate fuel load (higher than SH1), depth about 1 foot, no grass fuels present. Spread rate low (2–5 chains/hour); flame length low (1–4 feet); fine fuel load 5.2 (tons/acre).
TL3 (Timber-Litter)	Moderate load. Spread rate very slow (0–2 chains/hour); flame length low (1–4 feet); fine fuel load 0.5 (ton/acre).
TL6 (Timber-Litter)	Moderate load, less compact. Spread rate moderate (5–20 chains/hour); flame length low (1–4 feet); fine fuel load 2.4 (ton/acre).

Note:
[1]One chain is equal to 66 feet.

Table 3.19-2. Vegetation Classifications

Fuel Model	Percent of Project Area
NB 1 (Non-burnable)	23
GS 1 (Grass-Shrub)	2
GS 2 (Grass-Shrub)	2
SH 2 (Shrub)	2
TL3 (Timber-Litter)	29
TL6 (Timber-Litter)	42

[5] San Mateo County. 2007. Fire Hazard Severity Zones in State Responsibility Areas. Available online at http://frap.fire.ca.gov/webdata/maps/san_mateo/fhszs_map.41.pdf. Accessed on March 5, 2019.
[6] https://www.fs.fed.us/rm/pubs_series/rmrs/gtr/rmrs_gtr371.pdf

Canopy Characteristics

The canopy characteristics of the vegetation community influence potential fire behavior on the project site. Canopy characteristics can be described using canopy cover, which is commonly expressed as a percentage of total ground area covered by the vertical projection of tree crowns.[7] The majority of the forested area within the project site is comprised of canopy cover percentages of 30 to 40 percent and 40 to 50 percent (see Figure 2-7 in Appendix I).

Canopy characteristics can also be described in terms of canopy base height and canopy bulk density. Canopy base height is a measure of the distance of canopy fuels to surface fuels.[8] Canopy bulk density is a measure of how closely canopy fuels are packed, which reflects the likelihood that fire can move through the forest canopy. The fuels in the project area have relatively high canopy base heights (greater than 4 feet) (see Figure 2-8 in Appendix I), except in areas that have high densities of shrubs and sapling trees (see Figure 2-9 in Appendix I).

Aspect

Aspect affects how much solar radiation a site receives and also the vegetation type and fuel loading. Table 3.19-3, Aspect within the Project Area, provides the aspect for the project site. Sixty percent of the project site occurs on north- and north-east-facing slopes. North-facing slopes are cooler and more shaded, thus delaying the drying of fuels longer into fire season and making them less available for combustion. North-facing slopes, however, tend to have heavier fuel loads, which can experience more severe wildfire behavior as fuels dry. South- and west-facing slopes tend to have less vegetation and lighter fuel loads. South-facing slopes receive higher solar radiation and are warmer, causing fuels to dry out sooner and more thoroughly during fire season.

Table 3.19-3. Aspect within the Project Area

Aspect (degrees)	Percent in Project Site
North	40
Northeast	19
East	9
Southeast	19
South	13

Fire History

According to the historic fire records contained within CAL FIRE's Fire and Resource Assessment Program[9] database, there have only been three large wildfires in the project vicinity since 1962 (see

[7] United States Forest Service. 2018. WindNinja. Project Webpage. Available online at https://www.firelab.org/project/windninja. Accessed February 2018. Accessed March 5, 2019.

[8] Smith, Frederick (no date). A Managers Guide to Canopy Fuels. Available at: https://www.firescience.gov/projects/06-3-3-13/project/06-3-3-13_a_managers_guide_to_canopy_fuels.pdf. Accessed March 5th, 2019.

[9] CAL FIRE. 2018. Fire and Resource Assessment Program-California's Forests and Rangelands: 2017 Assessment. Available online at http://frap.fire.ca.gov/assessment2017/index. Accessed on March 7, 2019.

Figure 2-10 in Appendix I). The previous lack of fire activity has been attributed to weather impacts, changes in forest management, extended fire regimes, and aggressive firefighting, among other reasons. [10]

The San Mateo-Santa Cruz CAL FIRE unit responded to 246 ignitions in 2017 in San Mateo and Santa Cruz Counties. Approximately 98 percent of these ignitions were kept to less than 10 acres in size. The top four causes of these 2017 wildfires are listed by CAL FIRE as undetermined, electrical power, miscellaneous, and debris burning.[11]

3.19.2 Regulatory Setting

Federal

National Fire Prevention and Control Act

The National Fire Prevention and Control Act was adopted in 1975 to reduce the nation's loss of life and property caused by wildfire through better fire prevention practices and coordination with state and local governments. The act established the National Fire Data System, which supports local decision-making by providing resources and critical information to keep firefighters and their communities safe.[12] The act also established master plans for fire prevention and control at all levels of government and is used by the Federal Emergency Management Agency in its disaster preparedness planning efforts.[13]

State

California Building Standards Code

The California Building Standards Code (Title 24 of the California Code of Regulations) contains a broad set of requirements for sustainable design, construction and maintenance, fire and life safety and accessibility. Applicable sections of the California Building Standards Code are below.

California Fire Code

The California Fire Code (Title 24, Part 9 of the California Code of Regulations) contains regulations consistent with nationally recognized and accepted practices for safeguarding life and property from fires and explosions, dangerous conditions arising from storing and handling hazardous materials and devices, and hazardous conditions in the use or occupancy of buildings or premises.[14] The California Fire Code also contains provisions to assist emergency response personnel.

[10] San Mateo County, 2015. San Mateo County Hazard Vulnerability Assessment. Available online at https://hsd.smcsheriff.com/sites/default/files/downloadables/2%20-%20Hazard%20Vulnerability%20Assessment.pdf. Accessed on March 7, 2019.
[11] CAL FIRE, 2018. San Mateo- Santa Crus Unit Strategic Fire Plan. Available at http://cdfdata.fire.ca.gov/pub/fireplan/fpupload/fpppdf1618.pdf. Accessed on March 7, 2019.
[12] National Fire Protection Association. 2018. National Fire Data System. Available online at https://www.nfpa.org/News-and-Research/Data-research-and-tools/National-Fire-Data-System. Accessed March 9, 2019.
[13] San Mateo County General Plan. 1986 Available online at https://planning.smcgov.org/sites/planning.smcgov.org/files/SMC-GP%201986.pdf. Accessed on March 5, 2019.
[14] Title 24, Part 9 of the California Code of Regulations. 2016. California Fire Code. Available online at https://www.citymb.info/Home/ShowDocument?id=28089. Accessed March 7, 2018.

California Building Code

The California Building Code (Title 24, Part 2 of the California Code of Regulations) contains general building design standards and construction requirements relating to fire and life safety, structural safety, and access compliance.[15] The code provides minimum standards to safeguard life, property, and public welfare by regulating the design, construction, and quality of materials.

Public Resources Code Sections 4201-5 (Chapter 806, Statutes of 1982)

Public Resources Code Sections 4201-5 require CAL FIRE to zone all SRAs according to the degree of fire hazard severity. Designation of these zones is based on fuel loading, slope, critical weather, and other relevant factors. CAL FIRE produces maps of each county that identifies SRAs and associated FHSZs. CAL FIRE periodically reviews the FHSZs, which are updated when appropriate.

Public Resources Code Section 4290 and 4291

Public Resources Code Sections 4290 and 4291 specify standards for defensible space around buildings or structures adjoining a mountainous area, forest-covered lands, brush-covered lands, grass-covered lands, or land that is covered with flammable material.

Government Code Sections 51175-89 (Chapter 1118, Statutes of 1992)

Government Code Sections 51175-89 require CAL FIRE to make recommendations for Very High FHSZ areas to LRA for adoption by local ordinance. It also provides guidance on ways that local jurisdictions can reduce wildfire risks and minimize the loss of wildfire damage to life, property, or resources.

Regional and Local

CAL FIRE Management Plan for the San Mateo/Santa Cruz Unit

The CAL FIRE Fire Protection Management Plan[16] was developed in 2004 for the San Mateo/Santa Cruz Unit. The plan identifies community assets vulnerable to wildfire and develops projects and activities to mitigate such risks. The overall goal of the plan is to reduce total wildfire costs and losses from wildland fire by protecting assets at risk through focused vegetation management projects and aggressive "Fire Safe Defense Awareness Programs" throughout the San Mateo/Santa Cruz Unit. The major components of the plan include the creation of local forums to determine the extent of the fire problem, identification of at-risk assets, development of wildfire protection zones, and development and implementation of vegetation management projects. The plan was developed collaboratively with various local and state agencies and organizations, including San Mateo County Parks, Mid Peninsula Open Space Trust, California Department of Parks and Recreation, and Santa Cruz County.

[15] Title 24, Part 2 of the California Code of Regulations. 2016. California Building Code. Available online at https://codes.iccsafe.org/content/chapter/1755/. Accessed on March 7, 2010.

[16] CAL FIRE. 2014. Fire Management Plan-San Mateo/Santa Cruz Unit. Available online at http://cdfdata.fire.ca.gov/pub/fireplan/fpupload/fpppdf136.pdf. Accessed on March 7, 2019.

Santa Cruz-San Mateo County Community Wildfire Protection Plan

The Santa Cruz-San Mateo County Community Wildfire Protection Plan (CWPP)[17] was developed in 2018 to expedite the preparation and implementation of hazardous fuels reduction projects within the wildland/urban interface. The CWPP aims to reduce wildfire risks in the wildland/urban interface areas of San Mateo and Santa Cruz County by identifying fire risks and hazards and proposing recommendations aimed at preventing and reducing both infrastructure and ecosystem damage associated with wildland fires. The CWPP was developed collaboratively with CAL FIRE, the Resource Conservation District of Santa Cruz County, the San Mateo Resource Conservation District, and the U.S. Fish and Wildlife Service.

County of San Mateo Emergency Operations Plan

The County of San Mateo Emergency Operations Plan provides policies and procedures to govern the effective management of emergency operations within the San Mateo County Operational Area (SMCOA).[18] The plan also assigns roles and responsibilities to county agencies involved in managing emergency operations. The SMCOA is comprised of all local governments within the geographic area of the County, special districts, unincorporated areas, and participating non-governmental entities. The primary objective of the plan is to provide for the "effective coordination of response forces and resources in preparing for and responding to situations associated with natural disasters, technological incidents and national security emergencies." The plan defines the roles and responsibilities of various agency departments in aiding in various emergency operational functions, including fire and rescue and emergency evacuation.

Title III, Chapter 3.84 of the San Mateo County Municipal Code

Title III, Chapter 3.84 of the County Municipal Code adopts the California Fire Code as the County Fire Code.

San Mateo County General Plan—Natural Hazards

The County General Plan contains policies to minimize the risks that wildfires pose to people and property. The following County General Plan Policies are relevant to the project:

- **Policy 15.26a:** When reviewing development proposals, use the Natural Hazards map to determine the general location of hazardous fire areas.
- **Policy 15.26b:** When the Natural Hazards map does not clearly illustrate the presence or extent of fire hazards, use more detailed maps including but not limited to the Fire Hazard Severity Zones Map prepared by the California Department of Forestry (CDF), any other source of information considered to be valid by CDF or by fire protection districts.
- **Policy 15.27c:** In urban areas, consider higher density land uses to be appropriate if development can be served by CDF/County Fire Department, a fire protection district or a city fire department, adequate access for fire protection vehicles is available and sufficient water supply and fire flow can be guaranteed.

[17] CAL Fire and Resource Conservation District of San Mateo County and San Cruz County. Community Wildfire Protection Plan. Available online at http://www.sanmateorcd.org/wp-content/uploads/2018/11/2018_CWPP_update_final-Opt.pdf. Accessed March 7, 2019.

[18] San Mateo County. 2015. County of San Mateo Emergency Operations Plan. Available online at https://hsd.smcsheriff.com/sites/default/files/downloadables/1%20-%20Emergency%20Operations%20Plan.pdf. Accessed on March 7, 2019.

- **Policy 15.28a:** Wherever possible, cluster new development near existing developed areas where there are adequate water supplies and good access for fire vehicles.
- **Policy 15.28b:** When development is proposed in hazardous fire areas, require that it be reviewed by the County Fire Warden to ensure that building materials, access, vegetative clearance from structures, fire flows and water supplies are adequate for fire protection purposes and in conformance to the fire policies of the General Plan.
- **Policy 15.30a:** Require connection to a public water system or private water company or provision of an on-site water supply as a condition of approval for any new development proposal.
- **Policy 15.30b:** Determine the quantity of on-site water supply, fire flow requirements and spacing and installation of hydrants in accordance with the standards of the agency responsible for fire protection for the site proposed for development.
- **Policy 15.30c:** Consider the use of additional on-site fire protection devices including but not limited to the use of residential sprinkler systems and contracting the services of private alarm companies for development proposed in remote areas.
- **Policy 15.31a:** Consider the adequacy of access for fire protection vehicles during review of any new development proposal.
- **Policy 15.31b:** Determine the adequacy of access through evaluation of length of dead end roads, turning radius for fire vehicles, turnout requirements, road widths and shoulders and other road improvement considerations for 15.9P conformance with the standards of the agency responsible for fire protection for the site proposed for development.
- **Policy 15.31c:** To the maximum extent possible, design access for fire protection vehicles in a manner which will not result in unacceptable impacts on visual, recreational and other valuable resources.
- **Policy 15.34a:** Require clearance of flammable vegetation around structures as a condition of approval to new development in accordance with the requirements of the agency responsible for fire protection.
- **Policy 15.34b:** Conduct periodic inspections to ensure maintenance of required clearances.
- **Policy 15.35:** Encourage the use of fire-retardant vegetation when reviewing new development proposals.
- **Policy 15.39:** Support the standards for fire resistant construction contained in the County Uniform Construction Administration Code, including but not limited to requirements for fire resistant roofing, ventilation, windows, chimneys, fire walls and other construction materials.
- **Policy 15.41:** Incorporate fire hazard concerns into the review of proposals for new development through measures, including but not limited to: (1) regulation of 15.11P land use and limitation of density, (2) review of access, water supply and hydrant location, (3) conformance to defined hazardous areas design criteria, and (4) conformance with established building code requirements.

Article II, Section 12.7 of the Redwood City Municipal Code

Article II, Section 12.7 of the City Municipal Code adopts the California Fire Code as the City Fire Code.

City of Redwood City General Plan—Public Safety

The City General Plan (2010) contains programs and policies to minimize wildfire threats to public safety. The following City General Plan policies and programs are relevant to the project:

- **Policy PS-9.2.** Identify alternative water sources for fire-fighting use during a disaster.
- **Policy PS-11.2.** Work with the Fire Department to determine and meet community needs for fire protection and related emergency services.
- **Program PS-33.** Emergency Vehicle Access and Secure Evacuation Routes. Require new development to provide adequate access for emergency vehicles, particularly fire-fighting equipment, as well as secure evacuation routes for inhabitants.

3.19.3 Thresholds of Significance

The significance of impacts related to wildfire is based on thresholds identified within Appendix G of the state CEQA Guidelines, shown below.

Impacts would be considered significant if the project would:

a. Substantially impair an adopted emergency response plan or emergency evacuation plan.

b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.

c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.

d. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

3.19.4 Impact Assessment and Methodology

The evaluation of potential project related wildfire impacts is based on the Wildfire Hazards Analysis conducted for the project (see Appendix I**)**. The Wildfire Hazards Analysis involved the classification of vegetation/fuel types, an evaluation of existing climactic conditions and fire risks, and an analysis of fire behavior within the project area. Fire behavior was modeled using the Interagency Fuel Treatment Decision Support System (IFTDSS).[19] IFTDSS is a state-of-the-art software and data integration framework that organizes fire and fuels software tools into a single online application. The browser-based modeling environment of IFTDSS allows users to simulate fire behavior and fire effects using the scientific algorithms and processes found in common fire behavior modeling applications.

Project-related wildfire impacts were also evaluated by assessing potential wildfire impacts from project activities to on-site and adjacent land and reviewing County and City General Plan policies and the adopted County of San Mateo Emergency Operations Plan.

[19] Interagency Fuel Treatment Decision Support System, 2019. IFTDSS Home. Available at: https://iftdss.firenet.gov/landing_page/. Accessed March 1, 2019.

3.19.5 Project-Specific Impacts and Mitigation Measures

Impact 3.19-1: Potential to substantially impair an adopted emergency response plan or emergency evacuation plan – No Impact

Canyon Lane Improvements

Canyon Lane is an unimproved gravel roadway that is inaccessible to emergency vehicles. The project would involve regrading and paving the unimproved roadway into a 20-foot-wide paved roadway to enable emergency vehicle access. The roadway would incorporate an emergency vehicle turnaround apparatus and would be constructed and maintained in accordance with the American Association of State Highway and Transportation Officials Standard HB-17, which provides design specifications and maintenance requirements for bridges and elevated surfaces used as part of a fire apparatus access road. Further, the roadway would be designated as a fire lane, and no street parking would be permitted. The entire roadway would be marked and posted in accordance with Section 22500.1 of the California Vehicle Code. Because the improvements to Canyon Lane would provide emergency vehicle access and would comply with all applicable design and maintenance provisions, the project would not impair any emergency response or evacuation procedures and functions described in the County of San Mateo Emergency Operations Plan. As a result, the project would not conflict with an adopted emergency response plan or emergency evacuation plan, and no impact would occur.

Proposed Single-Family Residence and Developable Parcels

The proposed single-family residence would not alter or impair any existing road networks used for emergency response or evacuation purposes. The proposed road extension would only serve a limited number of parcels, development of which would not substantially increase trips along evacuation routes or otherwise interfere with any emergency response or evacuation procedures and functions described in the County of San Mateo Emergency Operations Plan. Therefore, the project would not conflict with an adopted emergency response plan or emergency evacuation plan, and no impact would occur.

Impact 3.19-2: Potential to exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire – Less than Significant with Mitigation

Canyon Lane Improvements

Construction

Canyon Lane is located within an oak woodland vegetation assemblage that is modelled primarily as timber litter fuel, with small patches of grass and shrubland vegetation. The project area has experienced low wildfire occurrence over the period of record (1960-2018) and fire behavior modelling predicts the fuels in the area would burn with mostly low to moderate intensity, in terms of flame length, rate of spread, and fireline intensity (see Appendix I).

Potential ignition sources would be increased during construction activities. Construction activities would require the use of internal combustion engines associated with vehicles and construction equipment and would involve the installation of a 12-kV electrical distribution line that could act as an ignition source.

The project site is located within a canyon subject to prevailing westerly winds. These characteristics could influence wildfire behavior in the event that construction activities sparked a wildfire. Therefore, mitigation measures have been identified to require that fire safety controls be implemented during all

construction activities (refer to Mitigation Measures WF/mm-1.1 through WF/mm-1.2). These measures would mitigate wildfire risks during construction activities. Further, construction activities would involve regrading and paving the unimproved roadway into a 20-foot-wide paved roadway. These ground-disturbing activities would decrease fuel loading in the immediate vicinity of the area of disturbance, as native woodland vegetation is removed and thinned in order to accommodate the roadway improvements. The roadway itself would also inherently function as a fuel break, as it would add non-combustible materials to the project site in the form of a paved roadway surface. This fuel break would slow the spread rate of wildfire and reduce wildfire intensity in the rare event that construction activities sparked a wildfire.

Construction of the Canyon Lane improvements would also involve the construction of a roadside fuel break. The roadside fuel break would result in the clearing of roadside vegetation by at least 10 feet on each side of the roadway and 15 vertical feet, as required by the CWPP and California Fire Code. A reduction of existing fuel loading would lower the fire behavior if a fire were to occur within the project site during construction. Implementation of Mitigation Measure WF/mm-1.3 would ensure that roadside vegetation would be cleared before the commencement of grading and paving activities.

Construction of the roadway improvements would involve the installation of a 12-kV electrical distribution line, which could be a source of ignition. To minimize any potential wildfire risks associated with the electrical utility line, the line would be installed within an underground trench beneath the roadway. The trench would be constructed in accordance with all applicable rules, standards, and regulations governing underground electric supply systems, including California Public Utility Commission General Order Numbers 128 and 165, which provides clearance requirements, minimum depths, and regular inspections of infrastructure.

Although the project is located within a canyon subject to prevailing westerly winds, in the event of a fire, fire behavior modelling predicts fuels in the area would burn with mostly low to moderate intensity. This is because the dominant fuel models identified within the project site (TL3 and TL6 model), which make up approximately 93 percent of the burnable areas of the project site (see Table 3.17-2), would have a low to moderate spread rate, a low flame length, and fine fuel load (see Table 3.17-1). Fire safety controls required by Mitigation Measures WF/mm-1.1 through WF/mm-1.2 and roadside fuel reduction activities that would commence prior to grading and paving activities, as required by Mitigation Measure WF/mm-1.3, would further reduce wildfire risk. As a result, construction of the project would not substantially exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire. Impacts would be less than significant with mitigation.

	Wildfire Mitigation Measures
WF/mm-1.1	*Smoking during project construction shall be prohibited except in designated areas, at least 20 feet from any combustible chemical/material and off of dry vegetation.*
WF/mm-1.2	*To minimize potential construction-related fire hazards, a Fire Awareness and Avoidance Plan shall be prepared. The Plan shall include the following measures:* *a. Fire preventative measures addressing cutting and grinding and welding* *b. Maintaining fire extinguishers in every vehicle on site* *c. Maintaining appropriate firefighting equipment, such as shovels, axes, or Pulaski's in all rubber-tired construction vehicles* *d. Equipping all construction equipment with appropriate spark arrestors and functioning mufflers* *e. Communication with emergency response agencies* *These requirements shall be noted in plan specifications and the Fire Awareness and Avoidance Plan shall be included in the project plans.* *The County and City shall review the plans and inspect the project site prior to construction to ensure consistency with these requirements.*
WF/mm-1.3	*Prior to the commencement of grading and paving activities associated with Canyon Lane, roadside vegetation shall be cleared by at least 10 feet on each side of the roadway and up to 15 vertical feet.*

Operation

The roadway would be designated as a fire lane, and no street parking would be permitted. The entire roadway would be marked and posted in accordance with Section 22500.1 of the California Vehicle Code. The project would establish a roadside fuel break, which would be maintained by the future homeowners in accordance with the CWPP and California Fire Code. CAL FIRE and the City Fire Department would be responsible for enforcing the roadside fuel break requirements within their respective jurisdictions. The roadway component of the project would not generate a use that would increase potential ignition sources as a result of project operations (potential increased ignition sources resulting from residential development is discussed below). As a result, operation of the roadway would not substantially exacerbate wildfire risks, thereby exposing project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire. Impacts would be less than significant.

Proposed Single-Family Residence

Construction

The parcel subject to development of the single-family residence is located within an oak woodland vegetation assemblage that is modelled primarily as timber litter fuel. The area has experienced low wildfire occurrence over the period of record (1960-2018) and fire behavior modelling predicts the fuels in the area would burn with mostly low to moderate intensity, in terms of flame length, rate of spread, and fireline intensity (see Appendix I). The parcel occurs on a south-facing slope, which tends to have less vegetation and lighter fuel loads when compared to north-facing slopes. However, south-facing slopes receive greater solar radiation and are warmer, so fuels dry out sooner and more thoroughly during the fire season. Westerly winds could further desiccate fuels in the area, which could lead to potentially higher rates of fire spread.

Potential ignition sources would be increased during construction activities. Construction activities would require the use of internal combustion engines associated with vehicles and construction equipment that could act as an ignition source. The parcel is located on the south side of a canyon subject to prevailing westerly winds. These characteristics could influence wildfire behavior in the event that construction activities sparked a wildfire. Therefore, mitigation measures have been identified to require that fire safety controls be implemented during all construction activities (refer to Mitigation Measures WF/mm-1.1 through WF/mm-1.2). These measures would reduce wildfire risks during construction activities. Further, construction would comply with Chapter 49, Section 4905 of the California Fire Code and all applicable sections of Title 24, Part 2, 701A3.2 of the California Code of Regulations, which would require the residence to be constructed using ignition-resistant materials to resist the intrusion of flame or embers projected by a vegetation fire. Compliance with these regulations would reduce the risk of structure loss from wildfire. In addition, the residence would include automatic sprinkler systems, as required by Section 903 of the California Fire Code.

A minimum 30-foot home defense zone and a 100-foot fuel reduction zone would be established around the perimeter of the residence, as required by California Government Code 51182 and Public Resources Code Sections 4290 and 4291. The home defense zone would result in the removal of all dead plants, grass, and weeds, as well as the trimming of trees and removal of branches that overhang the roof. The fuel reduction zone would result in the mowing of annual grasses down to a maximum of 4 inches in height, creation of horizontal and vertical spacing between shrubs and tree, and the removal of fallen leaves, needles, twigs, bark, cones, and small branches to a depth of 3 inches. This reduction in fuel loading within the home defense and fuel reduction zones would help to avoid the spread of fire from one tree or shrub to another and reduce structural ignitability.

Although the project is located within a canyon subject to prevailing westerly winds, fire behavior modelling predicts fuels in the area would burn with mostly low to moderate intensity. Construction of the residence would use ignition-resistant materials and would incorporate design features to reduce wildfire risk. Further, construction vehicles and equipment would incorporate fire safety controls, as required by Mitigation Measure WF/mm-1.1 and WF/mm-1.2. As a result, construction of the project would not substantially exacerbate wildfire risks, thereby exposing project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire. Impacts would be less than significant with mitigation.

Operation

Increased use/residential activities and fuel build-up in the home defense zone established around the residence could increase wildfire risk. However, the single-family residence would be consistent with the surrounding residential areas and would not substantially increase or exacerbate wildfire risks in the project area. In addition, a 30-foot home defense zone and a 100-foot fuel reduction zone would be maintained around the residence in compliance with California Government Code 51182 and Public Resources Code Sections 4290 and 4291. CAL FIRE would be responsible for periodic inspections and enforcement of home defense zones.

The home defense zone and fuel reduction zone would reduce fuel loading, which would help avoid the spread of fire from one tree or shrub to another. As a result, the residence would not substantially exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire. Impacts would be less than significant.

Developable Parcels

Construction of the future developable parcels would be required to adhere to the same requirements as those described above for the single-family residence. As a result, construction of the project would not substantially exacerbate wildfire risks, thereby exposing project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire. Impacts would be less than significant with mitigation.

Post-construction activities would also require the maintenance of a defensible space around each of the 11 residences in accordance with California Government Code 51182 and Public Resources Code Sections 4290 and 4291. CAL FIRE and the City Fire Department would be responsible for periodic inspections and enforcement of home defense zones on parcels located within their respective jurisdictions. The City of Redwood City Fire Department would be responsible for periodic inspections and enforcement of the home defense zone established on the one parcel located within its jurisdiction. As a result, post-construction impacts would be less than significant.

Impact 3.19-3: Potential to require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment – Less than Significant

Canyon Lane Improvements

Construction

Construction of the roadway improvements would involve the construction of associated infrastructure including the installation of a 12-kV electrical distribution line and an eight-inch water main. Wildfire protection infrastructure in the form of a roadside fuel break would also be constructed along Canyon Lane.

To minimize any potential wildfire risks associated with the electrical utility line, the line would be installed within an underground trench beneath the roadway. The trench would be constructed in accordance with all applicable rules, standards, and regulations governing underground electric supply systems, including California Public Utility Commission General Order Numbers 128 and 165, which provide clearance requirements and minimum depth requirements.

Construction of the eight-inch water main would provide water and fire protection to the abutting parcels. The waterline would meet or exceed the National Fire Protection Association 1142, "Standard on Water Supplies for Suburban and Rural Fire Fighting,"[20] 2012 Edition, the California Fire Code, California Code of Regulations title 24, part 9, and Redwood City Ordinance No. 2325, § 2, 1-14-08 Water Main Upgrade.[21] The watermain would be capable of supplying a fire flow of 1,500 gallons of water per minute for a duration of 2 hours (180,000 gallons), as required by the California Fire Code.

[20] Standard on Water Supplies for Suburban and Rural Fire Fighting identifies a method of determining the minimum water supply necessary for structural fire-fighting purposes.

[21] Redwood City Ordinance No. 2325, Section 2, 1-14-08 Water Main Upgrade provides design specifications for water main upgrades.

Construction of the roadside fuel break would result in the clearing of roadside vegetation by at least 10 feet on each side of the roadway and 15 vertical feet, as required by the CWPP and California Fire Code.

Construction activities associated with the 12-kV electrical distribution line, eight-inch water main, and roadside fuel break would require the use of internal combustion engines associated with construction equipment, which could be a source of ignition. To minimize wildfire risks associated with the use of this equipment, fire safety controls would be implemented during all construction activities (refer to Mitigation Measures WF/mm-1.1 through WF/mm-1.2). These fire safety controls would reduce any wildfire risks associated with the construction of the project to less-than-significant levels.

Construction of a portion of the waterline would result in the temporary removal of vegetation. Impacts to biological resources associated with the waterline are described in more detail in Section 3.4, Biological Resources. Construction of the roadside fuel break would result in the permanent removal of 34 trees. Impacts to biological resources associated with the Canyon Lane improvements are described in more detail in Section 3.4. Implementation of the mitigation measures identified in Section 3.4 would ensure that any potential impacts to biological resources during construction are reduced to less-than-significant levels.

Operation

The roadway would include associated infrastructure such as an underground electrical utility line and waterline. The electrical utility line would be maintained in accordance with the California Public Utility Commission General Order Numbers 128 and 165, which prescribe regular inspection requirements for powerline infrastructure. The waterline would not pose any significant wildfire risks once installed underground. Because the electrical utility line would be installed underground and would be inspected in accordance with all applicable requirements, operation of the line would not substantially exacerbate wildfire risks, and impacts would be less than significant.

The roadside fuel break established along Canyon Lane would be maintained by the future homeowners out to at least 10 feet on each side of the roadway and 15 vertical feet, as required by the CWPP and California Fire Code. CAL FIRE and the City Fire Department would be responsible for enforcing the roadside fuel break requirements within their respective jurisdictions. The roadside fuel breaks would be maintained using mechanized tools and equipment. If these tools and equipment are powered by internal combustion engines, fire safety controls would be implemented during all maintenance activities (refer to Mitigation Measures WF/mm-1.1 through WF/mm-1.2). With regular maintenance and inspection of the roadside fuel breaks and implementation of Measures WF/mm-1.1 through WF/mm-1.2, operation and maintenance activities associated with the fuel break would not substantially exacerbate wildfire risks, and project impacts would be less than significant.

Maintenance of the roadside fuel break would result in the ongoing removal of vegetation. Impacts to biological resources associated with the Canyon Lane improvements are described in more detail in Section 3.4, Biological Resources. Implementation of the mitigation measures identified in Section 3.4 would ensure that any potential biological impacts associated with the ongoing maintenance of the roadside fuel break are reduced to less-than-significant levels.

Proposed Single-Family Residence

Construction

Construction of the residence would include a minimum 30-foot home defense zone and a 100-foot fuel reduction zone that is established around the residence, as required by California Government Code 51182 and Public Resources Code Sections 4290 and 4291. The home defense zone would result in the

removal of all dead plants, grass, and weeds, as well as the trimming of trees and removal of branches that overhang the roof. Construction of the home defense zone may require the use of internal combustion engines associated with construction equipment, which could be a source of ignition. To minimize wildfire risks associated with the use of this equipment, fire safety controls would be implemented during all construction activities (refer to Mitigation Measures WF/mm-1.1 through WF/mm-1.2). These fire safety controls would reduce any wildfire risks to less-than-significant levels. As a result, construction of the home defense zone and fuel reduction zone would not substantially exacerbate fire risk, and project impacts would be less than significant.

Construction of the home defense zone and fuel reduction zone would result in the permanent removal of 11 upland trees and other vegetation. Impacts to biological resources associated with the single-family residence are described in more detail in Section 3.4, Biological Resources. Implementation of the mitigation measures identified in Section 3.4 would ensure that any potential impacts to biological resources during construction of the single-family residence are reduced to less-than-significant levels.

Operation

The residence would include a minimum 30-foot home defense zone and a 100-foot fuel reduction zone, as required by California Government Code 51182 and Public Resources Code Sections 4290 and 4291. The home defense zone would be maintained by the future property owner and periodically inspected by CAL FIRE. Maintenance of the home defense zone may require the use of internal combustion engines associated with construction equipment, which could be a source of ignition. To minimize wildfire risks associated with the use of this equipment, fire safety controls would be implemented during all construction activities (refer to Mitigation Measures WF/mm-1.1 through WF/mm-1.2). These fire safety controls would reduce any wildfire risks to less-than-significant levels. As a result, operation and maintenance activities associated with the home defense zone and fuel reduction zone would not substantially exacerbate wildfire risks, and project impacts would be less than significant.

Maintenance of the home defense zone and fuel reduction zone would result in ongoing removal and/or trimming of vegetation. Impacts to biological resources associated with vegetation removal are described in more detail in Section 3.4, Biological Resources. Implementation of the mitigation measures identified in Section 3.4 would ensure that any potential biological impacts associated with the ongoing maintenance of the home defense zone and fuel reduction zone are reduced to less-than-significant levels.

Developable Parcels

Construction

Construction activities associated with each of the developable parcels would be similar to those described for the proposed single-family residence. Therefore, the project would not substantially exacerbate fire risk, and impacts would be less than significant.

Operation

The residences associated with each developable parcel would be subject to the same requirements as those described for the single-family residence. Therefore, the project would not substantially exacerbate fire risk, and impacts would be less than significant.

Impact 3.19-4: Potential to expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes – Less than Significant

As described in Section 3.10, Hydrology and Water Quality, the project site is located downslope and to the east of Lower Emerald Lake Dam. Emerald Branch, an existing intermittent drainage channel, flows eastward, parallel to and on the north side of the existing Canyon Lane. Runoff water from the project area eventually flows to Redwood Creek, which is the largest watershed in San Mateo County, and drains into the San Francisco Bay. Downstream of the project site lie numerous residential communities that could potentially be impacted by flooding or landslides as a result of runoff, post-fire slope instability, or drainage changes.

In the event of a wildfire, vegetative cover and trees, which act to stabilize the soil, would be removed. Assuming no regrowth of vegetation, exposed soils would increase the rate and amount of runoff following a rain event. As described in Section 3.10, runoff would largely be channeled into defined drainage facilities that are designed to carry peak flows. Runoff patterns would not likely change following a wildfire, as water would continue to be directed through drainage facilities constructed with concrete or other fire hardened materials. The drainage facilities would also include biotreatment facilities and a bioretention swale that would reduce the volume of runoff conveyed to Emerald Branch. These systems would meet the requirements of the Municipal Regional Stormwater Permit and contain and treat at least 80 percent of the total runoff over the life of the project. Because the project would include fire hardened drainage facilities designed to reduce runoff, the project would not expose people or structures to significant downstream flooding risks as a result of runoff or drainage changes. Impacts would be less than significant.

As described in Section 3.7, Geology and Soils, the project site is generally underlain by stable soils. Soils underlying a portion of the waterline site were identified to be part of an active landslide. However, the Applicant would implement Mitigation Measure GEO/mm-1.2, which requires the construction of a stitch pier wall to stabilize the soil and the installation of the water line at depth within the resistant bedrock underlying the landslide. In addition, as described in Chapter 2, Project Description, a retaining wall would also be constructed along Canyon Lane to provide added soil and slope stability. As a result, the project would not expose people or structures to significant downstream landslides risks as a result post-fire slope instability. Impacts would be less than significant.

CHAPTER 4. ALTERNATIVES ANALYSIS

4.1 INTRODUCTION

This chapter discusses a range of alternatives to the project, including a reduced roadway length, an annexation of the unincorporated County project area into the City of Redwood City, and the No Project Alternative; compares the environmental advantages and disadvantages of each alternative to the others; and identifies the Environmentally Superior Alternative.

The CEQA Guidelines provide the following guidance for the discussion of alternatives to the project:

- "An EIR shall describe a range of reasonable alternatives to the project, or to the location of a project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." (Section 15126.6(a))
- "The EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project. A matrix displaying the major characteristics and significant environmental effects of each alternative may be used to summarize the comparison." (Section 15126.6(d))
- "The specific alternative of 'no project' shall also be evaluated along with its impact. The purpose of describing and analyzing a no project alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project." (Section 15126.6(e))
- "If the environmentally superior alternative is the 'no project' alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives." (Section 15126.6(e)(2))
- "The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the basic objectives of the project." (Section 15126.6(f))
- "Alternative Locations. Only locations that would avoid or substantially lessen any of the significant effects of the project need be considered for inclusion in the EIR." (Section 15126.6(f)(2)(A))

4.2 PROJECT OBJECTIVES AND PURPOSE

In accordance with the CEQA Guidelines, appropriate alternatives for EIR analysis are those that meet most of the basic project objectives and avoid or substantially lessen any of the significant environmental effects of the project. Consequently, this section reviews the objectives that were identified for the project and any significant unavoidable environmental effects.

As described in Chapter 2, Project Description, the objectives identified for the project include those put forth by the Applicant as well as the County. The Applicant's stated objectives, and the County's objectives in reviewing the project, are as follows:

The Applicant's primary objective and underlying purpose is to provide residential development and opportunities for future development, while providing utilities and necessary physical improvements to Canyon Lane.

Specific project objectives include:

- To improve Canyon Lane in order to facilitate routine and emergency access to 12 parcels that would become developable. The objectives of the individual future property owners may vary, but, assuming project approval, owners of the lots could construct single-family homes in accordance with zoning restrictions, any necessary subsequent environmental review, and after approval of all necessary planning and building permits.
- To provide housing, and the opportunity for future housing on lots associated with the project, on a site that is currently zoned for single-family housing.
- To assist in maximizing housing opportunities in San Mateo County, while maintaining the predominantly single-family character of the neighborhood.

4.3 ALTERNATIVES DEVELOPMENT AND ANALYSIS PROCESS

In defining the feasibility of alternatives, the CEQA Guidelines state: "Among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries (projects with a regionally significant impact should consider the regional context), and whether the proponent can reasonably acquire, control or otherwise have access to the alternative site." If an alternative was found to be infeasible, as defined above, then it was dropped from further consideration in this analysis.

In addition, CEQA Guidelines Section 15126.6 states that alternatives should "…attain most of the basic objectives of the project...". As further explained by the California Supreme Court (In re Bay-Delta Programmatic Environmental Impact Report Coordinated Proceedings, 43 Cal.4th 1143, 1165-1166 [2008]), an EIR should focus the alternatives analysis on a range of alternatives that are feasible and can achieve the project's underlying fundamental purpose. Alternatives determined to be infeasible and that cannot achieve the basic project's purpose need not be studied.

The alternatives selected for analysis have been evaluated against the project to provide a comparison of environmental effects and to identify the Environmentally Superior Alternative. Note that the significance of impacts associated with the project, and the determination of impacts presented in this section for comparative purposes, are based on the respective identified changes in conditions relative to the environmental baseline (as described in Chapter 3, Environmental Impact Analysis). The County has the discretion to select whatever alternative or combination of alternatives it deems most appropriate, provided that the environmental impacts of the project can be mitigated, or to the extent that they cannot, provided that the County adopts a Statement of Overriding Considerations, per Section 15093 of the CEQA Guidelines.

4.3.1 Alternative Project Evaluation Process

The environmental impacts of the alternatives carried forward for review in the EIR, including the No Project Alternative, were compared against the impacts of the project for each environmental issue area discussed in Chapter 3, Environmental Impact Analysis. A significance determination was made about each alternative for each issue area, and a basis for that determination has been provided. The determination of comparative impacts makes a significance determination for each potential impact and also utilizes the following criteria:

- **No Impact:** The significance criteria do not apply or no impact would result.

- **Similar:** Impacts would be identical or would be of the same general extent and severity as the impacts associated with the project; therefore, the significance determination would be the same.
- **Increased:** New potentially significant impacts or a substantial increase in the severity of the impacts associated with the project would occur; therefore, the significance determination would be greater.
- **Reduced:** Potentially significant impacts would be avoided or a substantial reduction in the severity of the impacts associated with the project would occur; therefore, the significance determination would be decreased.

As a result of this evaluation and comparison of potentially significant environmental impacts, an Environmentally Superior Alternative has been identified.

4.4 CONSIDERED ALTERNATIVES

Criteria used to develop project alternatives included: (1) whether the alternative would avoid or substantially lessen significant impacts; (2) whether the alternative would generally meet the project objectives and underlying fundamental purpose; and (3) whether implementation of the alternative would be feasible. Specific consideration was given to potential alternatives that would avoid or minimize impacts.

4.4.1 Alternative 1: Reduced Roadway

The Reduced Roadway Alternative would limit the roadway improvement activities to the first approximately 550 feet. The Reduced Roadway (Length) Alternative would be sufficient to reach the proposed single-family residence. Because the roadway would not extend beyond the proposed-single family residence to provide access to the other developable parcels, only the proposed single-family residence would be constructed as part of the project. The Reduced Roadway Alternative would include an emergency vehicle turnaround designed in accordance with the minimum specifications provided in the 2016 California Fire Code.

4.4.2 Alternative 2: Annexation

The Annexation Alternative would involve the annexation of the unincorporated area of the project site into the City prior to the occurrence of development.

Under the Annexation Alternative, the project would be subject to the City's zoning and land use requirements. The development pattern that could result after annexation is provided to describe the environmental impacts that could result if annexation occurred.

4.4.3 No Project Alternative

The No Project Alternative would maintain existing conditions at the project site. No construction of the single-family residence, roadway improvements, or developable parcels would occur.

4.5 ALTERNATIVES IMPACT ANALYSIS

This section evaluates the impacts of the alternatives and compares them to the impacts of the project identified in Chapter 3, Environmental Impact Analysis. Table 4-1 compares the impacts of each alternative to those of the project.

4.5.1 Alternative 1: Reduced Roadway

The Reduced Roadway Alternative would result in impacts that are largely reduced compared to those identified for the project. The Reduced Roadway Alternative would limit the roadway improvement activities to the first approximately 550 feet up to the single-family residence, and only that single-family residence would be constructed.

The Reduced Roadway Alternative would result in fewer environmental impacts compared to the project. Aesthetic impacts would be slightly reduced under this alternative, as the change in the visual character or quality of the site would be less pronounced with only one single-family residence being constructed and only a segment of the roadway being improved. Further, the Reduced Roadway Alternative would result in less temporary emissions of fugitive dust (due to the reduced scope of the project), which would decrease visual impacts. Air quality, greenhouse gas emissions, and energy consumption would all be reduced under this alternative, as the quantity of emissions generated and energy consumed during construction and operation of the alternative would be less than with the project.

Biological impacts associated with the Reduced Roadway Alternative would be reduced compared to impacts identified for the project. Because only the first approximately 550 feet of roadway would be constructed, the amount of temporary and permanent land disturbance would be reduced when compared to the project. Temporary disturbance requirements would be reduced by approximately 48 percent, or approximately 0.54 acre, when compared to the project. Permanent land disturbance requirements would be reduced by approximately 53 percent, or approximately 0.26 acre, when compared to the project. Temporary and permanent land disturbance requirements would be further reduced by maintaining the inaccessibility of the 11 developable parcels farther down the paper street, and thus reducing the ease of their future development.

The Reduced Roadway Alternative would result in the removal of fewer trees. In addition, this alternative would result in reduced hardscaping requirements, which would decrease runoff and soil erosion, increase groundwater recharge, and reduce the introduction of anthropogenic contaminants such as petrochemicals, herbicides, and fertilizers into the ecosystem. The Reduced Roadway Alternative would not allow for the future development of the developable parcels, which would reduce the potential for water quality impacts. As a result, hydrology and water quality may slightly improve under this alternative. However, the significant and unavoidable impact related to flooding hazards cannot be reduced to a less-than-significant level under this alternative, as the single-family residence would still be located within a flood hazard area. However, the magnitude of the significant and unavoidable flooding impact would be reduced, as the anticipated amount of pollutants that might be released during such an event would be less than the amount expected if the full road was constructed, resulting in an expected greater number of homes and associated potential for release of pollutants.

Noise impacts would be reduced under the Reduced Roadway Alternative when compared to the project. The reduced scale of the project would result in less excavation and grading, thereby reducing the number of truck trips associated with construction activities. Additionally, the construction schedule would be shortened, which would reduce the duration of construction-generated noise.

The Reduced Roadway Alternative would result in a reduced contribution to the region's population increase, as only the proposed single-family residence would be developed. A reduced population increase would also translate into a reduction in total vehicle miles traveled, and demand for public services, utilities and service systems, and recreational facilities. However, this reduction in demand would be minor when compared to the project.

Impacts to geology and soils would be similar to those identified for the project, as the alternative (specifically the water main) would be subject to similar geologic instability as the project. The Reduced

Roadway Alternative would include the construction of an emergency vehicle apparatus turnaround. As such, emergency vehicle access would be similar under this alternative. Additionally, the Reduced Roadway Alternative would result in similar impacts to the following resources: wildfire, minerals, land use and planning, hazards, cultural resources, and agricultural and forestry resources.

The Reduced Roadway Alternative would partially meet the project objectives, as it would allow for the construction of one single-family residence on an underutilized site that is currently zoned for single-family housing and provide routine emergency vehicle access. However, the Reduced Roadway Alternative would fall short of meeting the project objectives related to maximizing housing opportunities within the County and providing the opportunity for future development in an area zoned for single-family housing.

4.5.2 Alternative 2: Annexation

The Annexation Alternative would involve the annexation of the unincorporated area of the project site into the City prior to the occurrence of development. Under the Annexation Alternative, the City Fire Department, Police Department, and Redwood City School District would serve the entire project area. This alternative would increase the City's population by 36 people, which is well below the rate of population increase over the past 8 years, and well below the net addition of 109 people that occurred between 2017 and 2018. This net increase is within the City's expected population growth (see Table 3.14-4 in Chapter 3.14, Population and Housing) and would not constitute a substantial increase in population growth or substantially increase the demand for public services. Additionally, this population is accounted for in the Regional Housing Needs Assessment, as described in Chapter 3.14, Population and Housing. As a result, impacts to population and housing and public services would be similar to those identified for the project.

The Annexation Alternative would be consistent with City Policy BE-14.5, which directs the City to "explore annexation desires and options for the Sphere of Influence areas." In addition, the San Mateo LAFCo has a stated policy that promotes the annexation of properties requesting service extensions into unincorporated County from a neighboring City.[1]

The Annexation Alternative may change the scale of the single-family residences associated with the future developable parcels, as the City's Residential Hillside Zoning District--a zoning designation that would likely apply to the Annexation Alternative—allows for a substantially greater lot coverage allowance (40 percent) and has no maximum Floor to Area Ratio (FAR). By contrast, the County's Residential Hillside/Design Review zoning designation that would apply to the majority of the future developable parcels under the proposed project, allows for a lot coverage of 25 percent and a maximum FAR of 30 percent. Because the Annexation Alternative may result in the construction of larger residences, this alternative could result in greater impacts to some environmental resources, the most prominent of which would be aesthetics (greater lot coverage), biological resources (greater lot coverage), energy (greater square footage), greenhouse gases/air quality (greater square footage), water quality (greater impervious surfaces), and noise (longer construction duration). However, the mitigation measures provided in this EIR would adequately address any potential increase in environmental impacts associated with the construction and operation of single-family residences that have greater lot coverages and FARs. While the scale of the residences would increase, the scope of construction and operation activities would largely be similar to those described for the proposed project. As such, the mitigation measures designed to minimize construction and operation impacts for the proposed project would be directly applicable to the Annexation Alternative. Therefore, the Annexation Alternative is not anticipated to result in any additional significant impacts beyond those already discussed in this EIR.

[1] San Mateo Local Agency Formation Commission. 2019. Consideration of Adoption of Updates to Policy for Extension of Service Outside Jurisdictional Boundaries (Government Code Section 56133). March 6.

The Annexation Alternative would meet all the objectives of the proposed project.

4.5.3 Alternative 3: No Project

The No Project Alternative would maintain existing conditions at the project area. No construction of the single-family residence, roadway improvements, or developable parcels would occur. As such, no environmental impacts would occur. However, the lots associated with the proposed single-family residence and future residences could be developed at a future time, pursuant to approval of all necessary planning and building permits, and legalization of lots, in certain cases. The No Project Alternative would fail to meet any of the project objectives and underlying purpose. The No Project Alternative would not provide residential development and opportunities for future development, and would not assist in maximizing home ownership in San Mateo County.

Table 4-1. Alternative Impact Analysis

Resource Area	Project	Reduced Roadway Alternative	Annexation Alternative	No Project Alternative
Aesthetics	Less than significant with mitigation incorporated	Less than significant with mitigation incorporated (Reduced)	Less than significant with mitigation incorporated (Increased)	No impact (Reduced)
Agricultural and Forestry	No impact	No impact (Similar)	No impact (Similar)	No impact (Similar)
Air Quality	Less than significant with mitigation incorporated	Less than significant with mitigation incorporated (Reduced)	Less than significant with mitigation incorporated (Increased)	No impact (Reduced)
Biological Resources	Significant and unavoidable	Less than significant with mitigation incorporated (Reduced)	Less than significant with mitigation incorporated (Increased)	No impact (Reduced)
Cultural and Tribal Cultural Resources	Less than significant with mitigation incorporated	Less than significant with mitigation incorporated (Similar)	Less than significant with mitigation incorporated (Similar)	No impact (Reduced)
Energy	Less than significant	Less than significant (Reduced)	Less than significant (Increased)	No impact (Reduced)
Geology and Soils	Less than significant with mitigation incorporated	Less than significant with mitigation incorporated (Similar)	Less than significant with mitigation incorporated (Similar)	No impact (Reduced)
Greenhouse Gas	Less than significant with mitigation incorporated	Less than significant with mitigation incorporated (Reduced)	Less than significant with mitigation incorporated (Increased)	No impact (Reduced)
Hazards and Hazardous Materials	Less than significant with mitigation incorporated	Less than significant with mitigation incorporated (Reduced)	Less than significant with mitigation incorporated (Similar)	No impact (Reduced)
Hydrology and Water Quality	Significant and unavoidable	Significant and unavoidable (Reduced)	Significant and unavoidable (Increased)	No impact (Reduced)
Land Use and Planning	Less than Significant	Less than Significant (Reduced)	Less than Significant (Similar)	No Impact (Reduced)
Mineral Resources	No impact	No impact (Similar)	No impact (Similar)	No impact (Similar)
Noise	Less than significant with mitigation incorporated	Less than significant with mitigation incorporated (Reduced)	Less than significant with mitigation incorporated (Increased)	No impact (Reduced)
Population and Housing	Less than significant	Less than significant (Reduced)	Less than significant (Similar)	No impact (Reduced)
Public Services	Less than significant	Less than significant (Reduced)	Less than significant (Similar)	No impact (Reduced)
Recreation	Less than significant	Less than significant (Reduced)	Less than significant (Similar)	No impact (Reduced)
Transportation and Traffic	Less than significant	Less than significant (Reduced)	Less than significant (Similar)	No impact (Reduced)
Utilities and Service Systems	Less than significant	Less than significant (Reduced)	Less than significant (Similar)	No impact (Reduced)

Resource Area	Project	Reduced Roadway Alternative	Annexation Alternative	No Project Alternative
Wildfire	Less than significant with mitigation incorporated	Less than significant with mitigation incorporated (Similar)	Less than significant with mitigation incorporated (Similar)	No impact (Reduced)

4.6 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA requires the alternatives section of an EIR to describe a reasonable range of alternatives to the project that avoid or substantially lessen any of the significant effects identified in the EIR analysis while still attaining most of the basic project objectives. The alternative that most effectively reduces impacts while meeting project objectives should be considered the "environmentally superior alternative." In the event that the No Project Alternative is considered the Environmentally Superior Alternative, the EIR should identify the Environmentally Superior Alternative among the other alternatives.

Based on the alternatives analysis and comparison of impacts in Table 4-1, the No Project Alternative is the Environmentally Superior Alternative. The No Project Alternative would avoid all impacts of the project and would not create any new significant impacts of its own. However, the No Project Alternative would fail to contribute toward the Regional Housing Needs Assessment allocations identified in Table 3.14-5 in Chapter 3.14, Population and Housing, and would not benefit local communities through the creation of jobs, demand for local goods and services, and increased sales and use tax revenue. Additionally, the No Project Alternative also would fail to meet any of the basic project objectives, including the provision of housing and routine and emergency access to developable parcels. Since the Environmentally Superior Alternative is the No Project Alternative, the Reduced Roadway Alternative was identified as the Environmentally Superior Alternative among the other alternatives based strictly on an analysis of the relative environmental impacts.

The Reduced Roadway Alternative would substantially reduce impacts to biological resources and would require less ground disturbance and impervious hardscaping. However, the significant and unavoidable impact related to flooding hazards cannot be reduced to a less-than-significant level under this alternative. This alternative would only partially meet the project objectives, as it would fail to maximize home ownership within the County and provide opportunity for future development. Further, this alternative's contribution towards the County's requirements to provide housing as outlined in the Regional Housing Needs Assessment and General Plan would be reduced when compared to the project.

CHAPTER 5. OTHER CEQA CONSIDERATIONS

5.1 GROWTH-INDUCING IMPACTS

CEQA Guidelines Section 15126.2(d) requires that EIRs provide a discussion of the growth-inducing impacts of a project. Growth-inducing impacts could be caused by projects that foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Growth-inducing impacts can also be caused by removing obstacles to population growth, such as an expansion of a wastewater treatment plant. Growth-inducing impacts can result from population increases that require the construction of new community services facilities. Based on the CEQA Guidelines criteria outlined above, the project was evaluated in order to determine if any part of the project demonstrates the potential to result in growth-inducing impacts.

Although not specifically part of the proposed project, improvements made to Canyon Lane would facilitate the future development of the 11 remaining parcels on the project site by providing access and utilities. As such, the development of the 11 developable parcels within the current zoning designations was assumed and analyzed throughout the EIR as a growth-inducing impact that is a reasonably foreseeable result of approval of the project. However, as demonstrated in the EIR, population growth that would result from the construction of the developable parcels would not require the construction of new community service facilities.

The project involves the construction of one-single family residence and the potential for future development of single-family residences on 11 parcels. As described in Section 3.14, Population and Housing, the proposed project would result in the direct increase of approximately three people within the County. If full buildout of the single-family residence and developable parcels were to occur, the growth-inducing impacts of the project would result in population growth of approximately 36 people (3 in the City and 33 in the County). The project would not directly or indirectly induce population growth beyond the expected 36 residents. Population and housing growth as a result of the project is expected and planned, as these increases are accounted for in the Association of Bay Area Governments' Projections 2013 and the Regional Housing Needs Plan, respectively.[1,2] Therefore, the growth-inducing impact as a result of the project would be less than significant.

5.2 SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES

CEQA Guidelines Section 15126.2(c) requires an EIR to consider significant, irreversible environmental changes, such as use of nonrenewable resources and irretrievable commitment of resources. Section 15126.2(c) states that the use of nonrenewable resources during the initial and continued phases of a project may be irreversible if a large commitment of these resources makes their removal, indirect removal, or use thereafter unlikely.

Generally, a project would result in significant irreversible environmental changes if:

- The primary and secondary impacts would generally commit future generations to similar uses;

[1] Association of Bay Area Government. 2014. Bay Area Plan Projections 2013. San Francisco Bay Area 2010-2040. p. 84.
[2] Association of Bay Area Government. 2015. Regional Housing Needs Plan. San Francisco Bay Area 2015-2023. p. 25. Available online at https://abag.ca.gov/sites/default/files/2015-23_rhna_plan.pdf. Accessed on March 13, 2019.

- The project would involve uses in which irreversible damage could result from any potential environmental accidents associated with the project;
- The project would involve a large commitment of nonrenewable resources; or
- The proposed consumption of resources is not justified (e.g., the project involves the wasteful use of energy).

This section of the EIR evaluates whether the project would result in the irretrievable commitment of resources or would cause irreversible changes in the environment.

5.2.1 Energy Conservation

In order to ensure that energy implications are considered in project decisions, CEQA requires that EIRs include a discussion of the potential energy impacts of projects, with particular emphasis on avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy. According to Appendix F of the CEQA Guidelines, the goal of conserving energy implies the wise and efficient use of energy, including: (1) decreasing overall per capita energy consumption; (2) decreasing reliance on natural gas and oil; and (3) increasing reliance on renewable energy sources.

Nonrenewable energy consumption would occur during the project's construction and operation phases. Construction energy consumption would be primarily in the form of indirect energy inherent in the production of materials used for construction (e.g., the energy necessary to manufacture concrete or asphalt) and the fuel used by construction equipment. Construction-related energy consumption is proportional to the size of the new residences.

Nonrenewable energy consumption would occur during the project's operation phase in the form of direct and indirect consumption. Direct nonrenewable energy would be consumed for typical household purposes such as electricity consumption, heating, and for the fuel used by the future residence's personal vehicles. Indirect nonrenewable energy consumption would primarily come from the energy associated with producing goods and services that are ultimately consumed by the future residences. Operational-related energy consumption would be proportional to the size of the residences. In addition, the residence would incorporate energy efficiency and conservation measures, as required by the California Green Building Standards.

5.2.2 Irreversible Commitment of Nonrenewable Resources

CEQA Guidelines Section 15126.2(c) states that use of nonrenewable resources during the initial and continued phases of a proposed project may constitute an irreversible environmental change if a large commitment of such resources makes their removal or reuse thereafter unlikely. Nonrenewable resources such as natural gas, petroleum products, asphalt, steel, copper and other metals, and sand and gravel are considered to be commodities that are available in a finite supply. Several irreversible commitments of limited resources would result from implementation of the project. Such resources include, but are not limited to, the loss of lumber, gravel, concrete, asphalt, petrochemical construction materials, metals, and water consumption.

The loss of some subsurface resources (natural gas, petroleum products, asphalt, gravel, etc.) would occur during construction and operation of the project. However, the project is of limited scale and its contribution to this loss is limited. The project would implement federal, state, and local goals and policies directed at moving away from reliance upon fossil fuels and encouraging renewable energy. The project would incorporate energy efficiency and conservation design elements specified in Chapter 4 of the California Green Building Standards and the County's and City's Construction and Demolition Debris

Ordinance that require recycling of certain materials and products. Due to the limited scale of the project and implementation of sustainable policies, impacts would be less than significant.

5.3 SIGNIFICANT ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

In accordance with Section 15126.2(b) of the CEQA Guidelines, an EIR is required to describe the significant impacts of a project, including those that are unavoidable (i.e., those impacts for which there is no feasible mitigation or those that remain significant after mitigation is applied).

Potential environmental effects of the proposed project and proposed mitigation measures are discussed in detail in Chapter 3, Environmental Impact Analysis, of this EIR. As discussed in Section 3.10, Hydrology and Water Quality, the project site is located approximately 0.15 mile downstream of Emerald Lake Lower Dam and is in the dam inundation zone. The California Department of Water Resources, Division of Safety of Dams has determined that the dam is in satisfactory condition and a risk of catastrophic failure is low. Although the risk of dam failure is rated as low, the project area is located approximately 1.6 miles northeast of the Peninsula segment of the San Andreas Fault Zone. In the event of a catastrophic dam failure (e.g., one in which all the water is released), the majority of the project site would be inundated, resulting in flooding of the Canyon Lane roadway and residences in the canyon. Flooding would continue downstream to cover an area approximately eight blocks wide and terminating at the CalTrain railroad line near El Camino Real. Flooding of Canyon Lane would cause pollutants to be released and enter the Redwood Creek system, and eventually San Francisco Bay. The Applicant and the current and future property owners of the developable parcels along Canyon Lane would not have the ability or authority to make any improvements to the dam that would ensure that the dam would not fail in an earthquake. Therefore, this impact would be significant and unavoidable. Additional discussion pertaining to this impact are included in Section 3.10, Hydrology and Water Quality.

As discussed in Section 3.4, Biological Resources, an additional preconstruction survey would be conducted prior to the commencement of construction to ensure avoidance of San Mateo woolly sunflower— a Federally- and State-listed endangered plant species. If impacts to San Mateo woolly sunflower cannot be avoided, then this impact would be significant and unavoidable because offsite mitigation would likely not be feasible due to very limited occurrences of this species.

5.4 CUMULATIVE IMPACTS

5.4.1 Introduction

In accordance with CEQA Guidelines Section 15130, this section provides a discussion of cumulative impacts on the environment that may result from the implementation of the project when considered with past, present, and probable future projects. As defined in CEQA Guidelines Section 15355, the term "cumulative impacts" refers to two or more individual effects, which, when considered together, are considerable or that compound or increase other environmental impacts. Cumulative impacts are changes in the environment that result from the incremental impact of development of the proposed project and all other nearby "related" projects.

This section analyzes all projects within the proposed project vicinity[3] that could produce a related or cumulative impact on the local environment when considered in conjunction with the proposed project.

[3] For projects located within the City of Redwood City, all projects located within one mile of the project site were considered. For projects located with the County, all projects located within the Emerald Lake Hills Community were considered.

The potential for cumulative impacts associated with the project are discussed for each resource section addressed in the EIR.

5.4.2 Related Projects

There are 47 related cumulative projects in the project vicinity. These projects are described in Table 5-1, Cumulative Projects, and shown in Figure 5-1, Cumulative Projects. This list is not intended to be an all-inclusive list of projects in the region, but an identification of the projects approved or planned in the County and City that are closely related to the proposed project (in project type and location) and that may result in impacts that, when combined with those of the proposed project, may result in cumulatively significant effects. The Cumulative Projects are entirely comprised of other single-family residential projects, and are either new development or the demolition and redevelopment of an existing residence.

Table 5-1. Cumulative Projects

Address	Map Key Number*	Distance to Project Site (miles)
County of San Mateo		
2041 Cordilleras Road	1	0.70
368 Lakeview Way	2	0.35
264 Sylvan Way	3	0.45
649 Park Road	4	0.79
841 Bayview Way	5	0.60
Jefferson Avenue	6	0.81
752 Hillcrest Way	7	0.36
607 Handley Trail	8	0.55
Lakemead Way	9	0.41
1462 Edgewood Road	10	0.54
1265 Edgewood Road	11	0.62
740 Lakemead Way	12	0.54
608 Lakeview Way	13	0.75
25 Estrada Place	14	0.93
549 Lakemead Way	15	0.60
515 Sunset Way	16	0.56
434 B Lakeview Way	17	1.05
1750 Cordilleras Road	18	0.44
2041 Cordilleras Road	19	0.83
368 Lakeview Way	20	0.45
264 Sylvan Way	21	0.44
753 Lakeview Way	22	0.38
703 Lakemead Way	23	0.61
698 'A' Edgecliff Way	24	0.63
265 Ferndale Way	25	0.90
722 B Esther Lane	26	0.50

Address	Map Key Number*	Distance to Project Site (miles)
308 Alameda De Las Pulgas	27	0.57
City of Redwood City		
3700 block Laurel Way (Laurel Way Joint Venture)	28	0.14
131 Myrtle Street	29	0.99
Alameda de Las Pulgas	30	1.90
208 Lowell Street	31	1.02
231 Myrtle Street	32	0.96
3247 Oak Knoll Drive	33	0.13
3724 Laurel Way	34	0.10
718 Canyon Road	35	0.15
999 Blandford Boulevard	36	1.08
238 Upland Road A	37	0.72
16 Hillview Avenue	38	0.93
2635 Brewster Avenue	39	0.69
2591 Brewster Avenue	40	0.76
422 Myrtle Street	41	1.00
456 Myrtle Street	42	1.02
538 Quartz Street	43	0.79
516 Saint Francis Street	44	0.89
1603 Madison Avenue	45	0.89
903 Upton Street	46	0.73
1151 Junipero Avenue	47	1.02

Note: *These numbers correspond to the numbered locations shown in Figure 5-1, Cumulative Projects.

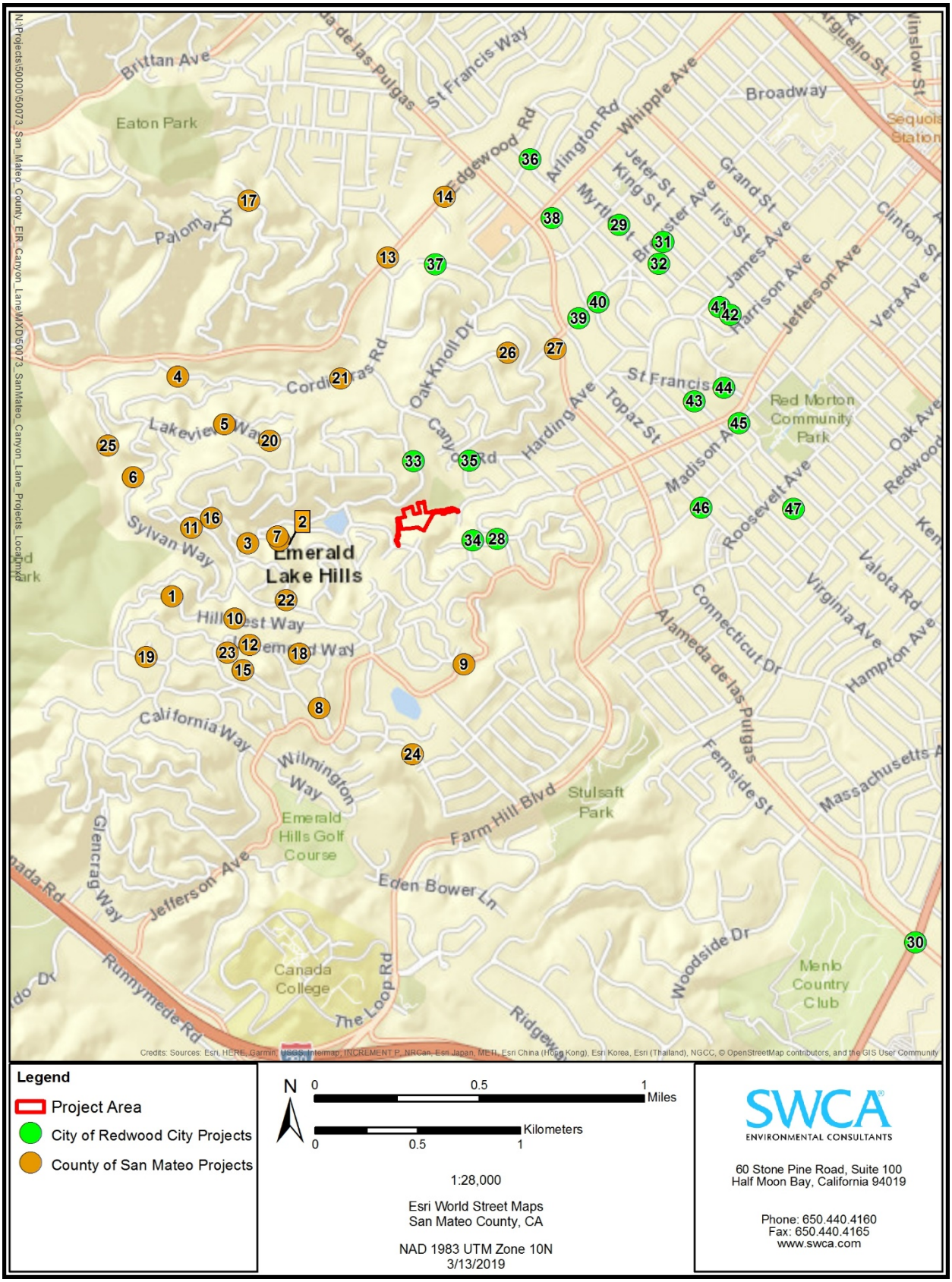


Figure 5-1. Cumulative Projects

Cumulative Impact Discussion

All resource topics included in Chapter 3, Environmental Impact Analysis, were evaluated for potential cumulative impacts when considered with the projects identified in Table 5.4-1. Each resource topic is evaluated in the subsections that follow.

Aesthetics

Cumulative impacts related to aesthetics would occur if the proposed project and other relevant project are constructed simultaneously and in close proximity to one another, creating a substantially aesthetically unpleasing landscape; or if the proposed project and Cumulative Projects would result in a substantial negative change in the foreground of one or more areas. The closest related project to the proposed project site is located within the City at 3724 Laurel Way (shown as Map Key 34 in Figure 5.4-1) and is not located within the same viewshed as the proposed project. Additionally, this related project and all other relevant projects would be primarily single-family residences, generally similar in character to the existing visual environment. Given the proposed project's less-than-significant impacts, with mitigation incorporated, to aesthetic resources and the location of the closest related project outside the proposed project's viewshed, no cumulative impacts on aesthetic resources would occur.

Agricultural and Forestry Resources

Cumulative impacts related to agricultural and forestry resources would occur if the proposed project and Cumulative Projects would convert forestry and agricultural resources or conflict with agricultural or forestry zoning. The proposed project would have no impact on agricultural or forestry resources. The Cumulative Projects are similar single-family residential projects located in a developed, urban area with no agricultural or forestry uses present. Therefore, the proposed project, combined with the Cumulative Projects, would not produce cumulatively considerable impacts.

Air Quality

A cumulative impact related to air quality would occur if the proposed project would combine with the Cumulative projects and be inconsistent with the local General Plan or 2017 Bay Area Clean Air Plan[4] The proposed project would not exceed Bay Area Air Quality Management District air quality thresholds with mitigation incorporated or conflict with the County or City General Plans. Further, other Cumulative Projects would also be required to adhere to Bay Area Air Quality Management District air quality thresholds and local General Plan requirements; therefore, the proposed project would not generate a significant aggregation of air quality pollutants. Cumulative impacts would be less than significant.

Biological Resources

Cumulative impacts related to biological resources would occur if the proposed project and other Cumulative Projects would cause a substantial aggregation of impacts on biological resources. The proposed project would have a significant and unavoidable impact on the San Mateo wooly sunflower if impacts to this plant species cannot be avoided. Considering the other Cumulative Projects would all occur within established residential neighborhoods, it is unlikely that the proposed project, when combined with the other Cumulative Projects, would result in aggregated impacts on sensitive species and/or habitat, wetlands, established wildlife corridors, or biological policies. As a result, cumulative impacts on biological resources would be less than significant.

[4] BAAQMD. 2017. *Clean Air Plan*. Available online at http://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf?la=en. Accessed March 16, 2019.

Cultural Resources

Cumulative impacts related to cultural resources would occur if the proposed project would aggregate with other Cumulative Projects to cause a substantial cumulative impact on historical, archaeological, paleontological, tribal cultural resources, or human remains. The proposed project would have less-than-significant impacts, with mitigation incorporated, on cultural and tribal cultural resources. The other Cumulative Projects would all occur within established residential neighborhoods similar to the proposed project. The Cumulative Projects would likely have similar cultural resources as the proposed project given their proximity, as well as similar environments, landforms, and hydrology. As described in the environmental setting in Section 3.5, Cultural Resources, there is no indication of any significant tribal or cultural resources located in the project area. The proposed project would require the cessation of construction activities following the discovery of any previously unidentified cultural resource. The potential impacts remaining after cessation of proposed project activities would be negligible and would not contribute to an incremental impact with the Cumulative Projects. The Cumulative Projects would also be required to follow a similar protocol with regards to the inadvertent discovery of cultural and tribal cultural resources. As such, cumulative impacts on cultural and tribal cultural resource would be less than significant.

Energy

Cumulative impacts on energy resources would occur if the proposed project and Cumulative Projects would combine to cause a substantial aggregation of impacts related to wasteful, inefficient, or unnecessary energy consumption or conflict with a state or local plan for renewable energy or efficiency. The proposed project would have less-than-significant impacts, with mitigation incorporated, on energy consumption during construction and operation. Energy consumption would occur during construction of the Cumulative Projects. However, similar to the proposed project, the construction workers would likely be sourced from local suppliers and a portion of construction waste or demolition material would also be recycled, as required by the County Waste Management Plan and City Construction and Demolition Debris Program. Operation of the Cumulative Projects would likely have energy consumption profiles similar to the project's. Assuming the development of the proposed single-family residence consumes approximately 7,763 kilowatt hours per year of electricity and approximately 42,324 kilo Btu per year of natural gas (equating to approximately 41 cubic feet), the total aggregated annual energy consumption of the Cumulative Projects combined with the project's would be approximately 380,387 kilowatt hours per year and approximately 2,073,876 kilo Btu per year (approximately 2,073 cubic feet). By comparison, in 2018, Pacific Gas and Electric Company (PG&E) delivered 79,774 gigawatt hours (1 gigawatt equals 1,000,000 kilowatts) of electricity to its customers.[5] In 2017, PG&E delivered approximately 431,005 cubic feet of natural gas to its customers, equating to approximately 444 million Btu. Therefore, total electricity and natural gas consumption of the Cumulative Projects aggregated with the proposed project would represent less than 0.01 percent of PG&E total annual energy demand.

The Cumulative Projects would be required to comply with the State, County, and City 2019 Building Energy Efficiency Standards, which require incorporation of energy-efficient materials and design standards. Therefore, the proposed project would not combine with Cumulative Projects to use energy in a wasteful or inefficient manner, and impacts would be less than significant.

[5] Pacific Gas & Electric. 2019. Energy deliveries by PG&E Corporations' from FY2013 to FY 2018 (in gigawatt hours). Available online at https://www.statista.com/statistics/591953/energy-deliveries-us-power-company-pg-and-e-corporation/. Accessed April 2, 2019.

The proposed project would result in no conflicts with state or local plans for renewable energy or energy efficiency. Therefore, the project would not combine with Cumulative Projects to result in significant cumulative impacts. Cumulative impacts would be less than significant.

Geology and Soils

Cumulative impacts related to geology and soils could occur if the proposed project and Cumulative Projects cause a substantial aggregation of impacts with regard to soil erosion, landslides, seismic hazards, or paleontological resources. The proposed project would result in less-than-significant impacts, with mitigation incorporated, on geology and soils. The Cumulative Projects would be subject to a similar range of seismic hazards with varying degrees of severity depending on various factors including the characteristics of subsurface materials, distance to active faults, topography, and others. The Cumulative Projects would be required to adhere to the same building standards as the proposed project, which would reduce seismic risks to people and property to less-than-significant levels. Therefore, the proposed project would result in less-than-significant cumulative impacts related to geology and soils.

Erosion and sediment issues could be cumulative in nature. However, similar to the proposed project, the Cumulative Projects would be required to comply with applicable standards and permitting requirements (e.g., implementation of a Stormwater Pollution and Prevention Plan [SWPPP] for projects with ground disturbance of 1 acre or more) to mitigate erosion and sediment control. Implementation of SWPPPs and other BMPs would mitigate any cumulative impacts on soil erosion and sedimentation, and cumulative impacts would be less than significant.

Proposed project impacts on paleontological resources would be less than significant with mitigation incorporated. Paleontological resources are tied to geologic units, not specific distances. Because the proposed project overlies older alluvial fan deposits (which have high paleontological sensitivity), it is possible that some or all of the Cumulative Projects overlie the same geologic deposits. Cumulative Projects that impact older alluvial fan deposits could result in significant impacts on paleontological resources. However, if there is potential to impact paleontological resources, these projects would be required to incorporate mitigation measures similar to those identified for the proposed project to mitigate any potential significant impacts to less-than-significant levels. As such, the proposed project when combined with Cumulative Projects would not result in significant cumulative impacts, and impacts would be less than significant.

Greenhouse Gases

GHG emissions are inherently a cumulative concern, in that the significance of GHG emissions is determined based on whether such emissions would have a cumulatively considerable impact on global climate change. Any proposed project emitting GHGs has the potential for an aggregation of impacts with regards to GHG and global warming. The proposed project would be consistent with all applicable plans and policies regulating GHG emissions and would not result in significant impacts with mitigation incorporated. The Cumulative Projects would be encouraged to implement all feasible mitigation measures to achieve maximum GHG reductions. As a result, cumulative impacts would be less than significant.

Hazards and Hazardous Materials

Cumulative impacts related to hazards and hazardous materials could occur through the transport, use, disposal, or accidental spill of hazardous materials, or through the unearthing of contaminated soils at the proposed project and Cumulative Project sites. The proposed project would have less-than-significant impacts on hazards and hazardous materials with mitigation incorporated. The Cumulative Projects would

likely require the use of similar hazardous material as the proposed project, such as gasoline, oil and grease to facilitate construction activities. Construction activities involving the use, transport, storage, and disposal of such hazardous materials would be conducted in compliance with all health and safety requirements such as the County and City General Plan policies, CCR Sections 337–340, and Chapter 6.95 of the California Health and Safety Code Article 1 and CCR Title 19, Public Safety, Division 2 (if required). Therefore, construction activities would not create a significant health or environmental hazard, and Cumulative impacts would be less than significant.

Similar to the proposed project, operation of the Cumulative Projects would likely not require the routine transport, use, storage, or disposal of hazardous materials except those involved in normal household activities, such as automobile fluids, cleaning products, and paints. Therefore, post-construction activities would not create a significant health or environmental hazard, and Cumulative impacts would be less than significant.

The Cumulative Projects would not occur on sites with a recorded Leaking Underground Storage Tank or occur on a hazardous waste and substance site, solid waste disposal site, or on a site with a Cease and Desist Orders and Cleanup Abatement Orders.[6,7,8,9] Therefore, the Cumulative Projects would not combine with the proposed project to expose the public, construction workers, and the environment to hazardous materials, and cumulative impacts would be less than significant.

Hydrology and Water Quality

Cumulative impacts related to hydrology and water quality could occur if the proposed project and relevant projects cause a substantial aggregation of impacts with regard to violation of water quality standards from regular discharges or polluted stormwater runoff, increased soil erosion or runoff, groundwater depletion or interference with groundwater recharge, or flooding due to construction in flood hazard areas. The proposed project would comply with the Municipal Regional Stormwater Permit, which would require the implementation of low impact development measures reduce stormwater runoff and mimic a site's predevelopment hydrology. It is anticipated that the other Cumulative Projects would be required to implement similar measures, in order to minimize erosion and drainage related impacts, as required under the California General Permit.

With respect to groundwater depletion or interference with groundwater management, the proposed project would have no impact. While the project would increase impervious surfaces, the majority of additional runoff created by the new impermeable surfaces would be retained in a bioretention swale as required by the Municipal Regional Stormwater Permit, which would allow for percolation into the groundwater table. Therefore, the proposed project could not combine with the Cumulative Projects to produce cumulatively considerable impacts.

With respect to flooding hazards, the proposed project is located within the Emerald Lake Dam inundation zone. In the event of a dam failure, flooding would cause pollutants to be released and enter the Redwood Creek system, and eventually San Francisco Bay, resulting in significant and unavoidable

[6] SWRCB. 2018. Geotracker. Available online at https://calepa.ca.gov/sitecleanup/corteselist/. Accessed March 16, 2019.

[7] DTSC. 2019. Hazardous Waste and Substances Site List. Available online at https://www.dtsc.ca.gov/SiteCleanup/Cortese_List.cfm. Accessed March 16, 2019.

[8] SWRCB. 2019. Sites Identified with Waste Constituents Above Hazardous Waste Levels Outside the Waste Management Unit. Available online at https://calepa.ca.gov/wp-content/uploads/sites/6/2016/10/SiteCleanup-CorteseList-CurrentList.pdf. Accessed March 16, 2019.

[9] SWRCB. 2019. Cease and Desist Orders and Cleanup Abatement Orders. Available online at https://calepa.ca.gov/sitecleanup/corteselist/. Accessed March 16, 2019/

impacts. Therefore, the proposed project would result in a cumulatively considerable impact in relation to hydrological resources.

Land Use and Planning

Cumulative impacts related to land use and planning could occur if the proposed project and Cumulative Projects would physically divide a community or conflict with the City or County General Plan and other regulatory policies. The proposed project would result in less-than-significant impacts on land use and planning. The Cumulative Projects would be located within established residential neighborhoods that are zoned for single-family residences (R-H and R-1 in the City and RH/DR in the County), and would not conflict with existing land use policies or zoning requirements. As such, the proposed project when combined with the Cumulative Projects would not produce a cumulatively considerable impact on land use and planning, and impacts would be less than significant.

Minerals

Cumulative impacts related to mineral resources could occur if the proposed project and the Cumulative Projects would result in the loss of mineral resources. The proposed project would have no impact on mineral resources. Therefore, the proposed project when combined with the Cumulative Projects, would not result in cumulatively considerable impacts.

Noise

Cumulative impacts related to noise would occur if two or more projects, in relatively close proximity to one another, are constructed or operate simultaneously and produce noise above average ambient noise levels or at levels that are unacceptable. The geographic scope considered for potential cumulative impacts related to noise is the area within 0.5 mile of the proposed project because sounds naturally attenuate with distance and intervening vegetation. There are 13 Cumulative Projects occurring within 0.5 mile of the proposed project, the closest of which is located approximately 0.10 mile (shown as Map Key 34 in Figure 5.4-1).

The proposed project would not exceed County and City noise thresholds and would result in less-than-significant noise impacts with mitigation incorporated. The Cumulative Projects would be required to adhere to the County and City Ordinances governing construction noise and construction timing. In addition, the proposed project area contains open space/recreational facilities and natural (unpaved) landscapes, including Coast Live Oak Forest habitat areas. These land uses and vegetative surfaces would help to attenuate construction noise generated from the Cumulative Projects nearby. Because the proposed project and Cumulative Projects would not exceed applicable noise thresholds and the surrounding landscape is conducive for attenuating construction noise generated from other nearby projects, cumulative impacts would be less than significant.

Operation of the project would produce noise similar in character and level to the current noises in surrounding neighborhoods, and would result in less than significant impacts to ambient noise levels. The Cumulative Projects would increase traffic and general neighborhood noise level; however, the noise levels would be geographically dispersed throughout the County, would be similar in character and level to existing noises in the surrounding residential neighborhoods, and would operate in accordance with the City's and County's noise thresholds for residential use. Further, nine of the 48 Cumulative Projects' residential units would involve the demolition of an existing residence and the construction of a new residence in place and therefore would not result in a net increase in population, or significant change in existing operational noise levels. Therefore, operation of the proposed project and Cumulative Projects would not combine to produce cumulatively significant impacts.

Population and Housing

Cumulative impacts related to population and housing would occur if the proposed project and Cumulative Projects would remove a significant amount of housing or directly induce substantial population growth. The proposed project would not remove housing but would directly induce population growth. Assuming the development of all 11 developable parcels, the proposed project would be expected to generate a population increase of approximately 36 people (3 in the City and 33 in the County), using the City and County average of 2.8 and 2.9 people per household, respectively. The impact of this increase in population would be less than significant.

The Cumulative Projects would result in the construction of 48 residential units.[10] Of these 48 residential units, nine would involve the demolition of an existing residence and the construction of a new residence in place and therefore would not result in a net increase in population. Of the remaining 39 residences, 24 residential units are located within the County and 15 are located within the City. Using the City and County average of people per household, these new residential units would increase population by approximately 42 people in the City and 70 people in County, for a total of 112 people. The aggregation of the proposed project and Cumulative Projects would result in the addition of 45 people in the City and 103 people in the County. The addition of 45 people to the City would result in an approximate population increase of less than 0.1 percent, which is less than the City's average annual population increase of 0.8 percent between the years 2010 and 2018. The addition of 112 people to the County would result in an approximate population increase of 0.15 percent, which is less than the County's average annual population increase of 0.8 percent between the years 2010 and 2018. Further, the addition of 45 people to the City and 112 people to the County is expected and planned, as these increases are accounted for in the Association of Bay Area Governments' Projections 2013 and the Regional Housing Needs Plan, respectively.[11,12] Therefore, the aggregation of impacts on population and housing would be considered less than significant.

Utilities and Service Systems

Cumulative impacts related to utilities and service systems could occur if the proposed project and Cumulative Projects would result in the need for new or expanded capacity for wastewater treatment, water supply, or landfill disposal. The proposed project would result in less than significant impacts on utilities and service systems. An aggregation of impacts would not occur, as the cumulative growth is expected and planned, as these increases are accounted for in the Association of Bay Area Governments' Projections 2013 and the Regional Housing Needs Plan, respectively.[13,14] As such the corresponding increases in the demand for electricity and natural gas, water, wastewater, telecommunications, and solid waste disposal capacity would be less than significant and when combined with the proposed project would not produce cumulatively significant impacts.

[10] Cumulative project 10 involves the subdivision of an existing parcel into two parcels, resulting in the net increase of two future housing units.

[11] Association of Bay Area Government. 2014. Bay Area Plan Projections 2013. San Francisco Bay Area 2010-2040. p. 84.

[12] Association of Bay Area Government. 2015. Regional Housing Needs Plan. San Francisco Bay Area 2015-2023. p. 25. Available online at https://abag.ca.gov/planning/housingneeds/pdfs/2015-23_RHNA_Plan.pdf. Accessed on March 13, 2019.

[13] Association of Bay Area Government. 2014. Bay Area Plan Projections 2013. San Francisco Bay Area 2010-2040. p. 84.

[14] Association of Bay Area Government. 2015. Regional Housing Needs Plan. San Francisco Bay Area 2015-2023. p. 25. Available online at https://abag.ca.gov/planning/housingneeds/pdfs/2015-23_RHNA_Plan.pdf. Accessed on March 13, 2019.

Public Services

Cumulative impacts related to public services could occur if the proposed project and Cumulative Projects would result in the need for new or expanded governmental facilities and services. The proposed project would result in less than significant impacts on public services. An aggregation of impacts would not occur, as the cumulative growth is expected and planned, as these increases are accounted for in the Association of Bay Area Governments' Projections 2013 and the Regional Housing Needs Plan, respectively.[15,16] As a result, cumulative impacts would be considered less than significant.

Recreation

Cumulative impacts related to recreation could occur if the proposed project and Cumulative Projects are constructed concurrently in close proximity to a recreation resource or would cause accelerated deterioration of existing recreational resources. The proposed project would have a less-than-significant impact on recreational resources. Considering the proposed project's minimal contribution to population growth and the numerous neighborhood and regional parks available in the proposed project area, the proposed project's aggregated impacts on recreational facilities when combined with Cumulative Projects would not be substantial. Therefore, any cumulative recreational resource impacts would be less than significant.

Transportation

Cumulative impacts on transportation and traffic could result if the proposed project, when combined with the Cumulative Projects, would generate significant increases in VMT. The proposed project would result in less-than-significant impacts on transportation and traffic. The proposed project would result in approximately 1,200 VMT (120 daily trips with an average of 10 miles per trip).[17] Assuming the Cumulative Projects would result in similar VMT, the proposed project's aggregated VMT would be approximately 4,900 (490 daily trips with an average of 10 miles per day). Additionally, the aggregation of the proposed project and Cumulative Projects would result in the addition of 45 people in the City and 103 people in the County, which is accounted for in the Association of Bay Area Governments' Projections 2013 and the Regional Housing Needs Plan, respectively.[18,19] Therefore, the associated increase in population and VMT would be negligible compared to the population of the County and region as a whole, and the proposed project would not combine with the Cumulative Projects to produce significant transportation and traffic impacts. Cumulative impacts would be less than significant.

Wildfire

Cumulative impacts related to wildfire could occur if the proposed project and Cumulative Projects result in greater potential to ignite wildfires. Of the 47 Cumulative Projects, 32 projects are located within the Very High, High, or Moderate Fire Hazard Severity Zone. However, these Cumulative Projects would adhere to all applicable requirements of the California Fire Code, California Government Code, California Public Resources Code, and the City and County General Plan. As a result, the proposed

[15] Association of Bay Area Government. 2014. Bay Area Plan Projections 2013. San Francisco Bay Area 2010-2040. p. 84.
[16] Association of Bay Area Government. 2015. Regional Housing Needs Plan. San Francisco Bay Area 2015-2023. p. 25. Available online at https://abag.ca.gov/planning/housingneeds/pdfs/2015-23_RHNA_Plan.pdf. Accessed on March 13, 2019.
[17] Kittelson. 2019. San Mateo County EIR for Canyon Lane Improvements – Peer Review. March 18.
[18] Association of Bay Area Government. 2014. Bay Area Plan Projections 2013. San Francisco Bay Area 2010-2040. p. 84.
[19] Association of Bay Area Government. 2015. Regional Housing Needs Plan. San Francisco Bay Area 2015-2023. p. 25. Available online at https://abag.ca.gov/planning/housingneeds/pdfs/2015-23_RHNA_Plan.pdf. Accessed on March 13, 2019.

project would not aggregate with the Cumulative Projects to create a cumulatively significant impact. Impacts would be less than significant.

CHAPTER 6. PREPARERS OF THE EIR

LEAD AGENCY

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Summer Burlison, Senior Planner
455 County Center, 2nd Floor
Redwood City, CA 94063

PROJECT APPLICANT

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Mel Casey
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Ian Todd, AICP, Project Manager

Patrick Cousineau, Deputy Project Manager/Planner

Jessica Henderson-McBean, Biologist

Katie Furstoss, Planner

Carlos Ituarte-Villarreal, Air Quality and Modeling Specialist

Juliet Bolding, Environmental Planner

Juliana Lehnen, Project Planner

Alex Wesson, Archaeologist

Jennifer Wynn, Environmental Planner

Sean Thomas, GIS Specialist

Alyssa Bell, Ph.D., Paleontologist

Liz Haines, Senior Research Editor

Barbara Sahm, Quality Assurance/Quality Control

Emily Creel, Quality Assurance/Quality Control

APPENDIX A

Arborist Reports

Mayne Tree Expert Company, Inc.

ESTABLISHED 1931 STATE CONTRACTOR'S LICENSE NO. 276793
CERTIFIED FORESTER • CERTIFIED ARBORISTS • PEST CONTROL • ADVISORS AND OPERATORS

RICHARD L. HUNTINGTON
PRESIDENT

JEROMEY INGALLS
CONSULTANT/ESTIMATOR

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January 7, 2019

Mr. Mel Casey
Casey Construction, Inc.
620 Handley Trl.
Redwood City, CA 94062

Dear Mr. Casey,

RE: 30 CANYON LANE, REDWOOD CITY (UNINCORPORATED)

On December 18, 2018, I gathered the information to produce an arborist report. This report is an update on my report dated April 3, 2012. The number of trees has changed, with some being removed and smaller ones, now large enough to be counted.

There are 14 trees included in this report. The trees not now included in the report are shown with a red "X" on the site plan. Trees to be removed due to construction are shown with a blue "X" on the site plan; they are trees numbered 1, 2, 4, 5, 6, 7, 8, 9, 12, 13, and 14. The retained trees numbered 3, 10, and 11 must be protected. Install chain link fencing supported by steel posts at the trees' driplines while still allowing for construction to proceed. See the attached *Mitigating Measures for Construction Impacts on Existing Trees.*

I recommend having excavation inspected for potential root damage. At that time, recommendations for mitigating measures can be made for the retained trees. Tree #11 is shown to be removed, but retention should be attempted; tree #10 is a large bay. Bay trees are the main vector of sudden oak death disease, *Phytophthora ramorum.* Removal of all bays is not an option, as this is native oak/bay woodland.

The tree survey has individual tree specifications with diameters estimated due to poison oak growth around the trees. Tree numbers are new, but some numbers from another survey are attached; these numbers are in parentheses on the tree survey that follows and gives reference points between the two reports.

To conclude, only trees #3 and #10 are to remain; tree #11 can remain if the retaining wall is shortened.

I think this report is accurate and based on sound arboricultural principles and practices.

Sincerely,

Richard L. Huntington
Certified Arborist WE #0119A
Certified Forester #1925

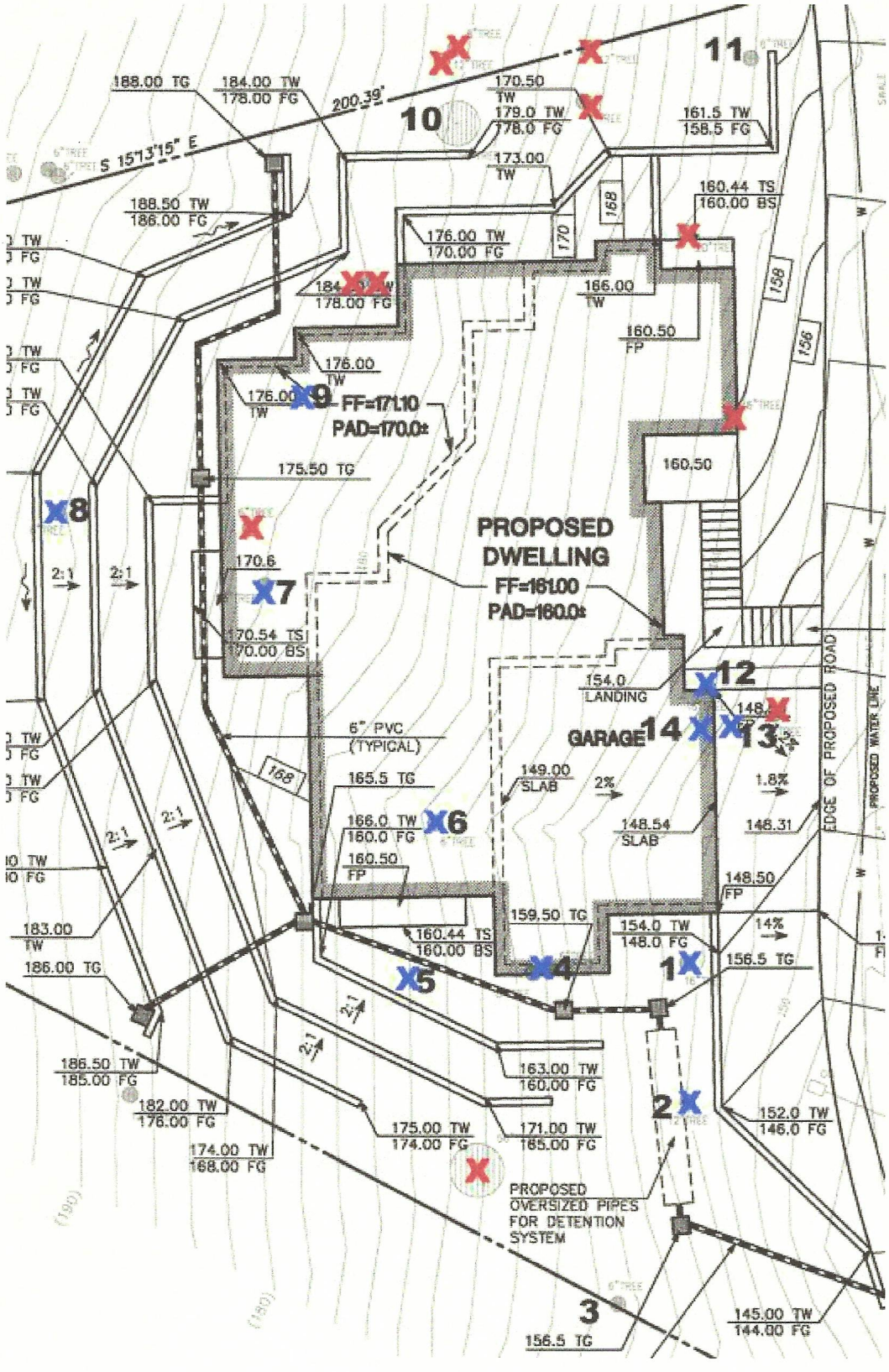
RLH:pmd





Tree Survey

Tree #	Species	Diameter (inches)	Condition (percent)	Comments
1 (17)	Valley Oak	20	50	Tree is uphill of manhole; has an uphill lean with the root crown buried. To be removed, due to proposed excavation of house & retaining wall.
2 (14)	Valley Oak	8	50	Leans toward road.
3	Valley Oak	9	55	In footprint of proposed detention system. Growing on property line with a southerly lean.
4	Buckeye	9, 9	50	Forks at 1 foot; lower fork leans into tree #1, while upper fork is horizontal. In proposed house footprint.
5	Valley Oak	16	55	Severe uphill lean & may have uprooted. In footprint of proposed drain line.
6	Bay	6	60	In proposed footprint.
7	Coast Live Oak	8	50	In proposed footprint; broken limb.
8	Bay	8	65	In footprint of proposed retaining wall system.
9	Coast Live Oak	18	60	Most growth on south side. In proposed footprint.
10	Bay	16, 16, 14, 12	55	Forks at 2 feet; canopy all sprouts from past topping. Proposed retaining wall is south of tree. Shortening the length of the wall to between contour line 180 & 182 will reduce potential impacts.
11	Bay	6	50	Tree with small stems. Shortening retaining wall by 2 to 3 feet will reduce potential impacts.
12 (18B)	Bay	12	55	In proposed footprint.
13 (18)	Coast Live Oak	16	55	30 feet north of manhole; root crown buried. Too close to excavation.
14 (18A)	Buckeye	6	50	In proposed footprint.


PROPOSED DWELLING
FF=161.00
PAD=160.0±
FF=171.10
PAD=170.0±
GARAGE
EDGE OF PROPOSED ROAD
PROPOSED WATER LINE
PROPOSED OVERSIZED PIPES FOR DETENTION SYSTEM
S 15°13'15" E
200.39'
188.00 TG
184.00 TW
178.00 FG
170.50 TW
179.0 TW
178.0 FG
161.5 TW
158.5 FG
173.00 TW
160.44 TS
160.00 BS
188.50 TW
186.00 FG
176.00 TW
170.00 FG
166.00 TW
160.50 FP
175.50 TG
170.6
170.54 TS
170.00 BS
154.0 LANDING
6" PVC (TYPICAL)
165.5 TG
149.00 SLAB
2%
1.8%
166.0 TW
160.0 FG
148.54 SLAB
148.31
160.50 FP
148.50 FP
159.50 TG
154.0 TW
148.0 FG
14%
156.5 TG
183.00 TW
186.00 TG
163.00 TW
160.00 FG
186.50 TW
185.00 FG
182.00 TW
176.00 FG
175.00 TW
174.00 FG
171.00 TW
165.00 FG
174.00 TW
168.00 FG
152.0 TW
146.0 FG
145.00 TW
144.00 FG
156.5 TG
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MITIGATING MEASURES FOR CONSTRUCTION IMPACTS ON EXISTING TREES

SECTION I: INTRODUCTION

It is an established fact that construction around existing trees will impact the trees to some degree. The degree of impact is largely predicated on the condition of the tree(s) before the construction activity begins. It is therefore important to inspect all trees prior to any construction activity to develop a "Tree Protection Program" based on the species, size, condition, and expected impact(s). A Certified Arborist (International Society of Arboriculture) is suggested for this work. The local University of California Extension, County Farm Advisors Office, or International Society of Arboriculture (ISA) website www.isa-arbor.com has the names of local certified arborists.

SECTION II: SITE PREPARATION

All existing trees shall be fenced within, at, or outside the dripline (foliar spread) of the tree using the following formula: Five inches in distance from the trunk, for every inch in trunk diameter, measured 4.5 feet above the average ground level. Example: a 24-inch diameter tree would have a fence erected 10 feet from the base of the tree (24 x 5 = 120/12 = 10). The fencing should not interfere with actual construction, but is intended to redirect unnecessary traffic and to protect limbs and roots. No storage of materials, unnecessary trenching, grading, or soil compaction shall be allowed within the dripline(s) of the tree(s). Local ordinances may have different tree protection formulae.

The chain link fencing should be a minimum of 6 feet high with 1.5-inch diameter steel pipes as posts. Moveable chain link fencing with concrete-block footings can be used if approved by the City Arborist. Once in place, fencing should not be moved.

If the fence is within the dripline(s) of the tree(s), the foliar fringe outside the fence shall be raised to offset the chance of limb breakage from construction equipment encroaching within the dripline(s). To protect roots, place a 6-inch thick layer of wood chips, overlaid with ¾-inch plywood.

Where the trunks or limbs may be impacted by equipment, trunks may be wrapped with wooden slats at least one inch thick bound securely, edge to edge, around the trunk as a Tree Wrap. A single layer, or more, of orange-plastic construction fencing is to be wrapped and secured around the outside of the wooden slats. Major scaffold limbs may require protection as determined by the City Arborist or Project Arborist.

All contractors, subcontractors, and other personnel shall be warned that encroachment within the fenced area is forbidden without the consent of the Certified Arborist on the job. This includes, but is not limited to, storage of lumber and other materials, disposed-of paints, solvents, or other noxious materials, parked cars, grading equipment, other heavy equipment or their exhaust, or allowing any fires below any protected trees. The temporary fence shall be maintained until the landscape contractor enters the job and commences landscape construction.

All tree protection measures must be in place prior to any work. If a protected tree is below construction, provide protection from any accidental liquid spill from draining into their root zones. Roots that are below hardscape areas could be impacted by chemicals that are placed below this hardscape, such as rodent or weed control chemicals.

SECTION III: GRADING/EXCAVATING

All grading plans that specify grading within the dripline of any tree or within the distance from the trunk as outlined in SECTION II when said distance is outside the dripline, shall first be reviewed by the certified arborist. The arborist shall outline provisions for aeration, drainage, pruning, tunneling beneath roots, root pruning, or other necessary actions to protect the trees. The arborist and City Arborist shall be notified prior to any excavation within the dripline of any heritage tree.

If trenching is necessary within the area, as described above, said trenching shall be undertaken by hand labor. All roots 2 inches or larger shall be tunneled and smaller roots shall be cut smoothly to the side of the trench. The side of the trench should be draped immediately with four layers of untreated burlap to a depth of 3 feet from the surface. The burlap shall be soaked nightly and left in place until the trench is backfilled to the original level. The arborist shall examine the trench prior to backfilling to ascertain the number and size of roots cut and to suggest further remedial repairs. Documenting large root encounters will help with future mitigating treatments.

SECTION IV: REMEDIAL REPAIRS, PENALTIES

The arborist on the job shall have the responsibility of observing all ongoing activities that may affect the tree(s) and prescribing necessary remedial work to insure the health and stability of said tree(s). This includes, but is not limited to, all arborist activities specified in SECTIONS I, II, and III. In addition, pruning, as outlined in the "Pruning Standards" of the Western Chapter of the International Society of Arboriculture, shall be prescribed as necessary. Fertilizing, mulching, aeration, irrigation, drainage, pest control, and other activities shall be prescribed according to the tree needs, local site requirements, and State Agricultural Pest Control Laws. All specifications shall be in writing. For a list of licensed pest control operators or advisors, consult the local County Agricultural Commissioner's Office or California Department of Pesticide Regulation.

Penalties, based on the cost of remedial repairs and the appraised values provided in the Evaluation Guide published by the International Society of Arboriculture, shall be assessed for damages to the trees. Do not damage any roots, limbs, or trunks. Do not attach any cables, chains, etc. to any protected tree.

SECTION V: FINAL INSPECTION

Upon completion of the project, the arborist shall review all work undertaken that impacted the existing trees. Special attention shall be given to cuts and fills, compaction, drainage, pruning, and future remedial work. The arborist should submit a final report in writing outlining the ongoing remedial care following the final inspection.

PREPARED BY THE MAYNE TREE EXPERT COMPANY – JANUARY 1, 1994

REVISED – MAY 11, 2016

Mayne Tree Expert Company, Inc.

ESTABLISHED 1931 — STATE CONTRACTOR'S LICENSE NO. 276793

CERTIFIED FORESTER • CERTIFIED ARBORISTS • PEST CONTROL • ADVISORS AND OPERATORS

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EMAIL: info@maynetree.com

November 1, 2016
(Revised March 7, 2017)

Mr. Mel Casey
Casey Construction, Inc.
619 Sylvan Wy.
Redwood City, CA 94062

Dear Mr. Casey,

RE: CANYON LANE, REDWOOD CITY (UNINCORPORATED)

At your request, I visited the above-referenced site to inspect and comment on trees along an existing road that could be impacted by the expansion and paving of that road.

Method

Each tree was identified and given a number. This number is scribed onto a metal foil tag and placed at eye level on the trunk of the tree. The identification numbers were also placed on the provided site map to show the approximate locations of the trees on the site. The diameter of each tree was found by measuring its trunk at 54 inches off the natural grade as described in the San Mateo County Significant Tree Ordinance. The height and canopy spread of each tree was estimated to show the tree's approximate dimensions. A condition rating was then given to each tree; this rating is based on form and vitality and can be further defined by the following table:

0	–	29	Very Poor
30	–	49	Poor
50	–	69	Fair
70	–	89	Good
90	–	100	Excellent

Lastly, a comments section is provided to give more individual detail for each tree.

Tree Survey

Tree #	Species	Diameter (inches)	Condition (percent)	Height (feet)	Spread (feet)	Comments
1	Monterey Cypress	9.5	65	25	18	Root crown covered; wound on northeast side of the trunk; poorly attached limb at 4½ feet; measured below limb.
2	Coast Live Oak	15.6	45	20	24	Root crown covered; two-stem at 1 foot (measured below two-stem attachment); smaller stem has grown through the fence; several codominant attachments in the upper canopy.
3	Monterey Pine	27.8	65	40	27	Root crown covered; large deadwood present; fair vigor and form.
4	Valley Oak	19.4	50	30	36	Root crown covered; several codominant attachments in the canopy; abundance of interior deadwood; most of the canopy growth is to the west; fair vigor.
5	Coast Live Oak	34.2	50	45	42	Root crown covered; located on north side of road; codominant at 3 feet with included bark; measured below codominant attachment; low leader growing over the road; abundance of interior deadwood and sprouts; excess end weight on the lateral limbs.
6	Valley Oak	7.5 (est.)	45	30	12	Root crown covered; Poison Oak around the trunk and base; leans east; good vigor.
7	Buckeye	8.0 (est.)	50	12	18	Root crown covered; four-stem at base; no tag; Poison Oak around the base.
8	California Bay Laurel	13.8	50	35	15	Partially covered root crown; located on the north side of road; codominant at 10 feet; tip dieback present in the upper canopy.
9	Valley Oak	33.3	45	45	51	Partially covered root crown; located on the north side of road; codominant at 15 feet; leans heavily to the southwest; large deadwood present; fair vigor.
10	Valley Oak	7.2	45	40	12	Root crown covered; leans northeast; codominant at 8 feet with included bark; good vigor.
11	Valley Oak	11.6	40	20	24	Root crown covered; top leans heavily to the south; good vigor, poor form; Poison Oak around the trunk.

Tree #	Species	Diameter (inches)	Condition (percent)	Height (feet)	Spread (feet)	Comments
12	Valley Oak	7.0	40	20	15	Root crown covered; significant lean to the southeast; good vigor, poor form.
13	California Bay Laurel	14.0, 8.3	40	35	18	Root crown covered; two-stem at the base; healthy canopy located on north side of the road.
14	Valley Oak	8.3	45	25	18	Root crown covered; significant lean to the north; good vigor.
15	Buckeye	18.0 (est.)	50	20	27	Root crown covered; five-stem at base; side-pruned along the road; good vigor; located on the north side of road.
16	California Bay Laurel	14.0 (est.)	40	30	27	Root crown covered; two-stem at the base; lower trunk covered by Poison Oak; tip dieback present in the upper canopy; wound on the trunk at 1 foot on the southeast side; no tag.
17	Valley Oak	28.8	50	35	24	Root crown covered; leans southeast; large dead limbs present; fair vigor.
18	Coast Live Oak	20.4	50	30	36	Root crown covered; slight lean to the west; heavy lateral limbs.
18A	Buckeye	7.9, 3.9	60	25	21	Leans north; two-stem at base; partially covered root crown; moderate amount of interior deadwood.
18B	California Bay laurel	13.8	50	35	21	Partially covered root crown; abundance of lower deadwood; several poorly attached limbs present.
19	Coast Live Oak	12.0 (est.)	45	18	21	Located on the north side of road; root crown covered; canopy leans over the road; codominant at 5 feet; Poison Oak around the base.
20	California Bay Laurel	18.0 (est.)	45	35	33	Root crown covered; three-stem at the base; located on the north side of road; canopy leans over the road; several codominant attachments in the upper canopy.
21	California Bay Laurel	11.3	65	30	15	Partially covered root crown; located on the north side of road; fair form and vigor; wound at 3 feet on the east side of the trunk.
22	Coast Live Oak	11.4	45	25	18	Root crown covered; located on the north side of road; top leans over the road; large interior deadwood present; fair vigor.

Tree #	Species	Diameter (inches)	Condition (percent)	Height (feet)	Spread (feet)	Comments
23	California Bay Laurel	11.3	40	35	27	Root crown covered; codominant at 8 feet; large dead limbs present; portion of the canopy leans over the road.
24	Coast Live Oak	9.0 (est.)	40	15	18	Root crown covered; codominant at 4 feet; vines cover the trunk; small portion of the canopy overhangs the road.
25	Coast Live Oak	16.0 (est.)	45	35	39	Root crown covered; codominant at 1 foot; vines on the trunk; abundance of interior deadwood, some large; good vigor.
26	California Bay Laurel	11.9	45	45	21	Partially covered root crown; codominant at 12 feet; fair vigor and form.
27	Coast Live Oak	8.9	25	12	9	Partially covered root crown; mostly dead.
28	Coast Live Oak	14.6	50	30	21	Partially covered root crown; adjacent 6-inch diameter stub near the base; top leans south; poor form.
29	California Bay Laurel	9.0, 5.2, 4.4	40	30	24	Root crown covered; three-stem at base; poor form.
30	Coast Live Oak	11.0 (est.)	45	30	24	Partially covered root crown; cavity present on south side of the trunk; top leans east; poor form; Poison Oak around the base; no tag.
31	Monterey Cypress	41.9	40	50	39	Significant decay on the south side of the trunk; partially covered root crown; abundance of interior deadwood; slight lean to the north; heavy lateral limbs.
32	Monterey Cypress	23.1	35	35	39	Partially covered root crown; one-sided canopy growth; top leans to the southeast; abundance of interior deadwood.
33	Plum	10.2	30	25	21	Root crown covered; significant lean northwest; broken top; poor form.
34	Coast Live Oak	9.8, 9.8	40	18	21	Root crown covered; codominant at base; cavity at base; tops lean northwest; poor form.
35	Coast Live Oak	13.1	45	18	36	Partially covered root crown; significant lean to the northwest; stag-headed crown; poor form.

Tree #	Species	Diameter (inches)	Condition (percent)	Height (feet)	Spread (feet)	Comments
36	Coast Live Oak	18.1	50	35	30	Top leans southwest; good vigor; large interior deadwood present; located on the north side of road.
37	California Bay Laurel	12.7	30	35	12	Top mostly dead; partially covered root crown; abundance of trunk sprouts; lower portion of the trunk is hollow.
37A	Coast Live Oak	11.5	45	35	15	Partially covered root crown; leans southwest; small cavity at 6 feet; upper limb in contact with adjacent tree.
38	Coast Live Oak	9.4	40	30	21	Partially covered root crown; top leans southeast; poor form, fair vigor.
39	California Bay Laurel	15.7	45	45	27	Sprouts around the base; multi-stem top; good vigor.
40	California Bay Laurel	8.2	50	45	18	Sprouts around the base; slight lean northwest; codominant top at 35 feet.
41	California Bay Laurel	13.7, 14.1	45	40	48	Root crown covered; codominant at base; tops growing north; large deadwood present; good vigor, poor form.
42	Coast Live Oak	23.4	30	35	36	Root crown covered; bark lifting off of the trunk; lower trunk is hollow; leans southwest; poor form; large dead limbs present.
43	California Bay Laurel	28.0 (est.)	40	45	36	Root crown covered; three-stem at the base; Poison Oak around the base; fair vigor and poor form; no tag; located on the north side of road.
44	California Bay Laurel	Average Diameter is 15.0	35	40	27	Total of five trees; two are dead and the remaining three are alive; root crown covered; Poison Oak around the base; no tag.
45	California Bay Laurel	29.0 (est.)	45	50	18	Located on the north side of road; overhanging drainage swale; slight lean north; no tag; three-stem at 18 feet with included bark; good vigor; poor form.
45A	California Bay Laurel	13.1, 13.2	45	45	42	Partially covered root crown; codominant at 2 feet; leans east; moderate amount of interior deadwood; heavy lateral limbs; located on a hillside.
45B	Valley Oak	25.0	50	45	39	Root crown covered; two-stem at 10 feet; large deadwood present; good vigor.

Tree #	Species	Diameter (inches)	Condition (percent)	Height (feet)	Spread (feet)	Comments
45C	California Bay Laurel	19.9, 8.7, 7.3	35	40	39	Root crown covered; tip dieback present; three-stem at base with one stem partially failed across the swale; top leans northeast.
46	Coast Live Oak	12.9	70	40	27	Partially covered root crown; good vigor and form.
47	Coast Live Oak	10.0	40	20	18	Cavity at the base; leans south; cavity at 8 feet; poor form and fair vigor.
47A	California Bay Laurel	8.9	45	25	27	Partially covered root crown; codominant at 2 feet; trunk measured below codominant attachment; leans southwest; abundance of interior deadwood.
48	Valley Oak	10.2	45	25	18	Root crown covered; top leans east over the easement; good vigor and poor form.
49	Valley Oak	14.9	50	30	27	Root crown covered; codominant at 8 feet; fair vigor and form; slight lean east.
50	Coast Live Oak	12.0 (est.)	35	18	15	Located behind a fence downhill; no tag; canopy is covered with Poison Oak; leans significantly uphill to the southeast.
51	Coast Live Oak	15.0 (est.)	40	15	18	Root crown covered; three-stem at 4 feet; located above a retaining wall; moderate amount of deadwood.
52	Coast Live Oak	12.0 (est.)	0	12	15	Tree is dead and covered in ivy.
53	Coast Live Oak	17.3	45	40	33	Root crown covered; old wound at the base on east side of the trunk; frass at the base in same area; slight lean west; ivy on the trunk.
54	Valley Oak	9.0 (est.)	40	30	27	Root crown covered; two-stem at 3 feet; slight lean southwest; good vigor; no tag.
54A	California Bay Laurel	26.6	45	45	36	Partially covered root crown; ivy growing up the trunk into the canopy; several codominant attachments present in the canopy; heavy lateral limbs, leans northeast.
54B	California Bay Laurel	6.6	30	20	12	Partially covered root crown; leans west.
54C	California Bay Laurel	9..6	30	25	18	Significantly covered root crown; ivy on the trunk growing into the upper canopy and covering the top; top leans significantly due to ivy growth.

Recommendations

Due to the type of project, I recommend removing all the trees that are designated for removal prior to performing any tree maintenance. After the removal stage of the project is completed, I recommend safety pruning to eliminate potentially hazardous large dead limbs, heavy lateral limbs, and exposing the root crowns of the trees to give them the best chance of survival into the future. All work performed shall be done by a qualified licensed tree care professional.

Observations

The location of this project is in a canyon. On one side of the existing road is a drainage swale and on the other is a steep hillside. All the trees on this report have received little-to-no maintenance in the past beyond clearance for the existing road. Many of these trees have an abundance of interior deadwood, poor form, and their root crowns are covered by soil and other organic material.

The majority of trees located on the northern side of the existing road are located on a drainage swale. These trees will be only partially affected by the expansion of the new road, as the majority of work is taking place on the opposite side of the existing road to minimize impact on the swale.

To complete the proposed construction plan, there is a list of trees that will need to be removed. I have identified these trees as #1, #3, #4, #6, #10, #11, #12, #14, #18, #18A, #18B, #26, #27, #28, #32, #33, #34, #35, #37, #37A, #38, #39, #40, #41, #42, #45, #45A, #45B, #46, #47, #47A, and #54C . All of the previously-mentioned trees are either in poor condition or will be severally impacted by the proposed construction.

The remaining trees indentified in this report, #2, #5, #7, #8, #9, #13, #15, #16, #17, #19, #20, #21, #22, #23, #24, #25, #29, #30, #31, #36, #43, and #44 that are located along the road will be partially impacted by the proposed construction. Either their canopies will need to be raised to provide adequate clearance for the construction traffic or portions of their root zones will be impacted by grade changes and the installation of asphalt for the new road.

Trees #48-#54C are located along a path that is part of a proposed water main installation. Of these trees, only trees #53 and #54C will be removed as a result of this water main installation. The new water main is an 8-inch diameter pipe that will require an excavated trench within the driplines of the identified trees. This trench should have minor impact on the trees' root zones but should not cause significant damage to the trees' health or structural integrity.

Tree #1 will be removed.

Tree #2 will have roughly 45 percent of its root zone impacted by the installation of the new pavement. This tree has adapted to the current compaction associated with the existing road; therefore, any new construction taking place within the footprint of the existing road should have only minimal impact on the future health of this tree.

Tree #3 will be removed.

Tree #4 will be removed.

Tree #5 will have roughly 50 percent of its root zone impacted by the proposed drive. This tree has adapted to the current compaction associated with the existing road; therefore, any new construction taking place within the footprint of the existing road should have only minimal impact on the future health of this tree. The base of this tree is very near the edge of the new road and, in the future, may cause damage to the road. I recommend hand digging along the edge of the road near the tree's trunk and identifying any roots near this area. Once excavated, an inspection shall take place to determine the next course of action.

Tree #6 will be removed.

Tree #7 will be partially impacted by the installation of the new drainage culvert. Depending on how close the new construction will be, this tree may need to be removed. An inspection shall take place during the excavation for the new drainage lines.

Tree #8 will be partially impacted by the installation of the new road. This tree has adapted to the current compaction associated with the existing road; therefore, any new construction taking place within the footprint of the existing road should have only minimal impact on the future health of this tree. An inspection shall take place during the excavation for the new road.

Tree #9 will be impacted by the installation of the new road. This tree has adapted to the current compaction associated with the existing road; therefore, any new construction taking place within the footprint of the existing road should have only minimal impact on the future health of this tree. An inspection shall take place during the excavation for the new road. A portion of this tree's canopy may need to be raised for future vehicle clearance.

Tree #10 will be removed.

Tree #11 will be removed.

Tree #12 will be removed.

Tree #13 will be impacted by the installation of the new road. This tree has adapted to the current compaction associated with the existing road; therefore, any new construction taking place within the footprint of the existing road should have only minimal impact on the future health of this tree. An inspection shall take place during the excavation for the new road. A portion of this tree's canopy may need to be raised for future vehicle clearance.

Tree #14 will be removed.

Tree #15 will be impacted by the installation of the new road. This tree has adapted to the current compaction associated with the existing road; therefore, any new construction taking place within the footprint of the existing road should have only minimal impact on the future health of this tree. An inspection shall take place during the excavation for the new road. A portion of this tree's canopy may need to be raised for future vehicle clearance.

Tree #16 will be impacted by the installation of the new road. This tree has adapted to the current compaction associated with the existing road; therefore, any new construction taking place within the footprint of the existing road should have only minimal impact on the future health of this tree. An inspection shall take place during the excavation for the new road. A portion of this tree's canopy may need to be raised for future vehicle clearance.

Tree #17 will be impacted by the installation of the new road. This tree has adapted to the current compaction associated with the existing road; therefore, any new construction taking place within the footprint of the existing road should have only minimal impact on the future health of this tree. An inspection shall take place during the excavation for the new road. A portion of this tree's canopy may need to be raised for future vehicle clearance.

Trees #18, #18A, and #18B will all be removed.

Trees #19, #20, #21, #22, #23, #24, and #25 will be impacted by the installation of the new road. These trees have adapted to the current compaction associated with the existing road; therefore, any new construction taking place within the footprint of the existing road should have only minimal impact on the future health of these trees. An inspection shall take place during the excavation for the new road. A portion of these trees' canopies may need to be raised for future vehicle clearance.

Trees #26, #27, and #28 will be removed.

Tree #29 will be impacted by the installation of the new road. This tree has adapted to the current compaction associated with the existing road; therefore, any new construction taking place within the footprint of the existing road should have only minimal impact on the future health of this tree. An inspection shall take place during the excavation for the new road. A portion of this tree's canopy may need to be raised for future vehicle clearance.

Trees #30 and #31 will be impacted by the installation of the new road. These trees have adapted to the current compaction associated with the existing road; therefore, any new construction taking place within the footprint of the existing road should have only minimal impact on the future health of these trees. An inspection shall take place during the excavation for the new road. A portion of the trees' canopies may need to be raised for future vehicle clearance.

Trees # 32, #33, #34, and #35 will be removed.

Tree #36 should not be impacted by the proposed construction.

Trees #37, #37A, #38, #39, #40, #41, and #42 will be removed.

Trees #43 and #44 should not be impacted by the proposed construction.

Tree #45, #45A, and #45B will be removed.

Tree #45C will be partially impacted by the proposed construction as a portion of its canopy is growing over the proposed construction area and will need to be removed.

Trees #46, #47, and #47A will be removed.

Trees #48, #49, #50, #51, and #52 will be partially impacted by the trench for the new water line. This trench is far enough away from the base of the trees to have only minimal impact on their current and future health. During the excavation, any roots larger than two inches in diameter should be left intact and tunneled under.

Trees #53 and #54 will be removed.

Trees #54A and #54B will be partially impacted by the new trench; however, the overall impact will be minor. During the excavation, any roots larger than two inches in diameter should be left intact and tunneled under.

Tree #54C will be removed.

TREE PROTECTION SPECIFICATIONS

1. Tree protection fencing shall be established along the line designated as "Limit of Disturbed Area" shown on the provided site maps. This fencing should consist of 4-foot tall orange plastic fencing supported by metal stakes that are a maximum of 10 feet apart driven into the ground approximately 2 feet deep.
2. **Avoid the following conditions.**
   DO NOT:
   a. Allow runoff or spillage of damaging materials into the area below any tree canopy.
   b. Store materials, stockpile soil, or park or drive vehicles within the Tree Protection Zone (TPZ).
   c. Cut, break, skin, or bruise roots, branches, or trunks without first obtaining authorization from the City Arborist.
   d. Allow fires under and adjacent to trees.
   e. Discharge exhaust into foliage.
   f. Secure cable, chain, or rope to trees or shrubs.
   g. Trench, dig, or otherwise excavate within the dripline or TPZ of the tree(s) without first obtaining authorization from the City Arborist.
   h. Apply soil sterilants under pavement near existing trees.
3. Avoid injury to tree roots. When a ditching machine, which is being used outside of the dripline of trees, encounters roots smaller than 2 inches, the wall of the trench adjacent to the trees shall be hand trimmed making clear, clean cuts through the roots. All damaged, torn, and cut roots shall be given a clean cut to remove ragged edges, which promote decay. Trenches shall be filled within 24 hours; but, where this is not possible, the side of the trench adjacent to the trees shall be kept shaded with four layers of dampened, untreated burlap, wetted as frequently as necessary to keep the burlap wet. Roots 2 inches or larger, when encountered, shall be reported immediately to the Project Arborist, who will decide whether the Contractor may cut the root as mentioned above or shall excavate by hand or with compressed air under the root. The root is to be protected with dampened burlap.

4. Any damage due to construction activities shall be reported to the Project Arborist or City Arborist within six hours so that remedial action can be taken.

5. Violation of any of the above provisions may result in sanctions or other disciplinary action.

6. A certified arborist shall be contracted as the site arborist. The site Arborist should be on call to do onsite inspections during any excavation that happens within the dripline(s) of protected tree(s) that is (are) to remain.

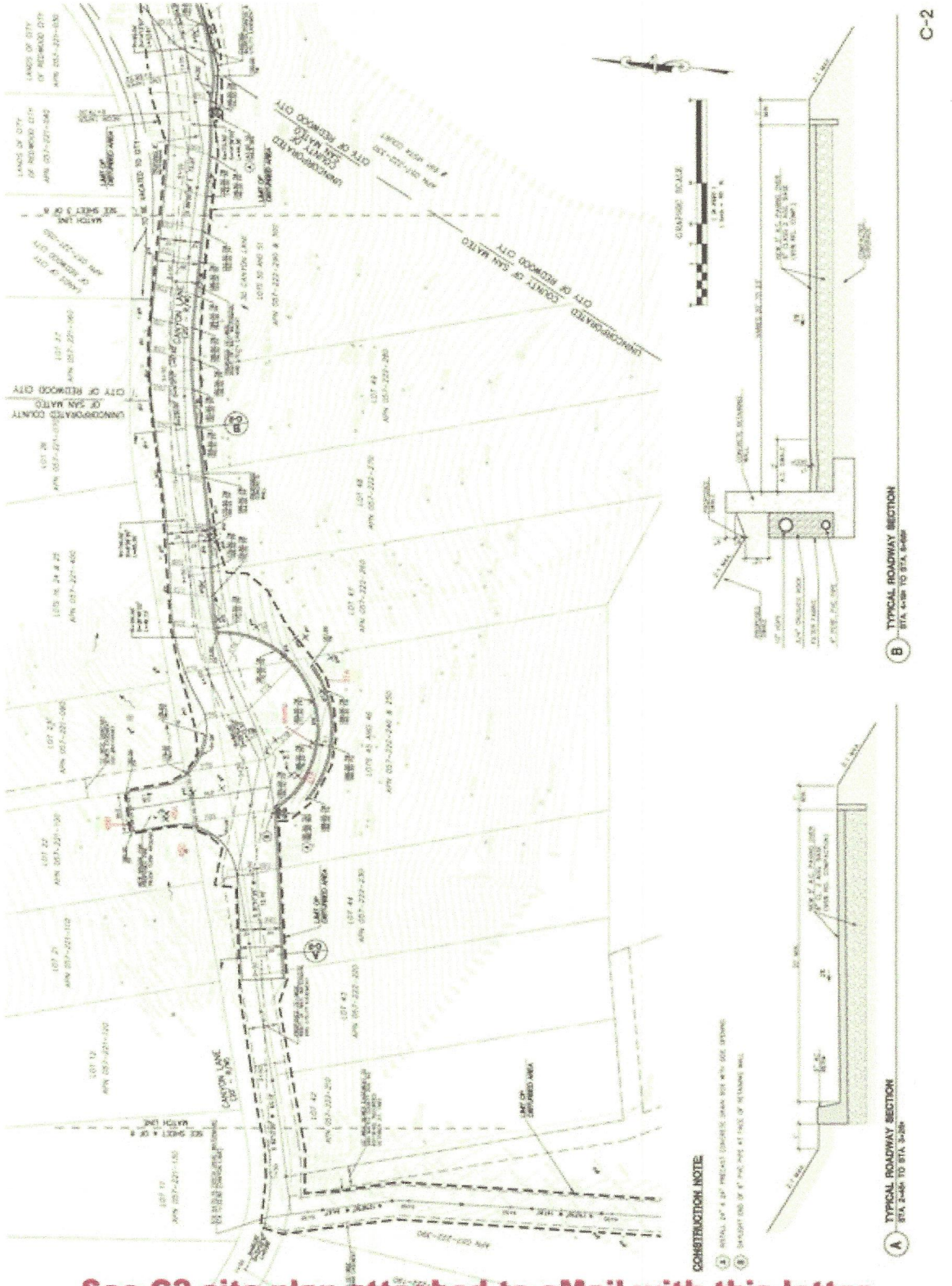
I believe this report is accurate and based on sound arboricultural principles and practices. If I can be of further assistance, please contact me at my office.

Sincerely,

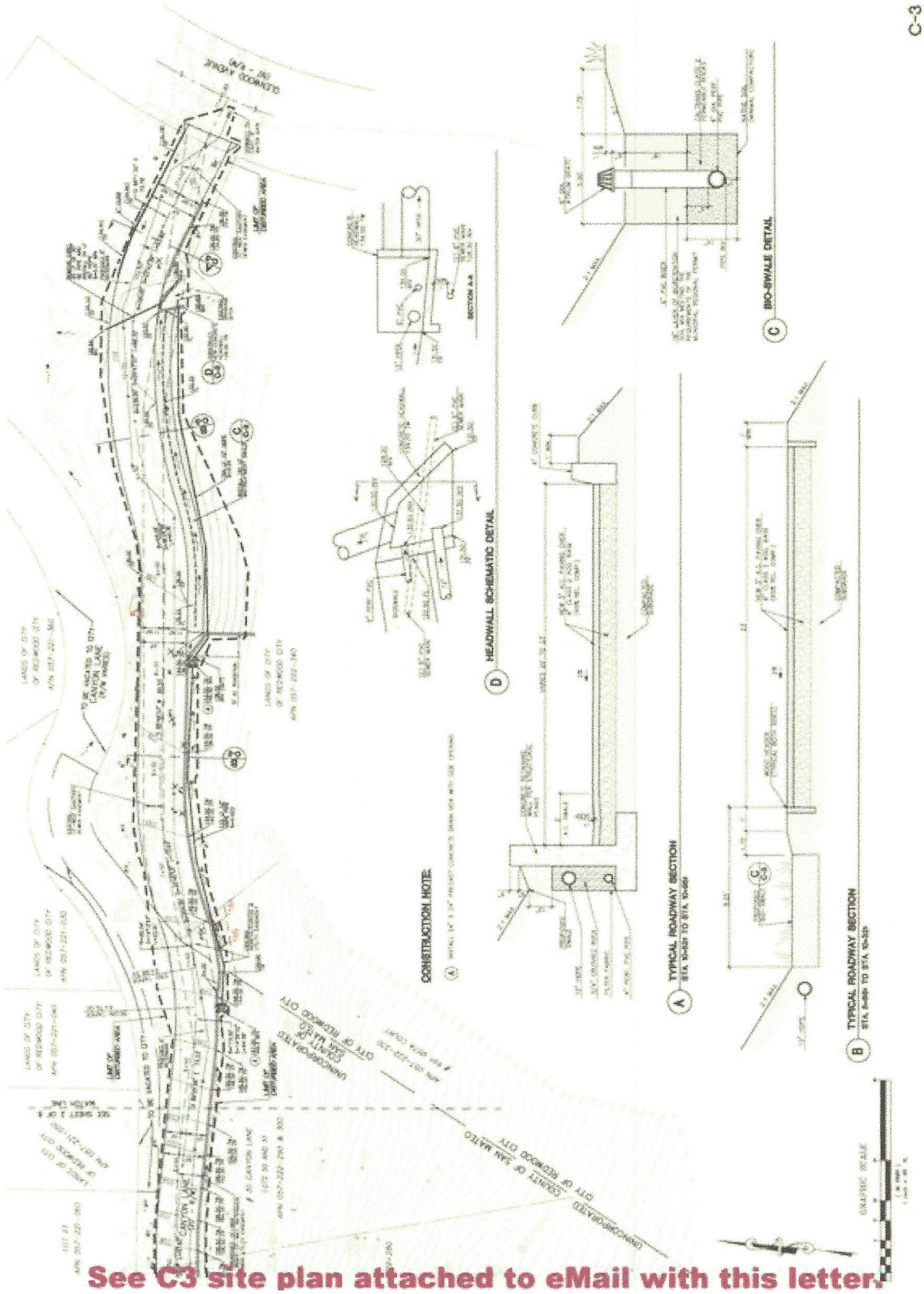
Jeromey A. Ingalls
Certified Arborist WE #7076A

JAI:pmd





See C2 site plan attached to eMail with this letter.


C-3
HEADWALL SCHEMATIC DETAIL
BIO-SWALE DETAIL
TYPICAL ROADWAY SECTION
TYPICAL ROADWAY SECTION
CONSTRUCTION NOTE
See C3 site plan attached to eMail with this letter.



See C4 site plan attached to eMail with this letter.

APPENDIX B

Traffic Study

CANYON LANE
EMERALD LAKE HILLS
UNINCORPORATED SAN MATEO COUNTY, CALIFORNIA

RECEIVED
JUL 18 2017
San Mateo County
Planning Division

November 22, 2016
Revised May 22, 2017

PROJECT DESCRIPTION

Canyon Lane is presently a paper street located in the Emerald Lake Hills area of unincorporated San Mateo County adjacent to the City of Redwood City. See Location Map, Figure 1, page 2. Construction of the street will open up a number of vacant parcels to development. Twelve parcels could be developed with single family detached housing. The realigned street will connect to Glenwood Avenue and extend westerly 880 feet into the undeveloped area. See Site Plan, Figure 2, page 3.

The first step in the development will be the installation of an eight inch water main to provide water and fire protection to the abutting parcels. Following the water main installation, grading for the street and installation of drainage works will be done and then the street will then be paved. It is estimated that all this work can be done in 2017.

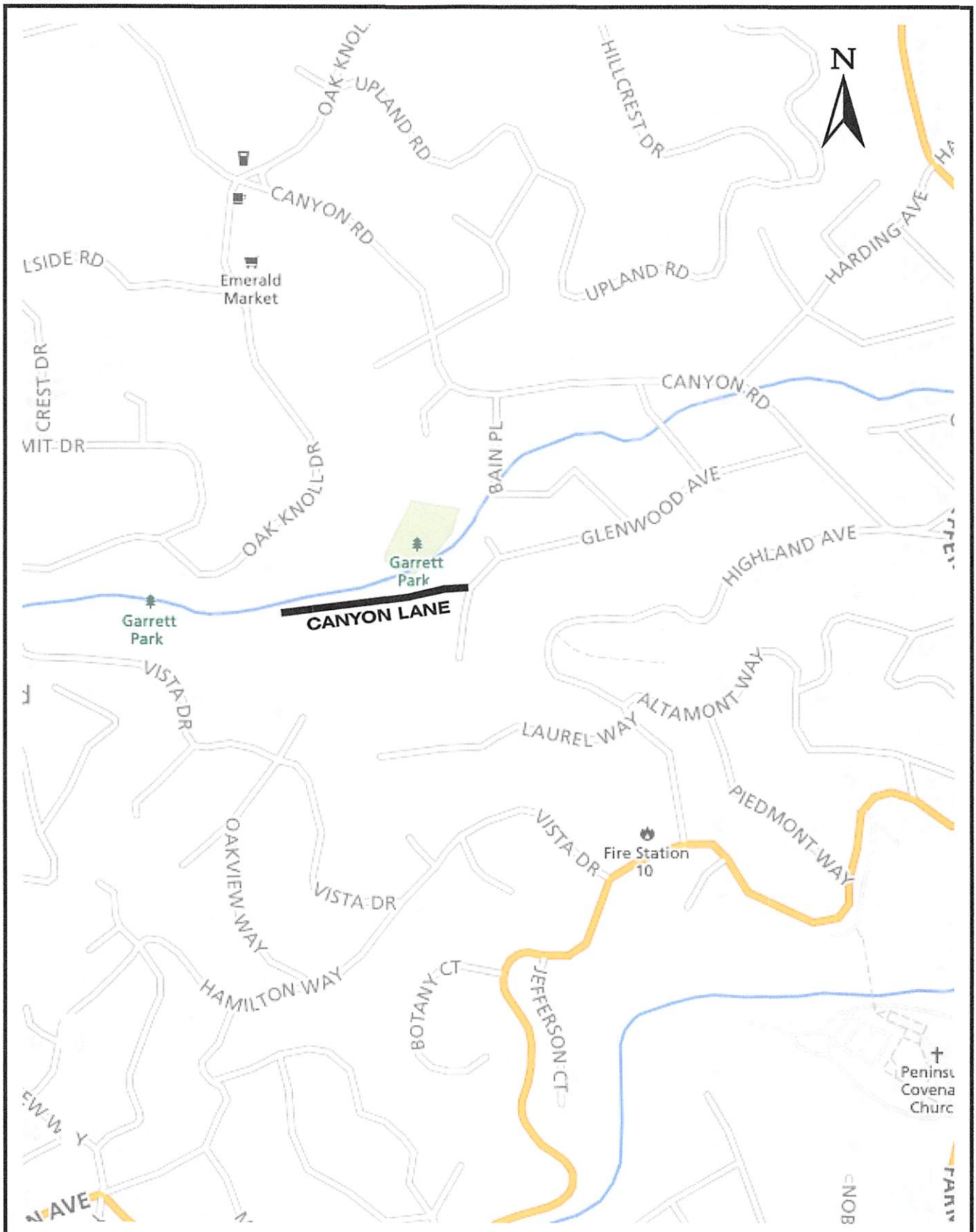
Development of the 12 individual parcels will likely be done over many years as they are presently owned by four separate owners. Development of the parcels will occur at such time when the individual owners deem appropriate and desirable. The site is located next to Garrett Park so vehicular access to the parcels will be controlled by an electric gate controlled by the owners of the parcels to preclude the public from parking in the site.

PROJECT TRAFFIC IMPACTS

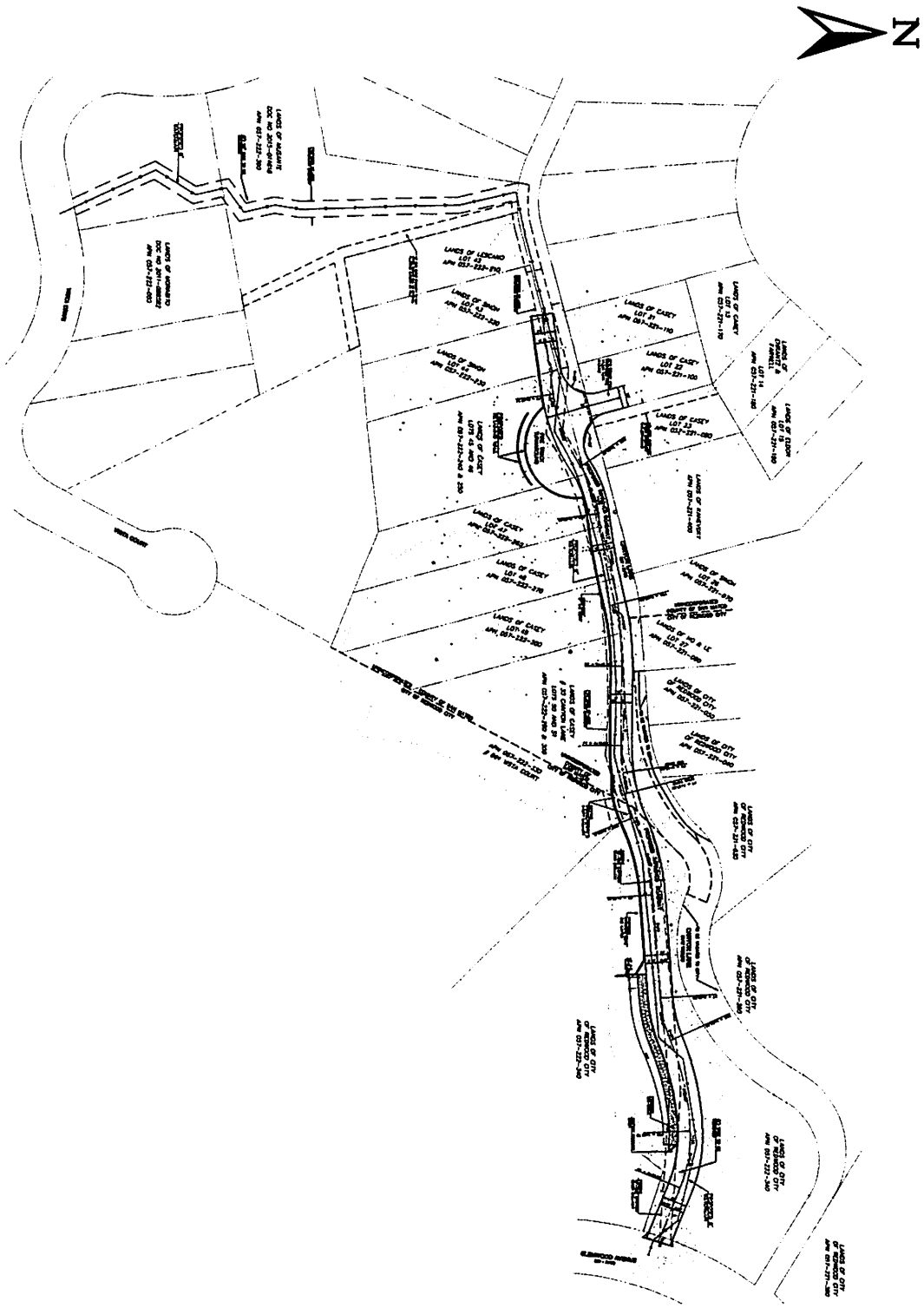
Traffic counts were taken on Glenwood Avenue in two locations in November, 2016, the first near Garrett Park and the second near Canyon Road. Figure 3, Glenwood Avenue Traffic Volumes, page 4, shows the change in traffic as a result of full development of the 12 parcels on Canyon Lane. A measure of the impact of traffic on residential streets is by use of the TIRE Index. An explanation of the TIRE Index is provided in the Appendix. A change in the TIRE Index by 0.1 or more indicates a visibly recognizable change in traffic. The changes in TIRE Index were calculated to be 0.27 on Glenwood Avenue near Garrett Park and 0.10 near Canyon Road. If these changes were to occur in a relatively short period of time, say within a year or so, then it could be taken as an impact on the traffic flow on Glenwood Avenue. However, because the development of the 12 parcels will likely occur over many years, possibly upwards of 10 years, this change in traffic will not be readily noticeable, and, therefore, not an impact.

PARKING

Each single family detached dwelling unit will have a 2-car garage and a driveway capable of accommodating two additional vehicles. There will also be an area on Canyon Lane near the intersection of Canyon Lane & Glenwood Avenue that could accommodate parking up to seven



LOCATION MAP
FIGURE 1



SITE PLAN
FIGURE 2



KEY

EXISTING	140	2.15
FUTURE	260	2.42
CHANGE		0.27

TIRE Index

Daily traffic volume

GLENWOOD AVENUE
WEEKDAY TRAFFIC VOLUMES
FIGURE 3

vehicles. The San Mateo County Zoning Regulations Section. 6119 require one parking space for dwellings with 0-1 bedrooms and two spaces for dwellings with two or more bedrooms.

ROADWAY AND PEDESTRIANS

The Canyon Lane roadway will be 23 feet wide for approximately 450 feet and transitioning to 20 feet wide for the remaining 430 feet. Near the end of the roadway there will be a turn around area for fire trucks. There will not be any sidewalks along Canyon Lane. Pedestrians will be able to walk in the roadway to access Glenwood Avenue. Presently there are no continuous sidewalks on either side of Glenwood Avenue from the end of the street to Bain Place. From Bain Place easterly to Canyon Road there are sidewalks on both sides of Glenwood Avenue.

CONCLUSIONS

1) **Traffic**. The TIRE Index is a measure of immediate traffic impact. While the Index shows an impact on Glenwood Avenue, the development of the lots on Canyon Lane will be over a long period of time, possibly 10 years or more, so the impact of additional traffic on Glenwood Avenue will not be readily noticed, and, therefore, not an impact.

2) **Parking.** Each single family dwelling lot will be capable of accommodating four or more vehicles, more than the Zoning Regulations require. Additionally there will be parking for up to seven vehicles on Canyon Lane near the intersection with Glenwood Avenue. The proposed parking supply exceeds the minimum requirements and is, therefore, appropriate to meet expected parking demands.

3) **Roadway & Pedestrians.** The proposed roadway width, 20-23 feet, is appropriate to meet the requirements for public safety vehicles and general vehicular traffic. While there are no sidewalks proposed on Canyon Lane, given the low volume of projected traffic on the roadway, the occasional pedestrian traffic can easily and safely use the roadway to access Glenwood Avenue, a street that does not have continuous sidewalks west of Bain Place.

Richard K Hopper

Richard K. Hopper, P.E.
Principal



APPENDIX

TRAFFIC COUNTS PLUS

mietekm@comcast.net
925.305.4358

CITY OF REDWOOD CITY
GLENWOOD AV. btwn CANYON RD. & BREEZE PL.

Site Code: 1WB
glenwood 1

Start Time	17-Nov-16 Thu	WB A.M.	WB P.M.	Hour Totals A.M.	Hour Totals P.M.	EB A.M.	EB P.M.	Hour Totals A.M.	Hour Totals P.M.	Both Dir. Total
12:00		0	4			0	2			6
12:15		0	3			1	2			6
12:30		0	5			0	5			10
12:45		0	1	0	13	0	1	1	10	2
01:00		0	5			0	11			16
01:15		0	3			0	5			8
01:30		0	5			0	5			10
01:45		0	3	0	16	0	5	0	26	8
02:00		0	6			0	2			8
02:15		0	5			0	8			13
02:30		0	8			0	4			12
02:45		0	4	0	23	0	4	0	18	8
03:00		0	***2***			0	5			7
03:15		0	***10***			0	7			17
03:30		0	***7***			0	5			12
03:45		0	***7***	0	26	0	***5***	0	22	12
04:00		1	2			0	***7***			10
04:15		0	4			0	***6***			10
04:30		0	5			0	***10***			15
04:45		0	8	1	19	0	4	0	27	12
05:00		0	2			0	1			3
05:15		0	5			2	6			13
05:30		0	4			2	4			10
05:45		1	10	1	21	2	2	6	13	15
06:00		0	3			1	1			5
06:15		0	5			1	3			9
06:30		1	2			0	1			4
06:45		0	5	1	15	1	3	3	8	9
07:00		0	2			2	0			4
07:15		1	3			***7***	2			13
07:30		1	3			***6***	2			12
07:45		1	2	3	10	***8***	2	23	6	***13***
08:00		4	0			***9***	1			***14***
08:15		***6***	2			6	1			***15***
08:30		***7***	4			6	0			***17***
08:45		***1***	0	18	6	3	2	24	4	6
09:00		***6***	6			7	1			20
09:15		2	1			3	0			6
09:30		5	2			5	0			12
09:45		7	0	20	9	3	0	18	1	10
10:00		3	1			3	0			7
10:15		3	3			8	1			15
10:30		2	0			5	0			7
10:45		6	1	14	5	5	0	21	1	12
11:00		5	1			4	0			10
11:15		2	0			2	0			4
11:30		2	0			5	0			7
11:45		3	0	12	1	5	0	16	0	8
Total		70	164			112	136			482
Day Total		234				248				
Percent		29.9%	70.1%			45.2%	54.8%			
Peak		08:15	03:00			07:15	03:45			07:45
Vol.		20	26			30	28			59
P.H.F.		0.714	0.650			0.833	0.700			0.868

TRAFFIC COUNTS PLUS

mietekm@comcast.net
925.305.4358

CITY OF REDWOOD CITY
GLENWOOD AV. E/O CANYON LN.

Site Code: 2EB
glenwood 2

Start Time	17-Nov-16 Thu	EB A.M.	EB P.M.	Hour Totals A.M.	Hour Totals P.M.	WB A.M.	WB P.M.	Hour Totals A.M.	Hour Totals P.M.	Both Dir. Total
12:00		0	0			0	1			1
12:15		0	1			0	2			3
12:30		0	1			0	3			4
12:45		0	0	0	2	0	1	0	7	1
01:00		0	2			0	1			3
01:15		0	1			0	0			1
01:30		0	2			0	0			2
01:45		0	1	0	6	0	0	0	1	1
02:00		0	0			0	2			2
02:15		0	2			0	3			5
02:30		0	4			0	1			5
02:45		0	1	0	7	0	1	0	7	2
03:00		0	1			0	1			2
03:15		0	1			0	1			2
03:30		0	1			0	1			2
03:45		0	2	0	5	0	2	0	5	4
04:00		0	2			0	0			2
04:15		0	1			0	***2***			3
04:30		0	***3***			0	***2***			5
04:45		0	***0***	0	6	0	***3***	0	7	3
05:00		1	***2***			0	***3***			6
05:15		1	***4***			0	0			5
05:30		1	1			0	1			3
05:45		0	0	3	7	0	4	0	8	4
06:00		0	0			0	2			2
06:15		1	1			1	1			4
06:30		0	0			0	1			1
06:45		0	1	1	2	0	1	1	5	2
07:00		0	0			0	1			1
07:15		2	0			0	0			2
07:30		0	0			0	1			1
07:45		2	1	4	1	0	0	0	2	3
08:00		4	0			1	0			5
08:15		2	0			1	0			3
08:30		1	0			1	0			2
08:45		1	0	8	0	0	0	3	0	1
09:00		1	1			1	1			4
09:15		2	0			0	0			2
09:30		2	0			1	0			3
09:45		1	0	6	1	2	0	4	1	3
10:00		0	0			1	0			1
10:15		***5***	1			1	2			***9***
10:30		***3***	0			0	0			***3***
10:45		***2***	0	10	1	***2***	0	4	2	***4***
11:00		***7***	0			***1***	0			***8***
11:15		0	0			***1***	0			1
11:30		0	0			***2***	0			2
11:45		0	0	7	0	1	1	5	1	2
Total		39	38			17	46			140
Day Total		77				63				
Percent		50.6%	49.4%			27.0%	73.0%			
Peak		10:15	04:30			10:45	04:15			10:15
Vol.		17	9			6	10			24
P.H.F.		0.607	0.563			0.750	0.833			0.667

TIRE INDEX

A way to determine the impact of a project's traffic on the surrounding street system is by use of the TIRE (**T**raffic **I**nfusion on **R**esidential **E**nvironment) index.[1] This index is based on the idea that increases in traffic volume have a greater impact on the residential environment on a lower volume street than along a street with a much higher level of baseline traffic. The TIRE index is a representation of the effects of traffic on safety, pedestrians, bicyclists, children playing near the street and the ability to freely maneuver into and out of driveways. A change in the TIRE index of 0.1 or more would be a noticeable increase in traffic on the street, and, therefore, an impact upon the residential environment. The five levels of the TIRE index are shown in Table _ below.

TABLE _
TIRE INDEX LEVELS

TIRE INDEX	DAILY TRAFFIC VOLUME	RESIDENTIAL ENVIRONMENT
0	1	
		A cul-de-sac street with one home.
1	10	
		A cul-de-sac street with 2-15 homes.
2	100	
		A 2-lane minor street.
3	1000	
		A 2-lane collector or arterial street.
4	10000	
		A 2 to 6-lane arterial street.
5	100000	

[1] Goodrich, D.K. and Donald Appleyard, University of California, Berkeley

APPENDIX C

California Emissions Estimator Model Results

Canyon Lane Project

San Mateo County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	22.00	1000sqft	1.00	22,000.00	0
Single Family Housing	1.00	Dwelling Unit	0.38	4,221.00	3

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	70
Climate Zone	5			**Operational Year**	2020
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - from equipment roster

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Trips and VMT - Based on the number of workers per phase

Grading -

Architectural Coating - Exterior and interior of residence would be painted

Area Coating - Exterior and interior of residence would be painted

Land Use Change -

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Parking	1,320.00	0.00
tblAreaCoating	Area_Parking	1320	0
tblConstructionPhase	NumDays	10.00	5.00
tblConstructionPhase	NumDays	4.00	20.00
tblConstructionPhase	NumDays	4.00	27.00
tblConstructionPhase	NumDays	10.00	5.00
tblConstructionPhase	NumDays	2.00	10.00
tblLandUse	LandUseSquareFeet	1,800.00	4,221.00
tblLandUse	LotAcreage	0.51	1.00
tblLandUse	LotAcreage	0.32	0.38
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Final Pavement
tblOffRoadEquipment	PhaseName		Final Pavement
tblOffRoadEquipment	PhaseName		Final Pavement
tblOffRoadEquipment	PhaseName		Final Pavement
tblOffRoadEquipment	UsageHours	6.00	8.00
tblTripsAndVMT	HaulingTripNumber	0.00	6.00
tblTripsAndVMT	HaulingTripNumber	0.00	1.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	25.00	20.00
tblTripsAndVMT	WorkerTripNumber	18.00	16.00
tblTripsAndVMT	WorkerTripNumber	18.00	16.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.1897	1.4666	0.9967	2.5600e-003	7.9900e-003	0.0597	0.0677	2.0200e-003	0.0551	0.0572	0.0000	229.0877	229.0877	0.0688	0.0000	230.8076
Maximum	**0.1897**	**1.4666**	**0.9967**	**2.5600e-003**	**7.9900e-003**	**0.0597**	**0.0677**	**2.0200e-003**	**0.0551**	**0.0572**	**0.0000**	**229.0877**	**229.0877**	**0.0688**	**0.0000**	**230.8076**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.1897	1.4666	0.9967	2.5600e-003	7.5400e-003	0.0597	0.0673	1.9700e-003	0.0551	0.0571	0.0000	229.0874	229.0874	0.0688	0.0000	230.8073
Maximum	**0.1897**	**1.4666**	**0.9967**	**2.5600e-003**	**7.5400e-003**	**0.0597**	**0.0673**	**1.9700e-003**	**0.0551**	**0.0571**	**0.0000**	**229.0874**	**229.0874**	**0.0688**	**0.0000**	**230.8073**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**5.63**	**0.00**	**0.65**	**2.48**	**0.00**	**0.09**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	4-1-2019	6-30-2019	1.0031	1.0031
2	7-1-2019	9-30-2019	0.5724	0.5724
		Highest	1.0031	1.0031

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0270	2.2000e-004	0.0162	2.0000e-005		1.2800e-003	1.2800e-003		1.2800e-003	1.2800e-003	0.1271	0.0437	0.1708	2.5000e-004	1.0000e-005	0.1793
Energy	2.3000e-004	1.9500e-003	8.3000e-004	1.0000e-005		1.6000e-004	1.6000e-004		1.6000e-004	1.6000e-004	0.0000	6.8208	6.8208	2.5000e-004	8.0000e-005	6.8521
Mobile	2.4800e-003	7.9000e-003	0.0280	9.0000e-005	8.0900e-003	1.0000e-004	8.1900e-003	2.1700e-003	9.0000e-005	2.2700e-003	0.0000	8.2845	8.2845	3.1000e-004	0.0000	8.2923
Waste						0.0000	0.0000		0.0000	0.0000	0.2558	0.0000	0.2558	0.0151	0.0000	0.6337
Water						0.0000	0.0000		0.0000	0.0000	0.0207	0.1444	0.1651	2.1300e-003	5.0000e-005	0.2336
Total	**0.0297**	**0.0101**	**0.0450**	**1.2000e-004**	**8.0900e-003**	**1.5400e-003**	**9.6300e-003**	**2.1700e-003**	**1.5300e-003**	**3.7100e-003**	**0.4036**	**15.2934**	**15.6969**	**0.0181**	**1.4000e-004**	**16.1910**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0270	2.2000e-004	0.0162	2.0000e-005		1.2800e-003	1.2800e-003		1.2800e-003	1.2800e-003	0.1271	0.0437	0.1708	2.5000e-004	1.0000e-005	0.1793
Energy	2.3000e-004	1.9500e-003	8.3000e-004	1.0000e-005		1.6000e-004	1.6000e-004		1.6000e-004	1.6000e-004	0.0000	6.8208	6.8208	2.5000e-004	8.0000e-005	6.8521
Mobile	2.4800e-003	7.9000e-003	0.0280	9.0000e-005	8.0900e-003	1.0000e-004	8.1900e-003	2.1700e-003	9.0000e-005	2.2700e-003	0.0000	8.2845	8.2845	3.1000e-004	0.0000	8.2923
Waste						0.0000	0.0000		0.0000	0.0000	0.2558	0.0000	0.2558	0.0151	0.0000	0.6337
Water						0.0000	0.0000		0.0000	0.0000	0.0207	0.1444	0.1651	2.1300e-003	5.0000e-005	0.2336
Total	**0.0297**	**0.0101**	**0.0450**	**1.2000e-004**	**8.0900e-003**	**1.5400e-003**	**9.6300e-003**	**2.1700e-003**	**1.5300e-003**	**3.7100e-003**	**0.4036**	**15.2934**	**15.6969**	**0.0181**	**1.4000e-004**	**16.1910**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.3 Vegetation

Vegetation

	CO2e
Category	MT
Vegetation Land Change	-66.6000
Total	**-66.6000**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Tree Removal Protection Erosion Control	Site Preparation	4/1/2019	4/12/2019	5	10	Lay down construction entrances, remove trees, install tree protective fencing, install erosion control devices
2	Roadway Construction	Grading	4/15/2019	5/10/2019	5	20	Surveying, excavation and off-haul to sub-grade level base rock , construct headwalls and install pre-fabricated bridge
3	Utility Work	Trenching	5/13/2019	6/21/2019	5	30	Hydro static testing, bac-ted flush, and watermain connection, install joint trench
4	Building Site Work	Grading	6/24/2019	7/30/2019	5	27	Excavate and off-haul to subgrade, site wall structures and foundation work, framing, roofing, and finish work, utility rouch in/site work, building finish, interior work and landscaping
5	Building coating	Architectural Coating	7/22/2019	7/30/2019	5	5	Paint building
6	Final Pavement	Paving	7/31/2019	8/6/2019	5	5	Prepare and fine tune roadway base rock to grade, place roadway roadway striping after adequate cure time, remove temporary fencing

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 1

Residential Indoor: 8,548; Residential Outdoor: 2,849; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Tree Removal Protection Erosion Control	Dumpers/Tenders	1	8.00	16	0.38
Tree Removal Protection Erosion Control	Excavators	1	8.00	158	0.38
Tree Removal Protection Erosion Control	Off-Highway Trucks	1	8.00	402	0.38

Tree Removal Protection Erosion Control	Off-Highway Trucks	1	8.00	402	0.38
Roadway Construction	Cranes	1	8.00	231	0.29
Roadway Construction	Dumpers/Tenders	4	8.00	16	0.38
Roadway Construction	Excavators	1	8.00	158	0.38
Roadway Construction	Off-Highway Trucks	1	8.00	402	0.38
Roadway Construction	Off-Highway Trucks	1	8.00	402	0.38
Roadway Construction	Off-Highway Trucks	1	8.00	402	0.38
Roadway Construction	Rollers	1	8.00	80	0.38
Utility Work	Dumpers/Tenders	2	8.00	16	0.38
Utility Work	Excavators	3	8.00	158	0.38
Utility Work	Off-Highway Trucks	1	8.00	402	0.38
Utility Work	Off-Highway Trucks	1	8.00	402	0.38
Utility Work	Other Construction Equipment	1	8.00	172	0.42
Building Site Work	Dumpers/Tenders	1	8.00	16	0.38
Building Site Work	Excavators	1	8.00	158	0.38
Building Site Work	Off-Highway Trucks	1	8.00	402	0.38
Building Site Work	Off-Highway Trucks	1	8.00	402	0.38
Building Site Work	Off-Highway Trucks	1	8.00	402	0.38
Building Site Work	Off-Highway Trucks	1	8.00	402	0.38
Building Site Work	Other Construction Equipment	1	8.00	172	0.42
Building coating	Air Compressors	1	8.00	78	0.48
Final Pavement	Dumpers/Tenders	1	8.00	16	0.38
Final Pavement	Off-Highway Trucks	1	8.00	402	0.38
Final Pavement	Off-Highway Trucks	1	8.00	402	0.38
Final Pavement	Other Construction Equipment	1	8.00	172	0.42
Final Pavement	Pavers	1	6.00	130	0.42
Final Pavement	Paving Equipment	1	8.00	132	0.36

Final Pavement	Rollers	1	7.00	80	0.38

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Tree Removal Protection Erosion Co	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Roadway Construction	10	20.00	2.00	6.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Utility Work	8	20.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Site Work	7	16.00	4.00	1.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building coating	1	2.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Final Pavement	7	16.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Tree Removal Protection Erosion Control - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	8.7700e-003	0.0876	0.0575	1.6000e-004		3.3500e-003	3.3500e-003		3.0900e-003	3.0900e-003	0.0000	14.4584	14.4584	4.5200e-003	0.0000	14.5713
Total	**8.7700e-003**	**0.0876**	**0.0575**	**1.6000e-004**	**0.0000**	**3.3500e-003**	**3.3500e-003**	**0.0000**	**3.0900e-003**	**3.0900e-003**	**0.0000**	**14.4584**	**14.4584**	**4.5200e-003**	**0.0000**	**14.5713**

3.2 Tree Removal Protection Erosion Control - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.0000e-004	1.0700e-003	0.0000	3.9000e-004	0.0000	4.0000e-004	1.0000e-004	0.0000	1.1000e-004	0.0000	0.3385	0.3385	1.0000e-005	0.0000	0.3387
Total	**1.5000e-004**	**1.0000e-004**	**1.0700e-003**	**0.0000**	**3.9000e-004**	**0.0000**	**4.0000e-004**	**1.0000e-004**	**0.0000**	**1.1000e-004**	**0.0000**	**0.3385**	**0.3385**	**1.0000e-005**	**0.0000**	**0.3387**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	8.7700e-003	0.0876	0.0575	1.6000e-004		3.3500e-003	3.3500e-003		3.0900e-003	3.0900e-003	0.0000	14.4584	14.4584	4.5200e-003	0.0000	14.5713
Total	**8.7700e-003**	**0.0876**	**0.0575**	**1.6000e-004**	**0.0000**	**3.3500e-003**	**3.3500e-003**	**0.0000**	**3.0900e-003**	**3.0900e-003**	**0.0000**	**14.4584**	**14.4584**	**4.5200e-003**	**0.0000**	**14.5713**

3.2 Tree Removal Protection Erosion Control - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.0000e-004	1.0700e-003	0.0000	3.9000e-004	0.0000	4.0000e-004	1.0000e-004	0.0000	1.1000e-004	0.0000	0.3385	0.3385	1.0000e-005	0.0000	0.3387
Total	**1.5000e-004**	**1.0000e-004**	**1.0700e-003**	**0.0000**	**3.9000e-004**	**0.0000**	**4.0000e-004**	**1.0000e-004**	**0.0000**	**1.1000e-004**	**0.0000**	**0.3385**	**0.3385**	**1.0000e-005**	**0.0000**	**0.3387**

3.3 Roadway Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.0000e-004	0.0000	6.0000e-004	7.0000e-005	0.0000	7.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0342	0.3436	0.2046	5.6000e-004		0.0139	0.0139		0.0128	0.0128	0.0000	49.9766	49.9766	0.0154	0.0000	50.3603
Total	**0.0342**	**0.3436**	**0.2046**	**5.6000e-004**	**6.0000e-004**	**0.0139**	**0.0145**	**7.0000e-005**	**0.0128**	**0.0129**	**0.0000**	**49.9766**	**49.9766**	**0.0154**	**0.0000**	**50.3603**

3.3 Roadway Construction - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.0000e-005	1.0500e-003	4.0000e-004	0.0000	5.0000e-005	0.0000	5.0000e-005	1.0000e-005	0.0000	2.0000e-005	0.0000	0.2542	0.2542	3.0000e-005	0.0000	0.2549
Vendor	1.0000e-004	2.5500e-003	9.8000e-004	1.0000e-005	1.3000e-004	2.0000e-005	1.5000e-004	4.0000e-005	2.0000e-005	5.0000e-005	0.0000	0.5350	0.5350	5.0000e-005	0.0000	0.5362
Worker	5.9000e-004	4.2000e-004	4.2900e-003	1.0000e-005	1.5700e-003	1.0000e-005	1.5800e-003	4.2000e-004	1.0000e-005	4.3000e-004	0.0000	1.3541	1.3541	3.0000e-005	0.0000	1.3548
Total	**7.2000e-004**	**4.0200e-003**	**5.6700e-003**	**2.0000e-005**	**1.7500e-003**	**3.0000e-005**	**1.7800e-003**	**4.7000e-004**	**3.0000e-005**	**5.0000e-004**	**0.0000**	**2.1432**	**2.1432**	**1.1000e-004**	**0.0000**	**2.1459**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.7000e-004	0.0000	2.7000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0342	0.3436	0.2046	5.6000e-004		0.0139	0.0139		0.0128	0.0128	0.0000	49.9765	49.9765	0.0154	0.0000	50.3603
Total	**0.0342**	**0.3436**	**0.2046**	**5.6000e-004**	**2.7000e-004**	**0.0139**	**0.0141**	**3.0000e-005**	**0.0128**	**0.0129**	**0.0000**	**49.9765**	**49.9765**	**0.0154**	**0.0000**	**50.3603**

3.3 Roadway Construction - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.0000e-005	1.0500e-003	4.0000e-004	0.0000	5.0000e-005	0.0000	5.0000e-005	1.0000e-005	0.0000	2.0000e-005	0.0000	0.2542	0.2542	3.0000e-005	0.0000	0.2549
Vendor	1.0000e-004	2.5500e-003	9.8000e-004	1.0000e-005	1.3000e-004	2.0000e-005	1.5000e-004	4.0000e-005	2.0000e-005	5.0000e-005	0.0000	0.5350	0.5350	5.0000e-005	0.0000	0.5362
Worker	5.9000e-004	4.2000e-004	4.2900e-003	1.0000e-005	1.5700e-003	1.0000e-005	1.5800e-003	4.2000e-004	1.0000e-005	4.3000e-004	0.0000	1.3541	1.3541	3.0000e-005	0.0000	1.3548
Total	**7.2000e-004**	**4.0200e-003**	**5.6700e-003**	**2.0000e-005**	**1.7500e-003**	**3.0000e-005**	**1.7800e-003**	**4.7000e-004**	**3.0000e-005**	**5.0000e-004**	**0.0000**	**2.1432**	**2.1432**	**1.1000e-004**	**0.0000**	**2.1459**

3.4 Utility Work - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0431	0.4351	0.3365	7.4000e-004		0.0187	0.0187		0.0172	0.0172	0.0000	66.4449	66.4449	0.0207	0.0000	66.9618
Total	**0.0431**	**0.4351**	**0.3365**	**7.4000e-004**		**0.0187**	**0.0187**		**0.0172**	**0.0172**	**0.0000**	**66.4449**	**66.4449**	**0.0207**	**0.0000**	**66.9618**

3.4 Utility Work - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.4000e-004	3.8300e-003	1.4700e-003	1.0000e-005	2.0000e-004	3.0000e-005	2.2000e-004	6.0000e-005	3.0000e-005	8.0000e-005	0.0000	0.8025	0.8025	7.0000e-005	0.0000	0.8043
Worker	8.9000e-004	6.2000e-004	6.4400e-003	2.0000e-005	2.3600e-003	2.0000e-005	2.3800e-003	6.3000e-004	1.0000e-005	6.4000e-004	0.0000	2.0311	2.0311	4.0000e-005	0.0000	2.0322
Total	**1.0300e-003**	**4.4500e-003**	**7.9100e-003**	**3.0000e-005**	**2.5600e-003**	**5.0000e-005**	**2.6000e-003**	**6.9000e-004**	**4.0000e-005**	**7.2000e-004**	**0.0000**	**2.8336**	**2.8336**	**1.1000e-004**	**0.0000**	**2.8365**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0431	0.4351	0.3365	7.4000e-004		0.0187	0.0187		0.0172	0.0172	0.0000	66.4448	66.4448	0.0207	0.0000	66.9617
Total	**0.0431**	**0.4351**	**0.3365**	**7.4000e-004**		**0.0187**	**0.0187**		**0.0172**	**0.0172**	**0.0000**	**66.4448**	**66.4448**	**0.0207**	**0.0000**	**66.9617**

3.4 Utility Work - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.4000e-004	3.8300e-003	1.4700e-003	1.0000e-005	2.0000e-004	3.0000e-005	2.2000e-004	6.0000e-005	3.0000e-005	8.0000e-005	0.0000	0.8025	0.8025	7.0000e-005	0.0000	0.8043
Worker	8.9000e-004	6.2000e-004	6.4400e-003	2.0000e-005	2.3600e-003	2.0000e-005	2.3800e-003	6.3000e-004	1.0000e-005	6.4000e-004	0.0000	2.0311	2.0311	4.0000e-005	0.0000	2.0322
Total	**1.0300e-003**	**4.4500e-003**	**7.9100e-003**	**3.0000e-005**	**2.5600e-003**	**5.0000e-005**	**2.6000e-003**	**6.9000e-004**	**4.0000e-005**	**7.2000e-004**	**0.0000**	**2.8336**	**2.8336**	**1.1000e-004**	**0.0000**	**2.8365**

3.5 Building Site Work - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.1000e-004	0.0000	2.1000e-004	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0499	0.5070	0.3193	8.8000e-004		0.0201	0.0201		0.0185	0.0185	0.0000	78.5661	78.5661	0.0247	0.0000	79.1836
Total	**0.0499**	**0.5070**	**0.3193**	**8.8000e-004**	**2.1000e-004**	**0.0201**	**0.0203**	**2.0000e-005**	**0.0185**	**0.0186**	**0.0000**	**78.5661**	**78.5661**	**0.0247**	**0.0000**	**79.1836**

3.5 Building Site Work - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-005	1.7000e-004	7.0000e-005	0.0000	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0424	0.0424	1.0000e-005	0.0000	0.0425
Vendor	2.6000e-004	6.8900e-003	2.6500e-003	1.0000e-005	3.5000e-004	5.0000e-005	4.0000e-004	1.0000e-004	5.0000e-005	1.5000e-004	0.0000	1.4445	1.4445	1.3000e-004	0.0000	1.4477
Worker	6.4000e-004	4.5000e-004	4.6300e-003	2.0000e-005	1.7000e-003	1.0000e-005	1.7100e-003	4.5000e-004	1.0000e-005	4.6000e-004	0.0000	1.4624	1.4624	3.0000e-005	0.0000	1.4632
Total	**9.1000e-004**	**7.5100e-003**	**7.3500e-003**	**3.0000e-005**	**2.0600e-003**	**6.0000e-005**	**2.1200e-003**	**5.5000e-004**	**6.0000e-005**	**6.1000e-004**	**0.0000**	**2.9493**	**2.9493**	**1.7000e-004**	**0.0000**	**2.9534**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					9.0000e-005	0.0000	9.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0499	0.5070	0.3193	8.8000e-004		0.0201	0.0201		0.0185	0.0185	0.0000	78.5660	78.5660	0.0247	0.0000	79.1835
Total	**0.0499**	**0.5070**	**0.3193**	**8.8000e-004**	**9.0000e-005**	**0.0201**	**0.0202**	**1.0000e-005**	**0.0185**	**0.0185**	**0.0000**	**78.5660**	**78.5660**	**0.0247**	**0.0000**	**79.1835**

3.5 Building Site Work - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-005	1.7000e-004	7.0000e-005	0.0000	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0424	0.0424	1.0000e-005	0.0000	0.0425
Vendor	2.6000e-004	6.8900e-003	2.6500e-003	1.0000e-005	3.5000e-004	5.0000e-005	4.0000e-004	1.0000e-004	5.0000e-005	1.5000e-004	0.0000	1.4445	1.4445	1.3000e-004	0.0000	1.4477
Worker	6.4000e-004	4.5000e-004	4.6300e-003	2.0000e-005	1.7000e-003	1.0000e-005	1.7100e-003	4.5000e-004	1.0000e-005	4.6000e-004	0.0000	1.4624	1.4624	3.0000e-005	0.0000	1.4632
Total	**9.1000e-004**	**7.5100e-003**	**7.3500e-003**	**3.0000e-005**	**2.0600e-003**	**6.0000e-005**	**2.1200e-003**	**5.5000e-004**	**6.0000e-005**	**6.1000e-004**	**0.0000**	**2.9493**	**2.9493**	**1.7000e-004**	**0.0000**	**2.9534**

3.6 Building coating - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0416					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.2400e-003	8.5700e-003	8.5900e-003	1.0000e-005		6.0000e-004	6.0000e-004		6.0000e-004	6.0000e-004	0.0000	1.1915	1.1915	1.0000e-004	0.0000	1.1940
Total	**0.0428**	**8.5700e-003**	**8.5900e-003**	**1.0000e-005**		**6.0000e-004**	**6.0000e-004**		**6.0000e-004**	**6.0000e-004**	**0.0000**	**1.1915**	**1.1915**	**1.0000e-004**	**0.0000**	**1.1940**

3.6 Building coating - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.0000e-005	8.9000e-004	3.4000e-004	0.0000	5.0000e-005	1.0000e-005	5.0000e-005	1.0000e-005	1.0000e-005	2.0000e-005	0.0000	0.1873	0.1873	2.0000e-005	0.0000	0.1877
Worker	2.0000e-005	1.0000e-005	1.5000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0474	0.0474	0.0000	0.0000	0.0474
Total	**5.0000e-005**	**9.0000e-004**	**4.9000e-004**	**0.0000**	**1.1000e-004**	**1.0000e-005**	**1.1000e-004**	**2.0000e-005**	**1.0000e-005**	**3.0000e-005**	**0.0000**	**0.2346**	**0.2346**	**2.0000e-005**	**0.0000**	**0.2351**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0416					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.2400e-003	8.5700e-003	8.5900e-003	1.0000e-005		6.0000e-004	6.0000e-004		6.0000e-004	6.0000e-004	0.0000	1.1915	1.1915	1.0000e-004	0.0000	1.1940
Total	**0.0428**	**8.5700e-003**	**8.5900e-003**	**1.0000e-005**		**6.0000e-004**	**6.0000e-004**		**6.0000e-004**	**6.0000e-004**	**0.0000**	**1.1915**	**1.1915**	**1.0000e-004**	**0.0000**	**1.1940**

3.6 Building coating - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.0000e-005	8.9000e-004	3.4000e-004	0.0000	5.0000e-005	1.0000e-005	5.0000e-005	1.0000e-005	1.0000e-005	2.0000e-005	0.0000	0.1873	0.1873	2.0000e-005	0.0000	0.1877
Worker	2.0000e-005	1.0000e-005	1.5000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0474	0.0474	0.0000	0.0000	0.0474
Total	**5.0000e-005**	**9.0000e-004**	**4.9000e-004**	**0.0000**	**1.1000e-004**	**1.0000e-005**	**1.1000e-004**	**2.0000e-005**	**1.0000e-005**	**3.0000e-005**	**0.0000**	**0.2346**	**0.2346**	**2.0000e-005**	**0.0000**	**0.2351**

3.7 Final Pavement - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	6.6100e-003	0.0676	0.0469	1.1000e-004		2.9800e-003	2.9800e-003		2.7500e-003	2.7500e-003	0.0000	9.6801	9.6801	3.0300e-003	0.0000	9.7560
Paving	1.3100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**7.9200e-003**	**0.0676**	**0.0469**	**1.1000e-004**		**2.9800e-003**	**2.9800e-003**		**2.7500e-003**	**2.7500e-003**	**0.0000**	**9.6801**	**9.6801**	**3.0300e-003**	**0.0000**	**9.7560**

3.7 Final Pavement - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2000e-004	8.0000e-005	8.6000e-004	0.0000	3.1000e-004	0.0000	3.2000e-004	8.0000e-005	0.0000	9.0000e-005	0.0000	0.2708	0.2708	1.0000e-005	0.0000	0.2710
Total	**1.2000e-004**	**8.0000e-005**	**8.6000e-004**	**0.0000**	**3.1000e-004**	**0.0000**	**3.2000e-004**	**8.0000e-005**	**0.0000**	**9.0000e-005**	**0.0000**	**0.2708**	**0.2708**	**1.0000e-005**	**0.0000**	**0.2710**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	6.6100e-003	0.0676	0.0469	1.1000e-004		2.9800e-003	2.9800e-003		2.7500e-003	2.7500e-003	0.0000	9.6801	9.6801	3.0300e-003	0.0000	9.7560
Paving	1.3100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**7.9200e-003**	**0.0676**	**0.0469**	**1.1000e-004**		**2.9800e-003**	**2.9800e-003**		**2.7500e-003**	**2.7500e-003**	**0.0000**	**9.6801**	**9.6801**	**3.0300e-003**	**0.0000**	**9.7560**

3.7 Final Pavement - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2000e-004	8.0000e-005	8.6000e-004	0.0000	3.1000e-004	0.0000	3.2000e-004	8.0000e-005	0.0000	9.0000e-005	0.0000	0.2708	0.2708	1.0000e-005	0.0000	0.2710
Total	**1.2000e-004**	**8.0000e-005**	**8.6000e-004**	**0.0000**	**3.1000e-004**	**0.0000**	**3.2000e-004**	**8.0000e-005**	**0.0000**	**9.0000e-005**	**0.0000**	**0.2708**	**0.2708**	**1.0000e-005**	**0.0000**	**0.2710**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	2.4800e-003	7.9000e-003	0.0280	9.0000e-005	8.0900e-003	1.0000e-004	8.1900e-003	2.1700e-003	9.0000e-005	2.2700e-003	0.0000	8.2845	8.2845	3.1000e-004	0.0000	8.2923
Unmitigated	2.4800e-003	7.9000e-003	0.0280	9.0000e-005	8.0900e-003	1.0000e-004	8.1900e-003	2.1700e-003	9.0000e-005	2.2700e-003	0.0000	8.2845	8.2845	3.1000e-004	0.0000	8.2923

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Parking Lot	0.00	0.00	0.00		
Single Family Housing	9.52	9.91	8.62	21,819	21,819
Total	9.52	9.91	8.62	21,819	21,819

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Single Family Housing	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Parking Lot	0.490452	0.049742	0.253638	0.136789	0.017926	0.006526	0.021436	0.006323	0.003943	0.003278	0.008771	0.000435	0.000741
Single Family Housing	0.490452	0.049742	0.253638	0.136789	0.017926	0.006526	0.021436	0.006323	0.003943	0.003278	0.008771	0.000435	0.000741

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	4.5622	4.5622	2.1000e-004	4.0000e-005	4.5801
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	4.5622	4.5622	2.1000e-004	4.0000e-005	4.5801
NaturalGas Mitigated	2.3000e-004	1.9500e-003	8.3000e-004	1.0000e-005		1.6000e-004	1.6000e-004		1.6000e-004	1.6000e-004	0.0000	2.2586	2.2586	4.0000e-005	4.0000e-005	2.2720
NaturalGas Unmitigated	2.3000e-004	1.9500e-003	8.3000e-004	1.0000e-005		1.6000e-004	1.6000e-004		1.6000e-004	1.6000e-004	0.0000	2.2586	2.2586	4.0000e-005	4.0000e-005	2.2720

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	42323.8	2.3000e-004	1.9500e-003	8.3000e-004	1.0000e-005		1.6000e-004	1.6000e-004		1.6000e-004	1.6000e-004	0.0000	2.2586	2.2586	4.0000e-005	4.0000e-005	2.2720
Total		**2.3000e-004**	**1.9500e-003**	**8.3000e-004**	**1.0000e-005**		**1.6000e-004**	**1.6000e-004**		**1.6000e-004**	**1.6000e-004**	**0.0000**	**2.2586**	**2.2586**	**4.0000e-005**	**4.0000e-005**	**2.2720**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	42323.8	2.3000e-004	1.9500e-003	8.3000e-004	1.0000e-005		1.6000e-004	1.6000e-004		1.6000e-004	1.6000e-004	0.0000	2.2586	2.2586	4.0000e-005	4.0000e-005	2.2720
Total		**2.3000e-004**	**1.9500e-003**	**8.3000e-004**	**1.0000e-005**		**1.6000e-004**	**1.6000e-004**		**1.6000e-004**	**1.6000e-004**	**0.0000**	**2.2586**	**2.2586**	**4.0000e-005**	**4.0000e-005**	**2.2720**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Parking Lot	7700	2.2400	1.0000e-004	2.0000e-005	2.2488
Single Family Housing	7982.49	2.3222	1.1000e-004	2.0000e-005	2.3313
Total		**4.5622**	**2.1000e-004**	**4.0000e-005**	**4.5801**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Parking Lot	7700	2.2400	1.0000e-004	2.0000e-005	2.2488
Single Family Housing	7982.49	2.3222	1.1000e-004	2.0000e-005	2.3313
Total		**4.5622**	**2.1000e-004**	**4.0000e-005**	**4.5801**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0270	2.2000e-004	0.0162	2.0000e-005		1.2800e-003	1.2800e-003		1.2800e-003	1.2800e-003	0.1271	0.0437	0.1708	2.5000e-004	1.0000e-005	0.1793
Unmitigated	0.0270	2.2000e-004	0.0162	2.0000e-005		1.2800e-003	1.2800e-003		1.2800e-003	1.2800e-003	0.1271	0.0437	0.1708	2.5000e-004	1.0000e-005	0.1793

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.9700e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0179					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	5.8900e-003	1.3000e-004	8.5700e-003	2.0000e-005		1.2400e-003	1.2400e-003		1.2400e-003	1.2400e-003	0.1271	0.0312	0.1583	2.4000e-004	1.0000e-005	0.1665
Landscaping	2.5000e-004	9.0000e-005	7.6500e-003	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0125	0.0125	1.0000e-005	0.0000	0.0128
Total	**0.0270**	**2.2000e-004**	**0.0162**	**2.0000e-005**		**1.2800e-003**	**1.2800e-003**		**1.2800e-003**	**1.2800e-003**	**0.1271**	**0.0437**	**0.1708**	**2.5000e-004**	**1.0000e-005**	**0.1793**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.9700e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0179					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	5.8900e-003	1.3000e-004	8.5700e-003	2.0000e-005		1.2400e-003	1.2400e-003		1.2400e-003	1.2400e-003	0.1271	0.0312	0.1583	2.4000e-004	1.0000e-005	0.1665
Landscaping	2.5000e-004	9.0000e-005	7.6500e-003	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0125	0.0125	1.0000e-005	0.0000	0.0128
Total	**0.0270**	**2.2000e-004**	**0.0162**	**2.0000e-005**		**1.2800e-003**	**1.2800e-003**		**1.2800e-003**	**1.2800e-003**	**0.1271**	**0.0437**	**0.1708**	**2.5000e-004**	**1.0000e-005**	**0.1793**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.1651	2.1300e-003	5.0000e-005	0.2336
Unmitigated	0.1651	2.1300e-003	5.0000e-005	0.2336

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0.065154 / 0.0410754	0.1651	2.1300e-003	5.0000e-005	0.2336
Total		**0.1651**	**2.1300e-003**	**5.0000e-005**	**0.2336**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0.065154 / 0.0410754	0.1651	2.1300e-003	5.0000e-005	0.2336
Total		**0.1651**	**2.1300e-003**	**5.0000e-005**	**0.2336**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.2558	0.0151	0.0000	0.6337
Unmitigated	0.2558	0.0151	0.0000	0.6337

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	1.26	0.2558	0.0151	0.0000	0.6337
Total		**0.2558**	**0.0151**	**0.0000**	**0.6337**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	1.26	0.2558	0.0151	0.0000	0.6337
Total		**0.2558**	**0.0151**	**0.0000**	**0.6337**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

	Total CO2	CH4	N2O	CO2e
Category	MT			
Unmitigated	-66.6000	0.0000	0.0000	-66.6000

11.1 Vegetation Land Change

Vegetation Type

	Initial/Final	Total CO2	CH4	N2O	CO2e
	Acres	MT			
Trees	3.3 / 2.7	-66.6000	0.0000	0.0000	-66.6000
Total		**-66.6000**	**0.0000**	**0.0000**	**-66.6000**

Canyon Lane Project

San Mateo County, Mitigation Report

Construction Mitigation Summary

Phase	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction												
Building coating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Site Work	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Final Pavement	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roadway Construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tree Removal Protection Erosion Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Utility Work	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

OFFROAD Equipment Mitigation

Equipment Type	Fuel Type	Tier	Number Mitigated	Total Number of Equipment	DPF	Oxidation Catalyst
Air Compressors	Diesel	No Change	0	1	No Change	0.00
Cranes	Diesel	No Change	0	1	No Change	0.00
Dumpers/Tenders	Diesel	No Change	0	9	No Change	0.00
Excavators	Diesel	No Change	0	6	No Change	0.00
Off-Highway Trucks	Diesel	No Change	0	13	No Change	0.00
Other Construction Equipment	Diesel	No Change	0	3	No Change	0.00
Pavers	Diesel	No Change	0	1	No Change	0.00
Paving Equipment	Diesel	No Change	0	1	No Change	0.00
Rollers	Diesel	No Change	0	2	No Change	0.00

Equipment Type	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	Unmitigated tons/yr						Unmitigated mt/yr					
Air Compressors	1.24000E-003	8.57000E-003	8.59000E-003	1.00000E-005	6.00000E-004	6.00000E-004	0.00000E+000	1.19152E+000	1.19152E+000	1.00000E-004	0.00000E+000	1.19403E+000
Cranes	5.04000E-003	6.00700E-002	2.29300E-002	6.00000E-005	2.55000E-003	2.34000E-003	0.00000E+000	5.18194E+000	5.18194E+000	1.64000E-003	0.00000E+000	5.22292E+000
Dumpers/Tenders	6.69000E-003	4.23600E-002	2.28200E-002	7.00000E-005	1.63000E-003	1.63000E-003	0.00000E+000	5.03086E+000	5.03086E+000	5.40000E-004	0.00000E+000	5.04436E+000
Excavators	1.91600E-002	1.97120E-001	2.39850E-001	3.80000E-004	9.51000E-003	8.75000E-003	0.00000E+000	3.40809E+001	3.40809E+001	1.07800E-002	0.00000E+000	3.43504E+001
Off-Highway Trucks	9.15800E-002	9.27460E-001	5.15580E-001	1.70000E-003	3.37300E-002	3.10300E-002	0.00000E+000	1.53040E+002	1.53040E+002	4.84200E-002	0.00000E+000	1.54250E+002
Other Construction Equipment	1.62700E-002	1.75090E-001	1.28610E-001	1.90000E-004	9.22000E-003	8.48000E-003	0.00000E+000	1.72151E+001	1.72151E+001	5.45000E-003	0.00000E+000	1.73513E+001
Pavers	5.40000E-004	5.86000E-003	5.44000E-003	1.00000E-005	2.90000E-004	2.60000E-004	0.00000E+000	7.91800E-001	7.91800E-001	2.50000E-004	0.00000E+000	7.98060E-001
Paving Equipment	5.30000E-004	5.64000E-003	6.31000E-003	1.00000E-005	2.80000E-004	2.60000E-004	0.00000E+000	9.14710E-001	9.14710E-001	2.90000E-004	0.00000E+000	9.21950E-001
Rollers	2.76000E-003	2.73100E-002	2.32400E-002	3.00000E-005	1.80000E-003	1.65000E-003	0.00000E+000	2.87115E+000	2.87115E+000	9.10000E-004	0.00000E+000	2.89386E+000

Equipment Type	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	Mitigated tons/yr						Mitigated mt/yr					
Air Compressors	1.24000E-003	8.57000E-003	8.59000E-003	1.00000E-005	6.00000E-004	6.00000E-004	0.00000E+000	1.19152E+000	1.19152E+000	1.00000E-004	0.00000E+000	1.19403E+000
Cranes	5.04000E-003	6.00700E-002	2.29300E-002	6.00000E-005	2.55000E-003	2.34000E-003	0.00000E+000	5.18193E+000	5.18193E+000	1.64000E-003	0.00000E+000	5.22292E+000
Dumpers/Tenders	6.69000E-003	4.23600E-002	2.28200E-002	7.00000E-005	1.63000E-003	1.63000E-003	0.00000E+000	5.03085E+000	5.03085E+000	5.40000E-004	0.00000E+000	5.04435E+000
Excavators	1.91600E-002	1.97120E-001	2.39850E-001	3.80000E-004	9.51000E-003	8.75000E-003	0.00000E+000	3.40808E+001	3.40808E+001	1.07800E-002	0.00000E+000	3.43504E+001
Off-Highway Trucks	9.15800E-002	9.27450E-001	5.15580E-001	1.70000E-003	3.37300E-002	3.10300E-002	0.00000E+000	1.53039E+002	1.53039E+002	4.84200E-002	0.00000E+000	1.54250E+002
Other Construction Equipment	1.62700E-002	1.75090E-001	1.28610E-001	1.90000E-004	9.22000E-003	8.48000E-003	0.00000E+000	1.72151E+001	1.72151E+001	5.45000E-003	0.00000E+000	1.73512E+001
Pavers	5.40000E-004	5.86000E-003	5.44000E-003	1.00000E-005	2.90000E-004	2.60000E-004	0.00000E+000	7.91800E-001	7.91800E-001	2.50000E-004	0.00000E+000	7.98060E-001
Paving Equipment	5.30000E-004	5.64000E-003	6.31000E-003	1.00000E-005	2.80000E-004	2.60000E-004	0.00000E+000	9.14710E-001	9.14710E-001	2.90000E-004	0.00000E+000	9.21950E-001
Rollers	2.76000E-003	2.73100E-002	2.32400E-002	3.00000E-005	1.80000E-003	1.65000E-003	0.00000E+000	2.87114E+000	2.87114E+000	9.10000E-004	0.00000E+000	2.89385E+000

Equipment Type	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	Percent Reduction											
Air Compressors	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000
Cranes	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.92978E-006	1.92978E-006	0.00000E+000	0.00000E+000	0.00000E+000
Dumpers/Tenders	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.98773E-006	1.98773E-006	0.00000E+000	0.00000E+000	1.98241E-006
Excavators	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.17368E-006	1.17368E-006	0.00000E+000	0.00000E+000	1.16447E-006
Off-Highway Trucks	0.00000E+000	1.07821E-005	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.24151E-006	1.24151E-006	0.00000E+000	0.00000E+000	1.16694E-006
Other Construction Equipment	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.16177E-006	1.16177E-006	0.00000E+000	0.00000E+000	1.15265E-006
Pavers	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000
Paving Equipment	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000
Rollers	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	3.48292E-006	3.48292E-006	0.00000E+000	0.00000E+000	3.45559E-006

Fugitive Dust Mitigation

Yes/No	Mitigation Measure	Mitigation Input		Mitigation Input		Mitigation Input	
No	Soil Stabilizer for unpaved Roads	PM10 Reduction	0.00	PM2.5 Reduction	0.00		
No	Replace Ground Cover of Area Disturbed	PM10 Reduction	0.00	PM2.5 Reduction	0.00		
Yes	Water Exposed Area	PM10 Reduction	55.00	PM2.5 Reduction	55.00	Frequency (per day)	2.00
No	Unpaved Road Mitigation	Moisture Content %	0.00	Vehicle Speed (mph)	0.00		
No	Clean Paved Road	% PM Reduction	0.00				

		Unmitigated		Mitigated		Percent Reduction	
Phase	Source	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
Building coating	Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00
Building coating	Roads	0.00	0.00	0.00	0.00	0.00	0.00
Building Site Work	Fugitive Dust	0.00	0.00	0.00	0.00	0.57	0.50
Building Site Work	Roads	0.00	0.00	0.00	0.00	0.00	0.00
Final Pavement	Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00
Final Pavement	Roads	0.00	0.00	0.00	0.00	0.00	0.00
Roadway Construction	Fugitive Dust	0.00	0.00	0.00	0.00	0.55	0.57
Roadway Construction	Roads	0.00	0.00	0.00	0.00	0.00	0.00
Tree Removal Protection Erosion Control	Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00
Tree Removal Protection Erosion Control	Roads	0.00	0.00	0.00	0.00	0.00	0.00
Utility Work	Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00
Utility Work	Roads	0.00	0.00	0.00	0.00	0.00	0.00

Operational Percent Reduction Summary

Category	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction												
Architectural Coating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hearth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Landscaping	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Indoor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Outdoor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Operational Mobile Mitigation

Project Setting:

Mitigation	Category	Measure	% Reduction	Input Value 1	Input Value 2	Input Value 3
No	Land Use	Increase Density	0.00			
No	Land Use	Increase Diversity	0.09	0.29		
No	Land Use	Improve Walkability Design	0.00			
No	Land Use	Improve Destination Accessibility	0.00			
No	Land Use	Increase Transit Accessibility	0.25			
No	Land Use	Integrate Below Market Rate Housing	0.00			
	Land Use	Land Use SubTotal	0.00			

No	Neighborhood Enhancements	Improve Pedestrian Network				
No	Neighborhood Enhancements	Provide Traffic Calming Measures				
No	Neighborhood Enhancements	Implement NEV Network	0.00			
	Neighborhood Enhancements	Neighborhood Enhancements Subtotal	0.00			
No	Parking Policy Pricing	Limit Parking Supply	0.00			
No	Parking Policy Pricing	Unbundle Parking Costs	0.00			
No	Parking Policy Pricing	On-street Market Pricing	0.00			
	Parking Policy Pricing	Parking Policy Pricing Subtotal	0.00			
No	Transit Improvements	Provide BRT System	0.00			
No	Transit Improvements	Expand Transit Network	0.00			
No	Transit Improvements	Increase Transit Frequency	0.00			
	Transit Improvements	Transit Improvements Subtotal	0.00			
		Land Use and Site Enhancement Subtotal	0.00			
No	Commute	Implement Trip Reduction Program				
No	Commute	Transit Subsidy				
No	Commute	Implement Employee Parking "Cash Out"				
No	Commute	Workplace Parking Charge				
No	Commute	Encourage Telecommuting and Alternative Work Schedules	0.00			
No	Commute	Market Commute Trip Reduction Option	0.00			
No	Commute	Employee Vanpool/Shuttle	0.00		2.00	
No	Commute	Provide Ride Sharing Program				
	Commute	Commute Subtotal	0.00			

No	School Trip	Implement School Bus Program	0.00			
		Total VMT Reduction	0.00			

Area Mitigation

Measure Implemented	Mitigation Measure	Input Value
No	Only Natural Gas Hearth	
No	No Hearth	
No	Use Low VOC Cleaning Supplies	
No	Use Low VOC Paint (Residential Interior)	100.00
No	Use Low VOC Paint (Residential Exterior)	150.00
No	Use Low VOC Paint (Non-residential Interior)	100.00
No	Use Low VOC Paint (Non-residential Exterior)	150.00
No	Use Low VOC Paint (Parking)	150.00
No	% Electric Lawnmower	
No	% Electric Leafblower	
No	% Electric Chainsaw	

Energy Mitigation Measures

Measure Implemented	Mitigation Measure	Input Value 1	Input Value 2
No	Exceed Title 24		
No	Install High Efficiency Lighting		
No	On-site Renewable		

Appliance Type	Land Use Subtype	% Improvement
ClothWasher		30.00
DishWasher		15.00
Fan		50.00
Refrigerator		15.00

Water Mitigation Measures

Measure Implemented	Mitigation Measure	Input Value 1	Input Value 2
No	Apply Water Conservation on Strategy		
No	Use Reclaimed Water		
No	Use Grey Water		
No	Install low-flow bathroom faucet	32.00	
No	Install low-flow Kitchen faucet	18.00	
No	Install low-flow Toilet	20.00	
No	Install low-flow Shower	20.00	
No	Turf Reduction		
No	Use Water Efficient Irrigation Systems	6.10	
No	Water Efficient Landscape		

Solid Waste Mitigation

Mitigation Measures	Input Value

Institute Recycling and Composting Services Percent Reduction in Waste Disposed	

Canyon Lane Project

San Mateo County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	22.00	1000sqft	1.00	22,000.00	0
Single Family Housing	1.00	Dwelling Unit	0.38	4,221.00	3

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	70
Climate Zone	5			**Operational Year**	2020
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Canyon Lane Project - San Mateo County, Summer

Project Characteristics -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - from equipment roster

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Trips and VMT - Based on the number of workers per phase

Grading -

Architectural Coating - Exterior and interior of residence would be painted

Area Coating - Exterior and interior of residence would be painted

Land Use Change -

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Parking	1,320.00	0.00
tblAreaCoating	Area_Parking	1320	0
tblConstructionPhase	NumDays	10.00	5.00
tblConstructionPhase	NumDays	4.00	20.00
tblConstructionPhase	NumDays	4.00	27.00
tblConstructionPhase	NumDays	10.00	5.00
tblConstructionPhase	NumDays	2.00	10.00
tblLandUse	LandUseSquareFeet	1,800.00	4,221.00
tblLandUse	LotAcreage	0.51	1.00
tblLandUse	LotAcreage	0.32	0.38
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Final Pavement
tblOffRoadEquipment	PhaseName		Final Pavement
tblOffRoadEquipment	PhaseName		Final Pavement
tblOffRoadEquipment	PhaseName		Final Pavement
tblOffRoadEquipment	UsageHours	6.00	8.00
tblTripsAndVMT	HaulingTripNumber	0.00	6.00
tblTripsAndVMT	HaulingTripNumber	0.00	1.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	25.00	20.00
tblTripsAndVMT	WorkerTripNumber	18.00	16.00
tblTripsAndVMT	WorkerTripNumber	18.00	16.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	16.0217	40.8004	26.8007	0.0720	0.2429	1.6684	1.8727	0.0557	1.5503	1.6030	0.0000	7,114.6973	7,114.6973	2.0675	0.0000	7,166.3849
Maximum	**16.0217**	**40.8004**	**26.8007**	**0.0720**	**0.2429**	**1.6684**	**1.8727**	**0.0557**	**1.5503**	**1.6030**	**0.0000**	**7,114.6973**	**7,114.6973**	**2.0675**	**0.0000**	**7,166.3849**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	16.0217	40.8004	26.8007	0.0720	0.2099	1.6684	1.8643	0.0519	1.5503	1.6021	0.0000	7,114.6973	7,114.6973	2.0675	0.0000	7,166.3849
Maximum	**16.0217**	**40.8004**	**26.8007**	**0.0720**	**0.2099**	**1.6684**	**1.8643**	**0.0519**	**1.5503**	**1.6021**	**0.0000**	**7,114.6973**	**7,114.6973**	**2.0675**	**0.0000**	**7,166.3849**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**13.55**	**0.00**	**0.45**	**6.68**	**0.00**	**0.06**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.1535	0.0209	1.4253	2.5300e-003		0.1900	0.1900		0.1900	0.1900	20.3783	6.3298	26.7082	0.0254	1.4400e-003	27.7706
Energy	1.2500e-003	0.0107	4.5500e-003	7.0000e-005		8.6000e-004	8.6000e-004		8.6000e-004	8.6000e-004		13.6418	13.6418	2.6000e-004	2.5000e-004	13.7229
Mobile	0.0157	0.0433	0.1626	5.5000e-004	0.0486	5.7000e-004	0.0492	0.0130	5.4000e-004	0.0136		55.2917	55.2917	1.9700e-003		55.3411
Total	**1.1704**	**0.0749**	**1.5925**	**3.1500e-003**	**0.0486**	**0.1914**	**0.2400**	**0.0130**	**0.1914**	**0.2044**	**20.3783**	**75.2633**	**95.6417**	**0.0276**	**1.6900e-003**	**96.8345**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.1535	0.0209	1.4253	2.5300e-003		0.1900	0.1900		0.1900	0.1900	20.3783	6.3298	26.7082	0.0254	1.4400e-003	27.7706
Energy	1.2500e-003	0.0107	4.5500e-003	7.0000e-005		8.6000e-004	8.6000e-004		8.6000e-004	8.6000e-004		13.6418	13.6418	2.6000e-004	2.5000e-004	13.7229
Mobile	0.0157	0.0433	0.1626	5.5000e-004	0.0486	5.7000e-004	0.0492	0.0130	5.4000e-004	0.0136		55.2917	55.2917	1.9700e-003		55.3411
Total	**1.1704**	**0.0749**	**1.5925**	**3.1500e-003**	**0.0486**	**0.1914**	**0.2400**	**0.0130**	**0.1914**	**0.2044**	**20.3783**	**75.2633**	**95.6417**	**0.0276**	**1.6900e-003**	**96.8345**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Tree Removal Protection Erosion Control	Site Preparation	4/1/2019	4/12/2019	5	10	Lay down construction entrances, remove trees, install tree protective fencing, install erosion control devices
2	Roadway Construction	Grading	4/15/2019	5/10/2019	5	20	Surveying, excavation and off-haul to sub-grade level base rock , construct headwalls and install pre-fabricated bridge
3	Utility Work	Trenching	5/13/2019	6/21/2019	5	30	Hydro static testing, bac-ted flush, and watermain connection, install joint trench
4	Building Site Work	Grading	6/24/2019	7/30/2019	5	27	Excavate and off-haul to subgrade, site wall structures and foundation work, framing, roofing, and finish work, utility rouch in/site work, building finish, interior work and landscaping
5	Building coating	Architectural Coating	7/22/2019	7/30/2019	5	5	Paint building
6	Final Pavement	Paving	7/31/2019	8/6/2019	5	5	Prepare and fine tune roadway base rock to grade, place roadway roadway striping after adequate cure time, remove temporary fencing

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 1

Residential Indoor: 8,548; Residential Outdoor: 2,849; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Tree Removal Protection Erosion Control	Dumpers/Tenders	1	8.00	16	0.38
Tree Removal Protection Erosion Control	Excavators	1	8.00	158	0.38
Tree Removal Protection Erosion Control	Off-Highway Trucks	1	8.00	402	0.38
Tree Removal Protection Erosion Control	Off-Highway Trucks	1	8.00	402	0.38
Roadway Construction	Cranes	1	8.00	231	0.29
Roadway Construction	Dumpers/Tenders	4	8.00	16	0.38
Roadway Construction	Excavators	1	8.00	158	0.38
Roadway Construction	Off-Highway Trucks	1	8.00	402	0.38
Roadway Construction	Off-Highway Trucks	1	8.00	402	0.38
Roadway Construction	Off-Highway Trucks	1	8.00	402	0.38
Roadway Construction	Rollers	1	8.00	80	0.38
Utility Work	Dumpers/Tenders	2	8.00	16	0.38
Utility Work	Excavators	3	8.00	158	0.38
Utility Work	Off-Highway Trucks	1	8.00	402	0.38
Utility Work	Off-Highway Trucks	1	8.00	402	0.38
Utility Work	Other Construction Equipment	1	8.00	172	0.42
Building Site Work	Dumpers/Tenders	1	8.00	16	0.38
Building Site Work	Excavators	1	8.00	158	0.38
Building Site Work	Off-Highway Trucks	1	8.00	402	0.38
Building Site Work	Off-Highway Trucks	1	8.00	402	0.38
Building Site Work	Off-Highway Trucks	1	8.00	402	0.38
Building Site Work	Off-Highway Trucks	1	8.00	402	0.38

Building Site Work	Other Construction Equipment	1	8.00	172	0.42
Building coating	Air Compressors	1	8.00	78	0.48
Final Pavement	Dumpers/Tenders	1	8.00	16	0.38
Final Pavement	Off-Highway Trucks	1	8.00	402	0.38
Final Pavement	Off-Highway Trucks	1	8.00	402	0.38
Final Pavement	Other Construction Equipment	1	8.00	172	0.42
Final Pavement	Pavers	1	6.00	130	0.42
Final Pavement	Paving Equipment	1	8.00	132	0.36
Final Pavement	Rollers	1	7.00	80	0.38

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Tree Removal Protection Erosion Co	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Roadway Construction	10	20.00	2.00	6.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Utility Work	8	20.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Site Work	7	16.00	4.00	1.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building coating	1	2.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Final Pavement	7	16.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Tree Removal Protection Erosion Control - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.7541	17.5265	11.5076	0.0323		0.6701	0.6701		0.6180	0.6180		3,187.5290	3,187.5290	0.9958		3,212.4230
Total	**1.7541**	**17.5265**	**11.5076**	**0.0323**	**0.0000**	**0.6701**	**0.6701**	**0.0000**	**0.6180**	**0.6180**		**3,187.5290**	**3,187.5290**	**0.9958**		**3,212.4230**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0298	0.0184	0.2274	7.9000e-004	0.0822	5.0000e-004	0.0827	0.0218	4.7000e-004	0.0223		79.2318	79.2318	1.6800e-003		79.2737
Total	**0.0298**	**0.0184**	**0.2274**	**7.9000e-004**	**0.0822**	**5.0000e-004**	**0.0827**	**0.0218**	**4.7000e-004**	**0.0223**		**79.2318**	**79.2318**	**1.6800e-003**		**79.2737**

3.2 Tree Removal Protection Erosion Control - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.7541	17.5265	11.5076	0.0323		0.6701	0.6701		0.6180	0.6180	0.0000	3,187.5289	3,187.5289	0.9958		3,212.4230
Total	**1.7541**	**17.5265**	**11.5076**	**0.0323**	**0.0000**	**0.6701**	**0.6701**	**0.0000**	**0.6180**	**0.6180**	**0.0000**	**3,187.5289**	**3,187.5289**	**0.9958**		**3,212.4230**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0298	0.0184	0.2274	7.9000e-004	0.0822	5.0000e-004	0.0827	0.0218	4.7000e-004	0.0223		79.2318	79.2318	1.6800e-003		79.2737
Total	**0.0298**	**0.0184**	**0.2274**	**7.9000e-004**	**0.0822**	**5.0000e-004**	**0.0827**	**0.0218**	**4.7000e-004**	**0.0223**		**79.2318**	**79.2318**	**1.6800e-003**		**79.2737**

3.3 Roadway Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0598	0.0000	0.0598	6.7600e-003	0.0000	6.7600e-003			0.0000			0.0000
Off-Road	3.4153	34.3605	20.4572	0.0562		1.3873	1.3873		1.2820	1.2820		5,508.9758	5,508.9758	1.6920		5,551.2763
Total	**3.4153**	**34.3605**	**20.4572**	**0.0562**	**0.0598**	**1.3873**	**1.4471**	**6.7600e-003**	**1.2820**	**1.2888**		**5,508.9758**	**5,508.9758**	**1.6920**		**5,551.2763**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.9800e-003	0.1022	0.0399	2.5000e-004	5.2100e-003	4.1000e-004	5.6200e-003	1.4300e-003	4.0000e-004	1.8200e-003		28.1391	28.1391	3.4100e-003		28.2242
Vendor	9.3100e-003	0.2512	0.0939	5.4000e-004	0.0135	1.7500e-003	0.0152	3.8800e-003	1.6700e-003	5.5500e-003		59.4029	59.4029	5.1400e-003		59.5315
Worker	0.0597	0.0367	0.4547	1.5900e-003	0.1643	1.0100e-003	0.1653	0.0436	9.3000e-004	0.0445		158.4636	158.4636	3.3500e-003		158.5475
Total	**0.0720**	**0.3902**	**0.5885**	**2.3800e-003**	**0.1830**	**3.1700e-003**	**0.1862**	**0.0489**	**3.0000e-003**	**0.0519**		**246.0056**	**246.0056**	**0.0119**		**246.3031**

3.3 Roadway Construction - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0269	0.0000	0.0269	3.0400e-003	0.0000	3.0400e-003			0.0000			0.0000
Off-Road	3.4153	34.3605	20.4572	0.0562		1.3873	1.3873		1.2820	1.2820	0.0000	5,508.9758	5,508.9758	1.6920		5,551.2763
Total	**3.4153**	**34.3605**	**20.4572**	**0.0562**	**0.0269**	**1.3873**	**1.4142**	**3.0400e-003**	**1.2820**	**1.2851**	**0.0000**	**5,508.9758**	**5,508.9758**	**1.6920**		**5,551.2763**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.9800e-003	0.1022	0.0399	2.5000e-004	5.2100e-003	4.1000e-004	5.6200e-003	1.4300e-003	4.0000e-004	1.8200e-003		28.1391	28.1391	3.4100e-003		28.2242
Vendor	9.3100e-003	0.2512	0.0939	5.4000e-004	0.0135	1.7500e-003	0.0152	3.8800e-003	1.6700e-003	5.5500e-003		59.4029	59.4029	5.1400e-003		59.5315
Worker	0.0597	0.0367	0.4547	1.5900e-003	0.1643	1.0100e-003	0.1653	0.0436	9.3000e-004	0.0445		158.4636	158.4636	3.3500e-003		158.5475
Total	**0.0720**	**0.3902**	**0.5885**	**2.3800e-003**	**0.1830**	**3.1700e-003**	**0.1862**	**0.0489**	**3.0000e-003**	**0.0519**		**246.0056**	**246.0056**	**0.0119**		**246.3031**

3.4 Utility Work - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.8741	29.0040	22.4335	0.0496		1.2442	1.2442		1.1475	1.1475		4,882.8618	4,882.8618	1.5194		4,920.8470
Total	**2.8741**	**29.0040**	**22.4335**	**0.0496**		**1.2442**	**1.2442**		**1.1475**	**1.1475**		**4,882.8618**	**4,882.8618**	**1.5194**		**4,920.8470**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	9.3100e-003	0.2512	0.0939	5.4000e-004	0.0135	1.7500e-003	0.0152	3.8800e-003	1.6700e-003	5.5500e-003		59.4029	59.4029	5.1400e-003		59.5315
Worker	0.0597	0.0367	0.4547	1.5900e-003	0.1643	1.0100e-003	0.1653	0.0436	9.3000e-004	0.0445		158.4636	158.4636	3.3500e-003		158.5475
Total	**0.0690**	**0.2879**	**0.5486**	**2.1300e-003**	**0.1778**	**2.7600e-003**	**0.1806**	**0.0475**	**2.6000e-003**	**0.0501**		**217.8665**	**217.8665**	**8.4900e-003**		**218.0789**

3.4 Utility Work - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.8741	29.0040	22.4335	0.0496		1.2442	1.2442		1.1475	1.1475	0.0000	4,882.8618	4,882.8618	1.5194		4,920.8470
Total	**2.8741**	**29.0040**	**22.4335**	**0.0496**		**1.2442**	**1.2442**		**1.1475**	**1.1475**	**0.0000**	**4,882.8618**	**4,882.8618**	**1.5194**		**4,920.8470**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	9.3100e-003	0.2512	0.0939	5.4000e-004	0.0135	1.7500e-003	0.0152	3.8800e-003	1.6700e-003	5.5500e-003		59.4029	59.4029	5.1400e-003		59.5315
Worker	0.0597	0.0367	0.4547	1.5900e-003	0.1643	1.0100e-003	0.1653	0.0436	9.3000e-004	0.0445		158.4636	158.4636	3.3500e-003		158.5475
Total	**0.0690**	**0.2879**	**0.5486**	**2.1300e-003**	**0.1778**	**2.7600e-003**	**0.1806**	**0.0475**	**2.6000e-003**	**0.0501**		**217.8665**	**217.8665**	**8.4900e-003**		**218.0789**

3.5 Building Site Work - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0153	0.0000	0.0153	1.6700e-003	0.0000	1.6700e-003			0.0000			0.0000
Off-Road	3.6989	37.5539	23.6499	0.0650		1.4905	1.4905		1.3727	1.3727		6,415.1334	6,415.1334	2.0169		6,465.5569
Total	**3.6989**	**37.5539**	**23.6499**	**0.0650**	**0.0153**	**1.4905**	**1.5058**	**1.6700e-003**	**1.3727**	**1.3743**		**6,415.1334**	**6,415.1334**	**2.0169**		**6,465.5569**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	3.7000e-004	0.0126	4.9200e-003	3.0000e-005	6.4000e-004	5.0000e-005	6.9000e-004	1.8000e-004	5.0000e-005	2.2000e-004		3.4740	3.4740	4.2000e-004		3.4845
Vendor	0.0186	0.5025	0.1877	1.0800e-003	0.0270	3.4900e-003	0.0305	7.7700e-003	3.3400e-003	0.0111		118.8057	118.8057	0.0103		119.0629
Worker	0.0478	0.0294	0.3638	1.2700e-003	0.1314	8.1000e-004	0.1322	0.0349	7.4000e-004	0.0356		126.7709	126.7709	2.6800e-003		126.8380
Total	**0.0668**	**0.5445**	**0.5564**	**2.3800e-003**	**0.1591**	**4.3500e-003**	**0.1634**	**0.0428**	**4.1300e-003**	**0.0469**		**249.0506**	**249.0506**	**0.0134**		**249.3853**

3.5 Building Site Work - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.8900e-003	0.0000	6.8900e-003	7.5000e-004	0.0000	7.5000e-004			0.0000			0.0000
Off-Road	3.6989	37.5539	23.6499	0.0650		1.4905	1.4905		1.3727	1.3727	0.0000	6,415.1334	6,415.1334	2.0169		6,465.5569
Total	**3.6989**	**37.5539**	**23.6499**	**0.0650**	**6.8900e-003**	**1.4905**	**1.4974**	**7.5000e-004**	**1.3727**	**1.3734**	**0.0000**	**6,415.1334**	**6,415.1334**	**2.0169**		**6,465.5569**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	3.7000e-004	0.0126	4.9200e-003	3.0000e-005	6.4000e-004	5.0000e-005	6.9000e-004	1.8000e-004	5.0000e-005	2.2000e-004		3.4740	3.4740	4.2000e-004		3.4845
Vendor	0.0186	0.5025	0.1877	1.0800e-003	0.0270	3.4900e-003	0.0305	7.7700e-003	3.3400e-003	0.0111		118.8057	118.8057	0.0103		119.0629
Worker	0.0478	0.0294	0.3638	1.2700e-003	0.1314	8.1000e-004	0.1322	0.0349	7.4000e-004	0.0356		126.7709	126.7709	2.6800e-003		126.8380
Total	**0.0668**	**0.5445**	**0.5564**	**2.3800e-003**	**0.1591**	**4.3500e-003**	**0.1634**	**0.0428**	**4.1300e-003**	**0.0469**		**249.0506**	**249.0506**	**0.0134**		**249.3853**

3.6 Building coating - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	11.8855					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3553	2.4472	2.4551	3.9600e-003		0.1717	0.1717		0.1717	0.1717		375.2641	375.2641	0.0317		376.0565
Total	**12.2408**	**2.4472**	**2.4551**	**3.9600e-003**		**0.1717**	**0.1717**		**0.1717**	**0.1717**		**375.2641**	**375.2641**	**0.0317**		**376.0565**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	9.3100e-003	0.2512	0.0939	5.4000e-004	0.0135	1.7500e-003	0.0152	3.8800e-003	1.6700e-003	5.5500e-003		59.4029	59.4029	5.1400e-003		59.5315
Worker	5.9700e-003	3.6700e-003	0.0455	1.6000e-004	0.0164	1.0000e-004	0.0165	4.3600e-003	9.0000e-005	4.4500e-003		15.8464	15.8464	3.4000e-004		15.8548
Total	**0.0153**	**0.2549**	**0.1393**	**7.0000e-004**	**0.0299**	**1.8500e-003**	**0.0318**	**8.2400e-003**	**1.7600e-003**	**0.0100**		**75.2492**	**75.2492**	**5.4800e-003**		**75.3862**

3.6 Building coating - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	11.8855					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3553	2.4472	2.4551	3.9600e-003		0.1717	0.1717		0.1717	0.1717	0.0000	375.2641	375.2641	0.0317		376.0565
Total	**12.2408**	**2.4472**	**2.4551**	**3.9600e-003**		**0.1717**	**0.1717**		**0.1717**	**0.1717**	**0.0000**	**375.2641**	**375.2641**	**0.0317**		**376.0565**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	9.3100e-003	0.2512	0.0939	5.4000e-004	0.0135	1.7500e-003	0.0152	3.8800e-003	1.6700e-003	5.5500e-003		59.4029	59.4029	5.1400e-003		59.5315
Worker	5.9700e-003	3.6700e-003	0.0455	1.6000e-004	0.0164	1.0000e-004	0.0165	4.3600e-003	9.0000e-005	4.4500e-003		15.8464	15.8464	3.4000e-004		15.8548
Total	**0.0153**	**0.2549**	**0.1393**	**7.0000e-004**	**0.0299**	**1.8500e-003**	**0.0318**	**8.2400e-003**	**1.7600e-003**	**0.0100**		**75.2492**	**75.2492**	**5.4800e-003**		**75.3862**

3.7 Final Pavement - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.6453	27.0536	18.7617	0.0433		1.1939	1.1939		1.0998	1.0998		4,268.2110	4,268.2110	1.3377		4,301.6529
Paving	0.5240					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**3.1693**	**27.0536**	**18.7617**	**0.0433**		**1.1939**	**1.1939**		**1.0998**	**1.0998**		**4,268.2110**	**4,268.2110**	**1.3377**		**4,301.6529**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0478	0.0294	0.3638	1.2700e-003	0.1314	8.1000e-004	0.1322	0.0349	7.4000e-004	0.0356		126.7709	126.7709	2.6800e-003		126.8380
Total	**0.0478**	**0.0294**	**0.3638**	**1.2700e-003**	**0.1314**	**8.1000e-004**	**0.1322**	**0.0349**	**7.4000e-004**	**0.0356**		**126.7709**	**126.7709**	**2.6800e-003**		**126.8380**

3.7 Final Pavement - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.6453	27.0536	18.7617	0.0433		1.1939	1.1939		1.0998	1.0998	0.0000	4,268.2110	4,268.2110	1.3377		4,301.6529
Paving	0.5240					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**3.1693**	**27.0536**	**18.7617**	**0.0433**		**1.1939**	**1.1939**		**1.0998**	**1.0998**	**0.0000**	**4,268.2110**	**4,268.2110**	**1.3377**		**4,301.6529**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0478	0.0294	0.3638	1.2700e-003	0.1314	8.1000e-004	0.1322	0.0349	7.4000e-004	0.0356		126.7709	126.7709	2.6800e-003		126.8380
Total	**0.0478**	**0.0294**	**0.3638**	**1.2700e-003**	**0.1314**	**8.1000e-004**	**0.1322**	**0.0349**	**7.4000e-004**	**0.0356**		**126.7709**	**126.7709**	**2.6800e-003**		**126.8380**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0157	0.0433	0.1626	5.5000e-004	0.0486	5.7000e-004	0.0492	0.0130	5.4000e-004	0.0136		55.2917	55.2917	1.9700e-003		55.3411
Unmitigated	0.0157	0.0433	0.1626	5.5000e-004	0.0486	5.7000e-004	0.0492	0.0130	5.4000e-004	0.0136		55.2917	55.2917	1.9700e-003		55.3411

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Parking Lot	0.00	0.00	0.00		
Single Family Housing	9.52	9.91	8.62	21,819	21,819
Total	9.52	9.91	8.62	21,819	21,819

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Single Family Housing	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Parking Lot	0.490452	0.049742	0.253638	0.136789	0.017926	0.006526	0.021436	0.006323	0.003943	0.003278	0.008771	0.000435	0.000741
Single Family Housing	0.490452	0.049742	0.253638	0.136789	0.017926	0.006526	0.021436	0.006323	0.003943	0.003278	0.008771	0.000435	0.000741

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	1.2500e-003	0.0107	4.5500e-003	7.0000e-005		8.6000e-004	8.6000e-004		8.6000e-004	8.6000e-004		13.6418	13.6418	2.6000e-004	2.5000e-004	13.7229
NaturalGas Unmitigated	1.2500e-003	0.0107	4.5500e-003	7.0000e-005		8.6000e-004	8.6000e-004		8.6000e-004	8.6000e-004		13.6418	13.6418	2.6000e-004	2.5000e-004	13.7229

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	115.956	1.2500e-003	0.0107	4.5500e-003	7.0000e-005		8.6000e-004	8.6000e-004		8.6000e-004	8.6000e-004		13.6418	13.6418	2.6000e-004	2.5000e-004	13.7229
Total		**1.2500e-003**	**0.0107**	**4.5500e-003**	**7.0000e-005**		**8.6000e-004**	**8.6000e-004**		**8.6000e-004**	**8.6000e-004**		**13.6418**	**13.6418**	**2.6000e-004**	**2.5000e-004**	**13.7229**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0.115956	1.2500e-003	0.0107	4.5500e-003	7.0000e-005		8.6000e-004	8.6000e-004		8.6000e-004	8.6000e-004		13.6418	13.6418	2.6000e-004	2.5000e-004	13.7229
Total		**1.2500e-003**	**0.0107**	**4.5500e-003**	**7.0000e-005**		**8.6000e-004**	**8.6000e-004**		**8.6000e-004**	**8.6000e-004**		**13.6418**	**13.6418**	**2.6000e-004**	**2.5000e-004**	**13.7229**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.1535	0.0209	1.4253	2.5300e-003		0.1900	0.1900		0.1900	0.1900	20.3783	6.3298	26.7082	0.0254	1.4400e-003	27.7706
Unmitigated	1.1535	0.0209	1.4253	2.5300e-003		0.1900	0.1900		0.1900	0.1900	20.3783	6.3298	26.7082	0.0254	1.4400e-003	27.7706

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0163					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0981					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	1.0363	0.0200	1.3403	2.5200e-003		0.1895	0.1895		0.1895	0.1895	20.3783	6.1765	26.5548	0.0252	1.4400e-003	27.6133
Landscaping	2.7300e-003	9.8000e-004	0.0850	0.0000		4.6000e-004	4.6000e-004		4.6000e-004	4.6000e-004		0.1534	0.1534	1.6000e-004		0.1573
Total	**1.1535**	**0.0209**	**1.4253**	**2.5200e-003**		**0.1900**	**0.1900**		**0.1900**	**0.1900**	**20.3783**	**6.3298**	**26.7082**	**0.0254**	**1.4400e-003**	**27.7706**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0163					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0981					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	1.0363	0.0200	1.3403	2.5200e-003		0.1895	0.1895		0.1895	0.1895	20.3783	6.1765	26.5548	0.0252	1.4400e-003	27.6133
Landscaping	2.7300e-003	9.8000e-004	0.0850	0.0000		4.6000e-004	4.6000e-004		4.6000e-004	4.6000e-004		0.1534	0.1534	1.6000e-004		0.1573
Total	**1.1535**	**0.0209**	**1.4253**	**2.5200e-003**		**0.1900**	**0.1900**		**0.1900**	**0.1900**	**20.3783**	**6.3298**	**26.7082**	**0.0254**	**1.4400e-003**	**27.7706**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Canyon Lane Project

San Mateo County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	22.00	1000sqft	1.00	22,000.00	0
Single Family Housing	1.00	Dwelling Unit	0.38	4,221.00	3

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	70
Climate Zone	5			**Operational Year**	2020
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - from equipment roster

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Trips and VMT - Based on the number of workers per phase

Grading -

Architectural Coating - Exterior and interior of residence would be painted

Area Coating - Exterior and interior of residence would be painted

Land Use Change -

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Parking	1,320.00	0.00
tblAreaCoating	Area_Parking	1320	0
tblConstructionPhase	NumDays	10.00	5.00
tblConstructionPhase	NumDays	4.00	20.00
tblConstructionPhase	NumDays	4.00	27.00
tblConstructionPhase	NumDays	10.00	5.00
tblConstructionPhase	NumDays	2.00	10.00
tblLandUse	LandUseSquareFeet	1,800.00	4,221.00
tblLandUse	LotAcreage	0.51	1.00
tblLandUse	LotAcreage	0.32	0.38
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Final Pavement
tblOffRoadEquipment	PhaseName		Final Pavement
tblOffRoadEquipment	PhaseName		Final Pavement
tblOffRoadEquipment	PhaseName		Final Pavement
tblOffRoadEquipment	UsageHours	6.00	8.00
tblTripsAndVMT	HaulingTripNumber	0.00	6.00
tblTripsAndVMT	HaulingTripNumber	0.00	1.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	25.00	20.00
tblTripsAndVMT	WorkerTripNumber	18.00	16.00
tblTripsAndVMT	WorkerTripNumber	18.00	16.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	16.0290	40.8218	26.8164	0.0719	0.2429	1.6685	1.8728	0.0557	1.5504	1.6031	0.0000	7,102.8134	7,102.8134	2.0678	0.0000	7,154.5085
Maximum	**16.0290**	**40.8218**	**26.8164**	**0.0719**	**0.2429**	**1.6685**	**1.8728**	**0.0557**	**1.5504**	**1.6031**	**0.0000**	**7,102.8134**	**7,102.8134**	**2.0678**	**0.0000**	**7,154.5085**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	16.0290	40.8218	26.8164	0.0719	0.2099	1.6685	1.8644	0.0519	1.5504	1.6022	0.0000	7,102.8134	7,102.8134	2.0678	0.0000	7,154.5085
Maximum	**16.0290**	**40.8218**	**26.8164**	**0.0719**	**0.2099**	**1.6685**	**1.8644**	**0.0519**	**1.5504**	**1.6022**	**0.0000**	**7,102.8134**	**7,102.8134**	**2.0678**	**0.0000**	**7,154.5085**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**13.55**	**0.00**	**0.45**	**6.68**	**0.00**	**0.06**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.1535	0.0209	1.4253	2.5300e-003		0.1900	0.1900		0.1900	0.1900	20.3783	6.3298	26.7082	0.0254	1.4400e-003	27.7706
Energy	1.2500e-003	0.0107	4.5500e-003	7.0000e-005		8.6000e-004	8.6000e-004		8.6000e-004	8.6000e-004		13.6418	13.6418	2.6000e-004	2.5000e-004	13.7229
Mobile	0.0145	0.0469	0.1691	5.2000e-004	0.0486	5.7000e-004	0.0492	0.0130	5.4000e-004	0.0136		52.4977	52.4977	2.0100e-003		52.5479
Total	**1.1692**	**0.0785**	**1.5990**	**3.1200e-003**	**0.0486**	**0.1914**	**0.2400**	**0.0130**	**0.1914**	**0.2044**	**20.3783**	**72.4693**	**92.8477**	**0.0276**	**1.6900e-003**	**94.0414**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.1535	0.0209	1.4253	2.5300e-003		0.1900	0.1900		0.1900	0.1900	20.3783	6.3298	26.7082	0.0254	1.4400e-003	27.7706
Energy	1.2500e-003	0.0107	4.5500e-003	7.0000e-005		8.6000e-004	8.6000e-004		8.6000e-004	8.6000e-004		13.6418	13.6418	2.6000e-004	2.5000e-004	13.7229
Mobile	0.0145	0.0469	0.1691	5.2000e-004	0.0486	5.7000e-004	0.0492	0.0130	5.4000e-004	0.0136		52.4977	52.4977	2.0100e-003		52.5479
Total	**1.1692**	**0.0785**	**1.5990**	**3.1200e-003**	**0.0486**	**0.1914**	**0.2400**	**0.0130**	**0.1914**	**0.2044**	**20.3783**	**72.4693**	**92.8477**	**0.0276**	**1.6900e-003**	**94.0414**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Tree Removal Protection Erosion Control	Site Preparation	4/1/2019	4/12/2019	5	10	Lay down construction entrances, remove trees, install tree protective fencing, install erosion control devices
2	Roadway Construction	Grading	4/15/2019	5/10/2019	5	20	Surveying, excavation and off-haul to sub-grade level base rock , construct headwalls and install pre-fabricated bridge
3	Utility Work	Trenching	5/13/2019	6/21/2019	5	30	Hydro static testing, bac-ted flush, and watermain connection, install joint trench
4	Building Site Work	Grading	6/24/2019	7/30/2019	5	27	Excavate and off-haul to subgrade, site wall structures and foundation work, framing, roofing, and finish work, utility rouch in/site work, building finish, interior work and landscaping
5	Building coating	Architectural Coating	7/22/2019	7/30/2019	5	5	Paint building
6	Final Pavement	Paving	7/31/2019	8/6/2019	5	5	Prepare and fine tune roadway base rock to grade, place roadway roadway striping after adequate cure time, remove temporary fencing

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 1

Residential Indoor: 8,548; Residential Outdoor: 2,849; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Tree Removal Protection Erosion Control	Dumpers/Tenders	1	8.00	16	0.38
Tree Removal Protection Erosion Control	Excavators	1	8.00	158	0.38
Tree Removal Protection Erosion Control	Off-Highway Trucks	1	8.00	402	0.38
Tree Removal Protection Erosion Control	Off-Highway Trucks	1	8.00	402	0.38
Roadway Construction	Cranes	1	8.00	231	0.29
Roadway Construction	Dumpers/Tenders	4	8.00	16	0.38
Roadway Construction	Excavators	1	8.00	158	0.38
Roadway Construction	Off-Highway Trucks	1	8.00	402	0.38
Roadway Construction	Off-Highway Trucks	1	8.00	402	0.38
Roadway Construction	Off-Highway Trucks	1	8.00	402	0.38
Roadway Construction	Rollers	1	8.00	80	0.38
Utility Work	Dumpers/Tenders	2	8.00	16	0.38
Utility Work	Excavators	3	8.00	158	0.38
Utility Work	Off-Highway Trucks	1	8.00	402	0.38
Utility Work	Off-Highway Trucks	1	8.00	402	0.38
Utility Work	Other Construction Equipment	1	8.00	172	0.42
Building Site Work	Dumpers/Tenders	1	8.00	16	0.38
Building Site Work	Excavators	1	8.00	158	0.38
Building Site Work	Off-Highway Trucks	1	8.00	402	0.38
Building Site Work	Off-Highway Trucks	1	8.00	402	0.38
Building Site Work	Off-Highway Trucks	1	8.00	402	0.38
Building Site Work	Off-Highway Trucks	1	8.00	402	0.38

Building Site Work	Other Construction Equipment	1	8.00	172	0.42
Building coating	Air Compressors	1	8.00	78	0.48
Final Pavement	Dumpers/Tenders	1	8.00	16	0.38
Final Pavement	Off-Highway Trucks	1	8.00	402	0.38
Final Pavement	Off-Highway Trucks	1	8.00	402	0.38
Final Pavement	Other Construction Equipment	1	8.00	172	0.42
Final Pavement	Pavers	1	6.00	130	0.42
Final Pavement	Paving Equipment	1	8.00	132	0.36
Final Pavement	Rollers	1	7.00	80	0.38

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Tree Removal Protection Erosion Co	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Roadway Construction	10	20.00	2.00	6.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Utility Work	8	20.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Site Work	7	16.00	4.00	1.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building coating	1	2.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Final Pavement	7	16.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Tree Removal Protection Erosion Control - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.7541	17.5265	11.5076	0.0323		0.6701	0.6701		0.6180	0.6180		3,187.5290	3,187.5290	0.9958		3,212.4230
Total	**1.7541**	**17.5265**	**11.5076**	**0.0323**	**0.0000**	**0.6701**	**0.6701**	**0.0000**	**0.6180**	**0.6180**		**3,187.5290**	**3,187.5290**	**0.9958**		**3,212.4230**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0331	0.0227	0.2213	7.5000e-004	0.0822	5.0000e-004	0.0827	0.0218	4.7000e-004	0.0223		74.3473	74.3473	1.6100e-003		74.3875
Total	**0.0331**	**0.0227**	**0.2213**	**7.5000e-004**	**0.0822**	**5.0000e-004**	**0.0827**	**0.0218**	**4.7000e-004**	**0.0223**		**74.3473**	**74.3473**	**1.6100e-003**		**74.3875**

3.2 Tree Removal Protection Erosion Control - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.7541	17.5265	11.5076	0.0323		0.6701	0.6701		0.6180	0.6180	0.0000	3,187.5289	3,187.5289	0.9958		3,212.4230
Total	**1.7541**	**17.5265**	**11.5076**	**0.0323**	**0.0000**	**0.6701**	**0.6701**	**0.0000**	**0.6180**	**0.6180**	**0.0000**	**3,187.5289**	**3,187.5289**	**0.9958**		**3,212.4230**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0331	0.0227	0.2213	7.5000e-004	0.0822	5.0000e-004	0.0827	0.0218	4.7000e-004	0.0223		74.3473	74.3473	1.6100e-003		74.3875
Total	**0.0331**	**0.0227**	**0.2213**	**7.5000e-004**	**0.0822**	**5.0000e-004**	**0.0827**	**0.0218**	**4.7000e-004**	**0.0223**		**74.3473**	**74.3473**	**1.6100e-003**		**74.3875**

3.3 Roadway Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0598	0.0000	0.0598	6.7600e-003	0.0000	6.7600e-003			0.0000			0.0000
Off-Road	3.4153	34.3605	20.4572	0.0562		1.3873	1.3873		1.2820	1.2820		5,508.9758	5,508.9758	1.6920		5,551.2763
Total	**3.4153**	**34.3605**	**20.4572**	**0.0562**	**0.0598**	**1.3873**	**1.4471**	**6.7600e-003**	**1.2820**	**1.2888**		**5,508.9758**	**5,508.9758**	**1.6920**		**5,551.2763**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	3.0500e-003	0.1055	0.0410	2.5000e-004	5.2100e-003	4.2000e-004	5.6300e-003	1.4300e-003	4.1000e-004	1.8300e-003		27.8469	27.8469	3.4400e-003		27.9328
Vendor	9.7500e-003	0.2557	0.1027	5.3000e-004	0.0135	1.7900e-003	0.0153	3.8800e-003	1.7100e-003	5.5900e-003		58.3843	58.3843	5.2800e-003		58.5164
Worker	0.0663	0.0453	0.4426	1.4900e-003	0.1643	1.0100e-003	0.1653	0.0436	9.3000e-004	0.0445		148.6946	148.6946	3.2200e-003		148.7750
Total	**0.0791**	**0.4064**	**0.5863**	**2.2700e-003**	**0.1830**	**3.2200e-003**	**0.1862**	**0.0489**	**3.0500e-003**	**0.0519**		**234.9257**	**234.9257**	**0.0119**		**235.2242**

3.3 Roadway Construction - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0269	0.0000	0.0269	3.0400e-003	0.0000	3.0400e-003			0.0000			0.0000
Off-Road	3.4153	34.3605	20.4572	0.0562		1.3873	1.3873		1.2820	1.2820	0.0000	5,508.9758	5,508.9758	1.6920		5,551.2763
Total	**3.4153**	**34.3605**	**20.4572**	**0.0562**	**0.0269**	**1.3873**	**1.4142**	**3.0400e-003**	**1.2820**	**1.2851**	**0.0000**	**5,508.9758**	**5,508.9758**	**1.6920**		**5,551.2763**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	3.0500e-003	0.1055	0.0410	2.5000e-004	5.2100e-003	4.2000e-004	5.6300e-003	1.4300e-003	4.1000e-004	1.8300e-003		27.8469	27.8469	3.4400e-003		27.9328
Vendor	9.7500e-003	0.2557	0.1027	5.3000e-004	0.0135	1.7900e-003	0.0153	3.8800e-003	1.7100e-003	5.5900e-003		58.3843	58.3843	5.2800e-003		58.5164
Worker	0.0663	0.0453	0.4426	1.4900e-003	0.1643	1.0100e-003	0.1653	0.0436	9.3000e-004	0.0445		148.6946	148.6946	3.2200e-003		148.7750
Total	**0.0791**	**0.4064**	**0.5863**	**2.2700e-003**	**0.1830**	**3.2200e-003**	**0.1862**	**0.0489**	**3.0500e-003**	**0.0519**		**234.9257**	**234.9257**	**0.0119**		**235.2242**

3.4 Utility Work - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.8741	29.0040	22.4335	0.0496		1.2442	1.2442		1.1475	1.1475		4,882.8618	4,882.8618	1.5194		4,920.8470
Total	**2.8741**	**29.0040**	**22.4335**	**0.0496**		**1.2442**	**1.2442**		**1.1475**	**1.1475**		**4,882.8618**	**4,882.8618**	**1.5194**		**4,920.8470**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	9.7500e-003	0.2557	0.1027	5.3000e-004	0.0135	1.7900e-003	0.0153	3.8800e-003	1.7100e-003	5.5900e-003		58.3843	58.3843	5.2800e-003		58.5164
Worker	0.0663	0.0453	0.4426	1.4900e-003	0.1643	1.0100e-003	0.1653	0.0436	9.3000e-004	0.0445		148.6946	148.6946	3.2200e-003		148.7750
Total	**0.0760**	**0.3010**	**0.5452**	**2.0200e-003**	**0.1778**	**2.8000e-003**	**0.1806**	**0.0475**	**2.6400e-003**	**0.0501**		**207.0789**	**207.0789**	**8.5000e-003**		**207.2914**

3.4 Utility Work - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.8741	29.0040	22.4335	0.0496		1.2442	1.2442		1.1475	1.1475	0.0000	4,882.8618	4,882.8618	1.5194		4,920.8470
Total	**2.8741**	**29.0040**	**22.4335**	**0.0496**		**1.2442**	**1.2442**		**1.1475**	**1.1475**	**0.0000**	**4,882.8618**	**4,882.8618**	**1.5194**		**4,920.8470**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	9.7500e-003	0.2557	0.1027	5.3000e-004	0.0135	1.7900e-003	0.0153	3.8800e-003	1.7100e-003	5.5900e-003		58.3843	58.3843	5.2800e-003		58.5164
Worker	0.0663	0.0453	0.4426	1.4900e-003	0.1643	1.0100e-003	0.1653	0.0436	9.3000e-004	0.0445		148.6946	148.6946	3.2200e-003		148.7750
Total	**0.0760**	**0.3010**	**0.5452**	**2.0200e-003**	**0.1778**	**2.8000e-003**	**0.1806**	**0.0475**	**2.6400e-003**	**0.0501**		**207.0789**	**207.0789**	**8.5000e-003**		**207.2914**

3.5 Building Site Work - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0153	0.0000	0.0153	1.6700e-003	0.0000	1.6700e-003			0.0000			0.0000
Off-Road	3.6989	37.5539	23.6499	0.0650		1.4905	1.4905		1.3727	1.3727		6,415.1334	6,415.1334	2.0169		6,465.5569
Total	**3.6989**	**37.5539**	**23.6499**	**0.0650**	**0.0153**	**1.4905**	**1.5058**	**1.6700e-003**	**1.3727**	**1.3743**		**6,415.1334**	**6,415.1334**	**2.0169**		**6,465.5569**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	3.8000e-004	0.0130	5.0700e-003	3.0000e-005	6.4000e-004	5.0000e-005	7.0000e-004	1.8000e-004	5.0000e-005	2.3000e-004		3.4379	3.4379	4.2000e-004		3.4485
Vendor	0.0195	0.5113	0.2053	1.0700e-003	0.0270	3.5700e-003	0.0306	7.7700e-003	3.4200e-003	0.0112		116.7686	116.7686	0.0106		117.0328
Worker	0.0530	0.0363	0.3541	1.1900e-003	0.1314	8.1000e-004	0.1322	0.0349	7.4000e-004	0.0356		118.9557	118.9557	2.5700e-003		119.0200
Total	**0.0729**	**0.5606**	**0.5645**	**2.2900e-003**	**0.1591**	**4.4300e-003**	**0.1635**	**0.0428**	**4.2100e-003**	**0.0470**		**239.1622**	**239.1622**	**0.0136**		**239.5012**

3.5 Building Site Work - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.8900e-003	0.0000	6.8900e-003	7.5000e-004	0.0000	7.5000e-004			0.0000			0.0000
Off-Road	3.6989	37.5539	23.6499	0.0650		1.4905	1.4905		1.3727	1.3727	0.0000	6,415.1334	6,415.1334	2.0169		6,465.5569
Total	**3.6989**	**37.5539**	**23.6499**	**0.0650**	**6.8900e-003**	**1.4905**	**1.4974**	**7.5000e-004**	**1.3727**	**1.3734**	**0.0000**	**6,415.1334**	**6,415.1334**	**2.0169**		**6,465.5569**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	3.8000e-004	0.0130	5.0700e-003	3.0000e-005	6.4000e-004	5.0000e-005	7.0000e-004	1.8000e-004	5.0000e-005	2.3000e-004		3.4379	3.4379	4.2000e-004		3.4485
Vendor	0.0195	0.5113	0.2053	1.0700e-003	0.0270	3.5700e-003	0.0306	7.7700e-003	3.4200e-003	0.0112		116.7686	116.7686	0.0106		117.0328
Worker	0.0530	0.0363	0.3541	1.1900e-003	0.1314	8.1000e-004	0.1322	0.0349	7.4000e-004	0.0356		118.9557	118.9557	2.5700e-003		119.0200
Total	**0.0729**	**0.5606**	**0.5645**	**2.2900e-003**	**0.1591**	**4.4300e-003**	**0.1635**	**0.0428**	**4.2100e-003**	**0.0470**		**239.1622**	**239.1622**	**0.0136**		**239.5012**

3.6 Building coating - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	11.8855					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3553	2.4472	2.4551	3.9600e-003		0.1717	0.1717		0.1717	0.1717		375.2641	375.2641	0.0317		376.0565
Total	**12.2408**	**2.4472**	**2.4551**	**3.9600e-003**		**0.1717**	**0.1717**		**0.1717**	**0.1717**		**375.2641**	**375.2641**	**0.0317**		**376.0565**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	9.7500e-003	0.2557	0.1027	5.3000e-004	0.0135	1.7900e-003	0.0153	3.8800e-003	1.7100e-003	5.5900e-003		58.3843	58.3843	5.2800e-003		58.5164
Worker	6.6300e-003	4.5300e-003	0.0443	1.5000e-004	0.0164	1.0000e-004	0.0165	4.3600e-003	9.0000e-005	4.4500e-003		14.8695	14.8695	3.2000e-004		14.8775
Total	**0.0164**	**0.2602**	**0.1469**	**6.8000e-004**	**0.0299**	**1.8900e-003**	**0.0318**	**8.2400e-003**	**1.8000e-003**	**0.0100**		**73.2538**	**73.2538**	**5.6000e-003**		**73.3939**

3.6 Building coating - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	11.8855					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3553	2.4472	2.4551	3.9600e-003		0.1717	0.1717		0.1717	0.1717	0.0000	375.2641	375.2641	0.0317		376.0565
Total	**12.2408**	**2.4472**	**2.4551**	**3.9600e-003**		**0.1717**	**0.1717**		**0.1717**	**0.1717**	**0.0000**	**375.2641**	**375.2641**	**0.0317**		**376.0565**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	9.7500e-003	0.2557	0.1027	5.3000e-004	0.0135	1.7900e-003	0.0153	3.8800e-003	1.7100e-003	5.5900e-003		58.3843	58.3843	5.2800e-003		58.5164
Worker	6.6300e-003	4.5300e-003	0.0443	1.5000e-004	0.0164	1.0000e-004	0.0165	4.3600e-003	9.0000e-005	4.4500e-003		14.8695	14.8695	3.2000e-004		14.8775
Total	**0.0164**	**0.2602**	**0.1469**	**6.8000e-004**	**0.0299**	**1.8900e-003**	**0.0318**	**8.2400e-003**	**1.8000e-003**	**0.0100**		**73.2538**	**73.2538**	**5.6000e-003**		**73.3939**

3.7 Final Pavement - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.6453	27.0536	18.7617	0.0433		1.1939	1.1939		1.0998	1.0998		4,268.2110	4,268.2110	1.3377		4,301.6529
Paving	0.5240					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**3.1693**	**27.0536**	**18.7617**	**0.0433**		**1.1939**	**1.1939**		**1.0998**	**1.0998**		**4,268.2110**	**4,268.2110**	**1.3377**		**4,301.6529**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0530	0.0363	0.3541	1.1900e-003	0.1314	8.1000e-004	0.1322	0.0349	7.4000e-004	0.0356		118.9557	118.9557	2.5700e-003		119.0200
Total	**0.0530**	**0.0363**	**0.3541**	**1.1900e-003**	**0.1314**	**8.1000e-004**	**0.1322**	**0.0349**	**7.4000e-004**	**0.0356**		**118.9557**	**118.9557**	**2.5700e-003**		**119.0200**

3.7 Final Pavement - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.6453	27.0536	18.7617	0.0433		1.1939	1.1939		1.0998	1.0998	0.0000	4,268.2110	4,268.2110	1.3377		4,301.6529
Paving	0.5240					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**3.1693**	**27.0536**	**18.7617**	**0.0433**		**1.1939**	**1.1939**		**1.0998**	**1.0998**	**0.0000**	**4,268.2110**	**4,268.2110**	**1.3377**		**4,301.6529**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0530	0.0363	0.3541	1.1900e-003	0.1314	8.1000e-004	0.1322	0.0349	7.4000e-004	0.0356		118.9557	118.9557	2.5700e-003		119.0200
Total	**0.0530**	**0.0363**	**0.3541**	**1.1900e-003**	**0.1314**	**8.1000e-004**	**0.1322**	**0.0349**	**7.4000e-004**	**0.0356**		**118.9557**	**118.9557**	**2.5700e-003**		**119.0200**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0145	0.0469	0.1691	5.2000e-004	0.0486	5.7000e-004	0.0492	0.0130	5.4000e-004	0.0136		52.4977	52.4977	2.0100e-003		52.5479
Unmitigated	0.0145	0.0469	0.1691	5.2000e-004	0.0486	5.7000e-004	0.0492	0.0130	5.4000e-004	0.0136		52.4977	52.4977	2.0100e-003		52.5479

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Parking Lot	0.00	0.00	0.00		
Single Family Housing	9.52	9.91	8.62	21,819	21,819
Total	9.52	9.91	8.62	21,819	21,819

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Single Family Housing	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Parking Lot	0.490452	0.049742	0.253638	0.136789	0.017926	0.006526	0.021436	0.006323	0.003943	0.003278	0.008771	0.000435	0.000741
Single Family Housing	0.490452	0.049742	0.253638	0.136789	0.017926	0.006526	0.021436	0.006323	0.003943	0.003278	0.008771	0.000435	0.000741

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	1.2500e-003	0.0107	4.5500e-003	7.0000e-005		8.6000e-004	8.6000e-004		8.6000e-004	8.6000e-004		13.6418	13.6418	2.6000e-004	2.5000e-004	13.7229
NaturalGas Unmitigated	1.2500e-003	0.0107	4.5500e-003	7.0000e-005		8.6000e-004	8.6000e-004		8.6000e-004	8.6000e-004		13.6418	13.6418	2.6000e-004	2.5000e-004	13.7229

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	115.956	1.2500e-003	0.0107	4.5500e-003	7.0000e-005		8.6000e-004	8.6000e-004		8.6000e-004	8.6000e-004		13.6418	13.6418	2.6000e-004	2.5000e-004	13.7229
Total		**1.2500e-003**	**0.0107**	**4.5500e-003**	**7.0000e-005**		**8.6000e-004**	**8.6000e-004**		**8.6000e-004**	**8.6000e-004**		**13.6418**	**13.6418**	**2.6000e-004**	**2.5000e-004**	**13.7229**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0.115956	1.2500e-003	0.0107	4.5500e-003	7.0000e-005		8.6000e-004	8.6000e-004		8.6000e-004	8.6000e-004		13.6418	13.6418	2.6000e-004	2.5000e-004	13.7229
Total		**1.2500e-003**	**0.0107**	**4.5500e-003**	**7.0000e-005**		**8.6000e-004**	**8.6000e-004**		**8.6000e-004**	**8.6000e-004**		**13.6418**	**13.6418**	**2.6000e-004**	**2.5000e-004**	**13.7229**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.1535	0.0209	1.4253	2.5300e-003		0.1900	0.1900		0.1900	0.1900	20.3783	6.3298	26.7082	0.0254	1.4400e-003	27.7706
Unmitigated	1.1535	0.0209	1.4253	2.5300e-003		0.1900	0.1900		0.1900	0.1900	20.3783	6.3298	26.7082	0.0254	1.4400e-003	27.7706

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0163					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0981					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	1.0363	0.0200	1.3403	2.5200e-003		0.1895	0.1895		0.1895	0.1895	20.3783	6.1765	26.5548	0.0252	1.4400e-003	27.6133
Landscaping	2.7300e-003	9.8000e-004	0.0850	0.0000		4.6000e-004	4.6000e-004		4.6000e-004	4.6000e-004		0.1534	0.1534	1.6000e-004		0.1573
Total	**1.1535**	**0.0209**	**1.4253**	**2.5200e-003**		**0.1900**	**0.1900**		**0.1900**	**0.1900**	**20.3783**	**6.3298**	**26.7082**	**0.0254**	**1.4400e-003**	**27.7706**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0163					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0981					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	1.0363	0.0200	1.3403	2.5200e-003		0.1895	0.1895		0.1895	0.1895	20.3783	6.1765	26.5548	0.0252	1.4400e-003	27.6133
Landscaping	2.7300e-003	9.8000e-004	0.0850	0.0000		4.6000e-004	4.6000e-004		4.6000e-004	4.6000e-004		0.1534	0.1534	1.6000e-004		0.1573
Total	**1.1535**	**0.0209**	**1.4253**	**2.5200e-003**		**0.1900**	**0.1900**		**0.1900**	**0.1900**	**20.3783**	**6.3298**	**26.7082**	**0.0254**	**1.4400e-003**	**27.7706**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

APPENDIX D

Biological Resources Analysis and Peer Review of the Biological Resources Report and Arborist Reports

SWCA ENVIRONMENTAL CONSULTANTS
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TECHNICAL MEMORANDUM

To: Summer Burlison, Project Planner
County of San Mateo Planning and Building Department
455 County Center, 2nd Floor
Redwood City, CA 94063

Date: March 12, 2019

Re: **Biological Resources Analysis and Peer Review of the Biological Resources Report and Arborist Reports for the Canyon Lane Roadway Improvements Development Project, San Mateo County, California.**

Dear Ms. Burlison:

SWCA Environmental Consultants (SWCA) has prepared this memorandum for San Mateo County (County) in support of the Canyon Lane Roadway Improvements Development Project (project) located in San Mateo County, California. At the request of the County, SWCA conducted a third-party review of the Canyon Lane Project Biological Resources Report (H.T. Harvey & Associates 2016) and Arborist Reports (Mayne Tree Expert Company, Inc. 2016 and 2012) to provide comment on these reports in the context of technical adequacy for assessing impacts under the California Environmental Quality Act. SWCA also conducted a biological resources analysis for portions of the project site that were not covered under the Biological Resources Report and Arborist Reports. The purpose of this memorandum is to summarize the findings of the peer review and biological resources analysis conducted by SWCA.

The project includes improvements to the existing Canyon Lane, including the construction of a retaining wall, a turnaround for emergency vehicles, and a single-span bridge that crosses an unnamed ephemeral creek. The project also includes the development of a single-family residence on a merged parcel (Assessor Parcel Numbers [APNs] 057-222-290 & 300), potential future development of 11 additional parcels (APNs 057-221-070, 057-221-090, 057-221-100, 057-221-110, 057-222-210, 057-222-220 & 230, 057-222-240 & 250, 057-222-260, 057-222-270, 057-222-280, and 057-221-060), and the construction of new utilities, including a waterline that would loop in with an existing waterline within the City of Redwood City (City) and an underground electrical distribution line.

ARBORIST REPORTS (MAYNE TREE EXPERT COMPANY, INC.)

Mayne Tree Expert Company, Inc. prepared an Arborist Report for the project in November 2016 (revised March 2017) and an Arborist Report in April 2012 (revised January 2019).

Arborist Report November 2016 (Revised March 2017)

The Arborist Report prepared in November 2016 (revised March 2017) included an assessment of trees that could be impacted by the expansion and paving of Canyon Lane. The following list contains SWCA's comments and recommendations based on a review of the report.

- Trees within the City were not measured in accordance with the City Tree Preservation Ordinance standards. The ordinance requires that measurements are taken at the widest section of the trunk between 6 and 36 inches above ground. According to the report, all tree measurements were taken at 4.5 feet above ground, regardless of whether the trees were located within City limits. This may result in the exclusion of trees could otherwise be considered "protected trees" under the ordinance. Trees within City limits must be measured in accordance with the City Tree Preservation Ordinance No. 1536 § 1, Ch. 35 §§ 35.1-35.9.

- In accordance with the City Tree Preservation Ordinance No. 1536 § 1, Ch. 35 §§ 35.1-35.9, all City-owned street trees and park trees with a diameter at breast height (DBH) of 12 inches or greater are protected. It is recommended that the Arborist Report explicitly indicate which trees fall within City jurisdiction. Additionally, the City Street Tree Ordinance No. 1010 protects all City-owned street trees, regardless of size, that are growing within the public right-of-way. It is recommended that the Arborist Report include language regarding suggested coordination with the City Public Works Department if there are any potential impacts to City-owned street trees, and coordination with the Parks, Recreation and Community Services Department if there are any potential impacts to Park Trees.

- It is recommended that the resolution of attached maps, illustrating tree locations, be higher to illustrate the relationship between trees and their surroundings.

- For Trees 24, 25, and 54, only one diameter measurement is provided for each tree. Given that the split of the codominant stems is below the standard measuring point for diameter, it is recommended that the diameter section have two measurements provided for each tree.

- For Trees 44 and 51, a single diameter value was provided for multiple trees. It is recommended that the diameter measurement of each tree be provided.

- The Arborist Report states that Tree 52 is dead and will be partially impacted by the trench for the new waterline. Therefore, it is recommended that this tree be proposed for removal.

Arborist Report April 2012 (Revised January 2019)

The Arborist Report prepared in April 2012 (revised January 2019) included an assessment of trees that could be impacted by the construction and development of a single-family residence on merged parcel APN 057-222-290 & 300. The following list contains SWCA's comments and recommendations based on a review of the report.

- Tree 11 is recommended for retention in the summary on page 1 of the report, with the stipulation that the retaining wall height should be shortened. However, throughout the remainder of the report, this tree is labeled with a blue "X" on the map and is slated for removal. It is recommended that additional clarification be included regarding project design and coordination with a certified arborist on the exact recommendations for Tree 11.

- The April 3, 2012 report states that four trees are of significant size to warrant heritage tree status. However, none of the trees listed in the table on page 3 have a DBH measurement that warrants heritage tree status under the San Mateo County Heritage Tree Ordinance. No trees in the January

2019 report update are reported as having heritage tree status. Based on the data in the 2012 report and January 2019 report update, it is understood that the heritage tree language within the report update is correct.

Additional arborist inspections and reporting will be required as part of the potential future development of the 11 additional parcels in order to assess the potential impacts to trees within these parcels. Trees within these parcels will need to be assessed for heritage tree status, and protection under the San Mateo County Heritage Tree Ordinance and the City of Redwood City Tree Preservation Ordinance. It is recommended that additional arborist reports be prepared prior to construction within the 11 future developable parcels.

CANYON LANE PROJECT BIOLOGICAL RESOURCES REPORT (H.T. HARVEY AND ASSOCIATES 2016)

SWCA reviewed the Canyon Lane Project Biological Resources Report, prepared by H.T. Harvey and Associates (H.T. Harvey) in December 2016, (2016 report) for the expansion of Canyon Lane and the installation of utilities. SWCA also edited the project description to include the development of a single-family residence on a merged parcel (057-222-290 & 300) and the potential future development of 11 parcels. The 2016 report did not analyze biological resources for the afore mentioned, expanded project description. Therefore, SWCA conducted a follow-up biological resources analysis to include areas within the expanded project description and evaluate biological resources within those areas that have potential to be impacted by the project.

Biological Resources Analysis (SWCA 2019)

SWCA Biologist Jessie Henderson-McBean conducted a desktop review and field investigation to evaluate biological resources that have potential to be impacted by the development of the single-family residence and potential future development of the 11 parcels. This section generally follows the format of the 2016 report and provides supplemental data to adequately address potential impacts associated with the expanded project description.

Methods

LITERATURE REVIEW

SWCA biologists reviewed the 2016 report to determine a baseline for surveys and literature review, and to provide comment on the report in the context of technical adequacy for assessing impacts under the California Environmental Quality Act.

Consistent with the 2016 report, SWCA reviewed all pertinent literature and databases to ensure that all data was current. SWCA's literature review was initiated with a query of the most recent version of the California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB) to identify reported occurrences of sensitive resources within the following USGS 7.5-minute quadrangle maps: Woodside, Palo Alto, Mindego Hill, La Honda, San Gregorio, Half Moon Bay, Montara Mountain, San Mateo, and Redwood Point. An Information for Planning and Consultation (IPaC) Resource List was obtained from the United States Fish and Wildlife Service (USFWS) to determine what federally listed and protected resources may occur in the area.

In addition to the CNDDB and IPaC queries, the California Native Plant Society (CNPS) Electronic Inventory of Rare and Endangered Plants of California (CNPS 2018) was reviewed to provide additional information on rare plants known to occur in the area. As CNPS does not maintain quadrangle-level

records for California Rare Plant Rank (CRPR) 4 species, the CNPS plant list for San Mateo County was also reviewed to determine if new rare plant occurrences had been recorded since the 2016 report was prepared.

FIELD STUDY

A reconnaissance-level field survey was conducted by SWCA Biologist Jessica Henderson-McBean on January 22, 2019, and a follow-up survey was conducted on February 6, 2019. The biological survey area included areas identified as the proposed Canyon Lane road expansion area, the proposed utility installation area, the single-family residence development, and 11 future development parcels. The biological survey area was surveyed by walking meandering transects throughout the survey area to document habitat conditions and to determine the potential for the presence of sensitive species. Potentially jurisdictional waters and wetlands were preliminarily mapped as part of the field study; however, no formal wetland delineation was conducted. In addition, no focused field surveys were performed as part of the reconnaissance-level surveys.

Regulatory Setting

As stated in the 2016 report, biological resources are regulated by a number of federal, state, and local laws and ordinances. SWCA did not have comment on the relevant laws and ordinances listed in the 2016 report. Therefore, the regulatory setting described in the 2016 report is consistent with that used for the 2019 biological resource evaluation.

Existing Biological Conditions

Consistent with the 2016 report, the project site is located within a forested canyon and is surrounded by residential development (Figure 1). The size of the project site has been expanded from 1.33 acres to 3.801 acres, as the project now encompasses a single-family residence and 11 potentially developable parcels situated north and south of the existing dirt road.

Site elevation ranges from approximately 130 feet at Glenwood Avenue to approximately 300 feet at Vista Lane. Although the project site has been expanded, soils within the expanded project site remain consistent with those described in the 2016 report. Soils in the project site are Urban land-orthents, cut and fill complex, 5 to 75 percent slopes, and Orthents, cut and fill-urban land complex, 5 to 75 percent slopes (NRCS 2019).

General Habitat Conditions and Wildlife Use

The 2019 reconnaissance-level field survey identified five general biotic habitats/features on the project site: coast live oak forest, developed, California annual grassland, riparian coast live oak forest, and disturbed. The 2016 report identified coast live oak forest, developed, California annual grassland, and riparian coast live oak forest habitat within the project site. Disturbed was added to this analysis to acknowledge a highly disturbed area on the southwestern side of the watermain installation area and is further described below. The 2016 report identified “drainage swales,” which have been renamed for the purposes of this report to reflect the hydrology of the features (intermittent drainage feature and ephemeral drainage feature). In addition, SWCA biologists identified one additional drainage feature as part of the expanded project description and identified disturbed habitat areas in the southwestern corner of the project site. These additional biotic features have been added to this analysis and are described in more detail below. The distribution of habitat acreages within the project site is depicted in Figure 2, and a summary of all habitat acreages on the site is presented in Table 1.

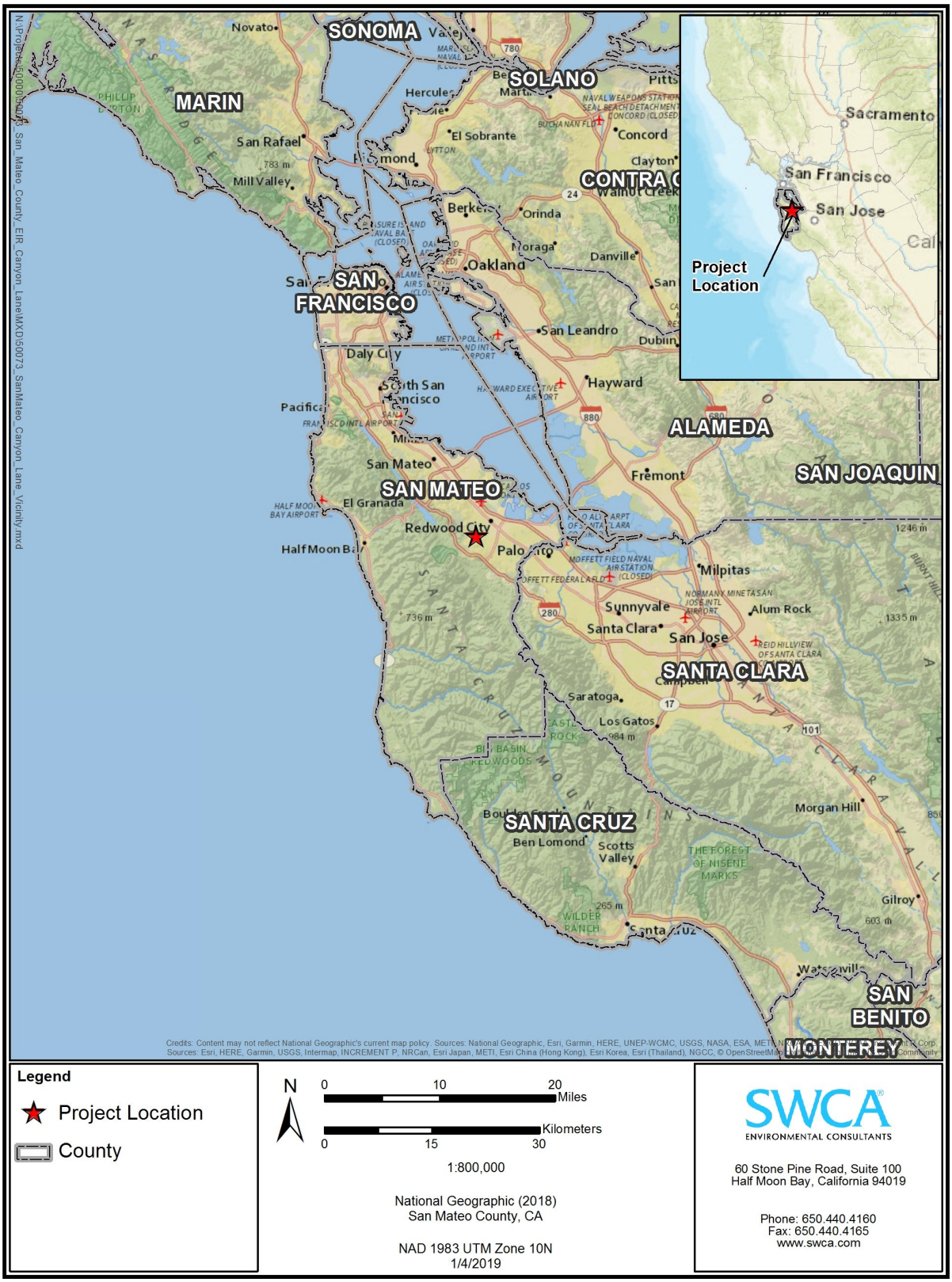


Figure 1. Vicinity Map

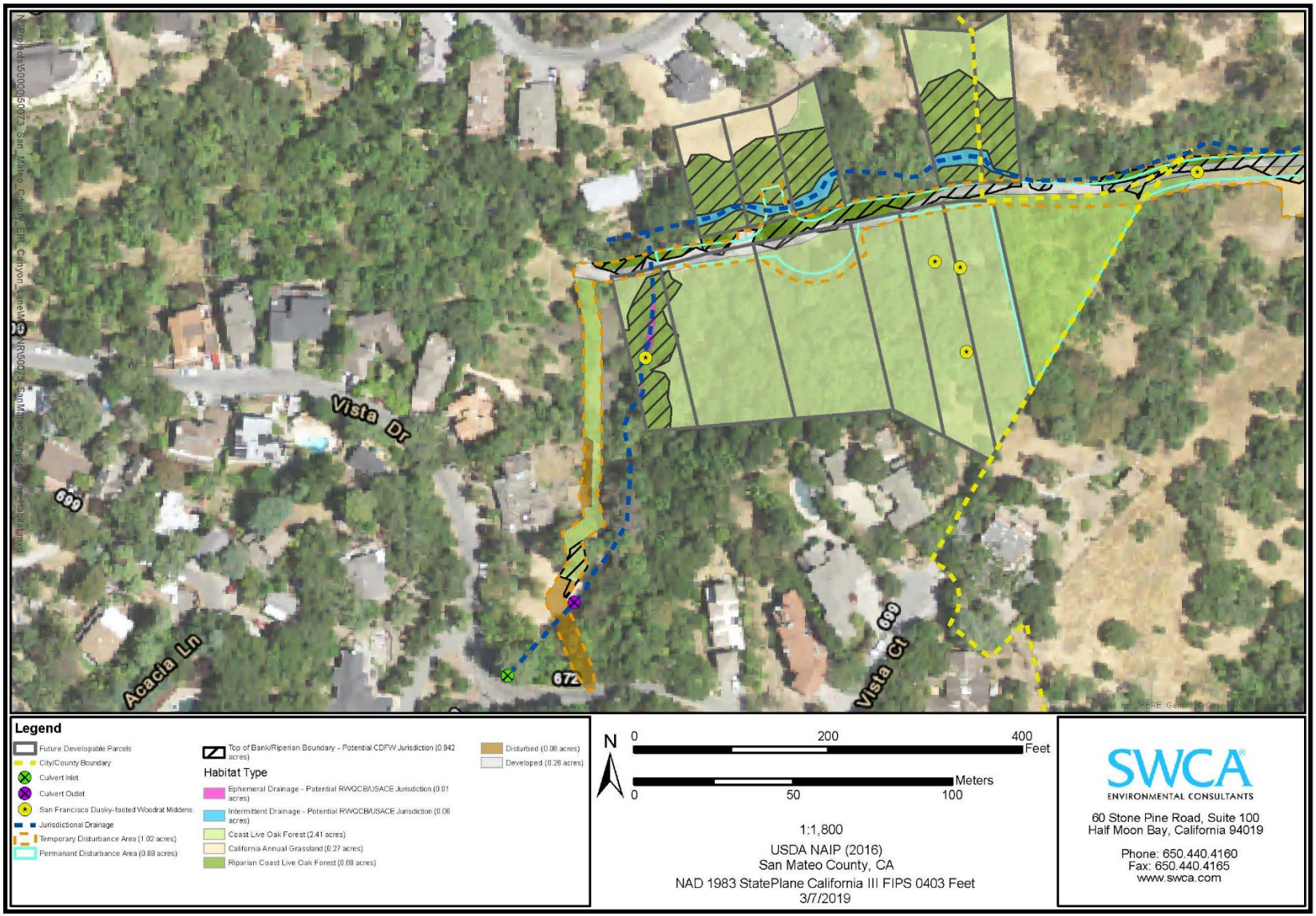


Figure 2a. Habitat and Project Impacts Map 1 of 2

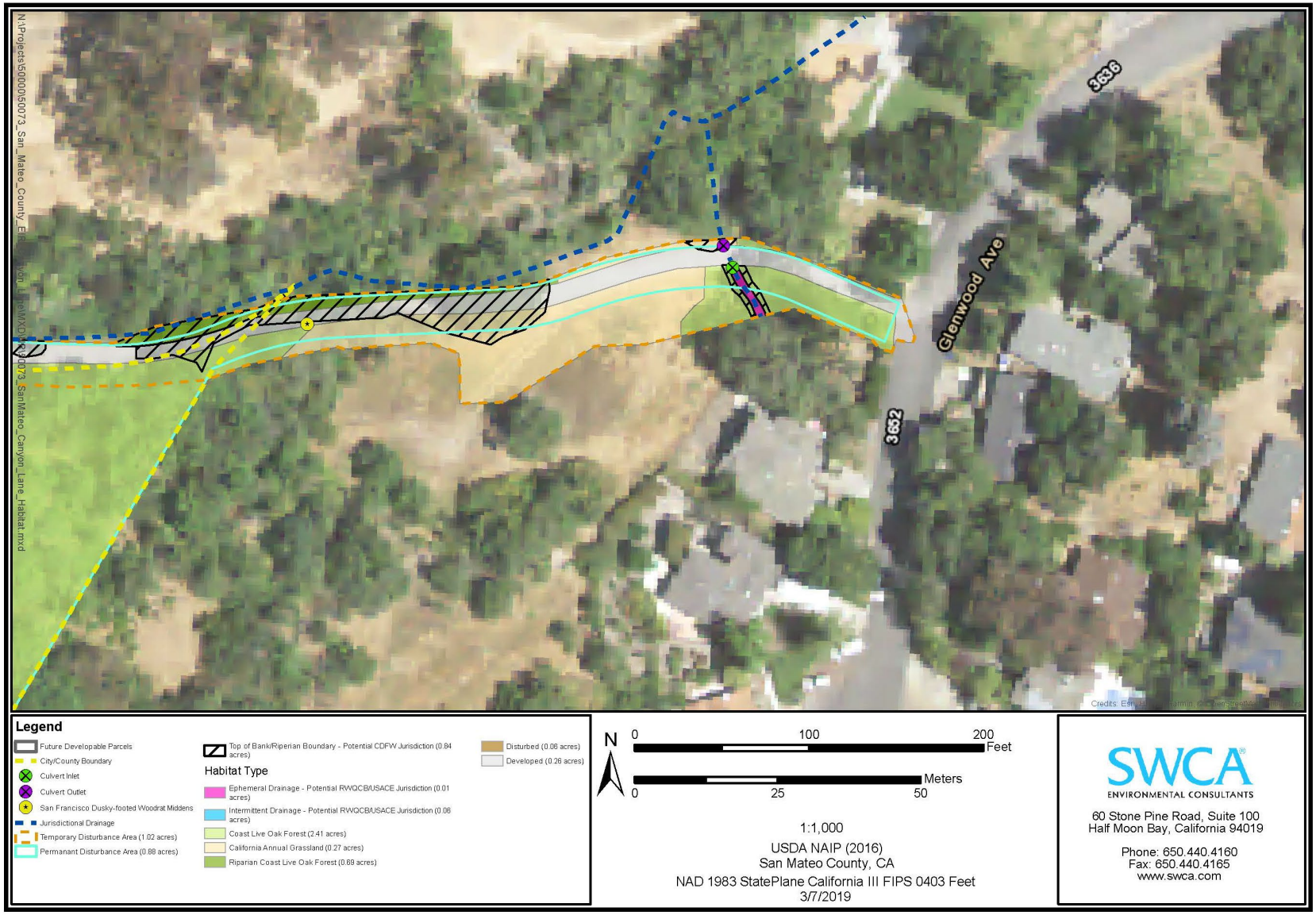


Figure 2b. Habitat and Project Impacts Map 2 of 2

Table 1. Habitat Acreages on the Project Site

Habitat	Area (acres)	Percentage of Site (%)
Coast live oak forest	2.417	63
Developed	0.260	7
California annual grassland	0.278	7
Riparian coast live oak forest	0.697	18
Disturbed	0.066	2
Intermittent drainage	0.067	2
Ephemeral drainage	0.016	1
TOTAL	3.801	100

Vegetation and Wildlife

In addition to the biotic habitat/features identified in the 2016 report, the following vegetation descriptions have been added to the report as a result of the expanded project description, and associated footprint, and changes to the biotic conditions on site.

Discussion and description of the "drainage swale" mentioned in the 2016 report under this heading is discussed in the Sensitive and Regulated Habitats section below as Ephemeral Drainage and Intermittent Drainage.

DISTURBED

Disturbed habitat is typically used to describe areas that have been previously physically disturbed to such an extent that previously existing natural communities are no longer supported. Disturbed areas either do not support any plant species or contain sparse, predominantly nonnative weedy species. This is not a natural community and generally does not provide high-quality habitat for wildlife or sensitive species.

This habitat type has been added to the biological analysis to acknowledge a highly disturbed area on the southwestern side of the watermain installation area. An ongoing landslide is present in this area, which appears to have been re-stabilized by contouring the slope, installing straw wattles to stabilize loose soils, and covering the area with woodchips (Steven F. Connelly 2017). Sparsely scattered annual grasses were observed growing up through the dense layer of woodchips. No other vegetation was observed growing in this area.

In general, disturbed habitat does not provide high-quality wildlife habitat, although reptiles may bask in open areas where sunlight hits the ground. In addition, wildlife may use this area as they pass through the vicinity to access adjacent habitats.

Special-Status Plants and Animal Species

Figures 3a, 3b, 4a and 4b in Appendix A show CNDDB special-status plant and animal species occurrence records within a 5-mile radius of the project. CNDDB maps have been updated to include any new occurrences recorded since the 2016 report was prepared.

SPECIAL-STATUS PLANTS

Eighty-six (86) special-status plants were considered for their potential to occur on the project site based on current CNPS (2019) and CNDDB (2019) records. Based on a review of suitable habitat, soils, elevation, and other environmental factors, SWCA determined that the project site contains suitable habitat for eight of the 86 species that were identified in the records search.

SWCA's determination regarding what plant species are considered absent from the project site was consistent those made in the 2016 report. The following plant species are considered absent from the project site: Franciscan onion (*Allium peninsulare var. franciscanum*), Western leatherwood (*Dirca occidentalis*), fragrant fritillary (*Fritillaria liliacea*), Crystal springs lessingia (*Lessingia arachnoidea*), and white-rayed pentachaeta (*Pentachaeta bellidiflora*).

SWCA's determination regarding what special-status plants have potential to occur at the project site was consistent with the 2016 report. The list of species that have potential to occur and information about where these species may occur within the project site is presented in Table 2.

SPECIAL-STATUS ANIMALS

Fifty-eight (58) special-status animal species were considered for their potential to occur on the project site based on current CNDDB (2019) records and USFWS species records. SWCA determined that the project site may contain suitable habitat for 18 of the 58 species that were identified in the records search. Of these 18 species, SWCA agreed with the 2016 report determination that the following species were absent from the project site due to a lack of suitable habitat or evidence that the species does not occur in the project vicinity: delta smelt (*Hypomesus transpacificus*), tidewater goby (*Eucyclogobius newberryi*), Central California coast steelhead (*Oncorhynchus mykiss irideus*), burrowing owl (*Athene cunicularia*), Bay checkerspot butterfly (*Euphydryas editha bayensis*), peregrine falcon (*Falco peregrinus anatum*), golden eagle *(Aquila chrysaetos*), white-tailed kite (*Elanus leucurus*), and ringtail (*Bassariscus astutus*).

SWCA agreed with the 2016 report determination that the following species are not expected to occur on the project site: California red-legged frog (*Rana draytonii*), San Francisco garter snake (*Thamnophis sirtalis tetrataenia*), California tiger salamander (*Ambystoma californiense*), and American badger (*Taxidea taxus*).

SWCA agreed with the 2016 report determination that the project site lacks suitable structures and crevices for large roosting maternity colonies of Townsend's big-eared bat (*Corynorhinus townsendii*). However, SWCA determined that there is potential for pallid bat (*Antrozous pallidus*) and other crevice roosting bats to occur on the project site. Rocky outcrops located to the north of the ephemeral drainage within the proposed 11 development parcels may provide suitable roosting habitat for individual pallid bats and other common crevice roosting bat species. In addition, trees located within the project site may provide suitable roosting habitat for foliage roosting bat species commonly found in the region such as the non-listed hoary bat (*Lasiurus cinereus*) and Western red bat (*Lasiurus blossevillii*), a California species of special concern.

Five special-status animal species were determined to have potential to occur on the project site. These species are described in Table 3.

Table 2. Special-Status Plant Species with Potential to Occur on the Project Site

Species Name	Habitat and Distribution	Flower Season	Legal Status Federal/ State/CNPS	Rationale for Expecting Presence or Absence
bent-flowered fiddleneck *Amsinckia lunaris*	Annual herb that occurs in coastal bluff scrub, cismontane woodland, and valley and foothill grassland. Elevation 3–500 meters.	May-June	--/--/1B.2	**Limited potential to occur.** Potentially suitable habitat for this species is located within coast live oak forest, and California annual grassland habitat on the project site.
Oakland star tulip *Calochortus umbellatus*	Perennial bulbiferous herb that occurs in broadleafed upland forest, chaparral, cismontane woodland, lower montane coniferous forest, and valley and foothill grassland habitats. This species is often found on serpentinite soils. Elevation 100–700 meters.	March-May	--/--/4.2	**Limited potential to occur.** Potentially suitable habitat for this species is located within both the grassland and coast live oak forest habitats on the project site.
California bottle-brush grass *Elymus californicus*	Perennial herb that occurs in broadleafed upland forest, cismontane woodland, North Coast coniferous forest, and riparian woodland habitats. Elevation 15–470 meters.	May-August (November)	--/--/4.3	**Limited potential to occur.** Potentially suitable habitat for this species is located within both the riparian coast live oak forest and coast live oak forest habitats on the project site.
San Mateo woolly sunflower *Eriophyllum latilobum*	Perennial herb that occurs in cismontane woodland (often serpentinite, on roadcuts), coastal scrub, and lower montane coniferous forest. Elevation 45–330 meters.	May-June	FE/CE/1B.1	**Potential to occur.** Potentially suitable habitat for this species is located within the coast live oak forest habitat on the project site.
bristly leptosiphon *Leptosiphon acicularis*	Annual herb that occurs in chaparral, cismontane woodland, coastal prairie, and valley and foothill grassland habitats. Elevation 55–1500 meters.	April-June	--/--/4.2	**Limited potential to occur.** Potentially suitable habitat for this species is located within the coast live oak forest and California annual grassland habitats on the project site.
serpentine leptosiphon *Leptosiphon ambiguus*	Annual herb that usually occurs on serpentinite soils, in cismontane woodland, coastal scrub, and valley and foothill grassland habitats. Elevation: 120–1130 meters.	March-June	--/--/4.2	**Potential to occur.** Potentially suitable habitat for this species is located within the coast live oak forest habitat on the project site; however, this species is presumed absent from the California annual grassland habitat due to the fact that the grassland habitat is not on serpentine soils.

Species Name	Habitat and Distribution	Flower Season	Legal Status Federal/ State/CNPS	Rationale for Expecting Presence or Absence
woodland woollythreads *Monolopia gracilens*	An annual herb associated with serpentine soil. Often found in openings within broadleafed upland forest, chaparral, cismontane woodland, north coast coniferous forest, and valley and foothill grassland. 100–1200 meters.	February - July	--/--/1B.2	**Limited potential to occur.** Potentially suitable habitat for this species is located within the coast live oak forest and California annual grassland habitat on the project site.
Michaels rein orchid *Piperia michaelii*	Perennial herb that occurs in coastal bluff scrub, closed-cone coniferous forest, chaparral, cismontane woodland, coastal scrub, and lower montane coniferous forest habitats. Elevation 3–915 meters.	April-August	--/--/4.2	**Limited potential to occur**. Potentially suitable habitat for this species is located within the coast live oak forest habitat on the project site.

Notes:

[1]List of plant species based on CNPS and CNDDB searches of USGS 7.5-minute quadrangles— Woodside, Palo Alto, Mindego Hill, La Honda, San Gregorio, Half Moon Bay, Montara Mountain, San Mateo and Redwood Point [2]Listing status based on CNDDB and CNPS data.

[3]Habitat associations and blooming periods based on the Jepson Online Interchange for California Floristics (Queried in February 2019).

*Occurrences recorded within 5 miles of the project.

Status Codes

-- = No status

FE = Federally listed endangered, FT = Federally listed threatened,

FC = Federal candidate for listing

SE = California state-listed endangered

ST = California state-listed threatened

SCE = California candidate endangered

California Rare Plant Ranking:

1A = Plants presumed extirpated in California and either rare or extinct elsewhere

1B = Plants rare, threatened, or endangered in California and elsewhere

2A = Plants presumed extirpated in California, but common elsewhere

2B = Plants rare, threatened, or endangered in California, but more common elsewhere

CRPR Threat Ranks:

0.1 = Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)

0.2 = Moderately threatened in California (20-80% of occurrences threatened / moderate degree and immediacy of threat)

0.3 = Not very threatened in California (less than 20% of occurrences threatened / low degree and immediacy of threat)

Table 3. Special-Status Animal Species with Potential to Occur on the Project Site

Species Name	Habitat and Distribution	Legal Status Federal/ State	Rationale for Expecting Presence or Absence
Western pond turtle *Emys marmorata*	Found in ponds, lakes, rivers, streams, creeks, marshes, and irrigation ditches with abundant vegetation. Prefers aquatic features with exposed banks, rocks, or logs for basking. Typically found in woodland, forest and grassland habitats. Typically between March and June turtles will leave the water and travel overland to search for food, better habitat, a mate, or nesting habitat.	--/SSC	**Limited potential to occur.** SWCA agreed with the assessment made by H.T. Harvey's 2016 report that western pond turtle may occur, although infrequently, within the project site. Although the project site lacks suitable high-quality aquatic habitat and basking sites for this species, the intermittent drainage feature may provide suitable temporary aquatic cover for vagrant individuals.
yellow warbler *Setophaga petechia*	Occurs in bushes, swamp edges, streams, and gardens. Yellow warblers nest in a variety of habitats including woods and thickets along the edges of streams, lakes, swamps, and marshes, particularly in willows, alders, and other moisture-loving plants.	--/SSC	**Potential to Occur. Unlikely to nest.** SWCA agreed with the assessment made by H.T. Harvey's 2016 report that this species is unlikely to nest within the project site, but may occur on the project site as a spring or fall migrant.
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*	Occurs in grasslands, scrub, and wooded areas throughout the San Francisco Bay area. This species builds large stick houses in trees or tree cavities as well as on the ground against logs or in dense brush.	--/SSC	**Present.** SWCA agreed with the assessment made by H.T. Harvey's 2016 report that suitable habitat for San Francisco dusky-footed woodrat occurs throughout the project site within coast live oak forest and riparian coast live oak forest habitat. SWCA identified four woodrat middens during the reconnaissance-level surveys (Figure 2).
pallid bat *Antrozous pallidus*	Occurs in semi-arid and arid landscapes in western North America, primarily in grasslands, shrub-steppe, and desert environments with rocky outcrops. This species can also be found in dry open oak forest, ponderosa forest, or open farmland. Roosts are most commonly in rock crevices; however, buildings, bridges, live trees and snags may also be suitable roosts for pallid bat.	--/SSC	**Potential to occur.** Although no suitable large crevices are present within the project site for large maternity colonies, rocky outcrops within the future developable parcels located on the north side of the intermittent drainage feature may provide suitable roosting habitat for individual roosting and small groups of maternity roosting pallid bats.

Species Name	Habitat and Distribution	Legal Status Federal/ State	Rationale for Expecting Presence or Absence
Western red bat *Lasiurus blossevillii*	Occurs in forests and woodlands from sea level up through mixed conifer forests, with grasslands, shrublands, open woodlands, forests and croplands nearby for foraging. This species roosts primarily in trees, and sometimes in shrubs. Roost sites are typically located adjacent to streams, fields or urban areas.	--/SSC	**Potential to occur.** Trees and shrubs throughout the project site may provide suitable roosting habitat for individual roosting and small groups of maternity roosting Western red bats.

Notes:

[1]List of animal species based on CNDDB searches of USGS 7.5-minute quadrangles – Woodside, Palo Alto, Mindego Hill, La Honda, San Gregorio, Half Moon Bay, Montara Mountain, San Mateo and Redwood Point

[2]Listing status based on CDFW CNDDB State & Federally Listed Endangered & Threatened Animals of California List, November 2018.

Status Codes

-- = No Status

FE = Federally Listed Endangered

FT = Federally Listed Threatened

FC = Federal Candidate for Listing

SE = California State-Listed Endangered

ST = California State-Listed Threatened

SCE = California Candidate Endangered

DL = Delisted

FP = CDFW Fully Protected

SSC = CDFW Species of Special Concern

Sensitive and Regulated Habitats

CDFW SENSITIVE HABITATS

Consistent with the 2016 report, SWCA identified riparian habitat along the ephemeral drainage and intermittent drainage corridors. This riparian habitat may be considered jurisdictional by CDFW. In addition to the riparian habitat identified along the intermittent drainage tributary to Arroyo Ojo de Agua and the eastern ephemeral drainage feature, riparian habitat, part of the expanded project description, was identified surrounding the western ephemeral drainage feature and south of Canyon Lane.

WATERS OF THE U.S./STATE

Consistent with the 2016 report, no formal wetland delineation was conducted for this report. However, potentially jurisdictional features do occur on the site. These features are described in detail below.

Intermittent Drainage

Intermittent streams and drainages are defined as having periods of flowing water during the wet season (winter-spring). These features are normally dry during the hot summer months and are not considered "relatively permanent waters." (Wetlands Professional Services 2017)

The 2016 report describes the presence of a "drainage swale" running parallel to Canyon Lane, which is an unnamed tributary of Arroyo Ojo de Agua. For the purpose of this analysis SWCA has renamed the "drainage swale" to "intermittent drainage" in order to more accurately reflect the seasonal waters present during the wet season.

During both site visits on January 22, 2019, and February 6, 2019, water was actively flowing in the intermittent drainage feature. Water was observed at approximately 8 to 12 inches in depth. The intermittent drainage feature is canopied by riparian coast live oak forest habitat, and the banks are covered with patches of dense Himalayan blackberry (*Rubus armeniacus*) as well as patches of annual grasses and forbs.

Consistent with findings in the 2016 report, the intermittent drainage does not provide suitable habitat for fish and most aquatic wildlife species due to the fact that the drainage is narrow and relatively shallow. In addition, the intermittent drainage, which is a tributary to Arroyo Ojo de Agua, runs underground from a large culvert inlet to the northeast of the project site, and through a series of pipes towards Redwood Creek. Due to the fact that this feature runs subsurface, it does not provide suitable aquatic dispersal habitat for fish or aquatic wildlife species. However, the intermittent drainage may provide a water source for wildlife species in adjacent habitats, which may use the drainages on the project site for drinking or bathing. In addition, the intermittent drainage feature may provide temporary aquatic refuge for the rare vagrant western pond turtle that may disperse through the area.

Ephemeral Drainage

Ephemeral drainage features are typically associated with having less flow than intermittent streams and water is only flowing for brief periods in response to rainfall. Ephemeral streams and ditches are normally dry for most of the year. (Wetlands Professional Services 2017)

The 2016 report describes a "second drainage swale" that connects to the above-described unnamed tributary of Arroyo Ojo de Agua, near the eastern boundary of the site. This drainage swale lacks a riparian canopy, but does contain some Himalayan blackberry along the banks of the feature. During both site visits on January 22, 2019, and February 6, 2019, water was actively flowing in this ephemeral

drainage feature. Water was observed at approximately 4 to 6 inches in depth due to the recent rain events.

As part of the expanded project description, SWCA identified another ephemeral drainage feature on the southwestern side of the project site which conveys stormwater runoff through a series of culverts, starting on the southwestern side of the project site near Vista Lane, and draining downslope towards the intermittent drainage on the north side of Canyon Lane. Water was flowing in this feature during both site visits (January 22, 2019 and February 6, 2019). Water was observed at approximately 6 inches in depth due to recent rain events. This second, western ephemeral drainage feature was not identified in the 2016 report, as the feature overlaps with the 11 future developable parcels and the proposed water main installation site.

Neither of the ephemeral drainages observed within the project site provide suitable habitat for fish and most aquatic wildlife species due to the fact that the drainages are narrow and relatively shallow, and the water in the drainages is the result of storm events. However, both of the ephemeral drainages may provide a seasonally present water source for wildlife species in adjacent habitats, which may use the drainages on site for drinking or bathing.

Biotic Impacts and Mitigation

OVERVIEW

The CEQA Guidelines outlined within the 2016 report are current and valid for impacts analysis within this report. SWCA's determinations remain consistent with the definitions and guidelines outlined in the 2016 report.

In summary, SWCA's assessment of the potential impacts for the project expansion of Canyon Lane remained consistent with those assessed in the 2016 report. However, due to the expanded project description, the areas of impact are no longer consistent with the areas reviewed in the 2016 report. Temporary and permanent impact areas are further described in Table 4 below. SWCA determined that mitigation measures and procedures described in the 2016 report provide mitigation for the impacts of the project on sensitive habitats and special-status species, with the exception of impacts to San Francisco dusky-footed woodrat and bat species. SWCA recommends the addition of language added to Mitigation Measure 7c (described below) to further prevent impacts to San Francisco dusky-footed woodrat young, and implementation of Mitigation Measure 10: Pre-Construction Bat Survey, described below to mitigate impacts to special-status bat species and maternal bat roosts.

Table 4. Temporary and Permanent Impacts as a Result of the Project

Habitat	Temporary Impact Area (acres)	Permanent Impact Area (acres)
Coast live oak forest	0.372	0.506
Developed	0.257	0.211
California annual grassland	0.173	0.056
Riparian coast live oak forest	0.144	0.103
Disturbed	0.066	N/A
Intermittent drainage	0.005	0.005
Ephemeral drainage	0.003	0.001
TOTAL	1.020	0.882

KEY ASSUMPTIONS

To date, the design for the proposed bridge over the tributary of Arroyo Ojo de Agua has not yet been finalized. However, the proposed design shows that the bridge would fully span the intermittent drainage without encroaching below the top of bank, and this design is a key assumption in this analysis, as well as in the 2016 report. Therefore, no additional permits or compensatory mitigation are anticipated beyond those outlined in the original Biological Resources Report. If there are changes to the bridge design which may impact the potentially jurisdictional boundaries of these features, additional permitting may be required.

The 11 developable parcels that are part of this proposed project were analyzed at a program level. The purpose of the assessment of these parcels, within this biological resources report, is to provide a baseline for future development on these parcels. As conditions may change, and no certain date of potential development is yet known, it is recommended that any future development of these parcels proceed only after a biological evaluation, specific to the parcel(s) in question, be completed. Considering potential future regulatory changes and changes to special-status species designations, an individual report, congruent with the CEQA process, will need be completed to assess potential impacts.

LESS-THAN-SIGNIFICANT IMPACTS

The levels of significance reported for impacts in the 2016 report are consistent with that of the expanded project description scope. However, the total acreages that will be impacted by the proposed project have been altered due to the expanded project description. The proposed project will result in 0.88 acre of permanent impacts and 1.02 acre of temporary impacts. These acreages do not include potential impacts from the 11 developable parcels which accounts of 2.62 acres of the project area, as described above.

IMPACTS FOUND TO BE LESS THAN SIGNIFICANT WITH MITIGATION

No additional impacts, beyond those reported in the 2016 report, to bent-flowered fiddleneck or San Mateo woolly sunflower were identified as part of the 2019 biological evaluation. The following Mitigation measures suggested in the 2016 report would be sufficient to mitigate the effects of the project on these species for the expanded project description: Mitigation Measures 1a, 1b, 1c, 2a, and 2b.

Loss of Protected Trees

Trees within the City were not measured in accordance with the City's tree ordinance standards. The City requires measurements be taken at the widest section of the trunk between 6 and 36 inches above ground.

Trees within the City will need to be measured in accordance with the standards outlined in the City tree ordinance. Trees within the County of San Mateo will need to be measured in accordance with the San Mateo County Significant Tree Ordinance.

Mitigation Measures 3a, 3b, 3c, 4a, 4b, and 4c proposed in the 2016 report for loss of protected trees are suggested to be applied to the expanded project description scope; however, additional trees may be added to the identified list of trees following updates to the Arborist Reports.

Impacts on Intermittent and Ephemeral Drainage Features and Water Quality

SWCA's determination on project impacts to potentially jurisdictional waters is consistent with that of the 2016 report. However, the expanded project description area includes one additional ephemeral drainage feature, observed on the western side of the project. The feature intersects with one of the 11 future developable parcels; however, Mitigation Measures 5a and 5b described in the 2016 report are relevant in

order to mitigate for potential impacts to all drainage features. Permitting will be required for the widening of the culvert crossing within the ephemeral drainage on the east side of Canyon Lane. Additional permitting may be required for the installation of the proposed bridge crossing, if the design encroaches on the jurisdictional boundaries of the intermittent drainage feature.

Impacts from Invasive Weeds

SWCA's determination on project impacts to invasive weeds is consistent with those described in the 2016 report. No additional mitigation measures beyond those stated in Mitigation Measure 6 are recommended.

Impacts on the San Francisco Dusky-Footed Woodrat

Five San Francisco dusky-footed woodrat nests were identified during the field surveys on January 22, 2019, and February 6, 2019. SWCA's determination on project impacts to dusky-footed woodrats is consistent with those described in the 2016 report. No changes to Mitigation Measures 7a and 7b are recommended, however the following language (indicated by the italicized text) has been added to Mitigation Measure 7c to further prevent any potential impacts to woodrat young.

> **BIO/mm-7c Pre-Construction Bat Survey**. Relocation of Nest Materials. If active woodrat nests are found within the project boundary during the preconstruction survey and avoidance is not feasible, the woodrats will be evicted from their nests prior to the removal of the nests and onset of ground-disturbing activities to avoid injury or mortality of the woodrats. A qualified biologist will disturb and *slowly dismantle* the woodrat nest to the degree that all woodrats leave the nest and seek refuge outside of the project activity area. *If dependent woodrat young are observed within the nest during dismantling, the biologist will stop dismantling, and install a buffer to allow additional time for the adults and young to disperse offsite. Once adults and young have dispersed offsite, the biologist will then complete dismantling of the nest.* Subsequently, the nest sticks will be relocated; these materials will be piled at the base of a nearby tree or shrub outside of the activity area. The spacing between relocated nests will not be less than 20 feet, unless a qualified biologist has determined that the habitat can support higher densities of nests.

Impacts on Western Pond Turtle

SWCA's determination on project impacts to western pond turtle is consistent with those described in the 2016 report. No additional mitigation measures beyond those stated in Mitigation Measure 8 are recommended.

Regulatory Overview for Nesting Birds

SWCA's determination on project impacts to nesting birds is consistent with those described in the 2016 report. No additional mitigation measures beyond those stated in Measure 1a, 1b and 1c are recommended.

Impacts on Roosting Bats

The project could result in the loss of bat roosting habitat, including potential roosting habitat for pallid bat, through the removal of onsite trees and impacts to rocky outcrops during construction. Loss of individual bats, bat colonies, or their habitat could occur if active bat roosts are present within trees or rocky outcrops, particularly if construction activities take place during the maternal roosting period season when young bats cannot yet fly or, for crevice-roosting bats, during hibernation when bat activity is decreased. Implementation of Mitigation Measure 10: Pre-Construction Bat Survey, would reduce this

potentially significant impact on special-status and roosting bat species to a less-than-significant level by ensuring tree removal activities are seasonally timed where active bat roosts occur, and mitigation is provided for the loss of identified bat roosts.

> **BIO/mm-10 Pre-Construction Bat Survey**. Prior to tree removal or grading of rocky outcrops, a qualified bat biologist shall conduct a visual and acoustic survey of the project site to identify if bats are roosting within trees or rocky outcrops within the project site. Sensitive habitat areas and roost sites should be avoided to the maximum extent possible. If no roosting sites or bats are observed during the survey, a letter report detailing the survey observations shall be sent to the California Department of Fish and Wildlife (CDFW) and no further mitigation is necessary.
>
> If roosting bats or indications of bat roosts are observed within the project site and cannot be avoided, CDFW will be consulted to determine if bat roost replacement is required. If required, roost replacement will be implemented before construction activities begin. Roost replacement will be implemented using suggested mitigation strategies such as those described in the Caltrans' *California Bat Mitigation Techniques, Solutions, and Effectiveness* report (Johnston et al. 2004) and will be based off species-specific roosting requirements. Roost replacement will be conducted on site to the extent feasible.
>
> If roosting bats or indications of bat roosts are observed within Project trees to be removed, tree removal shall be conducted between September 1 and March 30 to avoid impacts to maternal bat roosts. During tree removal and where potential bat roosts were identified, a qualified bat biologist shall be present and tree removal will begin with portions of the tree that do not provide suitable roost habitat (e.g., low limbs lacking forage). Trees will be disassembled at a speed in coordination with the on-site qualified bat biologist that allows any roosting bats to vacate the tree.

Implementation of the pre-construction survey and bat roosting minimization measures presented in mm/BIO-10 would avoid and minimize impacts to roosting bat species and the impacts will be reduced to a less-than-significant level.

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APPENDIX A

CNDDB Maps

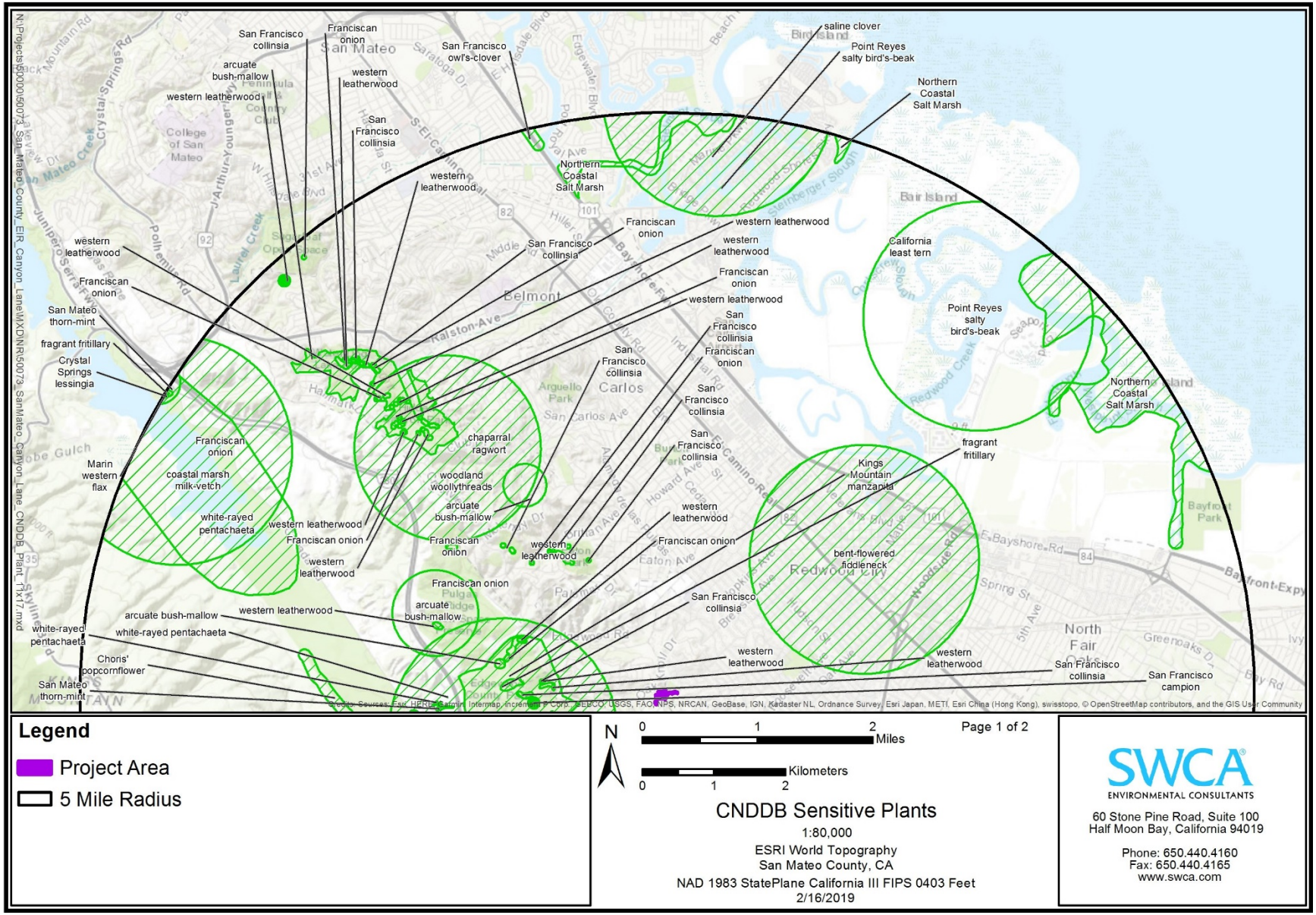


Figure 3a: CNDDB Sensitive Plant Records (1 of 2)

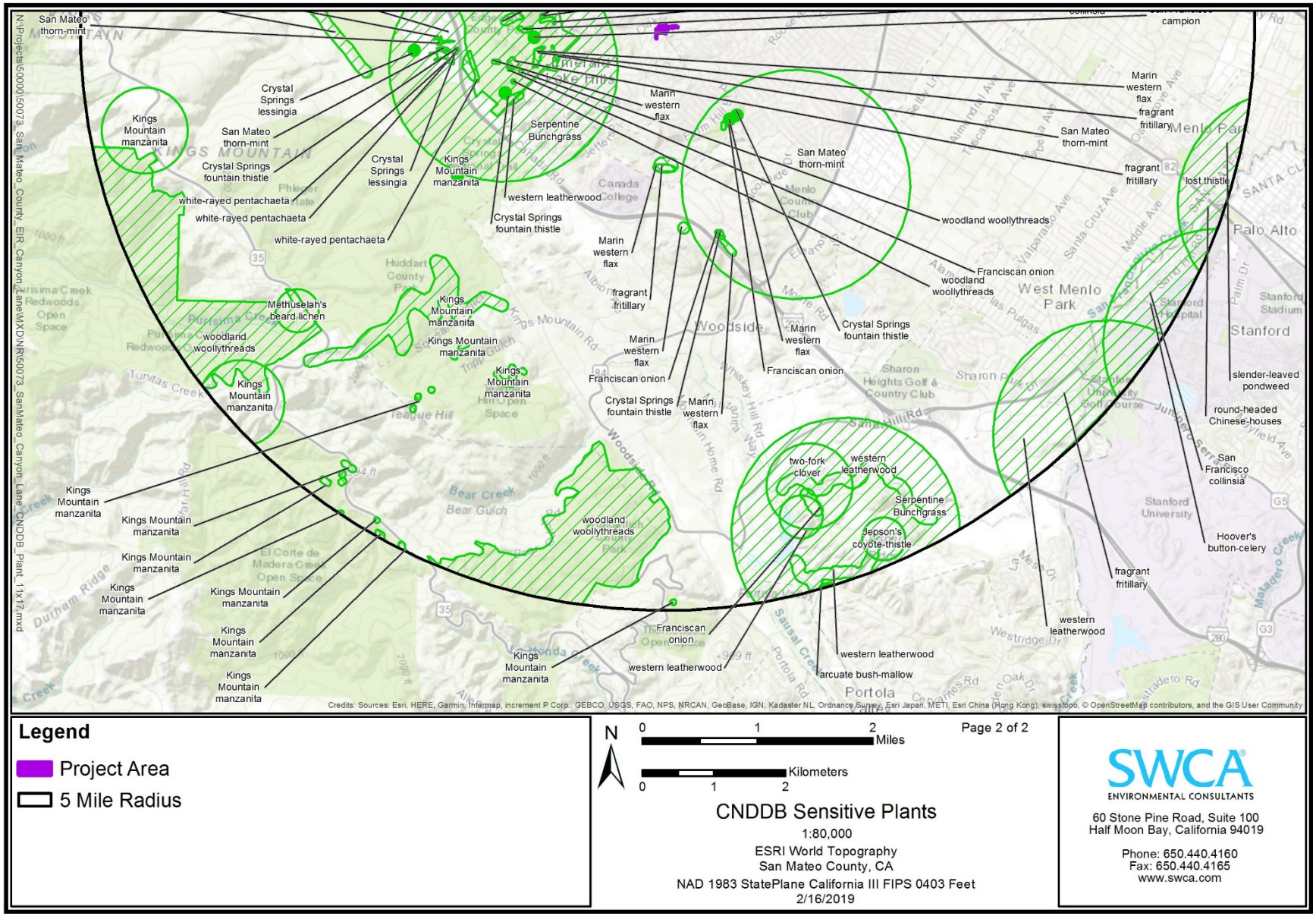


Figure 3b: CNDDB Sensitive Plant Records (2 of 2)

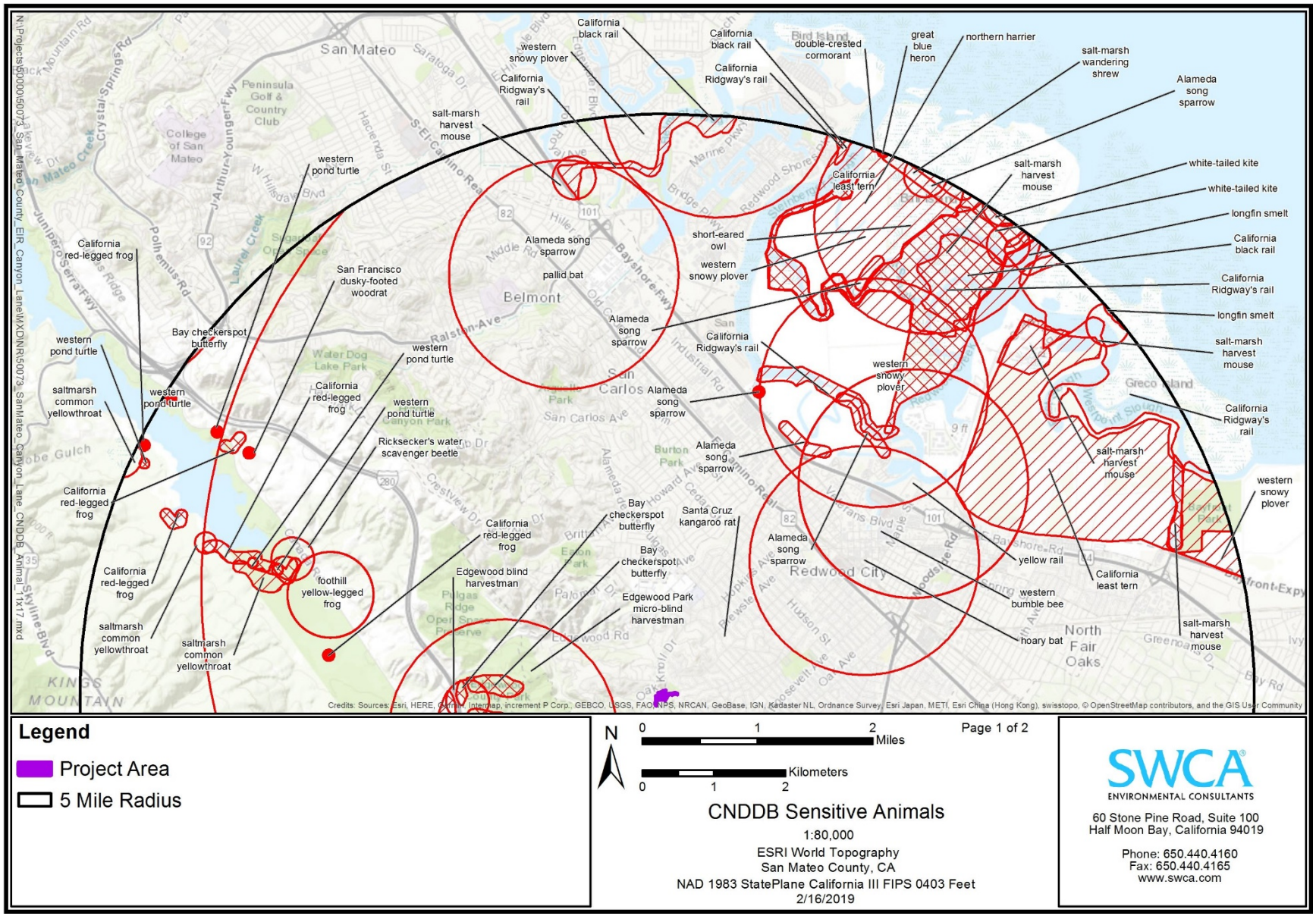


Figure 4a: CNDDB Sensitive Animal Records (1 of 2)

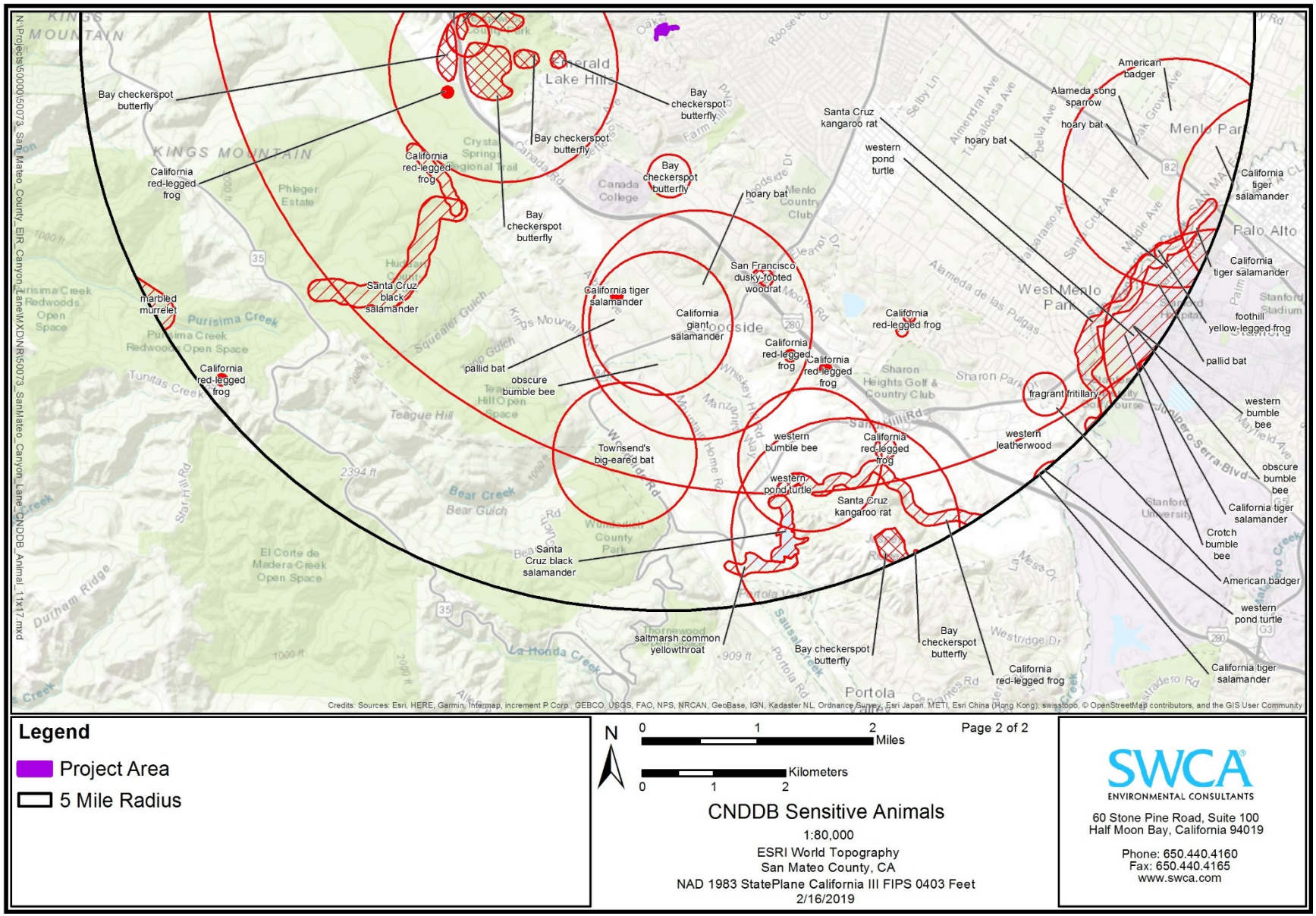


Figure 4b: CNDDB Sensitive Animal Records (2 of 2)

APPENDIX E

Rare Plant Survey

SWCA
ENVIRONMENTAL CONSULTANTS
Sound Science. Creative Solutions.®

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Half Moon Bay, California 94019
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www.swca.com

TECHNICAL MEMORANDUM

To: **Summer Burlison, County of San Mateo Planning and Building Department**

From: Jessica Henderson-McBean, SWCA Environmental Consultants

Date: July 23, 2019

Re: **Rare Plant Survey Results for the Canyon Lane Roadway Improvements Development Project, San Mateo County, California / SWCA Project No. 50073**

INTRODUCTION

SWCA Environmental Consultants (SWCA) has prepared this memorandum for San Mateo County (County) in support of the Canyon Lane Roadway Improvements Development Project (project) located in San Mateo County, California. The purpose of this memorandum is to document the results of focused rare plant surveys conducted by SWCA biologists Jessica Henderson-McBean and Rachel Stump on May 21 and June 13, 2019.

These seasonally timed rare plant surveys were conducted as a follow up to the reconnaissance-level surveys performed on January 22 and February 6, 2019, in support of the preparation of the project Environmental Impact Report (EIR).

SURVEY METHODS

SWCA conducted a literature review prior to the reconnaissance-level surveys performed in January and February 2019. The literature review included queries of the California Natural Diversity Database (CNDDB)[1], the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC)[2] report for the study area, and the California Native Plant Society (CNPS)[3] Rare Plant Inventory.

Two special-status species were determined to have potential to occur within the project area: San Mateo woolly sunflower (*Eriophyllum latilobum*; federally endangered and state endangered, CNPS 1B.1), and bent-flowered fiddleneck (*Amsinckia lunaris*; CNPS 1B.2). Six special-status species were determined to have limited potential to occur within the project area: woodland woollythreads (*Monolopia gracilens*; CNPS 1B.2), Oakland star tulip (*Calochortus umbellatus*; CNPS 4.2), California bottle-brush grass (*Elymus californicus*; CNPS 4.3), bristly leptosiphon (*Leptosiphon acicularis*; CNPS 4.2), serpentine

[1] California Department of Fish and Wildlife (CDFW). 2019. California Natural Diversity Database (CNDDB). California Department of Fish and Game, Sacramento, CA.

[2] U.S. Fish and Wildlife Service (USFWS). 2019. Official species lists online. U.S. Fish and Wildlife Service, Sacramento District.

[3] California Native Plant Society (CNPS). 2019. Inventory of Rare and Endangered Plants. Online Edition. California Native Plant Society. Sacramento, CA.

leptosiphon (*Leptosiphon ambiguous*; CNPS 4.2), and Michael's rein orchid (*Piperia michaelii;* CNPS 4.2).

Rare plant surveys focused primarily on San Mateo woolly sunflower and bent-flowered fiddleneck as impacts to these species were determined to be potentially significant in the preparation of the EIR due to their potential to occur. The biologists visited reference sites for San Mateo woolly sunflower and bent-flowered fiddleneck prior to each round of surveys in order to determine the bloom status and to calibrate the field team to identifying these species (additional information on the reference sites can be found in Attachment A).

The biological survey area included areas identified as the proposed Canyon Lane road expansion area, the proposed utility installation area, the single-family residence development, and 11 future development parcels. The biological survey area was surveyed by walking meandering transects throughout the survey area to identify potential special-status species. The surveyors referred to The Jepson Manual[4] to verify plant identification.

RESULTS

No special-status plants were observed within the survey area during the 2019 surveys. Surveys were conducted in May and June following a season of good rainfall (approximately 114% of the normal)[5], providing optimal conditions for the detection of rare plants. The surveys were conducted over a range of bloom periods to capture the flowering period of all special-status plants with a likelihood for occurrence in the biological survey area. A complete inventory of all plant species observed within the survey area is included as Attachment B.

[4] Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken (eds.) 2012. *The Jepson Manual: Vascular Plants of California*. 2nd Edition. University of California Press, Berkeley.

[5] National Oceanic and Atmospheric Administration (NOAA). 2019. Climate Station Precipitation Summary. Available at: https://www.cnrfc.noaa.gov/awipsProducts/RNOWRKCLI.php. Accessed July 2019.

ATTACHMENT A

Photo Documentation

Reference Site for Bent-Flowered Fiddleneck (*Amsinckia lunaris*)



Photo A-1: Reference site visited on May 20, 2019, by SWCA Biologist Ms. Henderson-McBean. More than 15 individuals observed at this location. Location: Marin County



Photo A-2: Reference site visited on May 20, 2019, by SWCA Biologist Ms. Henderson-McBean. More than 15 individuals observed at this location. Location: Marin County



Photo A-3: Reference site visited on June 12, 2019, by SWCA Biologist Ms. Henderson-McBean. Individuals that were previously observed were no longer flowering, but approximately 10 individuals were identifiable and flowering during the June 2019 visit. Location: Marin County



Photo A-4: Reference site visited on June 12, 2019, by SWCA Biologist Ms. Henderson-McBean. Individuals that were previously observed were no longer flowering, but approximately 10 individuals were identifiable and flowering during the June 2019 visit. Location: Marin County

Reference Sites for San Mateo Woolly Sunflower (*Eriophyllum latilobum*)



Photo A-5: Reference site visited on May 21, 2019, by SWCA Biologists Ms. Henderson-McBean and Ms. Stump. Approximately 10 individuals were easily identifiable and flowering. Location: San Mateo County



Photo A-6: Reference site visited on May 21, 2019, by SWCA Biologists Ms. Henderson-McBean and Ms. Stump. Approximately 10 individuals were easily identifiable and flowering. Location: San Mateo County



Photo A-7: Reference site visited on June 13, 2019, by SWCA Biologists Ms. Henderson-McBean and Ms. Stump. Approximately 15 plants observed. Location: San Mateo County



Photo A-8: Reference site visited on June 13, 2019, by SWCA Biologists Ms. Henderson-McBean and Ms. Stump. Approximately 15 plants observed. Location: San Mateo County

ATTACHMENT B

Floral Compendium

Table B-1. Floral Compendium

Scientific Name	Common Name
Angiosperms (Eudicots)	
Anacardiaceae	**Cashew family**
Toxicodendron diversilobum	poison oak
Apiaceae	**Umbellifers**
Daucus carota	wild carrot
Sanicula crassicaulis	Pacific sanicle
Torilis arvensis	common hedgeparsley
Apocynaceae	**Dogbane family**
Asclepias fascicularis	narrowleaf milkweed
Araliaceae	**Ginseng family**
Hedera helix	English ivy
Asteraceae	**Daisy family**
Achillea millefolium	yarrow
Artemisia douglasiana	mugwort
Baccharis pilularis	coyote brush
Carduus pycnocephalus	Italian thistle
Cichorium intybus	common chicory
Cotula australis	Australian brass buttons
Cynara cardunculus	artichoke
Hemizonia congesta	hayfield tarweed
Hypochaeris radicata	rough cat's ear
Tragopogon porrifolius	salsify
Buxaceae	**Box family**
Buxus sempervirens	common box
Cactaceae	**Cactus family**
Opuntia spp	prickly pear cactus
Caprifoliaceae	**Honeysuckle family**
Symphoricarpos albus	snowberry
Euphorbiaceae	**Spurge family**
Euphorbia spathulata	reticulate-seeded spurge
Fabaceae	**Legumes**
Acacia dealbata	silver wattle
Genista monspessulana	French broom
Lathyrus latifolius	sweet pea
Trifolium angustifolium	narrow leaved clover
Vicia sativa	common vetch
Fagaceae	**Beech family**
Quercus agrifolia	coast live oak

Scientific Name	Common Name
Quercus obata	valley oak
Quercus velutina	black oak
Gentianaceae	**Gentian family**
Zeltnera muehlenbergii	Muhlenberg's centaury
Geraniaceae	**Geranium family**
Geranium molle	cranesbill geranium
Grossulariaceae	**Currant family**
Ribes californicum	hillside gooseberry
Lamiaceae	**Mint family**
Stachys rigida	rough hedgenettle
Lauraceae	**Laurel family**
Umbellularia californica	California bay laurel
Malvaceae	**Mallow family**
Malva parviflora	cheeseweed mallow
Montiaceae	**Portulaca family**
Claytonia perfoliata	Miner's lettuce
Myrsinaceae	**Myrsine family**
Lysimachia arvensis	scarlet pimpernel
Myrtaceae	**Myrtle family**
Eucalyptus globulus	Tasmanian blue gum
Oleaceae	**Olive family**
Olea europaea	olive
Oxalidaceae	**Wood sorrels**
Oxalis pes-caprae	Bermuda buttercup
Phrymaceae	**Lopseed family**
Diplacus aurantiacus	sticky monkeyflower
Polygonaceae	**Buckwheat family**
Rumex maritimus	golden dock
Proteaceae	**Grevillea family**
Grevillea robusta	silkoak
Rosaceae	**Rose family**
Cotoneaster franchetii	Cotoneaster
Heteromeles arbutifolia	toyon
Prunus cerasifera	cherry plum
Rosa Californica	California wild rose
Rubus armeniacus	Armenian blackberry
Rubiaceae	**Coffee family**
Galium aparine	common bedstraw
Sapindaceae	**Soapberry family**
Aesculus californica	California buckeye

Scientific Name	Common Name
Salicaceae	**Willow family**
Poplar alba	white poplar
Salix lasiolepis	Arroyo willow
Scrophulariaceae	**Figworts**
Scrophularia californica	California bee plant
Angiosperms (Monocots)	
Asparagaceae	**Asparagus family**
Agave americana	agave
Chlorogalum pomeridianum	wavy-leafed soap plant
Asphodelaceae	**Aloe family**
Aloe maculata	aloe
Cyperaceae	**Sedge family**
Cyperus eragrostis	tall flatsedge
Iridaceae	**Iris family**
Iris spp	iris
Sisyrinchium belllum	blue eyed grass
Liliaceae	**Lillies**
Calochortus albus	white fairy lantern
Dichelostemma capitatum	blue dicks
Fritillaria affinis	checker lily
Melianthaceae	**Honey bush family**
Melianthus major	Cape honey flower
Poaceae	**Grasses**
Avena fatua	wild oat
Lolium multiflorum	Italian rye grass
Briza maxima	rattlesnake grass
Bromus carinatus	California brome
Bromus diandrus	ripgut brome
Bromus rubens	red brome
Cynosurus echinatus	hedgehog dogtail
Ehrharta erecta	panic veldt-grass
Elymus glaucus	blue wild rye
Phalaris aquatica	harding grass
Gymnosperms	
Cupressaceae	**Cypress family**
Cupressus spp.	unknown cypress
Sequoia sempervirens	redwood
Ferns	
Dennstaedtiaceae	**Bracken family**
Pteridium aquilinum	western brackenfern

Scientific Name	Common Name
Dryopteridaceae	**Leptosporangiate ferns**
Polystichum munitum	western swordfern
Pteridaceae	**Pteridophyte family**
Adiantum jordanii	maidenhair fern

APPENDIX F

Cultural Resources Technical Report

CULTURAL RESOURCES TECHNICAL REPORT FOR THE PROPOSED CANYON LANE ROADWAY IMPROVEMENTS, SAN MATEO COUNTY, CALIFORNIA

APRIL 2019

PREPARED FOR

County of San Mateo Planning and Building Department

PREPARED BY

SWCA Environmental Consultants

CULTURAL RESOURCES TECHNICAL REPORT FOR THE PROPOSED CANYON LANE ROADWAY IMPROVEMENTS, SAN MATEO COUNTY, CALIFORNIA

Prepared for

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SWCA Project No. 50073

SWCA Cultural Resources Report No. 19-182

April 2019

Keywords: Positive Results; APN 057-221-060, 057-221-070, 057-221-090, 057-221-100, 057-221-110, 057-222-210, 057-222-220 & 230, 057-222-240 & 250, 057-222-260, 057-222-270, 057-222-280, 057-222-290 & 300; Canyon Lane (Temporary Site #CL-01); Redwood City, Emerald Hills, San Mateo County; PLSS Special Survey Area: Pulgas; Woodside, CA USGS quadrangle

Archaeological and other heritage resources can be damaged or destroyed through uncontrolled public disclosure of information regarding their location. This document contains sensitive information regarding the nature and location of archaeological sites, which should not be disclosed to the general public or unauthorized persons.

Information regarding the location, character, or ownership of a cultural resource is exempt from the Freedom of Information Act pursuant to 54 U.S.C. 307103 (National Historic Preservation Act) and 16 U.S.C. Section 470(h) (Archaeological Resources Protections Act).

MANAGEMENT SUMMARY

Purpose and Scope: The County of San Mateo Planning and Building Department (County) retained SWCA Environmental Consultants (SWCA) to provide a cultural resources study in support of a proposed development project known as the Canyon Lane Roadway Improvements (project). The approximately 3.8-acre project area is located in San Mateo County, California, and includes lands within the city of Redwood City as well as within unincorporated San Mateo County. The project area is east of Lower Emerald Lake and west of the George L. Garrett Jr Memorial Park (Garrett Park).

The project area includes 12 undeveloped parcels and Canyon Lane, a gated dead-end gravel roadway, as well as a proposed water pipeline alignment. The proposed project involves the realignment and improvement of Canyon Lane (existing), construction of a new, approximately 1,050-foot-long (320-m-long), 8-inch-diameter (20-cm-diameter) water pipeline, and the construction of a single-family residence on one parcel. The road improvements and pipeline would support the future development of 11 remaining currently undeveloped parcels within the project area.

This study includes a cultural resources records search, review of historic maps and aerial photographs, a pedestrian cultural resources survey, and the preparation of this technical report documenting the results of the study and providing management recommendations. SWCA's cultural resources assessment addresses the entire project area, but the pedestrian survey was limited to the portions of the project where ground disturbance is currently proposed. As such, the 2.68-acre survey area includes the currently proposed development as well as the proposed linear project components (road improvements and pipeline). The 11 remaining developable parcels were not included in the pedestrian survey.

The current study was completed under the provisions of the California Environmental Quality Act (CEQA; 14 California Code of Regulations [CCR] Section 15064.5 and Public Resources Code [PRC] Section 21083.2). This report is an appendix to the environmental impact report (EIR) being prepared for the proposed project.

Dates of Investigation: The Northwest Information Center (NWIC), located at Sonoma State University, Rohnert Park, California, conducted a California Historic Resources Information System (CHRIS) records search of the project area and a 0.5-mile (0.8-km) radius in response to a request from SWCA on January 17, 2019. The County contacted the California Native American Heritage Commission (NAHC) requesting a review of the Sacred Lands File (SLF). The NAHC responded on January 10, 2019, indicating that the results of the search were negative. The NAHC identified six local tribal contacts. The County sent letters to the NAHC-listed contacts and to one additional contact from the Amah Mutsun Tribal Band on January 24, 2019. No responses were received. SWCA conducted an intensive pedestrian survey on February 6, 2019, of the proposed Canyon Lane improvements, including the locations of the proposed roadway improvements and water main as well as the merged parcel currently proposed for the development of a single-family residence; a total of 2.68 acres were surveyed.

Summary of Findings: The records search conducted by staff at the NWIC identified three known archaeological sites (two previously recorded sites and one unrecorded site) within 0.5 mile (0.8 km) of the proposed project; no previously recorded resources were identified within the project area itself. A review of historic maps and aerial photographs revealed one historic-age building constructed in 1938 on a parcel adjacent to but outside of the project area, and one historic-age road within the project area (Canyon Lane). The NAHC SLF search was negative, and the County did not receive any responses to the letters sent to tribal contacts. The three archaeological sites within 0.5 mile of the project area revealed by the records search will not be impacted by the proposed project. Although the proposed water main would be constructed adjacent to the southern boundary of the parcel containing an historic-age building located at 3339 Oak Knoll Drive, Redwood City (unincorporated; assessor's parcel number [APN] 057-221-130),

no project-specific indirect impacts to this resource are anticipated. Existing trees and vegetation will screen any construction noise and dust. SWCA's pedestrian survey recorded Canyon Lane as a historic linear resource (temporary number CL-01). Newly recorded historic linear resource CL-01 (Canyon Lane) is recommended ineligible for listing on the CRHR as a result of this evaluation because it does not meet any of the four eligibility criteria. As such, Canyon Lane is not a historical resource for the purposes of CEQA.

Disposition of Data: The cultural resources report, including confidential appendices, will be filed with the NWIC, the County, and SWCA's Half Moon Bay office. All field notes, photographs, and records related to the current study are on file at the SWCA Half Moon Bay office.

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INTRODUCTION

At the request of the County of San Mateo Planning and Building Department, SWCA Environmental Consultants (SWCA) has completed a cultural resources study in support of a proposed development project known as the Canyon Lane Roadway Improvements. The approximately 3.8-acre project area is located in San Mateo County, California, and includes lands within the City of Redwood City, as well as within unincorporated San Mateo County. The project area is located east of Lower Emerald Lake and west of the George L. Garrett Jr. Memorial Park (Garrett Park; Figure 1, Figure 2, and Figure 3).

The project area includes 12 undeveloped parcels and Canyon Lane, a gated dead-end gravel roadway, as well as a proposed water pipeline alignment. The proposed project involves the realignment and improvement of Canyon Lane (existing), construction of a new, approximately 1,050-foot-long (320-m-long), 8-inch-diameter (20-cm-diameter) water pipeline, and the construction of a single-family residence on one parcel. The road improvements and pipeline would support the future development of 11 remaining currently undeveloped parcels within the project area referred to herein as "developable parcels."

This study includes a cultural resources records search, review of historic maps and aerial photographs, a pedestrian cultural resources survey, and the preparation of this technical report documenting the results of the study and providing management recommendations. SWCA's cultural resources assessment addresses the entire project area, but the pedestrian survey was limited to the portions of the project where ground disturbance is currently proposed. As such the survey area includes the currently proposed development, as well as the proposed linear project components (road improvements and pipeline) (Figure 4). The 11 remaining developable parcels were not included in the pedestrian survey.

SWCA Senior Project Manager/Archaeologist Alex Wesson, B.A., served as the lead archaeologist for this study. Cultural Resources Specialist Nicholas Poister, M.A., Registered Professional Archaeologist (RPA), conducted the cultural resources survey. Mr. Wesson and Mr. Poister co-authored this report. Cultural Resources Specialist Joanne Minerbi, M.A., RPA, and Architectural Historian Nelson White, M.S.H.P., also contributed to this report. Heather Gibson, Ph.D., RPA, served as the project's Principal Investigator. Dr. Gibson exceeds the Secretary of the Interior's Professional Qualification Standards in history and archaeology. Geographic Information Systems (GIS) Specialists Sean Thomas, B.A., and Julie Gaertner, M.S., created the figures for this report.

REGULATORY SETTING

The current study was completed under the provisions of the California Environmental Quality Act (CEQA; 14 California Code of Regulations [CCR] Section 15064.5 and Public Resources Code [PRC] Section 21083.2).

CEQA requires a lead agency (in this case, the County of San Mateo) to determine whether a project may have a significant effect on historical resources. Sections 21083.2 and 21084.1 of the Statutes of CEQA, PRC Section 5024.1, and Section 15064.5 of the State CEQA Guidelines were used as the guidelines for the cultural resources study. PRC Section 5024.1 requires that any properties that can be expected to be directly or indirectly affected by a proposed project be evaluated for California Register of Historical Resources (CRHR) eligibility. The purpose of the CRHR is to maintain listings of the state's historical resources and to indicate what properties are to be protected, to the extent prudent and feasible, from material impairment and substantial adverse change. The term "historical resources" includes a resource listed in, or determined to be eligible for listing in, the CRHR; a resource included in a local register of historical resources; and any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant (State CEQA Guidelines Section 15064.5[a]). The criteria

for listing properties in the CRHR were expressly developed in accordance with previously established criteria developed for listing in the National Register of Historic Places (NRHP). According to PRC Section 5024.1(c)(1–4), a resource may be considered historically significant if it retains integrity and meets at least one of the following criteria. A property may be listed in the CRHR if the resource:

(1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

(2) Is associated with the lives of persons important in our past;

(3) Embodies the distinctive characteristics of a type, period, region or method of installation, or represents the work of an important creative individual, or possesses high artistic values; or

(4) Has yielded, or may be likely to yield, information important in prehistory or history.

Under CEQA, if an archeological site is not a historical resource but meets the definition of a "unique archeological resource" as defined in PRC Section 21083.2, then it should be treated in accordance with the provisions of that section. A unique archaeological resource is defined as:

> An archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:
>
> (1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
>
> (2) Has a special and particular quality such as being the oldest of its type or the best available example of its type.
>
> (3) Is directly associated with a scientifically recognized important prehistoric or historic event or person.

Resources that neither meet any of these criteria for listing on the CRHR nor qualify as a unique archaeological resource under CEQA PRC Section 21083.2 are viewed as not significant. Under CEQA, "A nonunique archaeological resource need be given no further consideration, other than the simple recording of its existence by the lead agency if it so elects" (PRC Section 21083.2[h]).

Impacts that adversely alter the significance of a resource listed in or eligible for listing in the CRHR are considered a significant effect on the environment. Impacts to historical resources from the proposed project are thus considered significant if the project physically destroys or damages all or part of a resource, changes the character of the use of the resource or physical feature within the setting of the resource that contributes to its significance, or introduces visual, atmospheric, or audible elements that diminish the integrity of significant features of the resource.

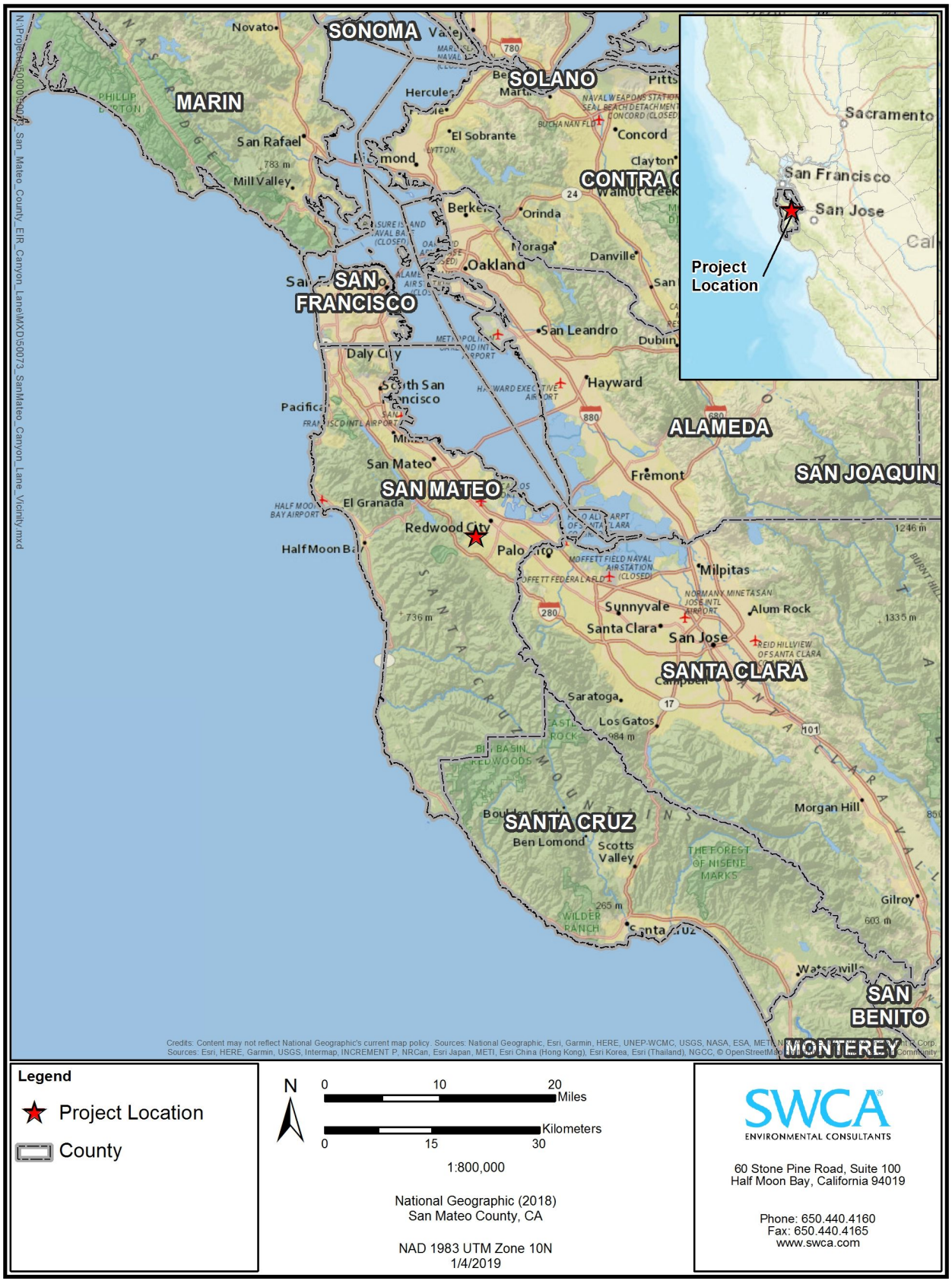


Figure 1. Project vicinity.

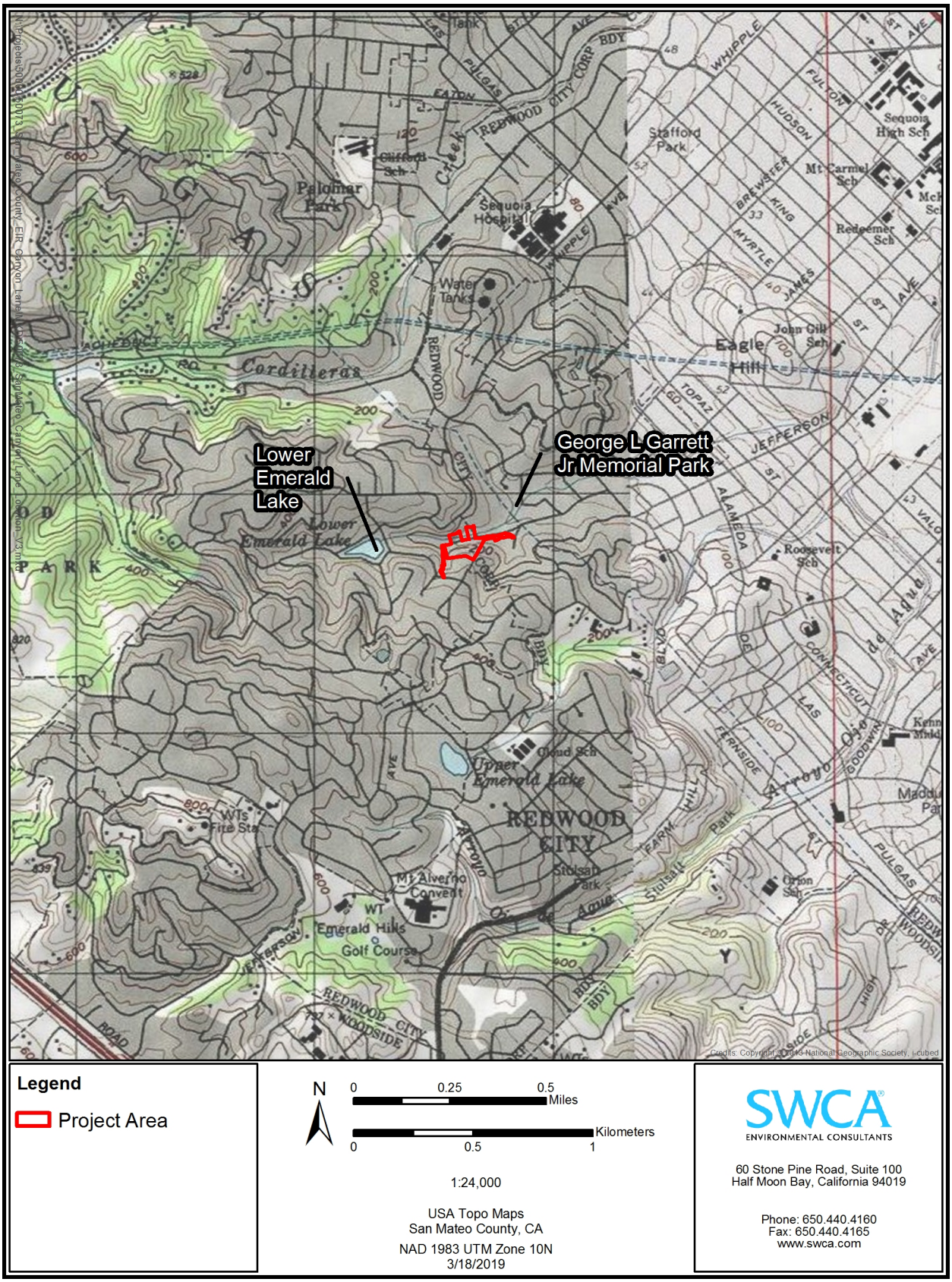


Figure 2. Project location.

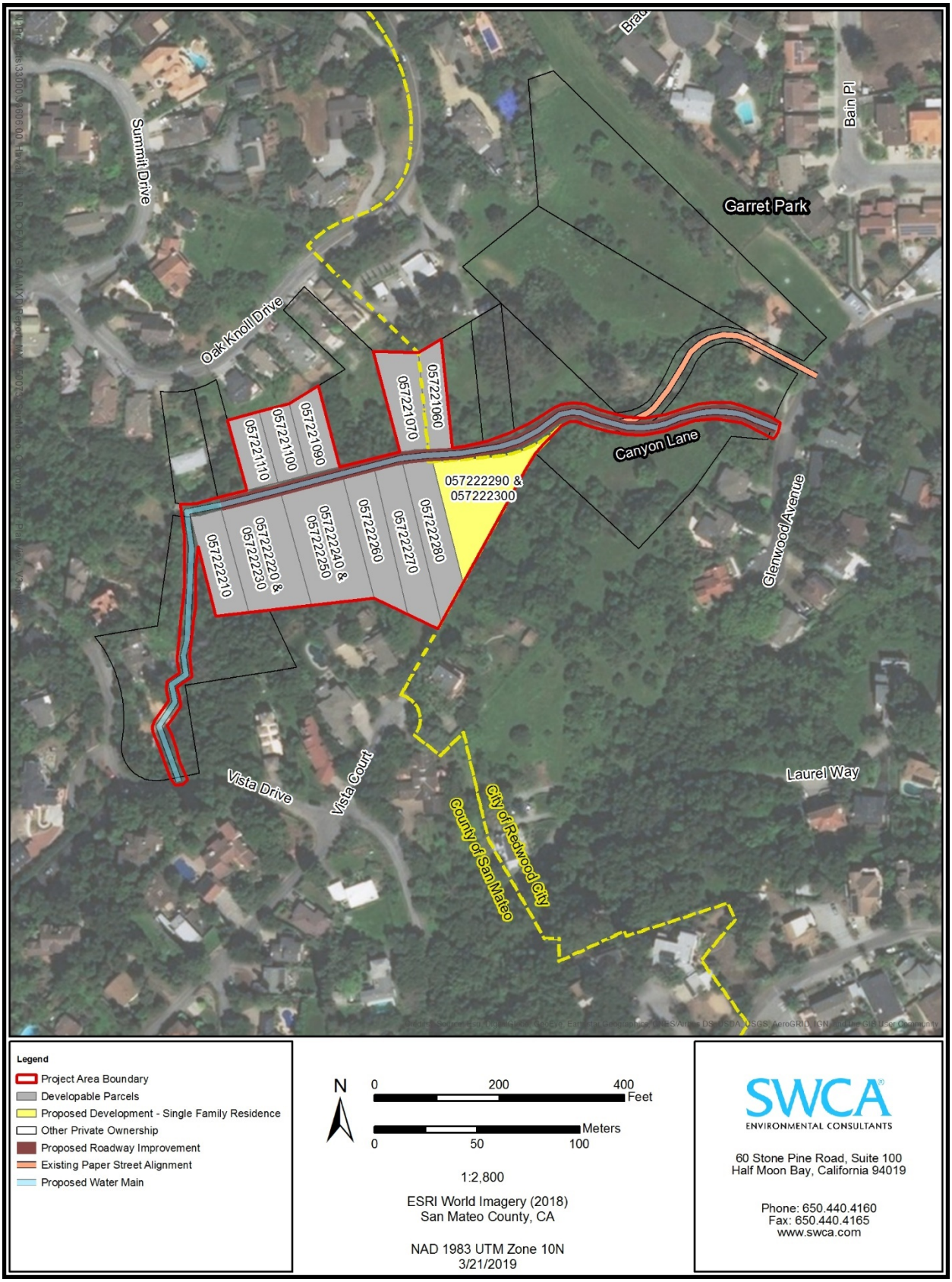


Figure 3. Project area; plan view.

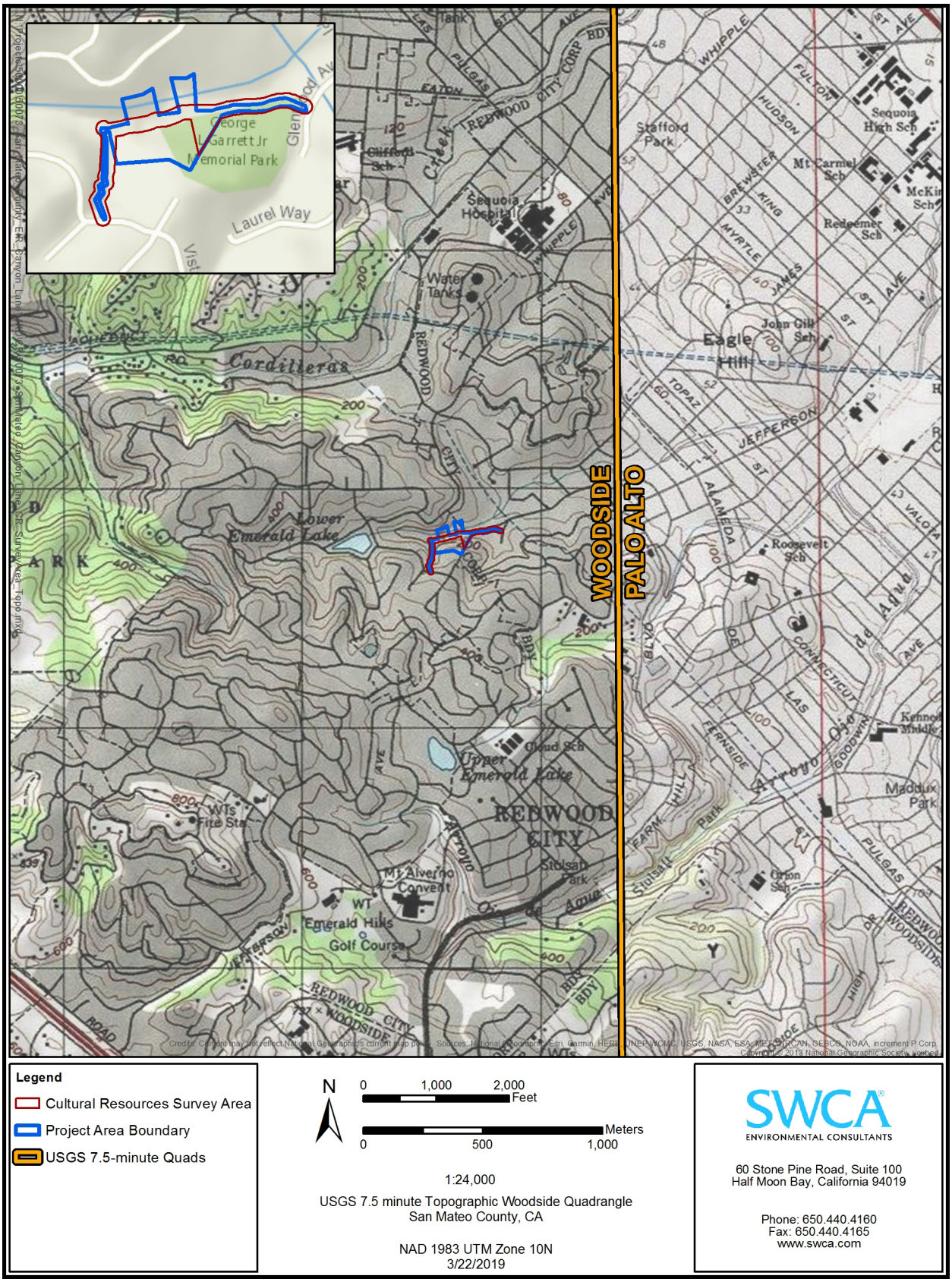


Figure 4. Cultural resources survey area.

Assembly Bill 52

Assembly Bill (AB) 52 amended PRC Section 5097.94 and added PRC Sections 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2, and 21084.3.

CONSULTATION WITH NATIVE AMERICANS

AB 52 formalizes the lead agency–tribal consultation process, requiring the lead agency to initiate consultation with California Native American groups that are traditionally and culturally affiliated with the project, including tribes that may not be federally recognized. As the lead agency, the County of San Mateo is required to begin consultation prior to the release of a negative declaration, mitigated negative declaration, or environmental impact report.

TRIBAL CULTURAL RESOURCES

Section 4 of AB 52 adds PRC Section 21074(a) and (b), which address tribal cultural resources and cultural landscapes. Section 21074(a) defines tribal cultural resources as either of the following:

> (1) Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following:
>
> > (A) Included or determined to be eligible for inclusion in the California Register of Historical Resources.
> >
> > (B) Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1.
>
> (2) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe.

Section 1(a)(9) of AB 52 establishes that "a substantial adverse change to a tribal cultural resource has a significant effect on the environment." Effects on tribal cultural resources should be considered under CEQA. Section 6 of AB 52 adds Section 21080.3.2 the PRC, which states that parties may propose mitigation measures "capable of avoiding or substantially lessening potential significant impacts to a tribal cultural resource or alternatives that would avoid significant impacts to a tribal cultural resource." Further, if a California Native American tribe requests consultation regarding project alternatives, mitigation measures, or significant effects to tribal cultural resources, the consultation shall include those topics (PRC Section 21080.3.2[a]). The environmental document and the mitigation monitoring and reporting program (where applicable) shall include any mitigation measures that are adopted (PRC Section 21082.3 [a]).

Environmental Setting

Regional Setting

The project area is within the Emerald Hills area of San Mateo County, which is situated along the central coast of California and encompasses approximately 554 square miles (including tidal waters) of the San Francisco Peninsula. The Pacific Ocean constitutes the county's western border and the San Francisco

Bay shoreline its eastern border. The county is bounded by San Francisco (city and county) to the north and by Santa Cruz and Santa Clara counties to the south and southeast, respectively.

The Santa Cruz Mountain Range traverses the county in a north-south direction, effectively dividing the county into two distinct regions: the Coastside and the Bayside. The Coastside is characterized by coastal terraces transitioning into the gently sloping foothills of the Santa Cruz Mountains. The Bayside is characterized by low-lying mudflats, marshes, artificial fill, and broad, flat alluvial plains. Farther west, this low-lying region transitions into the foothills of the Santa Cruz Mountains, increasing in slope to 15 to 30 percent near its crest. The proposed project is located on the Bayside of the Santa Cruz Mountains.

Local Setting

The project area is within a west-trending hillside canyon, surrounded by single-family residential homes scattered throughout the adjacent hillsides. The project area, minus the gravel roadway, is undeveloped and consists of oak forest, grassland, and intermittent creek that runs parallel to Canyon Lane. None of the 12 developable parcels have been extensively graded or developed and thus maintain the natural slope and vegetation of the hillside canyon.

The project area consists of 22 parcels and the Canyon Lane gravel roadway, covering approximately 3.8 wooded acres within a relatively steep-sided canyon east and downstream of Lower Emerald Lake. The lake is situated on a 5-acre parcel and includes a swimming lake fed by seasonal creeks and contained by an earthen dam. Water released from the lake is discharged into an ephemeral creek that flows parallel to Canyon Lane where it eventually reaches Garrett Park, a 6.9-acre park with playground facilities, picnic areas, and barbecue facilities to the east of the project area.

One of the 12 developable parcels with the project area (assessor's parcel number [APN] 057-221-060) is located within the city of Redwood City, and the 11 remaining developable parcels (APNs 057-221-070, 057-221-090, 057-221-100, 057-221-110, 057-222-210, 057-222-220 & 230, 057-222-240 & 250, 057-222-260, 057-222-270, 057-222-280, 057-222-290 & 300) are located within the unincorporated county. The 12 developable parcels are currently zoned RH/DR (Residential Hillside/Design Review) in the county and RH (Residential Hillside) in the city. The project area has a General Plan land use designation of Low-density Residential with the unincorporated county and a land use designation of Park within the city.

Dominant trees in the project area include coast live oak, toyon, buckeye, and bay laurel. In the understory are found coyote brush, blackberry, poison oak, short grasses and a variety of herbs. Feral artichokes are notable in the meadow. Soils are primarily a dark brown sandy clay with abundant organic material. Cobbles, boulders, and outcrops of serpentine are common. There is also a considerable amount of scrap concrete and asphalt in the streambed and along the roadway, presumably fill material used in leveling the roadway.

CULTURAL SETTING

Prehistoric Period

The project area is within the San Francisco Bay Region, one of eight arbitrary organizational divisions of the state (Moratto 1984). This archaeological region includes all of today's San Mateo and Marin counties, and western, northern, or southern portions of Alameda, Contra Costa, Napa, Santa Clara, Santa Cruz, Solano and Sonoma counties bordering the Bay Area (Moratto 1984). The prehistory of this region is divided into six periods: Early Holocene (Lower Archaic, 8000–3500 calibrated [cal] BC), Early period

(Middle Archaic, 3500–500 cal BC), Lower Middle period (Initial Upper Archaic, 500 cal BC–cal AD 430), Upper Middle period (Late Upper Archaic, cal AD 430–1050), Initial Late period (Lower Emergent, cal AD 1050–1550) and Terminal Late period (cal AD 1550–1776; Milliken et al. 2007:101, 114–118).

Early Holocene/Lower Archaic (cal 8000–3500 BC)

Occupation in the San Francisco Bay Area during the Prehistoric period may have occurred as early as 8,000 years ago, when sea levels were some 15–20 m (49–66 feet) lower than today (Bickel 1978:7), but the earliest archaeological sites in this area date to only 6,000 years ago during the Middle Holocene. It is likely that Holocene alluvial deposits buried many prehistoric sites in this area (Moratto 1984:221, 277; Ragir 1972). To the east in the Los Vaqueros region of Contra Costa County, closer to the Sacramento–San Joaquin Delta, for example, is one of the few early Holocene-age sites in the region, CA-CCO-696. This site provides one of the earliest dates from a site with a millingstone component (Milliken et al. 2007:114). To the south at an inland site in Santa Cruz County (Scotts Valley Site, CA-SCR-177), stone tools have been found in deposits dating to more than 6,000 years ago (Breschini and Haversat 1991:128–129). Data from coastal sites in central and southern California during the Paleo-Coastal Tradition of the Paleoindian period indicate the economy was a diverse mixture of hunting and gathering, with a major emphasis on aquatic resources in many coastal areas (e.g., Jones et al. 2002). The few Bay Area sites include two in the Santa Clara Valley (CA-SCL-65 and CA-SCL-178) and one on the peninsula coast of Santa Cruz County (CA-SCR-7; Hylkema 2002:233–235). The artifact assemblages in these Bay Area sites have large numbers of handstones and milling slabs as well as core and flake tools. Dates from CA-SCR-7, the Sand Hill Bluff shell mound, range from 4100 to 1400 BC, and includes large corner and side-notched projectile points. There is abundant evidence that marine resources such as fish, sea mammals, and shellfish were exploited at coastal sites.

Early Period/Middle Archaic (3500–500 cal BC)

Sites characteristic of the Early period/Middle Archaic in the San Mateo area date to as early as 5,500 years ago and as late as 2,500 years ago (3500–500 cal BC). Such sites often contain manos and metates (grinding stones), as well as many mortar fragments, indicating that acorns and/or various seeds formed an important part of the diet (Moratto 1984:201). The period is marked by the first cut bead, the grooved *Callananx biplicata* (formerly *Olivella biplicata*) rectangle bead. Mortars and pestles appear in the Bay Area archaeological record during this time period. A wooden mortar and stone pestle were recovered from CA-CCO-637; these artifacts dated to 3800 cal BC (Milliken et al.2007:115).

The University Village Site (CA-SMA-77) in San Mateo County and the lower levels of the West Berkeley Site (CA-ALA-307) in Alameda County may represent an Early Bay culture coeval with the Windmiller Pattern (Gerow with Force 1968). The lowest level of the West Berkeley Site has been radiocarbon dated to 3030–2890 cal BC (see Lightfoot and Luby 2002:270). Gerow (1974) further suggested that the Early Bay Culture had more in common with southern California coastal cultures than the Windmiller Pattern diagnostic of the Early Horizon in the Delta area. Additional artifact assemblages, such as from CA-SCL-354 in the Los Altos foothills, imply that characteristics of Windmiller assemblages were present on the South Bay peninsula (Hylkema 2002:244). Also, on the peninsula coast, *Callananx* rectangular beads (type L1) and Rossi square-stemmed and large side-notched projectile points are diagnostic of the Early period (Hylkema 2002:250).

Lower Middle Period/Initial Upper Archaic (500 cal BC–cal AD 430)

People inhabiting the San Francisco Bay region during the Lower Middle period (also known as the Berkeley period) practiced a maritime hunting and gathering economy. Large accumulations of shellfish remains, or "shell mounds," formed over hundreds, or even thousands, of years through accretion at

village sites fronting the Bay that were reused seasonally or year-round (Lightfoot 1997:135). Numerous shell mounds contain hundreds of burials as well as ceremonial items, house floors, hearths, and storage pits, indicating they were used as burial, ceremonial, and residential places (Lightfoot 1997:131–136; Lightfoot and Luby 2002:276–277).

The well-known Emeryville Shell Mound (CA-ALA-309) and Ellis Landing Site (CA-CCO-295) date to this period (see discussion in Lightfoot and Luby 2002:270; Nelson 1909). In 1902, Max Uhle initially excavated the Emeryville shell mound (CA-ALA-309), revealing a stratified deposit with numerous cultural sequences (Uhle 1907). The Emeryville Shell Mound was one of the largest in the Bay Area, with estimated size of at least 100 by 300 m, with a maximum depth of nearly 10 m (Moratto 1984:227–228). The lower levels contained flexed burials associated with artifacts such as pointed bone implements, chert bifaces, perforated charmstones, red ochre, and a predominance of bay oyster shells (Moratto, 1984:229). Upper levels appeared to have cremation burials, polished stone artifacts, flaked obsidian tools, and more clam than oyster. In 1924, Schenck discovered approximately 700 burials, most interred in a flexed position, when he "rescued" materials from the site as it was being leveled during construction of a paint factory (Schenck 1926).

Artifacts typical of the Lower Middle period include spire-lopped *Callianax*, and *Callianax* saucer beads; circular *Haliotis* ornaments appear in this period (Milliken et al. 2007:115). Assemblages generally have a relatively small frequency of flaked stone points; projectile points are commonly contracting stemmed and lanceolate types, some of which are made from obsidian (Hylkema 2002). Burials are variable flexed and semi-flexed with inconsistent orientation.

Milling implements include large and small boulder or cobble mortars and various types of pestles, indicating that acorns formed an important part of the diet. In the South Bay, processing of hard seeds continued to be important throughout this period, as evidenced by the number of milling slabs and handstones in the artifact assemblages from that area (Hylkema 2002:244–245, 252). Other plant resources included hazel nuts, cattail seeds, grass and soaproot bulbs; the latter were roasted in earth ovens.

Shellfish species exploited varied depending on location within the Bay Area (Hylkema 2002:252). Along the West Bay in San Mateo County and the East Bay of Alameda County, bay mussel, oyster, and clam are more prevalent. In contrast, horn snail, oyster, and bay mussel are the principal shellfish recovered from South Bay mounds. Temporal variation in shellfish species is also present in the mound assemblages.

Upper Middle Period/Late Upper Archaic (cal AD 430–1050)

The Upper Middle Period/Late Upper Archaic period is marked by the collapse of the *Callianax* saucer bead trade network at cal AD 430 around the Bay Region (Milliken et al. 2007:116). The period is also evidenced by a number of changes in subsistence, foraging, and land use patterns that begin to reflect the use pattern known from Historic-period Native American groups in the area. A substantial increase in the intensity of subsistence exploitation, including fishing, hunting, and gathering (particularly of acorn), evidenced in the archaeological record, correlates directly with population growth (Moratto 1984:211–214). Bow and arrow technology, the use of harpoons, and tubular tobacco pipes appear during this period. However, a greater emphasis is placed on the procurement and processing of vegetal foods, especially acorns, as evidenced in the increase of milling tools, especially the mortar and pestle. Both coiled and twined basketry were used as domestic and ceremonial items. Population size and the number of settlements increased during this period, although the large shell mound villages of the Lower Middle period were apparently no longer favored residential places (Lightfoot and Luby 2002:264, 277). There is an increase in grave goods, particularly during the Upper Middle period, compared with few grave goods identified during the Lower Middle period in Bay Area sites.

During the Upper Middle period, the climate fluctuated between cooler, wetter periods and warmer, drier periods. During cooler, wetter periods, alluvial deposition increased; comparatively little deposition occurred in the drier intervals. Extended periods of relatively little rainfall, referred to as the Medieval Climatic Anomaly (MCA), produced droughts across the West between about AD 650 to 850 and again in the Late period, AD 1150 to 1250 (Jones et al. 1999). The dry conditions during the MCA may be related to the abandonment of shell mound villages as primary residential locations, which began around AD 700 (Lightfoot and Luby 2002:277, 279). Settlement strategies were apparently reorganized and focused on a dispersed pattern, with the establishment of both coastal and interior habitation areas, coinciding with the exploitation of seasonally available resources.

Initial Late Period/Lower Emergent (cal AD 1050–1550)

The Late period ushers in a time of status differentiation and the rise of secret societies, cults, and associated traits. Exchange networks, with the use of clamshell disk beads as a form of currency, expanded during this period. Exchange items included magnesite, steatite, *Callianax* beads, and obsidian. Compared with the Middle Period, the use and occurrence of shell beads with burials blossomed (Milliken and Bennyhoff 1993). *Haliotis* banjo pendants may represent the introduction and spread of the Kuksu cult, beginning during the transition from the Middle to Late period in the Bay Area (Hylkema 2002:260). The quantity of non-dietary *Callianax* shells in coastal sites during the Late period, coupled with a concomitant increase of the shells in mortuary contexts throughout central California during this period, attests to the rise of both exchange networks and status differentiation, with coastal peoples supplying the shells to the interior groups. Partial cremation appears or reappears during this time as well as marked stratification, with a diversity of grave goods included in the wealthiest of graves (Milliken et al. 2007:217).

During the Late period on the peninsula coast, site assemblages indicate there was an increase of birds and marine mammals, especially sea otters, in the diet. At the same time, there was a decrease in terrestrial fauna in the archaeological record (Hylkema 2002:254–255). Further inland at large residential, upland meadow sites in Santa Cruz County (CA-SCR-9 and CA-SCR-20), both dense shell and abundant deer and elk bone are present, suggesting these areas were continuously reoccupied on a seasonal basis.

Terminal Late Period/Protohistoric Ambiguities (cal AD 1550–1776)

The Terminal Late period is marked by the abrupt disappearance of the *Callianax* sequin and cup beads ca. AD 1500 to 1550 (Milliken et al. 2007:117). During this period and before the Spanish established a substantial presence, a cultural shift was occurring. The North Bay began to take a more dominant role in the production of new technology and trade items, including clamshell disk beads, toggle harpoons, hopper mortars, corner-notched projectile points, and magnesite tube beads. The precise reason for this cultural shift is unknown, but could have been driven by conflict between groups or the spread of European diseases northward from Mexico prior to 1776 (Milliken et al. 2007:117–118.)

ETHNOGRAPHIC OVERVIEW

The project location is within an area historically occupied by the tribelets of the Costanoan linguistic group (Levy 1978). Descendants of Costanoan speakers prefer to be called by the name of the tribelet from which they are descended. When their heritage is mixed or the specifics have been lost over generations, they prefer the use of a native term *Ohlone,* rather than the European-imposed term Costanoan (“coastal dwellers”; Margolin 1978).

Costanoan territory extended between the Carquinez Strait and San Pablo Bay on the north, southward along the coast beyond Monterey Bay to Carmel Valley, and inland to the coast range (Levy 1978:485).

Neighboring groups included the Coast Miwok north across the Carquinez Strait, the Miwok and Northern Valley Yokuts to the east, and the Salinan and Esselen to the south.

Spanish mission records, diaries, and journals provide most of the information about the Costanoans because little ethnographical research has been conducted in the twentieth century (Levy 1978:495). The most thorough study, by Milliken (1995), used mission records, and Margolin (1978) reconstructed Native American life in the Bay Area.

The numerous Costanoan social groups in this region were organized by tribelets, each of which could have several villages or a main village with a number of camps (Levy 1978:487). Tribelets were also political units that were structured by similarities in language and ethnicity, each holding claim to a designated portion of territory. Topographic features, such as rivers, watersheds and ridgelines, defined tribelet territories and the boundaries were strictly respected.

Linguistically, these tribelets belong to the Utian, or Miwok-Costanoan, language family, part of a hypothesized larger Penutian linguistic stock (Mithun 2001:309). The Costanoan family is broken down into four branches: the Karkin, in the Carquinez Strait area; the Northern Costanoan, consisting of the Chocheno (with four dialects), Ramaytush, Tamyen and Awaswas languages; the Soledad, seen only in Cholon; and the Southern Costanoan branch, consisting of Rumsen and Mutsun (Mithun 2001:535). Speakers of these languages and dialects, in various configurations, have been treated as tribes in the past in accordance with anecdotal reports. Through detailed examination of mission records, marriage patterns and dialect variation seen in personal names, Milliken (1995:229) delineated 43 separate political entities (tribelets) in the San Francisco Bay, Santa Cruz and inland area, with an additional six or so tribelets in the south Monterey Bay and Carmel Valley region.

Each tribelet's territory contained a main village and smaller satellite villages. The villages were typically situated along a river or stream for easy access to fresh water (Levy 1978:487). Coastal people did not build directly on the shoreline but usually on an overlooking bluff. Dwellings were domed structures consisting of a tule- or grass-covered framework of poles, with rectangular doorways and central hearths (Levy 1978:492). Villages often contained specific enclosures for dancing. Assembly halls in the center of the settlement were common; some halls were large enough to accommodate an entire village population of some 200 people. Each community had a sweat lodge placed near a stream. The Costanoans either buried or cremated the deceased, sometimes depending on firewood availability. There is no mention of cemeteries associated with villages (Levy 1978:490–491).

The rich resources of the ocean, bays, valleys, and mountains provided Ohlone-speaking peoples with food and all their material needs (Levy 1978:491–492). The primary food staple was acorn, supplemented by a great variety of animal and plant resources. Depending on species availability and desirability, Costanoans used four oak species, including coast live, valley, tanbark, and black. Collected nuts included buckeye, laurel, pine nuts, and hazelnuts. Seeds from dock, chia and other salvias, tarweed, and holly-leaf cherry were collected and ground into meal. Vegetal resources also included several berry-producing plants, wild onions, carrots, tule roots, and greens of clover and other annuals. Large and small game, including deer, elk, antelope, bears, mountain lions, raccoons, ground squirrels, woodrats, mice, moles, dogs, rabbits, and jackrabbits, plus seals and stranded whales, were part of their diet. Migrating waterfowl were an important resource and included geese, ducks, and coots. Pigeons, quails, and hawks were also consumed but not eagles, owls, ravens, or turkey vultures. Rivers and streams provided freshwater fish, including steelhead, salmon, and sturgeon, whereas the ocean provided sharks, sardines, and lampreys. The Costanoan diet also included a variety of insects and reptiles, but not amphibians.

For hunting and gathering natural resources, Costanoans used a wide array of tools, implements, and enclosures. Among those used for hunting land mammals and birds were bows and arrows, traps and snares, deer-head disguises, bolas, nets and net sinkers, and enclosures/blinds. Communal hunting drives

were used to catch rabbits, whereas nets and poisons were used to harvest fish. Tule watercraft were used for transportation and for fishing and hunting waterfowl on enclosed bays and marshes. Many plants were collected using wooden tools: long poles for dislodging acorns and pinecones, fire-hardened digging sticks for obtaining roots, and beaters for dislodging seeds. Once collected, seeds, roots and nuts were placed in burden baskets and transported for processing or storage (Levy 1978:491).

Costanoans used a variety of tools to process food resources. These tools included portable stone mortars and pestles, bedrock mortars, hopper mortars, anvils, woven strainers and winnowers, leaching and boiling baskets, woven drying trays, and knives. Various foods were baked in earthen ovens. Wooden paddles were carved for stirring food in the boiling baskets. There were shell spoons, basket dippers, and mush bowls for serving food, and woven water jugs and storage containers for storing food.

The presence of exotic items such as obsidian, steatite, and shell indicates Costanoan tribelets traded with coastal groups and mountain tribes (Levy 1978:493). Dietary items were also traded with the Plains Miwok, Sierra Miwok, and Yokuts. Costanoans provided mussels, abalone shells, dried abalone, and salt to the Yokuts and *Callianax* shells to the Miwok. They received pine nuts from the Yokuts, but other food resources received by the Costanoan tribelets are unrecorded.

The Native American population in this region came into contact with European culture at the beginning of Spain's land exploration and settlement in AD 1769. Traditional lifeways were altered drastically during the late 1700s to early 1800s when the Spanish placed their capital at Monterey, built forts at Monterey and San Francisco, and established seven Franciscan missions to convert native peoples to Christianity and the European way of life. Large-scale epidemics soon swept through the mission population and remaining villages (Milliken 1995). Subsequent Spanish colonial towns at Santa Cruz and Yerba Buena (San Francisco), followed by large Mexican land grants, separated Costanoans from their harvesting grounds and hunting parks. Many surviving Native Americans were pulled away from their own villages to the new Euro-American settlements. It is estimated that the combined Costanoan population fell from a pre-Contact total of 10,000 down to 2,000 by the end of the mission period in 1834 (Levy 1978:486). Also during the mission period, the dwindling Costanoan population intermarried within other interior tribes at the missions, mixing their cultural identities.

During the late 1800s, several Native American communities of mixed heritage remained in rural areas, with Pleasanton, Monterey, and San Juan Bautista the best known (Levy 1978:487). Even these groups continued to shrink as young people married into other groups and moved away. Estimates of the total remaining population of people with recognizable Costanoan descent were fewer than 300 in 1973 (Levy 1978:487). According to Levy:

> In 1971 descendants of the Costanoan united in a corporate entity, the Ohlone Indian Tribe, and received title to the Ohlone Indian Cemetery where their ancestors who died at Mission San José are buried (1978:487).

Since that time, other descendants of Costanoan tribelets have organized political and cultural heritage organizations that are active locally and statewide. All are concerned with revitalizing aspects of their culture, learning their language through notes collected by anthropologist John Harrington and preserving the natural resources that played a vital role in traditional culture. Some Costanoan groups are also seeking federal recognition of their tribe, petitioning the Bureau of Indian Affairs with reconstructed tribal histories and genealogies, records that will be a great resource for future generations of Costanoans.

The project area lies within the traditional domain of Ramaytush-speaking Costanoan tribelets, which included most of San Mateo and San Francisco counties. The best estimate for the Ramaytush population in the 18th century is ca. 1,400 individuals, based upon mission records and archaeological data (Levy 1978:485). The territory of the Lamchin tribelet included the bayshore and adjacent valleys from Belmont

to Atherton with its most prominent settlement, Cachanigtac (also known as Las Pulgas), probably situated along Pulgas Creek in San Carlos. Lamchin people were incorporated into the native population at Mission San Francisco de Asís, where their names appear in in the baptismal register during the 1780s and 1790s (Brown 1973–1974; Milliken 1983:86–90, 139; Milliken 1995:246–247).

HISTORIC OVERVIEW

Post-Contact history for the state of California generally is divided into three periods: the Spanish period (1769–1822), the Mexican period (1822–1848), and the American period (1848–present). Although there were brief visits by Spanish, Russian, and British explorers from 1529 to 1769, the beginning of Spanish settlement in California occurred in 1769 with a settlement at San Diego and the first (Mission San Diego de Alcalá) of 21 missions established from 1769 to 1823. Word of Mexican victory after a decade of revolt against the Spanish crown reached California in 1822, marking the beginning of the Mexican period. This period was marked by an extensive era of land grants, most of which were in the interior of the state, and by exploration by American fur trappers west of the Sierra Nevada.

With the signing of the Treaty of Guadalupe Hidalgo in 1848, ending the Mexican-American War, California became a territory of the United States. The discovery of gold in 1848 at Sutter's Mill near Sacramento and the resulting Gold Rush influenced the history of the state and the nation. The rush of tens of thousands of people to the goldfields also had a devastating impact on the lives of indigenous Californians, with the introduction and concentration of diseases, the loss of land and territory (including traditional hunting and gathering locales), violence, malnutrition and starvation. Thousands of settlers and immigrants continued to pour into the state, particularly after the completion of the transcontinental railroad in 1869.

Local History

The current project area was passed by various Spanish expeditions in the late eighteenth century. In 1769, Gaspar de Portolá and Father Juan Crespi, missing their intended destination of Monterey, first sighted San Francisco Bay from Sweeney Ridge in Pacifica. A campsite of the Portolá Expedition is a registered California State Historic Landmark (#92) in nearby Woodside. Although the party never traversed Redwood City itself, they did interact with a group of natives on nearby San Francisquito Creek (Beck and Haase 1974:317; Nelson 1909:347). They were followed in 1774 by Fernando Javier Rivera and Father Francisco Palou, who advocated for the establishment of a mission at Palo Alto. This recommendation was passed over in favor of San Francisco due to the lack of a suitable harbor on the peninsula. Colonel Juan Bautista de Anza and Father Pedro Font scouted this location two years later, journeying from Monterey. In an instance of particular interest to the current study, Font described a shell mound on lower Redwood Creek, writing, "…there was a great pile of mussels… or which one village often fights another" (Milliken 1983:87).

Mission San Francisco de Asís was founded on October 9, 1776, and the resident fathers soon proved to be highly successful in converting the region's Native Americans and concentrating them at the site. Overcrowding became an issue and some natives were relocated to *rancherias* on the pennisula where there were better agricultural prospects (Beck and Haase 1974:no. 19; Hart 1987; Hynding 1982:19–22). One of these was Rancho Las Pulgas, extending from present-day San Mateo to Palo Alto. This *rancho nacional* of the San Francisco Presidio was formally granted to Luis Argüello by Governor Pablo Vicente on November 27, 1835. After California became a territory of the United States, Rancho Las Pulgas (surveyed at 35,240 acres) was patented to Luis's heir, María de la Soledad Ortega de Argüello, by the Supreme Court on October 2, 1857 (Beck and Haase 1974:no. 30; Hendry and Bowman 1940:1031–1038; Hoover et al. 1966:404-406; Stevens 1856).

Variously known by the names Los Palos Colorados, Arroyo Salinas, Red Woods Embarcadero, Pulgas Ranch Embarcadero, Steinbergers, and Mezesville, Redwood City became a center of timber extraction during the Spanish period; this industry intensified with the advent of the Gold Rush (Brown 1975:76; Gudde 1998:313). Logs harvested in the hills above the city were brought down Redwood Ravine to the Embarcadero, where they where lashed together and set adrift for San Francisco. Mills, lumberyards, and wharfs characterized Redwood City in the 1850s; there were at least 10 documented sawmills in the environs of the city in 1853. Following intervals as Mezesville, after the Argüello's attorney, and Steinbergers, after a stage stop owner, Redwood City acquired its current appellation in September of 1856 (Brown 1975:75–76; Hoover et al. 1966:407–408; Hynding 1982:37, 90; Richards 1973; Stanger 1963:53–54). That same year, the southern portion of San Francisco County became San Mateo County and the county seat was moved to Redwood City in 1857 (Coy 1973:238–239; Hart 1987:410; Hoover et al. 1966:389).

METHODS

Records Search and Map Review

On January 17, 2019, SWCA requested a records search of the California Historical Resources Information System (CHRIS) from the Northwest Information Center (NWIC), located at Sonoma State University in Rohnert Park. As part of this study, SWCA reviewed the following resources:

- National Register of Historic Places – Listed Properties
- California Register of Historical Resources
- California Inventory of Historical Resources
- California State Historical Landmarks
- California Points of Historical Interest
- California Office of Historic Preservation Historic Property Directory and Determinations of Eligibility

In addition, SWCA reviewed all relevant previously recorded archaeological site records and previously conducted surveys.

Built Environment Desktop Review

Historic maps provided by the NWIC, as well as historic maps and aerial photographs available online, were reviewed to identify historic linear resources and historic built environment resources within the project area and adjacent parcels. The following historic maps and aerial photographs were reviewed:

- 1856 Plat of Pulgas Rancho
- 1940 USGS Halfmoon Bay 15' Quadrangle
- 1961 USGS Half Moon Bay 15' Quadrangle
- Topographic maps available at historicaerials.com:
    - 1940

  - 1954
  - 1959
  - 1960
  - 1961
  - 1962
  - 1964
  - 1967
  - 1969
- Aerial photographs available at historicaerials.com:
  - 1948
  - 1956
  - 1958
  - 1960
  - 1968

Native American Outreach

The San Mateo County Planning and Building Department (County) contacted the California Native American Heritage Commission (NAHC) requesting a review of the Sacred Lands File (SLF) and list of appropriate tribal contacts for the project area. The County mailed a letter to each of the contacts provided, plus one additional contact from the Amah Mutsun Tribal Band, on January 24, 2019, describing the proposed project and including a map of the project location (Appendix B). The letters invited the tribal representatives to consult with the County, asked if they have any concerns about the proposed project, and inquired if they would like any additional information regarding resources in the area.

Field Survey

SWCA archaeologist Nicholas Poister conducted an intensive pedestrian survey of the project area on February 6, 2019. Mr. Poister conducted the survey using parallel pedestrian transects spaced no more than 10 m apart over the entire survey area. A total of 2.68 acres were surveyed for cultural resources (see Figure 4). The cultural resources survey area included three main components: the Canyon Lane roadway with a 30-foot (9-m)buffer on either side; a triangular merged parcel (057-222-290/057-222-300) proposed for a single-family residence; and a 70-foot-wide (21-m-wide) corridor where a subsurface water pipeline is proposed. Only those portions of the project where ground disturbance is currently proposed were subjected to pedestrian survey; the remaining 11 “developable parcels” were excluded from the pedestrian survey because they will be subject to design and planning review in the future. Mr. Poister examined all areas of exposed ground surface for prehistoric artifacts (e.g., chipped stone tools and production debris, stone milling tools), historic artifacts (e.g., metal, glass, ceramics), soil

discoloration that might indicate the presence of a cultural midden, linear features, soil depressions, and other features indicative of the former presence of historic structures or buildings (e.g., foundations).

RESULTS

Records Search

The NWIC responded to SWCA's records search request on January 24, 2019.

Prior Cultural Resources Studies

The NWIC records search revealed that five cultural resources studies have been conducted within a 0.5-mile radius of the project area (Table 1). The previous study S-3044 encompassed the project area, and S-39064 may have included a very small portion of the project area. Report S-3044, titled *Cultural Resources Evaluation of the Emerald Lake Hills Sanitation Facilities Project, San Mateo County, California* (Chavez 1977), concluded that no known archaeological or historic resources are located in the then-proposed sanitation facilities' service area on the basis of an archival review and a surface reconnaissance in the field. The author concluded that no discernable adverse impacts to cultural resources would result from the planned expansion of the facilities. The author does caution that the field reconnaissance conducted was far from complete; a significant portion of the area was not inspected because it was situated on private property, on steep slopes, or was obscured by dense vegetation.

Table 1. Previously Conducted Cultural Resources Studies within 0.5 Mile (0.8 km) of the Project Area

Report No.	Study Title	Author (Affiliation)	Year	Study Type	Within Project Area?
S-003044	*Cultural Resources Evaluation of the Emerald Lake Hills Sanitation Facilities Project, San Mateo County, California*	David Chavez	1977	Archaeological, Field study	Yes
S-035355	*Archaeological Testing Conducted at 1780 Cordilleras Rd, Redwood City, San Mateo County, California (letter report)*	James M. Allan (William Self Associates, Inc.)	2008	Archaeological, Excavation	No
S-035355	*Archaeological Research Design and Evaluation Plan, Archaeological Site CA-SMA-304, Redwood City, California*	William Self Associates, Inc.	2008	Archaeological, Management/planning	No
S-039064	*Cultural Resources Assessment Report in Support of Initial Study and Environmental Impact Report, Laurel Way Residential Subdivision, City of Redwood City, San Mateo County*	Basin Research Associates	2009	Archaeological, Field study	Possible
S-040929	*Archaeological Data Recovery Report (SMA-83) (ADRR) and Final Archaeological Resources Report (FARR), San Francisco Public Utilities Commission, Water System Improvement Program, Bay Division Pipeline Reliability Upgrade Project, East Bay and Peninsula Bay Division Pipeline No. 5, Alameda and San Mateo Counties, California*	Basin Research Associates, Inc.	2013	Archaeological, Excavation, Field study, Monitoring	No

Report No.	Study Title	Author (Affiliation)	Year	Study Type	Within Project Area?
S-043506	*New Tower Submission Packet; Jefferson Avenue & Lake View Way; CCU1278; 815 Lake View Way, Redwood City, San Mateo County*	Lorna Billat (EarthTouch, Inc.)	2013	Architectural/historical, Field study	No

Previously Recorded Cultural Resources

The NWIC records search revealed two previously recorded prehistoric archaeological sites (CA-SMA-304 and CA-SMA-394) and one unrecorded site within a 0.5-mile radius of the project area (Table 2; all three sites are located outside of the proposed project area. Sites CA-SMA-304 and CA-SMA-394 were officially recorded in 1976 by the Redwood City Planning Department. These previously recorded sites are likely the two shell mounds on lower Redwood Creek described by Nelson as a part of his 1909 study and may include the one that Friar Pedro Font noted in 1776 (Milliken 1983 in Basin Research Associates 2009; Nelson 1909). Artifacts and features present include habitation debris, hearths, pits, and, at CA-SMA-394, burials. No burials or artifacts were removed or collected during the course of testing; these were instead reinterred onsite. The nature of the unrecorded site within the 0.5-mile radius (discovered in 1987) is presently unknown.

Table 2. Previously Recorded Cultural Resources within 0.5 Mile (0.8 km) of the Project Area

Primary No.	Time Period	Resource Description	Name	Recording Year (Name, Affiliation)	Within Project Area?
P-41-000447	Prehistoric	Site	Indian Mounds, Cordilleras Road	1990 (Barb Bocek, Stanford University) 1976 (Jeffrey D. Rhoads, Redwood City Planning Department)	No
P-41-002242	Prehistoric	Site	Indian Mounds, BDPL#1P, SFPUC Pipeline BDPL No. 1 and 2	2013 (Christopher Canzonieri, Basin Research Associates, Inc.) 2010 (Colin Busby, Christopher Canzonieri, Basin Research Associates, Inc.) 1976 (Jeffrey D. Rhoads, Redwood City Planning Department)	No
n/a	Unknown	Site	n/a	n/a (unrecorded)	No

Built Environment Desktop Review

SWCA reviewed historic maps provided by the NWIC, as well as other historic maps and aerial photographs available online. This desktop review resulted in the identification of one historic-age road within the project area (Canyon Lane) and one historic-age building located on a parcel adjacent to the proposed project area.

Canyon Lane (Temporary Site Number CL-01)

Canyon Lane is an historic linear cultural resource dating to the 1940s; the unimproved road is visible on aerial imagery as early as 1948. Canyon Lane falls within the lands of the former Rancho Las Pulgas, southwest of present-day Whipple Avenue. The 1856 plat of Pulgas Rancho shows the area south of Whipple's Road among the tributaries of Redwood Creek, where Canyon Lane is now located, as

undeveloped. Emerald Lake Hills, where the project area and Canyon Lane are located, was a popular vacation destination in the 1920s, and many of the original vacation homes have become permanent residences (Department of Environmental Management 1986:8.10). Fed by a creek, Lower Emerald Lake had been constructed by 1940, according to the Half Moon Bay topographic map from the same year (U.S. Geological Survey [USGS]), Lower Emerald Lake was present, fed by a creek. One home was southeast of the lake, between the modern alignments of Canyon Lane and Vista Drive, and one structure was situated between the modern alignments of Canyon Lane and Oak Knoll Drive. However, Canyon Lane itself is not depicted on the 1940 topographic map. The aerial imagery from 1948 reveals moderate tree coverage along unimproved Canyon Lane and the adjacent creek, with the addition of one home south of the road. Sparse agricultural use can be seen in some parcels in the surrounding area, but much of the land remained undeveloped. At this time, the dirt road extended from Glenwood Avenue nearly all the way to Lower Emerald Lake, paralleling the creek. By 1954, Canyon Lane clearly curved towards its termination at Vista Drive. Aerial imagery from 2002 shows increased development surrounding Canyon Lane, approximating the current residential density north and south of the road.

3339 Oak Knoll Drive

One privately owned parcel (APN 057-221-130; 3339 Oak Knoll Drive, Redwood City [unincorporated]) located outside of the project area but adjacent to the proposed water main and roadway improvements, contains a building constructed in 1938, according to County of San Mateo Assessor's Office records. Although not formally recorded as such, this building is considered a historic built environment resource based on its age (more than 50 years). The building does not appear on aerial photographs until 1968, and does not appear on topographic maps until 1961; however, SWCA defers to the County's information regarding its date of construction (1938).

Native American Outreach

The NAHC responded to the County's request on January 10, 2019, indicating that the results of the search were negative (Appendix B). The NAHC identified six local tribal contacts of the following affiliations:

- Amah Mutsun Tribal Band
- Amah Mutsun Tribal Band of Mission San Juan Bautista
- Costanoan Rumsen Carmel Tribe
- Indian Canyon Mutsun Band of Costanoan
- Muwekma Ohlone Indian Tribe of the SF Bay Area
- The Ohlone Indian Tribe

The County received no response to the letters sent to these NAHC-listed contacts and the one additional contact from the Amah Mutsun Tribal Band.

Pedestrian Survey

SWCA conducted an intensive pedestrian survey on February 6, 2019, of the proposed Canyon Lane improvements, including the locations of the proposed roadway improvements and water main as well as the merged parcel currently proposed for the development of a single-family residence (defined as the survey area; see Figure 5 through Figure 7). A total of 2.68 acres were surveyed using pedestrian transects spaced at a maximum of 10 m. One resource was identified during the survey: Canyon Lane (temporary

site number CL-01), recorded as a historic linear resource. No other resources were observed within the survey area.



Figure 5. Overview of project area showing Canyon Lane from entrance on Glenwwod Avenue; view to west.



Figure 6. Typical vegetation and slope on merged parcel 057-222-290/057-222-300 (proposed single-family residence development); view to northeast.



Figure 7. Cleared area at the head of tributary gulch at southern end of proposed water main; view to north.

Ground visibility was generally poor across the area, typically less than 10 percent, due to the ubiquitous presence of live vegetation and leaf litter. However, there were patches where up to 50 percent of the ground surface was visible. Visibility along the roadway was 100 percent. In some instances, transects were rerouted around stands of very dense brush.

One sparse historic artifact scatter was noted near the southern end of the proposed water line, outside of the boundary of the project area and cultural resources survey area. Artifacts observed include approximately six complete or mostly complete glass bottles of historic age, three tin cans, broken container glass fragments, and ceramic tile and porcelain fragments as well as saw-cut animal bones. This resource was not recorded because it is located outside the project area and will not be impacted by the proposed project.

Canyon Lane (Temporary Site Number CL-01)

Canyon Lane (temporary site number CL-01) is a Historic-period road constructed between 1940 and 1948 identified through desktop review of historic maps and aerial imagery and recorded during the pedestrian survey (Figure 8). Canyon Lane is an approximately 10-foot-wide gravel roadway that begins at Glenwood Avenue (an improved public roadway located within the city of Redwood City) and extends west approximately 550 feet before crossing into the jurisdictional boundary of the county. The total length of the road within the project area is 999.45 feet. The research potential of this resource has been exhausted by its recording during the cultural resources technical study conducted for the proposed project, and few meaningful conclusions can be drawn from further study. The resource does not appear to meet the minimum criteria to be considered eligible for the CRHR under Criteria 1 through 4 and does not represent a unique archaeological resource. Therefore, SWCA recommends that Canyon Lane is ineligible for listing in the CRHR and that no further work is required.



Figure 8. Canyon Lane from entrance on Glenwwod Avenue; view to west.

DISCUSSION AND RECOMMENDATIONS

The records search identified two previously recorded archaeological sites (CA-SMA-304 and CA-SMA-394) and one undocumented archaeological site within 0.5 mile of the project area; none of these sites are located within the project area itself. As previously discussed, prehistoric habitation debris, hearths, and pits were recorded in 1976 at both CA-SMA-304 and CA-SMA-394; burials were documented at CA-SMA-394. These archaeological resources are probably the two shell mounds studied by Nelson in the earliest years of the twentieth century and mentioned by Font in 1776. These three known archaeological resources are located well outside the project area and will not be impacted by the proposed project.

SWCA's review of historic maps and aerial photographs identified one unrecorded historic built environment resource located outside of the project area but adjacent to the proposed water main and roadway improvements. The privately owned parcel at 3339 Oak Knoll Drive, Redwood City, (unincorporated; APN 057-221-130), contains a building constructed in 1938 according to County of San Mateo Assessor's Office records. Although not formally recorded as such, this building is considered a historic built environment resource based on its age (more than 50 years). Although the proposed water main would be constructed adjacent to the southern boundary of this parcel, no project-specific indirect impacts to this resource are anticipated. Existing trees and vegetation will screen any construction noise and dust.

SWCA recorded the existing Canyon Lane as a historic linear resource during the cultural resources pedestrian survey based on its presence on historic maps and aerial photographs as early as 1948. SWCA evaluated this linear resource for eligibility for the CRHR and recommends it ineligible for listing because it does not meet any of the four eligibility criteria. As such, Canyon Lane is not a historical resource for the purposes of CEQA.

The pedestrian survey noted the presence of a concentration of apparently historic refuse outside the cultural resources survey area, near the southern end of the water line corridor. This unrecorded resource will not be impacted by the proposed project because it is located outside the project area.

In conclusion, no historical resources or unique archaeological resources as defined by CEQA were identified within the project area, and no further cultural resources work is recommended at this time.

In the event that cultural resources are exposed during construction, work in the immediate vicinity of the find must stop until a qualified archaeologist can evaluate the significance of the find. Construction activities may continue in other areas. If the discovery proves significant under the provisions of CEQA, additional work such as testing or data recovery may be warranted.

The discovery of human remains is always a possibility during ground disturbances; State of California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to California PRC Section 5097.98. The San Mateo County Coroner must be notified of the find immediately, and all work shall cease in the immediate vicinity of the find. If the human remains are determined to be ancient or likely Native American, the coroner will notify the NAHC, which will designate and notify a Native American Most Likely Descendant (MLD). The MLD shall complete the inspection of the site within 48 hours of notification and may recommend scientific removal and non-destructive analysis of human remains and items associated with Native American burials.

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APPENDIX A

Records Search Results Summary

CALIFORNIA HISTORICAL RESOURCES INFORMATION SYSTEM

ALAMEDA
COLUSA
CONTRA COSTA
DEL NORTE
HUMBOLDT
LAKE
MARIN
MENDOCINO
MONTEREY
NAPA
SAN BENITO
SAN FRANCISCO
SAN MATEO
SANTA CLATA
SANTA CRUZ
SOLANO
SONOMA
YOLO

Northwest Information Center
Sonoma State University
150 Professional Center Drive, Suite E
Rohnert Park, California 94928-3609
Tel: 707.588.8455
nwic@sonoma.edu
http://www.sonoma.edu/nwic

1/24/2019 NWIC File No.: 18-1342

Alex Wesson
SWCA Environmental Consultants
51 W. Dayton Street
Pasadena, CA 91105

re: Canyon Lane EIR, SWCA Project #50073

The Northwest Information Center received your record search request for the project area referenced above, located on the Woodside & Palo Alto USGS 7.5' quads. The following reflects the results of the records search for the project area and a 0.5 mile radius:

Resources within project area:	None
Resources within 0.5 mile radius:	P-41-000447 & 002242; C-156 (C#s are assigned to unrecorded resources).
Reports within project area:	S-3044. S-39064 may have included a very small part of the project area.
Reports within 0.5 mile radius:	S-35355, 40929, & 43506.

Resource Database Printout (list):	☐ enclosed	☒ not requested	☐ nothing listed
Resource Database Printout (details):	☐ enclosed	☒ not requested	☐ nothing listed
Resource Digital Database Records:	☒ enclosed	☐ not requested	☐ nothing listed
Report Database Printout (list):	☐ enclosed	☒ not requested	☐ nothing listed
Report Database Printout (details):	☐ enclosed	☒ not requested	☐ nothing listed
Report Digital Database Records:	☒ enclosed	☐ not requested	☐ nothing listed
Resource Record Copies:	☐ enclosed	☒ not requested	☐ nothing listed
Report Copies:	☒ enclosed	☐ not requested	☐ nothing listed
OHP Historic Properties Directory:	☒ enclosed	☐ not requested	☐ nothing listed
Archaeological Determinations of Eligibility:	☐ enclosed	☐ not requested	☒ nothing listed
CA Inventory of Historic Resources (1976):	☒ enclosed	☐ not requested	☐ nothing listed
Caltrans Bridge Survey:	☐ enclosed	☒ not requested	☐ nothing listed
Ethnographic Information:	☐ enclosed	☐ not requested	☐ nothing listed
Historical Literature:	☐ enclosed	☐ not requested	☐ nothing listed
Historical Maps:	☒ enclosed	☐ not requested	☐ nothing listed
Local Inventories:	☐ enclosed	☐ not requested	☒ nothing listed
GLO and/or Rancho Plat Maps:	☒ enclosed	☐ not requested	☐ nothing listed

Shipwreck Inventory: ☐ enclosed ☒ not requested ☐ nothing listed

*Notes:
** Current versions of these resources are available on-line:
Caltrans Bridge Survey: http://www.dot.ca.gov/hq/structur/strmaint/historic.htm
Soil Survey: http://www.nrcs.usda.gov/wps/portal/nrcs/surveylist/soils/survey/state/?stateId=CA
Shipwreck Inventory: http://www.slc.ca.gov/Info/Shipwrecks.html
The ethnographic & historical literature on file are published documents.

Please forward a copy of any resulting reports from this project to the office as soon as possible. Due to the sensitive nature of archaeological site location data, we ask that you do not include resource location maps and resource location descriptions in your report if the report is for public distribution. If you have any questions regarding the results presented herein, please contact the office at the phone number listed above.

The provision of CHRIS Data via this records search response does not in any way constitute public disclosure of records otherwise exempt from disclosure under the California Public Records Act or any other law, including, but not limited to, records related to archeological site information maintained by or on behalf of, or in the possession of, the State of California, Department of Parks and Recreation, State Historic Preservation Officer, Office of Historic Preservation, or the State Historical Resources Commission.

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the CHRIS Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

Should you require any additional information for the above referenced project, reference the record search number listed above when making inquiries. Requests made after initial invoicing will result in the preparation of a separate invoice.

Thank you for using the California Historical Resources Information System (CHRIS).

Sincerely,

Lisa C. Hagel
Researcher

APPENDIX B

Native American Heritage Commission Correspondence

This page has been redacted due to confidential information

APPENDIX C

Department of Parks and Recreation 523 Series Forms

This page has been redacted due to confidential information

Appendix G

Geotechnical Reports

J. Yang and Engineers
Geotechnical
General Civil Engineers

2758 CANYON CREEK DR. • SAN RAMON, CA 94583
(925) 831-8678 • FAX (925) 831-3645

Project No. J14-1591
December 28, 2014

Mr. Mel Casey:

Subject: Proposed Roadway Improvment at
0 Canyon Lane
Redwood City, California
Geotechnical Site Investigation

Dear Mr. Casey:

In accordance with your authorization, J. Yang and Engineers has investigated the geotechnical site conditions at the subject site for the proposed roadway improvement development in Redwood City, California.

The accompanying report presents our conclusions and recommendations based on our investigation. Our evaluations indicate that the site is physically suitable for the proposed construction, provided the recommendations in this report are carefully followed and are incorporated into the plans and specifications.

Should you have any questions or require additional information, please contact our office (925)831-8678 at your convenience.

Very truly yours,

J. Yang and Engineers

Jae H. Yang, P.E.
Project Geo. Engineer



Project No. J14-1591

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Project No. J14-1591

I. INTRODUCTION

A. Location and Description of Site

This report presents the results of a geotechnical site investigation at 0 Canyon Lane (down stream of Emerald Lake dam), Redwood City, California. (Plate 1-Location Map). The site was investigated on December 11, 2014. The site is located at Canyon Lane paralleled with down stream of existing swale (Emerald Lake outlet or down below of Oak Knoll Dr. The site is currently developed dirt road to the Glenwood Ave.

Development plans call for improving of the existing dirt road for the future of housing access road.

B. Purpose and Scope of Work

The purpose of the site investigation was to determine surface and subsurface soil conditions at the subject access road site. Based on the results of the investigation, criteria were established for the grading of the access road site, the design of road structure for the planned traffic, and the construction of other related facilities on the property. Our investigation included the following:

1. Field reconnaissance by the Soil Engineer
2. Drilling and sampling of the subsurface soil.
3. Laboratory Testing.
4. Analysis of the data and formulation of conclusion and recommendations.
5. Preparation of this report.

Project No. J14-1591

II. FIELD EXPLORATION AND LABORATORY TESTING

Subsurface conditions were explored on December 11, 2014 by drilling seven boring. The boring locations were chosen to provide subsurface information at the random areas on the preliminary access road and fire department turnaround area.

The boring locations are shown on PLATE 3. The boring were drilled with B24 5" solid stem flyight auger. Our soil engineer logged the boring and obtained bulk and relatively undisturbed drive samples for visual classification and subsequent laboratory testing. Drive samples were obtained with the split barrel sampler (2-inch I.D.) equipped with brass liner tubes.

The samplers were driven with a 140-pound hammer falling 30 inches. Standard penetration test N-values obtained with the SPT sampler and the S&H split-barrel sampler results are shown on the boring logs in PLATE 4.

The soils encountered were described in accordance with the Unified Soils Classification System outlined in PLATE A1.

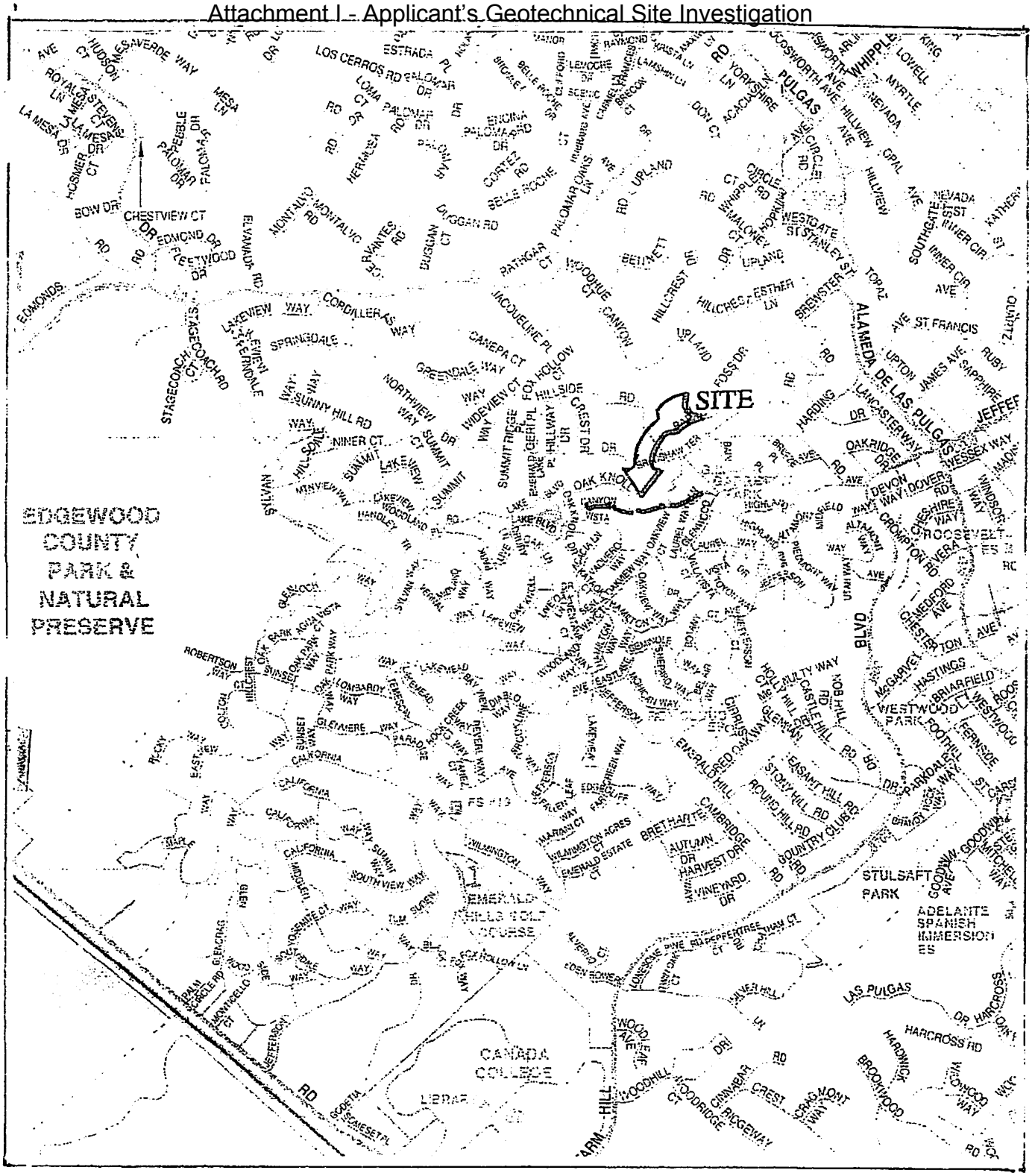


PLATE 1

LOCATION MAP

Project No. J14-1591

III. GEOTECHNICAL EVALUATION AND DISCUSSION

A. Assessment of Seismic Hazards

This site could be affected by an earthquake with its epicenter of the active faults in the Bay Area. At present, it is not possible to predict when or where movement will occur on these faults. It must be assumed, however, that movement along one or more of these faults will result in a moderate earthquake during the lifetime of any improvements at this site.

Two active fault systems are known to exist within the vicinity of the site. The approximate location of these faults are southwest 23 km from the siteas shown on Figures 1.

In the event of an earthquake, the seismic risk will depend on the distance of the structure from the epicenter and source fault, the character and magnitude of the earthquake, the groundwater and soil conditions underlying the structure and its immediate vicinity, and the nature of the construction.

The potential seismic hazards in the tests area are the effects of ground shaking resulting from earthquakes on nearby faults.

Regional subsidence or uplift caused by a differential vertical movement along a fault takes place over large areas. In the event of such a movement on the San Andreas Fault, the site would probably respond as a unit; resulting damage from this phenomenon is unlikely.

The potential structural damage due to ground shaking is caused by the transmission of earthquake vibrations from the ground into a structure. The variables which determine the extent of damage are: the characteristics of the underlying earth materials, the design of the structure, the quality of materials and workmanship used in construction, the location and magnitude of the earthquake, and the duration andintensity

of shaking. The most destructive effects of an earthquake are usually seen where the ground is unstable and the structures are poorly designed and constructed.

Preliminary estimates of ground response characteristics at this site indicate that high accelerations can be expected during a moderate to major earthquake on the San Andreas Fault or a major earthquake on the Monte Vista-Shannon Fault or Any of these events could cause strong ground shaking at this site. The duration of shaking and the frequency components of the vibrational waves will depend upon the magnitude and location of the earthquake.

Structures should be designed to accommodate earthquake vibrations. If quality design and construction criteria are met, as set forth in the latest edition of the Uniform Building Code, CALTRANS Highway Design Manual and CALTRANS Standard Specifications.

B. Site Geologic and Site Stability

The natural slopes on the proposed site are relatively flat to gentle slope and show generally good site stability. In accordance with Geotechnical Hazards Synthesis map (12/'76), hazard area zone 11, San mateo County that geologic materials are Franciscan Sandstone. The Franciscan sandstone (undivided) consists of sandstone and lithic rock with interbedded siltstone and shale and local conglomerate.

The upper soils at the site are cohesive with grass roots and are relatively resistant to erosion. The materials could erode if slopes are left unplanted and subjected to fast flowing runoff. Recommendations are presented in this report to mitigate problems associated with erosion.

C. SUBSURFACE SOIL CONDITIONS

Based upon examination of the exploratory boring (see PLATE 4: Boring Logs), materials encountered in the seven borings at locations shown on PLATE 3. The subsurface soils consist generally of silty clay to mottled silty sand and siltstone bed layer as shown on the boring logs. These materials generally grade from stiff to hard in relative density.

Groundwater was not observed at the time of our investigation at average depth of 10 feet.

The current (December, 2014), groundwater was not observed at the time of our investigation at average depth of 10 feet. However, in our professional judgement, the highest projected groundwater level to be approximately bottom of existing creek.

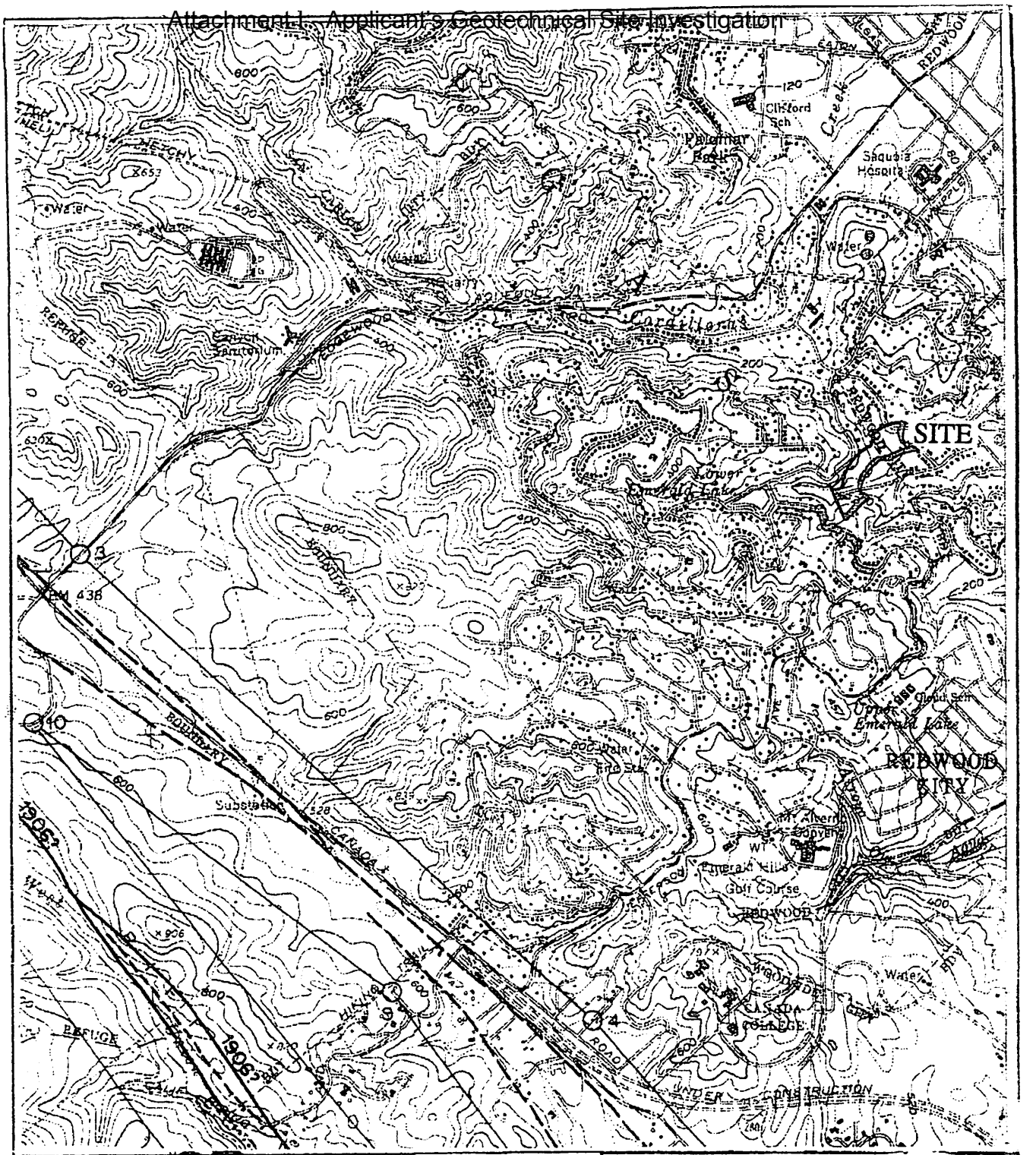
IV. CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on the investigation and evaluations described in this report. The recommendations and specifications presented herein should be incorporated into the project plans and documents during design and construction. Supplemental recommendations and/or modifications may be made at a later date, as more detailed development plans become available.

A. General Conclusions

1. The site is considered suitable from a geotechnical aspect for the proposed a preliminary access roadway improvement plan.

2. There were no soil or geologic conditions encountered during the investigation of the site which would preclude the planned construction.



SOURCES

STATE OF CALIFORNIA
EARTHQUAKE FAULT ZONES (1/94)

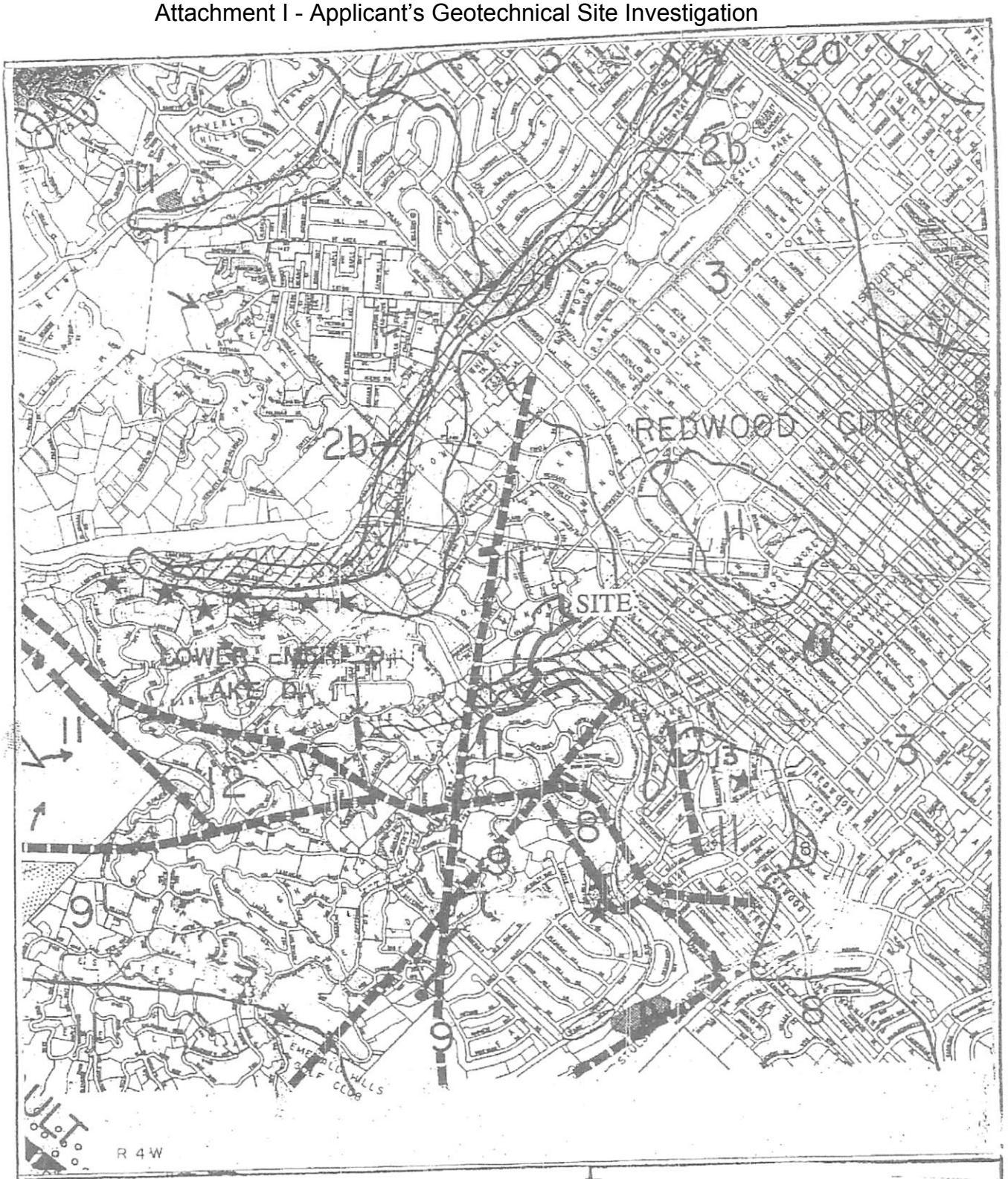
N

J. Yang and Engineers

SCALE:	FIGURE: 1
DATE: 12/16/14	

0 Canyon Lane
Redwood City, California

JOB NUMBER:



SOURCES

GEOTECHNICAL HAZARDS SYNTHESIS MAPS
SAN MATEO COUNTY (12/76)

Hazard Area Zone: 11

J. Yang and Engineers

SCALE:

FIGURE: 2

DATE: 12/16/14

0 Canyon Lane
Redwood City, California

JOB NUMBER: J14-1591

3. The site, as is all the San Francisco region, is seismicall active. Ground shaking is expected to have the following characteristics at the site and parameters are noted in the 2013 California Building Code:

    a. Site Class: C
    b. Soil Profile: Very dense soil and soft rock
    c. N-Value: N > 50
    d. ss: 2.189, s1: 1.042
    e. Earthquake loads on retaining walls: 12H (H=height of wall)

4. The recommendations in this report are based on the assumption that grading will minimal for the building pads and appropriate building site. When final development plans and detailed grading plans are available, the conclusions and recommendations of this report should be reviewed and modified if necessary, to suit those plans.

Site Clearing, Grubbing and Preparation of Areas to be Filled.

5. All grading operations associated with the planned development should be carried out as described in the following paragraphs.

6. Remove 1.5 foot of the topsoils from the proposed building pads, asphaltic concrete, old foundation concrete, debris and contaminated soils, root systems and loose or soft soil in the areas of the planned development. Buried structures such as pipelines, or other underground facilities should be removed from areas of planned development. Any of the soft soil deposits should be removed and replaced with compacted fill. A final determination of the treatment of soft surface soil should be made the soil engineer at the time of grading.

7. All compaction requirements are based on maximum dry densities and optimum moisture determined by ASTM Test Procedure D1557-97.

8. The top 1.5 foot of soil should be removed from the existing access road ways. After stripping, areas to receive non expansive fill should be stripped to firm natural ground, scarified, moisture-conditioned to 3 to 5% above optimum moisture content, and compacted to at least 95% relative compaction. If soils are too wet, considerable drying time and discing may be required to reduce their moisture content to near optimum. Where cut natural ground is exposed beneath subgrade, the soil should be scarified to a depth of 4 inches minimum from the rough grade, moisture conditioned as above, and compacted at least 95% relative compaction.

9. Existing native soils may be used as compacted fill in road bed areas, provided it is free of organic or other deleterious material. All fill should be compacted to at least 90% relative compaction at moisture contents 3 to 5% above optimum. The upper 24 inches pavement right-of-way should be compacted to at least 95% relative compaction.

10. Import fill, if required, should be approved by the Soil Engineer, and should have soil properties equivalent to or better than the natural soil. Import fill should not contain rocks larger than 4 inches in diameter.

Surface and Subsurface Drainage

11. All grading at the site should be done in such a manner as to prevent ponding of water during or after construction. Areas adjacent to tops of slopes should be graded to direct runoff away from the slope and into established drainage patterns. In general, the soils at the site are cohesionless and are prone to erosion. Erodible surface materials may be exposed locally, however. Efforts should be made, therefore, to establish slope vegetation before the next rainy season after grading.

12. Valleys or swales behind the open retaining walls, which will be filled, should be provided with subdrains to collect and discharge the subsurface seepage flow.

Typically, subdrains will be perforated plastic pipe surrounded by select import filter gravel wrapped with filter fabric. The subdrains should be connected at their low points to a storm drainage system or to other approved discharge points. Subdrain outlets should be protected from erosion and siltation and be noted on "as-built" plans by the project Civil Engineer for future reference.

Placing Spreading and Compacting Fill Material

13. The selected fill material shall be place in layer which can be compacted satisfactorily with the equipment being used. Each layer shall be spread evenly and shall be thoroughly blade-mixed during the spreading to provide uniformity of material in each layer.

14. When the moisture content of the fill material is below that sufficient to achieve the desired compaction, water shall be added until the moisture content is as specified to assure thorough bonding during the compacting process. When the moisture content of the fill material is excessive, the fill material shall be aerated by blading or other satisfactory methods until the moisture content is as specified.

15. After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted. Unless specifically modified by the Soil Engineer, compaction shall be to a minimum relative compaction of 90%.

16. Compaction shall be by sheepsfoot rollers, multiple-wheel pneumatic-tired roller or other types of acceptable compaction rollers. Rollers shall be of such design that they will be able to compact the fill to the specified compaction. Tolling shall be accomplished while the fill material is at the approximate optimum or other specified moisture content. Rolling of each layer shall consist of sufficient passes to achieve the specified compaction.

17. Field density tests will be performed by the Soil Engineer during placement of the compacted fill Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density tests shall be taken in compacted material below the disturbed surface. When these tests indicated that the density of any layer of fill or portion thereof is below the required compaction, the particular layer or portion shall be reworked until the required density has been obtained.

18. The fill operation shall be continued in thin compacted layers, as specified above, until the fill has been brought up to the finished slopes and grades as shown on the accepted plans.

19. Earth moving and working operations shall be controlled to prevent water from running into excavated areas. Ponded water shall be promptly removed and the site kept at a workable moisture content.

Subdrains

20. Subdrains shall be placed as recommended by the Soil Engineer in the field and shall consist of approved pipes and approved filter material as specified in the current edition of California Standard Specifications(Caltrans).

21. Permeable material for use in backfilling trenches under, around or over subdrains and permeable material for blankets or other subdrainage purposes shall consist of hard, durable clean sand, gravel or crushed stone and shall be free from organic matter, clay balls, or other deleterious substances. It shall consist of aggregate meeting California Standard Specifications for Class 2 Permeable Material (Section 68). Other materials may be used if approved by the Soil Engineer after appropriate testing.

22. Trenches for subdrains shall be excavated to a width equal to the outside diameter of the perforated pipe plus 1 foot and to a depth established by the Soil Engineer. The bottom of the trench shall then be covered full width by 4 inches minimum of specified filter material and the drain pipe laid with perforations at the bottom. The pipe shall be installed with a minimum slope of 1%, discharged into positive drainage devices.

23. After the pipe has been placed, the subdrain pipe shall be covered with filter material to a minimum of 2 feet over the top of the pipe. The material shall then be covered for the full width of the trench or blanket by compacted fill material.

24. Unless otherwise recommended, the following minimum pipe diameters shall be used; Laterals up to 50 feet in length - 4 inches; and Laterals over 50 feet in length and Main Subdrains - 6 inches.

Slope Construction

25. Cut and fill slopes shall be constructed no steeper than 2:1 (horizontal to vertical), unless otherwise recommended in the body of the report. All cut or fill slopes in excess of 6 feet in height shall be reviewed by J. Yang and Engineers or slope stability.

26. Fill slopes shall not be constructed on natural slopes steeper than 2:1. Where fill is to be placed on sloping ground steeper than 6:1, the toe of the fill shall be initiated on a base key (bench) excavated into weathered bedrock or other competent material. The base key shall be at least 12 feet wide and sloped at least 2% into the hillside. Subsequent keys shall be continuously excavated through the soil zone and int the weathered bedrock or other competent material as the filling progresses. The width and frequency of these subsequent keys may vary with soil conditions and steepness of slopes.

27. The faces of cut and fill slopes shall be prepared and maintained to control erosion. This control may consist of effective planting. The protection for the slopes shall be installed as soon as practical after completion of slope grading.

Trench Backfill

28. Materials for trench backfill shall consist of: soil and rock materials from the excavation, free of organic and other deleterious substances, and free from rocks larger than 4 inches in greatest dimension; imported sand; crushed rock or gravel; or imported soil previously tested by the Soil Engineer. The approved backfill materials shall be used in those portions of the trenches described below.

29. Backfill for bedding and initial backfill (minimum depth of 13 inches over the pipes) shall consist of imported sand or crushed materials ("quarry fines") free from clay

or organic material. The material shall be well graded of such size that 90 to 100% will pass a No.4 sieve, and not more than 5% will pass a No.200 sieve. Stones or rock fragments larger than 2 inches will not be permitted in the bedding and initial backfill.

30. Subsequent backfill, defined as the backfill overlying initial backfill and extending to within 18 inches of subgrade elevation, shall consist of either approved on-site excavation, or approved granular import material. Subsequent backfill shall be free from organic and other deleterious substances, and be of such size (gradation) to allow uniform compaction to the specified relative compaction. Rocks larger than 4 inches in greatest dimension will not be permitted as subsequent backfill.

31. The final 18 inches of backfill (measured from subgrade elevation) in pavement areas shall consist of on-site clayey soils, or imported clayey soils, to provide a relatively impermeable cap over the underlying trench backfill. The final backfill shall be free from organic and other deleterious substances, and shall contain no rock fragments larger than 2 inches. The material shall be uniformly blended to allow compaction to the specified relative compaction.

32. Trench backfill in street or paved areas, unless specifically modified in the body of the soil report or by the appropriate local jurisdiction, shall be compacted to at least 90% relative compaction to within 18 inches of subgrade elevation. The uppermost 18 inches of backfill, measured from subgrade elevation, shall be compacted to a minimum relative compaction of 95%.

33. Unless specifically modified within the body of the soil report, subsequent and final trench backfill within building areas shall be compacted to a minimum relative compaction of 90% to the surface of the surrounding

ground. Trench backfill outside building areas, shall be compacted to a minimum relative compaction of 85% to the surface of the surrounding ground.

34. It is the intent of these specifications that utility trench backfill be mechanically compacted. Jetting may be permissible where subdrains are included within trench to discharge excess water, and the backfill materials have Sand Equivalent of 20 or greater. The Soil Engineer shall make subsequent recommendations on use of jetting based on field conditions exposed during trench excavation and further testing of backfill material.

35. Groundwater entering trenches at the time of excavation shall be removed by positive and permanent means t a controlled outlet as recommended by the Soil Engineer.

36. The Soil Engineer will observe and periodically test the backfill during the underground construction to asses that the work was constructed in essential compliance with these specifications.

Seasonal Limits

37. Fill material shall not be placed, spread or rolled during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until field tests by the Soil Engineer indicate that the moisture content and density of the fill are as previously specified.

Unusual Conditions

38. In the event that unusual conditions not covered by these specifications are encountered during grading operations, the Soil Engineer shall be immediately notified for evaluation and recommendations.

Foundations

39. The planned retaining wall structures such as Fire Department turnaround area or bridge abutment should be founded on the firm native soil. Recommendations for pier and cantilever or crib walls are presented in this report.

40. The following general foundation type may be used at this site. Final selection of appropriate foundation systems will depend on the project structural engineer's preference, actual soil conditions, and final foundation systems. When these features are known, a review by geotechnical engineer should be made to select the appropriate foundation type and final design parameter

Drilled Cast-In-Place Concrete Piers and Grade Beams

Footings for outside of the basement walls, it is recommended that the diameter of the piers should be a minimum of 16 inches and a minimum depth of 13 feet from the bottom of the wall base slab. The actual depths of piers will be determined at the time of drilling by a soil engineer. The piers for these foundation systems should be transfer structural loads to the subsurface soils. The drilled piers will derive their load carrying capacity from peripheral skin friction between the pier shaft and the surrounding soil. An allowable skin friction value of 500 pounds per square foot (psf) of embedment may be used for design purposes for combined dead plus live loads. Friction resistance in the upper portion of the pier within 18 inches of the ground surface should be ignored when determining the load carrying capacity of the piers. The pier should be spaced at least three pier diameters and stagger layout.

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Retaining Walls

The retaining wall should be designed to resist lateral pressures exerted from a media having an equivalent fluid weight as follows:

Gradient of Back Slope	Equivalent Fluid Weight pcf	Passive Resistance pcf	Coefficient of friction	Angle of Internal Friction
Flat	45	400	0.3	25
2 : 1	55	400	0.3	25

Drainage behind retaining walls should consist of a 4-inch diameter perforated pipe surrounded by filter gravel, 1/2 inch to 1 inch in size wrapped with filter fabric.

Concrete Slab-on-Grade Floors

Concrete slab-on-grade floors should be supported on a minimum of 6 inches of Class 2 aggregate base. Aggregate for Class 2 aggregate base shall be free from vegetable matter and other deleterious substances, and shall be of such nature that it can be compacted readily under watering and rolling to form a firm, stable base. The Class 2 aggregate should be complied with latest CATRANS Specification Section 26-1.02B. At the option of the contractor, the grading for either the 1-1/2 inch maximum or 3/4 inch shall be used. The slab subgrade to receive aggregate base, should be rolled smooth prior to slab construction to provide a uniformly dense non-yielding surface.

Drainage

All ground surfaces, including pavements and sidewalks, should slope away from the structures at a minimum gradient of 2 percent. Surface runoff should be controlled by a system of swales and catch basins, and then conveyed off the property to suitable discharge facility.

Surface water should not be allowed to pond on the site.

Flexible Pavement Thicknesses

If flexible or rigid pavement is required as part of the project, the design criteria recommend based on an assumed R-value of 20 (typical clayey gravels, gravel-sand clay mixtures), Assumed Traffic Indexes (T.I.) and the CALTRANS design procedure for asphaltic concrete pavement, we recommend the following preliminary asphaltic concrete pavement thicknesses:

		Thickness (inches)	
		Asphaltic	Class 2
Location	T.I.	Concrete	AggregateBase*
Automobile Parking	4	2	6
Driveways and Service Areas	5	3	8

R-Value -78 minimum the subgrade soil may vary in quality and contain local areas of low shear strengths. We should observe the completed subgrade to check that the preliminary pavement design is applicable. Subgrade soils to receive pavement should be rolled to provide a smooth, unyielding surface compacted to at least 95% relative compaction. On site subgrade soils should be maintained in a moist condition until covered the completed pavement section. The Class 2 Aggregate Base should be placed in a manner to prevent segregation, uniformly moisture conditioned to near optimum and compacted to at least 95% relative compaction with a smooth and unyielding surface.

Trench Backfill

16. Underground utility trenches may be backfilled with on-site soils, provided they are moisture-conditioned to near optimum and are not in "chunks". Bedding and initial

backfilling should be done in accordance with local requirements and specifications. Subsequent backfilling should be done in accordance with local requirements and specifications. Subsequent backfill (generally one foot and higher above the utility) should be placed in layers and mechanically compacted as follows:

Trench Location	Minimum Relative Compaction
Natural ground, outside street and lot areas.	85%
Lot areas and streets, below upper 24 inches.	90%
Street areas, entire depths.	95%

Observation and Testing

17. All work connected with site grading, drainage and erosion control should be observed and tested by the soil engineer. The purpose of these services will be to confirm that the conditions exposed during grading are as anticipated and provide supplemental recommendations if required; and to determine that the site work is being done in general conformance with the recommendations of this report and the County of San Mateo and City of Redwood City requirements

Additional Soil Engineering Service

18. We should review the final design and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications. We should provide engineering services during site preparation, grading, foundation and pavement construction phases of the work. This would allow us to observe compliance with the design concepts, specifications and to allow design changes in the event that surface conditions differ from those anticipated prior to the start of construction.

V. PLAN REVIEW, CONSTRUCTION OBSERVATION AND TESTING

We should be retained to review the earthwork and foundation plans and specifications for conformance with the intent of our recommendations. The review would enable us to modify our recommendations if final design conditions are not as we now understand them to be. During construction, we should observe and test the earthwork and foundation installation. As needed during construction, we should be retained to consult on geotechnical questions, construction problems, and unanticipated conditions. This will allow us to develop supplemental recommendations as appropriate for the actual soil conditions encountered and the specific construction techniques employed by contractor.

VI. GUIDELINES FOR REQUIRED SERVICES

The following list of services are the services required and must be provided by Yang and Associates, during the project development. These services are presented in check list format as a convenience to those entrusted with their implementation.

The items listed are included in the body of the report in detail. This list is intended only as an outlined of the required services and does not replace specific

recommendations and, therefore, *must be used with reference to* the total report.

The importance of careful adherence to the report recommendations cannot be overemphasized. It should be noted, however, that this report is issued with the understanding that each step of the project development will be performed under the direct observation of Yang and Engineers.

The use of this report by others presumes that they have verified all information and assume full responsibility for the total project.

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ITEM DESCRIPTION	REQUIRED	NOT REQUIRED
1. Provide foundation design parameters	X	
2. Review grading plans & specifications	X	
3. Review foundation plans & specs.	X	
4. Observe & provide demolition recommendation		X
5. Observe & provide site stripping recommendations	X	
6. Observe and provide recommendations on moisture conditioning, removal and/or precompaction of unsuitable existing soils	X	
7. Observe and provide recommendations on installation of subdrain facilities		X
8. Observe and provide testing services on fill areas and/or imported fill materials	X	
9. Review as-graded plans and provide additional foundation recommendations, if necessary	X	
10. Observe and provide compaction tests on sanitary sewers, storm drain, water lines *and PG&E trenches*	X	
11. Observe foundation excavations and provide supplemental recommendations, if necessary, prior to placing concrete	X	
12. Observe and provide moisture conditioning recommendations for foundation areas prior to placing concrete		X
13. Provide design parameters for retaining walls	X	
14. Provide geologic observations and recommendations for keyway excavations and cut slopes during grading	X	
15. Excavate and recompact all geologic trenches and/or test pits.		X

VII. LIMITATIONS AND UNIFORMITY OF CONDITIONS

A. The recommendations of this report are based upon the assumption that the soil conditions do not deviate from those disclosed in the borings and test pits. If and variations or undesirable conditions are encountered during construction, or if the actual construction will differ from that planned at the present time, J. Yang and Engineers should be notified so that supplemental recommendations can be given.

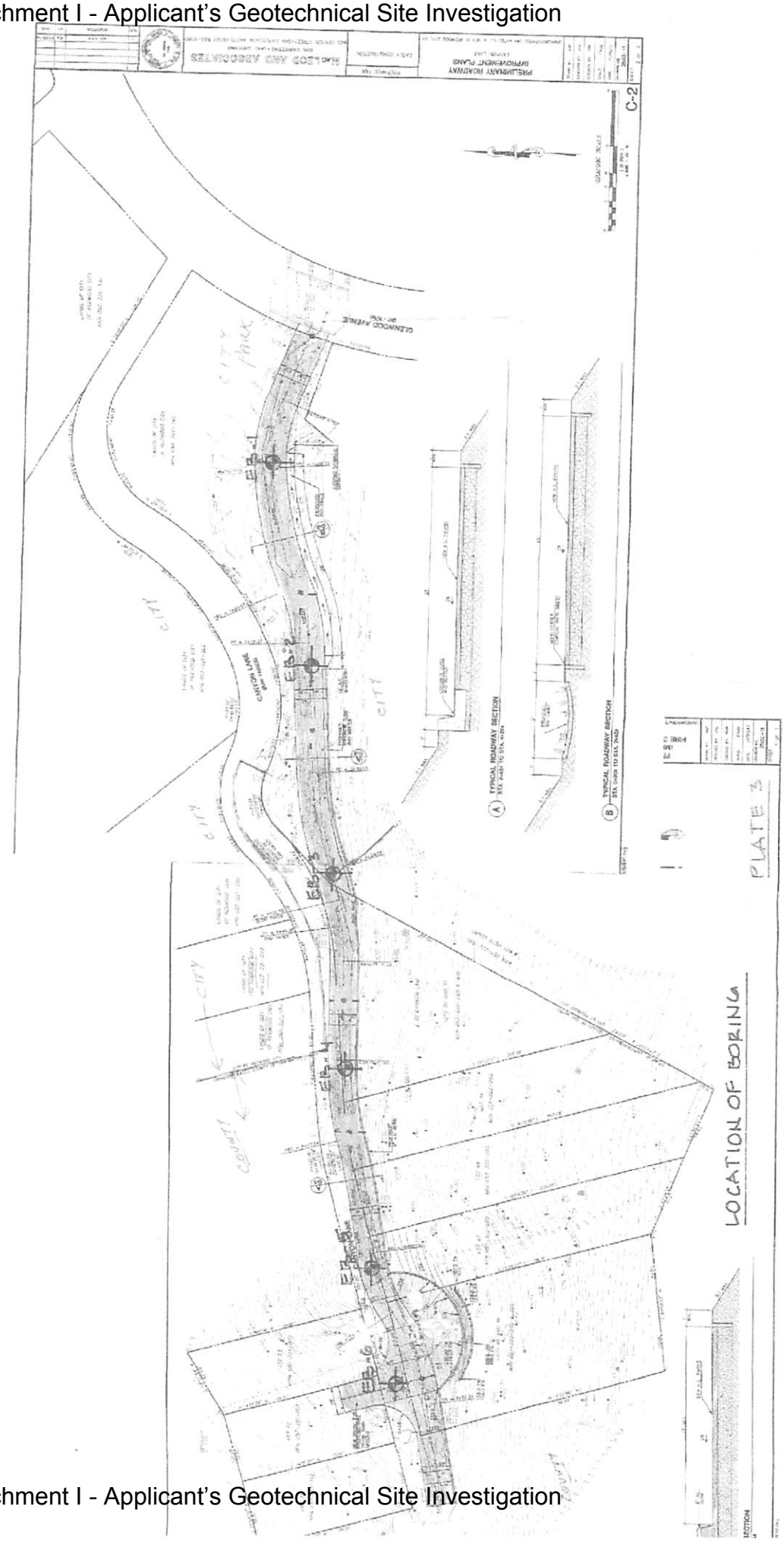
B. This report is issued the understanding that it is responsibility of the owner or of his representatives to ensure that the information and recommendations contained herein are called to the attention of the other members of the design team (architect and engineers) for the project and are incorporated into the plans, and that the necessary steps are taken to see that the contractors and subcontractors carry out such recommendations in the field.

C. The findings of this report are valid as of the present date. However, changes in the conditions can occur with the passage of time, whether they be due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated, wholly or in part, by changes outside of our control. Therefore, this report is subject to review by J. Yang and Engineers after a period of two(2) years has elapsed from date of issuance of this report.

D. The body of the report specifically recommends that J. Yang and Engineers be provided the opportunity for general review of the project plans and specifications, and that J. Yang and Engineers be retained to provide observation and testing services during construction. The validity of this report assumes that J. Yang and Engineers will be retained to provide these services.

E. This report was prepared at your request for our services, and in accordance with the currently accepted geotechnical engineering practice. No warranty based on the contents of this report is intended, and none shall be inferred from the statements or opinions expressed herein.

APPENDIX AA


PRELIMINARY ROADWAY IMPROVEMENT PLANS
C-2
GLENWOOD AVENUE
CITY
CITY LIMIT
CITY
CITY
CITY
COUNTY
A TYPICAL ROADWAY SECTION
B TYPICAL ROADWAY SECTION
LOCATION OF BORING
PLATE 3

USCS SOIL CLASSIFICATION

PRIMARY DIVISIONS			SOIL TYPE	SECONDARY DIVISIONS
COARSE GRAINED SOILS (< 50 % Fines)	GRAVEL	CLEAN GRAVEL (< 5% Fines)	GW	Well graded gravel, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravel or gravel-sand mixtures, little or no fines.
		GRAVEL with FINES	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SAND	CLEAN SAND (< 5% Fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SAND WITH FINES	SM	Silty sands, sand-silt mixtures, non-plastic fines.
			SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS (> 50 % Fines)	SILT AND CLAY Liquid limit < 50%		ML	Inorganic silts and very fine sands, with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, lean clays.
			OL	Organic silts and organic clays of low plasticity.
	SILT AND CLAY Liquid limit > 50%		MH	Inorganic silt, micaceous or diatomaceous fine sandy or silty soil.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

RELATIVE DENSITY

SAND & GRAVEL	BLOWS/FOOT*
VERY LOOSE	0 to 4
LOOSE	4 to 10
MEDIUM DENSE	10 to 30
DENSE	30 to 50
VERY DENSE	OVER 50

CONSISTENCY

SILT & CLAY	STRENGTH^	BLOWS/FOOT*
VERY SOFT	0 to 0.25	0 to 2
SOFT	0.25 to 0.5	2 to 4
FIRM	0.5 to 1	4 to 8
STIFF	1 to 2	8 to 16
VERY STIFF	2 to 4	16 to 32
HARD	OVER 4	OVER 32

GRAIN SIZES

BOULDERS	COBBLES	GRAVEL		SAND			SILT & CLAY
		COURSE	FINE	COURSE	MEDIUM	FINE	
12"	3"	0.75"		4	10	40	200

SIEVE OPENINGS — U.S. STANDARD SERIES SIEVE

Classification is based on the Unified Soil Classification System; fines refer to soil passing a No. 200 sieve.

* Standard Penetration Test (SPT) resistance, using a 140 pound hammer falling 30 inches on a 2 inch O.D. split spoon sampler; blow counts not corrected for larger diameter samplers.

^ Unconfined Compressive strength in tons/sq. ft. as estimated by SPT resistance, field and laboratory tests, and/or visual observation.

KEY TO SAMPLERS



Modified California Sampler (3-inch O.D.)
Mid-size Sampler (2.5-inch O.D.)
Standard Penetration Test Sampler (2-inch O.D.)

KEY TO TEST DATA

SOIL CLASSIFICATION CHART & KEY TO TEST DATA

PLATE A1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE

PROJECT:	0 Canyon Lane Redwood City, CA	BORING NO.	EB - 1
BORING SUPERVISOR:	J. Yang	TYPE OF BORING:	B24 5" solid stem auger
HAMMER WEIGHT:	140#/30"drop	DATE OF BORING:	12-16-14
SURFACE ELEVATION:	NA		
GROUNDWATER DEPTH			

DESCRIPTION OF MATERIALS	DEPTH IN FT.	SAMPLE	SAMPLE NUMBER-SAMPLE DIAMETER	DRIVING RESISTANCE BLOWS PER FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSIVE STRENGTH P.S.F.	OTHER TESTS
Silty Clay (topsoil)								
Clayey sand, dark grayish/brown.	5	EB1 5	2"	50	102	21	1.2ksf	
W.L.								
Sandy clay, brownish/gray **	10	EB1 10	2"	50/2"	--	--	--	
Bottom of hole								
**: Unable to recover sample due to gravel.	15							
	20							
	25							
	30							

Job No. J14-1591	J. Yang and Engineers	PLATE 4

PROJECT:	0 Canyon Lane Redwood City, CA	BORING NO.	EB - 2
BORING SUPERVISOR:	J. Yang	TYPE OF BORING:	B24 5" solid stem auger
HAMMER WEIGHT:	140#/30"drop	DATE OF BORING:	12-16-14
SURFACE ELEVATION:	NA		
GROUNDWATER DEPTH			

DEPTH IN FT.	SAMPLE	SAMPLE NUMBER-SAMPLE DIAMETER	DRIVING RESISTANCE BLOWS PER FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSIVE STRENGTH P.S.F.	OTHER TESTS	DESCRIPTION OF MATERIALS
								Silty clay (topsoil)
								Clay, dark yellowish brown.
5	EB2	5 2"	52	101	21	1.7		▽ W.L
								Sandy clay, gray
10	EB2	2"	50/2"	--	--	--		Sandy gravel, gray **
	10	2"	70	--	--	--		Bottom of hole

**: Unable to recover sample due to gravel

Job No. J14-1591	J. Yang and Engineers	PLATE 4

PROJECT: 0 Canyon Lane, Redwood City, CA							BORING NO. EB – 3	
BORING SUPERVISOR: J. Yang	TYPE OF BORING: B24 5" solid stem auger						DATE OF BORING: 12-16-14	
HAMMER WEIGHT: 140#/30"drop								
SURFACE ELEVATION: NA								
GROUNDWATER DEPTH								
DESCRIPTION OF MATERIALS	DEPTH IN FT.	SAMPLE	SAMPLE NUMBER-SAMPLE DIAMETER	DRIVING RESISTANCE BLOWS PER FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSIVE STRENGTH P.S.F.	OTHER TESTS
Silty clay (topsoil)								
Sandy clay, dark brown.	5	EB 3	2"	87	122	12	1.5ksf	
Sandy clay, gray. refusal at 11' sandstone bedrock. **	10	EB3	2"	60/2"	--	--	--	
Bottom of hole								
**: Unable to recover sample due to bedrock.	15							
	20							
	25							
	30							

Job No. J14-1591	J. Yang and Engineers	PLATE 4

PROJECT: 0 Canyon Lane, Redwood City, CA								**BORING NO.** EB - 4	
BORING SUPERVISOR: J. Yang	**TYPE OF BORING:** B24 5" solid stem auger							**DATE OF BORING:** 12-16-14	
HAMMER WEIGHT. 140#/30"drop									
SURFACE ELEVATION: NA									
GROUNDWATER DEPTH									
DESCRIPTION OF MATERIALS	**DEPTH IN FT.**	**SAMPLE**	**SAMPLE NUMBER-SAMPLE DIAMETER**	**DRIVING RESISTANCE BLOWS PER FT.**	**DRY DENSITY P.C.F.**	**MOISTURE CONTENT %**	**UNCONFINED COMPRESSIVE STRENGTH P.S.F.**	**OTHER TESTS**	
Silty clay (topsoil)									
Sandy clay/clayey sand, dark grayish brown.	5	EB4	5 2"	65	117	14	11ksf		
Silty sand, gray. refusal at 11' bedrock. **	10	EB4	10 2"	75/5"	--	--	--		
Bottom of hole									
**: Unable to recover sample due to bedrock	15								
	20								
	25								
	30								

Job No. J14-1591	J. Yang and Engineers	PLATE 4

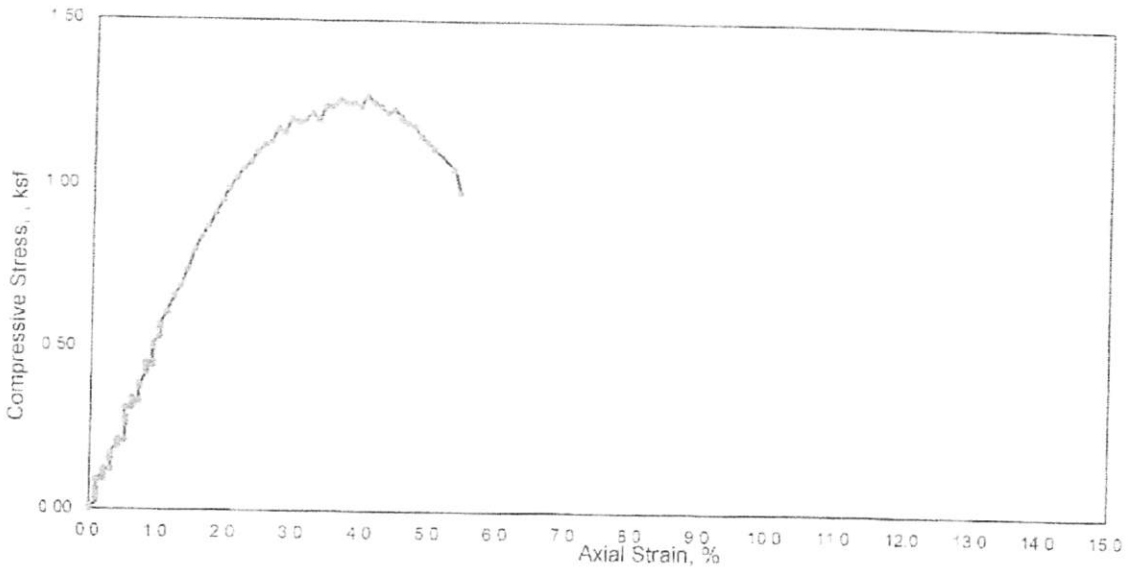
PROJECT: 0 Canyon Lane, Redwood City, CA								**BORING NO.** EB - 5	
BORING SUPERVISOR: J. Yang	**TYPE OF BORING:** B24 5" solid stem auger							**DATE OF BORING:** 12-16-14	
HAMMER WEIGHT. 140#/30"drop									
SURFACE ELEVATION: NA									
GROUNDWATER DEPTH									
DESCRIPTION OF MATERIALS	**DEPTH IN FT.**	**SAMPLE**	**SAMPLE NUMBER-SAMPLE DIAMETER**	**DRIVING RESISTANCE BLOWS PER FT.**	**DRY DENSITY P.C.F.**	**MOISTURE CONTENT %**	**UNCONFINED COMPRESSIVE STRENGTH P.S.F.**	**OTHER TESTS**	
Silty clay (topsoil)									
Sandy clay, dark brownish gray	5	EB5	5 2"	66	124	12	4ksf		
mottled silty sand, brown									
Mottled silty,gravel, ** Refusal at 10'	10								
Bottom of hole									
**: Unable to recover sample due to bedrock	15								
	20								
	25								
	30								

Job No. J14-1591 | J. Yang and Engineers | PLATE 4

PROJECT: 0 Canyon Lane, Redwood City, CA							BORING NO. EB - 6	
BORING SUPERVISOR: J. Yang	TYPE OF BORING: B24 5" solid stem auger						DATE OF BORING: 12-16-14	
HAMMER WEIGHT: 140#/30"drop								
SURFACE ELEVATION: NA								
GROUNDWATER DEPTH								
DESCRIPTION OF MATERIALS	DEPTH IN FT.	SAMPLE	SAMPLE NUMBER-SAMPLE DIAMETER	DRIVING RESISTANCE BLOWS PER FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSIVE STRENGTH P.S.F	OTHER TESTS
Silty clay (topsoil)								
Sandy clay/clayey sand, dark brownish gray								
Refusal drilling at 5.5' **	5	EB5	5 2"	65/2"	--	--	--	
Bottom of hole								
**: Unable to recover sample due to bedrock	10							
	15							
	20							
	25							
	30							

Job No. J14-1591 | J. Yang and Engineers | PLATE 4

Unconfined Compression Test Report



Specimen Failure Picture



Specimen No.			1
Initial	Diameter, in	D_o	1.90
	Height, in	H_o	4.54
	Water Content, %	ω_o	21.5
	Dry Density, lbs/ft^3	γ_{d_o}	102.9
	Saturation, %	S_o	93.7
	Void Ratio	e_o	0.607
Time to Failure, min		t_f	4.0
Unconfined Compressive Strength, ksf		q_u	1.27
Shear Strength, ksf		s_u	0.63
Strain at Failure, %		ε_f	4.0
Average Rate of Strain to Failure, %/min		$\dot{\varepsilon}$	1.0

Description of Specimen: Dark Grayish Brown Clayey Sand (SC)

Amount of Material Finer than the No. 200, % nm

LL: nm	PL: nm	PI: nm	G_s: 2.65 Assumed	Specimen Type: Undisturbed	Test Method: ASTM D 2166

nm = not measured, na = not applicable

Limitations: Pursuant to applicable building codes, the results presented in this report are for the exclusive use of the client and the registered design professional in responsible charge. The results apply only to the samples tested. If changes to the specifications were made and not communicated to Kleinfelder, Kleinfelder assumes no responsibility for pass/fail statements (meets/did not meet), if provided. As the samples tested were sampled and/or transported to our laboratory by parties other than Kleinfelder staff, this report makes no representation of whether the samples are representative of the material onsite.

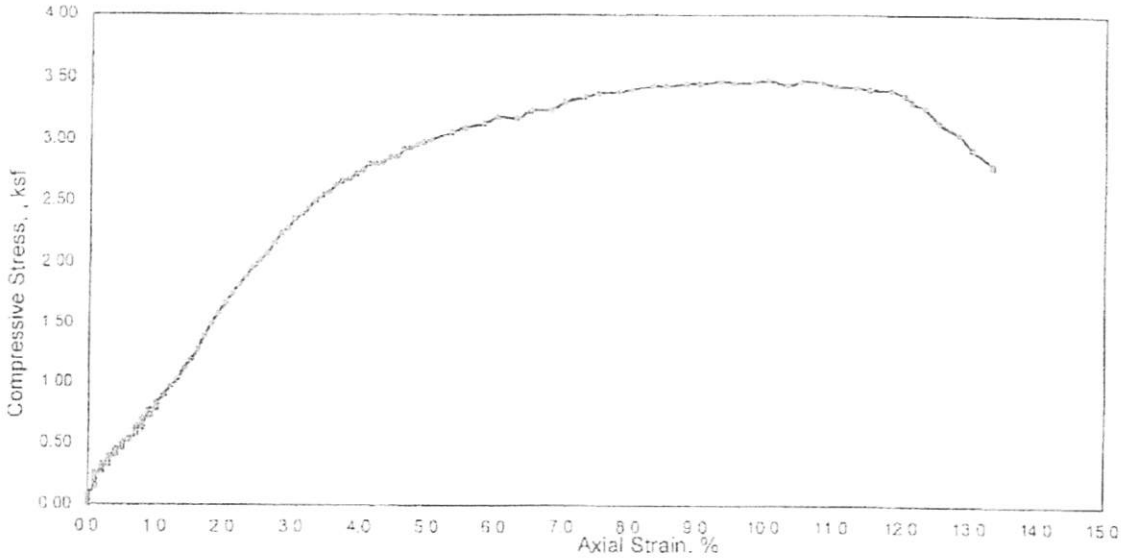
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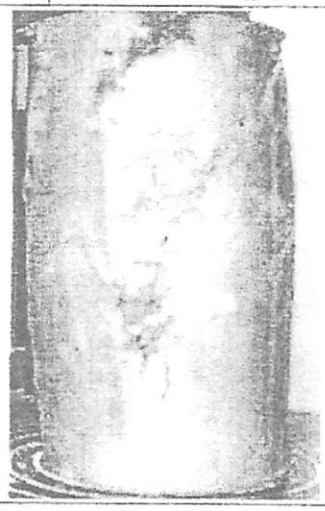
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Project No.:	14648 - YANG & ENG.
Project Name:	CANYON LN
Sample:	EB-1
Depth, ft.:	5.0
Date:	December 23, 2014

Plate
1 of 1
A-01

Unconfined Compression Test Report



Specimen Failure Picture				
	Specimen No.			1
	Initial	Diameter, in	D_o	1.92
		Height, in	H_o	4.30
		Water Content, %	ω_o	21.4
		Dry Density, lbs/ft^3	$^{\gamma}d_o$	101.4
		Saturation, %	S_o	89.7
		Void Ratio	e_o	0.631
	Time to Failure, min.		t_f	10.0
	Unconfined Compressive Strength, ksf		q_u	3.48
	Shear Strength, ksf		s_u	1.74
	Strain at Failure, %		ε_f	10.0
	Average Rate of Strain to Failure, %/min		ε	1.0

Description of Specimen: Dark Yellowish Brown Lean Clay (CL)

Amount of Material Finer than the No. 200, % nm

LL: nm	PL: nm	PI: nm	G_s: 2.65 Assumed	Specimen Type: Undisturbed	Test Method: ASTM D 2166

nm = not measured, na = not applicable

Limitations: Pursuant to applicable building codes, the results presented in this report are for the exclusive use of the client and the registered design professional in responsible charge. The results apply only to the samples tested. If changes to the specifications were made and not communicated to Kleinfelder, Kleinfelder assumes no responsibility for pass/fail statements (meets/did not meet), if provided. As the samples tested were sampled and/or transported to our laboratory by parties other than Kleinfelder staff, this report makes no representation of whether the samples are representative of the material onsite.

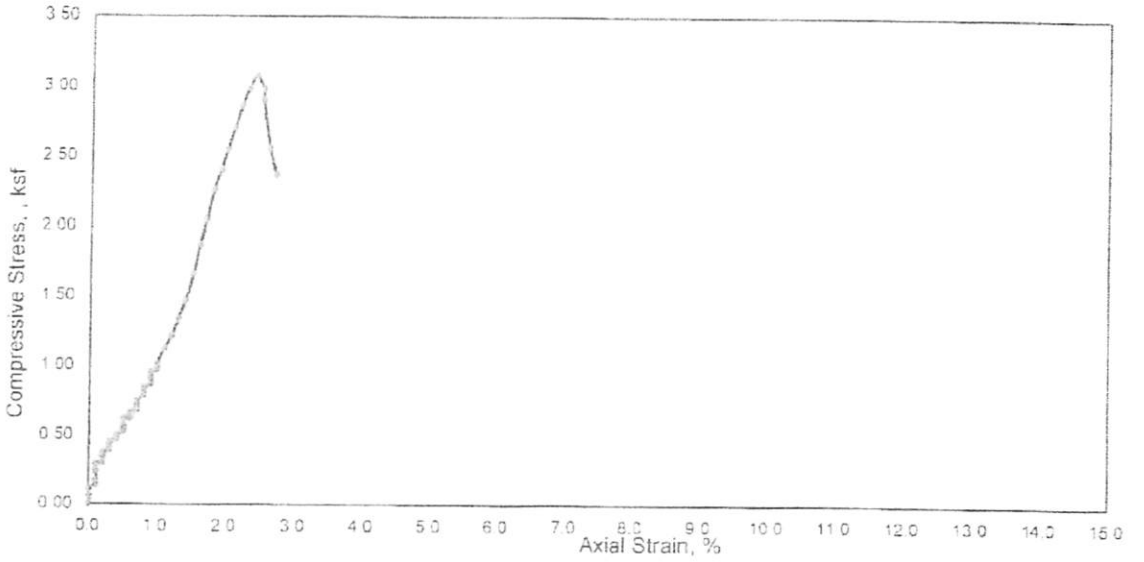
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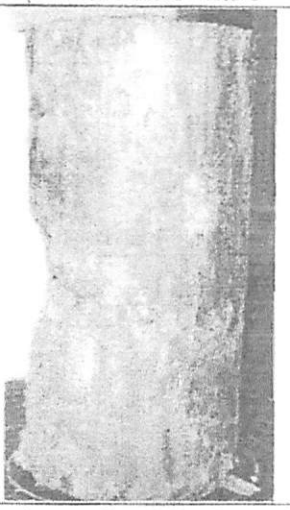
Project No.:	14648 - YANG & ENG
Project Name:	CANYON LN
Sample:	EB-3
Depth, ft.:	5.0
Date:	December 23, 2014

Plate 1 of 1

A-02

Unconfined Compression Test Report



Specimen Failure Picture	Specimen No.		1
	Initial: Diameter, in	D_O	1.86
	Initial: Height, in	H_O	4.33
	Initial: Water Content, %	ω_O	11.9
	Initial: Dry Density, lbs/ft^3	γ_{d_o}	122.0
	Initial: Saturation, %	S_O	89.1
	Initial: Void Ratio	e_O	0.355
	Time to Failure, min.	t_f	2.4
	Unconfined Compressive Strength, ksf	q_u	3.08
	Shear Strength, ksf	s_u	1.54
	Strain at Failure, %	ε_f	2.4
	Average Rate of Strain to Failure, %/min	$\dot{\varepsilon}$	1.0

Description of Specimen: Dark Olive Brown Sandy Lean Clay (CL)

Amount of Material Finer than the No. 200, % nm

LL: nm	PL: nm	PI: nm	G_S: 2.65 Assumed	Specimen Type: Undisturbed	Test Method: ASTM D 2166

nm = not measured, na = not applicable

Limitations: Pursuant to applicable building codes, the results presented in this report are for the exclusive use of the client and the registered design professional in responsible charge. The results apply only to the samples tested. If changes to the specifications were made and not communicated to Kleinfelder, Kleinfelder assumes no responsibility for pass/fail statements (meets/did not meet), if provided. As the samples tested were sampled and/or transported to our laboratory by parties other than Kleinfelder staff, this report makes no representation of whether the samples are representative of the material onsite.

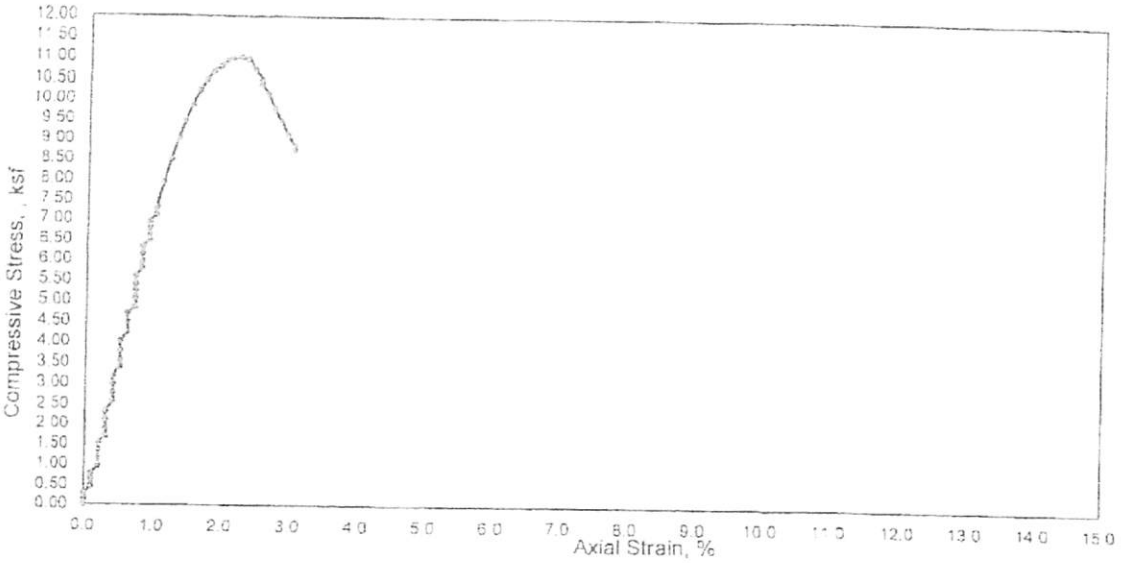
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Project No.:	14648 - YANG & ENG.
Project Name:	CANYON LN.
Sample:	EB-4
Depth, ft.:	5.0
Date:	December 23, 2014

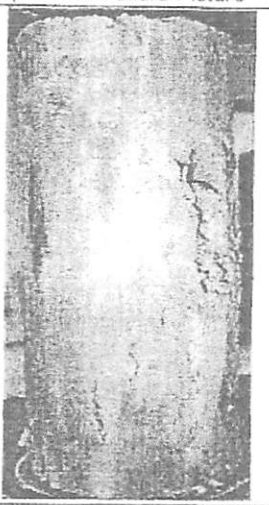
Plate 1 of 1

A-03

Unconfined Compression Test Report



Specimen Failure Picture



Specimen No.			1
Initial	Diameter, in	D_o	1.90
	Height, in	H_o	4.31
	Water Content, %	ω_o	14.4
	Dry Density, lbs/ft^3	γ_{d_c}	116.8
	Saturation, %	S_o	91.8
	Void Ratio	e_o	0.416
Time to Failure, min.		t_f	2.1
Unconfined Compressive Strength, ksf		q_u	11.00
Shear Strength, ksf		s_u	5.50
Strain at Failure, %		ε_f	2.1
Average Rate of Strain to Failure, %/min		$\dot{\varepsilon}$	1.0

Description of Specimen: Dark Grayish Brown Sandy Lean Clay (CL)

Amount of Material Finer than the No. 200, % nm

LL: nm	PL: nm	PI: nm	G_s: 2.65 Assumed	Specimen Type: Undisturbed	Test Method: ASTM D 2166

nm = not measured, na = not applicable

Limitations: Pursuant to applicable building codes, the results presented in this report are for the exclusive use of the client and the registered design professional in responsible charge. The results apply only to the samples tested. If changes to the specifications were made and not communicated to Kleinfelder, Kleinfelder assumes no responsibility for pass/fail statements (meets/did not meet), if provided. As the samples tested were sampled and/or transported to our laboratory by parties other than Kleinfelder staff, this report makes no representation of whether the samples are representative of the material onsite.

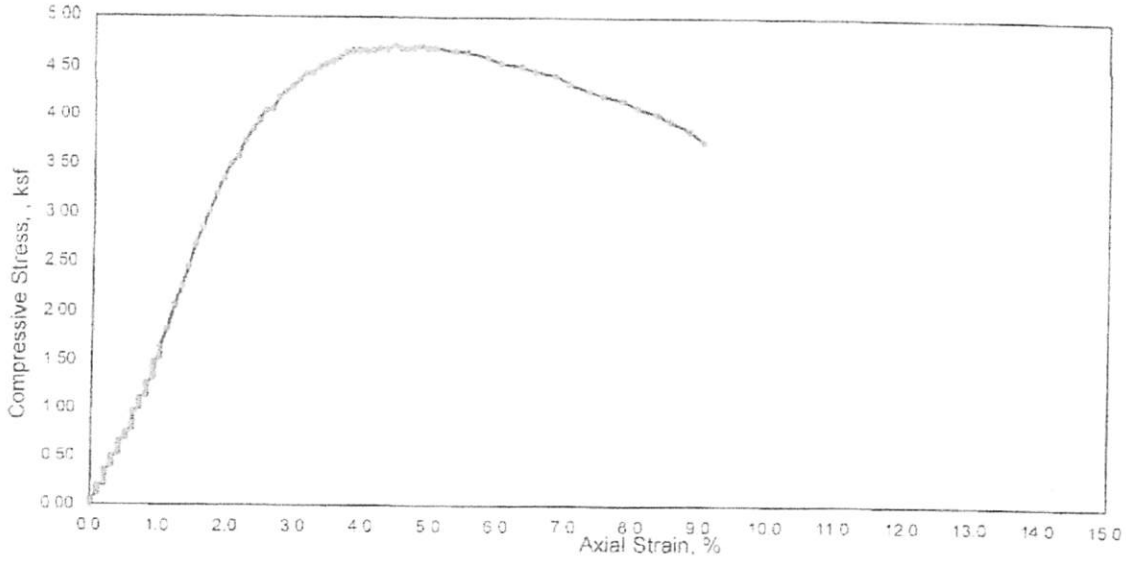
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Project No.:	14648 - YANG & ENG
Project Name:	CANYON LN
Sample:	EB-6
Depth, ft.:	5.0
Date:	December 23, 2014

Plate 1 of 1

A-04

Unconfined Compression Test Report



Specimen Failure Picture



Specimen No.			1
Initial	Diameter, in	D_O	1.92
	Height, in	H_O	3.94
	Water Content, %	ω_O	12.8
	Dry Density, lbs/ft^3	γ_{d_O}	124.0
	Saturation, %	S_O	101.8
	Void Ratio	e_O	0.334
Time to Failure, min.		t_f	4.4
Unconfined Compressive Strength, ksf		q_u	4.72
Shear Strength, ksf		s_u	2.36
Strain at Failure, %		ε_f	4.4
Average Rate of Strain to Failure, %/min		$\dot{\varepsilon}$	1.0

Description of Specimen: Dark Grayish Brown Sandy Lean Clay (CL)

Amount of Material Finer than the No. 200, % nm

LL: nm	PL: nm	PI: nm	G_S: 2.65 Assumed	Specimen Type: Undisturbed	Test Method: ASTM D 2166

nm = not measured, na = not applicable

Limitations: Pursuant to applicable building codes, the results presented in this report are for the exclusive use of the client and the registered design professional in responsible charge. The results apply only to the samples tested. If changes to the specifications were made and not communicated to Kleinfelder, Kleinfelder assumes no responsibility for pass/fail statements (meets/did not meet), if provided. As the samples tested were sampled and/or transported to our laboratory by parties other than Kleinfelder staff, this report makes no representation of whether the samples are representative of the material onsite.

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Project No.:	14648 - YANG & ENG
Project Name:	CANYON LN
Sample:	EB-6
Depth, ft.:	10.0
Date:	December 23, 2014

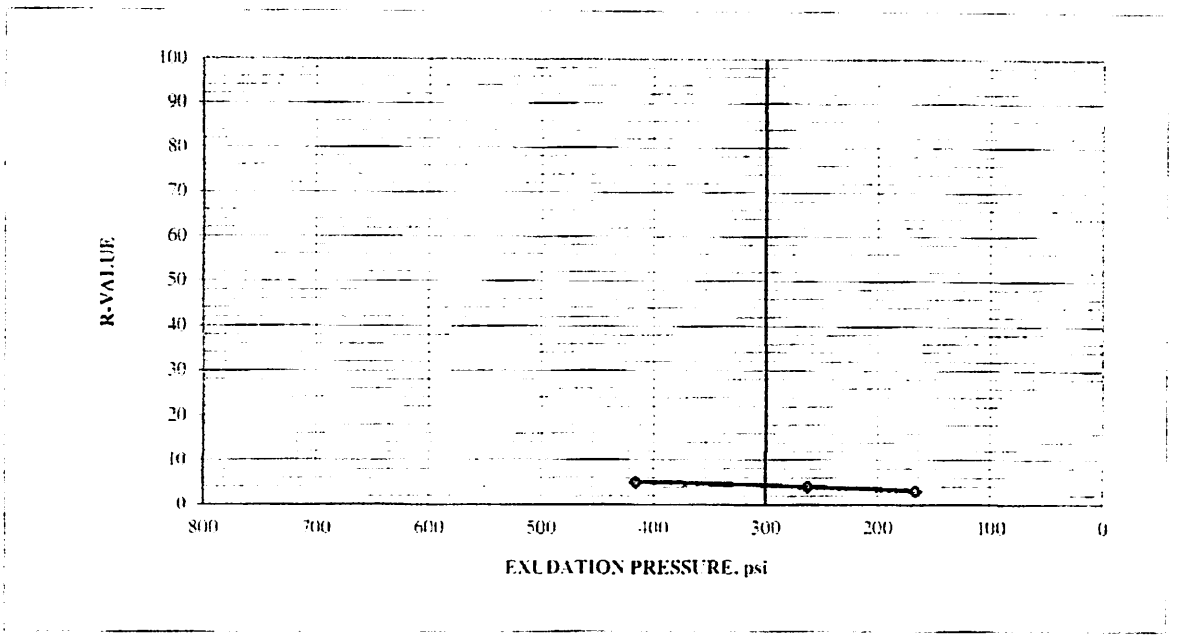
Plate
1 of 1
A-05

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Laboratory Test Report

Project Name: YANG AND ENGINEERS - CANYON LN. RWC
Project No.: 14648
Lab No.: HL7416
Sample Date: December 16, 2014
Sample No.: HL7416 - BULK
Sample Location: BULK
Material Description: LEAN CLAY
Report Date: December 24, 2014

Resistance R-Value and Expansion Pressure of Compacted Soils (ASTM D2844, CTM 301)



Briquette No.	A	B	C
Moisture at Test, %	20.4	18.5	16.7
Dry Unit Weight at Test, pcf	105.4	108.1	112.1
Expansion Pressure, psf	26	48	65
Exudation Pressure, psi	167	262	415
Resistance Value	3	4	5
R - Value at 300 psi Exudation Pressure:			**4**

Reviewed By on 12/24/2014: _____

Aaron Kidd
Laboratory Manager

Limitations: Pursuant to applicable building codes, the results presented in this report are for the exclusive use of the client and the registered design professional in responsible charge. The results apply only to the samples tested. If changes to the specifications were made and not communicated to Kleinfelder, Kleinfelder assumes no responsibility for pass/fail statements (meets/did not meet), if provided.

J. Yang and Engineers
Geotechnical
General Civil Engineers

P.O.BOX 2148, SAN RAMON, CALIFORNIA
(925) 831-8678 • FAX (925) 831-3645

Project No. J14-1591
May 5, 2017

Casey Construction
619 Sylvan Way
Emerald Hills, CA 94062

Subject: Update for the Geotechnical Investigation Report
J14-1591, Dated December 28, 2014
Reference: Proposed Roadway Improvement at
0 Canyon Lane
Redwood City, California

GEOTECHNICAL SITE INVESTIGATION

Dear Mr. Casey:

In accordance with your request, we have performed a soil and foundation investigation and evaluation for the reference site. The site geotechnical investigation report have been prepared for the reference address previously for Mr. Mel Casey by J. Yang and Engineers, Job No. J14-1591, dated 12-28-14.

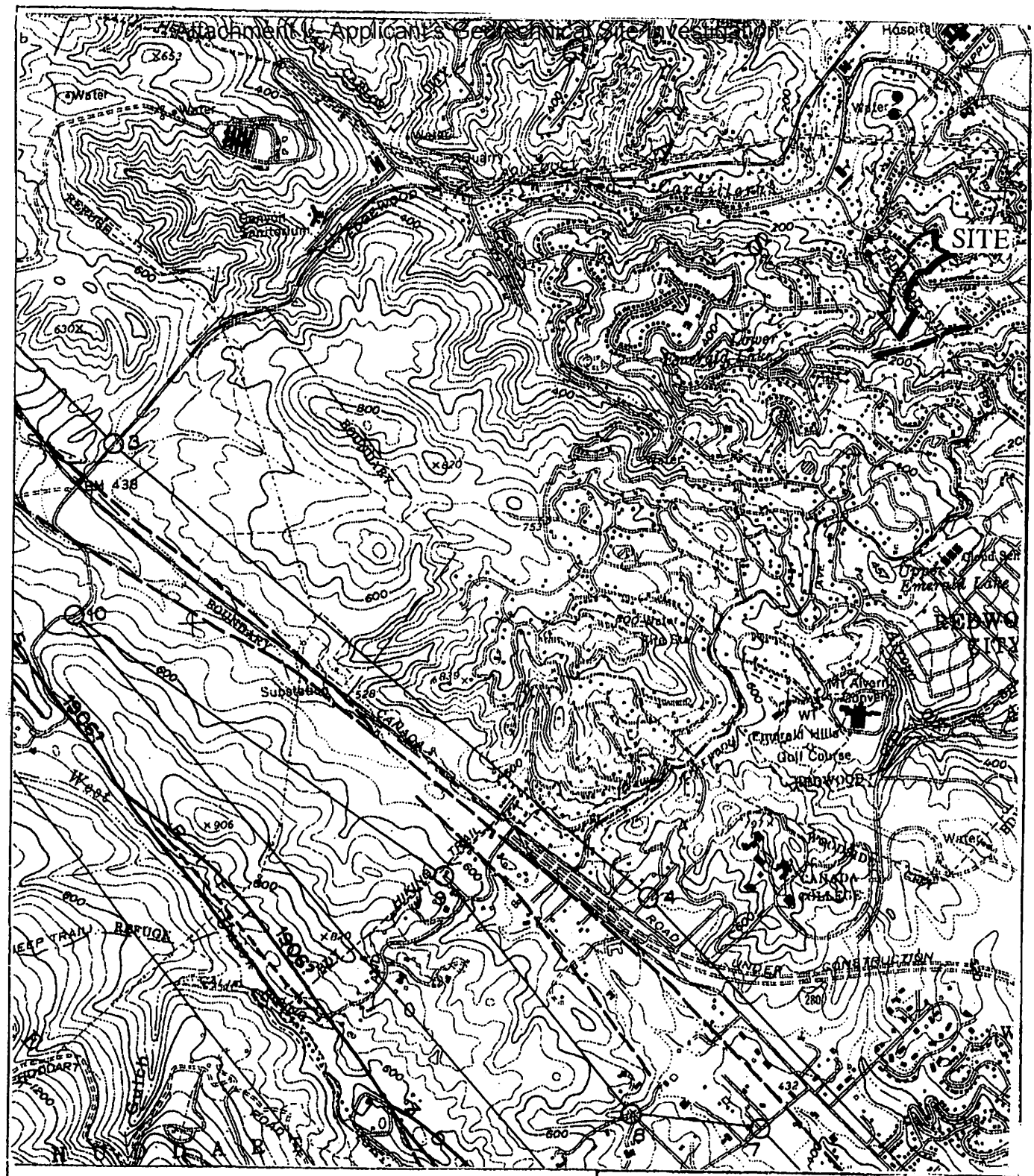
The subject report is still valid as of the present date and should be used as a project reference documents.

Should you have any questions or require additional information, please contact our office (925)831-8678 at your convenience.

Jae H. Yang - P.E.
Project Geo. Engineer



RECEIVED
2017 JUN 13 A 1:30
SAN MATEO COUNTY
PLANNING AND BUILDING
DEPARTMENT



SOURCES

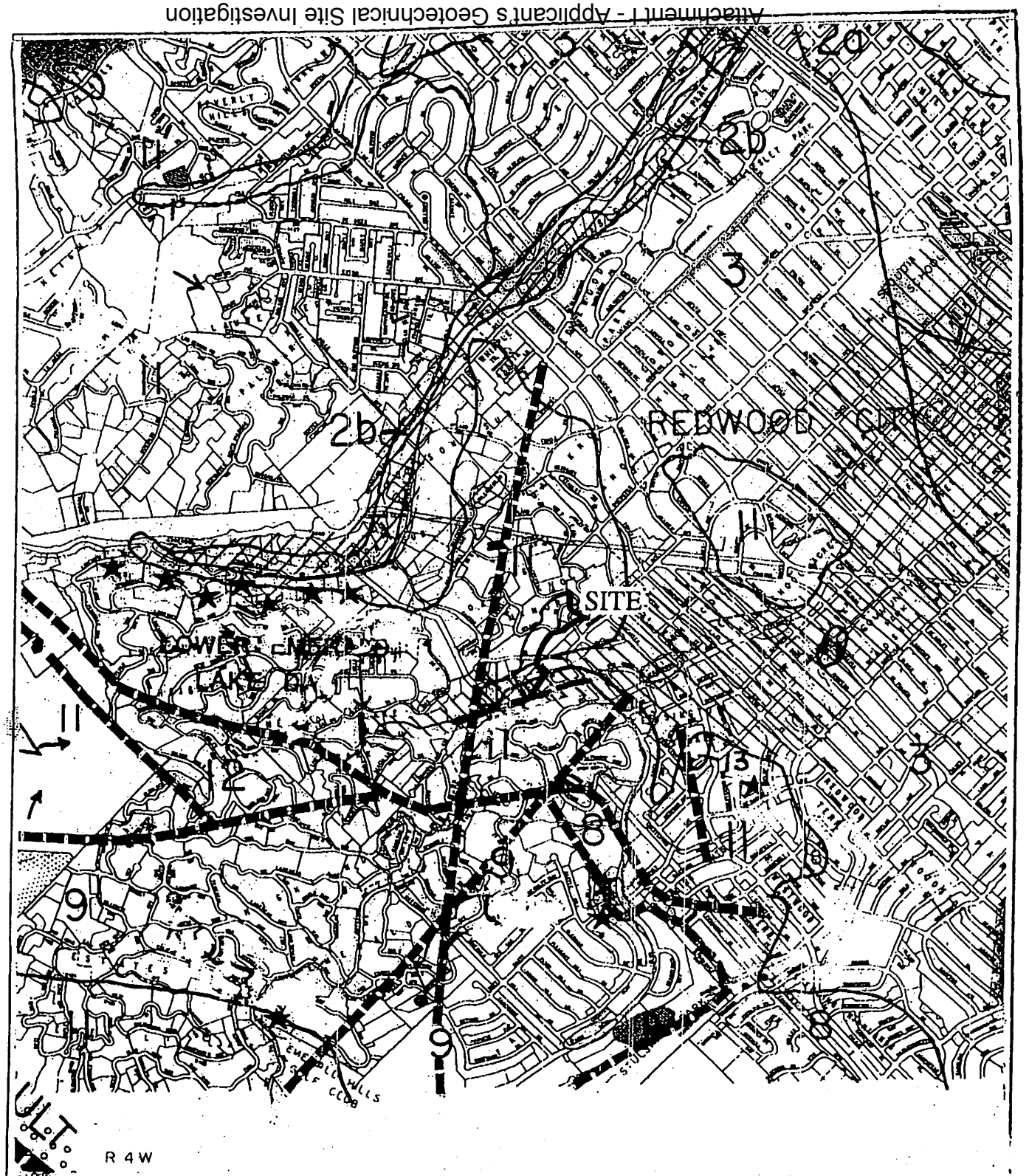
STATE OF CALIFORNIA
EARTHQUAKE FAULT ZONES (1/94)

J. Yang and Engineers

SCALE:	FIGURE: 1
DATE: 12/16/14	

0 Canyon Lane
Redwood City, California

JOB NUMBER:



SOURCES

GEOTECHNICAL HAZARDS SYNTHESIS MAPS
SAN MATEO COUNTY (12/76)

Hazard Area Zone: II

N

J. Yang and Engineers

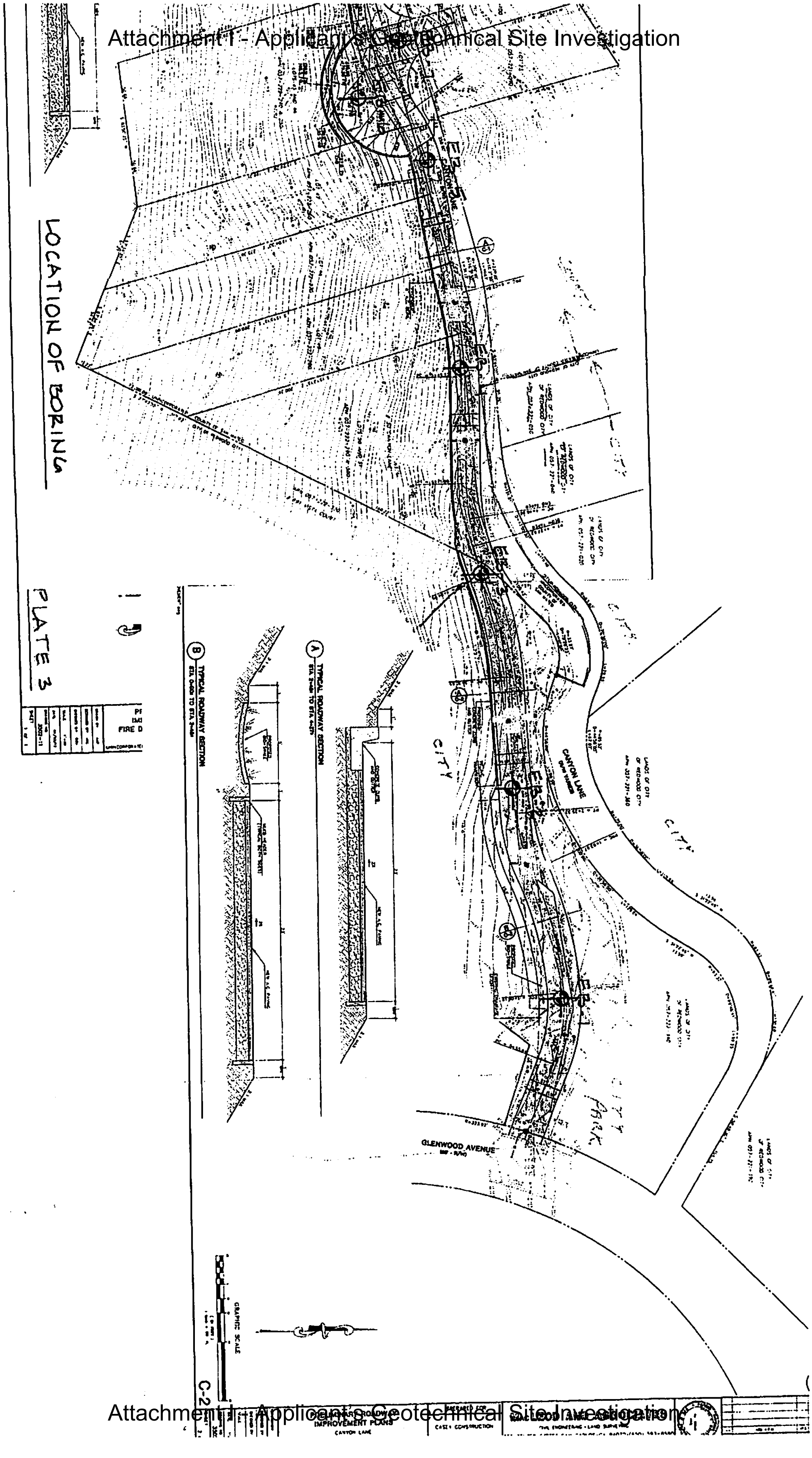
SCALE:	FIGURE: 2
DATE: 12/16/14	

0 Canyon Lane
Redwood City, California

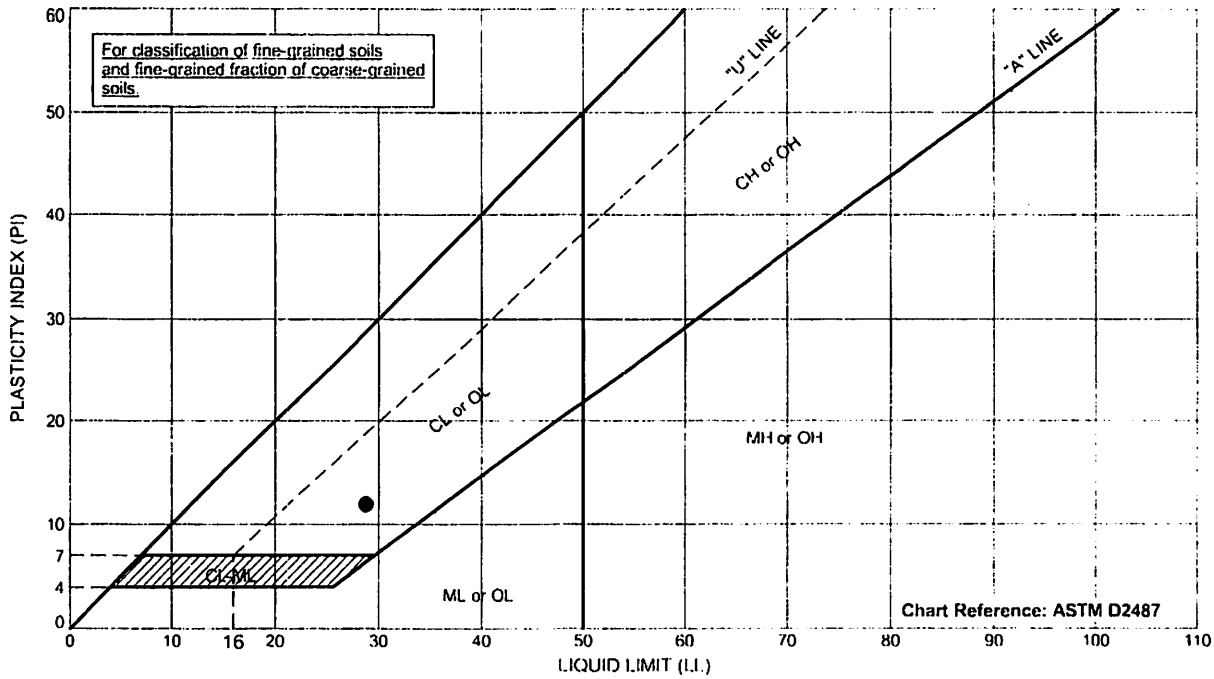
JOB NUMBER: J14-1591

Attachment 1 - Applicant's Geotechnical Site Investigation

Attachment I - Applicant's Geotechnical Site Investigation



Attachment I - Applicant's Geotechnical Site Investigation



	Exploration ID	Depth (ft.)	Sample Description	Passing #200	LL	PL	PI
●	HL10137	0	OLIVE BROWN SANDY LEAN CLAY (CL)	NM	29	17	12

Testing perfomed in general accordance with ASTM D4318.
NP = Nonplastic
NM = Not Measured

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PROJECT NO.:	00014648
DRAWN BY:	CP
CHECKED BY:	CP
DATE:	5/16/2017
REVISED:	-

ATTERBERG LIMITS

YANG & ENGINEERS
Canyon Lane

FIGURE
1

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

Memorandum

DATE: March 26, 2019

TO: Juliana Lehnen

FROM: Peter Connolly

RE: Dam Failure Inundation Hazard
Canyon Lane Roadway Improvements Development Project
San Mateo County, California
Ninyo & Moore Project No. 403433001

In accordance with your request, Ninyo & Moore has reviewed a Dam Break Inundation Study[1] and recent Inspection Reports[2,3] for the Emerald Lake 1 Lower Dam (Department of Water Resources Dam No. 612.000) at the Emerald Lake Country Club to assess the inundation hazard arising from a dam break on the proposed Canyon Lane Roadway Improvements Development project.[4]

The Emerald Lake 1 Lower Dam is a 57-foot tall earthen dam that was originally built in 1885 and re-built in 1929. The dam stores water for summer recreation with a capacity of approximately 45 acre-feet at the allowable storage pool elevation. The reservoir is drained by a siphon pipe and a spillway with a wier that is about 5¾ feet below the crest.

The dam was recently inspected by the Division of Safety of Dams (DSOD) on January 17, 2017 and on January 16, 2019. The dam, reservoir, and appurtenant structures were found to be safe for continued use as a result of these inspections based on known information and visual observations with no signs of seepage on the downstream face, groins, or embankment toe. The inspection reports included recommendations for continuation of vegetation and rodent control efforts on the upstream face of the dam and management of vegetation in the spillway approach.

Schaaf & Wheeler conducted a Dam Break Inundation Study using the recommended guidance prepared by the California Office of Emergency Services in Title 23, Division 2, Chapter 1, Article 6, Section 335 of the California Code of Regulations. This study, which is based on the downstream hazard potential and not the actual condition of the dam, considered a piping failure on a sunny day with the reservoir at the rated capacity. The study, which did not consider the grade modifications associated with the proposed project, concluded that the conjectured failure scenario would produce a peak flood wave of approximately 5,765 cubic feet per second and produced a dam break inundation map. A portion of the dam break inundation map is

presented as Figure 1. The alignment of the proposed Canyon Lane improvements and associated parcels considered for development are noted on Figure 1. The inundation map indicates that the depth of inundation adjacent to most of the parcels considered for development as a result of the proposed project, may be up to 20 feet for the conjectured scenario. This potential level of inundation may impact the improved roadway and associated future residential development based on the proposed grading and existing channel topography on the improvement plans. The available topographic information in the roadway improvement plans indicates that the bottom of the channel that carries runoff from Lower Emerald Lake along the Canyon Lane alignment is generally no more than about 13 feet below the adjacent proposed street grade for Canyon Lane and the proposed pads for the developable parcels are generally no more than 1 or 2 feet above the adjacent street grade.

The inundation hazard can be mitigated by owner compliance with DSOD regulations, which includes periodic inspections and stability reviews, and implementation of recommended maintenance or remedial actions. Future studies may indicate that additional measures may also be feasible methods for mitigating the inundation hazard. These additional measures may include changing proposed grades for improvements to avoid levels subject to inundation or the construction of supplemental upstream structures to retain or manage dam failure flood waves.

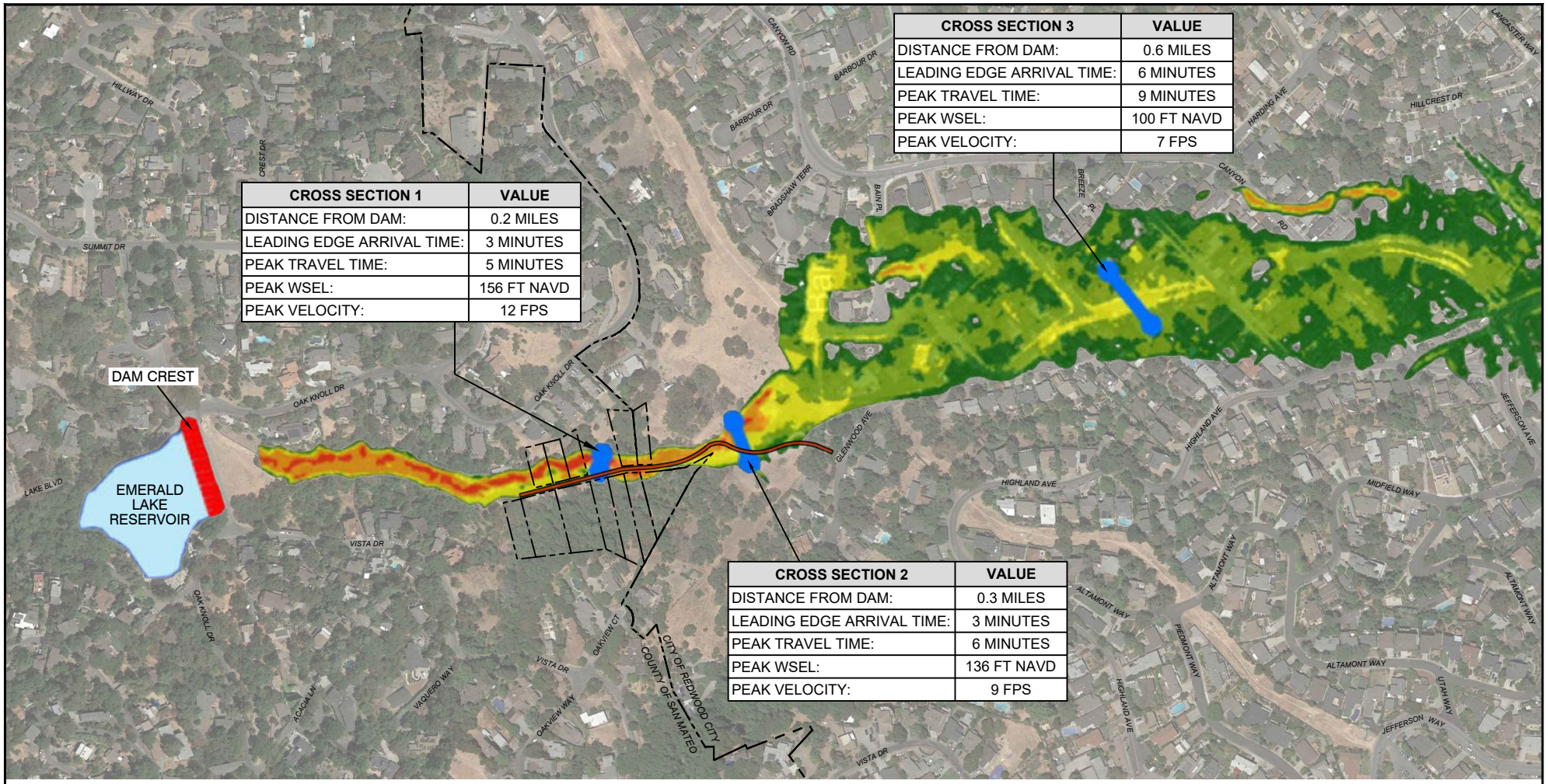
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[1] Schaaf & Wheeler, 2018, Emerald Lake 1: Dam Break Inundation Study, Draft dated November.

[2] Division of Safety of Dams, 2019, Inspection of Dam and Reservoir in Certified Status, Emerald Lake #1 Lower, California Natural Resources Agency, Department of Water Resources, Report dated February 11.

[3] Division of Safety of Dams, 2017, Inspection of Dam and Reservoir in Certified Status, Emerald Lake #1 Lower, California Natural Resources Agency, Department of Water Resources, Report dated November 9.

[4] MacLeod and Associates, 2017, Roadway Improvement Plans, Canyon Lane, Redwood City and Unincorporated San Mateo County, California, 14 Sheets, Dated January 12.



CROSS SECTION 1	VALUE
DISTANCE FROM DAM:	0.2 MILES
LEADING EDGE ARRIVAL TIME:	3 MINUTES
PEAK TRAVEL TIME:	5 MINUTES
PEAK WSEL:	156 FT NAVD
PEAK VELOCITY:	12 FPS

CROSS SECTION 2	VALUE
DISTANCE FROM DAM:	0.3 MILES
LEADING EDGE ARRIVAL TIME:	3 MINUTES
PEAK TRAVEL TIME:	6 MINUTES
PEAK WSEL:	136 FT NAVD
PEAK VELOCITY:	9 FPS

CROSS SECTION 3	VALUE
DISTANCE FROM DAM:	0.6 MILES
LEADING EDGE ARRIVAL TIME:	6 MINUTES
PEAK TRAVEL TIME:	9 MINUTES
PEAK WSEL:	100 FT NAVD
PEAK VELOCITY:	7 FPS

LEGEND

MAXIMUM DEPTH (FT.)

1 - 2 | 3 | 4 - 5 | 6-9 | 10 - 20

NOTES:
FT = FEET
FPS = FEET PER SECOND
NAVD = NORTH AMERICAN VERTICAL DATUM 1988
WSEL = WATER SURFACE ELEVATION

PROPOSED ROADWAY IMPROVEMENT

PROPOSED DEVELOPMENT AND DEVELOPABLE PARCEL BOUNDARIES

N

SCALE (FEET)
0 425 850

NOTE: DIMENSIONS, DIRECTIONS, AND LOCATIONS ARE APPROXIMATE I REFERENCE: SCHAAF & WHEELER, 2018; GOOGLE EARTH, 2019

403433001.dwg 03/15/2019 AEK

FIGURE 1

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

DAM BREAK INUNDATION HAZARD

EMERALD LAKE 1 LOWER DAM
SAN MATEO COUNTY, CALIFORNIA
403433001 I 03/19

GEOTECHNICAL SITE INVESTIGATION
30 Canyon Lane
Redwood City, California

Y & A J19 - 1663

By

Jae H. Yang - Project Engineer

J. Yang and Engineers
Geotechnical
General Civil Engineers

P.O.BOX 2148, SAN RAMON, CALIFORNIA
(925) 831-8678 • FAX (925) 831-3645

Project No. J19-1663
February 11, 2019

Mr. Mel Casey:

Subject: Proposed New Residences at
Canyon Lane
Redwood City, California
Geotechnical Site Investigation

Dear Mr. Casey:

In accordance with your authorization, J. Yang and Engineers has investigated the geotechnical site conditions at the subject site for the proposed housing development in Redwood City, California.

The accompanying report presents our conclusions and recommendations based on our investigation. Our evaluations indicate that the site is physically suitable for the proposed construction, provided the recommendations in this report are carefully followed and are incorporated into the plans and specifications.

Should you have any questions or require additional information, please contact our office (925)831-8678 at your convenience.

Very truly yours,

J. Yang and Engineers

Jae H. Yang, P.E.
Project Geo. Engineer



Project No. J19-1663

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I. INTRODUCTION

A. Location and Description of Site

This report presents the results of a geotechnical site soil foundation investigation at 30 Canyon Lane, Redwood City, California (Plate 1-Location Map). The site was investigated on February 11, 2019. The site is located at southwest corner of Canyon Lane and Oak Knoll Dr. The ground slopes down in the east direction from the site. The site is currently developed rolling slope.

Development plans call for construction of the new single family residential buildings and facilities.

B. Purpose and Scope of Work

The purpose of the site investigation was to determine surface and subsurface soil conditions at the subject site. Based on the results of the investigation, criteria were established for the grading of the site, the design of foundations for the proposed structures, and the construction of other related facilities on the property. Our investigation included the following:

1. Field reconnaissance by the Soil Engineer
2. Drilling and sampling of the subsurface soil.
3. Laboratory Testing.
4. Analysis of the data and formulation of conclusion and recommendations.
5. Preparation of this report.

II. FIELD EXPLORATION AND LABORATORY TESTING

Subsurface conditions were explored on February 11, 2019 by drilling three boring. The boring locations were chosen to provide subsurface information at the major structure areas.

The boring locations are shown on PLATE 3. The boring were drilled with B24 5" solid stem flyight auger. Our soil engineer logged the boring and obtained bulk and relatively undisturbed drive samples for visual classification and subsequent laboratory testing. Drive samples were obtained with the split barrel sampler (2-inch I.D.) equipped with brass liner tubes.

The samplers were driven with a 140-pound hammer falling 30 inches. Standard penetration test N-values obtained with the SPT sampler and the S&H split-barrel sampler results are shown on the boring logs in PLATE 4.

The soils encountered were described in accordance with the Unified Soils Classification System outlined in PLATE A1.

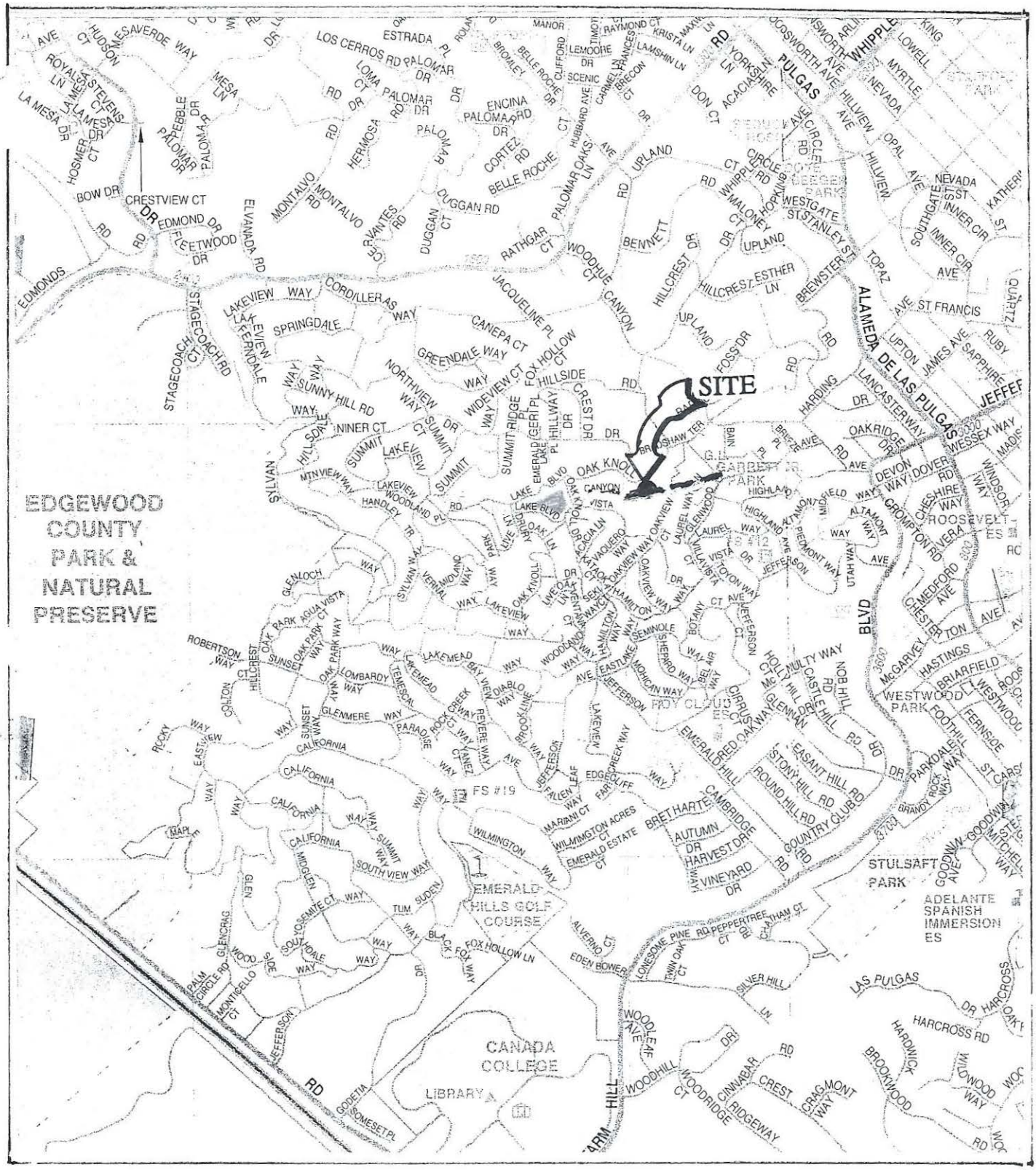
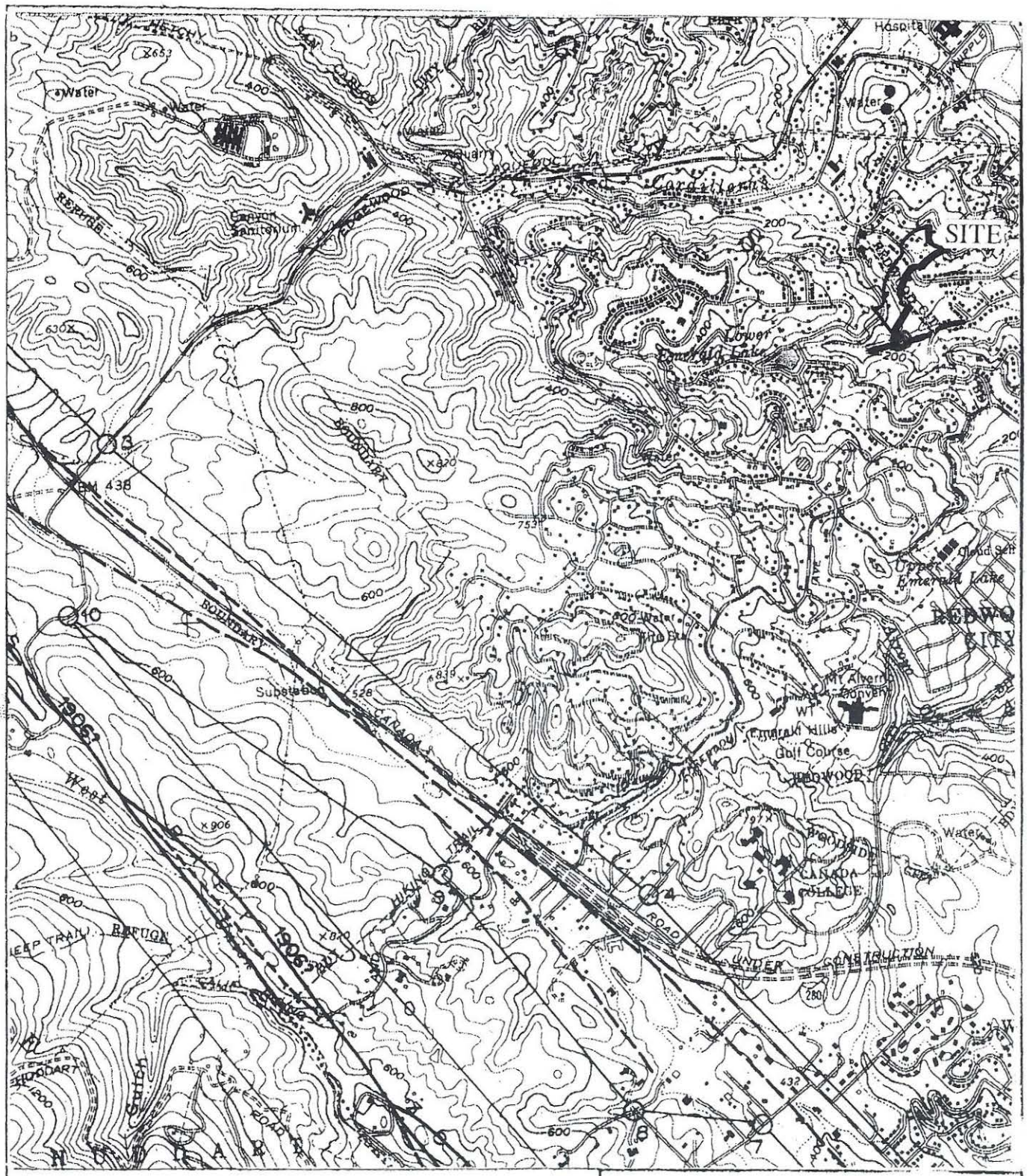


PLATE 1

LOCATION MAP



SOURCES

STATE OF CALIFORNIA
EARTHQUAKE FAULT ZONES (1/94)

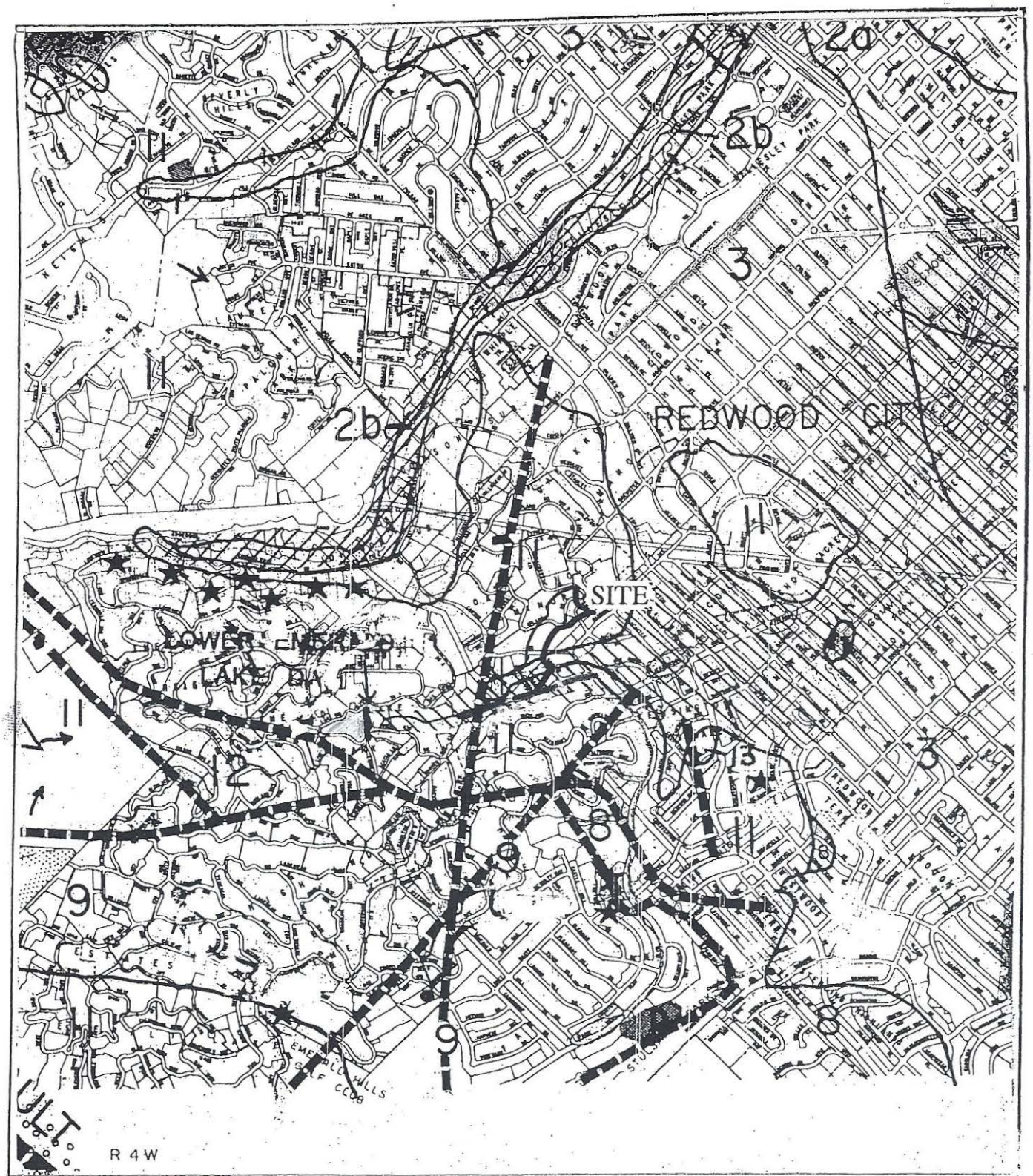
N

J. Yang and Engineers

SCALE:	FIGURE: 1
DATE: 12/16/14	

30 Canyon Ln
Redwood City, California

JOB NUMBER: J19-1663



SOURCES

GEOTECHNICAL HAZARDS SYNTHESIS MAPS
SAN MATEO COUNTY (12/76)

Hazard Area Zone: 11

N

J. Yang and Engineers

SCALE:	FIGURE: 2
DATE: 12/16/14	

30 Canyon Ln
Redwood City, California

JOB NUMBER: J19-1663

III. GEOTECHNICAL EVALUATION AND DISCUSSION

A. Assessment of Seismic Hazards

This site could be affected by an earthquake with its epicenter of the active faults in the Bay Area. At present, it is not possible to predict when or where movement will occur on these faults. It must be assumed, however, that movement along one or more of these faults will result in a moderate earthquake during the lifetime of any improvements at this site.

Active fault systems are known to exist within the vicinity of the site. The approximate location of these faults are southwest 25km as shown on Figures 1.

In the event of an earthquake, the seismic risk will depend on the distance of the structure from the epicenter and source fault, the character and magnitude of the earthquake, the groundwater and soil conditions underlying the structure and its immediate vicinity, and the nature of the construction.

The potential seismic hazards in the tests area are the effects of ground shaking resulting from earthquakes on nearby faults.

Regional subsidence or uplift caused by a differential vertical movement along a fault takes place over large areas. In the event of such a movement on the San Andreas Fault, the site would probably respond as a unit; resulting damage from this phenomenon is unlikely.

The potential structural damage due to ground shaking is caused by the transmission of earthquake vibrations from the ground into a structure. The variables which determine the extent of damage are: the characteristics of the underlying earth materials, the design of the structure, the quality of materials and workmanship used in construction, the location and magnitude of the earthquake, and the duration and intensity

of shaking. The most destructive effects of an earthquake are usually seen where the ground is unstable and the structures are poorly designed and constructed.

Preliminary estimates of ground response characteristics at this site indicate that high accelerations can be expected during a moderate to major earthquake on the San Andreas Fault or a major earthquake on the Monte Vista-Shannon Fault or Any of these events could cause strong ground shaking at this site. The duration of shaking and the frequency components of the vibrational waves will depend upon the magnitude and location of the earthquake.

Structures should be designed to accommodate earthquake vibrations. If quality design and construction criteria are met, as set forth in the latest edition of the Uniform Building Code, the potential for structural damage to wood-frame residential buildings can be substantially reduced.

B. Site Geologic and Site Stability

The natural slopes on the proposed site are relatively flat to gentle slope and show generally good site stability. In accordance with Geotechnical Hazards Synthesis map (12/'76), hazard area zone 11, San mateo County that geologic materials are Franciscan Sandstone. The Franciscan sandstone (undivided) consists of sandstone and lithic rock with interbedded siltstone and shale and local conglomerate.

The upper soils at the site are cohesive with grass roots and are relatively resistant to erosion. The materials could erode if slopes are left unplanted and subjected to fast flowing runoff. Recommendations are presented in this report to mitigate problems associated with erosion.

C. SUBSURFACE SOIL CONDITIONS

Based upon examination of the exploratory boring (see PLATE 4: Boring Logs), materials encountered in the four borings at locations shown on PLATE 3. The subsurface soils consist generally of silty clay to mottled silty sand and siltstone bed layer as shown on the boring logs. These materials generally grade from stiff to hard in relative density.

Groundwater was not observed at the time of our investigation at average depth of 15 feet.

The current (February, 2006), groundwater was not observed at The time of our investigation at average depth of 17 feet. However, in our professional judgement, the highest projected groundwater level to be approximately 20 feet fron the existing grade.

D. UNDERGROUND BASEMENT EXCAVATION AND SAFETY PLAN

If basement excavations are part of this project, attention is directed to Section 7-1.01E "Trench Safety" of State of California Department of Transportation or CAL/OSHA or City of Palo Alto Basement Construction requirements. Excavation for any hole 5 feet or more in depth shall not begin until the contractor has received approval from engineer of contractor's detailed plan for workers protection from the hazards of caving ground during the excavation of the basement. Deep holes in unstable soil conditions may require extra support (shoring) to prevent cave-ins.

Detailed descriptions of materials encountered in each of the test borings are presented on the logs in Plate 4. Changes in the condition of the property may occur with the passage of time due to natural processes and on the subject site of adjacent properties. Thus, the drilled boring logs and related information depict subsurface conditions only at the locations indicated and on the particular date designated on the logs. Soil conditions at other locations may differ from conditions at these locations.

IV. CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on the investigation and evaluations described in this report. The recommendations and specifications presented herein should be incorporated into the project plans and documents during design and construction. Supplemental recommendations and/or modifications may be made at a later date, as more detailed development plans become available.

A. General Conclusions

1. The site is considered suitable from a geotechnical aspect for the proposed a dwelling facilities.

2. There were no soil or geologic conditions encountered during the investigation of the site which would preclude the planned construction.

3. The site, as is all the San Francisco region, is seismicall active. Ground shaking is expected to have the following characteristics at the site and parameters are noted in the 2016 Building Code.

    a. Seismic zone factor (Z): 0.4
    b. Seismic coefficient (Ca): 0.44Na
    c. Seismic coefficient (Cv): 0.64Nv
    d. Soil profile type: Sd
    e. Near-source factor (Na): 1.4, (Nv): 1.7
    f. Expected seismic source type: A

4. The recommendations in this report are based on the assumption that grading will minimal for the building pads and appropriate building site. When final development plans and detailed grading plans are available, the conclusions and recommendations of this report should be reviewed and modified if necessary, to suit those plans.

Site Preparation and Grading

5. All grading operations associated with the planned development should be carried out as described in the following paragraphs.

6. Remove 1.5 foot of the topsoils from the proposed building pads, asphaltic concrete, old foundation concrete, debris and contaminated soils, root systems and loose or soft soil in the areas of the planned development. Buried structures such as pipelines, or other underground facilities should be removed from areas of planned development. Any of the soft soil deposits should be removed and replaced with compacted fill. A final determination of the treatment of soft surface soil should be made the soil engineer at the time of grading.

7. All compaction requirements are based on maximum dry densities and optimum moisture determined by ASTM Test Procedure D1557-90.

8. The top 1.5 foot of soil should be removed from the planned building pads and driveways. After stripping, areas to receive non expansive fill should be stripped to firm natural ground, scarified, moisture-conditioned to 3 to 5% above optimum moisture content, and compacted to at least 90% relative compaction. If soils are too wet, considerable drying time and discing may be required to reduce their moisture content to near optimum. Where cut natural ground is exposed beneath slabs-on-grade, the soil should be scarified to a depth of 4 inches from finished rough grade, moisture conditioned as above, and compacted at least 90% relative compaction.

9. Existing native soils may not be used as compacted fill in building and street areas, provided it is free of organic or other deleterious material. All fill should be compacted to at least 90% relative compaction at moisture contents 3 to 5% above optimum. The upper 24 inches pavement right-of-way should be compacted to at least 95% relative compaction.

10. Import fill, if required, should be approved by the Soil Engineer, and should have soil properties equivalent to or better than the natural soil. Import fill should not contain rocks larger than 4 inches in diameter.

Surface and Subsurface Drainage

11. All grading at the site should be done in such a manner as to prevent ponding of water during or after construction. Areas adjacent to tops of slopes should be graded to direct runoff away from the slope and into established drainage patterns. In general, the soils at the site are cohesionless and are prone to erosion. Erodible surface materials may be exposed locally, however. Efforts should be made, therefore, to establish slope vegetation before the next rainy season after grading.

12. Valleys or swales behind the open retaining walls, which will be filled, should be provided with subdrains to collect and discharge the subsurface seepage flow. Typically, subdrains will be perforated plastic pipe surrounded by select import filter gravel wrapped with filter fabric. The subdrains should be connected at their low points to a storm drainage system or to other approved discharge points. Subdrain outlets should be protected from erosion and siltation and be noted on "as-built" plans by the project Civil Engineer for future reference.

Foundations

13. The proposed building structures should be founded on the firm native soil. Recommendations for pier and grade beams are presented in this report.

14. The following general foundation type may be used at this site. Final selection of appropriate foundation systems will depend on the building structural engineer's preference, actual soil conditions, and final building

foundation systems. When these features are known, a review by geotechnical engineer should be made to select the appropriate foundation type and final design parameter

Drilled Cast-In-Place Concrete Piers and Grade Beams

Footings for outside of the basement walls, it is recommended that the diameter of the piers should be a minimum of 16 inches and a minimum depth of 14 feet from the bottom of the grade beam. The actual depths of piers will be determined at the time of drilling by a soil engineer. The piers for these foundation systems should be transfer structural loads to the subsurface soils. The drilled piers will derive their load carrying capacity from peripheral skin friction between the pier shaft and the surrounding soil. An allowable skin friction value of 500 pounds per square foot (psf) of embedment may be used for design purposes for combined dead plus live loads. Friction resistance in the upper portion of the pier within 18 inches of the ground surface should be ignored when determining the load carrying capacity of the piers. The pier should be spaced at least three pier diameters and reinforced their entire length.

Retaining Walls

The retaining wall should be designed to resist lateral pressures exerted from a media having an equivalent fluid weight as follows:

Gradient of Back Slope	Equivalent Fluid Weight pcf	Passive Resistance pcf	Coefficient of friction	Angle of Internal Friction
Flat	45	400	0.3	25
2 : 1	55	400	0.3	25

Drainage behind retaining walls should consist of a 4-inch diameter perforated pipe surrounded by filter gravel, 1/2 inch to 1 inch in size wrapped with filter fabric to the dewatering pump station or day light.

Concrete Slab-on-Grade Floors

Concrete slab-on-grade floors should be supported on a minimum of 6 inches of Class 2 aggregate base. Aggregate for Class 2 aggregate base shall be free from vegetable matter and other deleterious substances, and shall be of such nature that it can be compacted readily under watering and rolling to form a firm, stable base. The Class 2 aggregate should be complied with latest CATRANS Specification Section 26-1.02B. At the option of the contractor, the grading for either the 1-1/2 inch maximum or 3/4 inch shall be used. The slab subgrade to receive aggregate base, should be rolled smooth prior to slab construction to provide a uniformly dense non-yielding surface.

Drainage

All ground surfaces, including pavements and sidewalks, should slope away from the structures at a minimum gradient of 2 percent. Surface runoff should be controlled by a system of swales and catch basins, and then conveyed off the property to suitable discharge facility.

Surface water should not be allowed to pond on the site. In addition, roof downspouts should be connected to closed collector pipes which discharge into the storm water system or onto paved parking areas or dispose through lined ditch.

Flexible Pavement Thicknesses

If flexible pavement is required as part of the building, the design criteria recommend based on an assumed R-value of 20 (typical clayey gravels, gravel-sand clay mixtures), Assumed Traffic Indexes (T.I.) and the CALTRANS design procedure for asphaltic concrete pavement, we recommend the following preliminary asphaltic concrete pavement thicknesses:

Location	T.I.	Thickness (inches) Asphaltic Concrete	Class 2 Aggregate Base*
Automobile Parking	4	2	6
Driveways and Service Areas	5	3	8

R-Value -78 minimum the subgrade soil may vary in quality and contain local areas of low shear strengths. We should observe the completed subgrade to check that the preliminary pavement design is applicable. Subgrade soils to receive pavement should be rolled to provide a smooth, unyielding surface compacted to at least 95% relative compaction. On site subgrade soils should be maintained in a moist condition until covered the completed pavement section. The Class 2 Aggregate Base should be placed in a manner to prevent segregation, uniformly moisture conditioned to near optimum and compacted to at least 95% relative compaction with a smooth and unyielding surface.

Trench Backfill

16. Underground utility trenches may be backfilled with on-site soils, provided they are moisture-conditioned to near optimum and are not in "chunks". Bedding and initial backfilling should be done in accordance with local requirements and specifications. Subsequent backfilling should be done in accordance with local requirements and specifications. Subsequent backfill (generally one foot and higher above the utility) should be placed in layers and mechanically compacted as follows:

Trench Location	Minimum Relative Compaction
Natural ground, outside street and lot areas.	85%
Lot areas and streets, below upper 24 inches.	90%
Street areas, entire depths.	95%

Observation and Testing

17. All work connected with site grading, drainage and erosion control should be observed and tested by the soil engineer. The purpose of these services will be to confirm that the conditions exposed during grading are as anticipated and provide supplemental recommendations if required; and to determine that the site work is being done in general conformance with the recommendations of this report and the County of San Mateo and City of Redwood City requirements

Additional Soil Engineering Service

18. We should review the final design and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications. We should provide engineering services during site preparation, grading, foundation and pavement construction phases of the work. This would allow us to observe compliance with the design concepts, specifications and to allow design changes in the event that surface conditions differ from those anticipated prior to the start of construction.

V. PLAN REVIEW, CONSTRUCTION OBSERVATION AND TESTING

We should be retained to review the earthwork and foundation plans and specifications for conformance with the intent of our recommendations. The review would enable us to modify our recommendations if final design conditions are not as we now understand them to be. During construction, we should observe and test the earthwork and foundation installation. As needed during construction, we should be retained to consult on geotechnical questions, construction problems, and unanticipated conditions. This will allow us to develop supplemental recommendations as appropriate for the actual soil conditions encountered and the specific construction techniques employed by contractor.

VI. GUIDELINES FOR REQUIRED SERVICES

The following list of services are the services required and must be provided by Yang and Associates, during the project development. These services are presented in check list format as a convenience to those entrusted with their implementation.

The items listed are included in the body of the report in detail. This list is intended only as an outlined of the required services and does not replace specific

recommendations and, therefore, must be used with reference to the total report.

The importance of careful adherence to the report recommendations cannot be overemphasized. It should be noted, however, that this report is issued with the understanding that each step of the project development will be performed under the direct observation of Yang and Engineers.

The use of this report by others presumes that they have verified all information and assume full responsibility for the total project.

ITEM DESCRIPTION	REQUIRED	NOT REQUIRED
1. Provide foundation design parameters	X	
2. Review grading plans & specifications	X	
3. Review foundation plans & specs.	X	
4. Observe & provide demolition recommendation		X
5. Observe & provide site stripping recommendations	X	
6. Observe and provide recommendations on moisture conditioning, removal and/or precompaction of unsuitable existing soils	X	
7. Observe and provide recommendations on installation of subdrain facilities		X
8. Observe and provide testing services on fill areas and/or imported fill materials	X	
9. Review as-graded plans and provide additional foundation recommendations, if necessary	X	
10. Observe and provide compaction tests on sanitary sewers, storm drain, water lines and PG&E trenches	X	
11. Observe foundation excavations and provide supplemental recommendations, if necessary, prior to placing concrete	X	
12. Observe and provide moisture conditioning recommendations for foundation areas prior to placing concrete		X
13. Provide design parameters for retaining walls	X	
14. Provide geologic observations and recommendations for keyway excavations and cut slopes during grading	X	
15. Excavate and recompact all geologic trenches and/or test pits.		X

VII. LIMITATIONS AND UNIFORMITY OF CONDITIONS

A. The recommendations of this report are based upon the assumption that the soil conditions do not deviate from those disclosed in the borings and test pits. If and variations or undesirable conditions are encountered during construction, or if the actual construction will differ from that planned at the present time, J. Yang and Engineers should be notified so that supplemental recommendations can be given.

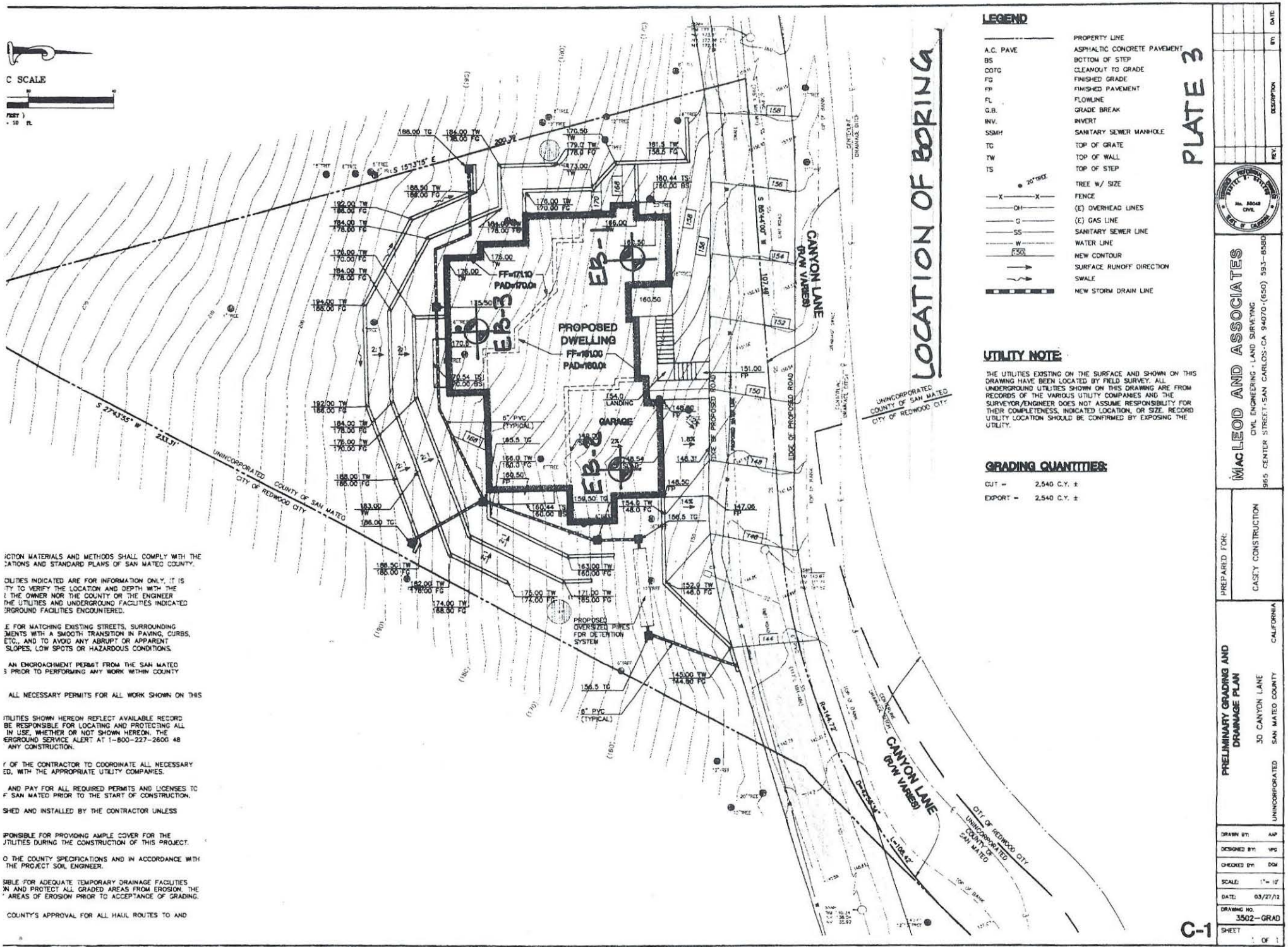
B. This report is issued the understanding that it is responsibility of the owner or of his representatives to ensure that the information and recommendations contained herein are called to the attention of the other members of the design team (architect and engineers) for the project and are incorporated into the plans, and that the necessary steps are taken to see that the contractors and subcontractors carry out such recommendations in the field.

C. The findings of this report are valid as of the present date. However, changes in the conditions can occur with the passage of time, whether they be due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated, wholly or in part, by changes outside of our control. Therefore, this report is subject to review by J. Yang and Engineers after a period of two(2) years has elapsed from date of issuance of this report.

D. The body of the report specifically recommends that J. Yang and Engineers be provided the opportunity for general review of the project plans and specifications, and that J. Yang and Associates be retained to provide observation and testing services during construction. The validity of this report assumes that J. Yang and Engineers will be retained to provide these services.

E. This report was prepared at your request for our services, and in accordance with the currently accepted geotechnical engineering practice. No warranty based on the contents of this report is intended, and none shall be inferred from the statements or opinions expressed herein.

APPENDIX A



C SCALE

FEET)
= 10 ft.

LEGEND

	PROPERTY LINE
A.C. PAVE	ASPHALTIC CONCRETE PAVEMENT
BS	BOTTOM OF STEP
COTG	CLEANOUT TO GRADE
FG	FINISHED GRADE
FP	FINISHED PAVEMENT
FL	FLOWLINE
G.B.	GRADE BREAK
INV.	INVERT
SSMH	SANITARY SEWER MANHOLE
TG	TOP OF GRATE
TW	TOP OF WALL
TS	TOP OF STEP
20" DEC.	TREE W/ SIZE
X X	FENCE
OH	(E) OVERHEAD LINES
G	(E) GAS LINE
SS	SANITARY SEWER LINE
W	WATER LINE
150	NEW CONTOUR
	SURFACE RUNOFF DIRECTION
	SWALE
	NEW STORM DRAIN LINE

PLATE 3

UTILITY NOTE:

THE UTILITIES EXISTING ON THE SURFACE AND SHOWN ON THIS DRAWING HAVE BEEN LOCATED BY FIELD SURVEY. ALL UNDERGROUND UTILITIES SHOWN ON THIS DRAWING ARE FROM RECORDS OF THE VARIOUS UTILITY COMPANIES AND THE SURVEYOR/ENGINEER DOES NOT ASSUME RESPONSIBILITY FOR THEIR COMPLETENESS, INDICATED LOCATION, OR SIZE. RECORD UTILITY LOCATION SHOULD BE CONFIRMED BY EXPOSING THE UTILITY.

GRADING QUANTITIES:

CUT = 2,540 C.Y. ±

EXPORT = 2,540 C.Y. ±

ICTION MATERIALS AND METHODS SHALL COMPLY WITH THE CATIONS AND STANDARD PLANS OF SAN MATEO COUNTY.

CILITIES INDICATED ARE FOR INFORMATION ONLY. IT IS TY TO VERIFY THE LOCATION AND DEPTH WITH THE THE OWNER NOR THE COUNTY OR THE ENGINEER THE UTILITIES AND UNDERGROUND FACILITIES INDICATED ERGROUND FACILITIES ENCOUNTERED.

E FOR MATCHING EXISTING STREETS, SURROUNDING MENTS WITH A SMOOTH TRANSITION IN PAVING, CURBS, ETC., AND TO AVOID ANY ABRUPT OR APPARENT SLOPES, LOW SPOTS OR HAZARDOUS CONDITIONS.

AN ENCROACHMENT PERMIT FROM THE SAN MATEO S PRIOR TO PERFORMING ANY WORK WITHIN COUNTY

ALL NECESSARY PERMITS FOR ALL WORK SHOWN ON THIS

ITILITIES SHOWN HEREON REFLECT AVAILABLE RECORD BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL IN USE, WHETHER OR NOT SHOWN HEREON. THE ERGROUND SERVICE ALERT AT 1-800-227-2600 48 ANY CONSTRUCTION.

Y OF THE CONTRACTOR TO COORDINATE ALL NECESSARY ED, WITH THE APPROPRIATE UTILITY COMPANIES.

AND PAY FOR ALL REQUIRED PERMITS AND LICENSES TO F SAN MATEO PRIOR TO THE START OF CONSTRUCTION.

SHED AND INSTALLED BY THE CONTRACTOR UNLESS

PONSIBLE FOR PROVIDING AMPLE COVER FOR THE UTILITIES DURING THE CONSTRUCTION OF THIS PROJECT.

O THE COUNTY SPECIFICATIONS AND IN ACCORDANCE WITH THE PROJECT SOIL ENGINEER.

SIBLE FOR ADEQUATE TEMPORARY DRAINAGE FACILITIES N AND PROTECT ALL GRADED AREAS FROM EROSION. THE AREAS OF EROSION PRIOR TO ACCEPTANCE OF GRADING.

COUNTY'S APPROVAL FOR ALL HAUL ROUTES TO AND

NO.	DESCRIPTION	BY	DATE

MACLEOD AND ASSOCIATES
CIVIL ENGINEERING - LAND SURVEYING
965 CENTER STREET · SAN CARLOS · CA 94070 · (650) 593-8580

PREPARED FOR:
CASEY CONSTRUCTION

PRELIMINARY GRADING AND DRAINAGE PLAN
30 CANYON LANE
UNINCORPORATED SAN MATEO COUNTY CALIFORNIA

DRAWN BY:	AAP
DESIGNED BY:	VPG
CHECKED BY:	DGM
SCALE:	1" = 10'
DATE:	03/27/12
DRAWING NO.	3502-GRAD
SHEET	1 OF 1

C-1

USCS SOIL CLASSIFICATION

PRIMARY DIVISIONS			SOIL TYPE	SECONDARY DIVISIONS
COARSE GRAINED SOILS (< 50 % Fines)	GRAVEL	CLEAN GRAVEL (< 5% Fines)	GW	Well graded gravel, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravel or gravel-sand mixtures, little or no fines.
		GRAVEL with FINES	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SAND	CLEAN SAND (< 5% Fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SAND WITH FINES	SM	Silty sands, sand-silt mixtures, non-plastic fines.
			SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS (> 50 % Fines)	SILT AND CLAY Liquid limit < 50%		ML	Inorganic silts and very fine sands, with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, lean clays.
			OL	Organic silts and organic clays of low plasticity.
	SILT AND CLAY Liquid limit > 50%		MH	Inorganic silt, micaceous or diatomaceous fine sandy or silty soil.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

RELATIVE DENSITY

SAND & GRAVEL	BLOWS/FOOT*
VERY LOOSE	0 to 4
LOOSE	4 to 10
MEDIUM DENSE	10 to 30
DENSE	30 to 50
VERY DENSE	OVER 50

CONSISTENCY

SILT & CLAY	STRENGTH^	BLOWS/FOOT*
VERY SOFT	0 to 0.25	0 to 2
SOFT	0.25 to 0.5	2 to 4
FIRM	0.5 to 1	4 to 8
STIFF	1 to 2	8 to 16
VERY STIFF	2 to 4	16 to 32
HARD	OVER 4	OVER 32

GRAIN SIZES

BOULDERS	COBBLES	GRAVEL		SAND			SILT & CLAY
		COURSE	FINE	COURSE	MEDIUM	FINE	
12 "	3"	0.75"		4	10	40	200
SIEVE OPENINGS				U.S. STANDARD SERIES SIEVE			

Classification is based on the Unified Soil Classification System; fines refer to soil passing a No. 200 sieve.

* Standard Penetration Test (SPT) resistance, using a 140 pound hammer falling 30 inches on a 2 inch O.D. split spoon sampler; blow counts not corrected for larger diameter samplers.

^ Unconfined Compressive strength in tons/sq. ft. as estimated by SPT resistance, field and laboratory tests, and/or visual observation.



KEY TO SAMPLERS

Modified California Sampler (3-inch O.D.)
Mid-size Sampler (2.5-inch O.D.)
Standard Penetration Test Sampler (2-inch O.D.)

KEY TO TEST DATA

SOIL CLASSIFICATION CHART & KEY TO TEST DATA

PLATE A1

DRAWN | JOB NUMBER | APPROVED | DATE | REVISED | DATE

KLEINFELDER
Bright People. Right Solutions.

Laboratory Test Report

Client:	Yang & Associates	Report No.:	19-HAY-00125 Rev. 0	Issued:	2/15/2019
Project:	00014648.002A			Field ID:	HL11945
	Yang & Associates 2017 Geotechnical Lab	Sampled by:	J.Yang	Date:	2/11/2019
	01-027L - HL11863 - Oakhurst Ave.	Submitted by:	J.Yang	Date:	2/11/2019

Expansion Index Test

Tested on **2/13/2019** by **M.Sacramento**

Material Description: **Olive Brown Sandy Lean Clay (CL)**

Sample Location: **BULK - HL11945**

Test Method:	**ASTM D4829**
Expansion Index :	**24**
Dry Density, pcf :	**115.2**
Water Content, as molded, %:	**8.5**
Final Water Content, %:	**18.6**
Initial Saturation, as molded %:	**49.8**

Classification of Potentially Expansive Soil

Expansion Index, EI	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
Above 130	Very High

Remarks:

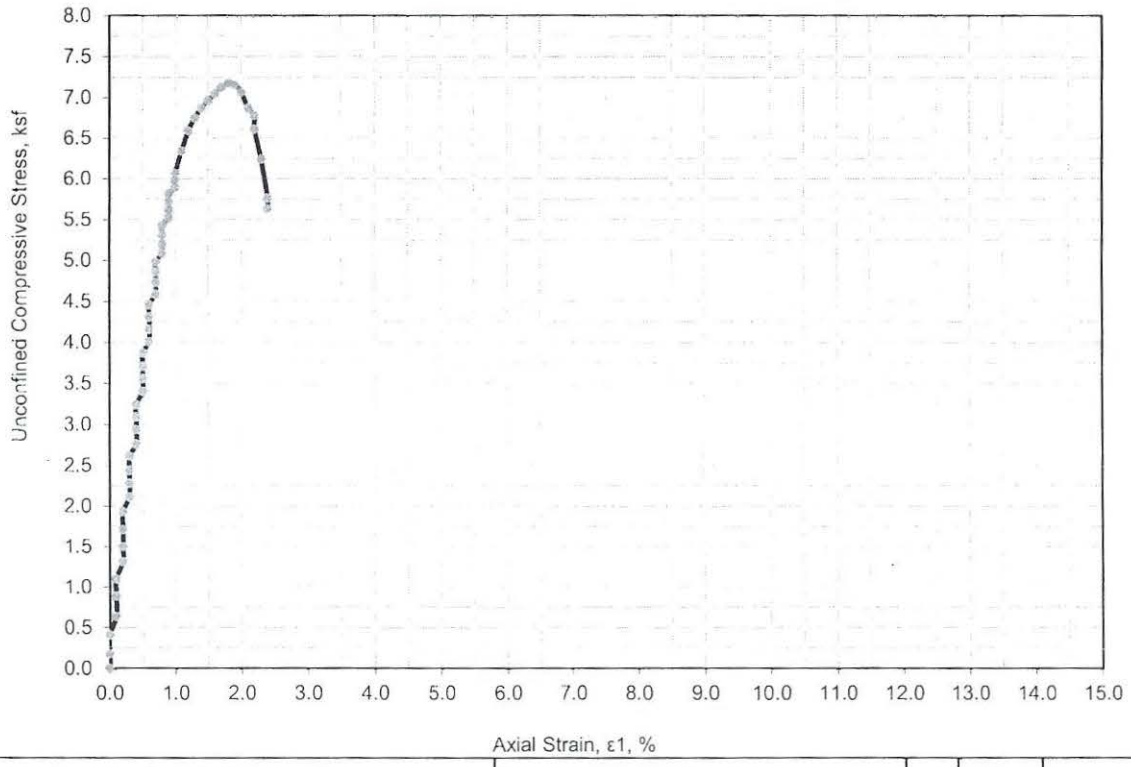
Potential Expansion: LOW

Reviewed on 2/15/2019 by Aaron Kidd,
Materials Manager I

PROJECT:	30 Canyon Ln Redwood City, CA						BORING NO.	EB - 1
BORING SUPERVISOR:	J. Yang	TYPE OF BORING: B24 5" solid Stem Auger					DATE OF BORING:	2-11-19
HAMMER WEIGHT:	140#/30" drop							
SURFACE ELEVATION:								
GROUNDWATER DEPTH								

DESCRIPTION OF MATERIALS	DEPTH IN FT.	SAMPLE	SAMPLE NUMBER-SAMPLE DIAMETER	DRIVING RESISTANCE BLOWS PER FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSIVE STRENGTH P.S.F.	OTHER TESTS
Clay (topsoil)								
Sandy clay, dark brown. (CL)	5	EB1	5 2"	37	111	17	7ksf	
Silty clay, brown (CL)	10	EB1	10 2"	23	115	17	4ksf	
Silty sand, small gravel, brown at 14' (CL)								
Refusal drilling at 15' **	15	EB1	15 2"	50/6"	--	--	--	
Bottom of hole								
**: Unable to recover sample due to broken soil.	20							
	25							
	30							

Job No. J19-1663	J. Yang and Engineers	PLATE 4



Specimen Failure Picture	Specimen No.			1
	Initial	Diameter, in	D_O	2.39
		Height, in	H_O	4.57
		Height to Diameter Ratio		1.91
		Water Content, %	ω_O	17.2
		Dry Density, lbs/ft^3	γ_{d_o}	110.9
		Saturation, %	S_O	89.5
		Void Ratio	e_O	0.520
	Time to Failure, min.		t_f	1.8
	Unconfined Compressive Strength, ksf		q_u	7.18
	Shear Strength, ksf		s_u	3.59
	Strain at Failure, %		ε_f	1.8
	Average Rate of Strain to Failure, %/min		$\dot{\varepsilon}$	1.0

Description of Specimen: Dark Olive Brown Sandy Lean Clay (CL)

Amount of Material Finer than the No. 200, %: nm

LL:	PL:	PI:	G_S:	Specimen Type:	Test Method:
nm	nm	nm	2.70 Assumed	Intact	ASTM D2166

Boring:	HL11945
Sample:	EB-1
Depth, ft:	5.0
Test Date:	2/12/19

Remarks: nm= not measured, na = not applicable

Height to Diameter ratio did not meet the specifications. H/D = 2 - 2.5

KLEINFELDER
Bright People. Right Solutions.
2601 Barrington Court, Hayward, California 94545

Project Number:	0014648.002A
Date:	2/15/2019
Entry By:	MS
Checked By:	MS
File Name:	HL11945

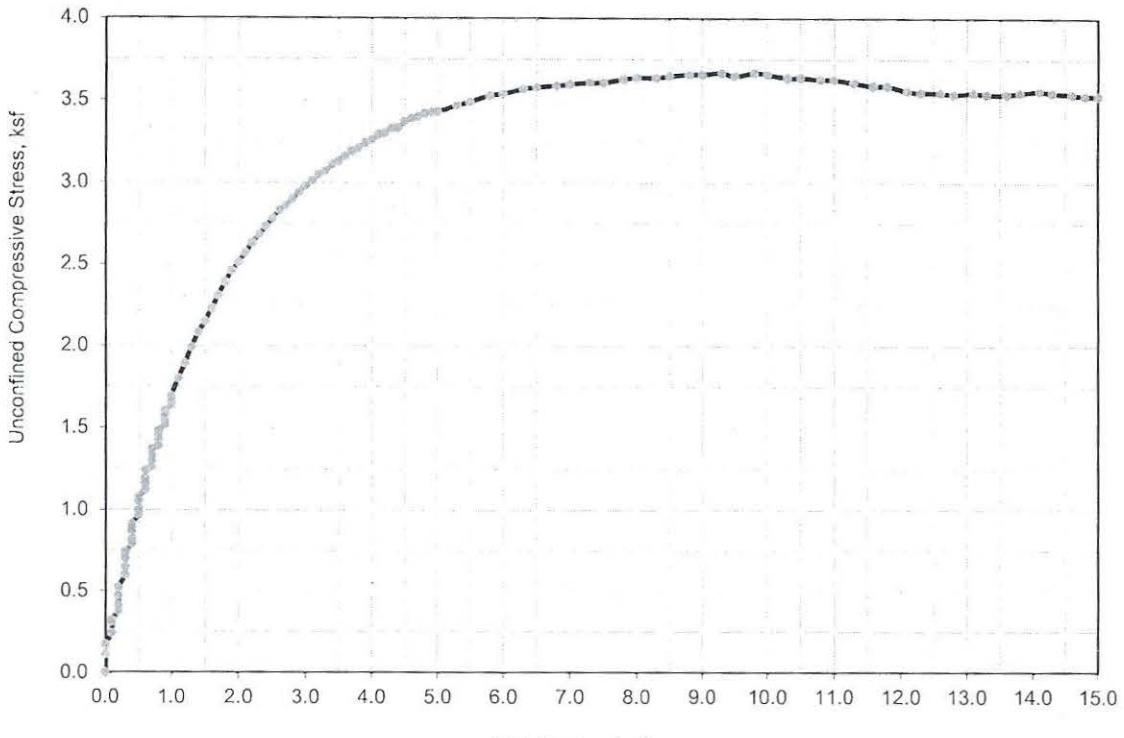
UNCONFINED COMPRESSION TEST (UC)

YANG AND ENGINEERS

30 Canyon Lane

Figure 1 of 1

1



Specimen Failure Picture



Specimen No.			1
Initial	Diameter, in	D_O	2.39
	Height, in	H_O	5.18
	Height to Diameter Ratio		2.17
	Water Content, %	ω_O	16.7
	Dry Density, lbs/ft^3	γ_{d_o}	115.4
	Saturation, %	S_O	98.7
	Void Ratio	e_O	0.459
Time to Failure, min.		t_f	9.8
Unconfined Compressive Strength, ksf		q_u	3.67
Shear Strength, ksf		s_u	1.84
Strain at Failure, %		ε_f	9.8
Average Rate of Strain to Failure, %/min		$\dot{\varepsilon}$	1.0

Description of Specimen: Olive Sandy Lean Clay with Gravel (CL)

Amount of Material Finer than the No. 200, %: nm

LL:	PL:	PI:	G_S:	Specimen Type:	Test Method:
nm	nm	nm	2.70 Assumed	Intact	ASTM D2166

Boring:	HL11945
Sample:	EB-1
Depth, ft:	10.0
Test Date:	2/12/19

Remarks: nm= not measured, na = not applicable

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Project Number:	0014648.002A
Date:	2/15/2019
Entry By:	MS
Checked By:	MS
File Name:	HL11945

UNCONFINED COMPRESSION TEST (UC)

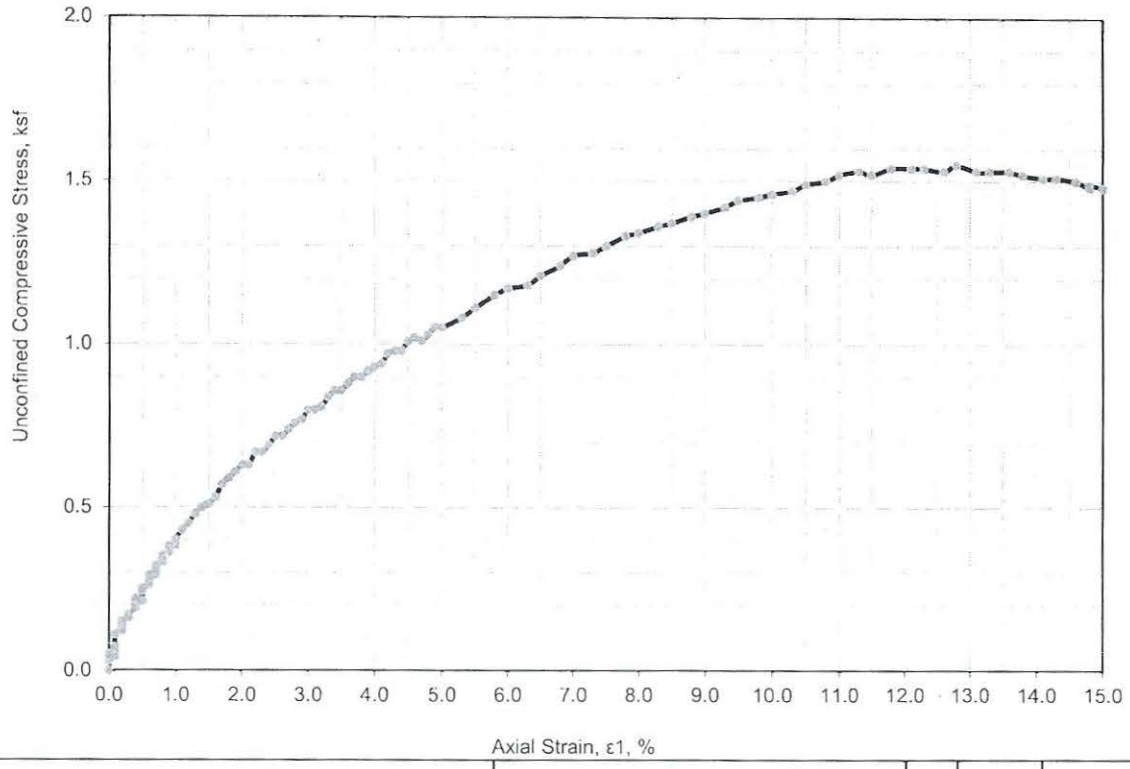
YANG AND ENGINEERS

30 Canyon Lane

Figure 2 of 1

PROJECT: 30 Canyon Ln Redwood City, CA								**BORING NO.** EB – 2	
BORING SUPERVISOR: J. Yang			TYPE OF BORING: B24 5" solid Stem Auger					DATE OF BORING: 2-11-19	
HAMMER WEIGHT: 140#/30" drop									
SURFACE ELEVATION:									
GROUNDWATER DEPTH									
DESCRIPTION OF MATERIALS	DEPTH IN FT.	SAMPLE	SAMPLE NUMBER-SAMPLE DIAMETER	DRIVING RESISTANCE BLOWS PER FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSIVE STRENGTH P.S.F.	OTHER TESTS	
Clay (topsoil)									
Sandy lean clay, dark brown. (CL)									
**	5	EB2	5 2"	35	--	--	--		
Sandy clay, brown. (CL)									
	10	EB2	10 2"	37	102	25	2ksf		
Silty sand with small gravel. brown.									
**	15	EB2	15 2"	50	--	--	--		
Refusal drilling at 15									
Bottom of hole									
**: Unable to recover sample due to broken soil.	20								
	25								
	30								

Job No. J19-1663	J. Yang and Engineers	PLATE 4



Specimen Failure Picture



Specimen No.			1
Initial	Diameter, in	D_O	2.41
	Height, in	H_O	5.23
	Height to Diameter Ratio		2.17
	Water Content, %	ω_O	25.4
	Dry Density, lbs/ft^3	γ_{d_o}	100.2
	Saturation, %	S_O	101.8
	Void Ratio	e_O	0.681
Time to Failure, min.		t_f	12.8
Unconfined Compressive Strength, ksf		q_u	1.55
Shear Strength, ksf		s_u	0.77
Strain at Failure, %		ε_f	12.8
Average Rate of Strain to Failure, %/min		$\dot{\varepsilon}$	1.0

Description of Specimen: Olive Brown Lean Clay with Sand (CL)

Amount of Material Finer than the No. 200, %: nm

LL:	PL:	PI:	G_S:	Specimen Type:	Test Method:
nm	nm	nm	2.70 Assumed	Intact	ASTM D2166

Boring:	HL11945
Sample:	EB-2
Depth, ft:	10.0
Test Date:	2/12/19

Remarks: nm= not measured, na = not applicable

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Project Number:	0014648.002A
Date:	2/15/2019
Entry By:	MS
Checked By:	MS
File Name:	HL11945

UNCONFINED COMPRESSION TEST (UC)

YANG AND ENGINEERS

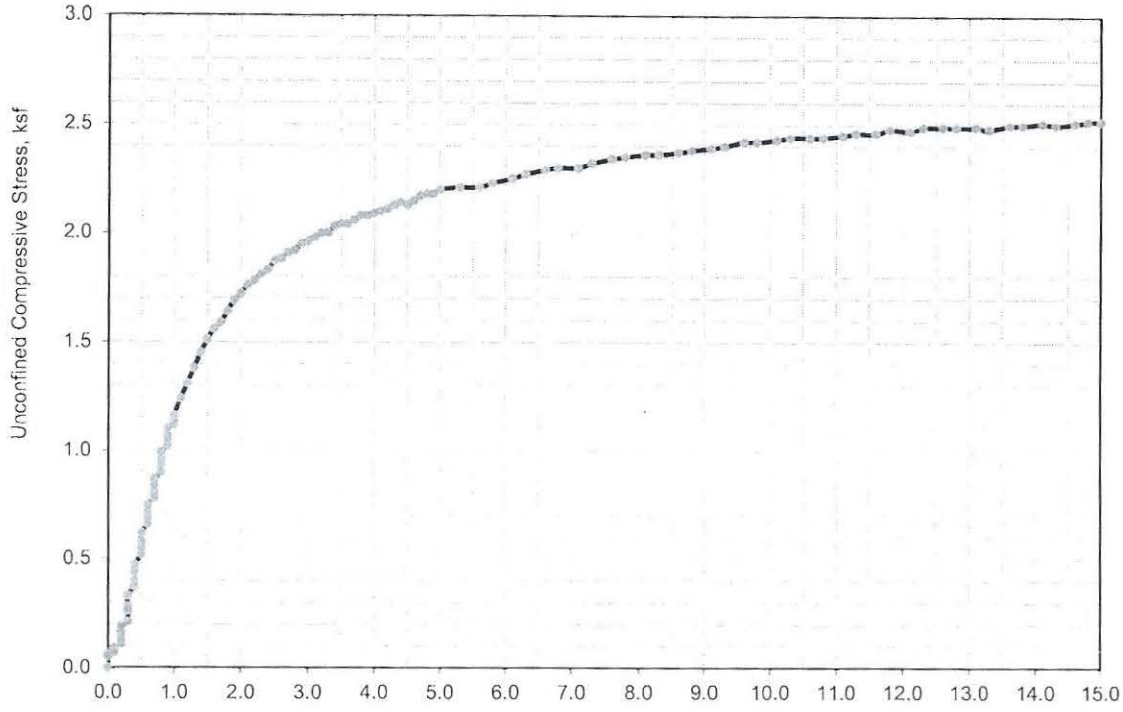
30 Canyon Lane

Figure 3

PROJECT: 30 Canyon Ln Redwood City, CA							BORING NO. EB - 3
BORING SUPERVISOR: J. Yang	TYPE OF BORING: B24 5" solid Stem Auger						DATE OF BORING: 2-11-19
HAMMER WEIGHT: 140#/30" drop							
SURFACE ELEVATION:							
GROUNDWATER DEPTH							

DESCRIPTION OF MATERIALS	DEPTH IN FT.	SAMPLE	SAMPLE NUMBER-SAMPLE DIAMETER	DRIVING RESISTANCE BLOWS PER FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSIVE STRENGTH P.S.F.	OTHER TESTS
Sandy clay (topsoil)								
Clay with sand, dark brown. (CL)								
Sandy clay, dark brown.	5	EB3 5	2"	40	105	21	3ksf	
Refusal drilling, rock. **		EB3 10	1.5	50	--	--	--	SPT
Bottom of hole	10							
**: Unable to recover sample due to rock.	15							
	20							
	25							
	30							

Job No. J19-1663	J. Yang and Engineers	PLATE 4



Specimen Failure Picture	Specimen No.		1
	Initial: Diameter, in	D_o	2.42
	Initial: Height, in	H_o	5.36
	Initial: Height to Diameter Ratio		2.21
	Initial: Water Content, %	ω_o	21.0
	Initial: Dry Density, lbs/ft^3	γd_o	105.6
	Initial: Saturation, %	S_o	95.6
	Initial: Void Ratio	e_o	0.596
	Time to Failure, min.	t_f	14.8
	Unconfined Compressive Strength, ksf	q_u	2.52
	Shear Strength, ksf	s_u	1.26
	Strain at Failure, %	ε_f	14.8
	Average Rate of Strain to Failure, %/min	$\dot{\varepsilon}$	1.0

Description of Specimen: Brownish Black Lean Clay with Sand (CL)

Amount of Material Finer than the No. 200, %: nm

LL:	PL:	PI:	G_S:	Specimen Type:	Test Method:
nm	nm	nm	2.70 Assumed	Intact	ASTM D2166

Boring:	HL11945
Sample:	EB-3
Depth, ft:	5.0
Test Date:	2/12/19

Remarks: nm= not measured, na = not applicable

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Project Number:	0014648.002A
Date:	2/15/2019
Entry By:	MS
Checked By:	MS
File Name:	HL11945

UNCONFINED COMPRESSION TEST (UC)

YANG AND ENGINEERS

30 Canyon Lane

Figure 4

STEVEN F. CONNELLY, C.E.G.
Consulting in Engineering Geology

May 26, 2017
Project #1704

REVISION # 1

Casey Construction Inc.
619 Sylvan Way
Emerald Hills, CA 94062
Attention: Mr. Mel Casey

RECEIVED
JUN 07 2017
San Mateo County
Planning and Building Department

Subject: **ENGINEERING GEOLOGIC INVESTIGATION**
Proposed Road and Water Main
Canyon Lane
San Mateo County, California

Dear Mr. Casey,

At your request, I have prepared this Engineering Geologic Investigation for the proposed road and water main to be constructed on your property located on Canyon Lane in San Mateo County, California (see Figure 1, Site Location Map). I understand that you intend to construct a new road and water main to service several proposed new home sites on the property, as shown on plans by MacLeod and Associates (see Figure 4, Site Geologic Map and Figure 5, Water Line Geologic Map).

The property (see Photo 1 below) is located within hillside terrain susceptible to potential landsliding. According to a review letter, dated 3/8/17, prepared by the San Mateo County Reviewing Geologists, Cotton Shires and Associates, Inc., potential geologic hazards should be addressed by an Engineering Geologist. This Engineering Geologic Investigation consequently is intended to satisfy County requirements, to document potential landslide conditions, and to provide appropriate recommendations for construction of the proposed road and water line.

As part of this Engineering Geologic Investigation, I have reviewed published geologic maps; reviewed a previous Geotechnical Investigation report; consulted with Mr. Ted Sayre of Cotton Shires and Associates, Inc., the reviewing geologists for San Mateo County; consulted with you; completed site reconnaissance and mapping; reviewed historical aerial photographs; logged three test pits excavated along the proposed water line alignment; completed Engineering Geologic analysis, and completed drafting and report preparation to complete this Engineering Geologic Investigation letter report.

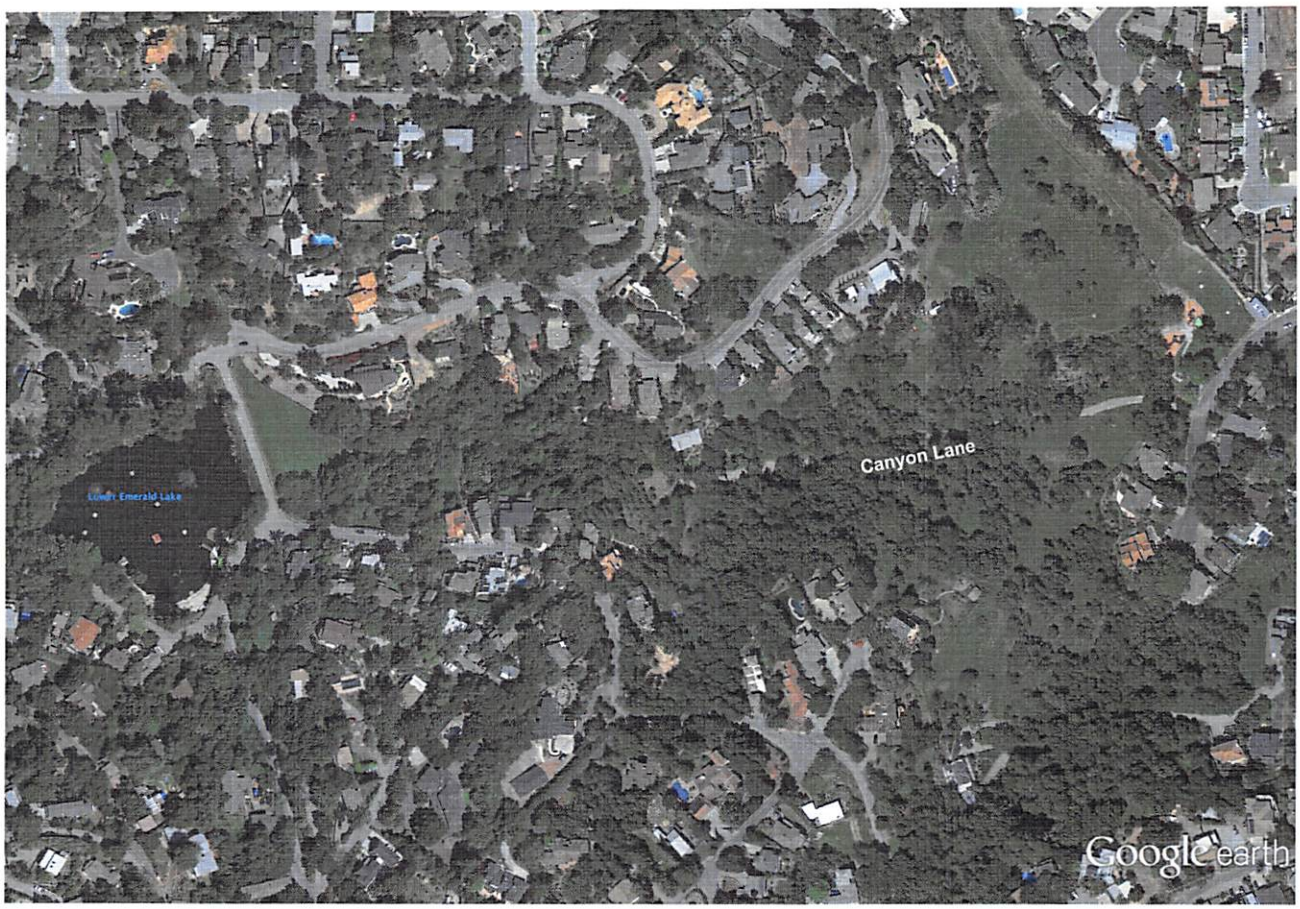


Photo 1: 2016 GoogleEarth image of Lower Emerald Lake and Canyon Lane, located downslope and to the east of Lower Emerald Lake Dam.

Site Conditions

Canyon Lane is a private roughly-paved road located along the northeast flank of the northwest-trending Santa Cruz Mountain Range, as shown on Figure 1, Site Location Map. The road is situated downslope and to the east of the Lower Emerald Lake Dam, as shown on Photo 1 above. Lower Emerald Lake Dam was constructed from artificial fill, as approximately shown on Figure 4, Site Geologic Map.

The existing Canyon Lane roadway is located parallel to an ephemeral drainage, situated along the northern side of the roadway. The roadway extends from Glenwood Drive and climbs gently uphill towards the west (see Photo 2 below). Portions of Canyon Lane appear to have been constructed by cut and fill methods with minor amounts of fill underlying the outer edge of the roadway.



Photo 2: View towards the east of the existing Canyon Lane near Glenwood Drive.

Proposed Development

Improvement of Canyon Lane is proposed to service several proposed homesites, identified by the proposed garage slabs, shown on Figure 4, Site Geologic Map. The upslope southern edge of the roadway will be widened with vertical cut slopes supported by proposed retaining walls. Three proposed home sites on the northern side of Canyon Lane will be accessed by proposed bridges crossing the ephemeral drainage.

A water line is proposed extending from an existing water main underneath Vista Drive, down a north-trending drainage swale to Canyon Lane and the proposed new homesites. An ephemeral drainage channel is located along the eastern side of the proposed water line alignment (see Figure 4). A drainage culvert beneath Vista Drive outlets into the head of the drainage channel.

Geology

According to the Brabb and others (1998), the Canyon Lane area is underlain by graywacke sandstone and sheared rock of the Franciscan Complex, as shown on Figure 2, Regional Geologic Map. Bedrock of the Whiskey Hill Formation, composed of coarse-grained sandstone and silty claystone, is mapped in the area of the proposed water line alignment. These rock units are separated by old inactive fault traces. The California Division of Mines and Geology (1974) does not map active faults in the site vicinity.

Stream channel deposits are mapped by Brabb and others (1998) within the drainage channel adjacent to Canyon Lane. Older alluvial fan deposits are identified in the low lying terrain at the eastern end of Canyon Lane.

The geologic information from Brabb and others (1998) is plotted on a San Mateo County Contour Map showing parcel boundaries on Figure 4, Site Geologic Map. Data from Brabb and others is also shown on Figure 5, Water Line Geologic Map. Geologic contacts and fault locations, however, should only be considered approximate.

Regional landslide mapping by Brabb and Pampeyan (1972) does not identify any landsliding in the site vicinity. The County of San Mateo (1976) also does not map landslides in the site vicinity (see Figure 3, County Geologic Hazards Map). The County of San Mateo (1976) maps Canyon Lane and the proposed homesites within a potential dam failure inundation zone, associated with Lower Emerald Lake Dam, as shown on Figure 3, County Geologic Hazards Map.

Air Photo Review

The following pairs of black & white and color aerial photographs were examined to observe site conditions and to aid in identifying potential landslide hazards.

Date	Photo Identification	Type	Scale
1930	C1025-63 & 64	B&W	1:14,400
9-26-48	GS-HR 2-43&44	B&W	1:23,600
6-9-56	DDB-3R-45 & 46	B&W	1:20,000
5-11-65	SM 2-60 & 61	B&W	1:12,000
6-7-73	3567-4-77&78	B&W	1:12,000
6-25-74	AREA 9 9-11 & 12	Color	1:20,000
2-21-81	GS-VEZR 3-283 & 284	B&W	1:24,000



Photo 3: 1965 air photo showing Lower Emerald Lake and Canyon Lane.

The subject property is visible in the air photos reviewed, however, the ground surface is generally obscured by thick tree cover, as shown on Photo 3 above. Canyon Lane and Lower Emerald Lake Dam were constructed sometime before the 1930 photo date. A quarry excavation is evident near the eastern end of Canyon Lane in the 1956 air photos. Evidence of active landsliding or faulting is not apparent in the air photos reviewed on or adjacent to Canyon Lane or the proposed water line alignment.

Geotechnical Investigation

J. Yang and Engineers (2017) completed a Geotechnical Site Investigation for the proposed roadway improvement. Six test borings were excavated to depths between 6 and 11 feet along Canyon Lane as part of the investigation. According to the boring logs, resistant materials were encountered at relatively shallow depths in all of the test borings. J. Yang found the proposed roadway improvement plan to be suitable from a geotechnical aspect.



Photo 4: View towards the north of resistant rock outcrop of Franciscan sandstone located near the eastern end of Canyon Lane.

Site Reconnaissance & Mapping

Four site reconnaissances were performed during May of 2017 as part of this Engineering Geologic Investigation. Evidence of an abandoned quarry is located along the south side of Canyon Lane near its junction with Glenwood Drive, as approximately shown on Figure 4, Site Geologic Map. A large rock outcrop of Franciscan sandstone is located on a ridge on the opposite side of Canyon Lane, as shown on Photo 4 below. Two additional sandstone rock outcrops are located to the west, as approximately shown on Figure 4.

Water was flowing in the ephemeral drainage adjacent to Canyon Lane at the time of the site visits. Water was also flowing down the recently constructed Vista Drive drainage culvert and the ephemeral drainage channel on the southern side of Canyon Lane. Minor amounts of fill appear to be located along the downslope edge of Canyon Lane. Existing slopes along the upslope side of Canyon Lane appear to be relatively stable.



Photo 5: View of asphalt cracking in Vista Drive suggestive of landslide activity.

Cracking suggestive of recent and ongoing landslide activity (see Photo 5 above) is apparent in Vista Drive, as approximately shown on Figure 4, Site Geologic Map and Figure 5, Water Line Geologic Map. Cracks have been patched and subsequently reopened. Hummocky, disturbed ground indicative of active landsliding is located below the cracking in Vista Drive (see Figures 4 & 5).

Subsurface Investigation

Three test pits were excavated as part of this investigation, in the approximate locations shown on Figure 4, Site Geologic Map and Figure 5, Water Line Geologic Map, to assess soil, bedrock, and landslide conditions along the proposed water line alignment (see Photo 6 below). A side wall of the test pits was cleaned, carefully examined, and logged, as presented on Figures 6 through 8, Logs of Test Pits 1 through 3. Please refer to the pit logs for detailed descriptions.



Photo 6: View of backhoe excavating Test Pit 1.

Test Pit 1 encountered about 2.5 feet of colluvial soil composed of very dark grayish brown, silty clay. The colluvial soil is underlain by 2.5 feet of light olive brown, firm to stiff, very moist, highly plastic, silty clay. A slightly undulating landslide surface, trending N62W and plunging 9 degrees N, occurs at a depth of about 5 feet, as shown on Photo 7 below. The upper 5 feet of soil comprise an active landslide deposit (see Photo 8 below).

The soils in the active landslide deposit are dark-colored organic materials that appear to have been previous colluvial deposits. The active landslide debris is underlain by highly weathered bedrock of the Whiskey Hill Formation composed of moist to wet, dense to hard, clayey silt with siltstone rock fragments. Moderately hard to hard siltstone of the Whiskey Hill Formation was encountered at a depth of about 8 feet.



Photo 7:

View of Test Pit 1. Pencil marks thin gray, undulating active landslide surface. Highly weathered bedrock occurs below.



Photo 8:

View of Test Pit 1 with brown-colored active landslide deposit overlying gray-colored highly weathered bedrock.

Test Pit 2 encountered about 2.5 feet of colluvial soil composed of firm to stiff, highly plastic, silty clay. The colluvial soil is underlain by about 2 feet of residual soil composed of firm to stiff, moderately plastic, silty clay. About 3.5 feet of highly weathered bedrock of the Whiskey Hill Formation was encountered below the surface soils. Hard clayey siltstone of the Whiskey Hill Formation was encountered at a depth of 8 feet. Test Pit 3 encountered similar materials as Test Pit 2.

Discussion

Based upon the results of this Engineering Geologic Investigation, an active landslide deposit (probably moving within the last 50 years) is located just below Vista Drive. The landslide impacts the proposed water line alignment, as approximately shown on Figures 4 and 5. Information from Test Pit 1 and topographic data suggest that the active landslide

deposit is about 8 feet deep, as approximately depicted on Figure 9, Geologic Cross-Section A-A'. Relatively resistant weathered bedrock of the Whiskey Hill Formation occurs below the landslide deposit. Cracking to the outer half of Vista Drive indicates that the landslide has impacted the roadway and may affect the underlying water line to be tapped for the proposed water line to service the proposed Canyon Lane development.

Findings and Recommendations

I did not observe evidence of landslide or fault activity that would impact the proposed road widening, proposed retaining walls, or proposed bridges for the proposed Canyon Lane development. The roadway and proposed home sites appear to be underlain by alluvial deposits and resistant weathered bedrock of the Franciscan Complex at relatively shallow depth.

A relatively shallow active landslide deposit is located at the head of the proposed water line alignment to service the proposed Canyon Lane Development. Three possible alternatives to mitigate the landslide problem would be to 1) move the proposed water line, 2) remove and replace the active landslide deposit as engineered fill, or 3) support the outer edge of Vista Drive with a stitch pier wall and locate the proposed water line at depth within the resistant bedrock underlying the landslide.

If alternatives 2 or 3 are pursued, further investigation and collaboration with the project Geotechnical Engineer will be required to develop findings and recommendations for the proposed mitigations. I would be glad to assist in any required geologic investigations for landslide mitigations or for site specific studies for proposed home sites.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

LIMITATIONS

This Engineering Geologic Investigation letter report has been prepared for the exclusive use of the addressee, and project architects and engineers. The opinions, comments, and conclusions presented in this report were based upon information derived from office studies, site mapping, and limited subsurface investigation. My work has been conducted in general conformance with the standard of care in the field of engineering geology currently in practice in the San Francisco Bay Area. I make no other warranty either expressed or implied.

Proposed Road and Water Line
Canyon Lane
San Mateo County, California

May 26, 2017
Project #1704

Thank you for the opportunity to prepare this Engineering Geologic Investigation letter report. Please call if you have any questions.

Sincerely,

Steven F. Connelly
Certified Engineering Geologist 1607

Copies: 7 - Addressee

Attachments

Figure 1: Site Location Map
Figure 2: Regional Geologic Map
Figure 3: County Geologic Hazards Map
Figure 4: Site Geologic Map
Figure 5: Water Line Geologic Map
Figure 6: Log of Test Pit 1
Figure 7: Log of Test Pit 2
Figure 8: Log of Test Pit 3
Figure 9: Geologic Cross-Section A-A'

References

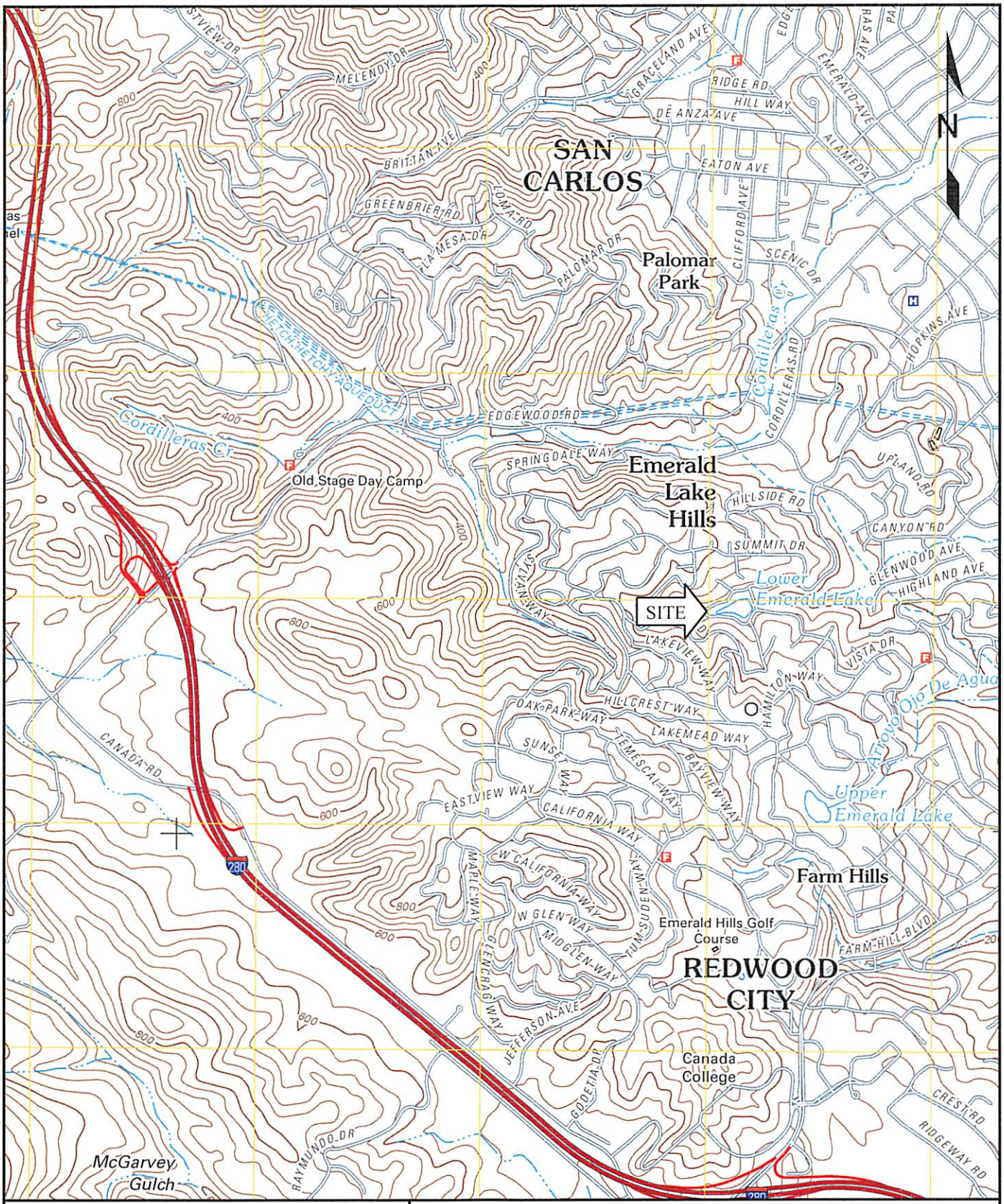
Brabb, E.E., Graymer, R.W., and Jones, D.L., 1998, Geology of the Palo Alto 30 X 60 Minute Quadrangle, California: A digital database, Open-File Report 98-348, Map Scale 1:100,000.

Brabb, Earl E. and Pampeyan, Earl H., 1972, Preliminary Map of Landslide Deposits in San Mateo County, California, U.S. Geological Survey Map MF-344, Map Scale 1:62.500.

County of San Mateo, 1976, Geotechnical Hazard Synthesis Map, prepared by Leighton and Associates, the San Mateo County Planning Department, and the U.S. Geological Survey, Map Scale 1:24,000.

County of San Mateo, 3/8/17, Geotechnical Review Sheet, prepared by Cotton Shires and Associates.

J. Yang and Engineers, December 28, 2014, Geotechnical Site Investigation, Proposed Roadway Improvement at 0 Canyon Lane, Redwood City, California.



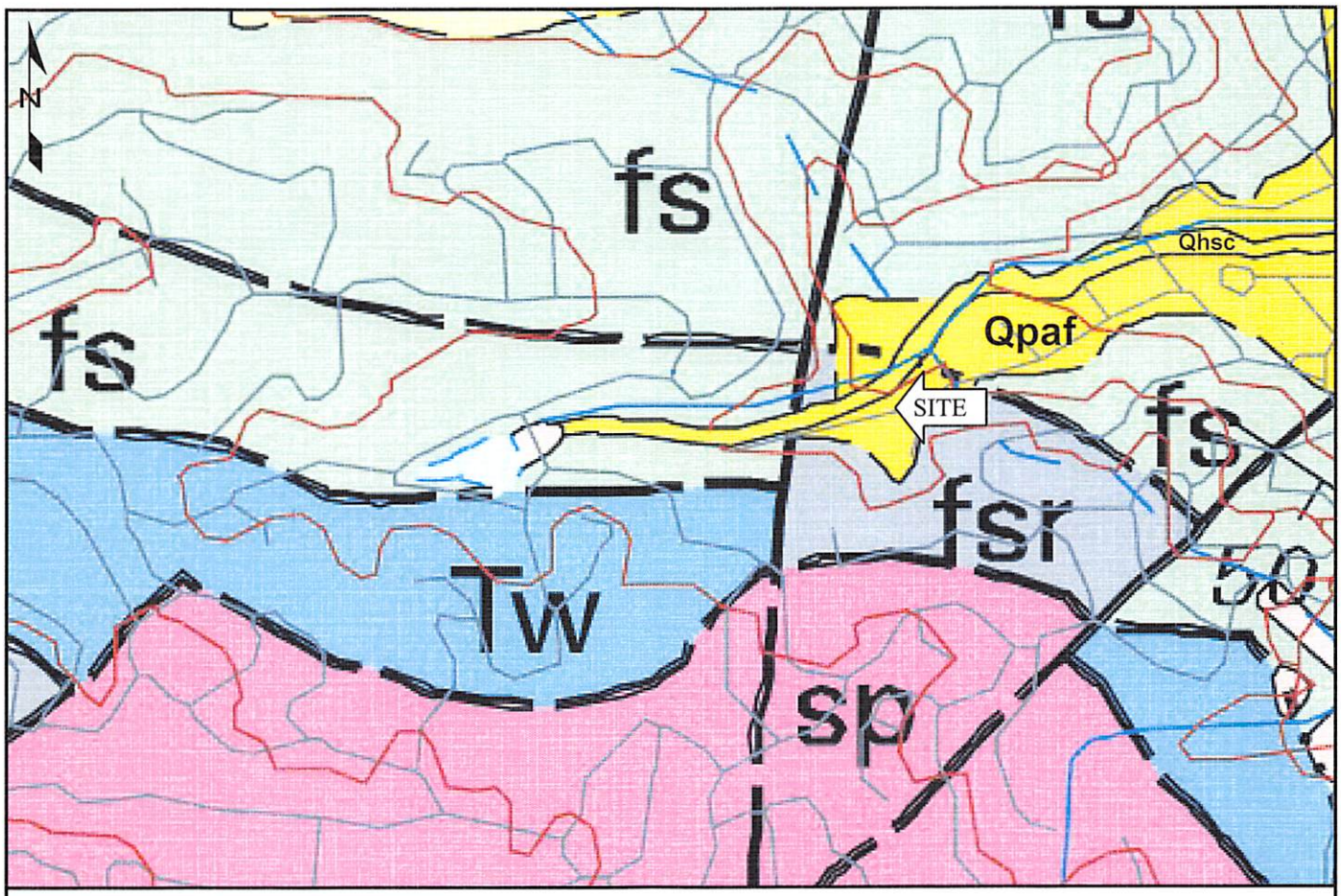
Regional Topographic Map

STEVEN F. CONNELLY, C.E.G.

Consulting in Engineering Geology

Proposed Road and Water Line
Canyon Lane
San Mateo County, California

Project #	Scale	Date	Figure
1704	1 Inch = 2000 Feet	5/26/17	1



EXPLANATION

- Geologic Contact, dashed where approximate, dotted where concealed
- Fault Trace, dashed where approximate, dotted where concealed, queried where uncertain
- Thrust or Reverse Fault
- 35 Strike and Dip of Bedding
- 35 Strike and Dip of Foliation

- Qhsc — Stream channel deposits
- Qpaf — Alluvial fan deposits
- Tw — Whiskey Hill Formation
- fsr — Sheared rock
- fs — Sandstone
- sp — Serpentinite

Source: Brabb, Graymer, and Jones, 1998

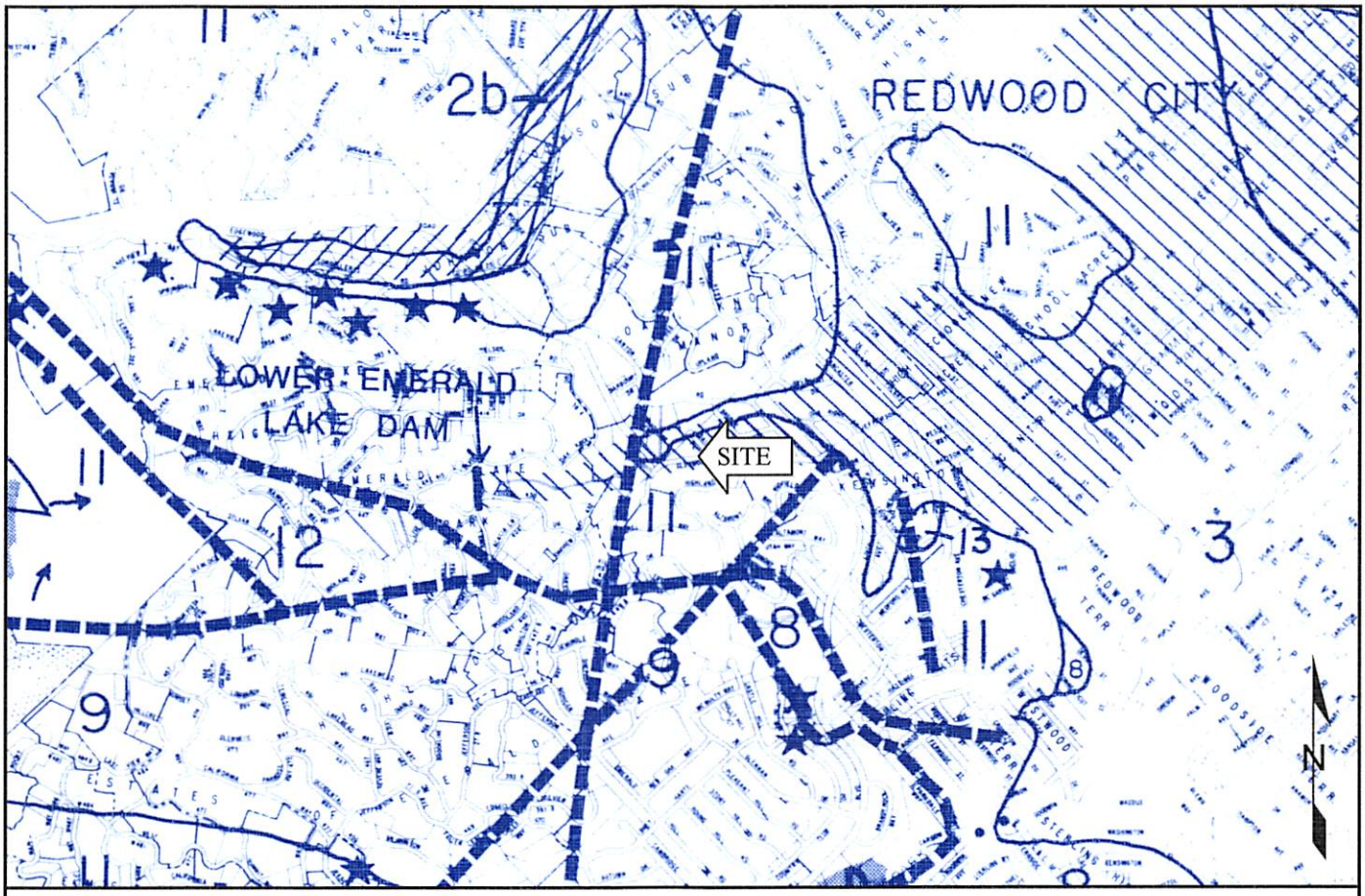
Regional Geologic Map

STEVEN F. CONNELLY, C.E.G.

Consulting in Engineering Geology

Proposed Road and Water Line
Canyon Lane
San Mateo County, California

Project #	Scale	Date	Figure
1704	1 Inch = 2000 Feet	5/26/17	2



EXPLANATION

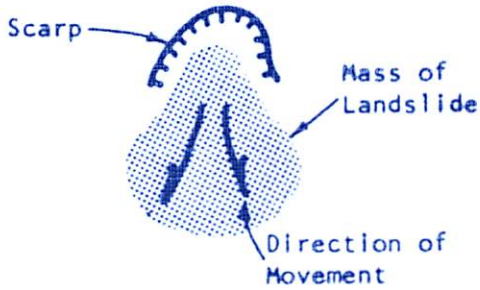
Geologic Contact, dashed where approx., dotted where concealed

Fault Trace, dashed where approximate, dotted where concealed, queried where uncertain

Thrust or Reverse Fault

35 Strike and Dip of Bedding

35 Strike and Dip of Foliation



D = Definite landslide
A = Active
F = Mapped in the field
P = Probable landslide deposit

Small landslide (50-500 ft. max. dimension mapped by photointerpretation)

Small landslide (50-500 ft.) mapped in the field

? Suspected or conjectured landslide.

Dam Failure Inundation Area

Source: County of San Mateo, 1976

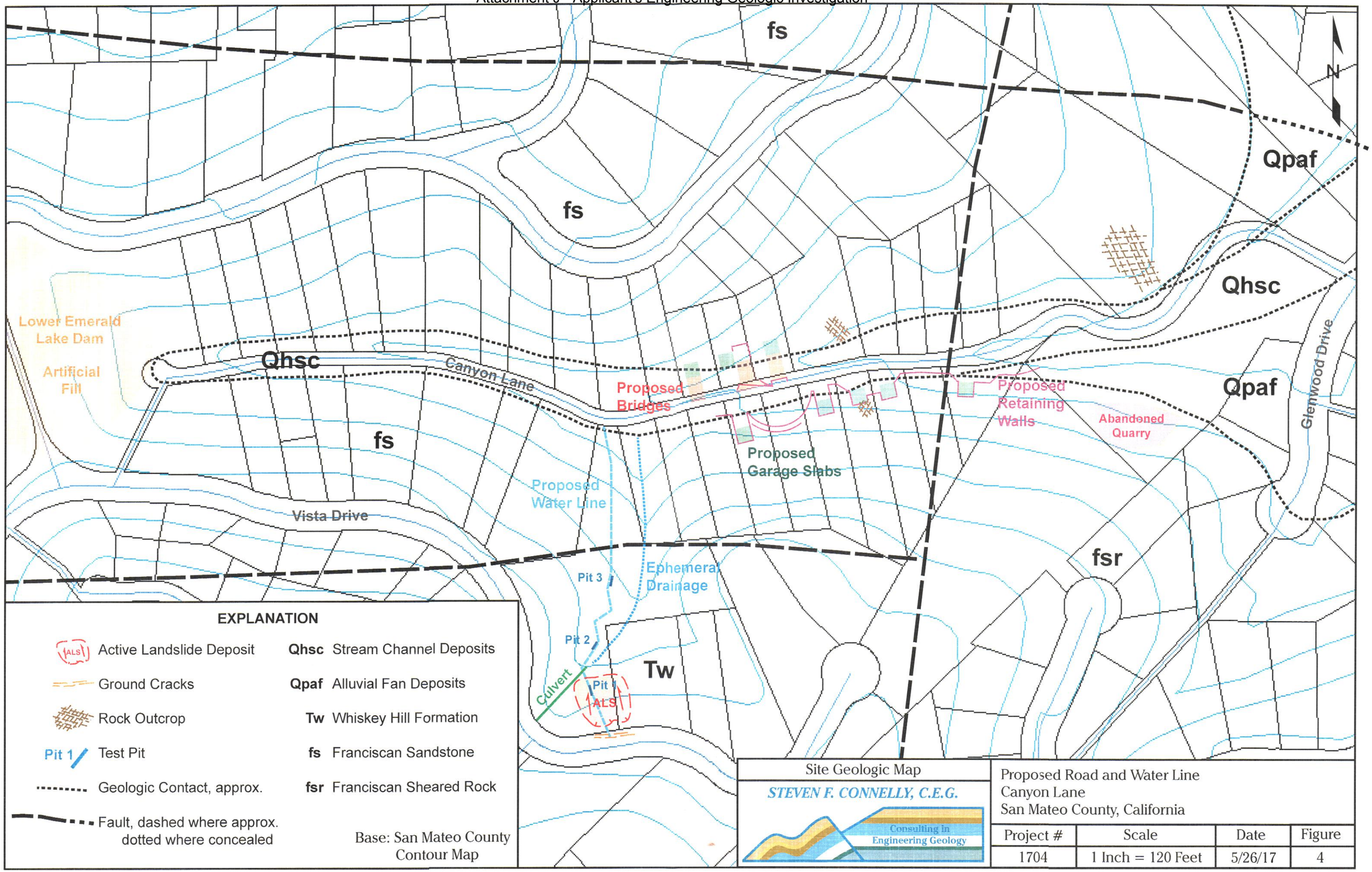
County Geologic Hazards Map

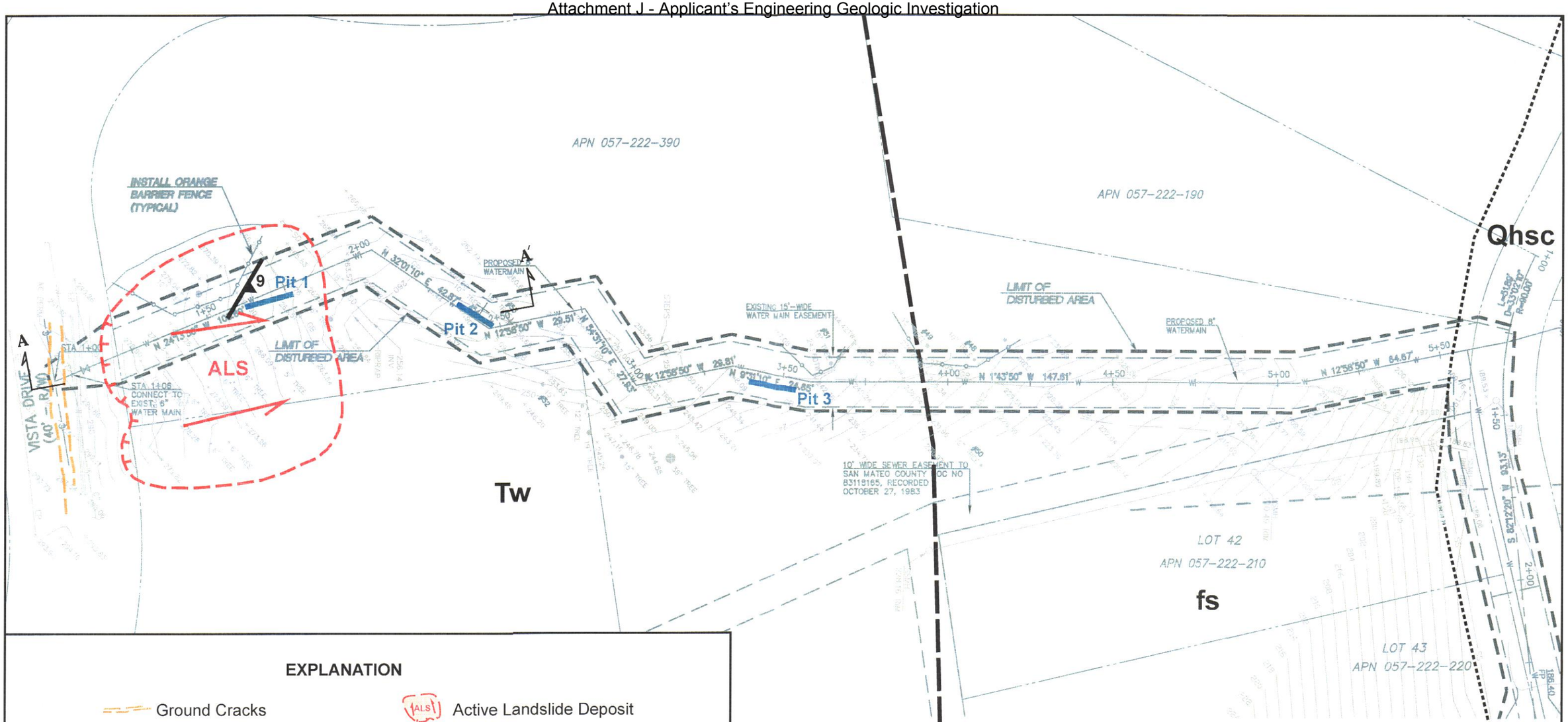
STEVEN F. CONNELLY, C.E.G.

Consulting in Engineering Geology

Proposed Road and Water Line
Canyon Lane
San Mateo County, California

Project #	Scale	Date	Figure
1704	1 Inch = 2000 Feet	5/26/17	3


fs
fs
fs
fs
fsr
Qpaf
Qhsc
Qhsc
Qpaf
Tw
N
Lower Emerald Lake Dam
Artificial Fill
Canyon Lane
Vista Drive
Proposed Bridges
Proposed Retaining Walls
Abandoned Quarry
Proposed Garage Slabs
Proposed Water Line
Glenwood Drive
Ephemeral Drainage
Pit 3
Pit 2
Pit 1
ALS
Culvert
EXPLANATION
Active Landslide Deposit
Ground Cracks
Rock Outcrop
Pit 1 Test Pit
Geologic Contact, approx.
Fault, dashed where approx. dotted where concealed
Qhsc Stream Channel Deposits
Qpaf Alluvial Fan Deposits
Tw Whiskey Hill Formation
fs Franciscan Sandstone
fsr Franciscan Sheared Rock
Base: San Mateo County Contour Map
Site Geologic Map
STEVEN F. CONNELLY, C.E.G.
Consulting in Engineering Geology
Proposed Road and Water Line
Canyon Lane
San Mateo County, California
Project # 1704
Scale 1 Inch = 120 Feet
Date 5/26/17
Figure 4



EXPLANATION

- Ground Cracks
- 9 — Trend and Plunge of Shear
- Pit 1 — Test Pit
- Geologic Contact, approx.
- Fault, dashed where approx. dotted where concealed
- A — A' Geologic Cross-Section
- ALS — Active Landslide Deposit
- **Qhsc** Stream Channel Deposits
- **Qpaf** Alluvial Fan Deposits
- **Tw** Whiskey Hill Formation
- **fs** Franciscan Sandstone
- **fsr** Franciscan Sheared Rock

Base: Water Main Extension Plan, MacLeod and Associates, dated 1/12/17

Water Line Geologic Map

STEVEN F. CONNELLY, C.E.G.

Consulting in Engineering Geology

Proposed Road and Water Line
Canyon Lane
San Mateo County, California

Project #	Scale	Date	Figure
1704	1 Inch = 30 Feet	5/26/17	5

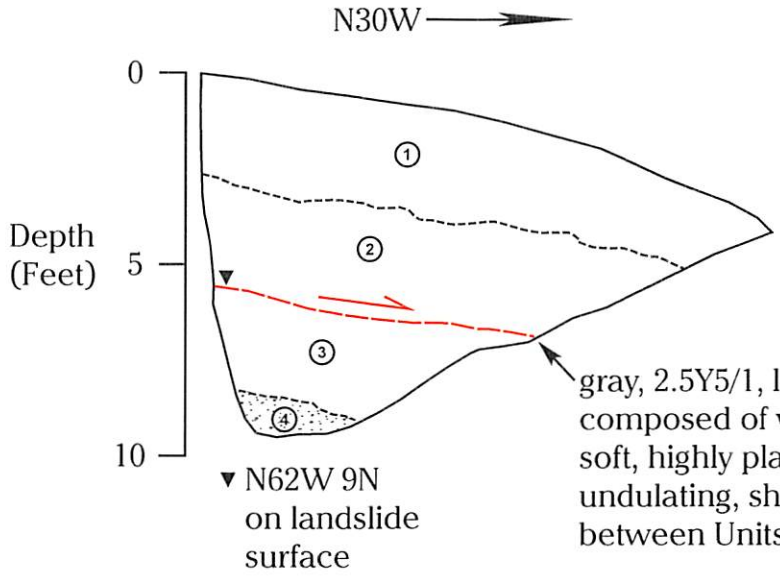
Symbols

gradational contact

relatively sharp contact

very sharp contact

N35W 9SW ▼ strike and dip of bedding or trend and plunge of shear surface



① very dark grayish brown, 2.5Y3/2, silty clay, very moist, soft to firm, some rootlets, high plasticity, roots and rootlets, trace rock fragments, CH (Colluvial Soil)

② light olive brown, 2.5Y5/4, silty clay, very moist, firm to stiff, high plasticity, abundant angular rock fragments of fine-grained sandstone, with angular grains, trace rootlets, CH (Active Landslide Deposit)

③ gray, 2.5Y5/1, to very dark gray, 2.5Y3/1, clayey silt, moist to wet, dense to hard, some fragments of weathered siltstone in a clayey matrix, CL (Highly Weathered Bedrock, Whiskey Hill Formation)

④ very dark gray, 2.5Y3/1, siltstone, fine-grained, moderately hard to very hard (Weathered Bedrock, Whiskey Hill Formation)

Logged by Steven F. Connelly, C.E.G., 5/18/17

Log of Test Pit 1	Proposed Road and Water Line Canyon Lane San Mateo County, California		
STEVEN F. CONNELLY, C.E.G. Consulting in Engineering Geology			
Project #	Scale	Date	Figure
1704	1 Inch = 5 Feet	5/26/17	6

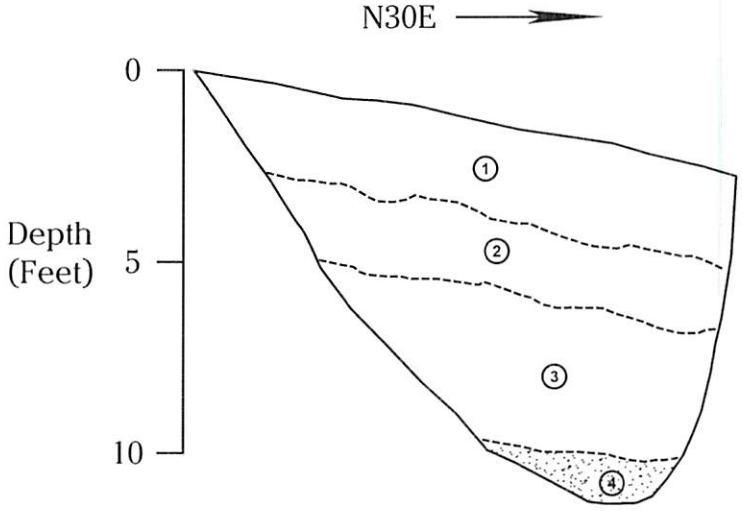
Symbols

gradational contact

relatively sharp contact

very sharp contact

N35W 9SW ▼ strike and dip of bedding or trend and plunge of shear surface



① very dark gray, 2.5Y3/1, silty clay, moist, firm to stiff, some rootlets, high plasticity, rootlets, CH (Colluvial Soil)

② dark gray, 2.5Y4/1, silty clay, moist, firm to stiff, trace rootlets, trace rock fragments of siltstone and sandstone, moderate plasticity, CH (Residual Soil)

③ dark gray, 2.5Y4/1, to dark grayish brown, 2.5Y4/2, clayey silt, moist, very stiff to hard, some rock fragments increasing with depth, low plasticity, CL (Highly Weathered Bedrock, Whiskey Hill Formation)

④ dark grayish brown, 2.5Y4/2, clayey siltstone, slightly moist, hard (Weathered Bedrock, Whiskey Hill Formation)

Logged by Steven F. Connelly, C.E.G., 5/18/17

Log of Test Pit 2	Proposed Road and Water Line Canyon Lane San Mateo County, California		
STEVEN F. CONNELLY, C.E.G. Consulting in Engineering Geology			
Project #	Scale	Date	Figure
1704	1 Inch = 5 Feet	5/26/17	7

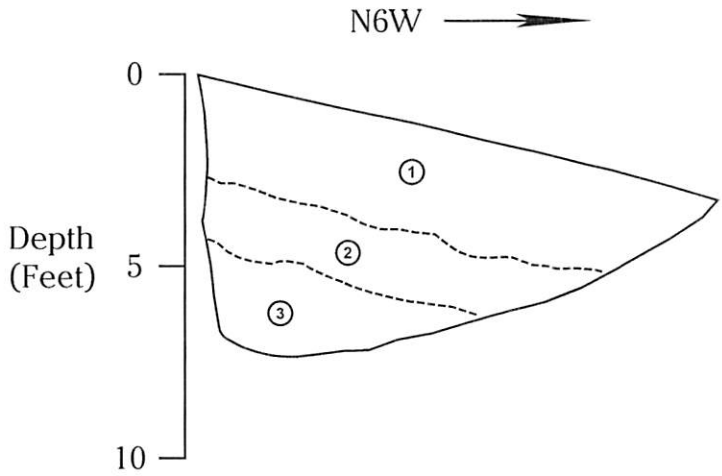
Symbols

gradational contact

relatively sharp contact

very sharp contact

N35W 9SW ▼ strike and dip of bedding or trend and plunge of shear surface



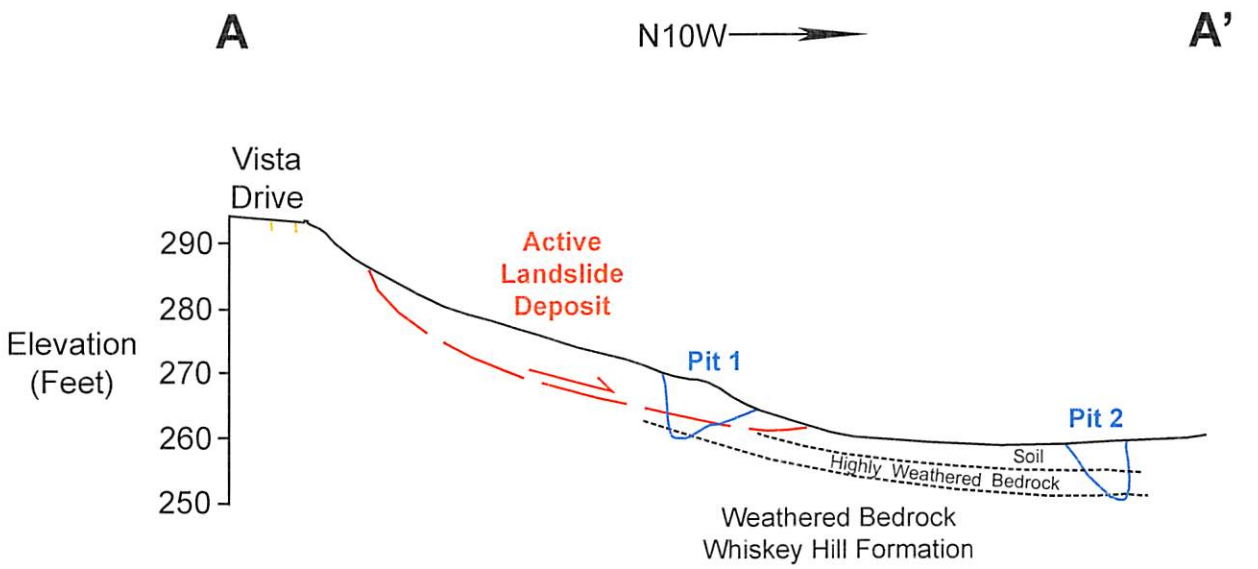
① very dark gray, 2.5Y3/1, silty clay, moist, firm to stiff, some rootlets, high plasticity, rootlets, CH (Colluvial Soil)

② dark gray, 2.5Y4/1, silty clay, moist, firm to stiff, trace rootlets, trace rock fragments of siltstone and sandstone, moderate plasticity, CH (Residual Soil)

③ dark gray, 2.5Y4/1, to dark grayish brown, 2.5Y4/2, clayey silt, moist, very stiff to hard, some rock fragments increasing with depth, low plasticity, CL (Highly Weathered Bedrock, Whiskey Hill Formation)

Logged by Steven F. Connelly, C.E.G., 5/18/17

Log of Test Pit 3	Proposed Road and Water Line Canyon Lane San Mateo County, California		
STEVEN F. CONNELLY, C.E.G. Consulting in Engineering Geology			
Project #	Scale	Date	Figure
1704	1 Inch = 5 Feet	5/26/17	8



Slope profile based on Water Main Extension Plan, MacLeod and Associates, dated 1/12/17

Geologic Cross-Section A-A'	Proposed Road and Water Line Canyon Lane San Mateo County, California			
STEVEN F. CONNELLY, C.E.G. Consulting in Engineering Geology	Project #	Scale	Date	Figure
	1704	1 Inch = 30 Feet	5/26/17	9

Appendix H

Notice of Preparation

Notice of Preparation

of an Environmental Impact Report and Scoping Meeting

for the

Canyon Lane Roadway Improvements Development Project

As the Lead Agency, the County of San Mateo (County) will prepare an Environmental Impact Report (EIR) for the Canyon Lane Roadway Improvements Development Project (project), and would like your views regarding the scope and content of the environmental information to be addressed in the EIR. The EIR will be used by the County when considering approvals for the project. The project description and location are attached.

A public scoping meeting will be held at the San Mateo County Planning and Building Department located at 455 County Center, 1st Floor, Room 101, Redwood City, CA 94063 from 6 p.m. to 8 p.m. on Tuesday, December 18, 2018. County staff will be available to answer questions regarding the project and EIR process. The opportunity to provide written public comment will be offered at the public scoping meeting.

According to State law, the deadline for your responses is 30 days after the receipt of this notice, which establishes a response deadline as the close of business on January 10, 2019. The County would appreciate an earlier response, if possible. Please identify a contact person and send your response to:

County of San Mateo Planning and Building Department
Attn: Summer Burlison
455 County Center, 2nd Floor
Redwood City, CA 94063
Phone: 650.363.1815
Email: sburlison@smcgov.org

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INTRODUCTION

The purpose of an Environmental Impact Report (EIR) is to inform decision-makers and the general public of the environmental effects of proposed projects that an agency may implement or approve. The EIR process is intended to provide information sufficient to evaluate a project and its potential for significant impacts on the environment; to examine methods for reducing adverse impacts; and to consider alternatives to the project. The EIR for the proposed project will be prepared and processed in accordance with the California Environmental Quality Act (CEQA) of 1970, as amended. In accordance with the requirements of CEQA, the EIR will include:

- A summary of the proposed project and its consequences;
- A project description;
- The environmental setting;
- A consideration and discussion of environmental impacts, including significant environmental effects and growth inducing impacts;
- A consideration and discussion of mitigation measures proposed to minimize significant effects;
- Alternatives to the proposed project; and,
- A discussion of cumulative impacts.

PROJECT DESCRIPTION

PROJECT LOCATION

The Canyon Lane Roadway Improvements Development Project (project) is located along Canyon Lane within the Emerald Lake Hills area of unincorporated San Mateo County (see Figure 1). The approximately 3.5-acre project site is comprised of 12 parcels and a gated, dead-end gravel roadway. One parcel (APNs 057-221-060) is located within the City of Redwood City and the 11 remaining parcels (057-221-070, 057-221-090, 057-221-100, 057-221-110, 057-222-210, 057-222-220 & 230, 057-222-240 & 250, 057-222-260, 057-222-270, 057-222-280, 057-222-290 & 300) are located within the San Mateo County. The project site is located within a hillside canyon, surrounded by single-family residential homes scattered throughout the adjacent hillsides. The project site, minus the gravel roadway, is unimproved and consists of oak forest, grassland, and intermittent creek that runs parallel to Canyon Lane. None of the 12 parcels have been extensively graded or developed and thus maintain the natural slope and vegetation of the hillside canyon.

The project site is located east of Lower Emerald Lake and west of the George L Garrett Jr Memorial Park (Garrett Park). The boundary between San Mateo County and the City of Redwood City runs through the project site, approximately 300 feet west of the juncture of Canyon Lane and Glenwood Avenue. Portions of Canyon Lane (a private, currently undeveloped "paper street[1]") near Glenwood Avenue, and south of Garrett Park, have been previously paved before transitioning to a dead-end gravel roadway towards the western side of the project site

[1] A paper street is a road or street that has been planned and appears on maps, but does not exist in reality and is typically not maintained by an agency.

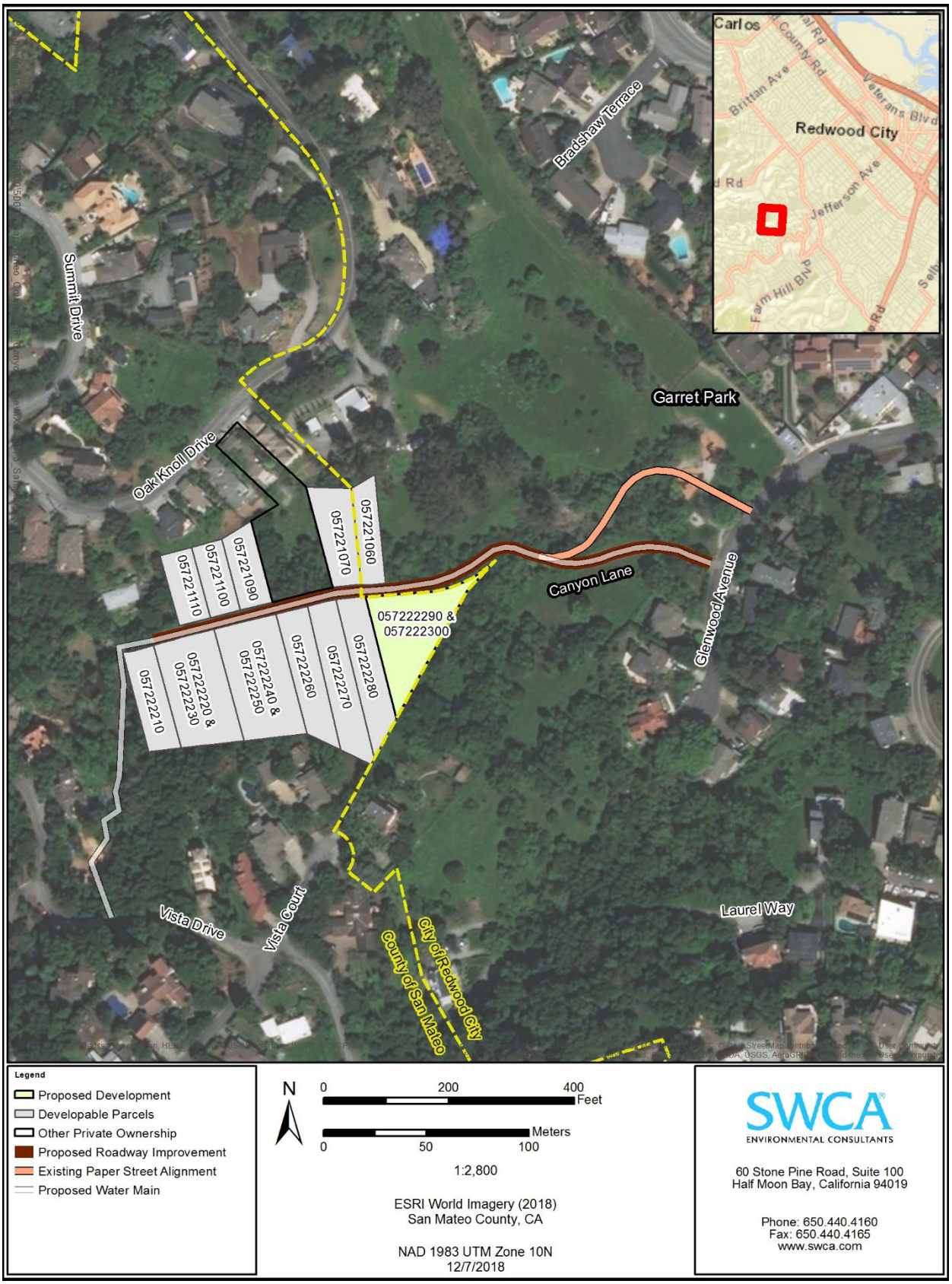


Figure 1. Canyon Lane Roadway Improvements Development Project Location

Currently there is a gate that blocks motor vehicles from entering the unimproved roadway. An existing San Mateo County Emerald Lake Heights Sewer Maintenance District sewer line underlays the gravel roadway.

Lower Emerald Lake is located west of the project site on a five-acre parcel and includes a swimming lake fed by seasonal creeks on which an earthen dam is located. Water that is released from the lake is discharged into a creek that flows parallel to Canyon Lane where it eventually reaches Garrett Park, a 6.9-acre park with playground facilities, picnic areas, and barbeque facilities to the east of the project site.

PROPOSED PROJECT

Canyon Lane Improvements

The proposed project involves the improvement and extension of Canyon Lane at Glenwood Avenue. The proposed improvement to Canyon Lane would involve regrading and paving the existing gravel roadway into a 20-foot-wide paved roadway, extending approximately 880 feet west from Glenwood Avenue. The project would include a turnaround for emergency vehicles and a single-span bridge that would cross the unnamed tributary that traverses the project site. The extension of Canyon Lane would provide routine and emergency access to 12 currently undeveloped privately-owned parcels. Road improvements made to Canyon Lane would result in a road grade ranging from 0.5 to 12.1 percent.

Canyon Lane would be realigned from its current mapped, or paper street, configuration to the existing gravel access road south of Garrett Park. The realignment would eliminate any conflicts with Garret Park and coincide with an existing sewer line underlying Glenwood Avenue and Vista Drive.

A minimum eight-inch water line extending approximately 1,050 linear feet would also be constructed to connect the water mains at Glenwood Avenue and Vista Drive to provide water service and fire protection to the 12 parcels. The water line extension would require authorization and approval by the City of Redwood City and the San Mateo Local Agency Formation Commission (LAFCo), as water service would be supplied by the City of Redwood City Water Department. Stormwater would be collected at four catch basins on the south side of Canyon Lane. Stormwater would then flow towards the east into a biotreatment swale that would treat stormwater before infiltrating into groundwater. A 12 kilovolt (kV) electrical distribution line would underlay Canyon Lane.

To achieve the roadway improvements, the proposed project would disturb slightly under one acre of land. The project would involve approximately 1,205 cubic yards of grading, including 1,145 cubic yards of cut and 60 cubic yards of fill. The project would include the removal of 21 existing trees, including 3 riparian coast live oak trees. Approximately 22,000 square feet of impervious roadway surface would be created. The haul route for project grading would be from the project site to Glenwood Avenue, Canyon Road, Cordilleras Road, and Edgewood Road to Interstate 280.

Proposed Single-Family Residence

In addition to the roadway improvements, the project would include the development of one single-family residence on two previously merged parcels (APN 057-222-290 & 300). The merged parcels that would be developed as part of the project total approximately 16,151 square feet in size.

The proposed residence would have a lot coverage of no more than 25 percent, Floor Area Ratio (FAR) of no more than 30 percent, and would comprise three levels, including a garage level, a main level, and an upper level. The garage would be sized to accommodate two vehicles. A driveway connecting Canyon Lane to the garage would also be constructed and would accommodate an additional two vehicles for guest parking. Construction of the residence would require approximately 2,540 cubic yards of excavation. New storm drainage facilities would be constructed that would convey water to a stormwater system that would be constructed as part of the Canyon Lane improvements. Electricity would reach the residence via the electrical distribution line that would underlay Canyon Lane.

Developable Parcels

The extension of the roadway would allow for the future development of the remaining 11 parcels; however, no development is currently proposed on these remaining parcels. As required under CEQA Guidelines Section 15126.2(d), the future development will be analyzed in the EIR as a growth-inducing and reasonably foreseeable impact as a result of the project. As described above, the 12 developable parcels are currently zoned RH/DR (Residential Hillside/Design Review) in the County and RH (Residential Hillside) in the City. For the purposes of the analysis, it is assumed that the remaining 11 developable parcels would be developed within the current zoning designations of the respective jurisdiction.

PROJECT OBJECTIVES

The primary objectives of the project are as follows:

- To improve Canyon Lane in order to facilitate routine and emergency access to 12 parcels that would become developable. The objectives of the individual future property owners may vary, but, assuming project approval, owners of the lots could construct single-family homes in accordance with zoning restrictions, any necessary subsequent environmental review, and after approval of building permits.
- To provide housing, and the opportunity for future housing on lots associated with the project, on an underutilized site that is currently zoned for single-family housing.
- Assist in maximizing home ownership in San Mateo County, while maintaining the predominantly single-family character of the neighborhood.

CEQA LEAD AND RESPONSIBLE AGENCIES

San Mateo County will serve as the Lead Agency under CEQA and will prepare the EIR in its role as the principal agency responsible for approving the project (CEQA Guidelines 21067). The City of Redwood City and LAFCo will serve as Responsible Agencies under CEQA. The City of Redwood City and LAFCo are responsible for authorizing and approving the City's eight-inch water line extension outside of the City's jurisdictional boundaries.

PROJECT APPROVALS

The project includes the following project approvals:

- Approval of a grading permit for the improvement of Canyon Lane and the construction of a single-span bridge across an unnamed creek at the north side of the roadway as part of a required turn-around area for emergency vehicles;
- Design review by the Emerald Lakes Hills Design Review Officer;
- Variance for grading associated with a single-family residence where the grading quantity will exceed 1,000 cubic yards in the County's RH/DR Zoning District;
- Issuance of a building permit for the construction of roadway improvements for Canyon Lane, including a single-span bridge, retaining walls, storm drainage facilities, and water line extension
- Issuance of a building permit for the construction of one new single-family residence on two previously merged parcels; and,
- Approval of a new (minimum) eight-inch water loop by LAFCo and the City of Redwood City to extend Redwood City water service outside of City jurisdictional boundaries.

POTENTIAL ENVIRONMENTAL IMPACTS

The proposed project has the potential to result in significant environmental impacts based on the results of the pre-application field surveys and initial analysis. Additional studies have and will be conducted as part of the environmental review process, and further determinations will be made in the EIR, including additional resources that could be impacted as a result of the project. Feasible mitigation measures will be identified in the EIR for impacts determined to be significant. The following resources have the potential to result in significant environmental impacts:

- Biological Resources: The project has the potential to impact special-status plant species including Bent-flowered Fiddleneck and San Mateo Woolly Sunflower.
- Hydrology and Water Quality: The project has the potential to expose people to flooding as a result of the failure of a levee or dam.

PUBLIC AND AGENCY COMMENTS

The purpose of the this Notice of Preparation (NOP) is to solicit input from the public and agencies about the scope of analysis to be included in the EIR. This NOP is being circulated for a 30-day review period. Please send your comments to:

Summer Burlison
County of San Mateo Planning and Building Department
455 County Center, 2nd Floor
Redwood City, CA 94063

A public scoping meeting will be held at the San Mateo County Planning and Building Department located at 455 County Center, 1st Floor, Room 101, Redwood City, CA 94063 from 6 p.m. to 8 p.m. on Tuesday, December 18, 2018. The opportunity to provide written public comment will be offered at the public scoping meeting.

Appendix I

Wildfire Assessment

SWCA®
ENVIRONMENTAL CONSULTANTS
Sound Science. Creative Solutions.®

20 East Thomas Road, Suite 1700
Phoenix, Arizona 85012
Tel 602.274.3831 Fax 602.274.3958
www.swca.com

TECHNICAL MEMORANDUM

Canyon Lane Roadway Improvements Development Project EIR

Wildfire Assessment

This Wildfire Assessment analyzes the impacts of wildfire hazards resulting from implementation of the proposed Canyon Lane Roadway Improvements Development Project (project) and provides general mitigation for those impacts to alleviate wildfire risk to people or structures. CEQA Guidance provides the following thresholds for determining impact significance related to wildfire:

Impacts would be considered significant if the Project would:

a. Substantially impair an adopted emergency response plan or emergency evacuation plan.

b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.

c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.

d. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

This assessment is divided into seven sections: project description, environmental setting, project exposure to wildland fire, fire behavior computer modeling, discussion, mitigation measures, and references.

PROJECT DESCRIPTION

The Applicant submitted an application for a Grading Permit to the County of San Mateo Planning and Building Department to allow for the construction of the project. The project is located within San Mateo County (County), California, and involves the improvement of Canyon Lane, development of a single-family residence on one parcel, and future development of residences on eleven parcels. The project also involves the construction of new utilities, including a waterline that would loop-in with an existing waterline within the City of Redwood City (City) and an underground electrical distribution line.

ENVIRONMENTAL SETTING

Location

The project is located along Canyon Lane within the Emerald Lake Hills area of San Mateo County, California (see Figures 1 and 2). San Mateo County is situated along the central coast of California and encompasses approximately 554 square miles (including tidal waters) of the San Francisco Peninsula. The County's western border is on the Pacific Ocean and the eastern border is on the San Francisco Bay shoreline. The County is bounded by the City and County of San Francisco to the north and by Santa Cruz and Santa Clara County to the south and southeast, respectively.
The approximately 3.5-acre project site is comprised of 12 parcels and a gated, dead-end gravel roadway (Canyon Lane). One parcel (APN 057-221-060) is located within the City and the 11 remaining parcels (APNs 057-221-070, 057-221-090, 057-221-100, 057-221-110, 057-222-210, 057-222-220 & 230, 057-222-240 & 250, 057-222-260, 057-222-270, 057-222-280, 057-222-290 & 300) are located within unincorporated San Mateo County.

Land Use

The project site is located within the Emerald Lake Park subdivision, which was recorded in the County Office of the County Recorder in 1920. The subdivision includes 59 residential lots bounded by Oak Knoll Drive to the north, Vista Drive to the south, Glenwood Avenue to the east, and Lower Emerald Lake to the west. The project site comprises approximately 3.5 acres of land east of Lower Emerald Lake and west of the George L Garrett Jr Memorial Park (Garrett Park). The site is situated within a hillside canyon, surrounded by single-family residential homes scattered throughout the adjacent hillsides. The project site, minus the gravel roadway, is undeveloped and consists of oak forest, grassland, and intermittent creek that runs parallel to Canyon Lane. The 12 developable parcels are currently zoned RH/DR (Residential Hillside/Design Review) in the County and RH (Residential Hillside) in the City. None of the 12 parcels have been extensively graded or developed and thus maintain the natural slope and vegetation of the hillside canyon.

Topography

The project site is situated within a hillside canyon that aligns east-west with the prevailing winds; the project site is surrounded by single-family residential homes scattered throughout the adjacent hillsides. Slopes vary from 0 to 25 degrees throughout the site.

Flammable Vegetation

Vegetation Communities

The project area is comprised primarily of Coastal Live Oak Forest (2.49 acres), with smaller patches of California Annual Grassland (0.29 acre), Riparian Coast Live Oak Forest (0.69 acre), and previously disturbed land (0.06 acre) and developed land (0.21 acre) (see Figure 3). SWCA biologists carried out a site inspection to verify vegetation density in the project area and to ground truth the spatial fuel model data used in this assessment.

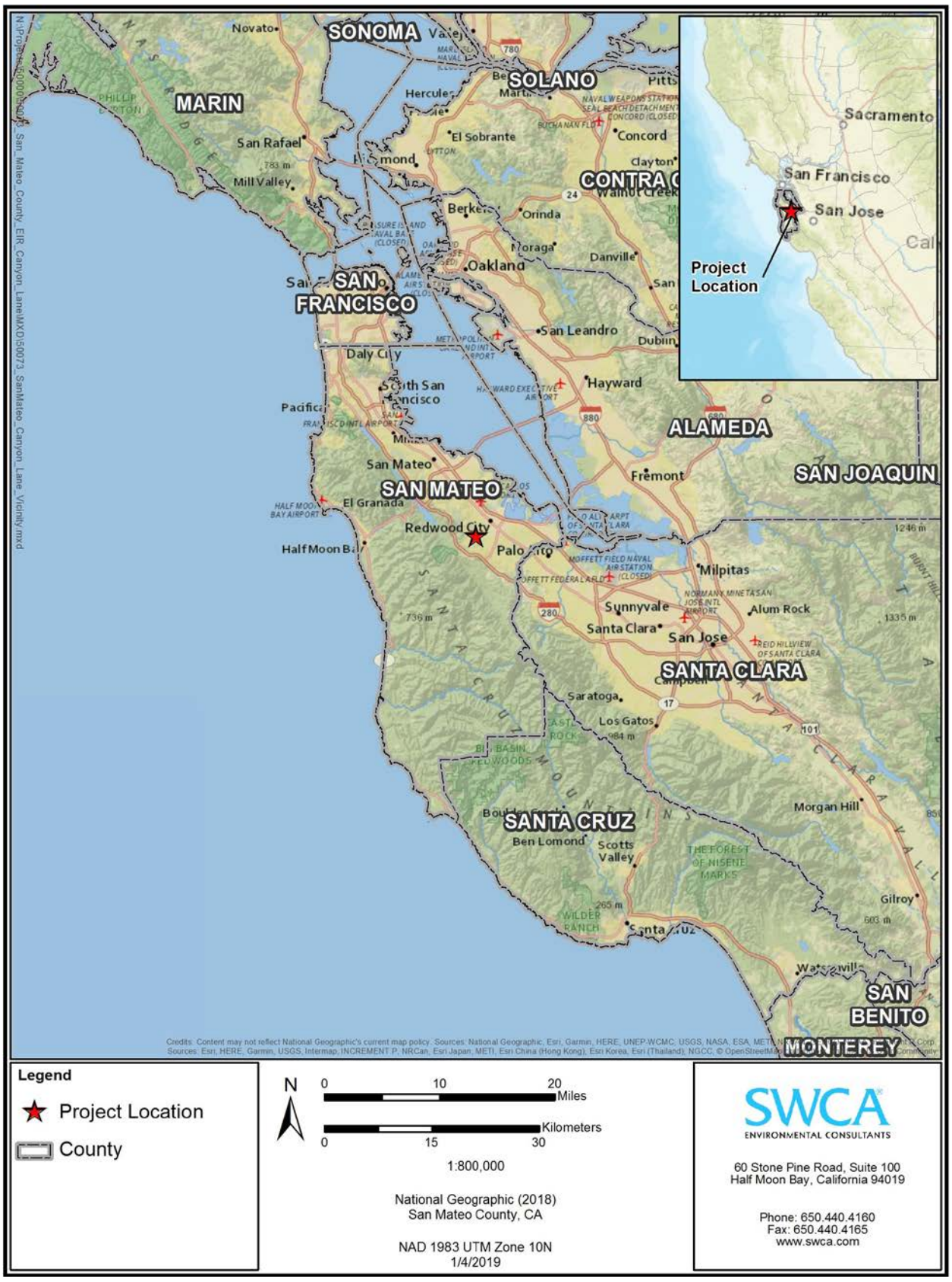


Figure 1 Project Vicinity Map

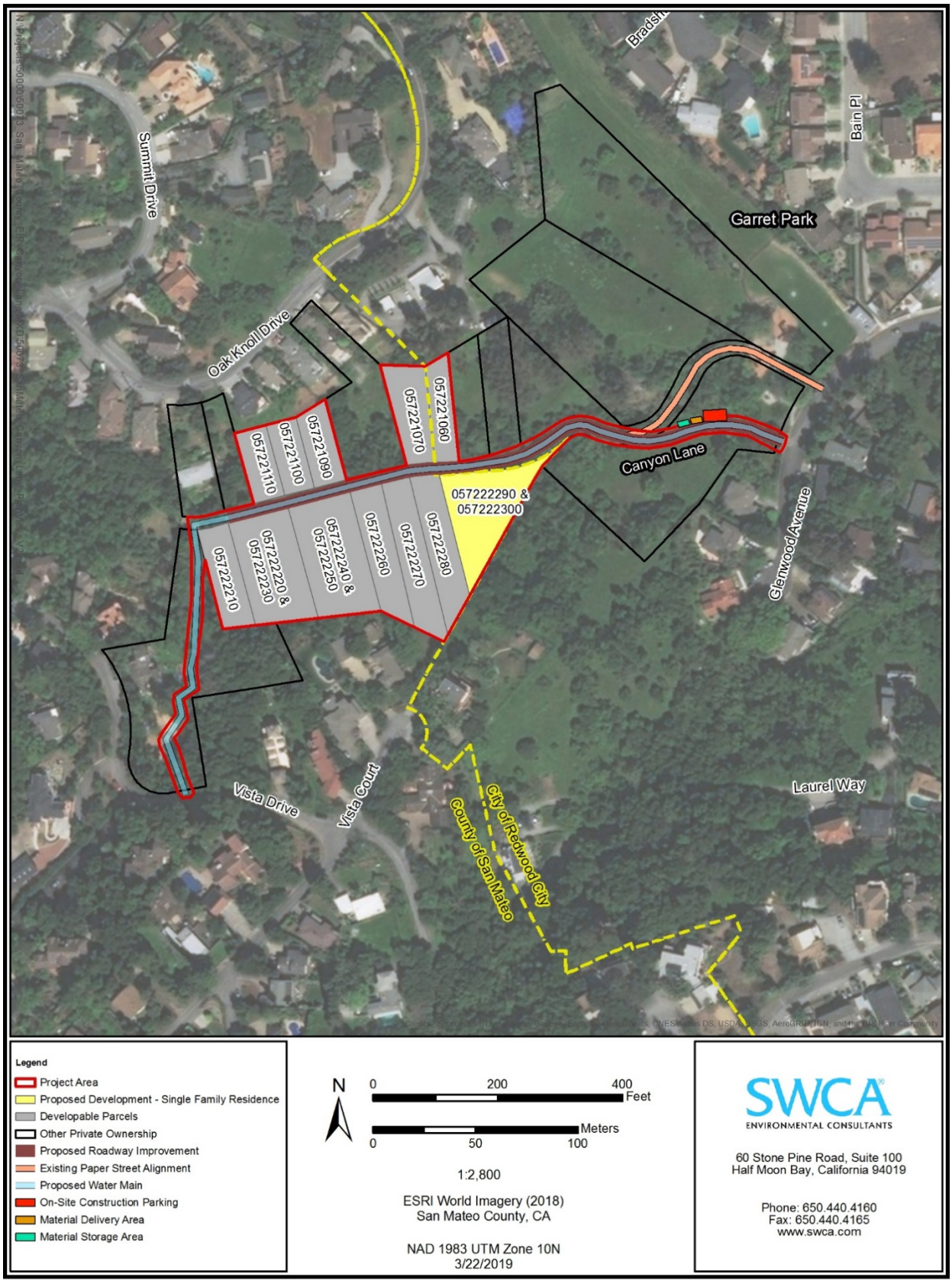


Figure 2 Project Location Map

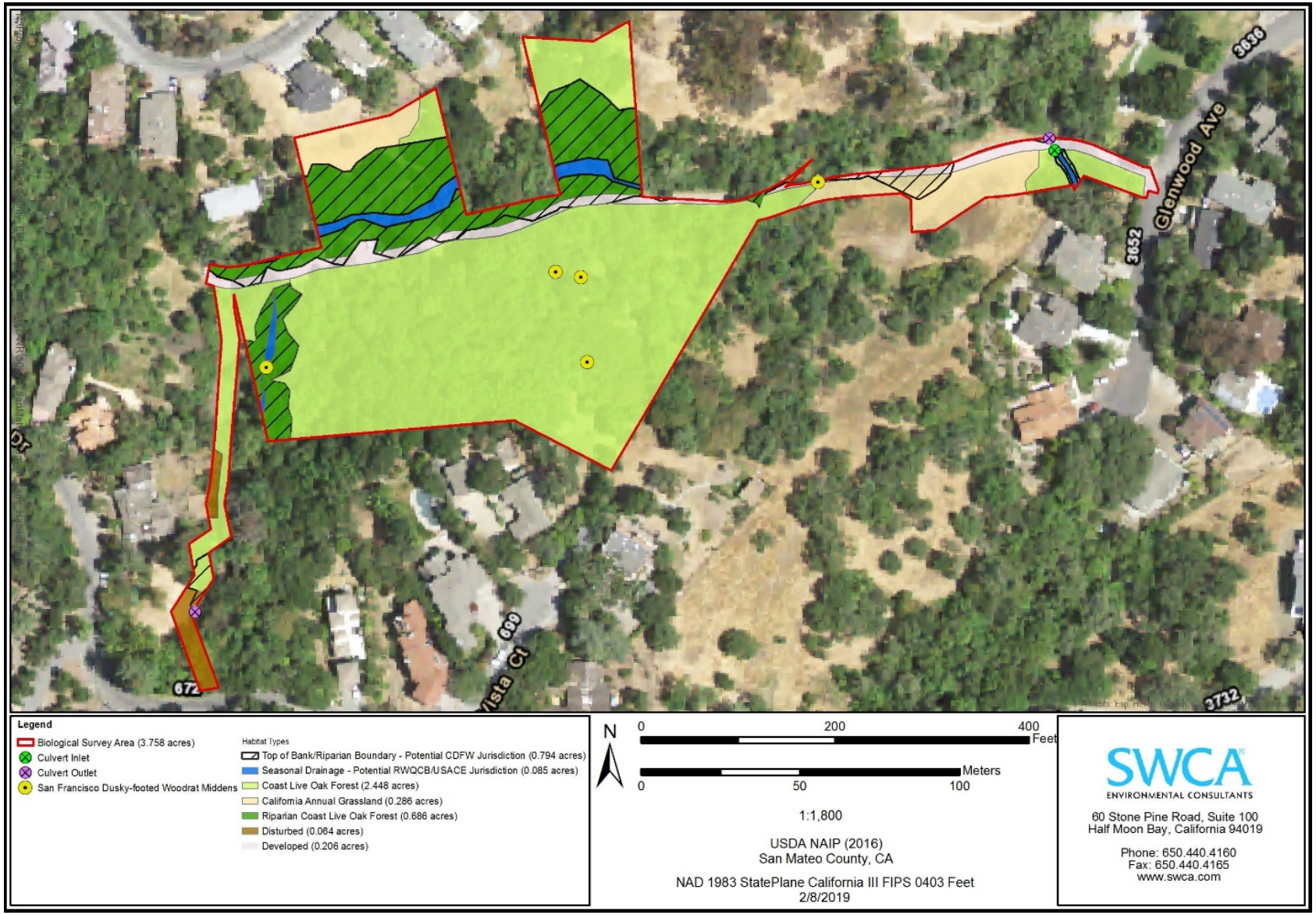


Figure 3. Vegetation Community Types within the Canyon Lane Project Area.

COAST LIVE OAK FOREST

Mature coast live oak and California bay trees are the dominant species in this habitat type. The trees are approximately 4–60 feet tall and form an intermittent to closed canopy on the hillslopes of the project site. Understory shrubs include poison oak (*Taxocodendron diversilobum*), toyon (*Heteromeles arbutifolia*), and coyote bush (*Baccharis pilularis*). Understory herbs that are present include ferns, such as gold back fern (*Pentagramma triangularis*) and California polypody (*Polypodium californicum*); grasses, such as onion grass (Melica sp.); and forbs, such as iris (*Iris sp*.). Leaf litter makes up a large component of the ground cover. A portion of the forest where the waterline would be installed has been cut and understory plants such as coyote bush and poison oak are dominant.

CALIFORNIA ANNUAL GRASSLAND

California annual grassland is restricted to the eastern portion of the project. The grassland community is dominated by non-native species. Common grasses were wild oats (*Avena sp*.), soft chess (*Bromus bordeaceus*), ripgut brome (*Bromus diandrus*), and dogtail grass (*Cynosurus echinatus*). Common forbs include bull thistle (*Cirsium vulgare*), poison hemlock (*Conium maculatum*), bristly ox-tongue (*Helminthotheca echioides*), and artichoke thistle (*Cynara carunculus*). The grassland is short in stature (less than approximately 1 foot tall). A limited number of invasive plants were observed near the existing road in this habitat.

RIPARIAN COAST LIVE OAK FOREST

Riparian coast live oak forest occurs along the banks of the drainage swale and is similar to the non-riparian coast live oak forest type described above. The canopy is intermittent to closed and composed mainly of California bay and coast live oak. Shrub species include Himalayan blackberry (*Rubus amerniacus*) and common snowberry (*Symphoricarpos allus*). The riparian forest supports the invasive weed French broom (*Genista monspessulana*) along small portions of the existing road and riparian banks. Sapling California bay trees also grow in the understory. Herb cover in the riparian forest is very sparse, but native herbs such as California manroot (*Marah fabacean*) are present and the invasive, non-native plant Bermuda grass (*Cynodon dactylon*) is present.

DEVELOPED

Developed area of the project site are composed of the existing Canyon Lane gravel road. The existing road is approximately 12–15 feet wide. The majority of the road is rocky and unvegetated; however, some portions have grassland vegetation growing between two tracks. Tree canopy overhangs much of the road as it passes through the coast live oak and riparian coast live oak forests.

Fuel Types

The vegetation communities described above can be classified into fire behavior fuel models based on the fire behavior that they are expected to exhibit during a wildfire. The fuels in the planning area are classified using Scott and Burgan's (2005) Standard Fire Behavior Fuel Model classification system. This classification system is based on the Rothermel surface fire spread equations, and each vegetation and litter type is broken down into 40 fuel models.

The general classification of fuels is by fire-carrying fuel type (Scott and Burgan 2005):

(NB) Non-burnable	(TU) Timber-Understory
(GR) Grass	(TL) Timber Litter

(GS) Grass-Shrub (SB) Slash-Blowdown

(SH) Shrub

The project area is classified into several grass, shrub, and timber litter fuel models, as shown in Table 1). Table 2 summarizes the fire behaviors that are typically observed in these fuel models. Figure 4 illustrates the fuel model classification for the project area.

Table 1. Scott and Burgan Fire Behavior Fuel Model composition as classified in the project area

Fuel Model	Percent of project area
NB 1 (Non-burnable)	23
GS 1 (Grass-Shrub)	2
GS 2 (Grass-Shrub)	2
SH 2 (Shrub)	2
TL3 (Timber-Litter)	29
TL6 (Timber-Litter)	42

Table 2. Fuel model descriptions for Scott and Burgan fuel models found in the project area.

Fuel Model	Fire behavior description
NB 1 (Non-burnable)	Urban or suburban development; insufficient wildland fuel to carry wildland fire.
GS 1 (Grass-Shrub)	Shrubs are about 1 foot high, low grass load. Spread rate moderate (5–20 chains[1]/hour); flame length low (1-4 feet); fine fuel load 1.35 (tons/acre).
GS 2 (Grass-Shrub)	Shrubs are 1–3 feet high, moderate grass load. Spread rate high (20–50 chains/hour); flame length moderate (4–8 feet); fine fuel load 2.1 (tons/acre).
SH 2 (Shrub)	Moderate fuel load (higher than SH1), depth about 1 foot, no grass fuels present. Spread rate low (2–5 chains/hour); flame length low (1–4 feet); fine fuel load 5.2 (tons/acre).
TL3 (Timber-Litter)	Moderate load. Spread rate very slow (0–2 chains/hour); flame length low (1–4 foot); fine fuel load 0.5 (ton/acre).
TL6 (Timber-Litter)	Moderate load, less compact. Spread rate moderate (5–20 chains/hour); flame length low (1–4 feet); fine fuel load 2.4 (ton/acre).

Notes: Based on Scott and Burgan's (2005) 40 Fuel Model System. For more information, refer to Scott and Burgan (2005).

[1]One chain is equal to 66 feet.

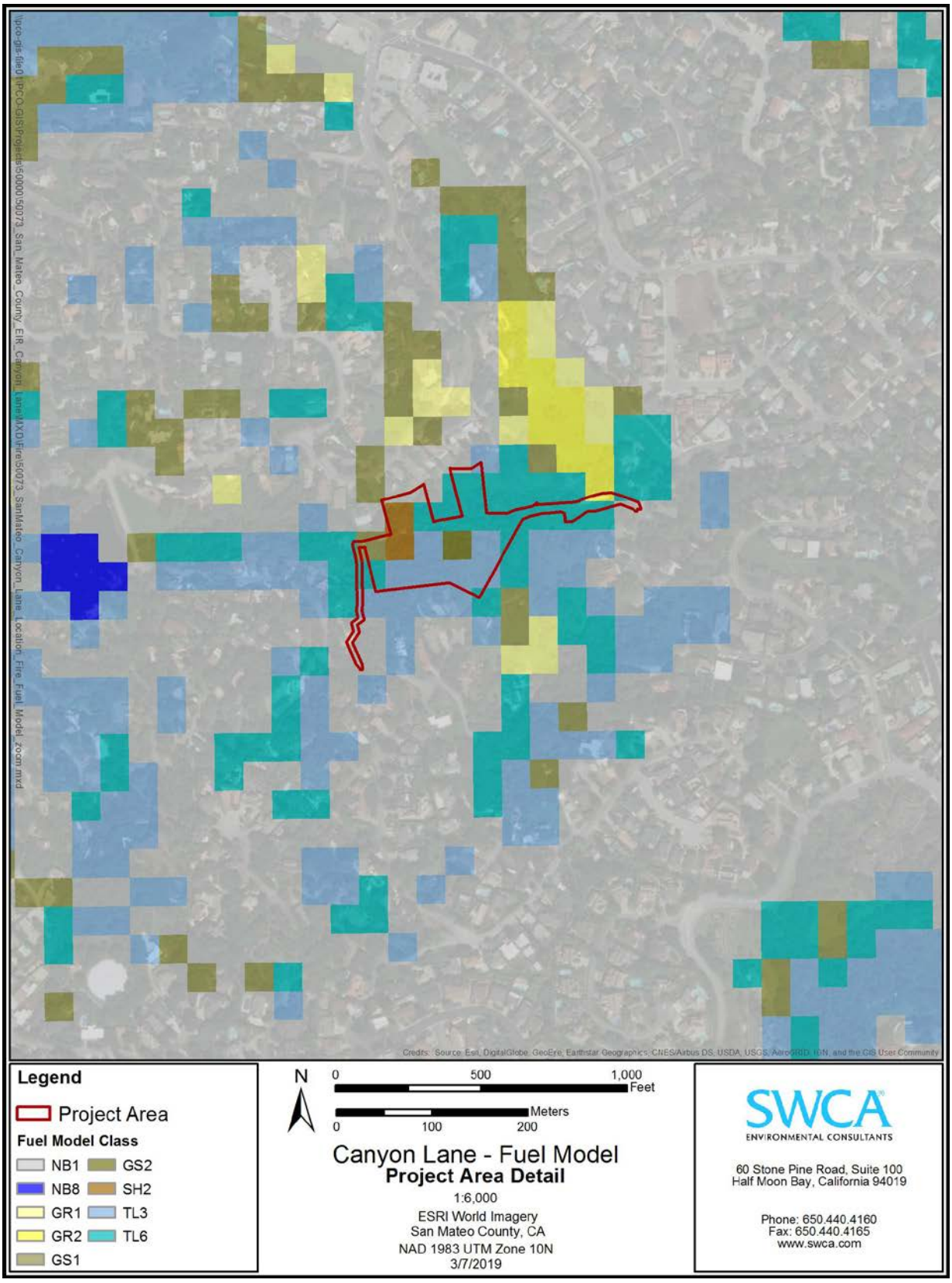


Figure 4. Fuel Model Classification for the project area.

The TL6 model, the dominant fuel model (making up 42 percent of the project area and the immediately adjacent areas), is comprised primarily of the coastal live oak vegetation type. The native hardwood forests support little ground fuel (probably less than 5 tons per acre) (Plumb 1980) and as a result associated fire intensity is minimal. This fuel model characterizes fire behavior in a moderate load broadleaf litter vegetation. The spread rate in these fuels is moderate (5–20 chains/hour) and the flame lengths are typically low to moderate (1–4 feet). These surface fire behavior characteristics are typically suppressed at the head or flanks of the fire by hand crews using hand tools (Andrews et al. 2011) as determined using the surface fire behavior characteristics chart (see Figure 5). Isolated pockets of heavy fuel accumulations can be expected to create erratic but localized fire behavior, which may generate more intense fire behavior (for example 4–8 feet flame lengths). Areas of particular concern are the large patches of coyote brush (*Baccharis pilularis*) intermixed with poison oak (*Toxicodendron diversilobum*) on the western side of the project area (see Figure 6). More intense fire behavior in these fuel types may require crews to use mechanized equipment for suppression.

Spread rates and flame lengths tend to be higher in the grass-shrub fuel models. These fuel models comprise only a small percentage of the project area (4 percent total).

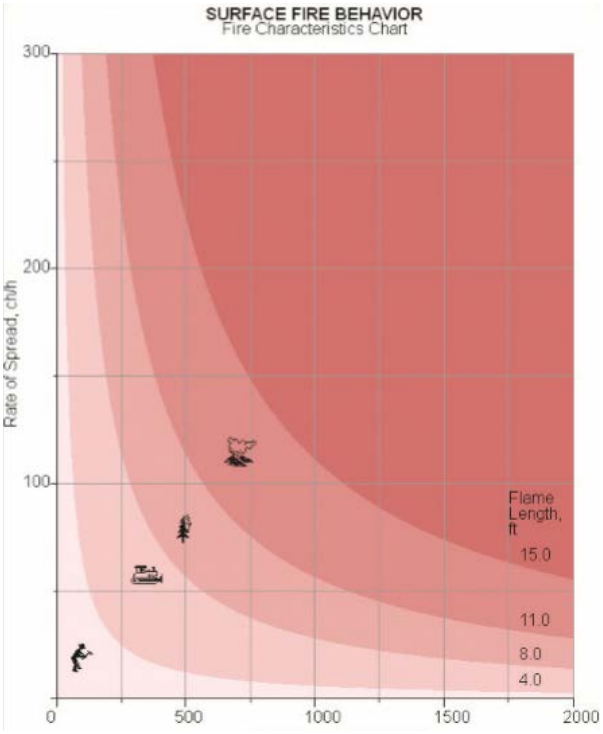


Figure 5. Wildfire "Hauling"/ Fire Characteristics Chart.



Figure 6. Example of coyote brush (*Baccharis pilularis*) intermixed with the poison oak (*Toxicodendron diversilobum*) on the western side of the project area. Note the structures located mid slope.

CANOPY CHARACTERISTICS

The canopy characteristics of the vegetation community influence potential fire behavior in the project area. Canopy characteristics can be described using canopy cover, canopy base height, and canopy bulk density data. The following description of the canopy in the project area is based on the LANDFIRE-modeled fuel data.

Canopy Cover

Canopy cover is commonly expressed as a percentage of total ground area covered by the vertical projection of tree crowns (USFS 2019. The majority of the forested area within the project area is comprised of canopy cover percentages from 30–40 percent and 40–50 percent (Figure 7). The project area has medium canopy cover of overstory trees; in areas with more continuous canopy, fire spread rates are higher due to the direct transmission of flames between individual trees.

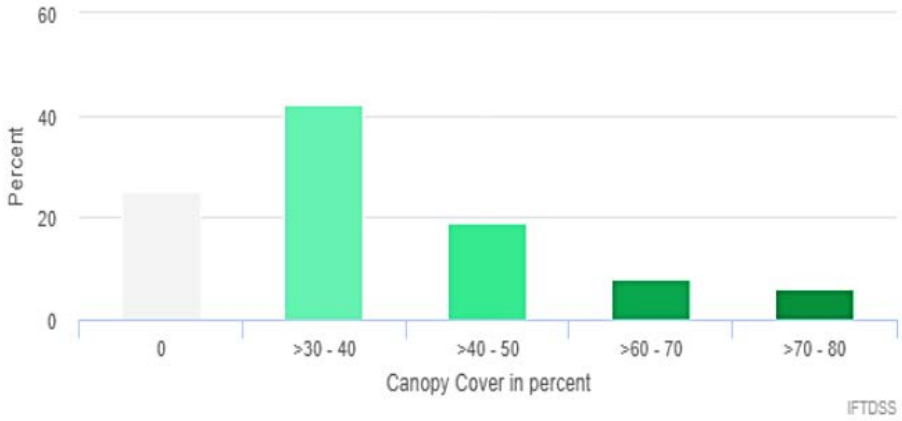


Figure 7. Percent Canopy Cover of modeled fuels within the project area.

Canopy Base Height

Canopy base height is a measure of the distance of canopy fuels to surface fuels (Smith n.d.). The fuels in the project area have relatively high canopy base heights (> 4 feet) (Figure 8), except in areas that have high densities of shrubs and sapling trees (Figure 9). This characteristic is important in determining potential for the transmission of fire from the surface into the canopy.

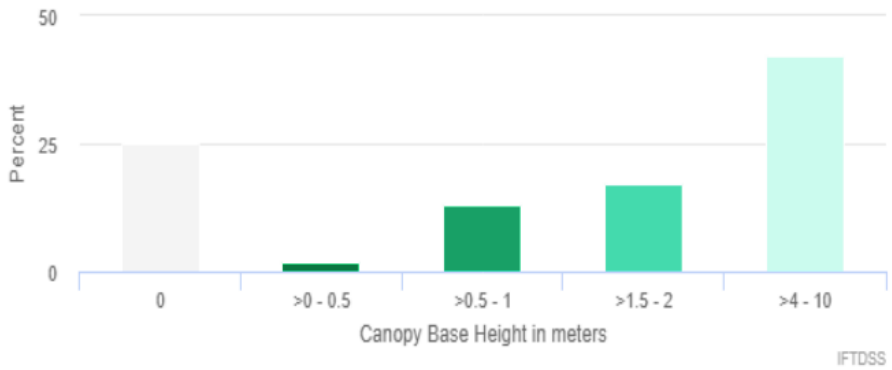


Figure 8. Canopy Base Height of modeled fuels in the project area.



Figure 9. Photograph showing area with dense vertical continuity of existing vegetation.

Canopy Bulk Density

Canopy bulk density is a measure of how closely canopy fuels are packed, which reflects the likelihood that fire can move through the forest canopy. Canopy bulk density in the project area falls primarily in the range of 0.05-.15 kg/m^3.

Aspect

Aspect affects how much solar radiation a site receives as well as the vegetation type on the site and fuel loading. Table 3 outlines the aspect for the project area. Sixty percent of the project area occurs on north- and north-east-facing slopes. North-facing slopes are cooler and more shaded, thus delaying the drying of fuels longer into the fire season and making them less available for combustion. North-facing slopes, however, tend to have heavier fuel loads; consequently, when fuels dry out, they can experience more severe wildfire behavior.

South- and west-facing slopes tend to have less vegetation and lighter fuel loads. South-facing slopes receive much higher solar radiation and are warmer, so fuels dry out sooner and more thoroughly during the fire season.

Table 3. Aspect within the project area

Aspect (degrees)	Percent in project area
338-22 (N)	40
23-67 (NE)	19
68-112 (E)	9
113-157 (SE)	19
158-202 (S)	13

Climate and Fire Weather

Although fires occur year-round, the typical fire season for the region usually starts in June and lasts into October (CAL FIRE 2018b). Weather conditions play a critical role in determining the size and scope of fires that could occur in the area. California regularly experiences extreme fire weather, with periods of strong winds, usually accompanied by high heat and low humidity.

Humidity

In general, relative humidity along the coast and within the project area is moderate to high throughout the year due to frequent ocean winds and fog (Golden Gate Weather Services 2002). The ocean is a source of cool, humid, maritime air; relative humidity decreases at increasing distance from the ocean. Humidity decreases significantly during the passage of dry northeasterly air from the interior of the state during the fall months. Relative humidity is observed as decreasing up to 20 percent during this period.

Wind Patterns

San Mateo County and the project area lie within the zone of the prevailing westerlies, meaning that winds blow out of the west/northwest for much of the year. However, during the fall transition, wind patterns shift from the prevailing west-northwest pattern in the summer to an east-northeast pattern as winds flow out of the Great Basin into the Central Valley, the Southwestern Desert Basin, and the South Coast (NPS 2008). This creates high pressure in Nevada and low pressure along the California coast, causing hot interior air to be drawn westward to the coast. These dry hot winds are known locally as the Diablo winds and are strong and gusty, often exceeding 100 miles per hour. Peak occurrence of these winds is in November, with a secondary peak in March. During this time, extreme fire danger is possible for the San Francisco Bay area because it coincides with low fuel moistures. Red flag warnings during periods of sustained Diablo winds are often posted for the Northern California coast, including the Bay

Area; however, the greatest frequencies of Diablo events are recorded in higher elevation areas in the coastal ranges and not at the elevation of Redwood City (Bowers 2018). In an analysis of Diablo Wind Events, Bowers (2018: 11) writes, "while events at near-coastal stations were infrequent, it is important to consider the impact these northeasterly winds could have on areas more prone to a coastal wind and marine influence."

Drought

This region was impacted by drought from 2012–2016 that has led to severe moisture deficits and significant declines in groundwater. Climate change projections for the region suggest that current and future increases in temperature, regardless of changes in precipitation, raise the probability of enhanced drought magnitude and duration (Ackerley et al. 2018). This condition has significant implications on wildfire frequency and magnitude (Westerling 2018).

Fire History

According to the historic fire records in CAL FIRE's Fire and Resource Assessment Program (FRAP)[1] database, there have only been three large wildfires in the vicinity of the project area since 1962 (Figure 10). This is confirmed in the San Mateo-Santa Cruz Community Wildfire Protection Plan, which states "there is no recent (50 year) major fire history within the planning area," i.e., San Mateo North-Coastal (CAL FIRE, San Mateo-Santa Cruz Unit, 2018), and the County Hazard Vulnerability Assessment, which states that "the county does not have a significant Wildland Urban Interface (WUI) fire history."[2] The reason for the previous lack of fire activity has been attributed to weather impacts, changes in forest management, extended fire regimes, and aggressive fire-fighting, as well as other factors (San Mateo County 2015).

The San Mateo-Santa Cruz CAL FIRE unit responded to 246 ignitions in 2017 in San Mateo and Santa Cruz Counties as a whole; 98 percent of these ignitions were kept to less than 10 acres in size. The top four causes of these 2017 wildfires are listed as undetermined, electrical power, miscellaneous, and debris burning (CAL FIRE 2018b).

Climate Change

There is strong evidence that anthropogenic climate change, especially rising temperatures and periodic droughts, has contributed to increased wildfire extent and severity in the western United States (Westerling et al. 2006, Abatzoglou & Williams 2016, Ackerley et al. 2018). Climate change predictions for the Bay Area suggest that a large proportion of change will occur in the frequency and/or intensity of extreme weather events, such as drought, winds, severe storms, and frosts. The frequency and magnitude of wildfires are expected to increase, resulting in more intense, faster-spreading fires in most locations (Fried et al. 2003, Westerling et al. 2018). Fire return intervals in coastal grass and brush vegetation in the area are expected to be cut in half, and the number of escaped fires is predicted to increase (NPS 2008). These predicted patterns would have significant implications for communities located in Very High Fire Hazard Severity Zones. According to fire history data, there has been a recurring increase in fire activity and acres burned in the Bay Area in recent years (Ackerley et al. 2018), and there are consistent projections of increased fire activity (more frequent or greater area burned) due to a warmer climate (Ackerley et al. 2018). Studies also suggest that increased development may act to reduce fire activity in areas close to high-density human development but would increase it in less populated WUI areas (Westerling 2018).

[1] CAL FIRE – Fire and Resource Assessment Program (http://frap.cdf.ca.gov/).

[2] https://hsd.smcsheriff.com/sites/default/files/downloadables/2%20-%20Hazard%20Vulnerability%20Assessment.pdf

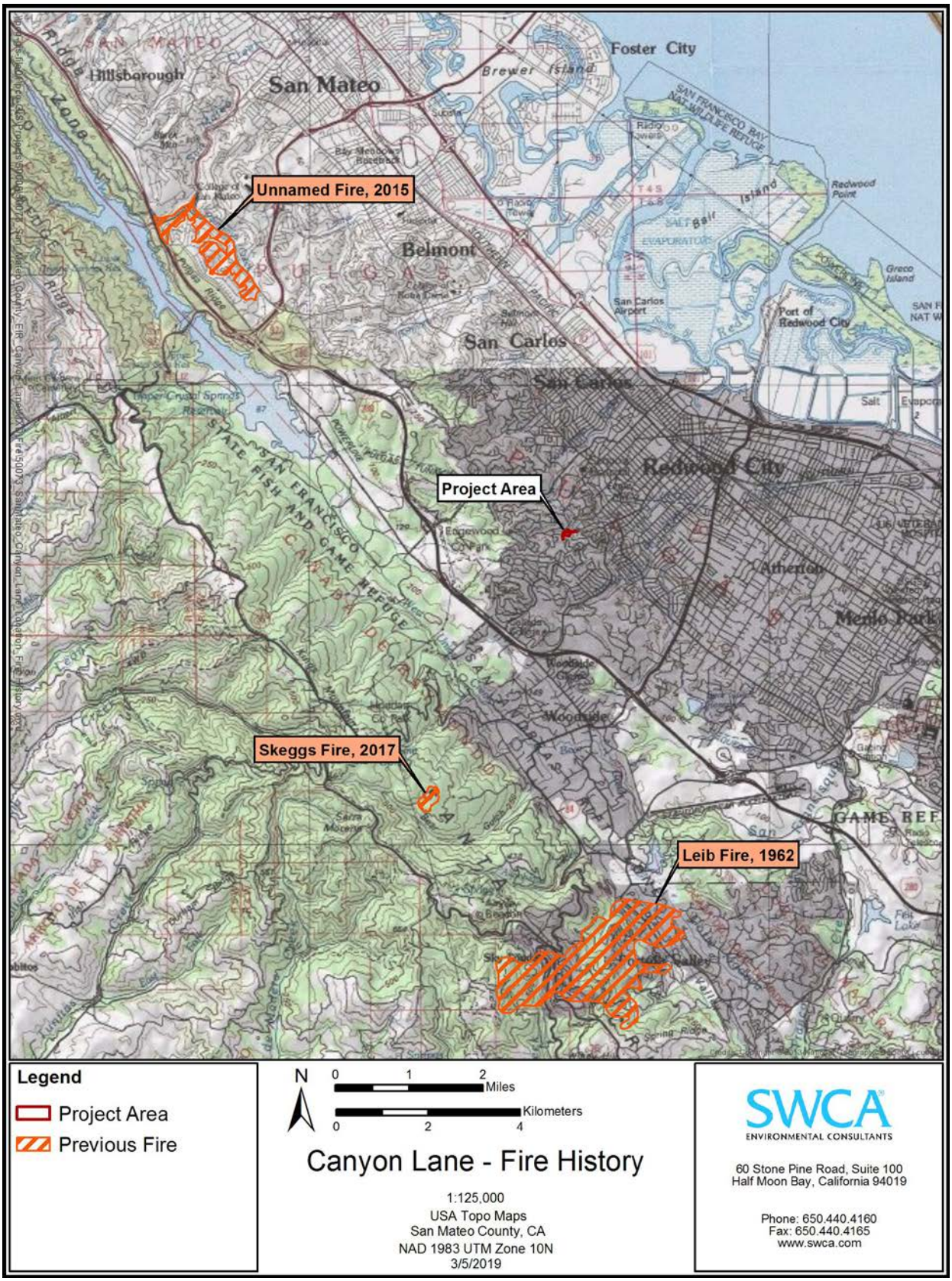


Figure 10. Fire Occurrence Frequency

PROJECT EXPOSURE TO WILDLAND FIRES

Wildfires are an inevitable and ecologically important process within oak-woodland ecosystems. Balancing fire risk with development within the WUI requires careful planning and implementing "Fire Safe" measures. The greatest wildfire risk occurs when homes are located in areas that are vulnerable and especially difficult to protect, and where fire suppression is made even more problematic because access to homes is hampered by narrow roads. Emerald Lake Hills is identified in the San Mateo-Santa Cruz Unit Strategic Fire Plan (CAL FIRE 2018b) as a wildland urban interface Community at Risk. The Canyon Lane development would promote in-growth within current urban boundaries. The development would be required to adhere to all local and state fire codes in order to minimize wildfire risk. Requirements to mitigate structural ignitability and enhance fire response capability would help alleviate wildfire risk but would not eliminate all risk.

Water Supply for Fire Suppression

The project would involve the installation of an 8-inch water main to provide water and fire protection to the abutting parcels. The water system would equal or exceed the National Fire Protection Association (NFPA) 1142, "Standard on Water Supplies for Suburban and Rural Fire Fighting," 2012 Edition, the California Fire Code, California Code of Regulations title 24, part 9 and Redwood City Ordinance No. 2325, § 2, 1-14-08 Water Main Upgrade.

In accordance with the California Fire Code, the minimum water supply for new dwellings (that do not exceed 3,600 square feet) should be capable of supplying a flow of 100 gallons of water per minute for a duration of 2 hours (10,000 gallons).

Hydrants should be located along the roadway as determined by the Fire Marshal to meet operational needs and at intervals pursuant to the California Fire Code. Fire hydrants should be accessible at all times and should have a perimeter clearance of 3 feet.

Fire Response

The project is predominately located within a State Responsibility Area (SRA) that has a Very High fire hazard severity zone (VHSZ) rating.[3] SRAs are areas in which CAL FIRE has legal and financial responsibility for wildland fire protections and where CAL FIRE administers fire hazard classifications and building standard regulations (California Governor's Office of Emergency Services 2018). The SRA land in the project area is County unincorporated. A portion of the project site (the eastern segment of Canyon Lane and parcel 057-221-060) is located within a Local Responsibility Area (LRA) that has a VHSZ (Figure 11 and 12). The LRA lands within the project area are within Redwood City Fire jurisdiction.

[3] http://frap.fire.ca.gov/webdata/maps/san_mateo/fhszs_map.41.pdf

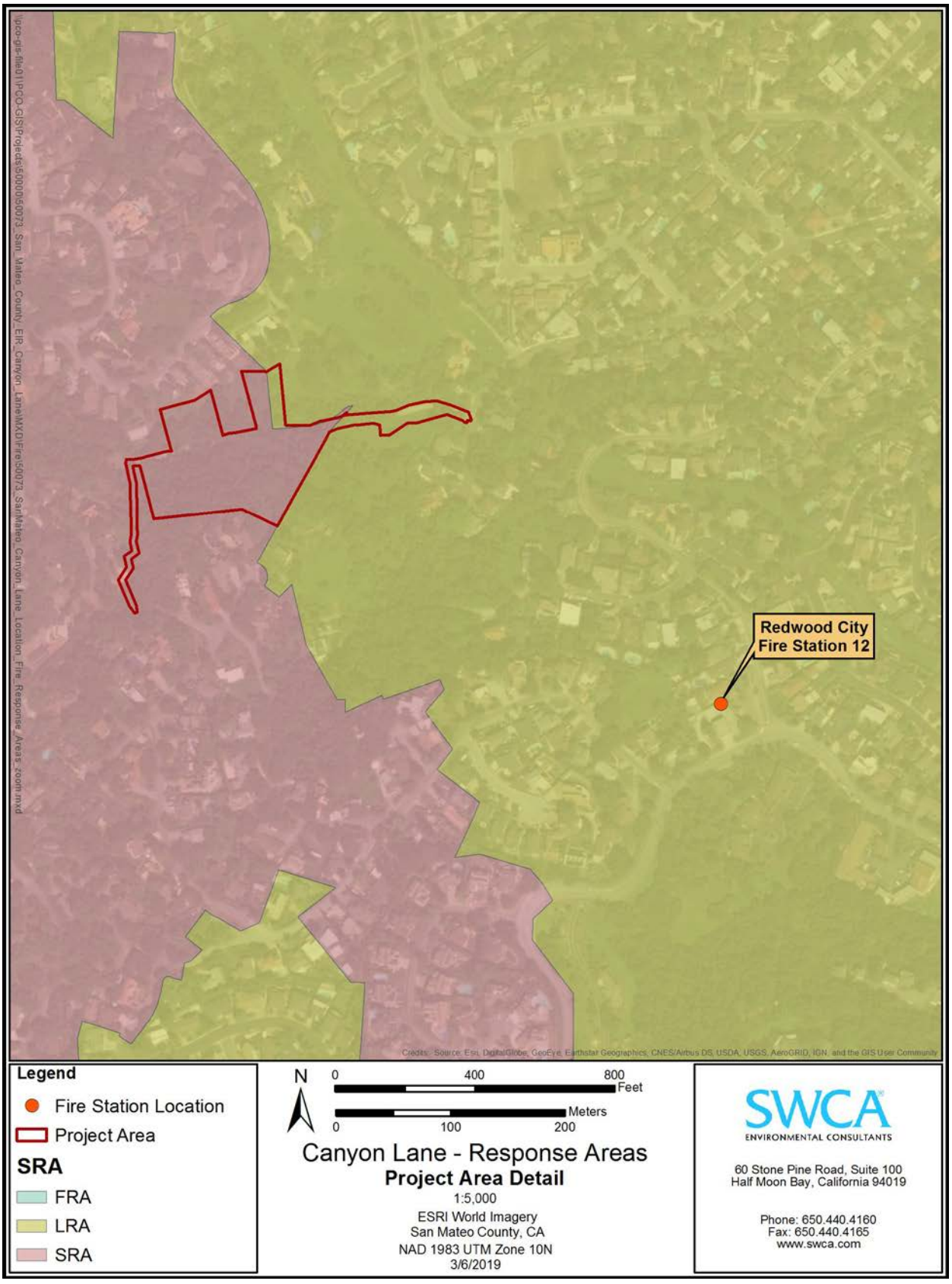


Figure 11. Fire Response Jurisdiction within the project area

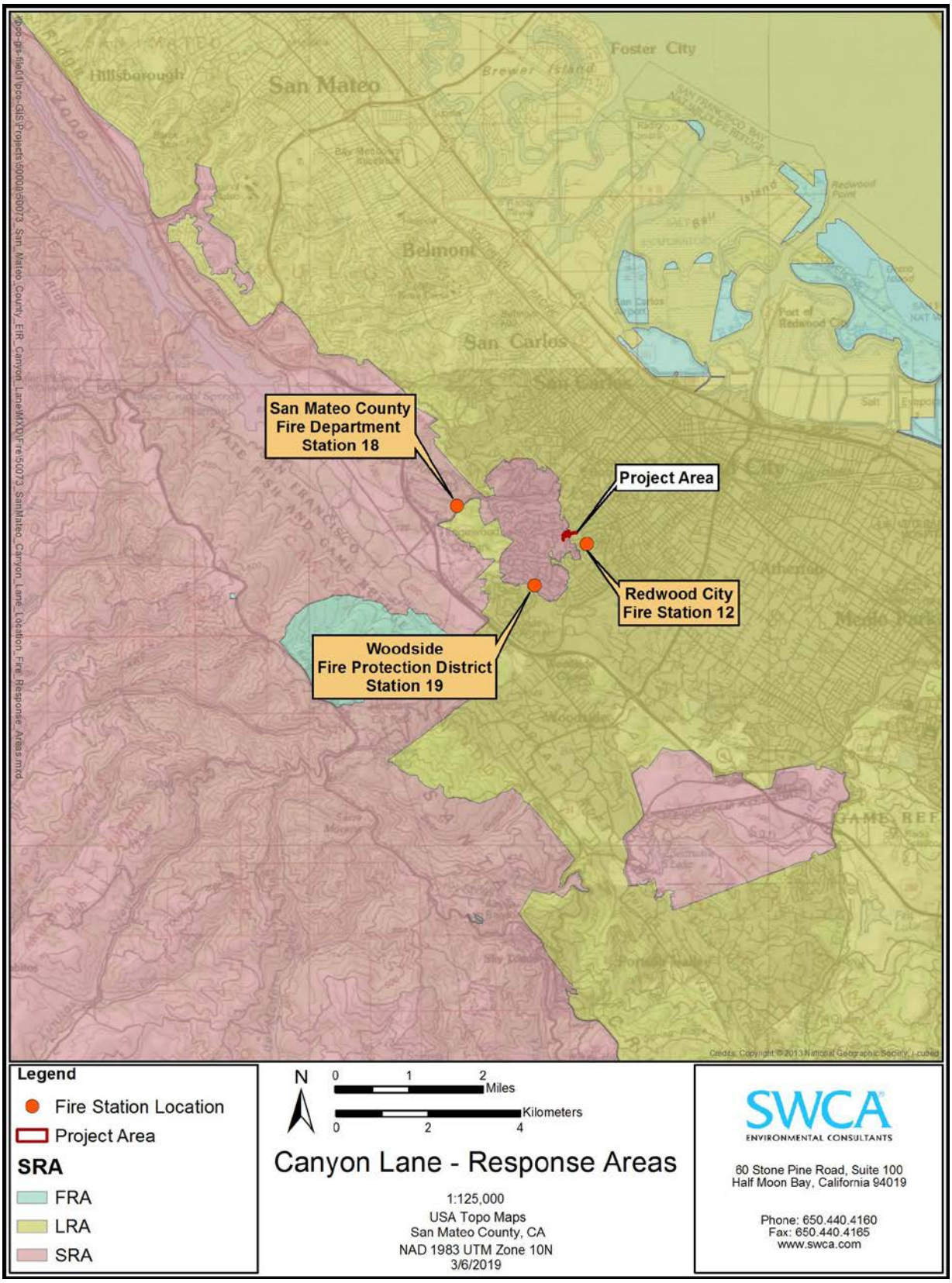


Figure 12. Fire Response across the greater landscape, showing the locations of the three closest fire stations.

Three fire stations are located within 3 miles of the project area (Figure 12):

- **San Mateo County Fire Department – Station 18**: This station is located 2.9 miles from the project area, an 8-minute drive.
- **Woodside Fire Protection District- Station 19:** This station is located 2.3 miles from the project area, an 8-minute drive.
- **Redwood City- Fire Station 12**: This station is located 1.0 miles from the project area, a 4-minute drive.

Within the unincorporated region, fire response would be provided by the San Mateo County Fire Department and the Woodside Fire Protection District. Mutual aid agreements and automatic aid agreements enable non-lead fire agencies to respond to fires outside of their district boundaries. Given the urban developed nature of the adjacent community and the network of access roads, response times would be within the acceptable time frame designated by the County (i.e., within 7 minutes)[4] from any of the three local fire departments.

Fire Access Roads

Canyon Lane is currently an unimproved gravel roadway that is inaccessible to emergency vehicles due to insufficient road width, overhanging vegetation, and insufficient emergency vehicle turnaround space.

The project would involve regrading and paving the unimproved roadway into a 20-foot-wide paved roadway to enable emergency vehicle access and meet CAL FIRE SRA Fire Safe Regulations and the California Fire Code. The roadway would incorporate an emergency vehicle turnaround apparatus and would be designed and maintained in accordance with the American Association of State Highway and Transportation Officials Standard HB-17 and the CAL FIRE SRA Fire Safe Regulations. Further, the roadway would be designated as a fire lane, and no street parking would be permitted. The entire roadway would be marked and posted in accordance with Section 22500.1 of the California Vehicle Code. The road grade should not exceed 16 percent.

Roadside vegetation should be reduced to a level that allows ease of access for emergency response personnel and equipment, reduces the number of roadside fire starts, and ensures the safety of fire suppression personnel using roads as fire control lines. Both local and state fire codes specify clearing of at least 10-feet on each side of a road or driveway and up to 15-feet of vertical clearance above. Fire apparatus access should not be obstructed in any manner, including vehicle parking or vegetation intrusion.

The installation of security gates to residential parcels should be approved by the fire department. Gates should have an approved means of emergency operation.

In the event of a bridge installation, bridges must be constructed and maintained to carry the load of fire apparatus. Load limits should be posted at both entrances to the bridge.

In accordance with the California Code of Regulations, Title 19, Division 1, Section 503.2.3. fire apparatus access roads should be designed and maintained to support the imposed loads of fire apparatus and should be surfaced to provide all-weather driving capabilities.

[4] https://performance.smcgov.org/reports/Fire

Setback from property lines

The minimum building setback from each property line in the project area would be 30 feet. Larger setbacks would be required in areas of increased slope in order to mitigate potential fire behavior.

Building Construction

The project site is located within an SRA that has a VHSZ rating.[5] A portion of the project site (the eastern segment of Canyon Lane and parcel 057-221-060) is located within an LRA that has a VHSZ.

All structures should comply with the ignition-resistive construction requirements of Chapter 7A of the California Wildland-Urban Interface Code[6]. New buildings located within the VHSZ in the SRA and LRA will comply with all sections of the California Code of Regulations Title 24, Part 2, 701A3.2 (New buildings located in any fire hazard severity zone).[7]

The broad objective of the California Code of Regulations pertaining to building standards in WUI areas is to establish minimum standards for materials and material assemblies and provide a reasonable level of exterior wildfire exposure protection for buildings in WUI areas. The use of ignition-resistant materials and design to resist the intrusion of flame or embers projected by a vegetation fire are expected to mitigate structure losses from wildfire.

The San Mateo County Fire Marshal's Office assists the San Mateo County Building Department in reviewing plans for the fire-resistive construction requirements established in the fire and building codes and has developed a joint checkoff sheet for use by the contractors, inspectors, and the plan reviewers (CAL FIRE 2018b). All new construction, remodels, and tenant improvements are reviewed by the San Mateo County Fire Marshal's Office, and field inspections determine project compliance with the state and local amendments to the building and fire codes. Prior to the final sign-off, the roads and driveways, address numbers, smoke detectors, water supply, fire suppression systems, fire alarm systems, automatic fire sprinkler systems, and vegetation clearance around the structure (PRC 4291) are inspected (CAL FIRE 2018b).

Fire Protection Systems:

In SRA areas, automatic sprinkler systems should be installed as per Section 903 of the California Fire Code.[8]

In LRA areas, as per Redwood City Code 903.2.13, approved automatic sprinkler systems should be installed in all new buildings or structures with the exception of one- and two-family residential homes, with a total floor area of 3,000 square feet or more. One- and two-family residential homes should be protected fully by an automatic fire sprinkler system in accordance with NFPA Standard 13D regardless of the square footage; the system should also be installed in accordance with the Redwood City Building Code for such occupancies, including Accessory Dwelling Units.[9]

[5] http://frap.fire.ca.gov/webdata/maps/san_mateo/fhszs_map.41.pdf

[6] http://www.fire.ca.gov/fire_prevention/downloads/ICC_2009_Ch7A_2007_rev_1Jan09_Supplement.pdf

[7] https://firesafesanmateo.org/resources/california-wildland-urban-interface-code-information

[8] https://www.citymb.info/Home/ShowDocument?id=28089

[9] https://library.municode.com/ca/redwood_city/codes/code_of_ordinances?nodeId=CH12FIPR_ARTIIREFICO

Defensible Space

As per California Government Code 51182 and Public Resources Code Sections 4290 and 4291, any person who owns, leases, controls, operates, or maintains a building or structure within the SRA and LRA must maintain a 30-foot firebreak (home defense zone) and will provide a reduced fuel zone for up to 100 feet from a structure.[10,11] Local and state fire departments carry out defensible space inspections (LE-100's) in SRAs and provide educational material to property owners.

Vegetation Management

Defensible space (fuel management zones) will be maintained by the property owners at least annually or more often as needed. Defensible space requires the installation and maintenance of Fire Safe Landscaping, as per the County guidelines.[12] Plants used in the defensible space will be selected from an approved fire-resistant planting materials list maintained by Fire Safe San Mateo County.[13]

FIRE BEHAVIOR COMPUTER MODELING

After field data were collected and available data analyzed, desktop fire behavior modeling was initiated to determine the potential fire behavior within the project area. Modeling was performed with the Interagency Fuel Treatment Decision Support System (IFTDSS 2019). IFTDSS is a state-of-the-art software and data integration framework that organizes fire and fuels software tools into a single online application. The browser-based modeling environment of IFTDSS allows users to simulate fire behavior and fire effects using the scientific algorithms and processes found in common fire behavior modeling applications, including FlamMap, Behave, FOFEM, CONSUME, and Wind Ninja (Drury et al. 2016). By integrating these tools into a server-side processing environment, IFTDSS is designed to improve the efficiency and effectiveness of fuel treatment planning for a variety of end users. This system is used by many land-management agencies across the country.

Fire Behavior Modeling Inputs

Fuels

IFTDSS uses the LANDFIRE vegetation dataset to estimate fuel conditions at a pixel resolution of 30 meters (LANDFIRE 2014). LANDFIRE data in the project area were evaluated for accuracy and suitability for fire modeling. According to LANDFIRE, the dominant fuel type in the project area was classified as TL2 Low Load Broadleaf Litter. This fuel model represents the coastal live oak vegetation assemblage. However, after consulting with local experts and fire behavior specialists and reviewing reconnaissance photos of the project area, the decision was made to modify the model to better capture the vegetation conditions on the ground, particularly the density and continuity of the fuels. The fuel model was modified to TL6, a Timber Litter Fuel model classified as a Moderate Load Broadleaf Litter model. This fuel model compared well with fuel loading information for coastal live oak, and the vertical arrangement of the fuels aligned well with photos of the project area. The intent of the fire behavior modeling was to predict the worst-case fire behavior in the project area, so accurately calibrating the fuel models to conditions on the ground was critical.

[10] https://firesafesanmateo.org/resources/defensible-space

[11] https://www.redwoodcity.org/departments/fire-department/fire-prevention/defensible-space/defensible-space-zones

[12] https://firesafesanmateo.org/resources/defensible-space/fire-safe-landscaping

[13] https://firesafesanmateo.org/resources/defensible-space/fire-resistant-plant-list

Weather/Fuel Moisture

For fire behavior modeling, IFTDSS evaluates wind speed, wind direction, and fuel moisture from the Remote Automated Weather Station (RAW) nearest to the project area. The Pulgas RAWS (37.4750, -122.2981) is within 2 miles of the proposed development. To model the worst-case fire behavior scenario, the Energy Release Component (ERC, related to the available energy at the flaming front of a fire) was first calculated for each day of the station period of record (1999-2016). The period of highest ERC for each year is assumed to be the peak of the fire season; July was determined to be the period with the highest ERC. IFTDSS then determined the 97th percentile wind and initial fuel moisture values within this timeframe. The 97th percentile weather was chosen so that modeling is carried out under extreme conditions. The 97th percentile wind speeds were 20 miles per hour during the timeframe, with a wind direction of 270 degrees. One-, 10- and 100-hour fuel moisture values for dead as well as live herbaceous and woody vegetation were further conditioned by examining probabilistic wildfire risk across a predefined larger landscape, known as a "pyrome." Pyromes are 128 areas across the continental United States exhibiting similar fire regimes, vegetation, and climate (Archibald et al. 2013). Within each pyrome, all available regional historical weather data were used to better estimate a worst-case fuel moisture profile (Short et al. 2016). For the Canyon Lane project area, IFTDSS used these regional values to adjust fuel moisture estimates taken from the Pulgas RAWS (see Table 4).

Table 4. Fuel Moisture Profile developed for 97th percentile weather conditions in the project area

Fuel Model	1-hr fuel moisture	10-hr fuel moisture	100-hr fuel moisture	Live Herbaceous fuel moisture	Live woody fuel moisture
All	4	5	9	143	164

Other IFTDSS Parameters

Crown fire behavior (the movement of fire through the crowns of trees or shrubs more or less independently of the surface fire) was modeled using the Scott and Reinhardt (2001) method, the method typically used to evaluate worst-case fire conditions. IFTDSS uses WindNinja algorithms to simulate a single-moment wind speed and direction across the model area, considering topography and drag (USFS 2018).

Fire Behavior Modeling Results

IFTDSS uses FlamMap 5.0 to model fire behavior. The primary fire behavior outputs used in this assessment are flame length, fireline intensity, rate of spread, and crown fire potential, described below. Figures 13 to 16 illustrate these four fire behavior parameters across the project area.

- **Flame Length:** The distance from the base to the tip of the flaming front. Flame length is used as an indicator of resistance to suppression and a guideline as to what suppression resources are needed. For example, National Wildfire Coordinating Group (NWCG) guidelines indicate that direct attack by hand crews is most effective for flame lengths under 4 feet, whereas engines and heavy equipment are more effective for direct attack on flame lengths up to 8 feet.
- **Fireline Intensity**: Measured in terms of heat released per unit of time from a 1-foot-wide section of the fuel bed along the flaming front, expressed as British Thermal Units per foot, in seconds (BTU/ft/sec). Like flame length, fireline intensity is used as an indicator of resistance to suppression.

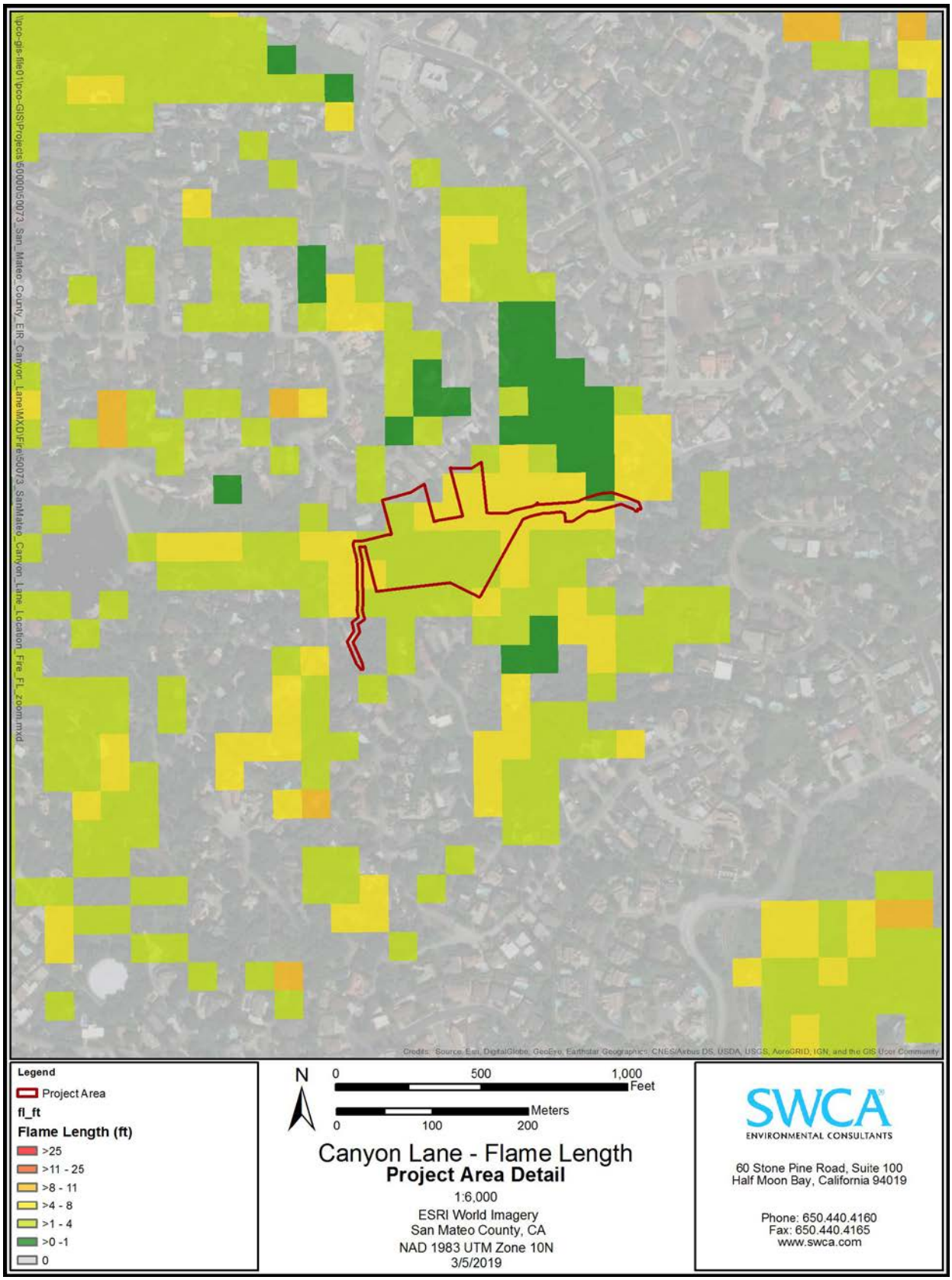


Figure 13. Projected Flame Lengths within the project area.

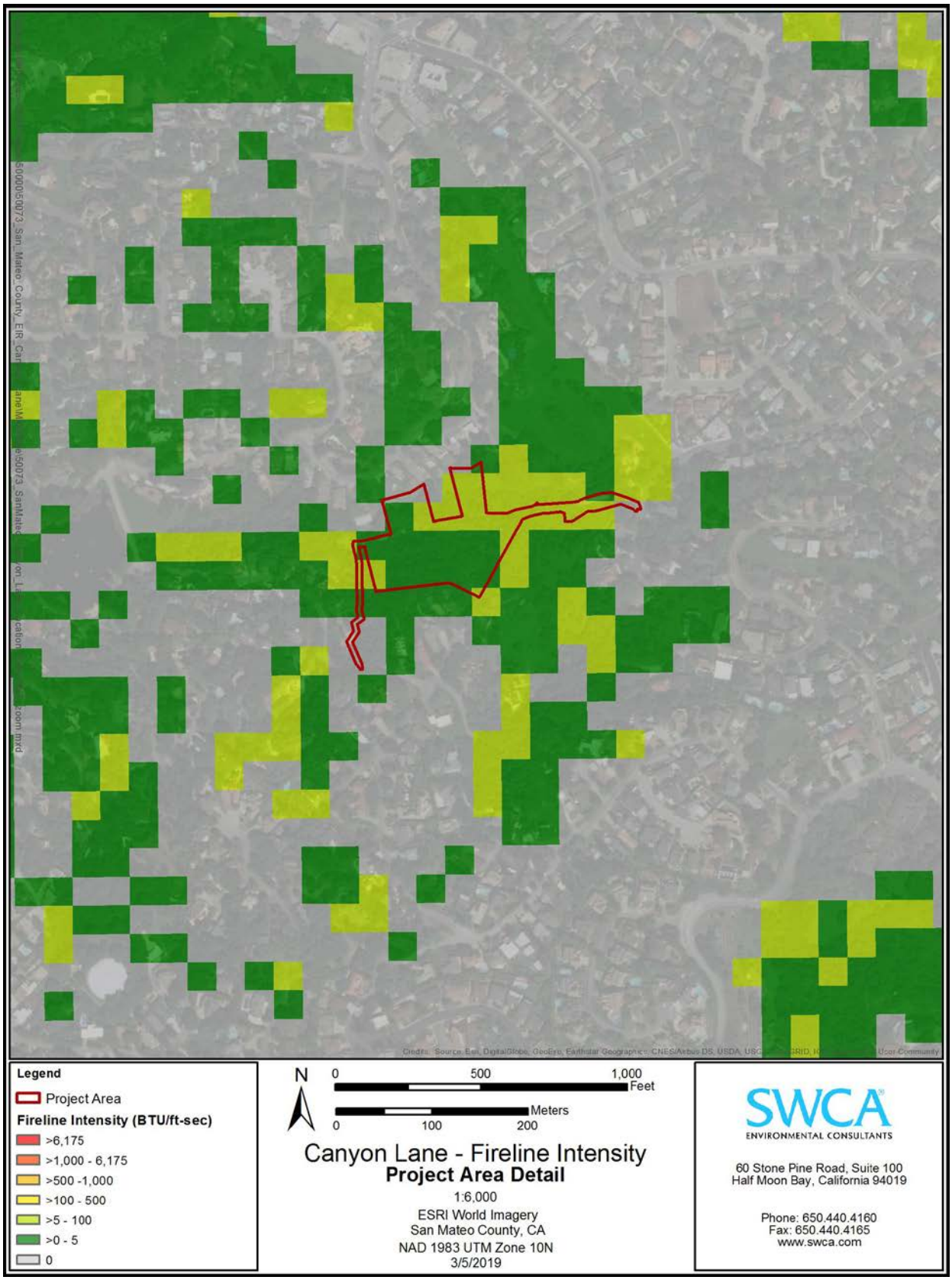


Figure 14. Projected Fireline Intensity within the project area.

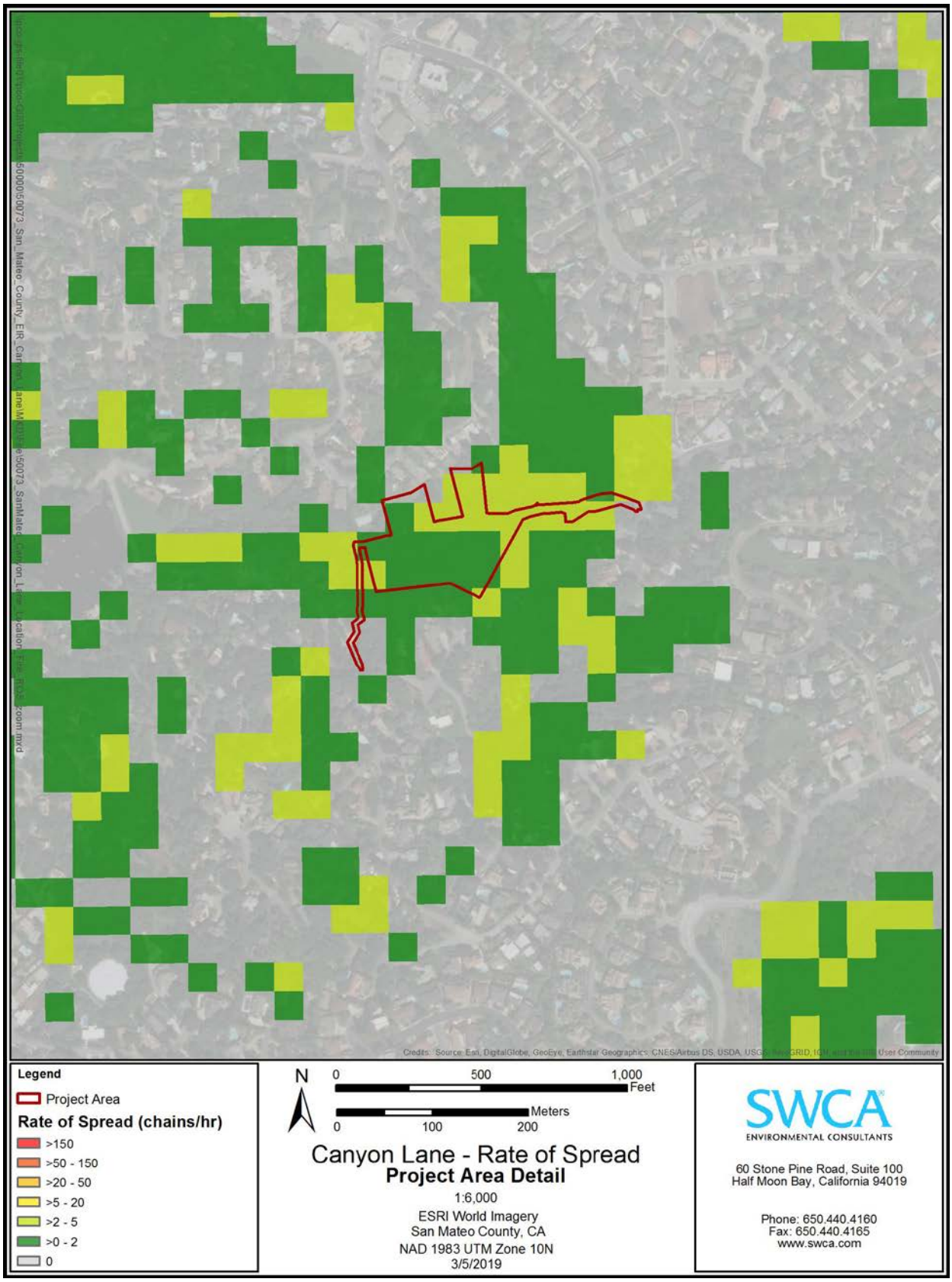


Figure 15. Projected Rate of Spread within the project area.

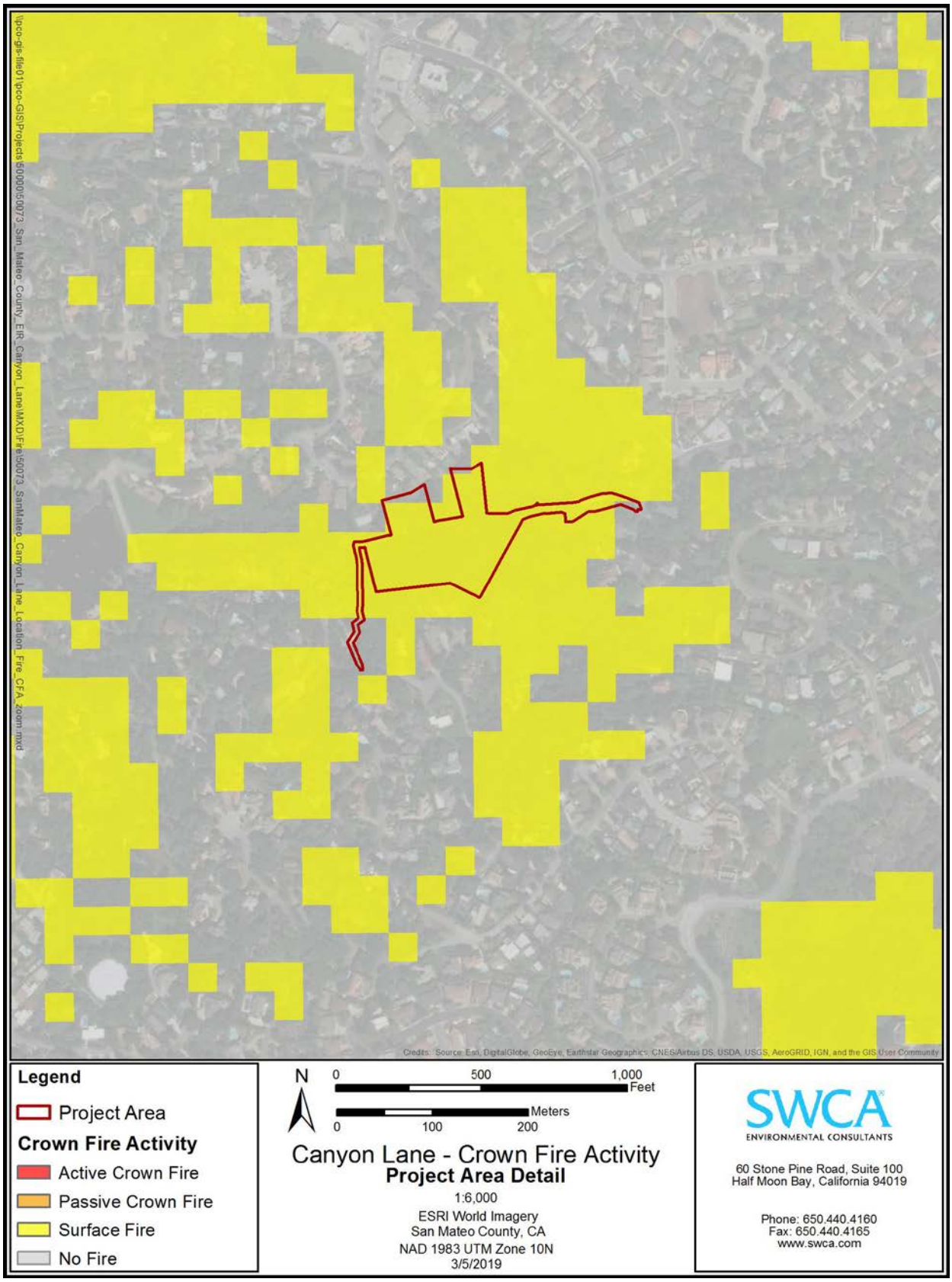


Figure 16. Projected Crown Fire Potential within the project area.

- **Rate of Spread**: The rate at which fire moves through the fuel bed, expressed in chains (66 feet) per hour. Rate of spread is helpful for planning the number and type of fire suppression resources that may be required to contain fire growing at a given rate.
- **Crown Fire Potential**: Describes fire activity in terms of no fire activity, surface fire activity, passive fire activity (torching), and active crown fire (crown to crown). This measure helps to guide treatment methods; for example, where active crown fire could be mitigated by fuel reduction that increases crown spacing.

As presented in Figures 13 to 16, wildfire behavior in the project area under current fuel conditions would be relatively low to moderate, with flame lengths primarily at 1–8 feet, fireline intensity from 0–100 BTU/ft/sec, rates of spread from 0–5 chains/hour, and surface fire only. As indicated by the surface fire behavior hauling chart (Figure 5), fire suppression under these conditions would require engines or heavy equipment. This is especially true where pockets of heavier fuels may be ignited.

Composite Wildfire Risk and Hazard Assessment

In order to model wildfire risk and hazard to the project area, the individual wildfire hazard datasets described above were combined with measures of a burn probability (fire occurrence density taken from historical perimeters and ignitions), to arrive at a composite wildfire hazard score with adjective rating from low to extreme.

All input datasets were in raster format with a cell size of 30 × 30 meters. Before running the model, SWCA equally weighted each of the input datasets (i.e., assign a percentage value reflecting that parameter's importance in the model). The parameters were then placed into a weighted overlay model, which "stacked" the datasets and evaluated an output value for each cell of the overlaid datasets. Cells in the resulting output contained an integer value representing the relative fire hazard severity (Figure 17).

When taken in isolation, the composite wildfire risk and hazard assessment would suggest the wildfire risk and hazard within the project location is low (Figure 17). However, less than 1 mile west of the project area are several vegetated open space areas (including Handley Rock Park, Edgewood Park and Natural Preserve, and, to the north west, Pulgas Ridge Open Space Preserve) that, according to fire behavior modeling, could experience more extreme fire behavior (Figures 18, 19, 20). There is a possibility that a wildfire could spread to the neighboring Emerald Hills subdivision and into the project area as a result of prevailing westerly winds (Figure 21). Interstate 280 transects these open space areas and could be a conduit for potential ignitions from motorists. It is important to consider this landscape-level risk because of the potential for large conflagrations that could spread beyond the project area, especially in the event of extreme weather. It is also important to consider that the fire behavior models classify man-made structures as non-burnable fuels, but in reality these structures may function as a combustible ember bed that could ignite if embers contact a receptive fuel (for example, leaf litter gathered in gutters). The potential structural ignitability is based upon whether the home has been "hardened" to wildfire.



Figure 17. Wildfire Hazard Risk in the project area

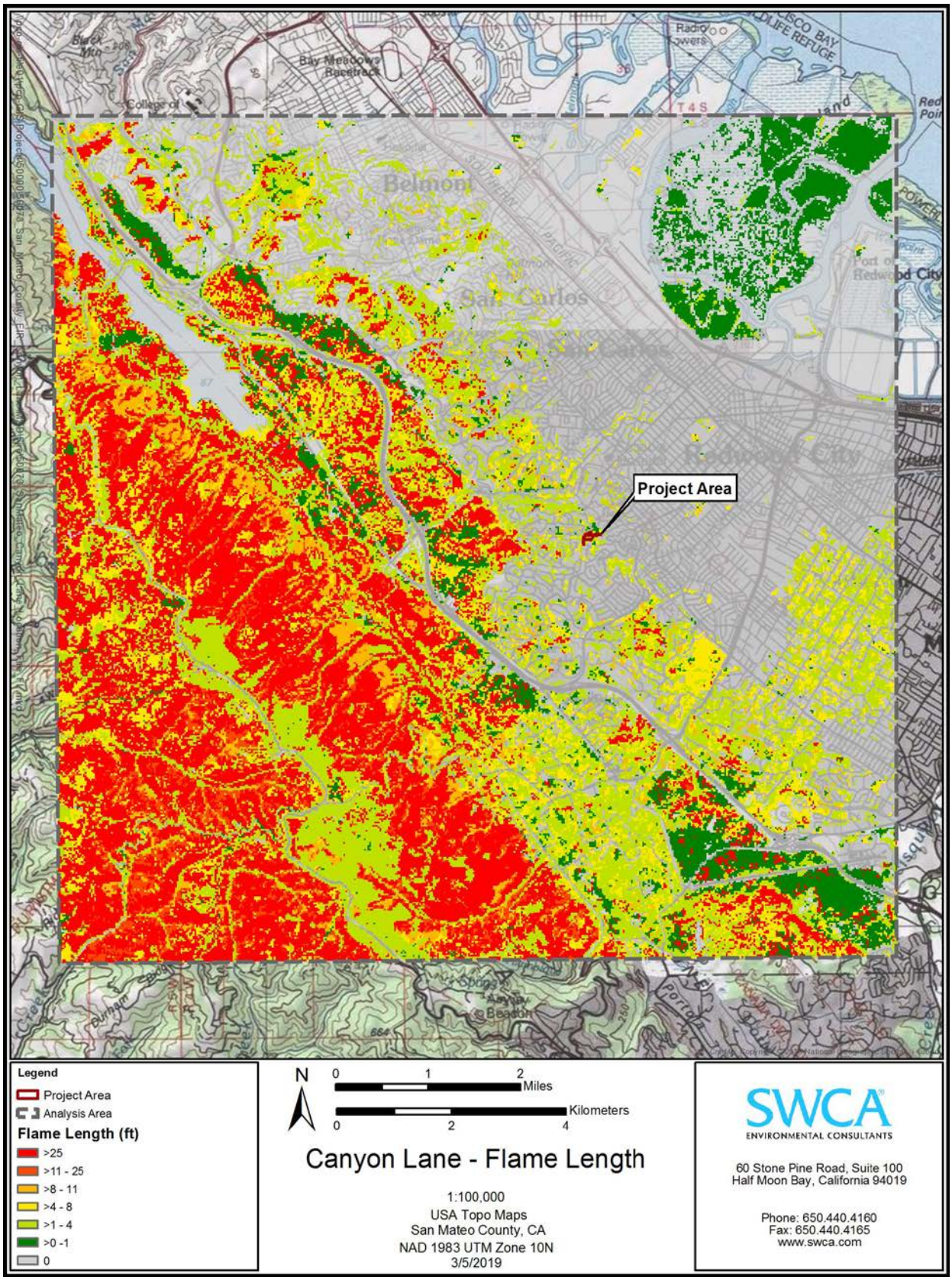


Figure 18. Potential Flame Lengths within the greater landscape

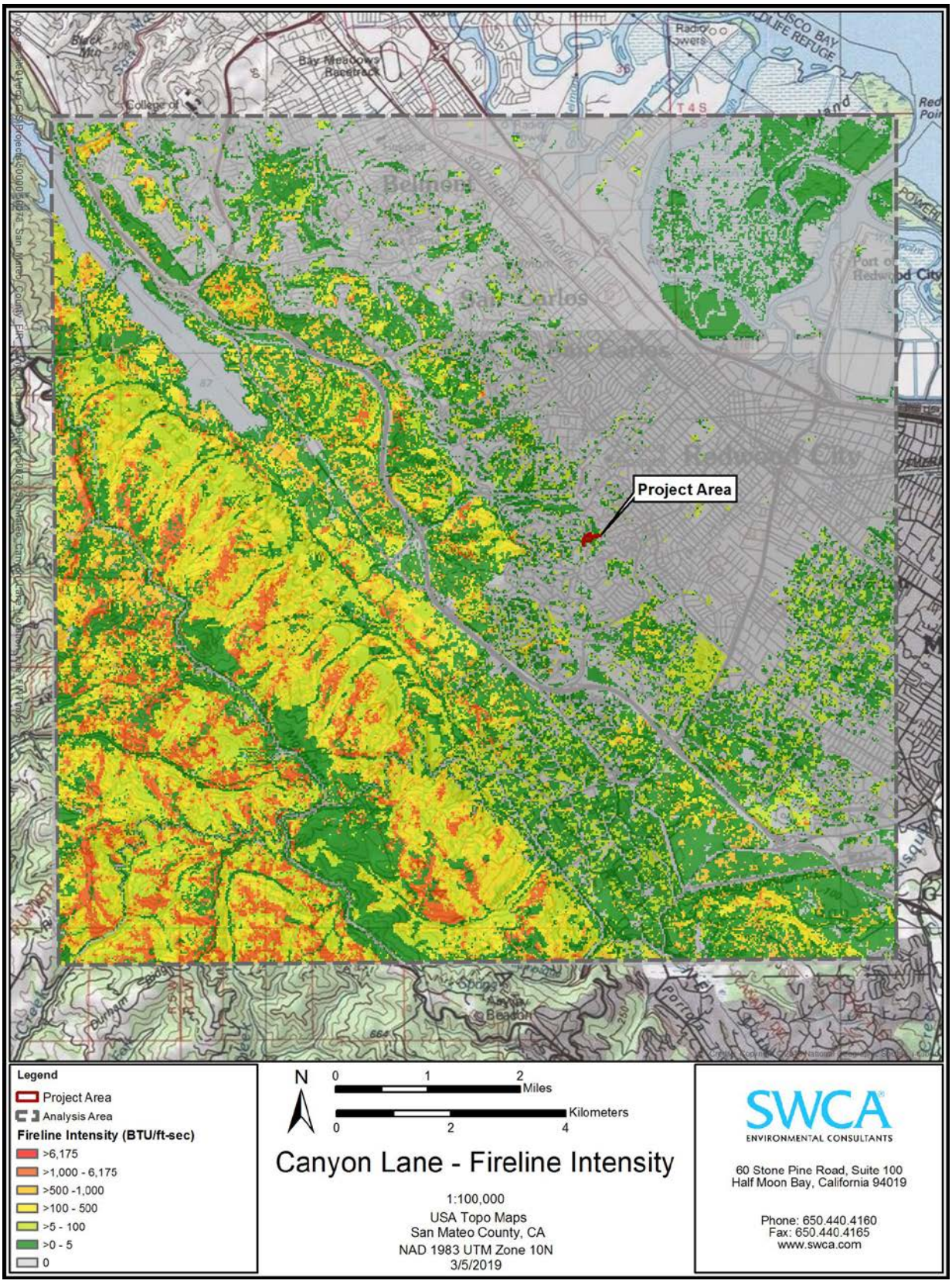


Figure 19. Potential Fireline Intensity within the greater landscape

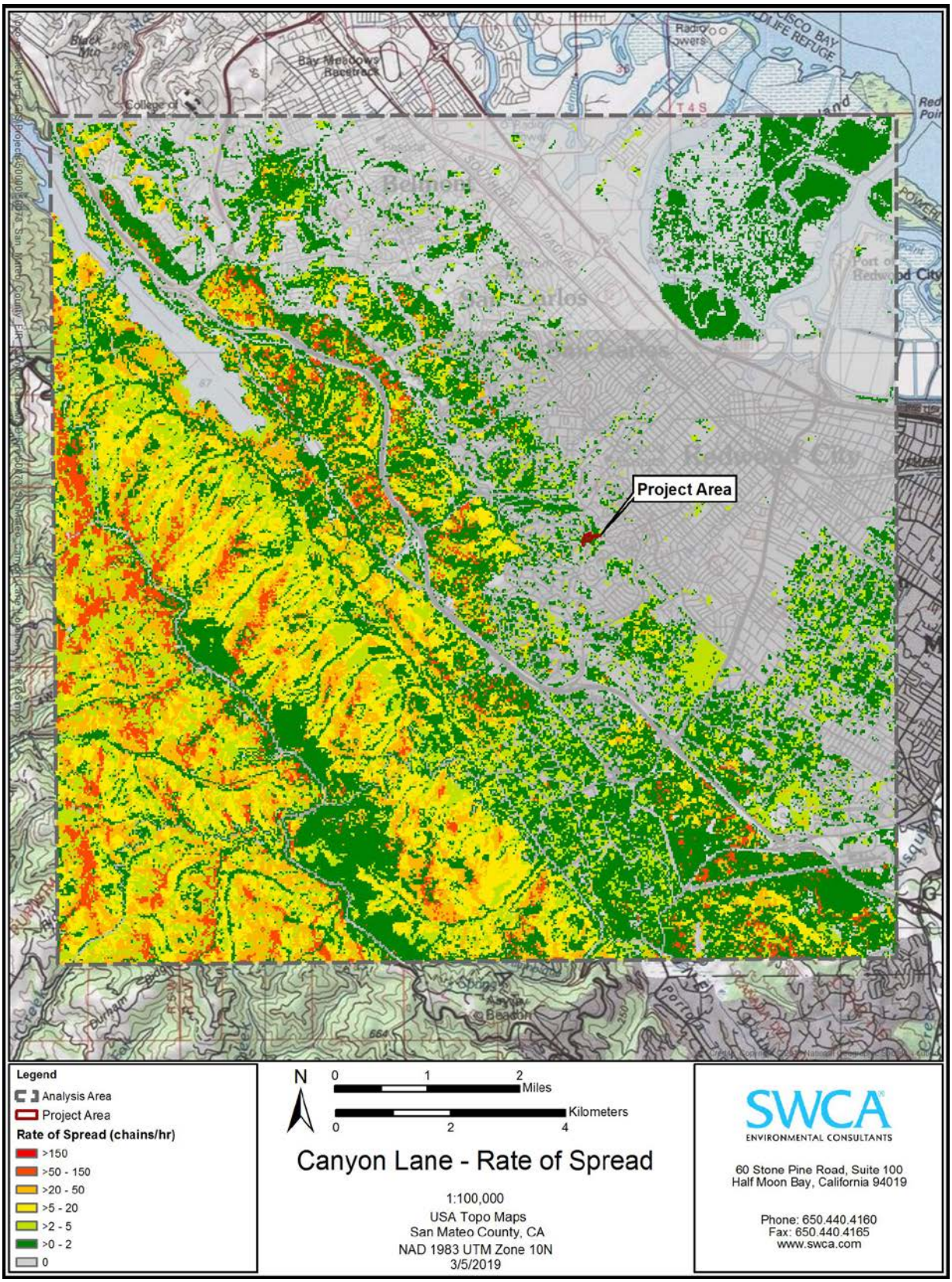


Figure 20. Potential Rate of Spread within the greater landscape

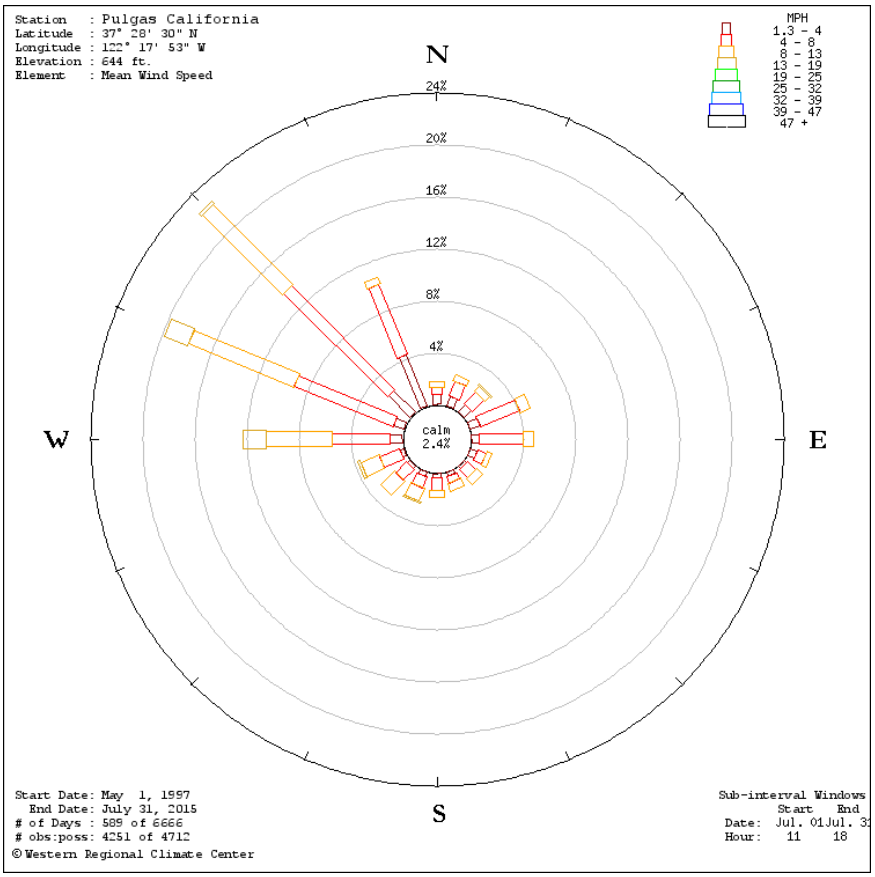


Figure 21. Wind rose from the Pulgas RAW station showing the dominant westerly wind direction during July. Source: Western Regional Climate Center.

DISCUSSION

This Wildfire Assessment analyzes the impacts of wildfire hazards resulting from implementation of the proposed project.

Canyon Lane is currently an unimproved gravel roadway that is inaccessible to emergency vehicles. The road width and overhanging vegetation impede both horizontal and vertical access by emergency vehicles. There is inadequate turnaround space and insufficient road width to safely accommodate large emergency vehicles. In the event of a wildfire, vegetation adjacent to the roadway would pose a hazard to people evacuating the area and to emergency responders and fire-fighters due to an insufficient buffer with the road. The project would involve regrading and paving the unimproved roadway into a 20-foot-wide paved roadway to enable emergency vehicle access. The roadway would incorporate an emergency vehicle turnaround apparatus and would be designed and maintained in accordance with the American Association of State Highway and Transportation Officials Standard HB-17. Further, the roadway would be designated as a fire lane, and no street parking would be permitted. The entire roadway would be marked and posted in accordance with Section 22500.1 of the California Vehicle Code. Because the project would provide emergency vehicle access and assuming that property owners would comply with all applicable design and maintenance provisions, the project would not impair any adopted emergency response or evacuation plan, and no significant impacts would occur.

The Canyon Lane project site is surrounded by residential development on all sides and areas of previous disturbance. Some portions of the project area include steep slopes with structures on the side and top of

the slope (Figure 22). The project site is located within an oak woodland vegetation assemblage that is modelled primarily as a timber litter fuel, with small patches of grass and shrubland vegetation. The area has experienced low wildfire occurence over the period of record (1960-2018), and fire behavior modeling predicts the fuels in the area would burn with mostly low to moderate intensity, in terms of flame length, rate of spread, and fireline intensity. During project implementation, fuel loading would be decreased in the area, as native woodland vegetation is removed or thinned in order to accommodate the road realignment and improvements and for the construction of a single-family home on one of the 12 parcels (057-222-290 & 300). The road realignment would support the future development of the 11 remaining currently undeveloped parcels, thereby leading to the removal or reduction of additional native vegetation community assemblages and further disturbing the fuel continuity. Overall the project would lower the potential fire behavior, as it would reduce existing fuel loading.

The area is subject to prevailing westerly winds, which could result in fire spread from adjacent open space located less than 1 mile west of the project site. According to fire modeling, adjacent open space would burn under more intense fire behavior, with more rapid rates of spread, increased fireline intensity, and greater flame lengths (Figures 19 to 20). In the event of an ignition within the open space or from Interstate 280, wildfire exposure would be heightened for the Emerald Hills community. Canyon Lane is in direct alignment with the prominent wind direction; if there were an ignition from the west, it could accelerate towards the project area, moving the fire from east to west, up the canyon. Under extreme conditions, fire could spread through existing residential areas into the project area. Westerly winds, however, are associated with more humid air from the Pacific, and therefore the potential for extreme weather out of the west is unlikely. Furthermore, the large network of roads within the Emerald Hills subdivision would facilitate relatively rapid emergency response, which would ease containment of a fire before it gains in size. Development within the project area would reduce the area of native woodland vegetation, lowering fuel loading and therefore mitigating fire risk overall, regardless of whether an ignition occurs within or adjacent to the project area.

Under extreme conditions, the area may be impacted by dry Diablo winds out of the east and northeast. These strong winds could occur during the late fall when the region experiences low relative humidity (Bowers 2018). However, to the east of the project area is heavy urban development, and therefore the potential for a wildfire ignition to spread from east to west towards the project area is minimal.

Potential ignition sources would be increased during construction activities and as unoccupied residential parcels are developed due to increased human activity. Safety mechanisms would be followed during all construction activities, including the use of spark arrestors and provision of fire- fighting equipment for use by construction crews. The project would comply with all applicable fire codes, which would require the use of fire-resistant construction materials and the development of defensible space, as well as vegetation maintenance and buffers along roadways. These actions would reduce potential structural ignitability and limit fuel continuity and loading, mitigating potential spread of fire from any ignition sources. The project would realign, widen, and improve the current condition of Canyon Lane, as well as develop single-family residences within the unoccupied parcels, which would break the continuity of native woodland vegetation. Developed land would function as a fuel break to slow the spread rate of wildfire and lessen fire intensity in the form of reduced flame lengths and fireline intensity.

In summary, although wildfire occurrence is expected to increase in the greater landscape with increased population growth, projected drought, climate change, and increased fuel accumulation, the development itself is in an area of lower risk, where wildfire occurrence, duration, and size are not expected to be significantly increased with the construction of the project.

MITIGATION MEASURES

The following mitigation measures are compiled from various local sources. Although specific wildfire mitigation measures are not proposed herein, these general mitigation measures are recommended for the protection of communities and infrastructure from wildfire hazard and risk within the project area.

Defensible Space clearing standards

California State Law requires clearance of flammable vegetation for 30 feet around the house. Flammable material includes all dead vegetative matter and live canopy fuels, and fuel reduction measures are recommended to avoid the spread of fire from one tree or shrub to another. In many instances, 30-foot clearance would not be enough to protect a home from wildfire, and some local ordinances require 100 feet of clearance. This is especially true of homes in steep or rolling terrain (characteristic of the project area), where additional clearance would be necessary to combat the influence of slope on fire behavior. As stated in the County Community Wildfire Protection Plan, defensible space is the responsibility of each individual homeowner, and recommendations are to create the maximum possible extent of defensible space around a home (Harper et al. 2019). Maintenance of defensible space is critical and should be accomplished prior to the fire season.

Woodland Health and Resilience

Many homeowners select a woodland setting for their home for aesthetic and wildlife values. One way to mitigate wildfire risk in these vegetation communities is to enhance woodland health and stand resiliency. Trees should be thinned out so that their crowns are separated when they are full grown. Trees should be removed from within 30 feet of a property and spaced out within a 100-foot buffer. Oaks around the home should be regularly pruned of dead wood. In addition, low-hanging branches should be pruned off to avoid being ignited by a ground fire. Trees should be kept in as healthy and vigorous a situation as possible to minimize the fuel loading from dead or dying trees (Harper et al. 2019).

Landscaping

Landscaping plants should be selected from an approved fire-resistant list provided by the San Mateo Fire Safe Council. All landscape trees should be carefully selected and positioned to minimize creation of ladder fuels below natural canopy.

Roadside Fuel Breaks

Roadside fuel breaks are typically between 10 and 40 feet wide and are typically constructed manually by chain-saw crews. Removed vegetation can be processed by chippers, treated by pile burning or lop and scatter, or removed off site. The San Mateo-Santa Cruz County CWPP (2018) provides specifications for roadside fuel breaks. [14]

Shaded Fuel Breaks

Shaded fuel breaks can be placed around structures or around a neighborhood to augment individual defensible space projects. The shaded fuel break should be developed in collaboration with the fire community and responsible fire agency and adapted to local environmental constraints (CAL FIRE 2018a).

[14] http://www.sanmateorcd.org/wp-content/uploads/2018/11/2018_CWPP_update_final-Opt.pdf

Powerlines

Locally, PG&E is the sole owner of the power distribution network. PG&E follows a strict internal program for utility line clearance within the PG&E right of way.

Hardening the Home

FIRE SAFE San Mateo County provides recommended actions that homeowners can take to hardening their home[15] so that it is ember-ignition resistant (resistant to embers carried aloft of a flaming front). Hardening actions include retrofitting a roof using fire-resistant materials such as composition, metal, or tile. In order to prevent embers entering a structure, homeowners are advised to cover all vents with a fine mesh with openings of 1/8 inch. Wood siding should be replaced with ignition-resistant building materials such as stucco or fiber cement. Many of the FIRE SAFE and FIREWISE guidelines are available to homeowners; following these guidelines can help to improve a structures survivability during a wildfire.[16]

Fire response and Evacuation

Pre-incident planning for fire operations can be used to improve fire response, familiarize responders to the area, and pre-identify hazards that may impact fire suppression strategies.[17]

Public Education and Outreach

The local community is heavily engaged in wildfire prevention and fire agencies, including CAL FIRE and the local fire departments, and recognize that fire prevention education is the most effective way to mitigate the number and type of ignitions. Organizations such as the Fire Safe Council and Resource Conservation Districts provide fire prevention support to the public; CAL FIRE also participates in FIRE SAFE programs, providing technical expertise to stakeholders. The San Mateo-Santa Cruz Unit Strategic Fire Plan (2018) and the San Mateo-Santa Cruz Community Wildfire Protection Plan (2018) provide detailed information on community engagement for fire prevention, with recommended actions to mitigate wildfire risk through education and outreach.[17, 18]
CAL FIRE identifies the education of residents as a strategy for fire prevention in the 2018 Unit Plan. The San Mateo-Santa Cruz Unit plans to educate residents using LE-100 inspections (defensible space inspections) and public contacts. The San Mateo County Fire Marshal's Office provides fire prevention services for unincorporated areas.

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[15] https://firesafesanmateo.org/resources/defensible-space/hardening-your-home

[16] https://firesafesanmateo.org/images/documents/home_survival_in_wildfire_prone_areas_8939.pdf

[17] http://cdfdata.fire.ca.gov/pub/fireplan/fpupload/fpppdf1618.pdf

[18] http://www.sanmateorcd.org/wp-content/uploads/2018/11/2018_CWPP_update_final-Opt.pdf

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