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July 20, 2017

Draft Environmental Impact Report (Draft EIR)

Project:	UCSF Mount Sutro Open Space Reserve Vegetation Management Plan
Location:	UCSF Parnassus Heights campus site
Block/Lot:	2634A/011
Sponsor:	University of California, San Francisco (UCSF)
Lead Agency:	The Regents of the University of California
Staff Contact:	Diane Wong, UCSF (415) 502-5952

This is the Draft Environmental Impact Report (Draft EIR) for the above-named project, prepared pursuant to the requirements of the California Environmental Quality Act (CEQA). This document is available for a 46-day public review and comment period beginning **July 24, 2017 through September 8, 2017**.

Project Description

The University of California, San Francisco (UC San Francisco or UCSF) is proposing to adopt and implement a vegetation management plan for the UCSF Mount Sutro Open Space Reserve (Reserve). The University-owned Reserve is a largely undeveloped 61-acre forest located within UCSF's Parnassus Heights campus site at the center of San Francisco. The Reserve is surrounded by UCSF's hospital, research, educational and support structures to the north/northwest, and by urban residential neighborhoods to the south, east, and west. The Reserve, designated as permanent open space by the Regents of the University of California (Regents), is open to the public and serves as a point of respite and recreation for UCSF and for the greater community. The primary purposes of the proposed Vegetation Management Plan (plan) fall into four broad categories:

- Protect the safety of Reserve users and adjacent campus and residential properties
- Improve and enhance the health and stability of the ecosystem
- Enhance the visual design and aesthetic experience in the Reserve
- Maintain and ensure public access to the Reserve

To achieve a healthy and stable ecosystem, the plan outlines strategies for increasing the biodiversity of vegetation, conserving existing native vegetation, improving the regeneration and recruitment of tall tree species, managing insect and disease pressure on blue gum eucalyptus, and improving structural diversity. The purpose of the plan is to provide a management framework for protecting, enhancing, and restoring vegetation in the 61-acre Reserve. University staff worked with consultants and a panel of technical advisors to develop the plan. The Draft plan is available at https://www.ucsf.edu/cgr/cgr-projects/mount-sutro-open-space-reserve.

For purposes of CEQA, the University of California is lead agency.

(continued on next page)

Anticipated Environmental Effects

The Draft EIR analyzes potential impacts associated with the following: Aesthetics; Air Quality; Biological Resources; Cultural and Tribal Cultural Resources; Forestry Resources; Geology and Soils; Greenhouse Gas Emissions; Hazards and Hazardous Materials; Hydrology, Water Quality and Water Supply; Noise; Recreation; Transportation and Traffic; and Wind. Significant environmental effects anticipated as a result of the project relate to Aesthetics; Biological Resources; Geology and Soils; Hazards and Hazardous Materials; Hydrology and Water Quality; Recreation; Transportation and Traffic; and Wind. The project site is not located on any of the lists of sites enumerated under Section 65962.5 of the Government Code.

Public Review and Comment

As indicated above, the Draft EIR is available at http://campusplanning.ucsf.edu/ for a 46-day public review and comment period beginning **July 24, 2017 through September 8, 2017.**

To give written feedback on the Draft EIR, comments should be sent to the attention of Ms. Diane Wong at the address noted below, or submitted via email to the following address: **EIR@planning.ucsf.edu**. All comments must be received no later than **September 8, 2017**.

Paper copies of the Draft EIR are also available for viewing at the UCSF Library at 530 Parnassus Avenue, and the following public library branches: Sunset Branch, 1305 18th Avenue; and the Park Branch, 1833 Page Street.

EIR Public Hearing

A public hearing on the Draft EIR is scheduled for Thursday, August 24, 2017 beginning at 6:30 PM. The hearing will be held at the Parnassus Heights campus site at Millberry Union, 500 Parnassus Avenue, San Francisco, CA. The purpose of the public hearing is to receive public comments on the adequacy and accuracy of the information presented in the Draft EIR.

Please note that all public comments made in writing or in oral testimony at the public hearing will be part of the public record. Comments received at the public hearing or in writing will be responded to in a Comments and Responses document to be prepared subsequent to the close of the comment period. After preparation of the Comments and Responses document, a draft of the Final EIR will be prepared for certification by the University of California.

Thank you for your interest in this project.

Sincerely,
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University of California, San Francisco

Vegetation Management Plan for the Mount Sutro Open Space Reserve

Draft Environmental Impact Report

July 2017

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University of California, San Francisco

Vegetation Management Plan for the Mount Sutro Open Space Reserve

Draft Environmental Impact Report

July 2017

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ACRONYMS AND ABBREVIATIONS

A

AAM	Annual Arithmetic Mean
AB	Assembly Bill
ACUPCC	American Colleges and University Presidents Climate Commitment
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model

B

BAAQMD	Bay Area Air Quality Management District
BMP	best management practice

C

CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model Version 2016.3.1
CalEPA	California Environmental Protection Agency
CalFire	California Department of Forestry and Fire Protection
Cal-IPC	California Invasive Plant Council
Caltrans	California Department of Transportation
CAP	Clean Air Plan
CARB	California Air Resources Board
CCR	California Code of Regulations
CDC	California Resources Agency Department of Conservation
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CEQA Guidelines	Guidelines for Implementation of the California Environmental Quality Act
CFR	Code of Federal Regulations

CGS	California Geologic Survey
CH_4	methane
C_2H_3Cl	vinyl chloride
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
Committee	Technical Advisory Committee
CRHR	California Register of Historic Resources
CSS	Combined Sewer System
CUFR	Center for Urban Forest Research
CVC	California Vehicle Code
CWA	Clean Water Act

D

dB	decibel
dBA	A-weighted decibel
DBH	diameter at breast height
DTSC	California Department of Toxic Substances Control

E

EAA	Emergency Assembly Areas
EIR	Environmental Impact Report
ESA	Endangered Species Act

F

FEMA	Federal Emergency Management Agency

G

GHG	greenhouse gas
GHG Reduction Strategy	Strategies to Address Greenhouse Gas Emissions
GPS	global positioning system

GWP	global warming potential

H

H_2S	hydrogen sulfide
HFC	hydrofluorocarbon
HI	Health Index
HRA	Health Risk Assessment

I

IPCC	International Panel on Climate Change
IS	Initial Study
ISA	International Society of Arboriculture

K

KOP	Key Observation Point

L

L_{01}	Noise level that is equaled or exceeded 1 percent of the specified time, considered the perceived maximum noise level.
L_{10}	Noise level that is equaled or exceeded 10 percent of the specified time, commonly called the "intrusive sound level."
L_{50}	Noise level that is equaled or exceeded 50 percent of the specified time
L_{90}	Noise level that is equaled or exceeded 90 percent of the specified time
L_{den}	Day Evening Night Sound Level
L_{dn}	Day/Night Average Sound Level
L_{eq}	equivalent sound level
L_{max}	maximum noise level
LRDP	Long Range Development Plan

M

MBTA	Migratory Bird Treaty Act
MCV	Manual of California Vegetation
mgd	million gallons per day

mg/m^3	milligrams per cubic meter
MM	mitigation measure
MT CO_2e	metric ton of carbon dioxide equivalent
Muni	San Francisco Municipal Railway

N

NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NEHRP	National Earthquake Hazards Reduction Program
N_2O	nitrous oxide
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places

O

O_3	ozone

P

Panorama	Panorama Environmental, Inc.
Pb	lead
PFC	perfluorocarbon
plan, proposed plan	Mount Sutro Open Space Reserve Vegetation Management Plan
$PM_{2.5}$	particulate matter less than 2.5 micrometers in size
PM_{10}	particulate matter up to 10 micrometers in size
Policy	University of California Policy on Sustainable Practices
ppb	parts per billion
ppm	parts per million
PRC	Public Resources Code

R

RAQS	Regional Air Quality Strategy
RCRA	Resource Conservation and Recovery Act
Regents	Regents of the University of California
Reserve	Mount Sutro Open Space Reserve
ROG	reactive organic gas
RTP	regional transportation plan
RWQCB	Regional Water Quality Control Board

S

SAP	Sustainability Action Plan
SB	Senate Bill
Scoping Plan	Climate Change Scoping Plan
SCP	Stormwater Control Plan
SF_6	sulfur hexafluoride
SFBAAB	San Francisco Bay Area Air Basin
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SFMTA	San Francisco Municipal Transportation Agency
SFPUC	San Francisco Public Utilities Commission
SIP	State Implementation Plan
SO_2	sulfur dioxide
SSC	Species of Special Concern
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board

T

TAC	Toxic Air Contaminant
TCP	Traffic Control Plan

U

UC	University of California
UCSF	University of California, San Francisco
UCSF GHGRS	University of California, San Francisco Greenhouse Gas Reduction Strategy

µg/m^3	micrograms per cubic meter
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

V

VOC	volatile organic compound

W

WHO	World Health Organization
WRCC	Western Regional Climate Center

1 INTRODUCTION

1.1 PURPOSE OF THIS ENVIRONMENTAL IMPACT REPORT

The University of California, San Francisco (UCSF) proposes to implement the UCSF Mount Sutro Open Space Reserve Vegetation Management Plan (proposed plan, or plan) within the Mount Sutro Open Space Reserve (Reserve) on UCSF's Parnassus Heights campus site in San Francisco, California. This Environmental Impact Report (EIR) has been prepared in accordance with the California Environmental Quality Act (CEQA) (Public Resources Code [PRC] § 21000 *et seq.*) and the amended Guidelines for the Implementation of CEQA (CEQA Guidelines) (14 California Code of Regulations [CCR] § 15000 *et seq.*) to provide an assessment of the potentially significant environmental effects of the proposed plan.

The University of California (the University or UC) is the "lead agency" for the plan evaluated in this Draft EIR. The Board of Regents of the University of California (The Regents), or its delegated committee or administrative official, has the principal responsibility for approving this project.

UCSF has prepared this EIR to:

- Inform the general public, the local community, and public agencies of the nature of the proposed plan; its potentially significant environmental effects; feasible mitigation measures to avoid or mitigate those effects; and reasonable and feasible alternatives to the proposed plan;
- Enable the University to consider the environmental consequences of approving the proposed plan; and
- Satisfy CEQA requirements.

As described in CEQA and the CEQA Guidelines, public agencies are charged with the duty to avoid or substantially lessen significant environmental effects of proposed projects, where feasible. A public agency is obligated to balance the proposed project's significant effects on the environment with its benefits, including economic, social, technological, legal, and other benefits. This EIR is an informational document that, as required by CEQA, (1) assesses the potentially significant environmental effects of the proposed plan, including cumulative impacts, (2) identifies feasible mitigation measures to avoid or substantially reduce significant impacts, (3) identifies any significant and unavoidable adverse impacts that cannot be mitigated to less than significant levels, and (4) evaluates a range of reasonable alternatives to the proposed plan, including the No Project Alternative, that would eliminate or substantially reduce any significant adverse environmental effects of the proposed plan.

The CEQA lead agency is required to consider the information in the EIR, along with any other relevant information in the administrative record, in making its decision on a proposed project. Although the EIR does not determine the ultimate decision that will be made regarding implementation of the proposed plan, CEQA requires the University to consider the information in the EIR and make findings regarding each significant effect identified in the EIR before it can approve the proposed plan. The Regents, or its delegated committee or administrative official, would certify the Final EIR prior to adopting the proposed plan.

1.2 SUMMARY OF THE PROPOSED PLAN

UCSF proposes to implement the plan on the Reserve. The age of the forest, forest pathogens, and recent drought conditions have caused a considerable decline in the health of the forest. The plan includes implementation of vegetation management activities to improve the conditions in the forest, including removing dead, dying, unhealthy, and structurally unsound trees; removing non-native understory vegetation; planting new trees; native plant restoration; managing defensible space; and maintaining trails and public access.

The purpose of the plan is to provide a management framework for protecting, enhancing, and restoring vegetation in the Reserve. The plan would address the potential threats in the Reserve: the number of dead, dying, unhealthy, and structurally unsound trees within the Reserve pose a potential threat to human safety (i.e., tree fall and fire hazard), and the composition of the forest poses a threat to the health of the forest and the corresponding aesthetic and recreational experience of people that use the Reserve.

The objectives of the plan, as summarized, are to:

1. Protect the safety of Reserve users and adjacent campus and residential properties
2. Improve and enhance the health and stability of the ecosystem
3. Enhance the visual design and aesthetic experience in the Reserve
4. Maintain and ensure public access to the Reserve

1.3 ENVIRONMENTAL REVIEW PROCESS

1.3.1 Draft EIR Publication and Review

UCSF has filed a Notice of Completion with the Governor's Office of Planning and Research, State Clearinghouse indicating that this Draft EIR has been completed and is available for review and comment by agencies and the public.

This Draft EIR is being circulated to local, state, and federal agencies; organizations; the public; and interested parties who wish to review and comment on the report. Written comments may be submitted to UCSF during the 46-day public review period from July 24th to September 8th.

To ensure inclusion in the Final EIR and full consideration by the lead agency, written comments on the Draft EIR may be submitted by mail or email to:

Mail: Diane Wong, Environmental Coordinator
UCSF Campus Planning
654 Minnesota Street
San Francisco, California 94143-0286

Email: EIR@planning.ucsf.edu

Copies of the Draft EIR and relevant materials referenced therein are available for review online at https://campusplanning.ucsf.edu/ and at the following locations:

- UCSF Kalmanovitz Library, 530 Parnassus Avenue, San Francisco, CA 94143
- San Francisco Public Library – Sunset Branch, 1305 18th Avenue, San Francisco, CA 94122
- San Francisco Public Library – Park Branch, 1833 Page Street, San Francisco, CA 94117

In reviewing the Draft EIR, readers should focus on the document's adequacy in identifying and analyzing significant effects on the environment and ways in which the significant effects of the proposed plan might be avoided or mitigated. Following the close of the review period, responses to comments on the Draft EIR will be prepared and published for public review. The Draft EIR, the responses to comments, and any text changes made to the Draft EIR and its appendices will constitute the Final EIR.

1.3.2 Type of EIR

This is a project level EIR prepared pursuant to Section 15161 of the State CEQA Guidelines to evaluate the impacts associated with the proposed plan. Each campus of the University is required to prepare a Long Range Development Plan (LRDP) that sets forth concepts, principles, and plans to guide the future growth of the campus. On November 20, 2014, the Regents adopted UCSF's 2014 LRDP, which outlines development proposals for UCSF through 2035. The 2014 LRDP reaffirms UCSF's commitment to the Reserve's designation as permanent open space and its availability for public use. One of the site-specific objectives in the 2014 LRDP is to:

> "Preserve the Mount Sutro Open Space Reserve as permanent open space, and serve as the steward of the Reserve by maintaining and expanding the trail system and by ensuring the safety of visitors and neighboring structures."

The 2014 LRDP also describes the vegetation management planning efforts and community process to address key issues including safety, fire hazards, and user experience. An EIR was prepared for the 2014 LRDP, which was certified by the Regents in November 2014 (State Clearinghouse Number 2013092047). The EIR identified the environmental impacts of the implementation of the 2014 LRDP, which includes any envisioned plans and activities that could occur across the UCSF campus sites. UCSF is bound to implement mitigation measures

identified in the 2014 LRDP where the measures are relevant to the work that UCSF undertakes on its campus sites. Several of the measures are relevant to the plan for the Reserve. The relevant 2014 LRDP measures are listed in the Project Description and identified in each resource subsection of **Section 4**. The analysis presented in **Section 4** evaluates environmental impacts that would result from implementation of the proposed plan following the application of these mitigation measures, which are considered part of the plan as proposed. The mitigation measures that are proposed to reduce impacts from the proposed plan would be monitored pursuant to the Mitigation Monitoring and Reporting Plan that will be adopted for the proposed plan by the Regents.

1.3.3 Public and Agency Review

On February 6, 2017, a Notice of Preparation (NOP), including an Initial Study (IS) for the plan, was published. The 30-day scoping period ended on March 8, 2017. A copy of the NOP/IS and comments received during the scoping period are provided in Appendix 1.0.

A scoping meeting for the EIR was held in the Golden Gate Room of the Millberry Union Event and Meeting Center on the UCSF Parnassus Heights campus site on February 23, 2017. The purpose of this meeting was to inform the public and interested agencies and organizations of the proposed plan, solicit comments, and identify areas of environmental concern. Comments received from the public regarding the environmental impact analysis of the plan are summarized at the beginning of each resource topic section in this EIR. The proposed plan analyzed in this EIR is substantially the same as the plan described in the NOP/IS.

1.4 INTENDED USE OF THIS EIR

The Regents, the decision-making body for the University, or its delegated committee or administrative official, will review the Final EIR for adequacy and consider it for certification pursuant to the requirements of CEQA Guidelines Section 15090. If the Regents certify the Final EIR, the Regents will then consider the plan, separately, for approval or denial. If the Regents chooses to approve the plan, findings on the feasibility of reducing or avoiding significant environmental effects will be made, a Statement of Overriding Considerations will be prepared, if necessary, and a Notice of Determination will be prepared and filed with the State Clearinghouse. The Notice of Determination will include a description of the plan, the date of approval, an indication of whether findings were prepared and a Statement of Overriding Considerations was adopted, and the address where the Final EIR and record of plan approval are available for review.

1.5 SCOPE OF THIS EIR

UCSF completed a preliminary review of the proposed plan, as described in CEQA Guidelines Section 15060, and determined that environmental review was required. UCSF prepared an IS in February 2017 and determined that an EIR would be prepared. Based on the IS and the

comments received at the scoping meeting and in response to the NOP, it was determined that the EIR would evaluate the following environmental topics in further detail:

- Aesthetics
- Air Quality
- Biological Resources
- Cultural and Tribal Cultural Resources
- Forestry Resources
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology, Water Quality, and Water Supply
- Noise
- Recreation
- Transportation and Traffic
- Wind

1.6 REPORT ORGANIZATION

This EIR has been organized into the following sections:

- **Acronyms and Abbreviations.** This section follows the Table of Contents.
- **Section 1: Introduction.** Outlines the CEQA process, and agency and public use of this EIR.
- **Section 2: Executive Summary.** Provides a summary of the proposed plan, objectives of the proposed plan, alternatives to the proposed plan, and environmental impacts that would occur as a result of implementing the proposed plan.
- **Section 3: Project Description.** Provides an in-depth description of the proposed project, including construction details and methods.
- **Section 4: Environmental Setting, Impacts, and Mitigation Measures.** Provides a discussion of existing conditions, an analysis of potential environmental impacts of the proposed project, identifies mitigation measures to reduce potentially significant effects, and identifies cumulative impacts.
- **Section 5: Alternatives.** Provides a description of alternatives to the proposed plan, including the No Project Alternative, and environmental impacts from alternatives.
- **Section 6: Other CEQA Considerations.** Includes a discussion of other topics required by CEQA, including growth-inducing effects of the proposed plan and the consumption of non-renewable resources.
- **Section 7: Report Preparation.** Identifies the preparers of the EIR and the public agencies consulted during preparation of the EIR.
- **Appendix 1.0: Notice of Preparation and Initial Study.** Provides the NOP/IS published on February 6, 2017, and the comments received during the scoping period.
- **Appendix 4.2: Air Quality, Greenhouse Gas Emissions, and Carbon Sequestration Support Information.** Provides the calculation spreadsheets, assumptions, and summary tables for emissions modeling; the methodology and results for carbon sequestration; and the methodology and results for the health risk assessment.

- **Appendix 4.3: Biological Habitat Evaluation Report.** Includes the methodology and results of the biological resources survey conducted for the EIR.
- **Appendix 4.4: Correspondence with Native American Tribes.** Provides records of communication with Native American tribes.
- **Appendix 4.8: Fire Hazards Report.** Includes the methodology and results of modeling fire hazards within the Reserve.
- **Appendix 4.9: Hydrology and Water Quality Support Information.** Includes the modeling methods and the results of modeling sediment flow within the Reserve.
- **Appendix 4.10: Noise Support Information.** Contains community noise survey data collected around the Reserve.
- **Appendix 4.12: Traffic Hazards Report.** Provides an analysis of traffic safety hazards along truck routes identified to haul materials out of the Reserve.

2 EXECUTIVE SUMMARY

2.1 PURPOSE

This Draft EIR has been prepared in accordance with CEQA (PRC § 21000 *et seq.*) to provide an assessment of the potentially significant environmental effects of the proposed UCSF Mount Sutro Open Space Reserve Vegetation Management Plan (proposed plan, or plan). It is the intent of this Executive Summary to provide the decision-makers and the public with a clear, simple, and concise description of the proposed plan and its potentially significant environmental impacts. CEQA Guidelines Section 15123 requires that the summary identify each significant effect, and recommended mitigation measure(s) and alternatives that would minimize or avoid potential significant impacts. The summary is also required to identify areas of controversy known to the lead agency, including issues raised by agencies and the public and issues to be resolved. These issues include the choice among alternatives and whether or how to mitigate significant effects. This section focuses on the major areas of importance in the environmental analysis for the proposed plan and utilizes non-technical language or includes explanations of technical language to promote understanding.

2.2 PLAN LOCATION AND DESCRIPTION

2.2.1 Plan Location

The Reserve is a largely undeveloped forest located within the Parnassus Heights campus site near the geographical center of San Francisco. The plan area comprises 59 acres of the 61-acre Reserve. The Reserve is surrounded by the remainder of the UCSF Parnassus Heights campus site, including UCSF's hospital, research, educational, and support structures to the north/northwest, and by urban residential neighborhoods to the south, east, and west. The UCSF Parnassus Heights campus site occupies approximately 107 acres of land at the base of Mount Sutro in the Inner Sunset neighborhood of San Francisco. Residential neighborhoods surrounding the plan area include the Inner Sunset, Cole Valley, Haight/Ashbury, Forest Knolls and Midtown Terrace. The Interior Greenbelt natural area, owned by the City and County of San Francisco, is located adjacent to the Reserve on the east side.

2.2.2 Plan Description

Plan Overview

The purpose of the plan is to provide a management framework for protecting, enhancing, and restoring vegetation in the Reserve. UCSF staff worked with consultants and a Technical

Advisory Committee (TAC) to develop the plan, including holding four public meetings with the TAC.

To achieve a healthy and stable ecosystem, the plan outlines strategies for increasing the biodiversity of vegetation, conserving existing native vegetation, improving the regeneration and recruitment of tall tree species, managing insect and disease pressure on blue gum eucalyptus, and improving structural diversity. In accordance with UCSF's already established risk-reduction program, the plan outlines the goal of protecting the safety of Reserve users and adjacent structures with vegetation management to reduce the risk of both tree failure and fire. Along trails, vegetation management would be implemented to clear sight lines.

The plan also seeks to enhance the visual design and aesthetics of the Reserve by establishing a mosaic of trees, shrubs and ground cover of different types, with gaps in the canopy that create patterns of sun and shade and offer views of the ocean and Golden Gate Park, and protect users from the wind. The desired outcome is to maintain a "forest" experience. UCSF provides for public access into the Reserve through a system of multi-use trails, built and maintained in partnership with the non-profit Sutro Stewards. New trails have been and will be developed as identified in the 2014 LRDP and analyzed in the 2014 LRDP EIR; the vegetation management plan proposes only to maintain vegetation around trails.

Existing Forest Conditions

Following a comprehensive inventory of the Reserve, the Reserve was divided into four forest types. These forest types were determined based on similar characteristics with respect to tree species composition, health, and density. The Reserve contains approximately 10,000 live and 3,500 dead trees, based on the size of each forest type and the density of trees per acre. Blue gum eucalyptus is the dominant tree species but was not found to be regenerating in sufficient numbers to provide for canopy replacement.

Plan Actions and Phasing

Desired Future Conditions

The plan identifies a series of forest treatments and management actions to meet its goals. The desired future conditions of the Reserve include:

- A restored eucalyptus canopy
- Healthy, diverse vegetation, including patches of native vegetation
- Uneven stands of trees (i.e., trees of many ages)
- Two to three snags (i.e., standing dead trees) per acre
- Control of invasive understory vegetation
- Additional native plant restoration areas

The plan continues the University's existing programs of tree risk assessment and hazard tree removal, creation and management of defensible space, maintaining trail access, and conservation and stewardship of native plants.

Treatments by Forest Types and Phases

Given the current conditions of each of the forest types, the following treatments are recommended in the plan:

- **Forest Type 1.** This forest type is currently too dense to sustain the number of existing trees per acre. Dead, dying, unhealthy, and structurally unsound trees would be removed and new trees would be planted to replace dead and dying trees to achieve a final density of between 75 and 100 trees per acre.
- **Forest Type 2.** Very few small diameter trees are present in this forest type; insufficient regeneration is occurring to sustain the forest canopy. A second age class would be established to maintain between 50 and 75 trees per acre. A long-term goal is to establish new age classes every 10 to 15 years.
- **Forest Type 3.** Most trees have low live crown ratios (i.e., only a small portion of the canopy is alive). Dead, dying, unhealthy, and structurally unsound trees would be removed and trees would be planted to replace dead and dying trees to achieve a final density of between 75 and 100 trees per acre. A long-term goal is to establish new age classes every 10 to 15 years.
- **Forest Type 4.** This forest type is currently in the best condition; drought stress is mitigated by summer fog. Dead and dying trees would be removed, and new trees would be planted to sustain between 80 and 100 trees per acre.

The plan identifies three phases during which management activities would be implemented to treat the forest. Forest treatments are summarized in Table 2.2-1. Seed tree[1], group selection[2], and individual tree selection[3] treatments would be used to thin the forest and promote regeneration. Forest treatments involving dead and dying tree removal would begin in Phase I to reduce safety hazards within the Reserve and to promote regeneration of the forest as quickly as possible. Forest treatments implemented in Phase I would continue in Phases II and III in different areas across the Reserve. Because it is difficult to predict how the conditions of the forest would change over the life of the plan, particularly in response to climate change, the forest treatments are defined to be adaptive and responsive to the changing forest conditions. The plan recommends updating the forest inventory prior to starting treatments during Phase III to ensure that forest treatments are appropriate for the future forest conditions.

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[1] Seed tree treatments for the proposed plan would involve the removal of dead, dying, unhealthy, and structurally unsound trees in areas between 0.5 and 1 acre in Phase I; areas would likely be similar in size for Phases II and III. Healthy trees are retained to provide diversity in the forest.

[2] Group selection treatments for the proposed plan would involve the removal of dead, dying, unhealthy, and structurally unsound trees in small groups of less than 0.5 acre each in Phase I; areas would likely be similar in size for Phases II and III. Groups would be large enough to promote shade-intolerant species while accommodating shade-tolerant species around the edges of the openings.

[3] Individual trees are removed to reduce safety concerns, promote the growth of remaining trees, reduce the number of dead trees, and provide space for regeneration.

Table 2.2-1 Forest Treatments by Phase

Treatment Phase	Treatment
Phase 1 *Initial 5 years* *Focuses on managing risk of hazard trees and initiating forest treatments*	• Establish two seed tree treatment areas (1.05 acres in total) in Forest Type 1 and eight group selection treatment areas (1.75 acres in total) in Forest Types 1, 3, and 4 to remove dead and dying trees • Plant blue gum and other species of eucalyptus across Forest Types 1, 2, and 3 with an approximately 20-foot by 20-foot spacing • Manage tree risk by removing individual dead and dying structurally unsound trees in all four forest types • Control invasive low-growing vines and shrubs that compete with native plants in all four forest types • Continue conservation and enhancement of native plants, and expand native plant conservation from 2 to 5 acres • Remove and/or trim trees to maintain defensible space between buildings and Reserve vegetation • Remove and/or trim vegetation along trails to maintain trails and public access
Phase 2 *6 to 10 years* *Focuses on forest restoration and regeneration*	• Remove dead and dying trees across Forest Types 1, 3, and 4 • Establish group selection or seed tree treatments in areas of low tree density in all four forest types • Plant blue gum, other species of eucalyptus, and native species in Forest Types 1, 2, and 3 with an approximately 20-foot by 20-foot spacing • Continue treatments started in Phase 1 (manage tree risk, plant natives, maintain defensive space, maintain trails) in all forest types
Phase 3 *11+ years* *Focuses on diversifying forest canopy and establishing new generation of trees*	• Update forest inventory prior to starting treatments • Continue removing dead and dying trees in all four forest types • Treat with a mix of individual tree selection, group selection, and seed tree treatments in all forest types • Plant blue gum, other species of eucalyptus, and native species across the Reserve with an approximately 20-foot by 20-foot spacing • Continue treatments started in Phase 1 (manage tree risk, plant natives, maintain defensive space, maintain trails) in all forest types

Methods to Implement Forest Treatments

Vegetation Management Methods

Vegetation would be managed to:

- Remove dead, dying, unhealthy and structurally unsound trees,
- Control invasive low-growing vines and shrubs that would compete with desired vegetation,
- Prevent diseased eucalyptus trees and stumps of trees from re-sprouting (these sprouts would also contain decay), and
- Plant new trees.

Work would be completed using manual and mechanical methods only. No herbicides would be used. Equipment used to implement the treatments would include, but would not be limited to, hand saws, pole saws, chainsaws, D-6 tractors or similar, excavators, backhoes, loaders,

masticators, feller bunchers, pick-up trucks, skidders, forwarders, water trucks, log trucks, chip vans, chippers, tub grinders, stump grinders, and cranes.

A maximum of 35 personnel would be on site at any given time. Typically, up to three crews of up to five workers each would implement the vegetation management activities, including tree removal. They would operate up to two pieces of larger equipment per crew. Vegetation management activities would occur yearly, beginning in September after the end of the nesting season and continue through February. No ground-disturbing activities would occur during a rain event (defined as 0.01 inch or more or precipitation).

Access, Staging, and Water Usage

Temporary access roads would be established in the Reserve to facilitate management activities. Access road creation may require tree and/or stump removal (grinding down stumps below the surface) and surface grading or excavation. Two existing trails would be widened to accommodate equipment.

Temporary landing areas (also known as staging areas) would be created to stage heavy equipment, store hand-held equipment, and store logs and chipped/masticated materials before they are hauled off-site. Landing areas would be no larger than 0.25 acre each, large enough to allow for log trucks and chip vans to turn around. Felled trees would be removed either by chipping the trees and dispersing the chipped vegetation materials on site or bucking and transporting the logs or chips to a disposal facility in log or chip trucks. These trucks would transport materials to an appropriate facility, located outside of San Francisco.

The plan currently does not include irrigation in the initial years of forest treatment. The goal is to establish new trees by planting just prior to the wet season so that irrigation is not needed. If planting and restoration efforts were unsuccessful, plants may receive supplemental water using backpack sprayers. Other options for a water source may include the SFPUC's water tank in Rotary Meadow or other nearby potable water sources. Water may be distributed using temporary, aboveground piping or a temporary water storage tank at the summit that could be used to fill watering trucks. No permanent storage structures would be built in association with the plan, as no permanent structures are allowed to be added to the Reserve.

Mitigation Measures from 2014 LRDP Relevant to the Plan

An EIR was prepared for the 2014 LRDP which was certified by the Regents in November 2014 (State Clearinghouse Number 2013092047). The UCSF 2014 LRDP EIR identified the environmental impacts of the implementation of the 2014 LRDP, including any envisioned plans or activities that could occur across the UCSF campus sites. UCSF is bound to implement these mitigation measures where relevant to the work that it undertakes on its campus sites. Several of the measures are relevant to the plan for the Reserve. These measures are identified throughout Section 4 of this EIR, with the text of the measures included here. Note that only the relevant parts of the measures are shown.

Mitigation Measure AIR-LRDP-1: Best Management Practices for Controlling Particulate Emissions. The following BAAQMD[4] Best Management Practices for particulate control will be required for all construction activities. These measures will reduce particulate emissions primarily during soil movement, grading and demolition activities but also during vehicle and equipment movement on unpaved plan sites.

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
3. 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.
4. All vehicle speeds on unpaved roads shall be limited to 15 mph.
5. [Not relevant]
6. 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, § 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
7. 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.
8. Post a publicly visible sign with the telephone number and person to contact at UCSF regarding dust complaints. This person shall respond and take corrective action within 48 hours. BAAQMD's telephone number shall also be visible to ensure compliance with applicable regulations.

Mitigation Measure AIR-LRDP-3: Off-Road Equipment Control Measures for NOx. All off-road equipment greater than 25 hp and operating for more than 20 total hours over the duration of construction activities shall have engines that meet or exceed U.S. EPA Tier 3 off-road emission standards.

Mitigation Measure BIO-PH-1a: Preconstruction Surveys for Monarch Butterfly Winter Roosts and Avoidance. Prior to demolition activities, a qualified biologist familiar with monarch butterfly aggregating behavior and habitat shall conduct a preconstruction survey for the presence of overwintering monarch butterfly aggregations. The survey shall be conducted in December or January during the period when overwintering aggregations appear. Should an overwintering aggregation be identified in trees adjacent to individual proposal sites within the Reserve, a 200-foot buffer shall be established around the occupied trees until the aggregation has dispersed.

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[4] Bay Area Air Quality Management District, CEQA Air Quality Guidelines, Table 8-1, 2012.

Mitigation Measure BIO-PH-1b: Preconstruction Breeding Bird Surveys and Nest Avoidance. Should construction activities associated with the new retaining wall, new trails, demolition of buildings, relocation, expansion, and replacement of the medical gas and diesel fuel tank storage, and construction of the new hospital addition within the Parnassus Heights campus site, commence during breeding bird season (February 15 – August 15) annually, UCSF shall retain a qualified biologist to conduct preconstruction nesting bird surveys in surrounding habitat for nesting birds. Specific measures to avoid and minimize impacts on nesting birds include, but are not limited to, those described below.

- To avoid and minimize potential impacts on nesting raptors and other birds, preconstruction surveys shall be performed not more than two weeks prior to initiating vegetation removal and/or construction and demolition activities during the breeding season (i.e., February 15 through August 15).
- To avoid and minimize potential impacts on nesting raptors and other birds, a no-disturbance buffer zone shall be established around active nests during the breeding season until the young have fledged and are self-sufficient, when no further mitigation would be required. Typically, the size of individual buffers ranges from a minimum of 250 feet for raptors to a minimum of 50 feet for other birds but can be adjusted based on an evaluation of the site by a qualified biologist in cooperation with the USFWS and/or CDFW.
- Birds that establish nests after construction starts are assumed to be habituated to and tolerant of the indirect adverse impacts resulting from construction noise and human activity. However, direct take of nests, eggs, and nestlings is still prohibited and an appropriate buffer must be established around the nest according to species and proximity to plan activities in order to avoid nest abandonment or destruction.
- If construction or demolition activities ceases for a period of more than two weeks, or vegetation removal is required after a period of more than two weeks has elapsed from the preconstruction surveys, then new nesting bird surveys must be conducted.

Mitigation Measure BIO-PH-1c: Avoidance and Minimization Measures for Special-Status Bats. A qualified wildlife biologist shall conduct preconstruction special-status bat surveys of suitable roost sites in the vicinity of construction and demolition sites that abut the forest of Mount Sutro Open Space Reserve. If active day or night roosts are found, the wildlife biologist shall take actions to make such roosts unsuitable habitat before construction and demolition activities begin. A no-disturbance buffer of 100 feet shall be created around active bat roosts being used for maternity or hibernation purposes. Bat roosts that are established during active construction or demolition are presumed to be unaffected by these activities, and no buffer would be necessary.

Mitigation Measure BIO-PH-1d: Preconstruction Surveys for Special-Status Plants and Plant Avoidance. Prior to construction activities, a qualified botanist shall conduct preconstruction surveys for special-status plants, coastal triquetrella and San Francisco gumplant, within the footprints of and in suitable habitat adjacent to locations of the new retaining wall, new trail

alignments, and any access routes and staging areas to be used in support of these plans. Surveys for coastal triquetrella can be conducted at any time of the year however surveys for San Francisco gumplant shall occur in the summer (June – September). Should special-status plant species be found during surveys, occurrences shall be marked in the field for avoidance during construction.

Mitigation Measure BIO-PH-1e: Relocation of Special-Status Plants. If special-status plants are located within the retaining wall or new trails footprint and cannot be avoided, then a rare plant salvage and relocation plan shall be developed to relocate individuals to suitable habitat within the Reserve. A qualified botanist shall develop and implement the plan according to CDFW guidelines and in coordination with CDFW. At a minimum, the plan shall include collection of reproductive structures from affected plants, a full description of microhabitat conditions necessary for each affected species, seed germination requirements, restoration techniques for temporarily disturbed occurrences, assessments of potential transplant and enhancement sites, success and performance criteria, and monitoring programs, as well as measures to ensure long-term population viability. The mitigation methods shall include either salvage and transplantation or collection and propagation of seeds or other vegetative material. Any plant relocation shall be done under the supervision of a qualified restoration botanist.

Mitigation Measure CUL-LRDP-3. Should an archaeological artifact be discovered during plan construction and excavation, pursuant to CEQA Guidelines 15064.5 (f), "provisions for historical or unique archaeological resources accidentally discovered during construction" shall be instituted. In the event that any prehistoric or historic subsurface cultural resources are discovered during ground disturbing activities, all work within 100 feet of the resources shall be halted and UCSF shall consult with a qualified archaeologist or paleontologist to assess the significance of the find (per Public Resource Code Section 5024.1, Title 14 CCR, Section 4852 and/or Public Resource Code 21083.2 in the event of a unique archaeological find). If any find is determined to be significant and will be adversely affected by the plan, representatives of UCSF and the qualified archaeologist and/or paleontologist shall meet to determine the appropriate avoidance measures or other appropriate mitigation (per CEQA Guidelines 15064.5 (b) and Public Resource Code 21083.2). All significant cultural materials recovered shall be subject to scientific analysis, professional museum curation, and documented by the qualified archaeologist according to current professional standards (per the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 FR44716)).

Mitigation Measure CUL-LRDP-4. If paleontological resources, such as fossilized bone, teeth, shell, tracks, trails, casts, molds, or impressions are discovered during ground-disturbing activities, all ground disturbing activities within 50 feet of the find shall be halted until a qualified paleontologist can assess the significance of the find and, if necessary, develop appropriate salvage measures in consultation with UCSF and in conformance with Society of Vertebrate Paleontology Guidelines (SVP, 1995; SVP, 1996).

Mitigation Measure CUL-LRDP-5. If the discovery includes human remains, CEQA Guidelines 15064.5 (e)(1) shall be followed:

> In the event of the accidental discovery or recognition of any human remains in any location other than a dedicated cemetery, the following steps should be taken:
>
> (1) There shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until:
>
> (A) The coroner of the county in which the remains are discovered must be contacted to determine that no investigation of the cause of death is required, and
>
> (B) If the coroner determines the remains to be Native American: (1) the coroner shall contact the Native American Heritage Commission within 24 hours. (2) The Native American Heritage Commission shall identify the person or persons it believes to be the most likely descended from the deceased Native American. (3) The most likely descendent may make recommendations to the landowner or the person responsible for the excavation work, for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods as provided in Public Resources Code Section 5097.98, or
>
> (2) Where the following conditions occur, the landowner or his authorized representative shall rebury the Native American human remains and associated grave goods with appropriate dignity on the property in a location not subject to further subsurface disturbance.
>
> (A) The Native American Heritage Commission is unable to identify a most likely descendent or the most likely descendent failed to make a recommendation within 24 hours after being notified by the commission.
>
> (B) The descendant identified fails to make a recommendation; or
>
> (C) The landowner or his authorized representative rejects the recommendation of the descendant, and the mediation by the Native American Heritage Commission fails to provide measures acceptable to the landowner.

Mitigation Measure GHG-LRDP-1: Construction-Related GHG Reduction Measures. The following BAAQMD-suggested measures shall be implemented during demolition and construction activities:

- Use alternative fueled (e.g., biodiesel, electric) construction vehicles/equipment where feasible;
- [Not relevant]

Mitigation Measure HAZ-LRDP-1. An Excavation Management Plan shall be prepared by a qualified consultant to include the California Air Resource Board (CARB) Asbestos Airborne

Toxic Control Measure (ATCM) for Construction, Grading, Quarrying and Surface Mining Operations to minimize naturally occurring asbestos through the application of best management practices for fugitive dust from construction, grading and excavation operations. Unless site specific testing by a certified laboratory can demonstrate the absence of encountering naturally occurring asbestos, construction specifications shall include implementation of this CARB ATCM.

Mitigation Measure NOI-LRDP-1a: Construction Noise Control Measures. UCSF contractors shall employ site-specific noise attenuation measures during construction to reduce the generation of construction noise. These measures shall be included in a Noise Control Plan that shall be submitted for review and approval by UCSF to ensure that construction noise is consistent with the standards set forth in the City's Noise Ordinance. Measures specified in the Noise Control Plan and implemented during plan construction shall include, at a minimum, the following noise control strategies:

- Equipment and trucks used for construction shall use the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds.
- Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 a-weighted decibels (dBA). External jackets on the tools themselves shall be used where feasible; this could achieve a reduction of 5 dBA. Quieter procedures, such as use of drills rather than impact tools, shall be used where feasible.
- Stationary noise sources shall be located as far from adjacent receptors as possible, and they shall be muffled and enclosed within temporary sheds, incorporate insulation barriers, or include other measures.

Mitigation Measure NOI-LRDP-1b: Construction Hours. Construction hours are restricted to the hours listed in the table below. In rare circumstances, work may need to occur outside of these work hour limits. In such cases, UCSF Community and Government Relations will receive advance notice from the plan manager, at least one week in advance as feasible, and will engage the community to identify measures to minimize potential impacts.

Days of the Week	Construction Hours			
	"Not Noisy" Work[a]		Noisy Work	
	Regular Hours	**Extended Hours**	**Regular Hours**	**Extended Hours**
Monday – Friday	7:00 am to 5:00 pm	5:00 pm to 8:00 pm	8:00 am to 5:00 pm	N/A
Saturday	N/A	8:00 am to 5:00 pm	N/A	9:00 am to 4:00 pm
Sunday	N/A	8:00 am to 5:00 pm	N/A	N/A

Notes:

[a] "Not Noisy" work = 80 decibels or less at 100 feet; "Noisy" work = more than 80 decibels at 100 feet.

[b] Extended hours to be considered by UCSF Community and Government Relations with advance notice from the plan manager.

Mitigation Measure TRAF-LRDP-1: Construction Coordination and Monitoring Measures. ***Traffic Control Plan for Construction*** –In order to reduce potential conflicts between construction activities and pedestrians, transit and autos during construction activities at the four campus sites, UCSF shall require construction contractor(s) to prepare a traffic control plan for major phases of plan construction (e.g. demolition, construction, or renovation of individual buildings). UCSF and its construction contractor(s) will meet with relevant City agencies to coordinate feasible measures to reduce traffic congestion, including temporary transit stop relocations (e.g. Parnassus Avenue (Parnassus Heights), Sutter Street (Mount Zion), etc.) and other measures to reduce potential traffic and transit disruption and pedestrian circulation effects during major phases of construction of the 2014 LRDP Plans. For any work within the public right-of-way, the contractor would be required to comply with the City of San Francisco's Regulations for Working in San Francisco Streets (the Blue Book), which establish rules and permit requirements so that construction activities can be done safely and with the least possible interference with pedestrians, bicyclists, transit, and vehicular traffic[5]. In addition to the regulations in the Blue Book, UCSF shall require the construction contractor(s) to comply with all state and federal codes, rules and regulations.

In the event that the construction timeframes of the major phases and other development plans adjacent to UCSF overlap, UCSF shall coordinate with City Agencies through the Transportation Advisory Staff Committee (TASC) and the adjacent developers to minimize the severity of any disruption to adjacent land uses and transportation facilities from overlapping construction transportation impacts. UCSF, in conjunction with the adjacent developer, shall propose a construction traffic control plan that includes measures to reduce potential construction traffic conflicts, such as staggering start and end times, coordinated material drop offs, collective worker parking and transit to job site and other measures.

Reduce SOV Mode Share for Construction Workers – In order to minimize parking demand and vehicle trips associated with construction workers, UCSF shall require the construction contractor to include in the Traffic Control Plan for Construction methods to encourage walking, bicycling, carpooling and transit access to the campus sites by construction workers in the coordinated plan.

Plan Construction Updates for Adjacent Residents and Businesses – In order to minimize construction impacts on access for nearby residences, institutions and businesses, UCSF shall provide nearby residences and adjacent businesses with regularly-updated information regarding plan construction, including construction activities, peak construction vehicle

[5] The SFMTA Blue Book, 8th Edition (2012), is available online through SFMTA (sfmta.com).

activities (e.g., concrete pours), travel lane closures, and lane closures via a newsletter and/or website.

2.3 PROJECT OBJECTIVES

CEQA Guidelines Section 15124(b) requires that the project description in an EIR include "a statement of the objectives sought by the applicant," which should include "the underlying purpose of the project." UCSF developed the following basic project objectives to satisfy the requirements of CEQA Guidelines Section 15124(b):

- **Protect the safety of Reserve users and adjacent campus and residential properties.** UCSF would continue to manage the risk of trees that may fall and injure Reserve users or damage property, and vegetation management would be focused in areas where people and buildings may be affected.
- **Improve and enhance the health and stability of the ecosystem.** The present Reserve ecosystem is not particularly healthy or diverse; it is dominated by blue gum eucalyptus trees, many of which are dead or dying, while small blue gum eucalyptus trees are not being recruited to the canopy. The plan includes actions to increase the biodiversity of vegetation, promote native vegetation, improve plant regeneration and recruitment, manage insects and disease pressure, and improve the structural diversity of the forest.
- **Enhance the visual design and aesthetic experience in the Reserve.** Vegetation management activities implemented to create a healthy and diverse forest would also result in a visually stimulating experience of the Reserve. These visual enhancements include providing a diverse mosaic of trees, shrubs, and groundcover, creating patterns of sun and shade via openings in the canopy, promoting healthy populations of wildlife, and creating openings for scenic views of Golden Gate Park and the Pacific Ocean.
- **Maintain and ensure public access to the Reserve.** Vegetation would be trimmed along trails to maintain lines of sight through the Reserve.

2.4 TOPICS OF KNOWN CONCERN

To determine the environmental topics that should be addressed in the EIR, UCSF prepared an IS and circulated it along with a NOP to receive input from interested public agencies and private parties. Copies of the NOP/IS are presented in Appendix 1.0 of this EIR. Based on both the NOP/IS and comments on the NOP/IS, this EIR addresses the following environmental topics in depth:

- Aesthetics
- Air Quality
- Biological Resources
- Cultural and Tribal Cultural Resources
- Forestry Resources
- Hazards and Hazardous Materials
- Hydrology, Water Quality, and Water Supply
- Noise
- Recreation

- Geology and Soils
- Greenhouse Gas Emissions
- Transportation and Traffic
- Wind

2.5 IMPACT SUMMARY

Section 4: Environmental Setting, Impacts, and Mitigation Measures presents a detailed discussion regarding potential environmental impacts of the proposed plan. In accordance with the CEQA Guidelines, a summary of the plan's impacts is provided in Table 2.7-1 presented at the end of this section. The proposed plan would have a significant and unavoidable impact with regard to temporary visual impacts from proposed forest treatments. The proposed plan would also considerably contribute to a significant and unavoidable temporary cumulative impact on visual quality from forest treatments. All other project-level and cumulative impacts of the proposed plan would either be less than significant or would be reduced to a less than significant level with the proposed project-level mitigation measures.

2.6 ALTERNATIVES

2.6.1 Alternative Summary and Comparison of Impacts

Consistent with CEQA requirements, a range of reasonable alternatives to the proposed plan was evaluated that could feasibly avoid or lessen any significant environmental impacts of the proposed plan and that would feasibly attain most of the basic objectives of the proposed plan. The alternatives analyzed in detail in this EIR are presented below.

Table 2.7-2, which follows Table 2.7-1, presents a comparison of the environmental impacts of each alternative with those that are expected to result from the proposed plan. The table is intended to allow decision makers, agencies, and the public to compare these alternatives with the proposed plan and weigh their relative merits and demerits. Alternative 4 is the environmentally superior alternative because it would avoid the significant and unavoidable aesthetics impact of the proposed plan and would reduce the significant fire hazards associated with the proposed plan.

2.6.2 Alternative 1: No Project Alternative

Pursuant to CEQA Guidelines Section 15126.6(e), an EIR must include an evaluation of a No Project Alternative so decision makers can compare the impacts of approving the proposed plan with the impacts of not approving the proposed plan. The evaluation of the No Project Alternative must discuss the existing conditions at the time the NOP was published (February 2017 for this EIR) as well as "what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services" (CEQA Guidelines Section 15126.6(e)(2)). Therefore, the No Project Alternative considers the reasonably foreseeable actions that would be implemented by UCSF if the proposed plan is not approved.

Under the No Project Alternative, the proposed plan would not be implemented. If the proposed plan is not approved by the Regents, it is reasonable to assume that UCSF would continue to conduct ongoing maintenance in the Reserve to reduce fire hazards and hazards to people and structures from falling trees. Ongoing maintenance would include, but would not necessarily be limited to, pruning trees and bushes, removing hazardous trees, removing debris, and maintaining trails.

2.6.3 Alternative 2: Modified Forest Treatments

Alternative 2 would involve modifying seed tree and group selection treatments in the Reserve. All other vegetation management activities, including management of defensible space and tree risk, trail maintenance, and native restoration, would remain the same as for the proposed plan. Tree planting within forest treatment areas, and spreading chips in areas of bare soil would also occur in the same manner as the proposed plan.

Under Alternative 2, seed tree and group selection areas would be set back a minimum distance of 30 feet from trails and roads. Individual tree selection would be used to create feathered edges around group and seed tree treatment areas, and native shrubs would be planted along the edges to screen the treatment areas. For group selection, groups would be restricted to no larger than 0.25 acre in size.

2.6.4 Alternative 3: Increased Native Tree Planting

Alternative 3 would involve planting native tree seedlings as well as eucalyptus seedlings in group selection areas during all phases of the plan. Tree removal activities would remain the same as the proposed plan; only the mix of species planted after tree removal would differ from the proposed plan. Healthy eucalyptus trees that currently exist in the forest would remain in place.

Instead of re-planting group selection areas with only eucalyptus, 25 percent of the trees planted during Phase I and 50 percent of the trees planted during Phases II and III would be native tree species. Native trees would be planted in separate group selection areas than eucalyptus to reduce competition among eucalyptus and native tree species and to create pockets of native vegetation. Native trees planted in group selection areas may include live oak, California laurel, redwood, and madrone, among others. Forest treatments would otherwise remain the same as the proposed plan. All other vegetation management activities, including the management of defensible space and tree risk, trail maintenance, and native restoration, would remain the same as the proposed plan.

2.6.5 Alternative 4: Modified Forest Treatments and Increase Native Tree Planting

Alternative 4 would be a combination of Alternatives 2 and 3. All activities described for Alternatives 2 and 3 would occur under Alternative 4:

- Seed tree and group selection treatment areas would be set back at least 30 feet from trails, native shrubs would be planted around the edges of treatment areas

that abut trails, and individual tree selection would be used to create feathered edges around treatment areas
- 25 percent of the trees planted during Phase I and 50 percent of the trees planted during Phases II and III would be native tree species, and native species would be planted in separate group selection areas than eucalyptus

All other vegetation management activities, including management of defensible space and tree risk, trail maintenance, and native restoration, would remain the same as for the proposed plan. Tree planting within forest treatment areas and spreading chips in areas of bare soil would also occur in the same manner as the proposed plan.

2.7 ISSUES TO BE RESOLVED/AREAS OF CONTROVERSY

This EIR addresses environmental issues associated with the proposed plan that are known to the lead agency or were raised by other public agencies or interested parties during the EIR scoping process. An EIR scoping meeting was held at Millberry Union at the Parnassus Heights campus site on February 23, 2017. The purpose of this meeting was to inform the public and interested agencies of the proposed plan, solicit comments, and identify areas of concern. Relevant comments from the public included the following:

- Concerns over increased risk of wildfire spreading with more eucalyptus planting, forest thinning, and the drying out of the forest from understory removal
- Public safety
- Cumulative impacts from the work that the City of San Francisco will be performing in the Interior Greenbelt
- Addressing alternatives with no eucalyptus planting, increased intensity of vegetation management activities, and decreased intensity of vegetation management activities
- Addressing archaeological sites or finds in the Reserve
- Ecosystem-level effects of the proposed vegetation management activities, including impacts of reduced density on migratory wildlife species
- Address loss of carbon from thinning
- Impacts associated with landslides and erosion
- Biological surveys to address several rare plants that have not been previously addressed

Comments received from the public, received both during the public meeting and in writing in response to the NOP, are summarized under each environmental section in this EIR.

Table 2.7-1 Summary of Proposed Plan Impacts and Mitigation Measures

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Aesthetics			
Impact Aesthetics-1: The proposed plan could have a substantial adverse effect on a scenic vista.	Less than significant	No mitigation is required.	N/A
Impact Aesthetics-2: The proposed plan could substantially degrade the existing visual character or quality of the site and its surroundings and the associated recreational experience.	Significant	**MM Aesthetics-1: Sowing at Landing Areas.** Seeds of annual native grasses or other fast-growing, native plants shall be sown at the South Ridge Trail, North Ridge Trail, and Nike Road landing areas for recreational use during months that the landing areas are not in use for vegetation management activities (generally, March through August). Seeds shall be sown within one week of the end of vegetation management activities for a given season. **MM Aesthetics-2: Natural Screening.** Fast-growing native shrubs, such as thimbleberry (*Rubus parviflorus*), toyon (*Heteromeles arbutifolia*), and coyote bush (*Baccharis pilularis*), shall be planted along the visible edge of seed tree and group selection treatment areas that abut trails or roads.	Significant and unavoidable
Impact Aesthetics-3: The proposed plan could result in significant impacts on visual resources in combination with past, present, and probable future development in the cumulative analysis study area.	Potentially considerable contribution	**MM Aesthetics-1: Usability of Landing Areas** **MM Aesthetics-2: Natural Screening**	Significant and unavoidable contribution
Air Quality			
Impact Air-1: The proposed plan could violate any air quality standard or contribute substantially to an existing or projected air quality violation.	Less than significant	No mitigation is required.	N/A

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Impact Air-2: The proposed plan could conflict with or obstruct implementation of the applicable air quality plan.	No impact	No mitigation is required.	N/A
Impact Air-3: The proposed plan could result in a cumulatively considerable net increase of any criteria pollutant for which the region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).	Less than significant	No mitigation is required.	N/A
Impact Air-4: The proposed plan could expose sensitive receptors to substantial pollutant concentrations. and **Impact Air-5:** The proposed plan could exceed the applicable LRDP EIR standard of significance by exposing receptors to toxic air contaminant emissions that (1) result in a cancer risk greater than 10 cancer cases per 1 million people exposed in a lifetime; or (2) for acute or chronic effects, result in concentrations of toxic air contaminant emissions with a Hazard Index of 1.0 or greater.	Less than significant	No mitigation is required.	N/A
Impact Air-6: The proposed plan could result in significant impacts on air quality in combination with past, present, and probable future	Less than significant contribution	No mitigation is required.	N/A

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
development in the cumulative analysis study area.			
Biological Resources			
Impact Biology-1: The proposed plan could 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 CDFW or USFWS.	Potentially significant	**MM Biology-1: Worker Training.** All workers must receive environmental training from a qualified biologist or another qualified personnel before commencing vegetation management activities. Training can also be accomplished through a pre-recorded training by a qualified biologist or another qualified personnel. The training shall describe special-status plant and wildlife species including migratory birds, nesting habitats that could occur within areas covered by the plan, protection afforded to these species, and avoidance and minimization measures required to avoid and/or minimize impacts from vegetation management activities. Training shall describe the requirements and boundaries of the plan area and the importance of complying with mitigation measures. Each employee or contractor shall be provided with an informational training handout as well. **MM Biology-2: Pre-construction Survey and Avoidance of Monarch Butterfly**. Prior to tree removal or other tree management activities that would occur during the winter roosting season for Monarch butterflies (November – February), a qualified biologist familiar with monarch butterfly roosting behavior shall conduct a survey of the areas in which work would occur and surrounding areas within 200 feet. If any winter roosts are found, the roosting tree(s) shall be clearly marked, and no tree removal or tree management activities within 200 feet of the tree(s) shall occur until the aggregation has dispersed. **MM Biology-3: Minimization of Harm to Bat Species**. Appropriate methods shall be used to minimize the potential of harm to bats during tree removal activities within the Reserve. A qualified biologist shall conduct a pre-activity survey for potential bat roosting areas. During the survey,	Less than significant

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		individual trees shall be visually inspected with binoculars for any active roosts or large cavities or openings that could be used by colonial bat species. If an active roost or large cavity is observed that could support bats (with the exception of maternity or hibernation roosts, which are addressed in BIO-PH-1c), the wildlife biologist, in accordance with guidance from CDFW, shall take actions to make such roosts unsuitable habitat before tree removal activities. Actions may include: • Removal of shrubs and very small trees one day prior to the removal of the tallest nearby or adjacent trees • Use of a two-step tree removal process. On Day 1, noise and vibration are created by cutting nonhabitat branches and limbs from habitat trees using chainsaws only. On Day 2, the remainder of the tree is removed. • Chipping of trees and/or limbs and other vegetation on-site **MM Biology-4: San Francisco Dusky-Footed Woodrat Nest Management**. No earlier than 30 days prior to the commencement of vegetation management activities in a given area, a qualified biologist shall conduct a pre-activity survey for San Francisco dusky-footed woodrat to determine if active woodrat nests (stick houses) with young are present within the area to be disturbed or within 50 feet of the area to be disturbed. All active nests shall be identified and their locations mapped and flagged for avoidance. If active woodrat nests with young are identified, a fence shall be erected around the nest site at a distance adequate to provide the woodrat sufficient foraging habitat, at the discretion of a qualified biologist. Vegetation management activities within the fenced area shall be postponed or halted until young have left the nest. A qualified biologist shall serve as a monitor during those periods when disturbance activities would occur near active nest areas to ensure that no inadvertent impacts on the nests occur. To the degree feasible, any identified woodrat nests shall be left undisturbed. If the relocation of a nest is required, UCSF shall prepare a woodrat nest relocation plan and submitted	

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		the plan to CDFW for review. The woodrat nest relocation plan may only be implemented after CDFW review and under the direction of a qualified biologist. No nest may be relocated while young are present in the nest. **MM Biology-5: Invasive Weed Control**. UCSF shall power wash all equipment and vehicles to be used for vegetation management activities that have been used in areas outside the Reserve prior to entering the Reserve. All materials used for erosion control (e.g., gravel and fill material, straw mats, erosion control blankets) shall be certified weed free. Landing areas and access roads shall be periodically maintained to remove any invasive weeds that have established during vegetation management activities.	
Impact Biology-2: The proposed plan could have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by CDFW or USFWS.	Potentially significant	**MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection**	Less than significant
Impact Biology-3: The proposed plan could 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.	Potentially significant	**MM Biology-1: Worker Training**	Less than significant
Impact Biology-4: The proposed plan could conflict with local policies and ordinances for the protection of biological resources, such as a tree preservation policy or ordinance.	Less than significant	No mitigation is required.	N/A

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Impact Biology-5: The proposed plan could exceed the applicable LRDP EIR standard of significance by damaging or removing heritage or landmark trees or native oak trees of a diameter specified in a local ordinance.	Less than significant	No mitigation is required.	N/A
Impact Biology-6: The proposed plan could result in significant impacts on biological resources in combination with past, present, and probable future development in the cumulative analysis study area.	Potentially considerable contribution	**MM Biology-1: Worker Training** **MM Biology-2: Pre-construction Survey and Avoidance of Monarch Butterfly** **MM Biology-3: Minimization of Harm to Bat Species**	Less than significant contribution
Cultural and Tribal Cultural Resources			
Impact Cultural-1: The proposed plan could cause a substantial adverse change in the significance of a historic resource as defined in Section 15064.5.	Less than significant	No mitigation is required.	N/A
Impact Cultural-2: The proposed plan could cause a substantial adverse change in the significance of an archaeological resource as defined in Section 15064.5.	Less than significant	No mitigation is required.	N/A
Impact Cultural-3: The proposed plan could cause a substantial adverse change in the significance of a tribal cultural resource as defined in PRC §21074.	Less than significant	No mitigation is required.	N/A

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Impact Cultural-4: The proposed plan could result in significant impacts on cultural resources in combination with past, present, and probable future development in the cumulative analysis study area.	Less than significant contribution	No mitigation is required.	N/A
Forestry Resources			
Impact Forestry-1: The proposed plan could result in the loss of forest land or conversion of forest land to non-forest use.	Less than significant	No mitigation is required.	N/A
Impact Forestry-2: The proposed plan could involve other changes in the existing environment that, due to their location or nature, could result in conversion of forest land to non-forest use.	No impact	No mitigation is required.	N/A
Impact Forestry-3: The proposed plan could result in significant impacts on forestry resources in combination with past, present, and probable future development in the cumulative analysis study area.	No contribution	No mitigation is required.	N/A
Geology and Soils			
Impact Geology-1: The proposed plan could be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the plan, and potentially result in on-or off-site landslide.	Potentially significant	**MM Geology-1: Erosion Control Best Management Practices.** Best management practices (BMPs) for forestry shall be implemented to ensure vegetation management activities do not destabilize slopes in the Reserve and erosion is controlled appropriately. The following BMPs shall be implemented as applicable and appropriate during vegetation management activities:	Less than significant

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
and **Impact Geology-2:** The proposed plan could expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides.		**Access Roads** • Create access roads that follow the contour of the land to avoid unnecessary cut and fill where feasible • Limit major routes to 5-10% of the total area • Install water bars at an appropriate spacing depending on slope and soil type (e.g., 300-500 feet for 2-5% slope; 200-300 feet for 6-10% slope; 100-200 feet for 11-15% slope; <100 feet for 16-20% slope) • Use erosion control structures (e.g., culverts, French drains, gravel/rock) to reduce erosion • Sow native grasses and other perennial herbs on access roads where natural colonization will not occur rapidly • Use surface mounds, depressions, logs, rocks, trees and stumps, slash and brush, the litter layer, and native herbaceous vegetation downslope of access roads to reduce sedimentation and erosion • Shut down skidding and truck traffic when soils become saturated and unable to support the machines • Close off temporary access roads after their use • Recontour to original contours after access roads are done being used • Consider chiseling, scarification or disking to break up compacted road surfaces to reestablish soil porosity when hauling is complete **Landing Areas** • Locate landings on a gentle slope to ensure good surface drainage • Sow native grasses and other perennial herbs on landings where natural colonization will not occur rapidly • Close off landings after their use • Recontour to original contours and restore with native vegetation after landing areas are done being used • Consider chiseling, scarification or disking to break up compacted landing surfaces to reestablish soil porosity when hauling is complete	

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		Tree Removal Areas • Stabilize steep slopes with mats or natural materials after tree removal and prior to planting **MM Geology-2: Unstable Slopes.** After a significant storm event (defined as 0.5 inches of rain within a 48-hour or greater period), the following conditions shall be met prior to any vegetation management activities: • The maps detailing areas of historic slope instability or rock fall in the *Final Geotechnical and Geological Evaluation Report for UCSF Mount Sutro* shall be reviewed (Rutherford + Chekene 2013) • If ground-disturbing or vegetation removal activities are proposed within or adjacent to areas of historic slope instability or rock fall, the saturation of the soils shall be estimated in the field; if muddy water drips from a handful of soil, the soil is considered saturated (Brouwer, Goffeau and Heibloem 1985) • The areas of historic slope instability or rock fall shall be flagged if the moisture content of the soils is determined to be high (i.e., muddy) and ground-disturbing or vegetation removal activities shall be avoided for a minimum of 48-hours after a significant storm event to permit soil drying	
Impact Geology-3: The proposed plan could result in substantial soil erosion or the loss of topsoil.	Potentially significant	**MM Geology-1: Erosion Control Best Management Practices** and **MM Geology-2: Unstable Slopes**	Less than significant
Impact Geology-4: The proposed plan could result in significant impacts on geology and soil conditions in combination with past, present, and probable future development in the cumulative analysis study area.	Potentially considerable contribution	**MM Geology-1: Erosion Control Best Management Practices** and **MM Geology-2: Unstable Slopes**	Less than significant contribution

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Greenhouse Gas Emissions			
Impact GHG-1: The proposed plan could generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.	Less than significant	No mitigation is required.	N/A
Impact GHG-2: The proposed plan could conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emission of greenhouse gases.	Less than significant	No mitigation is required.	N/A
Impact GHG-3: The proposed plan could result in significant impacts on greenhouse gas emissions in combination with past, present, and probable future development in the cumulative analysis study area.	Less than significant contribution	No mitigation is required.	N/A
Hazards and Hazardous Materials			
Impact Hazards-1: The proposed plan could create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.	Potentially significant	**MM Hazards-1: Spill Containment and Countermeasure Plan.** UCSF shall prepare and incorporate methods and techniques to minimize the exposure of the public to potentially hazardous materials during implementation of the proposed plan into a Spill Containment and Countermeasure Plan (SCCP) to ensure hazardous materials are properly handled, stored, and transported and that any inadvertent leaks or spills are adequately cleaned and reported. At a minimum, the SCCP shall address the following procedures related to the use of hazardous materials during vegetation management activities and emergency response: • Proper disposal of contaminated soils and materials (i.e., clean up materials)	Less than significant

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		• Daily inspection of vehicles and equipment for leaks particularly in landing areas and spill containment procedures • Emergency response and reporting procedures to address hazardous material releases • Fuels and lubricating oils for vehicles and heavy equipment will not be stored or transferred within 100 feet of any storm drains • Emergency spill supplies and equipment shall be available to respond in a timely manner if an incident should occur • Response materials such as oil-absorbent material, tarps, and storage drums shall be available in the plan area at all times during management activities and shall be used as needed to contain and control any minor releases • The absorbent material shall be removed promptly and disposed of properly • Placement of as needed, minor amounts of fuel, lubricants, and hydraulic fluid for equipment operation in appropriate storage tanks on the bed of fueling vehicles • Location of bulk lubricating oil, hydraulic fluids, and other materials used for vehicle and equipment maintenance shall be stored at landing areas • Use of secondary containment and spill rags when fueling • Discourage "topping-off" fuel tanks • Spill kits for all fuel trucks and fueling areas All workers shall be trained on the specific procedures for hazardous materials and emergency response as an element of the required worker environmental training prior to working in the plan area.	
Impact Hazards-2: The proposed plan could create a significant hazard to the public or the environment through reasonably	Potentially significant	**MM Hazards-1: Spill Containment and Countermeasure Plan**	Less than significant

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
foreseeable upset and accident conditions involving the release of hazardous materials into the environment.			
Impact Hazards-3: The proposed plan could expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.	Potentially significant	**MM Hazards-2: Fire Prevention Plan.** UCSF shall prepare a Fire Prevention Plan that addresses procedures for fire prevention during active vegetation management. The Fire Prevention Plan shall include requirements for carrying emergency fire suppression equipment, restricting smoking, and idling vehicles. The Fire Prevention Plan shall address the following fire risk reduction measures: • Personnel shall not be permitted to smoke within the Reserve during the implementation of vegetation management activities • Training and briefing all personnel in fire prevention and suppression methods prior to performing vegetation management activities within the Reserve • Storage of prescribed fire tools and water within or near large mechanical equipment or vehicles used for vegetation management activities • Water sources shall be identified, including water storage tanks or water trucks that would be used in case of a fire • All equipment shall have spark arrestors • Provisions for increasing fire safety tools and availability of water during times of high fire potential (i.e., a combination of low relative humidity, high temperatures, and high wind); the use of fuel- and diesel-powered equipment shall not be permitted during Red Flag Warning Days	Less than significant
Impact Hazards-4: The proposed plan could result in significant impacts on hazards and hazardous materials in combination with past, present, and probable future	Potentially considerable contribution	**MM Hazards-2: Fire Prevention Plan**	Less than significant contribution

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
development in the cumulative analysis study area.			
Hydrology and Water Quality			
Impact Hydrology-1: The proposed plan could substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on or off site.	Potentially significant	**MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection.** Best Management Practices (BMPs) for erosion control and water quality protection shall be applied wherever the soil surface is disturbed by vegetation management activities, including trail widening, landing preparation and use, tree removal, and invasive brush and vine removal. BMPs shall be implemented prior to, during, and after annual vegetation management activities for erosion control and water quality protection, as specified here. These measures should be incorporated into the SWPPP, but these measures may be altered, supplemented, or deleted during the San Francisco Bay RWQCB's review process, as it has final authority over the terms of the SWPPP: **Pre-Activity BMPs:** • For trail widening and landing preparation, install devices or structures to control runoff, which could include but are not limited to silt fencing, French drains or waterbars • For seed tree and group selection treatment areas, install flagging to delineate treatment areas to minimize vegetation disturbance outside of the areas designated for treatment. As needed, such as on very steep slopes, install sediment transport barriers downstream (such as but not limited to coir logs) of the treatment areas to catch mobilized sediment and potentially chips or other slash and larger debris and maintain until seedlings have stabilized the area • If coir logs are used, they should be embedded in the soil surface by 50 to 60 percent of their diameter and staked at close intervals to minimize slumping and localized failures	Less than significant

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		• For landing areas use gravel, logs, or other materials to prevent heavy equipment from settling down into forest soils and to reduce runoff **Activity BMPs:** • Sweep up loose soil and other debris tracked in on any paved areas at the end of each work day. Dispose of removed material at an approved off-site location • Clean-up any spills immediately. If spills occur on earthen treatment sides or access trails, segregate the spill and remove both the spill material and the contaminated surface soil and dispose of at an approved off-site landfill for such material • For downed trees, remove any large, loose slash material (such as loose limbs and branches or bark), as feasible, that could become mobilized in a big storm event • After major storms, check sediment retention BMPs and clean and restore as needed **Post-Activity BMPs:** • For individual tree removal on steeper slopes, install coir logs or other equivalent methods, along the downslope grading perimeter to trap sediment, if erosion is observed post-removal • Disturbed soil surfaces should be covered with 3 to 4 inches of wood mulch or weed-free straw • Remove water bars or other water diversion structures and fill ruts; clear landing areas of excess debris once vegetation is established or it is determined that erosion and sedimentation is no longer occurring, and seed landing areas (per MM Aesthetics-1) **Woodland Creek** • Prohibit the removal of trees or other ground disturbance within 20 feet of Woodland Creek when the creek has flow • Require directional felling away from the stream	

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		• Immediately remove any logging debris from the stream and away from the banks • Maintain sufficient ground cover along the stream to trap sediment	
Impact Hydrology-2: The proposed plan could substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site.	Potentially significant	**MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection**	Less than significant
Impact Hydrology-3: The proposed plan could create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.	Potentially significant	**MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection**	Less than significant
Impact Hydrology-4: The proposed plan could require new or expanded water supply entitlements.	Less than significant	No mitigation is required.	N/A
Impact Hydrology-5: The proposed plan could result in significant impacts on water resources in combination with past, present, and probable future development in the cumulative analysis study area.	Potentially considerable contribution	**MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection**	Less than significant contribution

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Noise			
Impact Noise-1: The proposed plan could expose persons to or generate noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies.	Less than significant	No mitigation is required.	N/A
Impact Noise-2: The proposed plan would result in a substantial temporary or periodic increase in ambient noise levels in the plan vicinity above levels existing without the plan.	Less than significant	No mitigation is required.	N/A
Impact Noise-3: The proposed plan could result in a substantial permanent increase in ambient noise levels in the plan vicinity above levels existing without the plan. and **Impact Noise-4:** The proposed plan could exceed an applicable LRDP EIR standard of significance by contributing to an increase in average daily noise levels (L_{dn}) of 3 dBA or more at property lines, if ambient noise levels in areas adjacent to proposed development already exceed local noise levels set forth in local general plans or ordinances for such areas based on their use.	Less than significant	No mitigation is required.	N/A

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Cumulative Impact Noise-1: The proposed plan could result in significant impacts on noise in combination with past, present, and probable future development in the cumulative analysis study area.	Less than significant contribution	No mitigation is required.	N/A
Recreation			
Impact Recreation-1: The proposed plan could increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.	Potentially significant	**MM Geology-1: Erosion Control Best Management Practices** **MM Aesthetics-1: Sowing at Landing Areas**	Less than significant
Impact Recreation-2: The proposed plan could result in significant impacts on recreational resources in combination with past, present, and probable future development in the cumulative analysis study area.	No contribution	No mitigation is required.	N/A
Transportation and Traffic			
Impact Traffic-1: The proposed plan could substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment). and **Impact Traffic-2:** The proposed plan could exceed the	Potentially significant	**MM Traffic-1: Traffic Control Plan Special Provisions.** The Traffic Control Plan (TCP), as required by TRAF LRDP-1, shall specifically address traffic control measures for large trucks (e.g., trucks hauling machinery, wood chips, or logs exceeding 55 feet in length) making turns at Johnstone Drive and Medical Center Way; Laguna Honda Boulevard and Clarendon Avenue; Parnassus Avenue and Stanyan Street; and Laguna Honda Boulevard, Dewey Boulevard, and Woodside Road to address conflicts with or hazards to other	Less than significant

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
applicable LRDP EIR standard of significance by causing substantial conflict among autos, bicyclists, pedestrians, and transit vehicles.		vehicles from large turning movements. Measures shall be consistent with the City and County of San Francisco Blue Book, and could include (but are not limited to) having a flagger positioned at those intersections to direct traffic when the trucks pass through or using a pilot vehicle ahead of large loads to control traffic. These control measures shall also address bicycle hazards for large truck turns at Laguna Honda Boulevard and Clarendon; and at Laguna Honda Boulevard, Dewey Boulevard, and Woodside Road. Safety provisions shall be added to the TCP that address stops of the UCSF Bronze shuttle along Medical Center Way and Johnstone Drive. The stops may need to be moved back from turning locations or a warning sign installed to indicate to transit riders to watch for large trucks turning and to move out of the way. **MM Traffic-2: Prohibit Large Truck Trips During Peak Commute Periods.** Large trucks (e.g., trucks hauling machinery, wood chips, or logs exceeding 55 feet in length) shall be prohibited from traveling to and from the Reserve during the peak commute hours of 7:00 a.m. and 9:00 a.m. and 4:00 p.m. to 7:00 p.m. unless otherwise allowed through consultations with the City and County of San Francisco. **MM Traffic-3: Truck Turn Restriction.** Trucks exceeding 55 feet in length shall be prohibited from making turns from Johnstone Drive to Medical Center Way and from Laguna Honda Boulevard to Clarendon Avenue.	
Impact Traffic-3: The proposed plan could result in inadequate emergency access.	Potentially significant	**MM Traffic-4: Access for Emergency Services.** The contractor shall coordinate with administrators of the UCSF Medical Center, SFFD, SFPD, and UCPD prior to vegetation management activities to ensure equipment and vegetation material at landing areas are not stored in a manner that would result in inadequate emergency access. The administrators shall be provided with information about the locations and durations of annual vegetation management activities, and where truck routes and landing areas could temporarily affect emergency access.	Less than significant

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		Landing areas shall not prevent emergency vehicles from passing through roadways, parking lots, or fire access roads. Adequate access to fire hydrants shall be maintained at all times, as determined through coordination with SFFD.	
Impact Traffic-4: The proposed plan could result in significant impacts on the transportation network and level of traffic in combination with past, present, and probable future development in the cumulative analysis study area.	Potentially considerable contribution	**MM Traffic-1: Traffic Control Plan Special Provisions** **MM Traffic-2: Prohibit Large Truck Trips During Peak Commute Periods** **MM Traffic-3: Truck Turn Restriction** **MM Traffic-4: Access for Emergency Services**	Less than significant contribution
Wind			
Impact Wind-1: The proposed plan could have a substantial adverse short-term windthrow-related effect on the safety of people or structures.	Potentially significant	**MM Wind-1: Monitor Tree Removal Areas.** A- forester or arborist shall monitor areas where trees are removed from the Reserve (i.e., defensible space and individual tree removal, group selection, and seed tree areas) on a quarterly basis (i.e., four times a year) to assess tree health and condition. Trees prone to windthrow (e.g., dead or diseased trees) and considered a hazard to people or structures shall be removed.	Less than significant
Impact Wind-2: The proposed plan could have a substantial adverse long-term windthrow-related effect on the safety of people or structures.	Less than significant	No mitigation is required.	N/A
Impact Wind-3: The proposed plan could have a substantial adverse effect on wind environments in local neighborhoods.	Less than significant	No mitigation is required.	N/A
Impact Wind-4: The proposed plan could result in significant impacts on wind in combination	Potentially considerable contribution	**MM Wind-1: Monitor Tree Removal Areas**	Less than significant contribution

Impact Statement	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
with past, present, and probable future development in the cumulative analysis study area.			

Table 2.7-2 Summary Comparison of Project Alternatives

Project Impact	Proposed Plan		Alternative 1: No Project Alternative	Alternative 2: Modified Forest Treatments	Alternative 3: Increased Native Tree Planting	Alternative 4: Modified Forest Treatments and Increased Native Tree Planting
	Before Mitigation	After Mitigation				
Impact Aesthetics-2: The proposed plan could substantially degrade the existing visual character or quality of the site and its surroundings and the associated recreational experience.	Significant	Significant and unavoidable	Avoided, but new significant and unavoidable impact created	Avoids significant and unavoidable impact from forest treatments but significant and unavoidable impact would remain for landing areas	Significant and unavoidable, but with added benefit of adding visual variety	Avoids significant and unavoidable impact from forest treatments but significant and unavoidable impact would remain for landing areas. Additional benefit of adding visual variety
Impact Biology-1: The proposed plan could 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 CDFW or USFWS.	Potentially significant	Less than significant	Increased, potentially significant and unavoidable	Similar (less than significant with mitigation), with added benefit of enhancing native vegetation	Similar (less than significant with mitigation), with added benefit of enhancing native vegetation	Similar (less than significant with mitigation), with added benefit of enhancing native vegetation

Project Impact	Proposed Plan		Alternative 1: No Project Alternative	Alternative 2: Modified Forest Treatments	Alternative 3: Increased Native Tree Planting	Alternative 4: Modified Forest Treatments and Increased Native Tree Planting
	Before Mitigation	After Mitigation				
Impact Biology-3: The proposed plan could 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.	Potentially significant	Less than significant	Increased, potentially significant and unavoidable	Similar (less than significant with mitigation), with added benefit of enhancing native vegetation	Similar (less than significant with mitigation), with added benefit of enhancing native vegetation	Similar (less than significant with mitigation), with added benefit of enhancing native vegetation
Impact Cultural-1: The proposed plan could cause a substantial adverse change in the significance of a historic resource as defined in Section 15064.5.	Less than significant	N/A	Increased, potentially significant and unavoidable	Similar, less than significant	Similar, less than significant	Similar, less than significant
Impact Geology-1: The proposed plan could be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the plan, and potentially result in on-or off-site landslide.	Potentially significant	Less than significant	Increased, potentially significant and unavoidable	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation
Impact Geology-2: The proposed plan could expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides.	Potentially significant	Less than significant	Increased, potentially significant and unavoidable	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation
Impact Geology-3: The proposed plan could result in substantial soil erosion or the loss of topsoil.	Potentially significant	Less than significant	Increased, potentially significant and unavoidable	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation

Project Impact	Proposed Plan		Alternative 1: No Project Alternative	Alternative 2: Modified Forest Treatments	Alternative 3: Increased Native Tree Planting	Alternative 4: Modified Forest Treatments and Increased Native Tree Planting
	Before Mitigation	After Mitigation				
Impact GHG-2: The proposed plan could conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emission of greenhouse gases.	Less than significant	N/A	Increased, less than significant	Similar, less than significant	Reduced, less than significant	Reduced, less than significant
Impact Hazards-1: The proposed plan could create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.	Potentially significant	Less than significant	Reduced, less than significant	Similar, less than significant	Similar, less than significant	Similar, less than significant
Impact Hazards-2: The proposed plan could 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.	Potentially significant	Less than significant	Reduced, less than significant	Similar, less than significant	Similar, less than significant	Similar, less than significant
Impact Hazards-3: The proposed plan could expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.	Potentially significant	Less than significant	Increased, potentially significant and unavoidable	Reduced, less than significant with mitigation	Reduced, less than significant with mitigation	Reduced, less than significant with mitigation

Project Impact	Proposed Plan		Alternative 1: No Project Alternative	Alternative 2: Modified Forest Treatments	Alternative 3: Increased Native Tree Planting	Alternative 4: Modified Forest Treatments and Increased Native Tree Planting
	Before Mitigation	After Mitigation				
Impact Hydrology-1: The proposed plan could substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on or off site.	Potentially significant	Less than significant	Reduced, less than significant	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation
Impact Hydrology-2: The proposed plan could substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site.	Potentially significant	Less than significant	Reduced, less than significant	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation
Impact Hydrology-3: The proposed plan could create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.	Potentially significant	Less than significant	Reduced, less than significant	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation

Project Impact	Proposed Plan		Alternative 1: No Project Alternative	Alternative 2: Modified Forest Treatments	Alternative 3: Increased Native Tree Planting	Alternative 4: Modified Forest Treatments and Increased Native Tree Planting
	Before Mitigation	After Mitigation				
Impact Recreation-1: The proposed plan could increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.	Potentially significant	Less than significant	Reduced, less than significant	Reduced, less than significant	Similar, less than significant with mitigation	Similar, less than significant with mitigation
Impact Traffic-1: The proposed plan could substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).	Potentially significant	Less than significant	Reduced, less than significant	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation
Impact Traffic-2: The proposed plan could exceed the applicable LRDP EIR standard of significance by causing substantial conflict among autos, bicyclists, pedestrians, and transit vehicles.	Potentially significant	Less than significant	Reduced, less than significant	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation
Impact Traffic-3: The proposed plan could result in inadequate emergency access.	Potentially significant	Less than significant	Increased, potentially significant and unavoidable	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation
Impact Wind-1: The proposed plan could have a substantial adverse short-term windthrow-related effect on the safety of people or structures.	Potentially significant	Less than significant	Increased, potentially significant and unavoidable	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation

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3 PROJECT DESCRIPTION

3.1 INTRODUCTION

This section presents the details of the proposed plan, including the need for the plan, the plan objectives, its various components, and the schedule for plan implementation.

3.2 PLAN AREA AND SURROUNDING USES

The Reserve is a largely undeveloped forest located within UCSF's Parnassus Heights campus site near the geographical center of San Francisco (see Figure 3.2-1). The UCSF Parnassus Heights campus site is the oldest of the UCSF campus sites and occupies approximately 107 acres of land at the base of Mount Sutro in the Inner Sunset neighborhood of San Francisco.

The Parnassus Heights campus site is generally bounded by Carl and Irving Streets to the north; 5th Avenue to the west; and Clarendon Avenue, Christopher Drive, and Crestmont Drive to the south. To the east, the campus extends east of Medical Center Way to Edgewood Avenue and the City and County of San Francisco's Interior Greenbelt (an open space forest contiguous to the Reserve).

Before its designation as an open space reserve, development of Mount Sutro was limited to three main areas:

1. The Aldea San Miguel Housing Complex near the summit of Mount Sutro, which includes housing for approximately 210 students and their families (approximately 380 people total) and a community center
2. The Lower Campus shelf at the northern end of the site where UCSF's main academic, clinical, and research facilities at Parnassus Heights are located, covering approximately 3.8 million gross square feet of development, including structured parking
3. The Woods parcel on the hillside in the center of the site that contains support functions, offices, and surface parking

The Reserve occupies the remaining 61 acres of the Parnassus Heights campus site, 59 of which are included in the plan area. In the 1950's, the United States government constructed a radar control facility for the Nike missile defense installations present in the San Francisco Bay Area. Located at the summit of Mount Sutro, the facility was accessed by the existing Nike Road. It was abandoned in the 1970's, and the site was cleared. In 2003, the Rotary Club of San Francisco funded a vegetation restoration project. Now known as "Rotary Meadow," this approximately two-acre area is

Figure 3.2-1 Regional Location



excluded from the plan's management activities and is maintained by UCSF Campus Life Services with support from the Sutro Stewards[1].

The Reserve is surrounded by the UCSF Parnassus Heights campus site, including UCSF's hospital, research, educational, and support structures to the north/northwest, and by urban residential neighborhoods to the south, east, and west. Residential neighborhoods surrounding the plan area include the Inner Sunset, Cole Valley, Haight/Ashbury, Forest Knolls, and Midtown Terrace. The Interior Greenbelt natural area, owned by the City and County of San Francisco, is located adjacent to the Reserve on the east side (see Figure 3.3-1).

3.3 PLAN HISTORY AND COMMUNITY PLANNING PROCESS

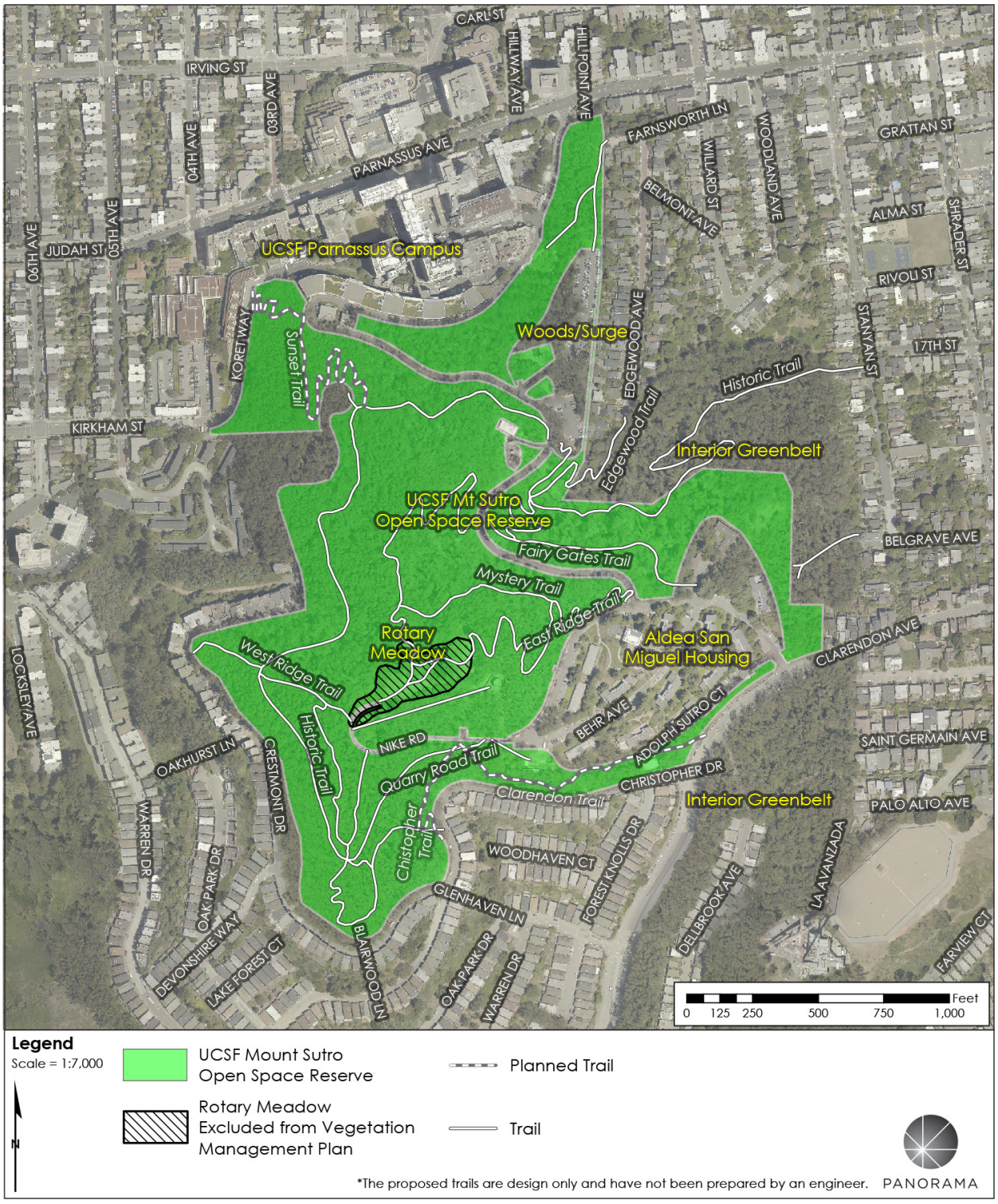
UCSF owns and manages the Reserve. In 1976, the Regents designated a 58-acre portion of the Reserve as "permanent open space to be kept free of any permanent structures or facilities except footpaths and appropriate landscape construction intended to enhance its use as a natural area," which was reaffirmed in UCSF's 2014 LRDP. The Reserve was resurveyed for the 1996 LRDP and was found to encompass a total of 61 acres.

To fulfill the proposal in UCSF's 1996 LRDP to investigate an appropriate maintenance and restoration program for trees and vegetation in the Reserve, the Mount Sutro Open Space Reserve Management Plan was completed in 2001. The Mount Sutro Open Space Reserve Management Plan was prepared with extensive community involvement to be a framework for future management actions. The principal purpose of the Mount Sutro Open Space Reserve Management Plan was to outline measures to restore and maintain the health of the Reserve and to minimize safety risks.

In 2009 and 2010, UCSF held meetings to solicit public input regarding the management of the Reserve. The process resulted in identifying demonstration areas and specific management actions for those demonstration areas, which formed the basis of the Mount Sutro Management Project. A Draft EIR was completed for this project in 2013; however, due to public concerns, including concerns regarding the use of herbicides, UCSF did not complete or certify the Draft EIR. Due to the rapid decline in forest health over the past few years, UCSF once again initiated the development of a vegetation management plan in late 2015 and identified key leaders in the fields of forest management and ecology to participate on the plan's Technical Advisory Committee (Committee). The Committee consists of Peter Brastow, the Biodiversity Coordinator at the San Francisco Department of the Environment; Peter Ehrlich, a forester with the Presidio Trust; Joe McBride, Professor Emeritus at UC Berkeley; Richard Sampson, the

[1] The Sutro Stewards is a nonprofit organization that organizes independent volunteers to conserve habitat through ecological restoration and native plant propagation while providing recreational opportunities in the Reserve.

Figure 3.3-1 Plan Area Location



division chief and a forester with the California Department of Forestry and Fire Protection (CalFire); and Lew Stringer, a restoration ecologist with the Presidio Trust. The Committee held four public meetings to discuss technical information to be incorporated into the plan. Consultants Matt Greene, Registered Professional Forester, and Jim Clark, Certified Arborist and Registered Consulting Arborist, prepared the plan in consultation with UCSF and the Committee, and with input from the community.

3.4 BASELINE CONDITIONS OF THE RESERVE

3.4.1 Vegetation Management History of the Reserve

Adolph Sutro and His Heirs

In the 1800s, Mount Parnassus (later renamed Mount Sutro) was covered predominantly with coastal scrub chaparral consisting of native grasses, wildflowers, and shrubs that provided habitat for a wide variety of wildlife. Trees likely included willow and bay along streams. Coast live oak and coast redwood may also have been present. In 1886, Adolph Sutro, a successful mining engineer, planted the mountain with blue gum eucalyptus, Monterey pine, Monterey cypress, and possibly fruit trees and other species. The blue gum eucalyptus were the most successful trees in adapting to the site conditions and they soon shaded out smaller trees of other species. Blue gum eucalyptus became the dominant tree species over time. Vine and shrubs species arose naturally or were planted and dominated the understory in many areas. Native vegetation disappeared as the eucalyptus and non-native understory became established. By the turn of the twentieth century, the entire mountain was covered with blue gum eucalyptus trees, and it became commonly known as Sutro Forest.

Adolph Sutro did not explicitly state his ultimate intent for the land use within the Sutro Forest. When initially planted, the forested area around Mount Sutro was private land but was informally used recreationally by the public for hiking, picnicking, and hunting. Sutro constructed a trail system around the peak that remained after his death and provided public access onto the property, helping to develop a local constituency for Mount Sutro as a public natural area. After Sutro's death in 1898, his heirs battled over the terms of his will and estate for over two decades. During the time his heirs had control over Mount Sutro, the forest was impacted by intermittent fires, vegetation thinning in 1909, public use, and logging in the 1930s.

University of California, San Francisco

Sutro offered to deed 13 acres at the northern base of Mount Sutro to the University for establishment of a new campus location. The University accepted the offer in October 1895. UC later purchased an 88-acre tract that included Mount Sutro from Sutro's heirs in 1947. UC deeded the current City Interior Greenbelt property to Harliegh Montgomery in 1953. Subsequent development of both the UC owned property, and the surrounding privately held parcels, resulted in the addition of new buildings, reduction of the overall forested area, and a redefined forest boundary.

The Reserve has been managed as open space since 1973 by UCSF. In 1976, the Reserve was designated by the Regents as permanent open space accessible to the public. The Reserve must be kept free of any permanent structures or facilities except footpaths and appropriate landscape construction intended to enhance its use as a natural area. Trails across and around the mountain were mapped in the 1890s. The trail network was expanded in the 1930s by Works Project Administration. Trails within the Reserve were informally mapped by members of the community in the 1970s, an effort that was renewed in 1999 and fortified by the Sutro Stewards in 2005. In addition to changes for safety and erosion control, their work led to the rediscovery and repair of the Historic Trail and construction of new connector trails. The UCSF Facilities Services in-house Landscape Division and Sutro Stewards continue to conduct trail maintenance in the Reserve today.

The condition of the blue gum eucalyptus trees has declined over the past decade. Overcrowded growing conditions, the last several years of drought, forest pathogens infestation, and the age of the stand have all contributed to the decline in health of the forest. The vegetation in the Reserve is currently neither healthy nor diverse. More than 25 percent of the blue gum eucalyptus are dead, and many of the remaining trees are dying or are structurally unsound. Too many blue gum eucalyptus trees are in the Reserve to support a sustained healthy canopy. Young blue gum eucalyptus trees are not being recruited into the canopy (i.e., not reaching full size) due in part to the dense understory of non-native vines.

Without management, it is likely that the existing eucalyptus will continue to decline and die, and other types of trees and vegetation will take over. The data show a continuing trend of declining eucalyptus tree health (see the Draft Vegetation Management Plan, January 20, 2017). Recent years, except for the 2016-2017 rainy season, have seen below-average rain, and forest pathogens are extensive. UCSF has concluded that the only path to healthy, diverse vegetation involves active management and silvicultural[2] treatment to promote forest regeneration.

An emergency forest treatment that involved dead and dying tree removal was conducted in December 2015 through January 2016 across a two-acre area around Johnstone Drive between Medical Center Way and Nike Road. Many of the trees were drought-stressed and dead or nearly dead and posed a significant hazard to the residents of the Aldea San Miguel Housing Complex. The dead and dying trees were removed and/or pruned to reduce fire hazards and to

[2] Silviculture is the "art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society such as wildlife habitat, timber, water resources, restoration, and recreation on a sustainable basis" (USFS 2017). Silvicultural treatments are designed to enhance growth and quality of a forest while promoting forest regeneration.

create defensible space between vegetation and buildings per an emergency exemption from CEQA[3].

3.4.2 Forest Inventory

A comprehensive forest inventory of the Reserve was conducted in April 2016. The measurements/observations recorded during the inventory include (but are not limited to):

- Tree species present in the Reserve
- Understory species present in the Reserve
- Native species present in the Reserve
- Diameter at breast height (dbh) of trees
- A determination whether a tree was dead or alive
- Crown class[4]
- Live crown ratio[5]
- Additional observations including the presence of forest openings, areas of windfall, prevalence of disease, and regeneration
- Wildlife
- Tree heights on some trees
- GIS mapping of roads, trails, and other features within the forest

Based on the forest inventory, tree density, history of the forest, tree health, tree composition, and aspect, four forest types were identified within the Reserve. Figure 3.4-1 provides the location of the four forest types, and Table 3.4-1 summarizes their characteristics.

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[3] State Clearinghouse Number 2015128279. Notice of Exemption was filed on 12/21/2015 for this work.

[4] The class of a tree based on its crown position relative to the position of the crowns on adjacent trees (Society of American Foresters 1994):
- **Dominant.** Crown extends above the general level of the main canopy and receives full light from above and partly from the sides.
- **Codominant.** Crown forms the general level of the main canopy and receives full light from above and comparatively little from the sides.
- **Intermediate.** Crown extends into the lower portion of the main canopy but is shorter in height than the codominants. Receives little direct light from above and none from the sides.
- **Suppressed.** Crowns are completely covered by the crowns of one or more neighboring trees.

[5] The ratio of the size of the live crown (i.e., the part of the tree with green leaves) to its total height. Live crown ratio is used to estimate tree health and level of competition with neighboring trees (dominant, codominant, etc.). A live crown ratio of 30 percent or below is considered poor; trees with a live crown ratio of 30 percent or below often respond poorly to release (i.e., removal of surrounding competing trees).

Figure 3.4-1 Forest Types

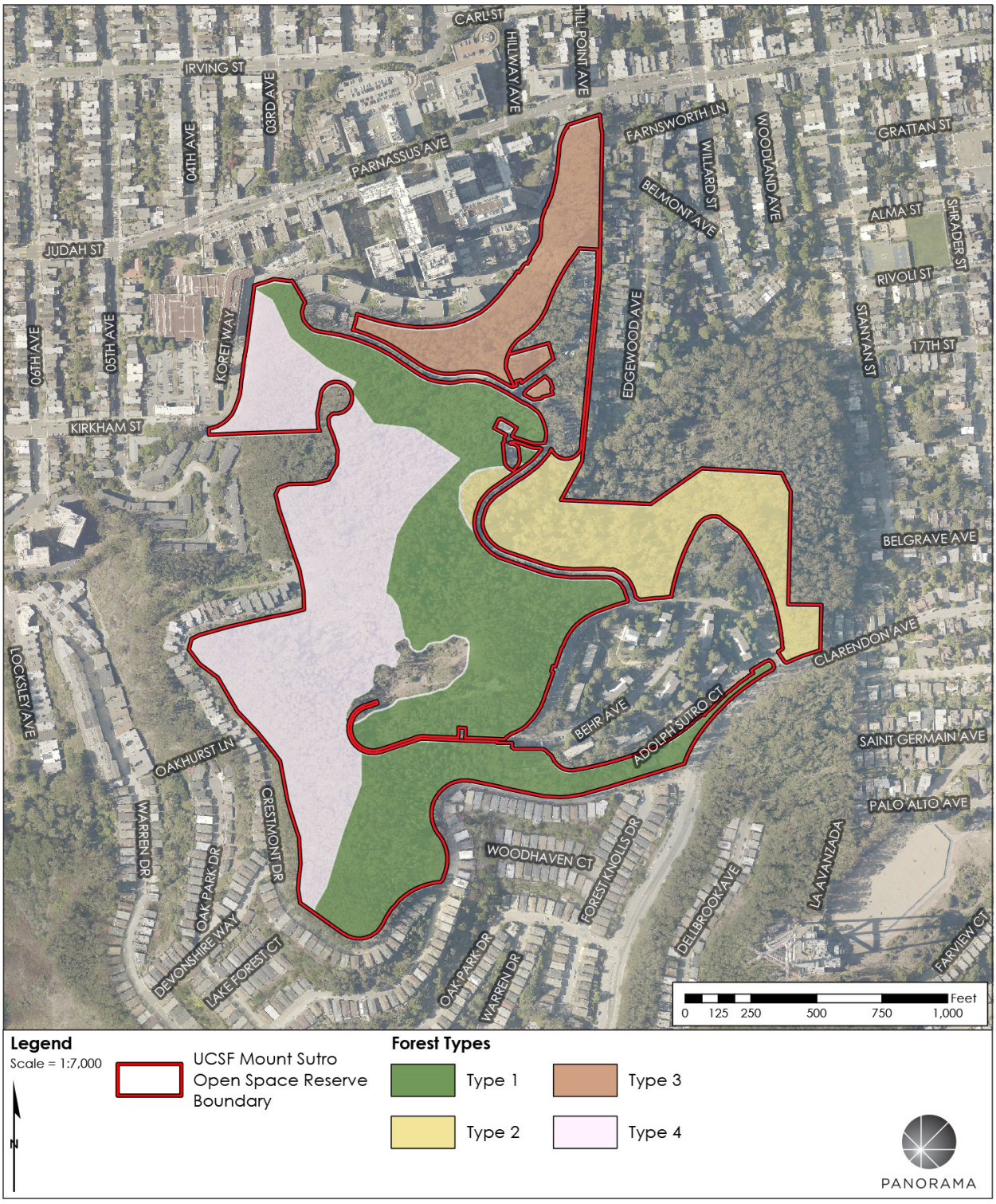


Table 3.4-1 Summary of 2016 Forest Inventory

Forest Type	Size (acres)	DBH Range (inches)	Live Crown Ratio (percent)	Trees per acre [a]			Tree Species		
				Live	Standing Dead	Total (live + dead)	Dominant	Secondary	Understory
1	24	2 to >36	≤ 20	270	100	370	Blue gum eucalyptus, blackwood acacia	Monterey cypress, Monterey pine, coast redwood, plum, cherry, California bay, coast live oak, willow	Himalayan blackberry, poison oak, red elderberry, ivy (various species), and others
2	9	14 to 20	≤ 20	45	10	55	Blue gum eucalyptus, Monterey cypress	Monterey pine, blackwood acacia, coast redwood, willow	English, German, and cape ivy; poison oak, and Himalayan blackberry
3	8	2 to >40	20 to 30	110	10	120	Blue gum eucalyptus, blackwood acacia	Willow, plum	English, German, and cape ivy; and Himalayan blackberry
4	18	2 to 34	≥ 40	50	50	100	Blue gum eucalyptus	Monterey cypress, cherry, coast live oak, willow	Elderberry, Himalayan blackberry, poison oak, bracken ferns, vetch, and others
Total Trees in the Reserve				**8,665**	**3,470**	**12,135**			

Note:

[a] A forest inventory was conducted in 1999 by HortScience, Inc. (HortScience, Inc. 1999). In the 1999 inventory, HortScience, Inc. estimated that the Reserve-wide tree density was 740 trees per acre. Two factors may explain the difference between the 1999 and 2016 results:

i. The 2016 inventory was designed to be statistically valid while the 1999 inventory was not; consequently, the results from the 2016 inventory are more reliable.

ii. The 2016 inventory used a minimum dbh of 2 inches while the 1999 inventory used a minimum dbh of 1 inch. A dbh class of 1 inch is not typically used in forest inventories because small trees naturally have a high mortality rate as they compete for nutrients, moisture, and light.

Source: (HortScience, Inc. and Matt Greene Forestry & Biological Consulting 2016)

3.4.3 Forest Conditions

Overview

Most trees observed in the Reserve are blue gum eucalyptus. Approximately 25 percent of the standing trees in the Reserve are dead, and live trees have been stressed by drought and forest pathogens. The upper crowns of most of the mature live trees have died back, resulting in live crown ratios of 20 to 30 percent. Forest Types 1, 2, and 3 are in fair condition; Forest Type 4 is in better overall condition. General observations and a description of the health of each forest type are provided here.

Forest Types

Forest Type 1

Forest Type 1 is primarily located between Medical Center Way and the main ridge in the Reserve, which runs north/south. Slopes in Forest Type 1 run between flat ground (on the ridge top and near the summit) to over 60 percent. The forest health of Forest Type 1 is in fair condition. Forest Type 1 has approximately 110 dead standing trees per acre, most of which are eucalyptus between 2 and 10 inches dbh. Large diameter trees are also dying. Forest Type 1 is characterized by an upper crown (i.e., tallest trees in the forest canopy) consisting of dead trees, and no stem sprouting was observed during the forest inventory. A heavy amount of windfall has occurred in Forest Type 1, particularly near the summit. Heavy vegetation cover in the understory is likely prohibiting new trees from becoming established.

Forest Type 2

Forest Type 2 is located on the east side of the Reserve between Medical Center Way and along Woodland Canyon. A drainage runs through Forest Type 2 in Woodland Canyon. The slopes within this forest type range from 20 to over 70 percent. The forest health of Forest Type 2 is in fair condition. Forest Type 2 has approximately 10 dead standing trees per acre. Most live trees have a live crown ratio of 20 percent or less, and little or no tree regeneration has occurred in the last 10 to 20 years as evident by the few small-diameter trees observed during the forest inventory.

Forest Type 3

Forest Type 3 is located on the north side of the Reserve between Medical Center Way and the main campus site. Most slopes are north-facing and, similar to Forest Type 2, extremely steep. The forest health of Forest Type 3 is in fair condition. This forest type has approximately 10 dead standing trees per acre. The upper crowns of most blue gum eucalyptus trees were dead. Of the live trees, most had 20 to 30 percent live crown ratios. Small-diameter trees were dead, and no basal or stem sprouting was observed during the forest inventory. A thick understory is likely prohibiting any new trees from becoming established.

Forest Type 4

Forest Type 4 is located on the west side of the Reserve. Its west-facing slopes receive more summer fog that rolls in from the Pacific Ocean than the rest of the Reserve. Likely a result of better moisture conditions, Forest Type 4 has the healthiest trees in the Reserve. Most trees have

foliage in the upper canopy and live crown ratios of 40 percent or greater. Forest Type 4 has approximately 50 dead trees per acre, most of which measure between 2 and 12 inches dbh. Some live, small-diameter blue gum eucalyptus are present in the understory. Many wind-thrown eucalyptus trees were observed during the forest inventory.

General Observations

Forest Pathogens and Pests

Heart rot of woody stems of eucalyptus was frequently observed during the forest inventory. Most blue gum eucalyptus trees currently in the Reserve arose as stump sprouts that developed around the margin of cut stumps. Stump sprouts can be compromised by decay of the original tree; over time, as sprouts die and are replaced, decay continues to develop. Thus, regeneration from existing trees will likely be susceptible to breakage and blow-down.

Blue gum eucalyptus in the Reserve have also been attacked by pests such as the long-horned borer (*Phoracantha* spp.), snout beetle (*Gonipterus scutellatus*), and tortoise beetle (*Trachymela sloanei*). Under normal conditions, these insects are not a significant problem for blue gum eucalyptus; however, the extended drought has stressed the eucalyptus and increased their susceptibility to pests. Insect pressure has likely contributed to the low live crown ratios observed during the forest inventory. While the drought conditions have ended in 2017, the effects of years of drought persist and future conditions are unknown. The ending of the drought does not change the need for active management.

Forest Openings

A few natural and man-made openings are present on the south and west sides of the Reserve. Three of these openings are associated with a San Francisco Public Utilities Commission (SFPUC) water tank on the south side of the Reserve and the connected pipeline that runs down the hill. The openings for the pipeline are narrow and long, roughly 0.1 to 0.25 acre in size; the opening around the water tank is larger (approximately 0.33 acre), mostly due to the water tank itself. Regeneration was observed around the water tank but not in the openings for the pipeline nor any other openings in the forest.

Regeneration

Little to no sprouting or natural regeneration was observed during the forest inventory. The only sprouting that was observed was in areas that were thinned in late 2015 and early 2016 along Johnstone Drive (as previously described) and near the water tank. Sprouting was only observed in locations that were in full sun. No other young trees were seen growing in the Reserve.

Native Vegetation

In 2010, Nature in the City observed that up to a dozen native plant communities once existed on Mount Sutro, including coastal scrub, mixed coastal scrub and grassland, mixed coastal scrub/evergreen woodland, coastal prairie and herb understory, Nootka reed grass and native

ferns, and snowberry scrub[6]. Small patches of natives are present in the Reserve but comprise at most 2 of the 59 acres reviewed during the forest inventory, which excluded Rotary Meadow. The patches of native vegetation are dispersed throughout the Reserve and do not comprise any one large area of the Reserve. Native shrubs present include California sagebrush (*Artemesia californica*), sticky monkeyflower (*Mimulus aurantiacus*), mugwort (*Artemesia douglasii*), lizard tail (*Eriophyllum staechadifolium*), cow parsnip (*Heracleum lanatum*), yellow bush lupine (*Lupinus arboreus*), and coyote brush (*Baccharis pilularis*). A few coast live oaks (*Quercus agrifolia*) have been planted in Rotary Meadow. Other trees or large shrubs planted as part of the restoration effort include California buckeye (*Aesculus californica*), toyon (*Heteromeles arbutifolia*), California waxmyrtle (*Morella californica*), and red elderberry (*Sambucus racemosa*). Native herbaceous vegetation observed includes yarrow (*Achillea millefolium*), blue wild rye (*Elymus glaucus*), woodland strawberry (*Fragaria vesca*), and bee plant (*Cleome* spp.).

3.5 DESCRIPTION OF PLAN

3.5.1 Desired Future Conditions

Desired future conditions direct vegetation management activities and forest treatments. The desired future conditions for the Reserve are based on UCSF's commitment to maintaining the Reserve as open space and enhancing its use as a natural area. The foundation for this commitment is healthy, diverse vegetation within the Reserve. The desired future conditions of the Reserve include:

- A restored eucalyptus canopy
- Healthy, diverse vegetation, including patches of native vegetation
- Uneven stands of trees (i.e., trees of many ages)
- Two to three snags (i.e., standing dead trees) per acre
- Control of invasive understory vegetation
- Additional native plant restoration areas
- An increase in biodiversity

Only under these conditions can successful growth and regeneration of the forest occur. After a first round of planting, the forest would become a two-aged forest; subsequent planting and, hopefully, natural regeneration would eventually create an uneven-aged forest. The results of implementing the plan would be a healthy forest with a high tree canopy, an understory of

[6] Nature in the City is San Francisco's first organization wholly dedicated to eco-literacy, restoration, and stewardship of San Francisco's wild places. They host nature walks, events for children and families, and volunteer opportunities throughout San Francisco. Nature in the City performed surveys of the Reserve in 2010 as part of their 2010 Mount Sutro Natural Resources Stewardship Implementation Plan, which was drafted to help guide the framework described in UCSF's 2001 Mount Sutro Open Space Reserve Management Plan.

mid-sized trees, as well as openings that allow light to reach the forest floor to allow for regeneration.

3.5.2 Explanation of Plan Objectives

Overview

The four objectives of the plan are presented in Section 1: Introduction. The following sections describe how the plan addresses each of the objectives.

Public Safety

To fulfill the objective of protecting the safety of Reserve users and adjoining campus and residential properties, the plan reduces the risk of tree failure and fire through vegetation management. UCSF would continue to manage the risk of trees that may fall and injure Reserve users or damage property. Vegetation management would be focused in areas where people and buildings may be affected, including areas near UCSF facilities, housing, roads, parking, and trails. Vegetation management would be in accordance with guidelines established by the San Francisco Fire Department and the California Department of Forestry and Fire Protection (Cal Fire) to create and maintain approximately 100 feet of defensible space between vegetation and buildings, roads, and neighboring properties. Along trails, hazard trees would be removed within 30 feet of trails.

Reserve and Ecosystem Health

Overview

As previously described, the Reserve ecosystem is not particularly healthy or diverse. The Reserve is dominated by blue gum eucalyptus trees, many of which are dead or dying, and small blue gum eucalyptus trees are not being recruited to the canopy. To fulfill the objective of improving and enhancing the health and stability of the Reserve ecosystem, the plan includes actions to increase the biodiversity of vegetation, promote native vegetation, improve plant regeneration and recruitment, manage insects and disease pressure, and improve the structural diversity of the forest.

Increase Biodiversity of Vegetation

To increase the biodiversity of vegetation in the Reserve, the plan includes planting species such as California buckeye, Pacific madrone, willow species, Monterey pine, coast live oak, California bay, coast redwood, and other eucalyptus species. Species diversity for both plants and wildlife would be monitored as a part of the plan in partnership with groups such as the Sutro Stewards and the Audubon Society[7].

[7] The Golden Gate Audubon Society leads bird watching field trips within the Reserve and helps update lists of birds observed within the Reserve.

Promote Native Vegetation
Localized areas of native vegetation observed by Nature in the City and during surveys for the plan have greater diversity of species than most of the Reserve. The plan includes the conservation and enhancement of existing localized areas of native vegetation with continued planting and cultivation. A long-term goal of native plant stewardship is to have viable assemblages of the communities observed by Nature in the City (refer to Section 3.4.3). UCSF would continue to work with the Sutro Stewards to establish specific goals for native vegetation, including existing and potential species, environmental requirements, and management of competing vegetation.

Improve Plant Regeneration/Recruitment
Tree species such as blue gum eucalyptus require growing conditions of full sun and adequate space without competition from vines and other groundcover plants. Most tree seeds require bare ground to germinate and establish. These conditions do not presently exist in the Reserve; thick groundcover including ivy and nightshade have suppressed regeneration. To create good growing conditions for eucalyptus, the plan includes the creation of openings in the forest canopy to provide areas with full sun exposure. Competing ground vegetation would be removed to establish areas of bare ground, and seedlings would be planted. Most plantings would be installed in the winter during the rainy season. Temporary irrigation may be used if unirrigated plants are unsuccessful.

Manage Insect and Disease Pressure
Insect and disease pressure would be reduced through several methods. Removing dead, dying, and unhealthy trees would remove trees that host insects and pathogens. The removal of competing vegetation, including the understory, would reduce water stress on remaining trees and improve their overall vigor. Increasing biodiversity of the Reserve would include the introduction of species that are not susceptible to these insects, reducing overall insect pressure. Instead of allowing sprouts to grow from removed trees that likely contain heart rot or other pathogens, new trees would be planted to avoid propagating diseased trees. Tree work would be performed in the fall to winter months when insects are not as active.

Improve Structural Diversity
To enhance structural diversity of the Reserve, a more diverse range of species would be planted, new age classes of trees would be established through planting, and openings in the forest canopy would be created to increase the patch structure of the forest. A limited number of snags would be left in place to provide habitat for wildlife; the snags would be strategically retained to maintain safety for users and buildings within and around the Reserve.

Visual Design and Aesthetics
The public has access to views of the Reserve from outside of the Reserve and from within. When viewed from afar, the Reserve should have continuous vegetation that screens existing structures. The experience within the Reserve, along its trails and roads, should have a mosaic of trees, shrubs, and groundcover of different types. There should be openings in the canopy that create patterns of sun and shade, and protect users from the wind. Tree trunks should be

visible. There should be openings that allow far views out of the Reserve towards the ocean and Golden Gate Park. Wildlife should be encouraged. Vegetation management activities that would be implemented to create a healthy and more diverse forest, including the removal of hazardous and diseased trees, native plant restoration, and tree planting, would also result in a visually stimulating experience of the Reserve.

Public Access

The primary public access into the Reserve is a system of multi-use trails. Three planned trails, the Sunset Trail, Christopher Trail, and Clarendon Trail, were approved as part of the 2014 LRDP and analyzed in the 2014 LRDP EIR. These trails are either currently under construction or will be constructed in the next few years. The plan proposes to maintain and improve new and existing trails through vegetation removal to prevent encroachment by vegetation and maintain walkability.

3.5.3 Vegetation Management Activities

Overview

The objectives of the plan would be accomplished through implementation of several vegetation management activities. UCSF would implement these vegetation management activities across four broad categories:

1. Forest treatments
2. Management of tree risk and defensible space
3. Native plant restoration
4. Maintenance of vegetation along trails and public access

Forest Treatments

Overview

Three forest treatment methods, described in detail below, would be implemented during vegetation management activities to remove dead, dying, unhealthy, and structurally unsound trees from the Reserve. Trees would be felled and bucked (i.e., cut into smaller pieces) using chainsaws and hauled to landing areas using heavy equipment where they would either be chipped or loaded onto trucks and hauled off-site. Some of the chipped materials, approximately 40 percent of the vegetation materials culled in the Reserve, would be spread across the Reserve on areas of bare ground (i.e., forest treatment areas and areas of understory removal). After trees are felled, stumps would be ground to below ground surface using a stump grinder and covered with mulch. Temporary trail closures would be required where trees are felled for public safety.

Individual Tree Selection Method

The individual tree selection method involves removing individual trees of all size classes fairly uniformly throughout a forest stand (i.e., forest type) to achieve objectives related to forest

structure. By removing dead, dying, unhealthy, and structurally unsound trees, the individual tree selection method:

- Promotes growth of remaining trees
- Provides space for new regeneration
- Provides defensible space
- Reduces fuel loads
- Reduces the risk of tree failure and injury or damage

A diagram of the individual tree selection method is presented in Figure 3.5-1.

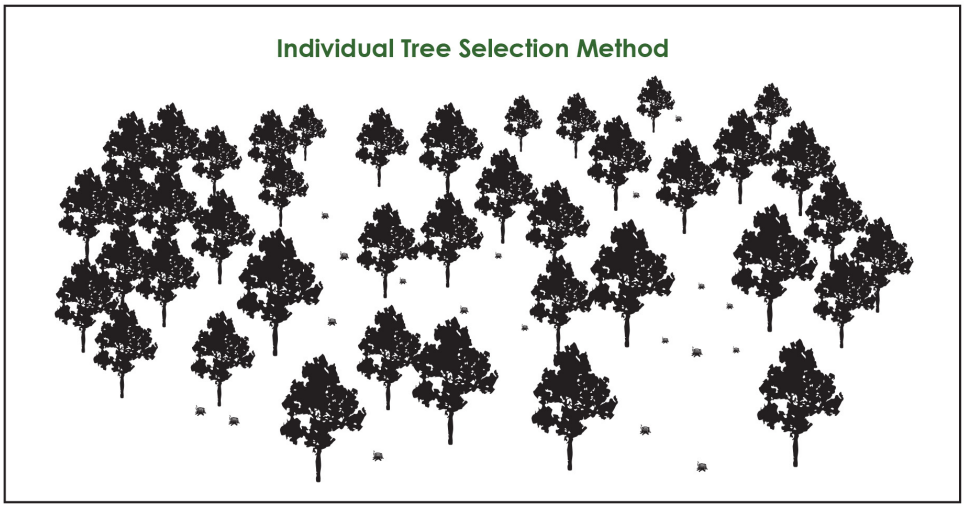
Group Selection Method

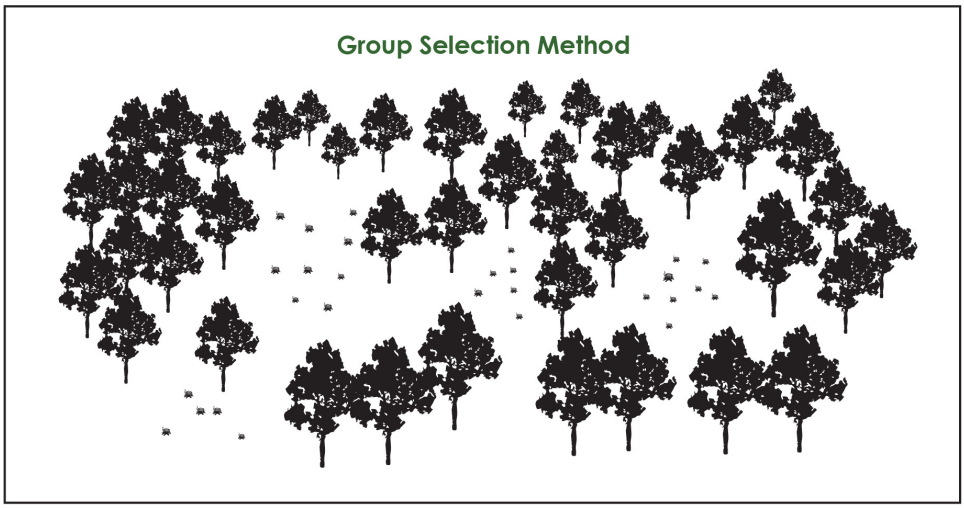
Group selection methods promote uneven-aged forest stands by creating clumps of even-aged trees distributed throughout the stand that develop into a mosaic of age classes across the stand. The method involves creating small openings of 0.5 acre or less by removing dead, dying, unhealthy, and structurally unsound trees; groups created during Phase I of the proposed plan would be 0.5 acre or smaller. The groups are large enough to promote some shade-intolerant species while accommodating shade-tolerant species around the edges of the openings. The shape of openings varies to maximize orientation to the sun. By removing dead and dying trees in small groups, the group selection method:

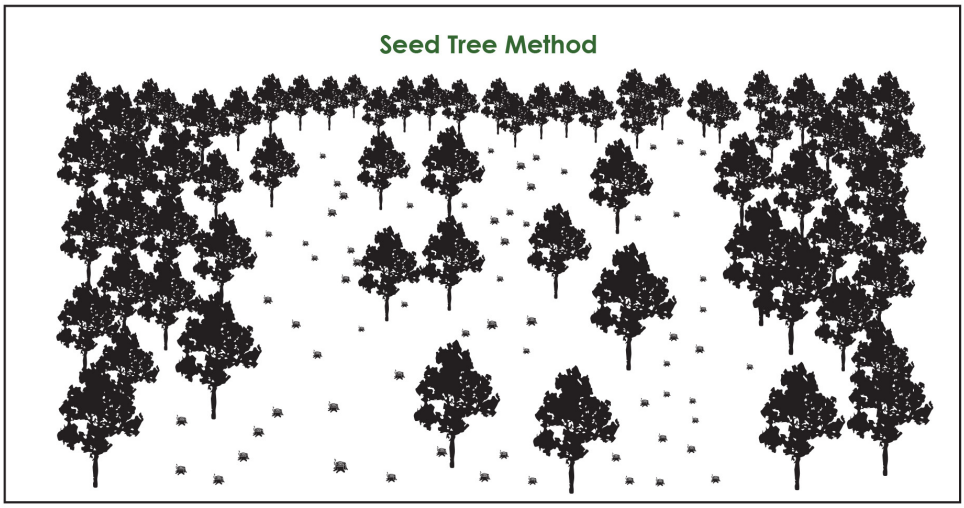
- Promotes the growth of remaining trees
- Provides space for new regeneration
- Reduces the risk of tree failure and injury or damage
- Reduce fuel loads

A schematic diagram of the group selection method is presented in Figure 3.5-1.

Figure 3.5-1 Diagrams of Forest Treatment Methods







Seed Tree Method
The seed tree method involves removing most trees in areas between 0.5 and 1 acre; seed tree treatment areas created during Phase I of the plan would be 1 acre or smaller. In seed tree treatment areas, healthy trees are retained to restock the forest. Large forest openings promote the regeneration and growth of trees that grow well in direct sunlight such as eucalyptus. In the Reserve, the seed tree method would be used in areas where trees are in the worst health and the risk of injury or damage is greatest. A diagram of the seed tree method is presented in Figure 3.5-1.

Tree Planting
Eucalyptus seedlings would be planted across the Reserve, including in areas of individual tree selection, seed tree, and group selection treatments, to promote regeneration of the forest. Seedlings would be planted at an approximately 20-foot by 20-foot spacing (i.e., 110 trees per acre), where needed, to establish a new age class. Native tree seedlings would be planted starting in Phase III of the plan (see Section 3.5.4 below) at a 1:1 ratio with eucalyptus (i.e., 50 percent eucalyptus, 50 percent native trees).

Understory Removal
English, German, and Cape ivy; Himalayan blackberry; and other non-native groundcover and vine species would be removed by hand or with equipment. Herbicides would not be used to remove any kind of vegetation in the Reserve. Treatment would focus on removing as much of the root system as possible so that brushing and trimming is kept to a minimum. Removed vegetation would be hauled off-site to prevent seed spread.

Management of Tree Risk and Defensible Space

Tree risk would be managed through the forest treatments described above and the maintenance of defensible space. UCSF currently manages tree risk through (1) routine inspections by staff as part of daily operations, and (2) bi-annual assessments of trees within and adjacent to use areas of the Reserve by an International Society of Arboriculture Tree Risk Assessment Qualified arborist. The assessment of trees along designated trails focuses on trees with a high potential for failure that could strike the trail. In the past, such trees have been 2 to 36 inches dbh and either dead, dying, or leaning towards the trail. Access to trees off-trail has been limited by the high density of low shrubs and vines, and assessments have generally been limited to less than 25 feet on either side of a trail. Under the proposed plan, the assessment area would be increased to 30 feet on either side of a trail, which would treat approximately 18 acres of the Reserve. Hazard trees would be removed within 30 feet of trails. Drive-by and/or walk-by inspections would also occur following storm events. Off-trail access for the assessments would be improved through trail maintenance and understory removal.

UCSF has set a goal of 100 feet of defensible space between vegetation and buildings, roads, and neighboring properties in the Reserve consistent with direction from the San Francisco Fire Department and CalFire. Within 30 feet of buildings, all flammable ground vegetation would be removed (i.e., only bare soil would remain), and low tree branches would be pruned to provide 10 feet of clearance to the ground. Between 30 and 100 feet from buildings, low branches and

ladder fuels on tree trunks (e.g., vines) would be pruned. Temporary trail closures would be required for public safety where trees are felled and/or pruned.

Native Plant Restoration

Native plants would be enhanced in existing localized communities of native vegetation, and the native plant conservation areas would be increased from the existing 2 acres to approximately 5 acres or more. Planting areas would be dispersed throughout the Reserve where forest openings would be created during forest treatments or non-native understory would be removed; the native planting areas would not be concentrated in any one large area of the Reserve. Non-natives would be removed by hand or with equipment such as weed whackers prior to planting natives. UCSF would plant a variety of native plant species, which are listed in Appendix 4.3 of the plan. Examples of native plant species that would be planted include big leaf maple, buckeye, sagebrush, huckleberry, coyote bush, San Francisco gumplant, toyon, and Douglas iris. Figure 3.5-2 shows the location of the restoration areas where UCSF proposes to enhance the native vegetation. Existing native plants would be retained whenever possible during forest treatment operations. Open areas created by tree removal and pruning may also be suitable for restoration with native plant species.

Maintenance of Vegetation Along Trails and Public Access

With the support of the Sutro Stewards, UCSF maintains a system of trails throughout the Reserve. Under the proposed plan, UCSF would continue to actively maintain vegetation within 5 to 10 feet on either side of trails, as appropriate. Non-woody vegetation would be trimmed to a height of 3 feet in order to maintain sight lines through the forest. Some trails would be maintained to be at least 5 feet wide to allow for the passage of a bike and a person at the same point. Downed logs or logs felled during forest treatments would be used to define and support trails by placing logs on the downhill side, where necessary.

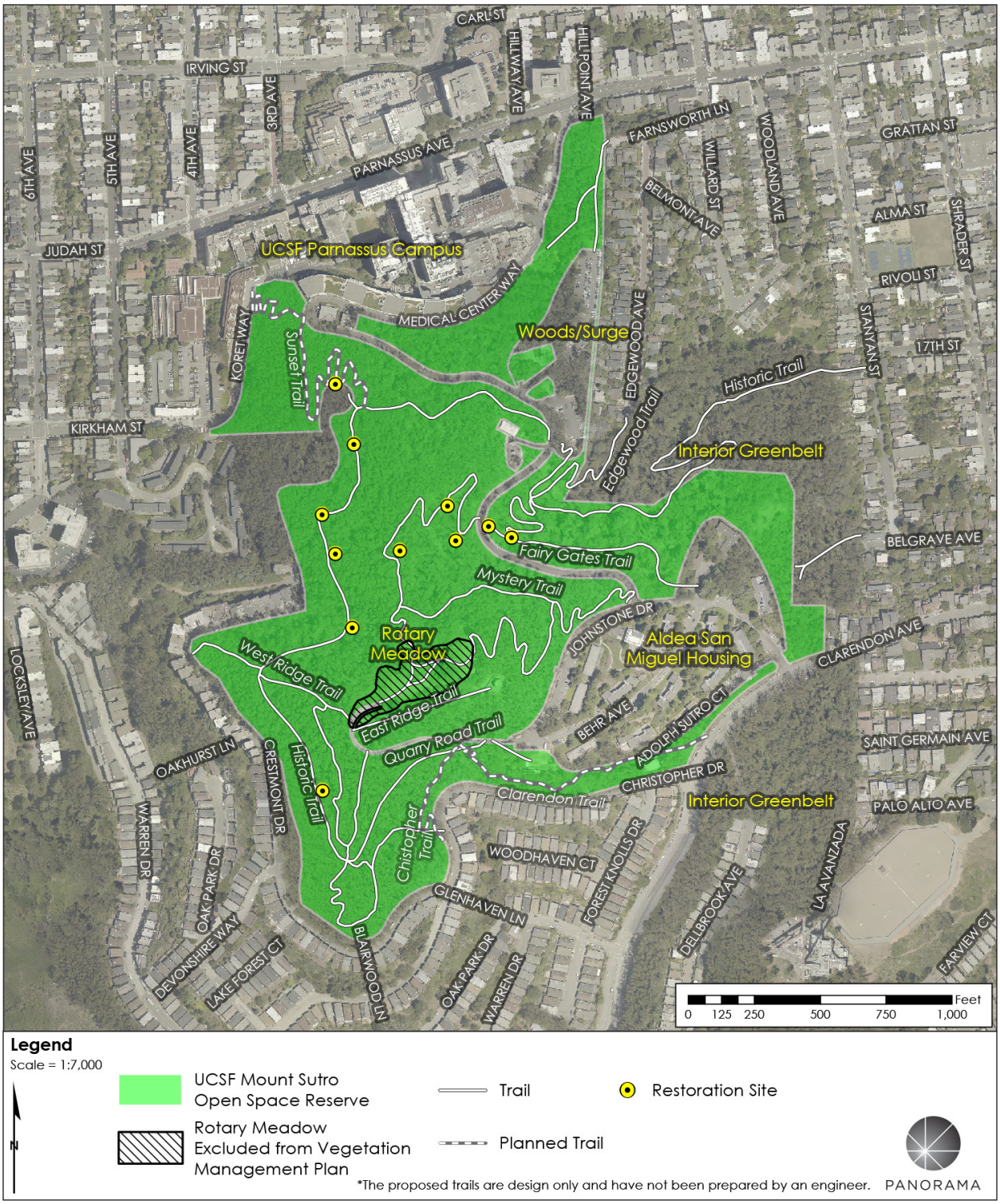
Three planned trails in the Reserve were approved under the 2014 LRDP. One of the trails, the Clarendon Trail, will be complete in mid-June 2017 before implementation of this plan; the other two trails, the Sunset and Christopher Trails, could be constructed during implementation of this plan. However, these trails are not considered part of the plan because they were approved under the 2014 LRDP and evaluated in the 2014 LRDP EIR. Vegetation maintenance would occur along these trails as part of the plan after construction of the trails is complete.

3.5.4 Vegetation Management Phasing

Description of Phases

UCSF would implement the vegetation management activities over 20 years in three phases, as described here. Treatment types implemented in Phase I would continue in Phases II and III in different areas, and seed tree and group selection treatments would occur across the Reserve. Because it is difficult to predict how the conditions of the forest will change over the life of the plan, particularly in response to climate change, the forest treatments are defined to be adaptive and responsive to the changing forest conditions. The plan recommends updating the forest inventory prior to starting treatments during Phase III to ensure that forest treatments are appropriate for the future forest conditions.

Figure 3.5-2 Location of Native Vegetation Restoration Areas



Phase I

Phase I would occur over the first five years (Years 1 – 5) of the plan. Phase I would focus on managing risk of hazardous trees and initiating forest treatments through the following vegetation management activities:

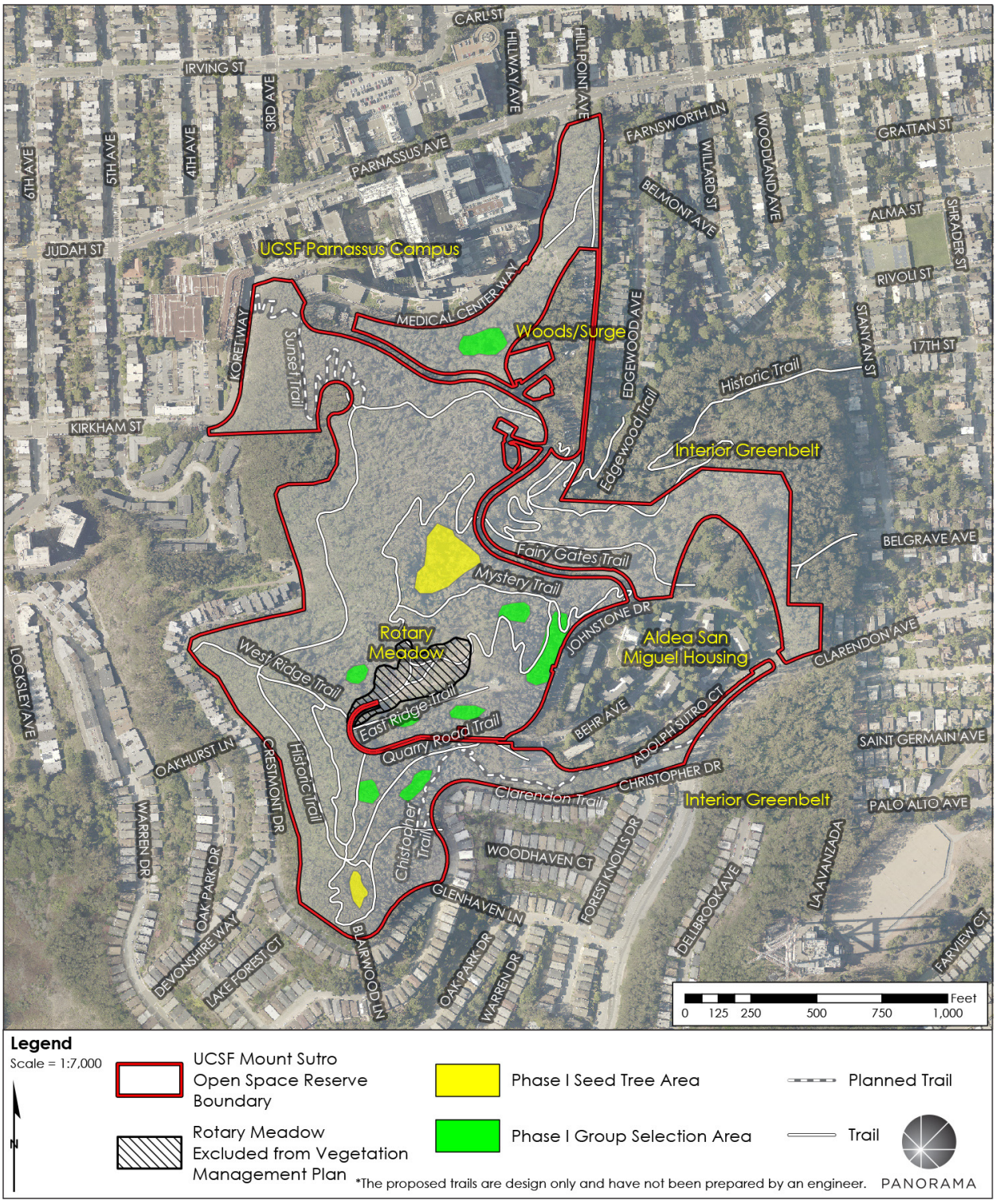
- Remove individual dead, dying, unhealthy, and structurally unsound trees across the Reserve (all four forest types) using the individual tree selection method.
- Establish two seed tree treatment areas (1.05 acres total) and six group selection treatment areas (1.27 acres in total) in Forest Type 1 to remove dead and dying trees. Phase I seed tree and group selection treatment areas in the Reserve are shown on Figure 3.5-3.
- Establish one group selection treatment area (0.34 acre) in Forest Type 3 to remove dead and dying trees.
- Establish one group selection treatment area (0.13 acre) in Forest Type 4 to remove dead and dying trees.
- Plant seedlings of blue gum and other eucalyptus species across Forest Types 1, 2, and 3 with an approximately 20-foot by 20-foot spacing (i.e., 110 trees per acre), where needed, to establish a new age class.
- Control low-growing vines and shrubs in the understory that compete with eucalyptus seedlings and native plants across the Reserve (all four forest types).
- Continue conservation and enhancement of native plants with the eventual goal of expanding native plant conservation from 2 to 5 acres.
- Remove hazard trees and/or prune trees to maintain defensible space between buildings and Reserve vegetation.
- Remove and/or trim vegetation along trails to maintain trails and public access.

Phase II

Phase II of vegetation management activities would be implemented over Years 6 – 10 of the plan. Forest restoration and regeneration would be the focus of Phase II, which would be implemented through the following vegetation management activities:

- Continue to remove individual dead, dying, unhealthy, and structurally unsound trees across Forest Types 1, 3, and 4 using the individual tree selection method.
- Establish new group selection or seed tree treatments in areas of low tree density across the Reserve (all four forest types).
- Plant blue gum and other species of eucalyptus in 50 percent of locations and non-eucalyptus in the other 50 percent on an approximately 20-foot by 20-foot spacing in Forest Types 1, 2, and 3, where needed, to reinforce the new age class established during Phase I.
- Continue restoring native vegetation, controlling understory, maintaining defensible space, and maintaining trails across the Reserve (all four forest types).

Figure 3.5-3 Phase I Treatment Areas



By the end of Phase II (Year 10), UCSF hopes to:

- Reduce hazard trees
- Reduce competition for water, sunlight, and growing space within the Reserve
- Restore at least 5 acres of native vegetation
- Establish at least 10 acres of young, healthy new forest, moving Forest Types 1 and 4 towards an uneven-aged forest and Forest Types 2 and 3 towards a two-age class forest
- Provide improved access and enhanced visitor experience

Phase III

Phase III would occur from Years 11 – 20 of the plan. Phase III would focus on diversifying the forest canopy and establishing a new generation of trees. Future climate conditions and how the forest will respond to future climate conditions are currently unknown; therefore, a forest inventory would be conducted prior to the start of Phase III vegetation management activities. The forest inventory would provide feedback on the effectiveness of forest treatments over the first 10 years of plan implementation, inform new recommendations about how to manage the Reserve or reinforce the existing forest treatments, and document shortcomings in existing data for the Reserve. Pending results from the forest inventory, the following vegetation management activities would be implemented:

- Continue to remove individual dead, dying, unhealthy, and structurally unsound trees to achieve desired stand densities. Tree removal should focus on species other than blue gum eucalyptus. Start in locations that are least likely to undergo reforestation (i.e., planting).
- Treat the entire Reserve with a mix of single tree selection, group selection, and seed tree treatments.
- Plant blue gum and other species of eucalyptus in 50 percent of locations and non-eucalyptus in the other 50 percent on an approximately 20-foot by 20-foot spacing. Eucalyptus should be planted in the more exposed side of forest openings to receive more sunlight.
- Continue controlling the understory, restoring native vegetation, maintaining defensible space, and maintaining trails across the Reserve.

Summary of Activities by Phase

Table 3.5-1 summarize the four activities as they would be performed by phase, including the methods, proposed impact area, and locations. Acreages of disturbance are provided for defined areas of vegetation management activities (e.g., seed tree treatment areas); unknown areas of disturbance are described generally such as for individual tree selection. Most trees proposed for removal using individual tree selection would be felled by hand and left in place. Due to this technique, individual trees would result in a disturbance area only slightly larger than the existing tree, but the area of disturbance is not known at this time because the number of trees proposed for removal has not yet been identified. Refer to Figure 3.5-1 for a pictorial representation of the individual tree selection method.

Table 3.5-2 and Table 3.5-3 summarize the rough estimations of tree removal and planting to reach the stated healthy tree densities for each forest type. It is anticipated than approximately 6,000 trees (predominantly dead and/or dying trees) would be removed during Phase I of the plan. Note that Table 3.5-2 and Table 3.5-3 are only estimations to provide a quantitative basis for the analysis in this EIR. Neither the exact number nor the actual trees for removal are known and will depend upon evaluations by arborists prior to tree removal. Final densities reflect a reduced number of trees, which are needed to create a healthy forest. The use of the forest as a recreational, visual, and ecological resource does not depend solely on the number of total trees in the forest but also on the overall health of the forest.

Table 3.5-1 Summary of Vegetation Management Activities by Phase

Activity	Methods	Area Impacted	Location
Phase 1 (Year 1-5)			
Forest Treatments	Dead and dying tree removal (individual tree selection method)	Individual trees throughout the plan area	Forest Types 1, 2, 3, and 4
	Seed tree treatment	1.05 acres	Forest Type 1 (see Figure 3.5-3)
	Group selection treatment	1.75 acres	Forest Types 1, 3 and 4 (see Figure 3.5-3)
	Tree planting (mixed eucalyptus species)	Areas of tree removal (≥ 2.8 acres)	Forest Types 1, 2, and 3
	Low-growing vine and shrub removal	Vines and shrubs throughout the plan area	Forest Types 1, 2, 3, and 4
Management of Tree Risk and Defensible Space	Hazard tree removal and/or pruning	18 acres	30 feet on either side of a trail
	Hazard tree removal and/or pruning	14 acres	Within 100 feet of buildings
Native Plant Restoration	Native vegetation planting	5 acres	11 potential restoration areas; see Figure 3.5-2
Maintenance of Vegetation Along Trails and Public Access	Vegetation removal	N/A	Trails
Phase 2 (Year 6-10)			
Forest Treatments	Dead and dying tree removal (individual tree selection method)	Individual trees throughout most of the plan area	Forest Types 1, 3, and 4
	Seed tree or group selection treatment	≥ 2.8 acres	Forest Types 1, 2, 3, and 4

Activity	Methods	Area Impacted	Location
	Tree planting (50 percent mixed eucalyptus species, 50 percent non-eucalyptus)	Areas of tree removal (≥ 2.8 acres)	Forest Types 1, 2, and 3
	Low-growing vine and shrub removal	Vines and shrubs throughout the plan area	Forest Types 1, 2, 3, and 4
Management of Tree Risk and Defensible Space	Hazard tree removal and/or pruning	18 acres	30 feet on either side of a trail
	Hazard tree removal and/or pruning	14 acres	Within 100 feet of buildings
Native Plant Restoration	Native vegetation planting	5 acres	11 potential restoration areas; see Figure 3.5-2
Maintenance of Vegetation Along Trails and Public Access	Vegetation removal	N/A	Trails
Phase 3 (Year 11-20)			
Forest Treatments	Mix of individual tree selection, group selection, and seed tree treatments to remove dead and dying trees, focusing on species other than eucalyptus	Patches and individual trees throughout the plan area	Forest Types 1, 2, 3, and 4
	Tree planting (50 percent mixed eucalyptus species, 50 percent non-eucalyptus)	Areas of tree removal	Forest Types 1, 2, 3, and 4
	Low-growing vine and shrub removal	Vines and shrubs throughout the plan area	Forest Types 1, 2, 3, and 4
Management of Tree Risk and Defensible Space	Hazard tree removal and/or pruning	18 acres	30 feet on either side of a trail
	Hazard tree removal and/or pruning	14 acres	Within 100 feet of buildings
Native Plant Restoration	Native vegetation planting	5 acres	11 potential restoration areas; see Figure 3.5-2
Maintenance of Vegetation Along Trails and Public Access	Vegetation removal	N/A	Trails

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Table 3.5-2 Summary of Tree Removal and Planting

Forest Type	Acres	Trees per Acre			Net Removed or Planted Trees to Achieve Final Desired Density (trees/acre)	Final Desired Stand Density (trees/acre)
		Live Trees[a]	Standing Dead Trees	Total		
1	24	270	100	370	Remove 270 to 295	75 to 100
2	9	45	10	55	Add up to 20	50 to 75
3	8	110	10	120	Remove 20 to 45	75 to 100
4	18	128	50	178	Remove 78 to 98	80 to 100

[a] Live trees include dying trees that are still alive, but are in declining health

Table 3.5-3 Summary of Tree Removal and Planting by Phase

Forest Type	Total Trees per Acre	Phase I [a]			Phase II [b]			Phase III [b]			Net Trees Removed or Planted per Acre
		Maximum Live Trees Removed per Acre per Year	Maximum Dead Trees Removed per Acre per Year	Maximum Trees [c] Planted per Acre per Year	Maximum Live Trees Removed per Acre per Year	Maximum Dead Trees Removed per Acre per Year	Maximum Trees [c] Planted per Acre per Year	Maximum Live Trees Removed per Acre per Year	Maximum Dead Trees Removed per Acre per Year	Maximum Trees [c] Planted per Acre per Year	
1	370	145	100	110	50 to 65	100	110	50 to 65	100	110	Remove 270 to 295
2	55	0	10	110	2	10	110	2	10	110	Add up to 20
3	120	55	10	110	20 to 25	10	110	20 to 25	10	110	Remove 20 to 45
4	178	40	50	–	10 to 15	50	–	10 to 15	50	–	Remove 78 to 98

Notes:

[a] The maximum numbers of live trees proposed for removal during Phase I would decrease after Year 1 to the maximum numbers proposed to occur during Phase II.

[b] The intensity of tree removal will depend on the health of the forest at a given location; the same acre of forest would not undergo the same intensity of tree removal during Phase II and Phase III. For example, if 50 to 65 trees are removed from a given acre of forest during Phase II, 50 to 65 trees would not be removed from that same acre during Phase III.

[c] Tree planting would occur on an as-needed basis. In areas where tree planting would occur, up to 110 trees would be planted per acre.

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3.5.5 Monitoring

Vegetation management activities would be monitored throughout implementation of the plan. The effectiveness of specific treatments can only be assessed over time by comparing the initial conditions of the Reserve with the conditions that develop as the forest matures. The following monitoring protocol would be implemented:

1. Monitor each individual forest treatment upon completion of the work and in Years 1, 3, and 5 (common response time for restoration plans). The following data would be noted during monitoring:
   a. Number and rough location of each planted tree
   b. Overall plant survival
   c. Effectiveness of vegetation management treatments
   d. Tree height and diameter growth
   e. Need for supplemental irrigation
   f. Need for fertilization/soil amendments
   g. Prevalence of stump sprouting
2. Re-visit the forest inventory plots established in spring 2016 every 10 years to assess forest health and structure.
3. Maintain an inventory of plants growing in the Reserve in conjunction with the Sutro Stewards.
4. Explore implementation of monitoring programs for wildlife with other non-profit groups.
5. Explore implementation of a feedback system where visitors could comment on the Reserve, including reporting their enjoyment, hazards, wildlife, vegetation, or other observations.

3.5.6 Incidental Activities and Requirements

Debris Handling and Removal

Debris in the form of logs, tree limbs, and chipped and masticated tree material would be generated during the implementation of forest treatments. For the individual tree selection, group selection, and seed tree methods, trees may be felled, bucked into smaller pieces, and either moved off-site or left to lay on the ground to decompose or to line trails and prevent trail erosion. Trees may also be chipped or masticated, and the chips would be spread across the forest floor or hauled off-site. Individual trees may also be pruned, and removed branches would be chipped.

Log trucks and chip vans would be used to haul felled and chipped trees and vegetation off-site. Trucks would be loaded at landing areas (described below) or on Medical Center Way. UCSF estimates that 2 to 8 haul trips for log trucks and 2 to 4 haul trips for chip vans per day (up to a total of 12 haul trips per day) would be needed to dispose of removed vegetation. During the first five years of vegetation management activities (Phase I), up to approximately 175 total truck trips (approximately 36 trips per year) would be required to haul removed

vegetation off-site. Green waste would be composted at an appropriate facility located outside of San Francisco. Up to approximately 160 cubic yards of wood chips could be hauled off-site in a day. Two points of entry would be used by equipment and vehicles to access the Reserve: Medical Center Way via Parnassus Avenue and Johnstone Drive via Clarendon Avenue. Additional information regarding access routes is provided in Section 4.12: Transportation and Traffic.

Actions to Ensure Success of Regeneration

Soil Productivity Testing

Prior to tree removal, soil productivity tests would be performed to ensure that sites in the Reserve have an adequate nutrient profile to sustain growth of new trees. UCSF would make reasonable efforts to ensure the success of planted eucalyptus and other tree species, including but not limited to fertilization/soil amendments for trees in accessible areas and/or planting different species that may be more adaptable to soil conditions. Consistent with monitoring, UCSF would continually monitor soil conditions and make adjustments as necessary to ensure regeneration of the forest.

Water Use

The plan does not currently include irrigation in the initial years of implementation. New trees would be planted just prior to the wet season such that irrigation would not be needed. If planting and restoration efforts were unsuccessful, plants may receive supplemental water using backpack sprayers. Other options for a water source may include the SFPUC's water tank in Rotary Meadow or other nearby potable water sources. Water may be distributed using temporary, aboveground piping or a temporary water storage tank at the summit that could be used to fill watering trucks. No permanent storage structures would be built in association with the plan, as no permanent structures are allowed to be added to the Reserve.

Access Roads and Landings

UCSF would widen existing trails/access roads to implement the forest treatments. The South Ridge Trail is currently wide enough to accommodate equipment (approximately 15 feet wide); while the trail would not be widened, two small trees would be removed for equipment access. A portion of the East Ridge Trail and the Quarry Road Trail would be widened up to 10 feet. Figure 3.5-4 shows the location of existing trails/access roads that would be widened.

Temporary landing areas (also known as staging areas) would be created to stage heavy equipment, store hand-held equipment, and store logs and chipped/masticated materials before they are hauled off-site. Landing areas would be no larger than 0.25 acre each, large enough to allow for log trucks and chip vans to turn around. Several landing areas would be located on existing asphalt and others would be located within the Reserve on bare ground; vegetation would be cleared from landing areas on bare ground, and the landings would be graded so logs that are stored in the areas cannot roll and trucks can be loaded in a flat location. Bare areas would be covered in a few inches of chips to minimize erosion. Figure 3.5-4 shows the location of temporary landing areas that would be created as a part of the plan. Table 3.5-4 summarizes the proposed landing areas.

Figure 3.5-4 Location of New Access Roads, Landing Areas, and Access Road Widening



Table 3.5-4 Landing Areas

Landing Area	Existing Asphalt or Bare Ground Covered in Chip?
Across from EHS Building	Bare Ground Covered with Chip
Surge Parking Lot	Existing Asphalt
Medical Center Way at Woods Parking Lot	Existing Asphalt
North Ridge Trail	Bare Ground Covered with Chip
Johnstone Drive (west)	Existing Asphalt
Johnstone Drive (south)	Existing Asphalt
SFPUC Water Tank	Bare Ground Covered with Chip
Nike Road	Bare Ground Covered with Chip
South Ridge Trail	Bare Ground Covered with Chip

3.5.7 Equipment, Personnel, and Work Schedule

Equipment

Table 3.5-5 identifies the equipment that would be needed to implement the vegetation management activities in the plan.

Table 3.5-5 Equipment for Proposed Vegetation Management Activities

Vegetation Management Activity	Equipment	
Access Road Widening	• Excavator	• Grader
Forest Treatments Management of Tree Risk and Defensible Space	• Hand saw • Pole saw • Chainsaw • D-6 tractor or similar • Excavator • Backhoe • Loader • Log truck • Chip van • Crane • Auger	• Masticator • Chipper • Feller buncher (possible) • Pick-up truck • Skidder • Forwarder • Water truck • Tub grinder • Stump grinder • Backpack sprayer
Native Plant Restoration	• Backpack sprayer • Bulb planter • Bulb transplanter • Trowel • Dibble • Plant auger	• Shovel • Weeder (cod weeder, handle weeder, claw weeder) • Hoe (prohoe, rogue hoe) • Pick-up truck
Maintenance of Vegetation Along Trails and Public Access	• Weeder (cod weeder, handle weeder, claw weeder)	• Hoe (prohoe, rogue hoe) • Grader • Pick-up truck

Personnel

Table 3.5-6 provides the number of personnel that would be needed to implement the vegetation management activities in the plan. A maximum of 35 personnel would be on site at any given time.

Table 3.5-6 Number of Personnel

Activity	Maximum Estimated Number of Personnel
Forest Treatment	2 – 3 crews of 3 – 5 people each (15 people max.)
Manage Tree Risk and Defensible Space	1 crew of 3 – 5 people (5 people max.)
Native Plant Restoration	3 – 5
Maintain Vegetation Along Trails and Public Access	3 – 5
Supervisors	3 – 5

Work Schedule

Construction Timing

The plan would be implemented over about 20 years. Implementation of the plan would begin in late fall/winter 2017, provided CEQA review is complete and the plan is approved. Vegetation management activities would occur yearly, beginning in September after the end of the nesting season and continue through February. Ground disturbing activities would not occur during a significant storm event[8]. Vegetation management activities could occur during the nesting season (March through August) if wildlife surveys are conducted immediately prior to implementing activities; however, all unnecessary work would be avoided during the nesting season.

Construction Hours

UCSF is bound to implement several of the mitigation measures described in the 2014 LRDP EIR, including Mitigation Measure NOI-LRDP-1b, which limits construction hours:

> Construction hours are restricted to the hours listed in the table below. In rare circumstances, work may need to occur outside of these work hour limits. In such cases, UCSF Community and Government Relations will receive advance notice from the project manager, at least one week in advance as feasible, and will engage the community to identify measures to minimize potential impacts.

[8] A significant storm event is defined as 0.5 inches of rain with a 48-hour or greater period between rain events, as defined in Appendix 5 to the 2009-0009-DWQ Construction General Permit, as amended by 2010-0014-DWQ and 2012-006-DWQ.

Days of the Week	Construction Hours			
	"Not Noisy" Work [a]		Noisy Work	
	Regular Hours	**Extended Hours [b]**	**Regular Hours**	**Extended Hours [b]**
Monday – Friday	7:00 am to 5:00 pm	5:00 pm to 8:00 pm	8:00 am to 5:00 pm	N/A
Saturday	N/A	8:00 am to 5:00 pm	N/A	9:00 am to 4:00 pm
Sunday	N/A	8:00 am to 5:00 pm	N/A	N/A

Notes:

[a] "Not Noisy" work = 80 decibels or less at 100 feet; "Noisy" work = more than 80 decibels at 100 feet.

[b] Extended hours to be considered by UCSF Community and Government Relations with advance notice from the plan manager.

3.6 REQUIRED PERMITS AND APPROVALS

The California Department of Fish and Wildlife (CDFW) is a trustee agency for the proposed project. Approval may be required by CDFW if there is incidental take of any state-listed species.

CDFW and the U.S. Army Corps of Engineers (USACE) may exert jurisdiction over Woodland Creek, a drainage within Stanyan Canyon on the eastern side of the Reserve, if the proposed plan would affect the flow, bed, bank, or riparian vegetation along the drainage.

3.7 REFERENCES

HortScience, Inc. and Matt Greene Forestry & Biological Consulting. 2016. "Draft Vegetation Managment Plan, Mount Sutro Open Space Reserve."

HortScience, Inc. 1999. "Mount Sutro Opace Space Reserve Maintenance and Restoration Plan." Pleasanton, California.

Society of American Foresters. 1994. Silviculture Terminology. September. Accessed February 27, 2017. http://oak.snr.missouri.edu/silviculture/silviculture_terminology.htm.

United States Forest Service (USFS). 2017. Silviculture. Accessed February 2, 2017. https://www.fs.fed.us/forestmanagement/vegetationmanagement/silviculture/index.shtml.

4 ENVIRONMENTAL SETTING, IMPACTS, AND MITIGATION MEASURES

4.0 INTRODUCTION

4.0.1 Overview

This section of the EIR presents potential environmental impacts of the proposed plan. The scope of the analysis and key terms are presented in this section to assist readers in understanding how the impact analysis has been prepared in this EIR.

4.0.2 Levels of Significance

The EIR uses a variety of terms to describe the levels of significance of adverse impacts identified during the course of the environmental analysis. The following are definitions of terms used in this EIR:

- **Significant and Unavoidable Impact.** Impacts that exceed the defined standards of significance and cannot be eliminated or reduced to a less than significant level through the implementation of feasible mitigation measures (referred to as MM in the sections).
- **Significant Impact.** Impacts that exceed the defined standards of significance and that can be eliminated or reduced to a less than significant level through the implementation of feasible mitigation measures.
- **Potentially Significant Impact.** Significant impacts that may ultimately be determined to be less than significant; the level of significance may be reduced in the future through implementation of policies or guidelines (that are not required by statute or ordinance), or through further definition of the project detail in the future. Potentially Significant Impacts may also be impacts about which there is not enough information to draw a firm conclusion; however, for the purpose of this EIR, they are considered significant. Such impacts are equivalent to Significant Impacts and require the identification of feasible mitigation measures.
- **Less Than Significant Impact.** Impacts that are adverse but that do not exceed the specified standards of significance.
- **No Impact.** The project would not create an impact.

4.0.3 Approach to Impact Analysis

The preparation of this EIR was preceded by an IS (included in Appendix A). The IS evaluated the existing physical conditions in the plan area and determined the environmental topics that require further analysis in the EIR. The topics that the IS determined would be studied further

in the EIR include: Aesthetics; Air Quality; Biological Resources; Cultural and Tribal Cultural Resources; Forestry Resources; Geology and Soils; Greenhouse Gas Emissions; Hazards and Hazardous Materials; Hydrology, Water Quality, and Water Supply; Noise; Recreation; Transportation and Traffic; and Wind.

Following the publication of the IS, a public scoping meeting was held to receive public comments on the IS and the topics to be analyzed in the EIR. Based on oral comments received at the public scoping meeting and on written comment letters received during the 30-day public comment period (see Appendix A for written comment letters received), no additional topics needed to be added to the EIR. The following topics were determined in the IS to require no further analysis in the EIR: Agriculture, Land Use, Population and Housing, Mineral Resources, Public Services, and Utilities and Utility Systems[1]. Accordingly, these topics are not discussed in this EIR.

For each of the resource areas evaluated in the sections that follow, the EIR describes the existing environmental setting, the potential for the plan to significantly affect the existing resources, and recommended mitigation measures that could reduce or avoid potentially significant impacts. Each of the resource sections also clearly identifies those impacts that were determined in the IS to be less than significant and thus do not require detailed evaluation in this EIR. Relevant mitigation measures adopted by the Regents in conjunction with the approval of the 2014 LRDP are included in and considered part of the proposed plan. The analysis presented in the subsequent sections evaluates environmental impacts that would result from implementation of the plan after the application of these 2014 LRDP measures.

4.0.4 Approach to Cumulative Impact Analysis

CEQA Requirements for Cumulative Analyses

An EIR must include a discussion of the cumulative impacts of a project in addition to the project-specific impacts. Per CEQA Guidelines Section 15355, cumulative impacts "refer to two or more individual effects which, when considered together, are considerable or which compound to increase other environmental impacts." Section 15130(a)(1) states that "a cumulative impact consists of an impact that is created from the combination of the project evaluated in the EIR together with other projects causing related impacts." The discussion of cumulative impacts must reflect the severity of the impacts and the likelihood of their occurrence; however, the discussion need not be as detailed as the discussion of project-specific impacts (CEQA Guidelines Section 15130(b)). The cumulative impact analysis for this EIR

[1] All significance criteria under Utilities and Service Systems were determined to have no impact or a less than significant impact, except for those related to water supplies available to serve the plan from existing entitlements and resources. This impact is addressed in the Hydrology, Water Quality, and Water Supply analysis in the EIR.

evaluates the potential cumulative impacts from the proposed plan in combination with other past, present, and probable future projects in or near the Reserve.

Methodology

CEQA Guidelines Section 15130(b) presents two approaches for identifying the relevant cumulative projects to include in the cumulative analysis in an EIR:

- A list of past, present, and probable future projects producing related or cumulative impacts, including those projects outside the control of the lead agency; or
- A summary of projections contained in an adopted local, regional, or statewide plan, or related planning document that describes or evaluates conditions contributing to the cumulative effect.

This EIR utilizes a hybrid approach: a list of past, present, and probable future projects (collectively referred to as "cumulative projects") is considered in combination with baseline conditions, agency projections, and adopted planning documents. The cumulative analysis considers, but does not exclusively rely on, planning documents to establish the cumulative scenario for the analysis.

The discussion of cumulative impacts in this EIR focuses on whether the incremental impacts of the proposed plan are cumulatively considerable when considering other, nearby projects. A cumulatively considerable impact means that the incremental impacts of an individual project are significant when viewed in context with the effects of past, present, and probable future projects (CEQA Guidelines Section 15065(a)(3)). The discussion of cumulative impacts in this EIR followed these guidelines:

1. **Define the Relevant Geographical Area of Impact.**
   The relevant area affected for each impact category is defined, with a reasonable explanation supporting the geographic area used in the analysis. (CEQA Guidelines Section 15130(b)(3).)
2. **Identify the Past, Present and Probable Future Projects Producing Related or Cumulative Impacts.**
   If a "list approach" is used, past, present, and probable future projects for each impact category are identified. All projects that might result in related impacts, not just similar sources or projects, are included. The future projects list also includes future aspects of the proposed plan that are reasonably foreseeable consequences of project approval (CEQA Guidelines Section 15130(b)(1).)
3. **Is There a Significant Impact to which Both the Proposed Plan and Other Projects Contribute?**
   The combined effects of both the proposed plan and the other identified projects that could result in an impact that is cumulatively significant are identified (*Communities for a Better Environment v. California Resources Agency* [2002] 103 Cal.App.4th 98, 120). This question has two parts: (1) is there a significant impact on the environment that (2) is the result of the effects of the project combined with

the effects of other projects? If the plan does not contribute to the impact, then it is not considered a significant cumulative impact for the purposes of analyzing the proposed plan. Mitigation is not considered at this point in the analysis.

4. **Is the Plan's Incremental Contribution Cumulatively Considerable?**
   If the answer to question 3 or 4 above is "no," then the impact is discussed briefly, with the basis for the determination set forth. If the answer to question number 3 above is yes, then the proposed plan's incremental effect is assessed to determine if it is cumulatively considerable without mitigation. Even where the plan might cause an "individually limited" or "individually minor" incremental impact that, by itself, is not significant, the plan may nevertheless contribute to a cumulative impact if the contribution is "cumulatively considerable" when viewed together with environmental changes anticipated from past, present, and probable future projects (CEQA Guidelines Sections 15064(h)(1), 15355(b).)
5. **Would Mitigation Reduce the Plan's Cumulatively Considerable Contribution to a Less Than Significant Level?**
   If the proposed plan contributes to a significant cumulative impact (question number 3, above) and if the plan's contribution is cumulatively considerable (question number 4, above), then the final question is whether mitigation would reduce the plan's contribution to a less than cumulatively considerable level. Even though mitigation may render the plan's contribution less than significant when viewed in isolation (i.e., at a project-specific level), the contribution that remains after mitigation may still be cumulatively considerable and, thus, not mitigated for cumulative impact analysis purposes. If the plan's contribution is mitigated to a less than cumulatively considerable level, then the impact can be found to be less than significant.
6. **What is the Significance of the Plan's Contribution to the Cumulative Impact?**
   The significance of the plan's contribution to the cumulative impact is stated as either: (1) less than significant (i.e., less than cumulatively considerable); (2) less than significant with mitigation (i.e., the cumulatively considerable contribution has been eliminated or rendered so small that it is no longer cumulatively considerable); (3) significant and unavoidable.

Area of Analysis and List of Projects, Plans, and Projections

The geographic area of analysis for cumulative impacts in this EIR varies by impact category, but is generally limited to projects occurring within 1 mile of the Reserve's boundary for most resource topics.

Present and probable future projects that could contribute to the cumulative scenario are listed in Table 4.0-1 and shown in Figure 4.0-1. Projects were identified through review of the UCSF 2014 LRDP and by contacting UCSF to inquire about the status and details of the projects.

The following planning documents were also considered in this cumulative impact analysis:

- San Francisco General Plan (San Francisco Planning Department 2014)

- UCSF 2014 Long Range Development Plan (UCSF 2014a)

Table 4.0-1 Cumulative Scenario Projects

No.	Project Name	Project Type	Project Components	Location	Status
1	Radiobiology, Medical Research 4, Surge, Woods, EHS, LPPI, Koret, and Proctor Demolition	Building demolition	Demolish the laboratory of Radiobiology, Medical Research 4, Surge, Woods, Environmental Health and Safety (EHS), Langley Porter Psychiatric Institute, and Koret Vision Research buildings	On the UCSF Parnassus Heights campus site along Kirkham Street, Koret Way, and Medical Center Way	Radiobiology, and Medical Research 4: demolition complete Surge, Woods: 2015-2019 EHS, Koret: 2031-2035 Langley Porter: 2025-2030
2	Long Hospital Addition	Building construction	Construct a new hospital addition to Long Hospital	UCSF Parnassus Heights campus site between Parnassus Avenue and Medical Center Way	2025-2030
3	Moffitt Hospital Renovation	Building renovation	Renovate and reuse Moffitt Hospital	UCSF Parnassus Heights campus site between Parnassus Avenue and Medical Center Way	2031-2035
4	UC Hall Renovation	Building seismic retrofitting	Seismically retrofit, renovate, and convert UC Hall to student housing	West end of UCSF Parnassus Heights campus site on Parnassus Avenue	Phase 1: -2020-2024 Phase 2: 2031-2035
5	Fifth and Parnassus Housing	Building construction	Construct 45 units of faculty housing	"L"-shaped site at 5th and Parnassus Avenues	2015-2019

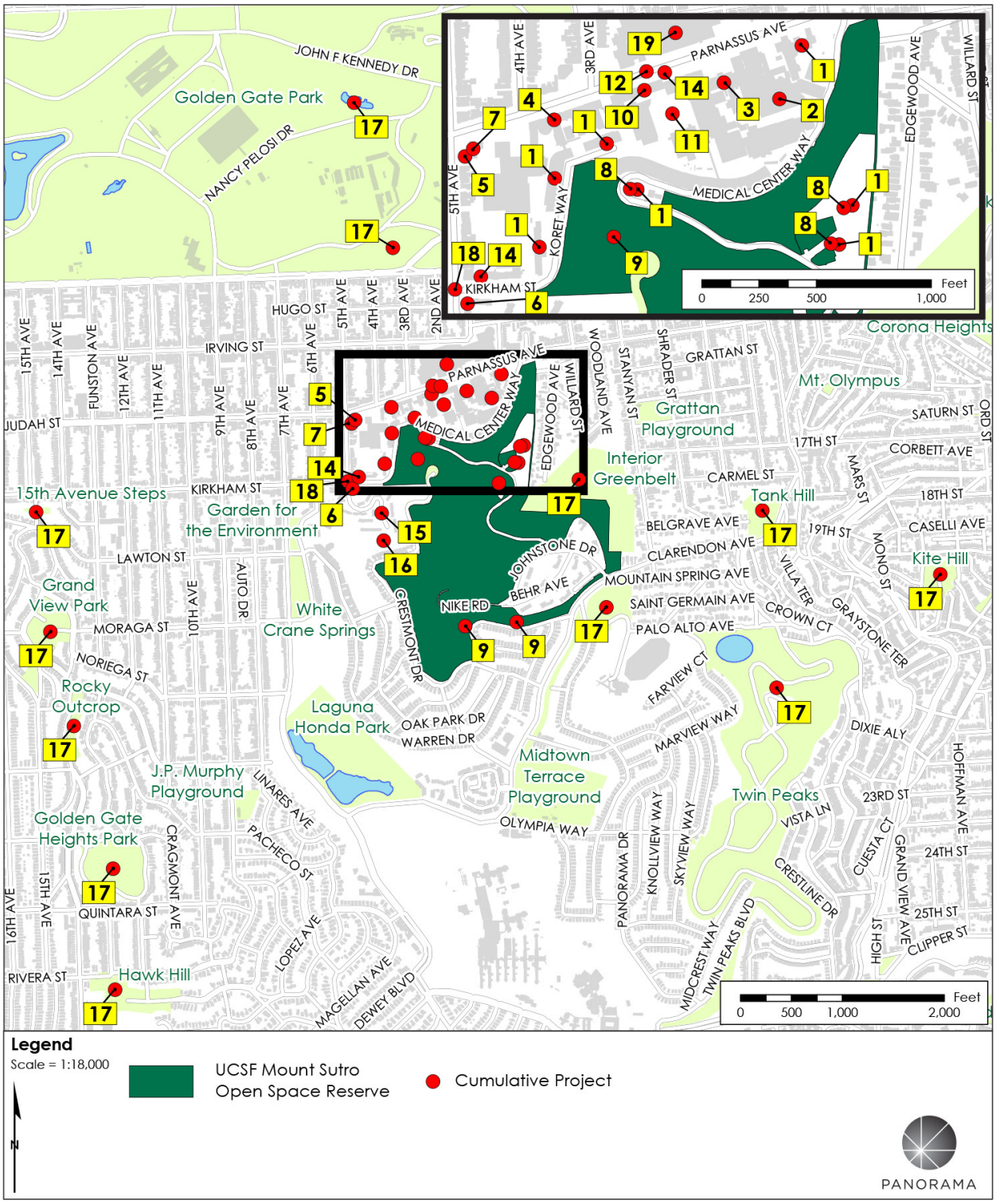
No.	Project Name	Project Type	Project Components	Location	Status
6	Proctor Demolition and Housing/Open Space Development	Building demolition and possible construction	Demolish Proctor building and either replace with either 32 residential housing units or restore to open space	Southwest corner of UCSF Parnassus Heights campus site on 5th Avenue and Kirkham Street	2020-2024
7	Faculty Alumni House Seismic Retrofitting	Building seismic retrofitting	Retrofit Faculty Alumni House to meet seismic standards	West end of UCSF Parnassus Heights campus site on Parnassus Avenue	2020-2024
8	Surge, Woods, and EHS Open Space Restoration	Restoration to open space	Following demolition of Surge, Woods, and EHS buildings, the footprints are proposed to be restored to Mount Sutro Open Space Reserve (Reserve)	North end of the Reserve off Medical Center Way	2020-2035
9	Mount Sutro Reserve Improvements	Reserve management	Restoration or creation of three new trails on the Reserve. Possibly locating a seed propagation nursery and gathering space for volunteers close to but outside the Reserve	Various locations in and possibly close to the Reserve (for nursery and gathering space)	Trails: 2015-2019
10	Clinical Sciences Renovation	Building renovation	Renovate and make seismic improvements to the Clinical Sciences building on the Parnassus Heights campus site	Center of UCSF Parnassus Heights campus site off Parnassus Avenue	Soft demolition complete, hard demolition and construction will resume Summer 2017
11	Saunders Court Renovation	Courtyard renovation	Expansion of the pavement, seating and tables, a new diagonal walkway, new plants; features that minimize windy conditions; and better access for the disabled and for fire trucks	Center of UCSF Parnassus Heights campus site	2020-2024

No.	Project Name	Project Type	Project Components	Location	Status
12	Parnassus Avenue Streetscape Plan	Streetscape improvements	New paving, street furniture, lighting and street trees, as well as sidewalk and crosswalk widening and better-defined campus gateways	Parnassus Avenue between 5th Avenue and Medical Center Way	Construction is expected to begin in 2019 and end after 2030
13	Medical Gas Storage Tanks Replacement	Storage tank replacement	Relocating and expanding medical gas storage tanks. Replacing underground diesel fuel storage tanks and underground lines connecting the tanks to Long Hospital. May require the closure of Medical Center Way for several months.	In and around Medical Center Way	Diesel fuel tank construction is estimated to begin the first quarter of 2018
14	UCSF Parking and Loading Improvements	Traffic improvements	Developing new loading areas accessible from Parnassus Avenue, and new parking areas accessible through the 5th and Kirkham intersection	Along Parnassus Avenue, at the intersection of 5th and Kirkham	Not specified, assumed in near term
15	1530 5th Avenue (Kirkham Project)	Housing demolition and development	Demolish 11 residential buildings containing 86 dwelling units and replace with 6 new 3-5 story buildings containing 445 dwelling units. Also, reconfigure 5th Avenue through the site, and install new sidewalks, landscaping, and support infrastructure.	Immediately south and southwest of the UCSF Parnassus Heights campus site, just south of the intersection of 5th Avenue and Kirkham Street	Scoping meeting was on 3/30/17; construction starting summer 2018 and ending in winter 2020/2021
16	San Francisco Overlook Development Residential Project (Overlook Project)	Housing development	Construction of 34 dwelling units, 24 as duplexes and 10 as townhomes, as well as a new paved, approximately 20-foot-wide, 700-foot-long private street.	Near the north end of Crestmont Drive, on the northwest slope of Mount Sutro, in the Forest Knolls neighborhood	Approved by SF Planning Commission March 2013 and May 2015

No.	Project Name	Project Type	Project Components	Location	Status
17	Significant Natural Resource Areas Management Plan (SNRA Management Plan)	Habitat management plan	Management plan to preserve, restore, and enhance fragments of unique plant and animal habitats (Significant Natural Resource Areas) within San Francisco and Pacifica	Many SNRA's located near Mount Sutro: Interior Green Belt, Twin Peaks, Tank Hill, Whiskey Hill, Lily Pond, 15th Ave Steps, Grandview Park, Rock Outcrop, Golden Gate Heights, and more	Plan was approved in February 2017; routine maintenance will continue until funding is secured
18	5th and Kirkham Traffic Calming Project	Traffic Calming	The project includes bulb outs with curb ramps at all four corners of the intersection and a median island on Kirkham to the west of 5th Avenue.	At the intersection of 5th Avenue and Kirkham Street	Construction to begin December 2017 and be completed August 2018
19	Millberry Union Towers Conversion	Building renovation	The existing office occupants will be relocated into Moffitt Hospital and the space will be converted to studio and one-bedroom units.	Parnassus Avenue between 3rd Avenue and Hillway Avenue	2031-2035

Sources: (San Francisco Planning Department 2011, San Francisco Planning Department 2012, San Francisco Planning Department 2014, UCSF 2014a, UCSF 2014b, San Francisco Planning Department 2017, UCSF 2017, Wong 2017)

Figure 4.0-1 Cumulative Projects Near the Proposed Plan



Sources: (San Francisco Planning Department 2011, San Francisco Planning Department 2012, San Francisco Planning Department 2014, UCSF 2014a, UCSF 2014b, San Francisco Planning Department 2017, UCSF 2017, Wong 2017)

4.0.5 References

San Francisco Planning Department. 2011. "Significant Natural Resource Areas Management Plan Environmental Impact Report."

—. 2012. "San Francisco Overlook Development Residential Project Environmental Impact Report."

—. 2014. "General Plan." http://generalplan.sfplanning.org/.

—. 2017. "1530 5th Avenue Notice of Preparation of an Environmental Impact Report."

University of California, San Francisco (UCSF). 2014a. "UCSF 2014 Long Range Development Plan."

—. 2014b. "UCSF 2014 Long Range Development Plan Environmental Impact Report."

—. 2017. "Update Jan-Mar 2017 Capital Programs."

Wong, Diane, interview by Kimi Worrell. 2017. Principal Planner, Physical Planning, UCSF (March 24).

4.1 AESTHETICS

4.1.1 Introduction

This section describes the existing visual quality in the plan area and evaluates the potential impacts on aesthetics from implementation of the proposed vegetation management activities. The section also provides a discussion of the applicable federal, state, regional, and local regulations that pertain to aesthetic and visual considerations. The impacts associated with the proposed plan are compared with the thresholds of significance used by the University pursuant to CEQA.

Comments related to aesthetics received during the public scoping process included the following:

- The plan should create and/or restore unobstructed views from the Reserve trail system and the summit
- Concern that the Reserve may appear bald or barren following vegetation management activities

4.1.2 Environmental Setting

Aesthetic and Visual Concepts

Overview

Aesthetics refers to the nature and appreciation of beauty in both form and appearance as perceived through the visual sense only. Aesthetic resources include the visual character and quality of an area, consisting of both the landscape features and the environment from which a visual resource is viewed. Aesthetic resources include, but are not limited to:

- Federal, state, and locally designated scenic resources
- Areas of high visual quality (e.g., scenic vistas, scenic hiking trails, and scenic highways)
- Recreation and open space areas that are visually attractive
- Landscape features, including canyons and gorges, valleys, and mountains
- Dark night skies

Terms used to describe aesthetic resources are defined in Table 4.1-1.

Table 4.1-1 Definition of Visual Resources Terms

Term	Definition
Visual Quality	The overall visual impression or attractiveness of an area as determined by the particular landscape characteristics, including landforms, rock forms, water features, and vegetation patterns. The viewer attributes of harmony, orderliness, and coherence contribute to the overall visual quality of a setting.

Term	Definition
Vividness	The visual impression received from contrasting landscape elements as they combine in distinctive visual patterns and how contrasting elements enhance or detract from the landscape components.
Affected Population (Viewers)	Considers the types of viewers (e.g., commuters, recreationists) that may see the proposed plan activities.
Viewer Exposure	Addresses the variables that affect viewing conditions from potentially sensitive areas. Viewer exposure considers the following factors: • **Landscape Visibility.** The ability to see the project components. • **Viewing Distance.** The proximity of viewers to the project. Described according to whether project activities would be viewed within the foreground (within one-half mile), middleground (one-half mile to two miles), or background (beyond two miles). • **Viewing Angle.** Considers whether the project would be viewed from above (superior), below (inferior) or from a level (normal) line of sight. • **Extent of Visibility.** Considers the relative location of the project facility to the viewer and whether visibility conditions are open, framed, or limited by intervening vegetation, structures, or terrain and whether project components include a backdrop or are silhouetted against the sky. • **Duration of View.** The amount of time the plan area would typically be seen from a sensitive viewpoint. In general, duration of view would be lesser in instances where the plan area would be seen for short or intermittent periods (e.g., from major travel routes) and greater in instances where the plan area would be seen regularly and repeatedly (e.g., from public use areas). • **Viewer Awareness.** Considers whether the viewer, while in sight of the plan area, is engaged in an active (e.g., soccer, driving) or passive (e.g., hiking, bird-watching) activity.
Viewer Sensitivity	A composite measurement of the overall susceptibility of a viewer to adverse visual or aesthetic impacts. Considers the combined factors of visual quality, affected population, viewer exposure, and viewer awareness of the visual impact. Viewer sensitivity is reflected according to high, moderate, and low visual sensitivity ranges.

Sources: (Federal Highway Administration 1988, Federal Highway Administration 2015)

Mount Sutro Open Space Reserve

Overview

Mount Sutro is among the tallest hills in San Francisco at an elevation of 909 feet. Mount Sutro and the Reserve are located near the northern limits of the San Miguel Hills, which include the taller Twin Peaks and Mount Davidson to the south and the somewhat lower Buena Vista Park to the northeast. The hills are generally located in the geographical center of San Francisco and form a backdrop to views from all directions within the city. As seen from other locations in the Bay Area, viewer attention is drawn in the direction of the Reserve by the highly vivid Sutro Tower.

Visual Quality and Vividness

The vegetation of the Reserve presents a relatively uniform, dense forest cover with many dead or dying trees that detract from its harmony, orderliness, and coherence as a forest as seen from

within the Reserve. Understory vegetation varies based on elevation, exposure, and management practices performed within the Reserve, which is exemplified by the relatively open Rotary Meadow at the summit of Mount Sutro (refer to Figure 4.1-1, images A and B), ivy within Stanyan Canyon that dominates nearly the entire ground plane (refer to Figure 4.1-1, image C), and north-facing slopes along the Historic Trail where moisture allows ferns to thrive and affords a sense of lushness (refer to Figure 4.1-1, images D and E). The overall visual quality of the Reserve, as viewed from within the Reserve, is moderate. While the Reserve is generally composed of a harmonious and coherent forest environment and system of multi-use trails, features such as Nike Road, the SFPUC water tank and associated access road, areas used for stockpiling materials, and dead and dying trees disrupt the orderliness of the Reserve.

Affected Population (Viewers)

Because it is located on a hill, the Reserve is highly visible. Many people are afforded views of the Reserve in the foreground and middleground, including visitors to the Reserve, surrounding residents and businesses that look toward the Reserve, and motorists. The Reserve is viewed by many people throughout San Francisco and the Bay Area as a background feature in combination with other nearby features such as the Interior Greenbelt, Twin Peaks, and Sutro Tower.

Two perspectives are considered when analyzing change to the visual characteristics of the vegetation in the Reserve. The first perspective includes views of the Reserve from surrounding areas. Dominant visual characteristics include the steep topography, a rounded peak, and dense forest coverage composed predominantly of eucalyptus trees (refer to Figure 4.1-1, images I and J). Together, these features combine to form a highly vivid forested island in an urban setting. The second perspective is from within the Reserve as seen from its trail system. The visual experience for viewers within the Reserve is sustained with a level of detail focused on the foreground environment. For many areas, the density of the forest is the dominant feature. Tree density often limits views to the foreground (refer to Figure 4.1-1, images F, G, and H).

In a few locations, views extend out of the Reserve to surrounding areas (refer to Figure 4.1-1, images D, E, F, and G). Views out to surrounding areas from the Reserve are generally filtered by vegetation but the surrounding neighborhoods, Twin Peaks, Mount Davidson, Ocean Beach, Golden Gate Park, the Presidio, Golden Gate Bridge, Marin Headlands, Mount Tam, and the East Bay are still partially visible.

Viewer Exposure

As one of the tallest hills in San Francisco, Mount Sutro is highly visible from all surrounding areas. In contrast, visibility within the Reserve is limited by the density of the forest. The Reserve is visible in the foreground, middleground, and background; in some areas, views to the Reserve are framed by urban development. Most views of the Reserve are from an inferior position looking up at the Reserve; level views exist for some immediate neighbors, residential areas on the slopes of Twin Peaks and Mount Davidson, and recreational areas on Twin Peaks, Mount Davidson, Grand View Park, and Buena Vista Park.

Figure 4.1-1 Existing Views of the Reserve



Image A. View looking west from Rotary Meadow.



Image B. View looking southwest from Rotary Meadow.



Image C. View looking north from Fairy Gates Trail in Foret Type 2.



Image D. View looking west from the Historic Trail in Forest Type 4.



Image E. View looking north from the Historic Trail in Forest Type 4.



Image F. View looking northeast from Mystery Trail in Forest Type 1.



Image G. View looking south from East Ridge Trail in Forest Type 1.



Image H. View looking north from South Ridge Trail in Forest Type 1.



Image I. View looking west from intersection of 17th Street and Clayton Street.



Image J. View looking east from Grandview Park.

Because of its high visibility from different areas, duration of views to the Reserve varies widely. Sustained views exist for visitors to the Reserve, visitors to surrounding parks with views of the Reserve (Grand View Park, Mount Davidson, Twin Peaks, and Buena Vista Park), UCSF Parnassus Heights patients and employees, and surrounding residences. Motorists are afforded short glimpses to moderate periods of visibility depending on the street orientation to the Reserve.

Viewer awareness is high for the visitors to the Reserve participating in trail-related recreation or education activities, UCSF Parnassus Heights patients and employees whose windows face the Reserve, and immediate neighbors. For others in San Francisco that can see the Reserve, viewer awareness is moderate to low because the Reserve is only one component in a varied visual environment.

Visual Sensitivity

People who are afforded sustained views of the Reserve (Reserve users, UCSF Parnassus Heights patients and employees, and surrounding residences) have a high viewer sensitivity. Viewer sensitivity for others living, working, or traveling in San Francisco is moderate to low.

4.1.3 Regulatory Considerations

University of California, San Francisco

UCSF 2014 LRDP

No UCSF goals or policies are relevant to the analysis of aesthetic impacts for the proposed plan. No measures identified in the 2014 LRDP are relevant to aesthetics; however, Objective F specifies that Mount Sutro must remain undeveloped open space:

> "Preserve the Mount Sutro Open Space Reserve as permanent open space, and serve as the steward of the Reserve by maintaining and expanding the trail system and by ensuring the safety of visitors and neighboring structures"

No permanent structures are allowed in the Reserve per the 1976 Regents' Resolution, which stated that the Mount Sutro Open Space Reserve was to be designated as permanent open space and kept free of any permanent structures or facilities except footpaths and appropriate landscape construction intended to enhance its use as a natural area.

Federal and State

No federal or state regulations are relevant to the analysis of aesthetic impacts for the proposed plan.

Local

San Francisco General Plan

The City and County of San Francisco's General Plan includes policies that pertain to views and visual quality. While not subject to these policies when using property under its control in furtherance of its educational purposes, UCSF strives to be consistent with them to the extent feasible. The policies most relevant to the proposed plan in relation to the topics of aesthetics and/or views are included in the Urban Design Element of the General Plan and are identified below. Map 1 in the Urban Design Element also identifies important vista points to be protected; Mount Sutro, however, is not identified as an important vista point on this map.

Principles for City Pattern

- Clearly visible open spaces act as orientation points, and convey information about the presence of recreation space to motorists and pedestrians.
- Where large parks occur at tops of hills, low-rise buildings surrounding them will preserve views from the park and maintain visibility of the park from other areas of the city.
- Highly visible open space presents a refreshing contrast to extensive urban development.

Image and Character

POLICY 1.1 Recognize and protect major views in the city, with particular attention to those of open space and water.

- Views contribute immeasurably to the quality of the city and to the lives of its residents. Protection should be given to major views

whenever it is feasible, with special attention to the characteristic views of open space and water that reflect the natural setting of the city and give a colorful and refreshing contrast to man's development.

- Overlooks and other viewpoints for appreciation of the city and its environs should be protected and supplemented, by limitation of buildings and other obstructions where necessary and by establishment of new viewpoints at key locations.
- Visibility of open spaces, especially those on hilltops, should be maintained and improved, in order to enhance the overall form of the city, contribute to the distinctiveness of districts and permit easy identification of recreational resources. The landscaping at such locations also provides a pleasant focus for views along streets.

Natural Areas

POLICY 2.1 Preserve in their natural state the few remaining areas that have not been developed by man.

- Natural areas in the city that remain in their original state are irreplaceable and must not be further diminished. Significant development should not take place in these areas, and facilities necessary to aid in human enjoyment of them should not disturb their visual feeling or natural ecology. Accordingly, parking lots and service buildings should be confined to areas that are already developed, and access pathways should be designed to have a minimum effect upon the natural environment. Where possible, the interior of these natural areas should be out of sight of the developed city.
- Lands in public ownership, primarily those of the City and Federal governments, constitute the bulk of these natural areas. Coordinated programs for conservation of both land features and ecology should be carried out, with high priority given to such management functions. Where natural areas are in private ownership, either special incentives or public acquisition should be used to assure a similar degree of preservation.

4.1.4 Significance Standards and Methodology

Significance Criteria

Impacts of the proposed plan on aesthetics would be considered significant if implementation of the plan would exceed the following standards of significance, in accordance with Appendix G of the State CEQA Guidelines and the UC CEQA Handbook:

1. Have a substantial adverse effect on a scenic vista;

2. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;
3. Substantially degrade the existing visual character or quality of the site and its surroundings;
4. Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area; or
5. Exceed the LRDP EIR significance standard by substantially reducing sunlight or significantly increasing shadows in public open space areas, or by increasing pedestrian level wind speeds above the hazard level set forth in the San Francisco Planning Code[1].

The IS for the proposed plan determined that the plan's effect on scenic vistas and visual character or quality should be evaluated in the EIR. These topics are analyzed in this section.

Issues Adequately Addressed in the Initial Study

The IS for the proposed plan found that implementation of the plan would have (1) no impact on scenic resources within a State scenic highway, and (2) a less than significant impact with regards to creating a new substantial source of light or glare and increasing pedestrian level wind speeds. These issues are not discussed further in this section.

Analysis Methodology

The assessment of impacts on visual resources focuses on changes in visual quality and character from vegetation management activities. The analysis considers visual changes from two perspectives: looking at the Reserve from surrounding areas and looking at the Reserve from within the Reserve. The analysis also notes where scenic views from trails within the Reserve may be enhanced through vegetation management.

Visual simulations were prepared from five different key observation points (KOPs) to provide an example of how views may change within the Reserve as a result of vegetation management activities. The location of KOPs and the direction in which they face is shown in Figure 4.1-2. Simulations were prepared to show visual impacts immediately after implementing vegetation management activities and five years after implementing vegetation management activities in the proposed plan. Simulations were not prepared past five years because it is not entirely known how the forest would respond to forest treatments and simulations showing conditions beyond five years would be highly speculative and potentially misleading. Visual simulations are considered when determining whether impacts on aesthetics would be significant. Images of current conditions in the Reserve and visual simulations are shown on Figure 4.1-3 through Figure 4.1-13.

[1] Wind impacts are addressed in Section 4.14: Wind, in this EIR, and are not addressed further in this section.

Figure 4.1-2 Key Observation Points

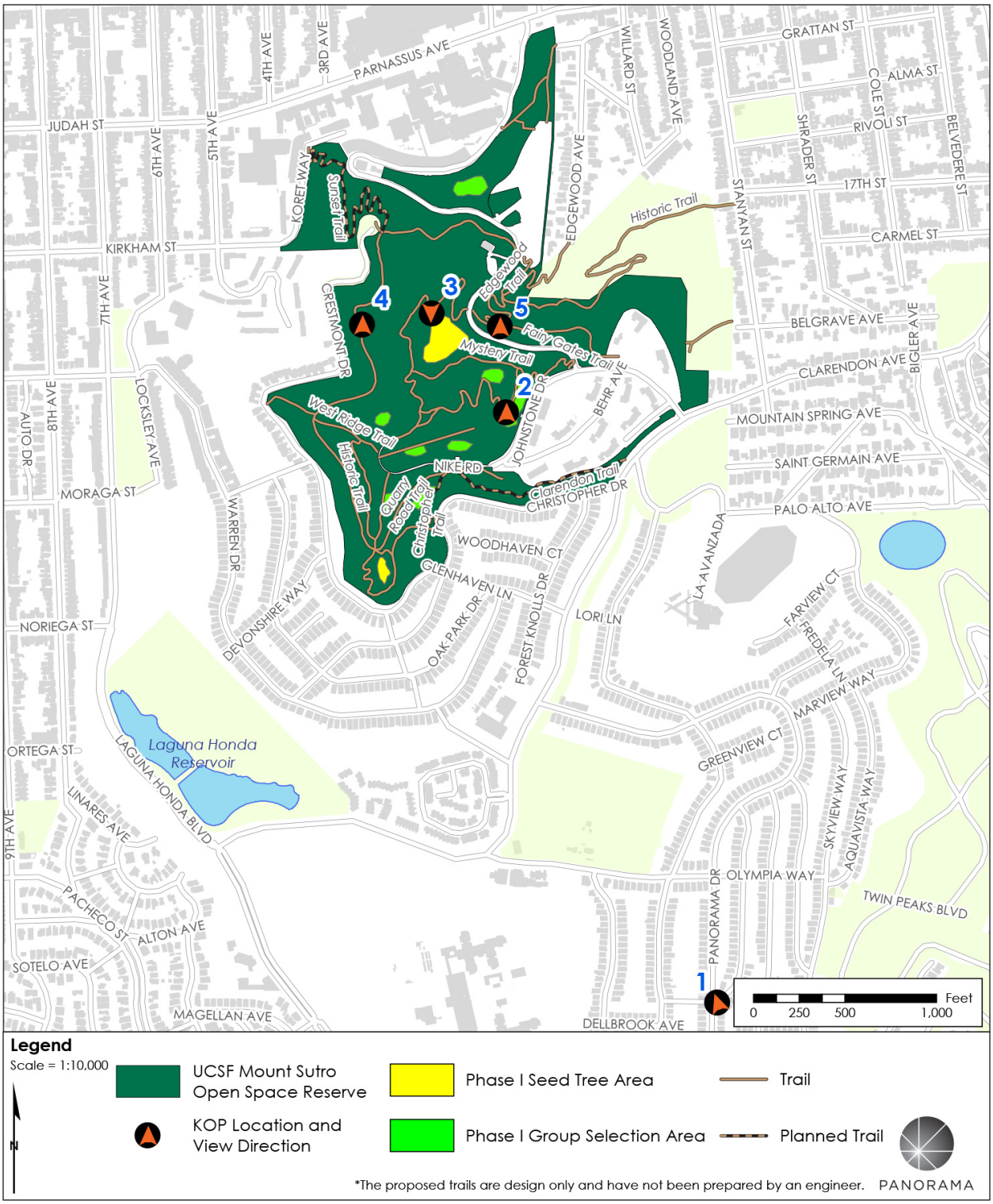


Figure 4.1-3 KOP #1: Existing Conditions



Figure 4.1-4 KOP #1: Visual Simulation 1 Year after Vegetation Management



Figure 4.1-5 KOP #2: Existing Conditions



Figure 4.1-6 KOP #2: Visual Simulation 1 Year after Vegetation Management



Figure 4.1-7 KOP #3: Existing Conditions



Figure 4.1-8 KOP #3: Visual Simulation 1 Year after Vegetation Management



Figure 4.1-9 KOP #3: Visual Simulation 5 Years after Vegetation Management



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Figure 4.1-10 KOP #4: Existing Conditions



Figure 4.1-11 KOP #4: Visual Simulation 5 Years after Vegetation Management



Figure 4.1-12 KOP #5: Existing Conditions



Figure 4.1-13 KOP #5: Visual Simulation 5 Years after Vegetation Management



4.1.5 Impacts

Impact Aesthetics-1: The proposed plan could have a substantial adverse effect on a scenic vista.	Significance Determination
	Less than significant

Overview

A scenic vista is defined as (1) a public view from an existing park, plaza, major roadway or other public area, or (2) a gateway or panoramic view from areas generally available to the public. Views from private residences and non-public access are not considered scenic views because they are not available to the public. The Reserve provides a dramatic visual contrast from the urban structures that surround it and is therefore an integral part of the aesthetic qualities of the central/western portion of San Francisco.

Vegetation Management Activities

Forest Treatments

Individual tree selection would create small gaps and seed tree and group selection treatments would create small- to medium-sized gaps (i.e., an acre or smaller) in the forest from the removal of dead and dying trees. Figure 4.1-3 and Figure 4.1-4 present the existing conditions and visual simulation of what the Reserve would likely look like after Year 1 of vegetation management activities from outside of the Reserve. While the removal of trees would reduce forest density and create a gap near the south side of the Reserve, scenic vistas of the Reserve from viewpoints such as Mount Davidson or Twin Peaks would not be substantially affected because the Reserve would be maintained as a forest and remain a stark contrast with the surrounding urban landscape. Over time, planted trees would grow into the canopy and fill gaps in the forest created by forest treatments and would appear more green and healthy than they currently appear. Impacts on scenic vistas from forest treatments as viewed from outside of the Reserve would be less than significant.

Foreground and middleground views within the Reserve are currently obscured by dense vegetation. The removal of individual trees and creation of forest gaps would reduce forest density, creating filtered views from within the Reserve to surrounding areas (refer to Figure 4.1-11). The creation of forest gaps near trails would potentially create filtered scenic vistas from trails to surroundings areas of San Francisco and beyond, including the Pacific Ocean, Farallon Islands, Golden Gate Bridge, Marin Headlands, Mount Tamalpais, Alcatraz Island, Yerba Buena Island, and the East Bay. Scenic vistas from high points in San Francisco that afford views of the city landscape and beyond are relatively rare, and the creation of scenic vistas from the Reserve would be beneficial to the visual experience of recreationalists and other users of the Reserve. While scenic vistas may be created, views of the forest would remain the dominant views within the Reserve. Impacts on scenic vistas from within the Reserve would be less than significant and beneficial.

Management of Tree Risk and Defensible Space
Management of defensible space would involve the removal of individual dead and dying trees, pruning branches, and removing flammable ground vegetation to prevent trees or branches from falling on nearby buildings. These activities would have no effect on scenic vistas looking into the Reserve from surrounding areas because minor tree, branch, and understory removal would not be discernable in middleground or background views from areas such as Twin Peaks. Views from trails aligned closest to the Reserve boundary, which include portions of the Historic, North Ridge, East Ridge, Fairy Gates, Edgewood, and South Ridge Trails, could experience a change from individual tree, branch, and understory removal. Impacts on views would be less than significant, however, because while vegetation removal would change the vegetation density, it would not alter the overall forest-like character or the overall visual experience of the forest.

Native Plant Restoration and Maintenance of Trails and Public Access
Scenic vistas looking in to the Reserve from outside areas would not be affected by native plant restoration or trail maintenance because these activities would occur at or very near the ground level and the ground would not be visible through the tree canopy. No impact would occur.

Vegetation along trails would be trimmed to maintain sight lines within the Reserve. Trimming vegetation taller than 3 feet within 5 to 10 feet of trails would allow trail users to see further into the forest and may improve the visibility of scenic vistas from the Reserve. Impacts from the maintenance of vegetation along trails would be less than significant.

Native plant restoration sites would be visible from the Reserve's trail system. Several of the species proposed to restore these areas can grow to obscure views at eye level; examples of native plants that could block views of the Reserve include coffeeberry, toyon, thimbleberry, and huckleberry. Currently, scenic vistas outside of the Reserve are not present due to the density of vegetation at eye level within the Reserve. Removing non-native understory within restoration sites would temporarily improve views; however, scenic vistas from within the Reserve may eventually become partially obscured again after native shrubs have been given sufficient time to grow. Native restoration sites may have thinner vegetation cover than existing non-native plants, which may afford less obscured views outside of the Reserve. Replacing non-native understory with native understory would not substantially change the visibility of scenic vistas from the Reserve. Impacts from native plant restoration would be less than significant.

Comparison of Impacts Across Phases

Phase I
The density of the forest would experience the most rapid decrease during Phase I of the plan. The largest number of trees and largest amount of vegetation would be removed during Phase I to manage forest treatments areas, defensible space, and native restoration areas. Figure 4.1-4 provides a visual simulation of what the Reserve would look like from a vista point outside of the Reserve. While the removal of trees would reduce forest density and create a gap near the south side of the Reserve, scenic vistas of the Reserve would not be substantially affected because the Reserve would be maintained as a forest and remain a stark contrast with the

surrounding urban landscape. The removal of understory vegetation would not be noticeable from scenic vistas outside of the Reserve because the understory would be blocked from view by the forest canopy. Impacts from vegetation management activities would have a less than significant impact on scenic vistas from outside of the Reserve.

Scenic vistas may be created during Phase I of the plan through strategic planning of forest gaps, creating views of features such as the Golden Gate Bridge. Views of scenic vistas would be enhanced by removing dead and dying trees within defensible space, non-native understory, and vegetation blocking sight lines along trails because vegetation removal would help open views of surrounding areas (refer to Figure 4.1-11). The creation of scenic vistas would be considered a beneficial change to the Reserve. While some areas of the forest may be opened to create scenic vistas, most of the Reserve, and consequently most of the views within the Reserve, would remain vegetated. The restoration of pockets of native vegetation may also create visual variety for viewers within the forest that was not previously present, which would be considered a beneficial impact. While vegetation would appear less dense after vegetation management activities commence, the Reserve would maintain its appearance as a forest. The impact on scenic vistas from within the Reserve during Phase I would be less than significant.

Phase II
Views from scenic vistas looking toward the Reserve would be similar to the simulation provided in Figure 4.1-4 during Phase II because it would take time for eucalyptus planted in Phase I to reach canopy height. As stated above, while gaps in the canopy would be apparent, the impact on scenic vistas would be less than significant because the forest would still appear as a forested island in an urban landscape.

Changes in vegetation density and cover would continue to occur over time through ongoing hazardous tree removal and management of the non-native understory. Generally, the density of non-native understory would fluctuate as areas of non-native vegetation are removed to maintain native restoration areas. Eucalyptus seedlings would begin to fill in forest treatment areas, and new forest treatment areas would be established. Vegetation management in areas visible from trails would continue to maintain filtered views of surrounding areas, which would be considered a beneficial impact. A mosaic of different stages of forest growth would start to be apparent in Phase II of the plan; however, activities would not be so intense in scale such that the appearance of the forest would be lost or obstructed, significantly altered, or otherwise have a substantial adverse effect on scenic vistas within the forest. Growth of eucalyptus seedlings would ensure forest character is retained. Impacts on scenic vistas within the Reserve during Phase II would be less than significant.

Phase III
Though vegetation management activities would result in an overall decrease in the density of forest vegetation, continued management of the Reserve towards an uneven-aged forest would ensure that the Reserve remains an urban forest. The heights of the trees would become varied over time as trees planted during Phase I grow and new trees are planted during Phases II and III. Native restoration areas would be established and create pockets of visually varied

understory. Scenic vistas looking out from the Reserve would be maintained through tree and vegetation removal or trimming. While the structure of the forest would change with vegetation management activities, impacts on scenic vistas both of and from the Reserve during Phase III would be less than significant.

Impact Aesthetics-2: The proposed plan could substantially degrade the existing visual character or quality of the site and its surroundings and the associated recreational experience.	**Significance Determination**
	Significant and unavoidable

Overview

Tree and vegetation removal as well as planting of native vegetation would result in changes to the visual character of the Reserve as seen from its trail system. Ideally, the Reserve would change over time from an even-aged to an uneven-aged forest, creating variation in the vertical structure of the forest, reducing the overall density of vegetation, and adding pockets of light that would reach the forest floor. Species diversity of vegetation would be enhanced through native restoration, potentially increasing the presence of wildlife that could be seen by recreationalists that use the Reserve. Tree and vegetation removal would also create filtered views of surrounding areas. Figure 4.1-3 through Figure 4.1-13 present views from KOPs within the Reserve.

Vegetation Management Activities

Forest Treatments

General Impacts

Prior to forest treatments, access routes would be established to facilitate tree and vegetation removal. Two trails, the Quarry Road Trail and a portion of the East Ridge Trail, would be widened up to 10 feet to accommodate equipment. Widening the trails would not present a substantial visual contrast within the Reserve because some trails, such as the South Ridge Trail, are as wide or wider than the proposed width of the Quarry Trail and portion of the East Ridge Trail. The use of equipment on these trails could cause road rutting and expose tree roots, which would degrade the visual quality of the trails in the foreground but not to a significant level. The impact would be less than significant. Mitigation Measure (MM) Geology-1, which requires UCSF to implement erosion control Best Management Practices (BMPs) on access roads, would further reduce the impact on visual quality to less than significant.

Landing areas would also be established prior to forest treatments. Half of the landing areas would be located on existing asphalt (e.g., Surge parking lot) where large vehicles are frequently seen. The asphalt landing areas would be used periodically for short periods of time (i.e., a few days) and are partially to fully screened by surrounding vegetation as viewed from trails within the Reserve. The impact on visual quality would be less than significant at the asphalt landing areas because they would be located in developed areas where vehicles are common and viewers would not be exposed to prolonged views of these staging areas.

For landing areas located on bare ground covered with chips, vegetation would be cleared and areas may be graded to stage equipment and removed vegetation. The staging of equipment at two of these landing areas, the EHS Building and the SFPUC Water Tank, would not degrade visual quality of the Reserve because these landing areas would be partially or fully screened by surrounding vegetation or would not be visible from trails or other public vantage points. Three landings areas, South Ridge Trail, North Ridge Trail, and Nike Road, would be located adjacent to or on trails. Removal of vegetation and views of staged equipment would have a significant impact on the visual character and quality of the Reserve because large equipment is not usually present in the Reserve, which would detract from the natural setting, and the 0.25-acre landing areas would be void of vegetation, providing a stark contrast with surrounding areas. The impact on visual character and quality would be significant. **MM Aesthetics-1: Sowing at Landing Areas**, requires the sowing of native grasses and other fast-growing plants at the South Ridge Trail, North Ridge Trail, and Nike Road landing areas when not in use. Mitigation would not reduce the impact to less than significant, however, because of the contrast created by clearing these landing areas and the presence of heavy equipment for part of the year. Impacts from landing areas on the visual quality and character of the Reserve would be significant and unavoidable.

Seed tree, group selection, and individual tree selection treatment areas would be visible from the Reserve's trail system. The effects of the three forest treatment methods are discussed separately below because the degree to which tree removal would occur under these three methods would differ.

Seed Tree and Group Selection Treatments

Seed tree and group selection treatments would be visible from trails within the Reserve. Seed tree treatments would involve cutting most trees in a treatment area, leaving only a few trees of the best quality to reproduce and revegetate the area, and group selection treatments would involve removing all trees within a group. Up to 110 eucalyptus seedlings per acre would be planted within seed tree and group selection treatment areas to enhance regrowth. Figure 4.1-7 and Figure 4.1-8 provide the existing conditions and a visual simulation of what a Phase I seed tree treatment area may look like immediately after tree removal from the North Ridge Trail. Figure 4.1-5 and Figure 4.1-6 provide the existing conditions and a visual simulation of what a group selection area may look like immediately after tree removal from the East Ridge Trail. As shown in the simulations, the areas would be mostly or wholly cleared of trees, stumps would not be visible because they would be ground down, chips would be spread around the treatment area to prevent resprouting of diseased eucalyptus and understory vegetation, and eucalyptus seedlings would be planted. The impact on visual quality and character of the Reserve from seed tree and group selection treatments would be significant; these treatments would create an initial, dramatic visual change to the visual character of the Reserve by removing nearly all trees from up to 1-acre areas at a time during Phase I of the plan.

Seed tree and group selection treatments areas for Phase I were chosen because nearly all the trees in the area are dead; it would not be feasible to change the location of the treatments because removing live trees in a different area would be detrimental to the quality of the forest.

Creating smaller gaps in the forest than those proposed for seed tree and group selection treatment areas would not be feasible because not enough area would be cleared to allow enough light to reach the forest floor to promote regeneration and growth of young eucalyptus. **MM Aesthetics-2: Screen Seed Tree and Group Selection Treatment Areas**, requires planting of fast-growing native shrubs to screen seed tree and group selection treatment areas; however, the areas would still be visible as the shrubs grow and the treatment areas would still be partially visible through the shrubs even after they have grown. The temporary visual impact from seed tree and group selection treatments would be significant and unavoidable.

Figure 4.1-9 provides a simulation of what the Phase I seed tree treatment area may look like five years after the treatment has been completed. Tasmanian blue gum eucalyptus has an exceptionally rapid growth rate; annual growth rates in California have been recorded at 2 meters (6.7 feet) per year for the first 5 years (Metcalf 1924). Eucalyptus planted in Year 1 of plan implementation could be up to 33.5 feet tall in Year 5. The simulation in Figure 4.1-9 assumes a more modest growth rate (an average of 5 feet per year) to conservatively estimate the visual characteristics of the forest after five years of growth. Growth of the eucalyptus trees would fill in the seed tree and group selection treatment areas such that the visual contrast between a bare landscape and the surrounding forest would be gone after approximately 5 to 10 years. In addition, the increased light, moisture, and nutrients available to trees surrounding seed tree areas would allow those trees to grow fuller and more healthy canopies. The visual character of the area would become consistent with the character of the surrounding forest after approximately 5 to 10 years, and recreationalists would experience greater vertical structural diversity, greater lushness in the existing and growing trees, and better views through the Reserve. The maintenance of understory vegetation within seed tree and group selection areas would allow recreationalists to see farther into the forest and maintain visual orderliness in the Reserve, improving the visual experience for recreationalists. The ability to see farther into the forest may also allow recreationalists to see others using the trails and prevent possible trail conflicts. Long-term impacts from seed tree and group selection treatment areas on visual character and quality would be beneficial and less than significant.

Individual Tree Selection Treatment

Individual tree selection treatments would involve removing individual stems of dead and dying trees from the Reserve. The intensity of individual tree removal would vary depending on location because (1) some areas of the forest have experienced higher rates of mortality than others (e.g., greater dieback has occurred in Forest Type 1 than in Forest Type 3) and (2) current tree density differs across the Reserve. KOPs #4 and #5 provide two examples of areas of individual tree selection (refer to Figure 4.1-10 through Figure 4.1-13) where the intensity of treatments would vary. The visual change from individual tree selection would be less pronounced than the change described for group selection above. The removal of dead vines and vegetation in the midstory would improve the coherence, orderliness, and harmony of the Reserve. Small gaps in the Reserve created through individual tree selection would be similar to gaps created when trees fall naturally and would add visual variety, characteristic of a healthy forest. Eucalyptus seedings would be planted to encourage growth of a healthy forest where

there is sufficient light; these trees would eventually come to fill the gaps created during treatments and would add structural diversity to the Reserve. Reducing the density of the forest and managing the midstory would also allow recreationalists to see farther into the forest and potentially anticipate possible trail conflicts. The changes in visual quality as a result of individual tree selection would generally be considered beneficial; impacts on visual quality would be less than significant.

Management of Tree Risk and Defensible Space

Individual dead and dying trees and hazardous limbs would be removed within defensible space in a manner similar to the individual tree selection method; therefore, the impacts described above for individual tree selection would apply to tree management within defensible space. The largest visual change within defensible space would be the removal of all flammable vegetation at ground level within 30 feet of buildings. Chips would be spread to prevent erosion and regrowth of the understory, which would represent a visual change from the current swaths of Himalayan blackberry and vines that dominate the understory. However, mechanical removal of the understory and spreading chips would likely not remove vegetation all together due to the rapid growth rates of non-native understory plants, and some vegetation would persist. The overall visual character of the forest would be maintained because trees would still be present within defensible space, and some vegetation would still be present in the understory. Impacts on visual quality would be less than significant.

Native Plant Restoration

Native plant restoration activities would occur in approximately 11 locations across the Reserve. Figure 4.1-12 and Figure 4.1-13 present the existing conditions and visual simulation of what a native restoration area may look like five years after restoration activities commence. Native grasses and shrubs would be planted to enhance existing native plant communities, adding visual variety and interest to the understory that is currently dominated by non-native Himalayan blackberry and vines. Enhancing native vegetation could attract wildlife that could be viewed by recreationalists in the Reserve. Increasing visual variety and wildlife would be considered beneficial impacts on visual quality. While native plant restoration areas would appear different in form and color from the dominant non-native understory, the areas would be dispersed and small in comparison to the remainder of the Reserve (i.e., 5 acres of native understory compared to 54 acres of non-native understory). Increasing native plant communities from 2 to 5 acres would not disrupt the overall visual character of the Reserve. The restoration of natives would, therefore, have a less than significant impact on the visual character and quality of the Reserve.

Maintenance of Trails and Public Access

Vegetation would be trimmed along trails to maintain sight lines in the forest, and logs would be placed on the downslope of trails to prevent erosion. The visual character of trails would not change as a result of trail maintenance activities, and visual quality would be enhanced by preventing vegetation from growing over trails and erosion from regular trail use. Maintaining sight lines for recreationalists may help prevent trail conflicts, and logs would help direct trail

users to the correct path. These impacts would generally be considered beneficial; impacts on the visual quality of trails would be less than significant.

Comparison of Impacts Across Phases

Phase I

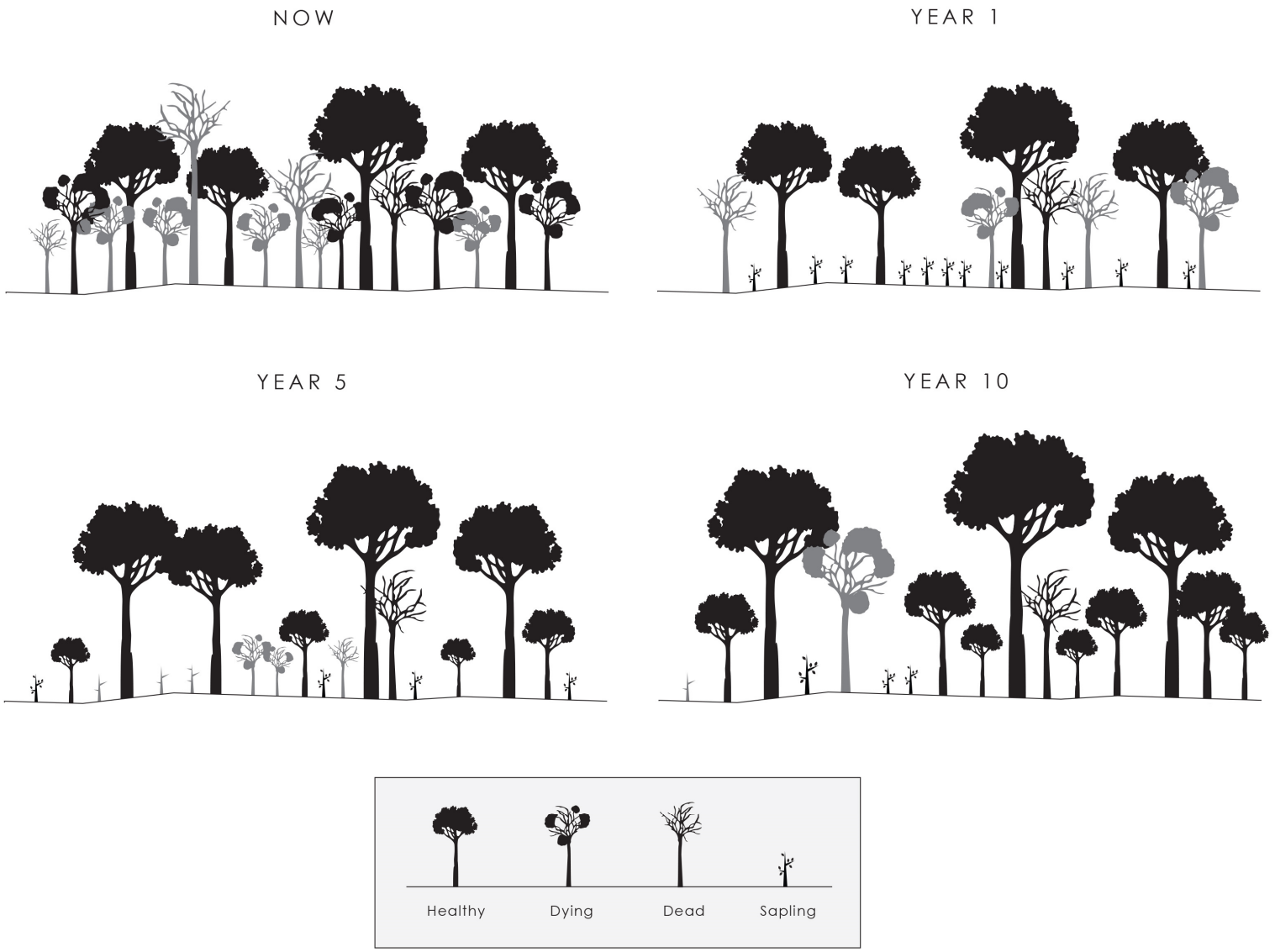
The change in visual character of the forest would be greatest during Phase I of the plan because landing areas and access roads would be created during Phase I and vegetation management activities could appear extensive. Viewers would be particularly sensitive to visual change because vegetation management at the scale of the plan has not been done before within the Reserve.

Over half of the landing areas are either asphalt or not located in areas fully visible to frequented trails or other public areas. The impact on visual quality at these landing areas would be less than significant. Preparation and use of the South Ridge Trail, North Ridge Trail, and Nike Road landing areas would significantly impact the visual quality of the forest. **MM Aesthetics-1: Sowing at Landing Areas**, which requires sowing landing areas with native grasses and other fast-growing plants during times that the landing areas are not in use, would reduce the impact but not to less than significant because landing areas would still present a stark visual contrast with the surrounding forest. The impact on visual quality from these landing areas would be significant and unavoidable.

Figure 4.1-5 through Figure 4.1-13 show the current visual conditions of the forest and what the forest may look like after vegetation management activities occur during Phase I, and Figure 4.1-14 provides a diagram of how the forest may change over time. As described above, the impact on the existing visual character from seed tree and group selection treatment would be significant. **MM Aesthetics-2: Screen Seed Tree and Group Selection Treatment Areas** requires planting of fast-growing native shrubs to screen seed tree and group selection treatment areas. Mitigation would not reduce the impact to less than significant because treatment areas would still be visible as shrubs grow and partially visible even when shrubs are grown. Seed tree and group selection treatments would have a short-term significant and unavoidable impact on the visual quality of the Reserve immediately after trees are removed.

Impacts from individual tree selection in other areas of the Reserve would be less than significant; as previously described, the removal of the midstory and growth of new eucalyptus would enhance the visual quality of the Reserve by increasing the harmony and orderliness of the Reserve and introducing structural diversity. Forest treatments and vegetation management along trails would enhance sight lines in the Reserve, which would increase the distance at which viewers could see through the Reserve and potentially help prevent trail conflicts. Native plant restoration would add visual variety to the understory and potentially attract wildlife for recreationalists to view. While a significant and unavoidable short-term impact would occur from seed tree and group selection treatments, the vegetation management activities would have a beneficial long-term impact on the visual character and quality of the forest during Phase I.

Figure 4.1-14 Diagram of Forest Progression Over Time



Note: Black trees represent trees that would be left standing during a forest treatment; grey trees would be removed. One snag is shown as being retained for wildlife.

Phase II and Phase III

Forest treatments would continue in Phases II and III. Figure 4.1-14 provides a diagram of how the character of the forest may change as a result of vegetation management activities. As the years of vegetation management activities continue, viewer sensitivity would decrease because viewers would be accustomed to activities occurring on a regular basis within the Reserve.

Landing areas would continue to be used during Phases II and III. The use of existing asphalt and obscured landing areas would have a less than significant impact on visual quality, as previously described. Continued use of the South Ridge Trail, North Ridge Trail, and Nike Road landing areas would significantly impact the visual quality of the forest because of the presence of large equipment and the contrast of a bare area within the surrounding forest. **MM Aesthetics-1: Sowing at Landing Areas** would reduce the impact but not to less than significant because the use of landing areas for a few months every year would still present a large visual contrast in the Reserve. The impact on visual quality from these landing areas would be significant and unavoidable.

Similar to impacts in Phase I, seed tree and group selection treatments performed in Phases II and III would create a dramatic contrast with surrounding vegetation immediately after they are performed. The impact on visual quality would be significant. **MM Aesthetics-2: Screen Seed Tree and Group Selection Treatment Areas** would reduce the impact, but short-term impacts on visual quality from seed tree and group selection treatments would remain significant and unavoidable.

Individual tree selection would also continue in Phases II and III. Similar to impacts described during Phase I, the removal of the midstory and growth of new eucalyptus would enhance the visual quality of the Reserve by increasing the harmony, orderliness, and coherence of the Reserve and introducing vertical structural diversity. Impacts due to these changes would be beneficial to the visual quality of the Reserve.

Eucalyptus planted in Phase I would quickly fill in areas of individual tree selection areas because of their fast growth rate. Ideally, the crowns of existing trees would begin to appear healthier as the competition for sunlight, nutrients, and water is reduced by removing dead and dying trees. Trails and native plant restoration areas would continue to be maintained and would sustain sight lines and vegetation diversity in the Reserve. Visual quality of the Reserve would improve as the forest regenerates and improves in overall vigor and species diversity. Long-term impacts on visual quality would be less than significant.

	Significance Determination
Impact Aesthetics-3: The proposed plan could result in significant impacts on visual resources in combination with past, present, and probable future development in the cumulative analysis study area.	**Significant and unavoidable contribution**

Geographic Scope

The geographic scope for the analysis of cumulative impacts associated with aesthetic resources includes both local and regional viewsheds. Cumulative aesthetic impacts would generally occur within 1 mile or less of the plan area. Beyond 1 mile, objects become less distinct or not visible if they blend in sufficiently with background forms, colors, and textures. Beyond 1 mile it is likely that sightlines will become impaired or blocked by intervening terrain and vegetation. The geographic extent of the cumulative analysis therefore extends up to 1 mile from the plan area.

Cumulative Analysis

Projects that could result in cumulative impacts with the proposed plan include the Kirkham Project (#15) and Overlook Project (#16), located adjacent to the Reserve and that fall within vistas that include the Reserve from vantage points in the city. The SNRA Management Plan (#17) would involve vegetation management activities within the Interior Greenbelt, which is contiguous with the Reserve. Building Demolition [#1], Surge, Woods, and EHS Open Space Restoration [#8], and Mt. Sutro Reserve Improvements [#9] would also occur adjacent to or within the Reserve.

Tree removal associated with the plan, and construction of buildings associated with several of the other projects, could all have impacts on the visual quality of the Mount Sutro area as observed from public areas, including local streets and recreational areas including Twin Peaks and Grand View Park. Construction of the Overlook Project and the Kirkham Project would be highly visible and could, both individually and together have significant visual impacts on the quality of the area when viewed from a distance and, therefore, a potentially significant cumulative impact. The Building Demolition [#1] and Surge, Woods, and EHS Open Space Restoration [#8] would not be highly visible from distant viewpoints because activities would either occur at the base of Mount Sutro or be obscured by other buildings and brush.

Implementation of the plan would result in some minor changes to the tree line and canopy; however, the forest would remain visible as a forest in stark contrast with the surrounding urban development when viewed from a distance. The contribution of the activities implemented in the plan to the overall potentially significant cumulative impact would be incrementally minor and less than considerable, because the impacts would be of a completely different nature than the impacts of the housing projects. Once construction is completed on the developments, they would likely blend in with the urban development that surrounds the forest and cumulative impacts on Mount Sutro as viewed from a distance, would be less than significant.

Other projects that could impact the visual quality from within the Reserve would generally be limited to projects within the Reserve, which would include Surge, Woods, and EHS Open Space Restoration [#8] and Mt. Sutro Reserve Improvements [#9]. The cumulative impact of these projects and the proposed plan could be significant because they would involve alterations to the landscape and the presence of construction equipment in an otherwise undeveloped area. Approximately 6,000 trees could be removed from the Reserve during Phase I, which could substantially change the appearance of the Reserve as viewed from within the Reserve. Compared to Surge, Woods, and EHS Open Space Restoration and Mt. Sutro Reserve Improvements, which would create new forested areas and new trails within the Reserve that would, in the long-term, contribute to the visual quality of the Reserve, the proposed plan would disproportionately contribute to the significant cumulative impact because the removal of trees, creation of landing areas, and management of seed tree and group selection areas near trails would change the appearance of the forest in those areas. **MM Aesthetics-1: Sowing at Landing Areas** and **MM Aesthetics-2: Screen Seed Tree and Group Selection Treatment Areas** would require some screening of the treatment areas and sowing grasses into landing area when not in use; however, impacts from implementation of the plan would remain significant and unavoidable. Therefore, the proposed plan would contribute significantly and cumulative impacts on visual quality of the Reserve as viewed from trails inside the Reserve would be significant and unavoidable.

4.1.6 Mitigation Measures

MM Aesthetics-1: Sowing at Landing Areas
Seeds of annual native grasses or other fast-growing, native plants shall be sown at the South Ridge Trail, North Ridge Trail, and Nike Road landing areas during months that the landing areas are not in use for vegetation management activities (generally, March through August). Seeds shall be sown within one week of the end of vegetation management activities for a given season.
Locations: South Ridge Trail, North Ridge Trail, and Nike Road landing areas
Performance Standards: • **Before Activities:** N/A • **During Activities:** N/A • **After Activities:** Sow seeds of native grasses or other fast-growing plants at specified landing areas

MM Aesthetics-2: Screen Seed Tree and Group Selection Treatment Areas
Fast-growing native shrubs, such as thimbleberry (*Rubus parviflorus*), toyon (*Heteromeles arbutifolia*), and coyote bush (*Baccharis pilularis*), shall be planted along the visible edge of seed tree and group selection treatment areas that abut trails or roads.
Locations: Edge of seed tree and group selection treatment areas that abut trails or roads
Performance Standards: • **Before Activities:** N/A • **During Activities:** N/A • **After Activities:** Plant native shrubs along edge of seed tree and group selection treatment areas

4.1.7 References

Federal Highway Administration. 1988. "Visual Impact Assessment for Highway Projects." U.S. Department of Transportation. Accessed July 19, 2016. http://www.dot.ca.gov/ser/downloads/visual/FHWAVisualImpactAssmt.pdf.

—. 2015. "Guidelines for the Visual Impact Assessment of Highway Projects." US Department of Transportation. Accessed July 19, 2016. http://www.environment.fhwa.dot.gov/guidebook/documents/VIA_Guidelines_for_Highway_Projects.pdf.

Metcalf, Woodbridge. 1924. "Growth of Eucalyptus in California Plantations." University of California Publications, November.

4.2 AIR QUALITY

4.2.1 Introduction

This section describes the existing air quality in the plan area and evaluates the potential impacts on air quality from implementation of the proposed vegetation management activities. The section also provides discussion of the applicable federal, state, regional, and local regulations that are relevant to air quality. The impacts associated with the proposed plan are compared with the thresholds of significance used by the University pursuant to CEQA.

Comments related to air quality received during the public scoping process included concerns regarding air pollutant emissions from implementation of the plan.

4.2.2 Environmental Setting

Air Basin

The Reserve is located within the San Francisco Bay Area Air Basin (SFBAAB). The SFBAAB covers roughly 5,340 square miles and consists of Napa, Marin, San Francisco, Contra Costa, Alameda, San Mateo, and Santa Clara Counties, the southern portion of Sonoma County, and the western portion of Solano County. The Bay Area Air Quality Management District (BAAQMD) is the state regulatory body responsible for air quality-related activities in the SFBAAB.

Climate, Meteorology, and Geography

The greatest influence on climate in San Francisco is the proximity to the Pacific Ocean. Winds throughout the year emanate primarily from the west and blow to the east. Temperatures in San Francisco generally range from the mid-40s during winter months to mid-60s during summer months. Daily and seasonal oscillations of temperature are minimal because of the moderating effects of the Pacific Ocean and the San Francisco Bay. Rainfall in San Francisco is highly variable but primarily occurs during the rainy season from November through April. Average annual rainfall in San Francisco is approximately 20 inches (WRCC 2016).

Air Pollutant Standards and Definitions

Overview

The United States Environmental Protection Agency (USEPA) has set air pollutant emission standards to protect public health. USEPA has set National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and particulate matter. Particulate matter criteria pollutants are classified as either respirable particulate matter less than 10 micrometers in diameter (PM_{10}) or fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$). The California Air Resource Board (CARB) has set California Ambient Air Quality Standards (CAAQS) for four pollutants in addition to the six NAAQS criteria pollutants: sulfates, hydrogen sulfide (H_2S), vinyl chloride (C_2H_3Cl), and visibility reducing particles.

Table 4.2-1 presents the NAAQS and CAAQS for the criteria air pollutants at different averaging periods, and the primary and secondary standards for each. Primary standards are the levels of air quality necessary to protect the public health with an adequate margin of safety. Secondary standards are the levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

Ozone

Ozone is found in the upper atmosphere (as the ozone layer) as well as at ground level. At ground level, ozone is considered a pollutant. Ozone forms when ozone precursors (i.e., reactive organic gases [ROGs], CO, nitrogen oxides [NO_x]) react with sunlight in the atmosphere. Sources of these precursors include fuel combustion in vehicles and industrial processes, gasoline vapors, and chemical solvents. Ozone can cause respiratory problems (i.e., chest pain, coughing, throat irritation) and exacerbate existing respiratory problems, such as asthma and bronchitis (USEPA 2016a). Ozone is at the highest concentrations in summer. Ozone emissions have steadily decreased in the Bay Area. Ozone NAAQS exceedances in SFBAAB occurred on seven days in 2015 compared to 23 days in 1980 (CARB 2015).

Carbon Monoxide

CO is a colorless, odorless gas produced by the incomplete combustion of fuels. CO concentrations tend to be the highest in the winter morning when surface-based inversions trap the pollutant at ground level. CO is emitted directly from internal combustion engines. The primary source of CO in urban areas is from motor vehicles. As such, higher concentrations of CO are found along transportation corridors. Exposure to CO results in reduced oxygen-carrying capacity of the blood. High CO concentrations can result in health risks particularly for individuals with compromised cardiovascular systems (USEPA 2016b). BAAQMD air pollutant monitoring data indicate that CO levels have been at healthy levels (i.e., below state and federal standards) in SFBAAB since the early 1990s. As a result, the region has been re-designated as attainment for the CO standard in the late 1990s (CARB 2004). The highest measured level of CO over any 8-hour averaging period in SFBAAB during recent years is less than 3.0 ppm, compared to the ambient air quality standard of 9.0 ppm (BAAQMD 2014a).

Nitrogen Dioxide

NO_2, and other nitrogen oxides, are formed during combustion of fossil fuels from vehicles and industrial processes. NO_2 is an ozone precursor, which can also cause acid rain and acid snow. Health effects of NO_2 include airway inflammation in healthy people and exacerbation of preexisting asthma (USEPA 2016a).

Sulfur Dioxide

SO_2 is a colorless, acidic gas with a strong odor. It is produced by the combustion of sulfur-containing fuels such as oil, coal, and diesel. SO_2 has the potential to damage building materials and can cause health effects at high concentrations. It can irritate lung tissue and increase the risk of acute and chronic respiratory disease. SO_2 is a precursor to the formation of atmospheric sulfate and particulate matter, and contributes to potential atmospheric sulfuric acid formation that can precipitate downwind as acid rain (USEPA 2016a).

Table 4.2-1 NAAQS and CAAQS for Criteria Air Pollutants

Pollutant	Averaging Time	CAAQS [a]	NAAQS [b]	
			Primary	Secondary
O_3	1 Hour	0.09 ppm (180 µg/m³)	–	–
	8 Hours	0.070 ppm (137 µg/m³)	0.070 ppm (137 µg/m³) [c]	0.070 ppm (137 µg/m³) [c]
CO	1 Hour	20 ppm (23 mg/m³)	35 ppm (40 mg/m³)	–
	8 Hours	9.0 ppm (10 mg/m³)	9 ppm (10 mg/m³)	–
NO_2	1 Hour	0.18 ppm (339 µg/m³)	100 ppb (188 µg/m³)	–
	AAM	0.030 ppm (57 µg/m³)	0.053 ppm (100 µg/m³)	0.053 ppm (100 µg/m³)
SO_2	1 Hour	0.25 ppm (655 µg/m³)	75 ppb (196 µg/m³)	–
	3 Hours	–	–	0.5 ppm (1,300 µg/m³)
	24 Hours	0.04 ppm (105 µg/m³)	0.14 ppm (365 ug/m³) [d]	–
	AAM	–	0.030 ppm (81 ug/m³) [d]	–
Pb	30-Day Average	1.5 µg/m³	–	–
	Calendar Quarter	–	1.5 µg/m³ [e]	1.5 µg/m³ [e]
	Rolling 3-Month Average	–	0.15 µg/m³	0.15 µg/m³
PM_{10}	24 Hours	50 µg/m³	150 µg/m³ [f]	150 µg/m³ [f]
	AAM	20 µg/m³	–	–
$PM_{2.5}$	24 Hours	–	35 µg/m³ [g]	35 µg/m³ [g]
	AAM	12 µg/m³	12.0 µg/m³	15 µg/m³
Sulfates	24 Hours	25 µg/m³	–	–
H_2S	1 Hour	0.03 ppm (42 µg/m³)	–	–
C_2H_3Cl	24 Hours	0.01 ppm (26 µg/m³)	–	–
Visibility Reducing Particles	8 Hours	Extinction coefficient of 0.23 per kilometer	–	–

Notes:

[a] Pollutant concentrations should not exceed CA standards for O_3, CO, SO_2 (1- and 24-hour), NO_2, PM_{10}, $PM_{2.5}$, and visibility reducing particles. Pollutant concentrations shall not equal or exceed any other concentrations.

[b] Pollutant concentrations should not exceed national standards (other than O_3, particulate matter, and those based on AAM) more than once per year. Annual standards should never be exceeded.

[c] An area achieves the O_3 standard when the fourth-highest 8-hour concentration measured at each site in a year, averaged over 3 years, is equal to or less than the standard.

[d] Applies to areas of nonattainment; however, there are no SO_2 nonattainment areas in California.

[e] Applies to areas of Pb nonattainment in Los Angeles County only.

[f] An area achieves the PM_{10} 24-hour standard when the expected number of days per calendar year with a 24-hour average concentration greater than 150 µg/m³ is equal to or less than one.

[g] An area achieves the $PM_{2.5}$ 24-hour standard when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard.

mg/m³: milligrams per cubic meter
µg/m³: micrograms per cubic meter
ppb: parts per billion
ppm: parts per million
AAM: Annual Arithmetic Mean

Source: (CARB 2016)

No additional SO_2 monitors, beyond monitors near sources emitting significant quantities of SO_2, are required for SFBAAB because BAAQMD jurisdiction has never been designated as federal nonattainment for SO_2 and no maintenance plans have been prepared for SO_2 (BAAQMD 2016).

Lead

Lead has a range of adverse neurotoxin health effects and was formerly released into the atmosphere primarily via leaded gasoline products. The phase-out of leaded gasoline in California resulted in decreasing levels of atmospheric lead. Most aviation gasoline (general aviation fuel for piston engines) also contains lead. Lead is a highly stable compound that accumulates in the environment and in living organisms. In humans, lead exposures can interfere with the maturation and development of red blood cells, affect liver and kidney functions, and cause nervous system damage (CARB 2016).

Respirable Particulate Matter

Particulate matter is a combination of liquid or solid particles suspended in the air. PM_{10} particles are smaller than 10 micrometers in diameter and typically include dust, pollen, and mold. Liquid particles include those from sprays and other toxic chemical compounds. PM_{10} particles are a threat to health because they can enter the lungs and are small enough that the respiratory system cannot naturally filter them out. PM_{10} can exacerbate asthma and bronchitis and potentially contribute to premature death (USEPA 2016a).

Fine Particulate Matter

Particulate matter is a combination of liquid or solid particles suspended in the air. $PM_{2.5}$ particles are smaller than 2.5 micrometers in diameter and typically include combustion particles, organic compounds, and metal particles. $PM_{2.5}$ is considered more hazardous to human health than PM_{10} because it can contain a larger variety of dangerous components than PM_{10} and can travel farther into the lungs, potentially causing scarring of lung tissue and reduced lung capacity (USEPA 2016a).

Existing Air Quality Conditions

Air Basin Designations

USEPA and CARB designate areas based on the attainment status for air quality standards (NAAQS or CAAQS). Attainment areas meet or exceed ambient air quality standards and nonattainment areas do not. Nonattainment areas are sometimes classified by degree of underperformance (i.e., marginal, moderate, serious, severe, and extreme). If there is insufficient air quality monitoring data to support a classification, the area is unclassified. It is generally assumed that unclassified areas are meeting the ambient air quality standard. Table 4.2-2 lists USEPA and CARB attainment designations by pollutant for the SFBAAB.

Table 4.2-2 San Francisco Bay Area Air Basin Designations

Pollutant	USEPA Designation	CARB Designation
O_3	Marginal Nonattainment	Nonattainment
CO	Attainment	Attainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment
Pb	Attainment	Attainment
PM_{10}	Unclassified	Nonattainment
$PM_{2.5}$	Moderate Nonattainment	Nonattainment
Sulfates	N/A	Attainment
H_2S	N/A	Unclassified
Visibility Reducing Particles	N/A	Unclassified

Sources: (BAAQMD 2017b, CARB 2016)

Toxic Air Contaminants

Health Effects

Toxic air contaminants (TACs) are a broad class of compounds known to have the potential to cause morbidity or mortality (i.e., have carcinogenic qualities). TACs are substances that are identified by the California Environmental Protection Agency (CalEPA) listed in Title 17 CCR § 93000. TACs (also referred to as hazardous air pollutants or air toxics) are air pollutants that may pose a present or potential hazard to human health. TACs can cause long-term health effects, including but not limited to cancer, asthma, and neurological damage as well as short-term health effects, including but not limited to eye watering and headaches.

Diesel exhaust is the predominant TAC in urban air and is estimated to contribute more than 85 percent of the total inventoried cancer risk in the SFBAAB (BAAQMD 2014b). Diesel exhaust is a complex mixture of gases, vapors, and fine particles. Some of the gaseous components of diesel exhaust, such as benzene, formaldehyde, and 1,3-butadiene, are suspected or known to cause cancer in humans. The particulates in diesel exhaust (diesel particulate matter) is mainly comprised of aggregates of spherical carbon particles coated with inorganic and organic substances (CARB 1998).

Sensitive Receptor Definition

BAAQMD defines sensitive receptors as land uses and facilities where sensitive populations are likely to be located (BAAQMD 2017c). Sensitive receptors can be categorized as follows:

- Residences (i.e., houses, apartments, retirement homes)
- Active recreational land uses (i.e., sports fields)
- Medical facilities (i.e., hospitals, long-term health care facilities)
- Convalescent homes

- Schools and playgrounds
- Childcare centers

Sensitive receptors have varying degrees of sensitivity to TACs. Residential areas are sensitive to poor air quality because people are often at home for extended periods. Active recreational land uses have a moderate sensitivity because vigorous exercise places a high demand on respiratory function. Some receptors are considered more sensitive to air pollutants than others, because of preexisting health problems, proximity to an emissions source, or duration of exposure to air pollutants. Facilities and land uses that have a relatively high sensitivity to poor air quality include schools, childcare centers, playgrounds, hospitals, and convalescent homes because children, the elderly, and the sick are more susceptible to respiratory infections and other air quality-related health problems than the general public. Children under 16 years are more susceptible to carcinogens compared to adults. As such, child care centers and schools are considered the highest risk sensitive receptors. BAAQMD recommends identifying sensitive receptors generally within 1,000 feet of a project site (BAAQMD 2017c).

Sensitive Receptors Near the Reserve

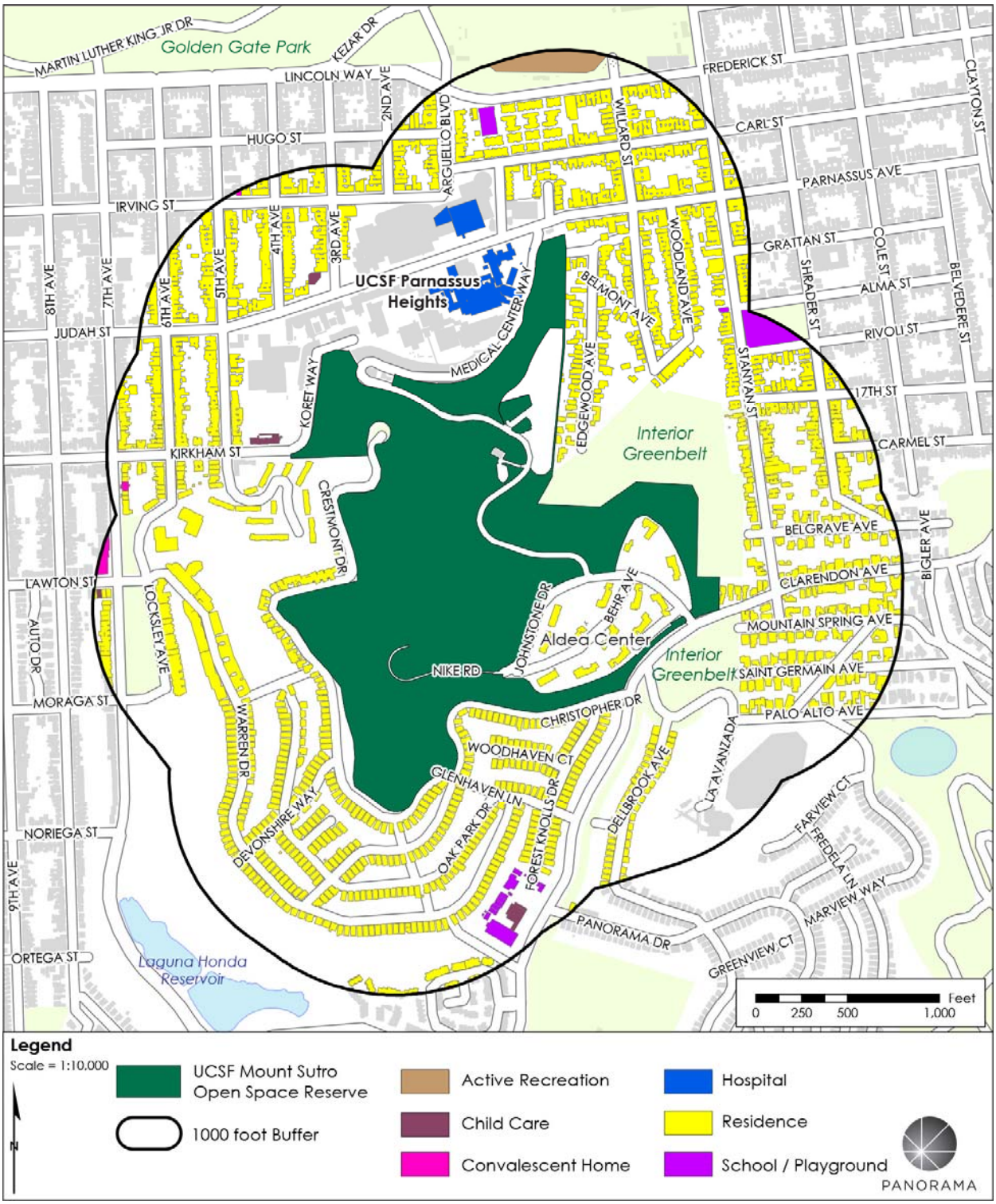
Sensitive receptors within 1,000 feet of the Reserve are listed in Table 4.2-3 and shown on Figure 4.2-1.

Table 4.2-3 Sensitive Receptors Within 1,000 Feet of the Reserve

Category of Receptor	Sensitive Receptor	Distance to Plan Area (feet)
Residences	–	Adjacent
Schools and Playgrounds	Clarendon Alternative Elementary School	626
	Circus School	526
	Grattan Playground	980
Hospital	UCSF Medical Center	Adjacent
Child Care	Clarendon Second Community Child Care	805
	UCSF Marilyn Reed Lucia Child Care	366
	UCSF Kirkham Child Development Center	104
	ABC Bay Area Child Care	961
Active Recreation	Grattan tennis courts	980
	Kezar Stadium	878
Convalescent Homes	Kindred Transitional Care and Rehabilitation	955
	Sunset Care Home	905

Sources: (ESRI 2017, UCSF 2017, City and County of San Francisco 2011, Google, Inc. 2017)

Figure 4.2-1 Sensitive Receptors Within 1,000 Feet of the Reserve



Sources: (ESRI 2017, UCSF 2017, City and County of San Francisco 2011, Google, Inc. 2017)

4.2.3 Regulatory Considerations

University of California, San Francisco

UCSF 2014 LRDP

The 2014 LRDP EIR identifies mitigation measures related to air quality. These measures are considered part of the plan and are shown here.

AIR-LRDP-1: Best Management Practices for Controlling Particulate Emissions. The following BAAQMD Best Management Practices for particulate control will be required for all construction activities. These measures will reduce particulate emissions primarily during soil movement, grading and demolition activities but also during vehicle and equipment movement on unpaved project sites.

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
3. 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.
4. All vehicle speeds on unpaved roads shall be limited to 15 mph.
5. 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.
6. 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, § 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
7. 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.
8. Post a publicly visible sign with the telephone number and person to contact at UCSF regarding dust complaints. This person shall respond and take corrective action within 48 hours. BAAQMD's telephone number shall also be visible to ensure compliance with applicable regulations.

AIR-LRDP-3: Off-Road Equipment Control Measures for NOx. All off-road equipment greater than 25 hp and operating for more than 20 total hours over the duration of construction activities shall have engines that meet or exceed U.S. EPA Tier 3 off-road emission standards.

Federal

USEPA is responsible for enforcing the federal Clean Air Act (CAA) and the 1990 amendments. The NAAQS were established by the federal CAA of 1970 and amended in 1977 and 1990.

National primary standards are "the levels of air quality necessary, with an adequate margin of safety, to protect the public health" (CARB 2016). National secondary standards are "the levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant" (CARB 2016). Table 4.2-1 presents the NAAQS for the criteria air pollutants at different averaging periods.

As part of its enforcement responsibilities, USEPA requires each state with nonattainment areas to prepare and submit a State Implementation Plan (SIP) that demonstrates the means to attain the federal standards. The SIP must integrate federal, state, and local plan components and regulations, and identify specific measures to reduce pollution in nonattainment areas, using a combination of performance standards and market-based programs.

State

CARB oversees air quality planning and control throughout California. It is primarily responsible for ensuring implementation of the 1989 amendments to the California CAA, responding to the federal CAA requirements, and regulating emissions from motor vehicles and consumer products within the state. CARB has established emission standards for vehicles sold in California and for various types of equipment available commercially. CARB also sets fuel specifications to further reduce vehicular emissions and develops airborne toxic control measures to reduce TACs identified under CARB regulations.

CARB is responsible for setting CAAQS under California Health and Safety Code Section 39606. The CAAQS, listed in Table 4.2-1 are intended to protect public health, safety, and welfare. CARB is also responsible for establishing and reviewing state standards, compiling the California SIP and securing approval of the SIP from USEPA, conducting research and planning, and identifying TACs. CARB regulates mobile sources of emissions in California, such as construction equipment, trucks, and automobiles, and oversees the activities of California's air quality management districts, which are organized at the county or regional level.

The California Air Toxics Program establishes the process for the identification and control of TACs and includes provisions to make the public aware of significant toxic exposures and for reducing risk. In accordance with Health and Safety Code, Section 44300 *et seq.* (The Air Toxics Hot Spots Information and Assessment Act, AB 2588, Connelly as amended by SB 1731, Calderon), the Director of the Office of Environmental Health Hazard Assessment (OEHHA) is responsible for the Air Toxics Hot Spots Program. OEHHA has adopted the Guidance Manual for Preparation of Health Risk Assessments. OEHHA recommends assessing cancer risk for projects where the maximally-exposed individual resident or sensitive receptor is exposed for two months or longer (Office of Environmental Health Hazard Assessment 2015).

Local

Bay Area Air Quality Management District

2017 Clean Air Plan

BAAQMD adopted the 2017 CAP to address state nonattainment in SFBAAB for both the 1- and 8-hour ozone standards. The 2017 CAP details a control strategy to address ozone precursors (ROGs and NO_x), particulate matter, TACs, and GHGs. The 85 control measures are categorized into nine economic sectors including transportation, energy, agriculture, and natural and working lands (BAAQMD 2017a).

2001 Ozone Attainment Plan

BAAQMD prepared the 2001 Ozone Attainment Plan to reduce ozone-forming emissions in the SFBAAB by implementing emissions reductions measures for stationary, area, and mobile sources, such as reductions in off-gassing of architectural coatings and organic liquids, low emissions vehicles, expansion of express bus systems, and bicycle and pedestrian programs. The 2001 Ozone Attainment Plan was adopted on November 1, 2001, as a revision to the California SIP (BAAQMD 2001). The 2001 Ozone Attainment Plan identified proposed control measures for stationary, area, and mobile sources to improve air quality and re-attain the national 1-hour ozone standard in the SFBAAB.

City and County of San Francisco

San Francisco General Plan

The Air Quality Element and Environmental Protection Element of the San Francisco General Plan includes several goals and policies pertinent to air quality that are applicable to the plan (City and County of San Francisco 1996), including:

Air Quality Element

Policy 4.3	Minimize exposure of San Francisco's population, especially children and the elderly, to air pollutants.
Objective 5	Minimize particulate matter emissions from road and construction sites.
Policy 5.1	Continue policies to minimize particulate matter emissions during road and building construction and demolition.

Environmental Protection Element

Objective 4	Assure that the ambient air of San Francisco and the Bay Region is clean, provides maximum visibility, and meets air quality standards.
Policy 4.1	Support and comply with objectives, policies, and air quality standards of the Bay Area Air Quality Management District.

4.2.4 Significance Standards and Methodology

Significance Criteria

Impacts of the proposed plan on air quality would be considered significant if implementation of the plan would exceed the following standards of significance, in accordance with Appendix G of the State CEQA Guidelines and the UC CEQA Handbook:

1. Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
2. Conflict with or obstruct implementation of the applicable air quality plan;
3. Result in a cumulatively considerable net increase of any criteria pollutant for which the plan region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);
4. Create objectionable odors affecting a substantial number of people;
5. Expose sensitive receptors to substantial pollutant concentrations; or
6. Exceed the applicable LRDP EIR standard of significance by exposing receptors to toxic air contaminant emissions that (1) result in a cancer risk greater than 10 cancer cases per 1 million people exposed in a lifetime; or (2) for acute or chronic effects, result in concentrations of toxic air contaminant emissions with a Hazard Index of 1.0 or greater.

The IS for the proposed plan determined that the plan's effect on the applicable air quality plan, air quality standards, cumulatively considerable net increase of any criteria pollutant, sensitive receptors, and applicable LRDP EIR standard of significance should be evaluated in the EIR. These topics are analyzed in this section.

Issues Adequately Addressed in the Initial Study

The IS for the proposed plan found that implementation of the plan would have a less than significant impact from the creation of objectionable odors that may affect a substantial number of people. This issue is not discussed further in this section.

Analysis Methodology

BAAQMD Significance Criteria

BAAQMD publishes guidelines to assist lead agencies in evaluating a project's potential impacts on air quality per the requirements of CEQA. In December 1999, BAAQMD adopted its *CEQA Guidelines – Assessing the Air Quality Impacts of Projects and Plans*, as a guidance document to provide lead government agencies, consultants, and project proponents with uniform procedures for assessing air quality impacts and preparing the air quality sections of environmental documents for projects subject to CEQA. The document contains recommended thresholds for use in determining whether projects would have significant adverse environmental impacts, identifies methodologies for predicting project emissions and impacts, and identifies measures that can be used to avoid or reduce air quality impacts. The BAAQMD CEQA Guidelines is an advisory document and local jurisdictions are not required to utilize its methodology.

BAAQMD adopted new thresholds of significance (BAAQMD thresholds) on June 2, 2010, to assist lead agencies in determining when potential air quality impacts would be considered significant under CEQA. BAAQMD also released new CEQA Guidelines in May 2011, which advise lead agencies on how to evaluate potential air quality impacts with the adopted new thresholds of significance. On March 5, 2012, the Alameda County Superior Court issued a judgment finding that BAAQMD had failed to comply with CEQA when it adopted its 2010 thresholds of significance. While the court did not determine whether the thresholds were valid, it did find that the adoption of the thresholds was a project under CEQA, and therefore BAAQMD should have conducted environmental review. Thus, the court set aside the thresholds and ordered BAAQMD to cease dissemination of them until it had complied with CEQA. The case was appealed to the First District Court of Appeal and the California Supreme Court and, most recently, heard again by the Court of Appeal on remand from the Supreme Court. The case was remanded to the trial court for further action consistent with the Supreme Court and appellate court decisions. BAAQMD thresholds are provided for informational purposes and are not required to be used by lead agencies in their environmental documents but may be used at the agency's discretion. The court did not rule on or question the adequacy of the evidentiary basis supporting the significance thresholds that are contained in the BAAQMD CEQA Air Quality Guidelines and the BAAQMD-recommended impact assessment methodologies. However, nothing in the court's decision prohibits an agency's use of BAAQMD thresholds to assess the significance of a project's air quality impacts. Therefore, based on the substantial technical research that went into the preparation of the thresholds by BAAQMD, this analysis uses the BAAQMD thresholds and the methodologies in its 2017 Air Quality CEQA Guidelines[1] to determine the significance of a project's impacts on air quality. BAAQMD thresholds are shown in Table 4.2-4.

Impact Assessment Methods

Criteria Air Pollutants

Criteria pollutant emissions generated during implementation of the proposed plan were modeled using detailed site preparation and vegetation management activity information. The plan would be implemented over 20 years. Year 1 activities would result in the highest air quality emissions because (1) access roads and landing areas would be created in Year 1, and (2) tree removal activities would be greatest during each year of Phase I, including Year 1.

[1] A subsequent update will be released to address outdated references, links, analytical methodologies or other technical information that may be in the 2017 Air Quality CEQA Guidelines or Thresholds Justification Report.

Table 4.2-4 BAAQMD Air Quality Significance Thresholds

Pollutant	Construction Thresholds	Operational Thresholds	
	Average Daily Emissions (lbs/day)	Average Daily Emissions (lbs/day)	Annual Average Emissions (tons/year)
ROG	54	54	10
NO_x	54	54	10
PM_{10}	82 (exhaust)	82	15
$PM_{2.5}$	54 (exhaust)	54	10
CO	Not Applicable	9.0 ppm (8-hour average) or 20.0 ppm (1-hour average)	
Fugitive Dust	Construction Dust Ordinance or other Best Management Practices	Not Applicable	
Health Risks and Hazards for New Sources			
Excess Cancer Risk	> 10.0 in one million		
Chronic or Acute Hazard Index	> 1.0		
Incremental annual average $PM_{2.5}$	> 0.3 µg/m^3		
Health Risks and Hazards for Sensitive Receptors (Cumulative from all sources within 1,000-foot zone of influence) and Cumulative Thresholds for New Sources			
Excess Cancer Risk	> 100 in one million		
Chronic Hazard Index	>10.0		
Annual Average $PM_{2.5}$	> 0.8 µg/m^3		

Source: (BAAQMD 2017c)

As such, the proposed Year 1 schedule, proposed equipment, haul trips, and anticipated number of workers were entered into California Emissions Estimator Model Version 2016.3.1 (CalEEMod), as recommended by BAAQMD, to estimate the maximum per year emissions from implementation of the proposed plan.

CalEEMod was used to calculate the plan's emissions from both on-site and off-site activities. Emissions from on-site activities include equipment and vehicle emissions, while off-site activities include worker, vendor, and haul truck traffic to and from the Reserve. For the Year 1 activities, equipment usage was provided by inputting the type, quantity, and average hours of use per day into CalEEMod. The maximum worker numbers, water trucks (vendor trips), and total haul trips were also inputted into CalEEMod. Modeling assumptions used to estimate the air emissions from Year 1 are provided in Appendix 4.2.

Health Risk Assessment

A Health Risk Assessment (HRA) for exposure to TACs requires the application of a risk characterization model to the results from the air dispersion model to estimate potential health

risk at each sensitive receptor location. CalEEMod was used to estimate emissions from Year 1, Years 2 through 10, and Years 11 through 20 activities that could affect sensitive receptors within 1,000 feet of the plan area, as shown in Figure 4.2-1. These years were selected to represent succession changes in forest management and grading activities that would occur during each of the three phases. The total emissions for each phase were assumed to occur in one year, so if the model indicated two years (based on the calendar), they were added together to represent annual emissions.

The American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) dispersion model was used to predict concentrations of DPM and $PM_{2.5}$ concentrations at sensitive receptors (residences, hospital and school) in the vicinity of the plan area. The AERMOD dispersion model is a BAAQMD-recommended model for use in modeling of these types of emission activities for CEQA projects.[2] For each phase of construction activity (or forest vegetation management), the AERMOD modeling utilized fourteen sources to represent the on-site construction emissions, seven for exhaust emissions and seven for fugitive dust emissions. Since activities could occur throughout the forest reserve, emissions were distributed uniformly across each area source. Construction emissions were modeled as occurring daily between 8:00 a.m. and 5:00 p.m., when most construction activity would occur. Residential, hospital and school receptors exposed to maximum cancer risk was calculated. The maximum modeled DPM concentrations were used to assess cancer risks. Community/Health risks also include non-cancer hazards, expressed as a Hazard Index and annual $PM_{2.5}$ concentrations. Further modeling assumptions are provided in Appendix 4.2.

4.2.5 Impacts

Impact Air-1: The proposed plan could violate any air quality standard or contribute substantially to an existing or projected air quality violation.	**Significance Determination**
	Less than significant

Vegetation Management Activities

Use of equipment and vehicles would generate criteria air pollutant emissions during preparation of access roads and landing areas, and during vegetation management activities. Fugitive dust emissions (PM_{10} and $PM_{2.5}$) would result from ground-disturbing activities and from the operation of vehicles and equipment on unpaved surfaces. Particulate matter (from diesel exhaust), ROG, and NO_X pollutant emissions would result from vehicle and truck trips, and the use of heavy equipment.

To present a conservative analysis of emissions generated in any year under the plan, Year 1 (defined as the first continuous season of work) activities were modeled, including activities

[2] BAAQMD, *Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 3.0.* May. 2012.

associated with tree and understory removal for forest health and defensible space, ground disturbance associated with native restoration sites, and vegetation removal for trail maintenance. Modeling assumptions used to estimate the air emissions from Year 1 are provided in Appendix 4.2. Year 1 involves the most ground disturbance.

Grading for up to four new landing areas, no larger than 0.25 acre each, would be required to stage equipment and downed logs, and to permit log trucks and chip vans to turn around. Several existing trails/access roads would be widened to allow larger equipment and vehicles to access treatment areas within the Reserve. Soil excavated for activities would be balanced on-site. These earth-moving activities were assumed to occur only at the beginning of plan implementation, starting in November 2017 and occurring over three months, ending in February 2018. Emissions from access road and landing area preparation activities are shown in Table 4.2-5. Tree removal activities during forest treatments and the management of defensible space would entail the use of many types of equipment and generate the greatest emissions. Vegetation management activities for Year 1 were assumed to begin in November 2017 and continue through February 2018. Emissions generated during Year 1 activities would not exceed the significance thresholds as shown in Table 4.2-5, with emissions considerably below the significance thresholds. The plan's potential to violate an air quality standard or contribute to an existing air quality violation would be less than significant.

Although emissions from Year 1 activities would not be significant, emissions would be further reduced through implementation of **AIR-LRDP-1: Best Management Practices for Controlling Particulate Emissions** and **AIR-LRDP-3: Off-Road Equipment Control Measures for NOx**. UCSF is obligated to implement **AIR-LRDP-1: Best Management Practices for Controlling Particulate Emissions** and **AIR-LRDP-3: Off-Road Equipment Control Measures for NOx** as part of the 2014 LRDP. These measures require UCSF to control particulate matter by implementing BAAQMD Best Management Practices and to use off-road equipment over 25 horsepower with engines that meet or exceed USEPA Tier 3 standards. The impact would remain less than significant.

Table 4.2-5 Year 1 of the Proposed Plan Emission Estimates

Criteria Air Pollutant	Average Daily Emissions (pounds/day)			BAAQMD Significance Thresholds
	Access Road and Landing Area Preparation Activities	Vegetation Management Activities	Total Year 1	
ROG	0.74	1.35	**2.09**	54
NO_X	9.03	12.90	**21.93**	54
PM_{10}	1.22	1.51	**2.73**	82
$PM_{2.5}$	0.42	0.71	**1.13**	54
CO	4.77	9.03	**13.80**	None

Comparison of Impacts Across Phases

Phase I (Years 2 through 5)
Access road and landing area preparation activities would not be required after Year 1 of the proposed plan. The number of trees removed, understory removed, restoration areas created, and trail vegetation treated during forest treatments and management of defensible space during Years 2 through 5 would be comparable or less than for Year 1. The criteria air pollutant emissions for vegetation management activities in Years 2 through 5 would be considerably below the significance thresholds because emissions would be less than for Year 1. Impacts from the generation of criteria air pollutants would be less than significant. As discussed above, UCSF must implement **AIR-LRDP-1: Best Management Practices for Controlling Particulate Emissions** and **AIR-LRDP-3: Off-Road Equipment Control Measures for NOx** in accordance with the 2014 LRDP. Implementation of these measures would further reduce emissions, and impacts would remain less than significant.

Phase II and Phase III
Fewer trees would be removed during Phase II and Phase III of the plan, and no new landing areas or access roads would be created. The lack of grading and fewer trees removed per year would require fewer hours of equipment and vehicle use, and consequently, a decrease in annual emissions compared to Phase I emissions. The impact from the generation of criteria air pollutants would be less than significant. **AIR-LRDP-1: Best Management Practices for Controlling Particulate Emissions** and **AIR-LRDP-3: Off-Road Equipment Control Measures for NOx**, as discussed previously, would be implemented as part of the proposed plan. Implementation of these measures would further reduce emissions, and the impact would remain less than significant.

Impact Air-2: The proposed plan could conflict with or obstruct implementation of the applicable air quality plan.	**Significance Determination**
	No impact

Vegetation Management Activities

Overview
The applicable air quality plans for the Reserve within the City and County of San Francisco are the 2017 Clean Air Plan (2017 CAP) and the San Francisco Bay Area 2001 Ozone Attainment Plan for the 1-Hour National Ozone Standard (2001 Ozone Attainment Plan).

2017 Clean Air Plan
The proposed plan could conflict with or obstruct the 2017 CAP if (1) the plan was to be inconsistent with the control measures, and/or (2) implementation of the plan were to generate criteria pollutant, TAC, or GHG emissions (see Section 4.7: Greenhouse Gas Emissions for analysis) that exceed the numerical thresholds defined by BAAQMD to attain the goals and objectives of the 2017 CAP.

Heavy equipment would be used to conduct tree removal for forest treatments and management of defensible space. Two applicable transportation control measures provide incentives to promote ridesharing (TR8), incentives to purchase new trucks that exceed NO_x emission standards, hybrid trucks, or zero-emission trucks (TR19), deploy construction and farm equipment with Tier III or IV off-road engines (TR22) and expand the replacement program for lawn and garden equipment (TR23) to reduce emissions. These programs are voluntary. The applicable transportation control measures are incentive measures and do not require vehicle upgrades or retrofits. Use of vehicles and equipment would not be inconsistent with these programs. Applicable natural and working lands control measure promote inclusion of off-site mitigation of GHG emissions through carbon sequestration (NW1) and urban tree planting (NW2). Trees would be planted as part of plan implementation. The proposed plan would not conflict with or obstruct implementation of the control measures identified to achieve the goals of the 2017 CAP. No impact would occur from conflict with control measures.

Estimated emissions during implementation of the proposed plan would not exceed the numerical significance thresholds for ozone and ozone precursors prepared by BAAQMD, as shown in Table 4.2-5 (see Impact Air-1 above). Air toxic emissions generated during plan activities would not result in significant impacts on sensitive receptors, as analyzed under Impact Air-4, below. The proposed plan would comply with BAAQMD thresholds and strategies identified to achieve the goals of the 2017 CAP. No impact would occur.

2001 Ozone Attainment Plan

The proposed plan could conflict with or obstruct the 2001 Ozone Attainment Plan if the plan were found to be inconsistent with the identified control measures. The identified control measures apply to transportation, mobile, stationary, and area sources. One mobile source control measure applies to the proposed plan, which recommends implementation of an "Enhanced" Inspection and Maintenance (I/M) program for on-road motor vehicles. On-road motor vehicles used during operation of the plan must be inspected biennially as part of the currently enforced enhanced I/M program, also known as a smog check. The other control measures do not apply to the proposed plan. The proposed plan would not conflict with any adopted control measure. No impact would occur.

Comparison of Impacts Across Phases

Air emissions would be greatest in Year 1 of plan implementation and would be reduced at each successive phase. No new equipment or methods that could conflict with the 2017 CAP or the 2001 Ozone Attainment Strategy would be introduced during later phases of the plan. Conflicts with the applicable plans would not occur during any phase.

Impact Air-3: The proposed plan could result in a cumulatively considerable net increase of any criteria pollutant for which the region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).	Significance Determination
	Less than significant

Vegetation Management Activities

The SFBAAB is designated as a nonattainment area for ozone and $PM_{2.5}$ under both NAAQS and CAAQS. The SFBAAB is also designated as nonattainment for PM_{10} under CAAQS, but not NAAQS. The proposed plan could have a cumulatively considerable impact on air quality if it either (1) resulted in emissions above the significance thresholds, or (2) violated any action in an attainment plan.

BAAQMD prepared the 2001 Ozone Attainment Plan to reduce ozone-forming emissions in the SFBAAB to achieve attainment of NAAQS and CAAQS ozone standards (BAAQMD 2001). BAAQMD thresholds for ozone precursor pollutants (ROGs and NO_X) and particulate matter (PM_{10} and $PM_{2.5}$) that must be met in order to attain and maintain ambient air quality standards are also the thresholds at which a project would be considered to have a cumulatively considerable net increase of any criteria pollutant for which the region is nonattainment.

As analyzed under Impact Air-1 above, the emissions generated during the most intense year of vegetation management activities (Year 1) would not exceed the significance thresholds for ROGs or NO_X, the precursors to ozone, or for particulate matter. As analyzed under Impact Air-2 above, the proposed plan would not conflict with the 2017 Clean Air Plan and the 2001 Ozone Attainment Plan. The plan's contribution to cumulative impacts would not be cumulatively considerable and would be less than significant.

Comparison of Impacts Across Phases

Air emissions would be greatest in Year 1 of plan implementation and would be reduced during implementation of each successive phase. The plan would not have a significant contribution to a cumulative net increase in ozone precursors or PM_{10} and $PM_{2.5}$ during any phase of its implementation. Impacts would be less than significant.

Impact Air-4: The proposed plan could expose sensitive receptors to substantial pollutant concentrations. and Impact Air-5: The proposed plan could exceed the applicable LRDP EIR standard of significance by exposing receptors to toxic air contaminant emissions that (1) result in a cancer risk greater than 10 cancer cases per 1 million people exposed in a lifetime; or (2) for acute or chronic effects, result in concentrations of toxic air contaminant emissions with a Hazard Index of 1.0 or greater.	Significance Determination
	Less than significant

Vegetation Management Activities

Localized CO Concentrations

CO emissions generated from truck traffic during plan implementation could result in CO hotspots, or localized concentrations of CO. Congested intersections with a large volume of traffic have the greatest potential to cause high, localized concentrations of CO, which could impact adjacent sensitive receptors. The proposed plan would generate a relatively small amount of temporary construction traffic. The 2017 CEQA Air Quality Guidelines indicate that a project would significantly impact CO levels if project traffic would increase traffic volumes at intersections to more than 44,000 vehicles per hour. Vehicles used to conduct plan activities would generate a maximum of 49 trips per day, or an average of five trips per hour (See Section 3.13: Transportation and Traffic for analysis) for equipment delivery, commuting for workers, and hauling culled vegetation materials off-site. Plan-related traffic increase of an average of five trips per hour would not cause traffic levels to exceed 44,000 vehicles per hour at any intersection. The impact on sensitive receptors from CO concentrations would be less than significant.

Toxic Air Contaminants

Diesel-powered equipment and vehicles such as haul trucks, backhoes, and excavators would be used during implementation of all types of vegetation management activities. Grading would occur to widen trails for use as access roads and to create landing areas. Diesel-powered equipment and grading would emit TACs in the form of diesel exhaust emissions and particulate matter. Diesel exhaust is a complex mixture of gases, vapors, and fine particles, some of which are suspected or known to cause cancer in humans.

Grading for access road and landing area preparation could occur for up to three months. While approximately one acre of land would be graded, these activities would not be concentrated in one location and each location would require a limited amount of grading. Vegetation management activities could occur during up to a 6-month season (may be shorter depending on the first rain of the season) for 20 years. Activities could occur for 10 hours a day, 5 days a week during this period, but would likely be spread out over the entire season. Additionally, many of the vegetation management activities, including tree planting, understory removal, and tree and vegetation trimming, would not emit TACs because they would be done by hand or with the use of unpowered hand equipment. Due to the 20-year implementation period of the plan and proximity to sensitive receptors, a HRA was conducted to analyze the impacts of

TAC emissions generated throughout plan implementation. The methods used to conduct the assessment followed the recently finalized guidelines by OEHHA, as detailed in Appendix 4.2. The cancer risk, annual $PM_{2.5}$ concentration, and non-cancer health hazards (Hazard Index)[3] caused by TAC emissions generated by plan activities at the nearest sensitive receptors are displayed in Table 4.2-6. Age-sensitivity factors reflect the greater sensitivity of infants and small children to cancer-causing TAC emissions.

As shown in Table 4.2-6, no exceedances of the 2014 LRDP or BAAQMD significance thresholds would occur, and the impact from TAC emissions on sensitive receptors would be less than significant. Additionally, UCSF is obligated to incorporate **AIR-LRDP-1: Best Management Practices for Controlling Particulate Emissions** and **AIR-LRDP-3: Off-Road Equipment Control Measures for NOx** as part of the 2014 LRDP. The incorporation of AIR-LRDP-1 and AIR-LRDP-3 would further reduce TAC emissions from equipment use by requiring UCSF to implement BAAQMD BMPs to control particulate matter and to use off-road equipment over 25 horsepower with engines that meet or exceed USEPA Tier 3 standards. Table 4.2-6 shows the reduction in health risks at each maximally exposed receptor. The impact on sensitive receptors from TAC emissions would remain less than significant.

Dry Deposition of Particulate Matter

Research has shown that trees can remove particulate matter from the air through a process known as dry deposition. Dry deposition is when particles in the atmosphere deposit themselves on a surface, decreasing the atmospheric concentration of particulate matter. Much of the fine particulates, $PM_{2.5}$, becomes permanently incorporated into leaf wax or cuticle, while a portion of the coarse fraction is resuspended as a function of wind speed. The remainder of the coarse fraction is eventually washed off to the ground by precipitation. The reduction in particular matter concentration due to dry deposition is localized to generally within 100 feet, with very little reduction in concentration beyond 1,000 feet of the tree or trees (McDonald, et al. 2016). The proposed plan would result in an overall reduction in the density and therefore number of trees in the plan area. However, the pollutant screening capabilities of trees is not directly correlated to the number of trees but rather to the canopy size, leaf density, health, and size of the trees. The plan would result in fewer trees overall in the forest, but the canopies and health of the trees would improve over the life of the plan and beyond, such that the forest could provide greater particulate matter removal than in its current condition where most of the trees are dying or dead, limiting the canopy size and leaf density. Impacts associated with the ability of the trees to screen pollutants would be less than significant.

[3] Hazard Index is a ratio of the TAC concentration to a reference exposure level.

Table 4.2-6 Maximum Health/Community Risk Impacts at the Nearest Sensitive Receptors to the Proposed Plan Area

Receptor Type	Cancer Risk (cases per million people)	Annual $PM_{2.5}$ Concentration ($\mu g/m^3$)	Hazard Index
Unmitigated			
Residential (infant/child, 30-year maximum exposure)	3.95	<0.01	<0.01
Hospital (infant, 1-year maximum exposure)	0.67	<0.01	<0.01
School (child 9-year maximum exposure)	0.1	<0.01	<0.01
Incorporation of AIR-LRDP-1 and AIR LRDP-3			
Residential (infant/child, 30-year maximum exposure)	2.56	<0.01	<0.01
Hospital (infant, 1-year maximum exposure)	0.38	<0.01	<0.01
School (child 9-year maximum exposure)	<0.1	<0.01	<0.01
2014 LRDP Significance Threshold	**>10**	**–**	**≥1.0**
BAAQMD Significance Threshold	**>10.0**	**>0.3**	**>1.0**
Threshold Exceeded?	**No**	**No**	**No**

Source: (Illingworth & Rodkin, Inc. 2017)

Comparison of Impacts Across Phases

Localized CO Concentrations

The maximum number of vehicle trips would not change substantially between each phase during the 20-year plan. The proposed plan's vehicle traffic would not generate substantial localized CO emissions. The impact on sensitive receptors from localized CO emissions would be less than significant.

Toxic Air Contaminants

The impact on sensitive receptors from the generation of TAC emissions would accumulate over the life of the plan as sensitive receptors are exposed to equipment and vehicle emissions. The level of health risk is dependent on several factors, including the type of pollutant, receptor type, and duration of exposure. The impact on sensitive receptors would increase for each year that plan activities occur. Table 4.2-6 details the cancer and non-cancer risks for the life of the proposed plan. As shown, the 2014 LRDP significance thresholds would not be exceeded. UCSF is obligated to implement **AIR-LRDP-1: Best Management Practices for Controlling Particulate Emissions** and **AIR-LRDP-3: Off-Road Equipment Control Measures for NOx** as part of the 2014 LRDP, which would further reduce the health risk to sensitive receptors. The impact on sensitive receptors from TAC emissions would be less than significant.

Dry Deposition of Particulate Matter

The greatest tree removal would occur during Phase I. During this time, dead and dying trees would be removed from areas where these trees present hazards to nearby structures. Approximately 2.8 acres would be treated using group selection or seed tree treatment. These areas are generally located in the interior of the Reserve, away from major roadways (e.g., Crestmont Drive) surrounding the Reserve that are the primary source of particulate matter in the area. Given the distance to residents and the small size of the treatment areas in the forest in comparison with the surrounding number of trees in the forest that could remove particulate matter, impacts related to the removal of particulate matter from the environment by trees would not have any measurable effect on nearby receptors. Localized impacts from fluctuations in particulate matter concentrations would be less than significant. In future years, more trees would be removed, but healthy trees would regenerate, improving the pollutant filtering capabilities of the forest by Phase II and Phase III. Impacts would be less than significant.

Impact Air-6: The proposed plan could result in significant impacts on air quality in combination with past, present, and probable future development in the cumulative analysis study area.	**Significance Determination**
	Less than significant contribution

Geographic Scope

Air quality is a regional resource and is neither defined nor limited by jurisdictional boundaries, political boundaries, or project boundaries. The cumulative study area for air quality primarily encompasses activities within the same air basins as the proposed project, specifically the SFBAAB. The cumulative impact from CO and TAC emissions on the health of receptors is much more localized. The geographic extent for cumulative impacts from CO emissions consists of intersections where peak cumulative traffic would occur. The geographic extent for cumulative projects is 1,000 feet, which is generally the distance within which TAC emission concentrations disperse and are no longer a significant health risk.

Cumulative Analysis

Regional Air Quality

Regional air quality is affected by all activities that occur within an air basin. The SFBAAB is in nonattainment for $PM_{2.5}$, PM_{10}, and ozone. Past and present projects in the SFBAAB have resulted in the nonattainment status. The cumulative impact from past, present, and probable future projects on existing air quality violations in the SFBAAB and criteria pollutants for which the SFBAAB is in nonattainment would be significant.

Cumulative impacts on regional air quality are addressed by the BAAQMD thresholds of significance for operational criteria pollutant emissions in the SFBAAB because BAAQMD considered all past, present, and probable future projects when they set the thresholds of significance. The construction thresholds represent the levels at which a project or plan's individual combustion emissions of criteria air pollutants and precursors would result in a cumulatively considerable contribution to the existing nonattainment designations. If a project's emissions exceed the numerical thresholds in the SFBAAB, the project would considerably

contribute to the cumulatively significant air quality impact. If a project's emissions do not exceed the numerical thresholds in the SFBAAB, the project would not considerably contribute to the cumulatively significant air quality impact.

Combustion and fugitive dust emissions generated during implementation of the proposed plan would not exceed the BAAQMD significance thresholds for criteria air pollutants (refer to Impact Air-1). Thus, the proposed plan would not contribute considerably to a significant cumulative air quality impact. UCSF is obligated to implement **AIR-LRDP-1: Best Management Practices for Controlling Particulate Emissions** and **AIR-LRDP-3: Off-Road Equipment Control Measures for NOx** as part of the 2014 LRDP, which require UCSF to control particulate matter by implementing BAAQMD Best Management Practices and to use off-road equipment over 25 horsepower with engines that meet or exceed USEPA Tier 3 standards. The contribution to a significant cumulative air quality impact wofounduld remain less than considerable.

Localized CO Concentrations

Carbon monoxide hotspots, fugitive dust emissions, or diesel emissions have the potential to result in localized impacts. Vehicle trip increases during construction and operation of cumulative projects could elevate CO emissions at intersections. BAAQMD screening guidance indicates that a project would not exceed the CO significance threshold if project traffic projections indicate traffic levels would not increase at any affected intersection to more than 44,000 vehicles per hour.[4] Parnassus Avenue is the only roadway with over 10,000 average daily trips in the vicinity of the plan area, with only 11,700 average daily trips (UCSF 2014). None of the roadways in the vicinity of the plan area would experience intersection operations of 44,000 vehicles per hour. The cumulative projects would not increase traffic at any affected intersection above the BAAQMD threshold, since the projects reasonably would not quadruple the traffic volume in the area. Localized CO emissions at intersections would not increase substantially due to buildout of cumulative projects. The cumulative impact from localized CO emissions would be less than significant.

Toxic Air Contaminants

Vehicles and equipment used during construction and operation of the cumulative projects would generate localized diesel and fugitive dust emissions near sensitive receptors. Many of the cumulative projects would affect the same sensitive receptors as the proposed project. Construction of the cumulative projects has the potential to subject sensitive receptors to elevated TAC emissions for a prolonged period. Dust and diesel emissions during implementation of Building Demolition (#1), Surge, Woods, EHS Open Space Restoration (#8), Mount Sutro Reserve Improvements (#9), Kirkham Project (#15), Overlook Project (#16), and SNRA Management Plan (#17) could increase TAC emissions at these adjacent residences.

[4] For a land-use project type, the BAAQMD CEQA Air Quality Guidelines state that a proposed project would result in a less than significant impact on localized CO concentrations if the project would not increase traffic at affected intersections to more than 44,000 vehicles per hour.

Overlapping schedules between the cumulative projects and the proposed plan could cumulatively increase health risks for any residences within 1,000 feet that could be exposed to the TAC emissions generated by each project. The cumulative impact of several projects occurring concurrently and exposing receptors to health risks from TAC emissions over an extended period is unknown but is conservatively assumed to be potentially significant.

Residences directly adjacent to the Reserve would experience the highest TAC emissions generated from plan activities. The annual $PM_{2.5}$ concentration at the maximally exposed sensitive receptor would be substantially less than 0.01 $\mu g/m^3$ compared to the BAAQMD threshold of greater than 0.8 $\mu g/m^3$ and an HI (non-cancer risk) of substantially less than 0.01 compared to a BAAQMD threshold of greater than 10.0 HI or a 2014 LRDP threshold of equal to or greater than 1.0 HI. The annual $PM_{2.5}$ and non-cancer risk due to the proposed plan would be negligible and would not therefore, have a considerable incremental contribution to an otherwise significant cumulative impact. TAC emissions generated during implementation of UCSF projects must not result in a cancer risk that exceeds the 2014 LRDP significance thresholds of greater than 10 cancer cases per 1 million people, or 10 ppm. Implementation of the plan would have a cancer risk of 3.95 ppm. This contribution in combination with other projects could be incrementally significant. As required by the 2014 LRDP, UCSF must incorporate **AIR-LRDP-1: Best Management Practices for Controlling Particulate Emissions** and **AIR-LRDP-3: Off-Road Equipment Control Measures for NOx** which would further reduce the TAC emissions from equipment use for the plan, by requiring UCSF to implement BAAQMD BMPs to control particulate matter and to use off-road equipment over 25 horsepower with engines that meet or exceed USEPA Tier 3 standards. The proposed project's contribution to cancer risk at adjacent residences would be further reduced by nearly half. The proposed plan would not contribute considerably to a significant cumulative impact on cancer risks with **AIR-LRDP-1: Best Management Practices for Controlling Particulate Emissions** and **AIR-LRDP-3: Off-Road Equipment Control Measures for NOx**.

Dry Deposition of Particulate Matter

Trees can remove particulate matter from the air, measurably reducing the concentration of particulate matter generally within 100 feet. Several cumulative projects (Building Demolition [#1], Surge, Woods, EHS Open Space Restoration [#8], Mount Sutro Reserve Improvements [#9], Kirkham Project [#15], Overlook Project [#16], and SNRA Management Plan [#17]) could involve tree removal activities within 100 feet of the plan area and adjacent sensitive receptors. Localized particulate matter concentrations may cumulatively increase in the vicinity of a few residences but not likely to a level that could significantly impact sensitive receptors. The cumulative impact would be less than significant.

4.2.6 Mitigation Measures

No mitigation measures would be required to reduce impacts to less than significant.

4.2.7 References

Bay Area Air Quality Management District (BAAQMD). 2001. "Revised San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard." San Francisco Bay Area Air Quality Management Plans. October 24. Accessed June 6, 2016. http://www.arb.ca.gov/planning/sip/planarea/bayareasip.htm.

—. 2014a. "Bay Area Emissions Inventory Summary Report: Criteria Air Pollutants Base Year 2011." May.

—. 2014b. "Improving Air Quality & Health in Bay Area Communities."

—. 2016. "2015 Air Monitoring Network Plan." July 1.

—. 2017a. "2017 Clean Air Plan." Spare the Air Cool the Climate A Blueprint for Clean Air and Climate Protection in the Bay Area. April 19.

—. 2017b. Air Quality Standards and Attainment Status. January 5. Accessed March 6, 2017. http://www.baaqmd.gov/research-and-data/air-quality-standards-and-attainment-status.

—. 2017c. CEQA Air Quality Guidelines. May.

California Air Resources Board (CARB). 1998. Report to the Air Resources Board on the Proposed Identification of Diesel Exhaust as a Toxic Air Contaminant. April 22.

—. 2004. "2004 Revision to the California State Implementation Plan for Carbon Monoxide."

—. 2015. Top 4 Summary. Accessed March 6, 2017. http://www.arb.ca.gov/adam/topfour/topfour1.php.

—. 2016. "Ambient Air Quality Standards." May 6.

—. 2016. Area Designations Maps: State and National. May. Accessed March 6, 2017. http://www.arb.ca.gov/desig/adm/adm.htm.

City and County of San Francisco. 1996. "San Francisco General Plan, adopted on June 27, 1996." June 27. http://www.sf-planning.org/ftp/General_Plan/index.htm.

—. 2011. "Building Footprints - City and County of San Francisco GIS dataset." San Francisco Enterprise GIS Program, Department of Technology and Pictometry, Inc.

ESRI. 2017. "Online GIS Vector and Raster Data."

Google, Inc. 2017. "Google Earth Pro."

Illingworth & Rodkin, Inc. 2017. "UCSF Mount Sutro Open Space Reserve Vegetation Management Plan - Construction Health Risk Assessment." April 28.

McDonald, Rob, Timm Kroeger, Tim Boucher, Wang Longzhu, Rolla Salem, Jonathan Adams, Steven Bassett, Misty Edgecomb, and Snigda Garg. 2016. Planting Healthy Air: A Global Analysis of the Role of Urban Trees in Addressing Particulate Matter Pollution and Extreme Heat. Technical Report, Arlington: The Nature Conservancy.

Office of Environmental Health Hazard Assessment. 2015. "Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments." Air Toxics Hot Spots Program. Air Community and Environmental Research Branch, Office of Environmental Helath Hazard Assessment, February.

University of California, San Francisco (UCSF). 2014. "UCSF 2014 Long Range Development Plan."

—. 2017. "Mt Sutro Open Space Preserve GIS data."

United States Environmental Protection Agency (USEPA). 2016a. Criteria Air Pollutants. May 3. Accessed May 5, 2016. https://www.epa.gov/criteria-air-pollutants.

—. 2016b. Final Rule for Control of Hazardous Air Pollutants. August 9. Accessed November 16, 2016.

Western Regional Climate Center (WRCC). 2016. San Francisco Oceansd, California (047767). May 19. Accessed March 6, 2017. http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7767.

4.3 BIOLOGICAL RESOURCES

4.3.1 Introduction

This section describes the existing biological resources in the plan area and evaluates the potential impacts on biological resources from the implementation of proposed vegetation management activities. The section also provides discussion of the applicable federal, state, regional, and local regulations that pertain to biological resources. The impacts associated with the proposed plan are compared with the thresholds of significance used by the University pursuant to CEQA. A biological resources report was prepared by Pacific Biology and information from the report is summarized in this section. The biological resources report is included in Appendix 4.3 of this EIR.

Comments related to biological resources received during the public scoping process included concerns about the following:

- Decrease in the abundance of wildlife
- Importance of the Reserve as a wildlife migratory corridor, particularly for avian species
- Removal of wildlife and special status species habitat from tree removal
- Wildlife impacts, including benefits, from planting of native species
- Further study of existing native plant communities

4.3.2 Environmental Setting

Regional Biological Setting

The Reserve is located in San Francisco in the Bay Area–Delta Bioregion[1] as defined by the State of California's Natural Communities Conservation Program. This bioregion supports a variety of natural communities that range from the open waters of the San Francisco Bay and Delta to salt and brackish marshes to grassland, chaparral, and oak woodlands. The temperate climate is Mediterranean in nature with relatively mild, wet winters and warm, dry summers. The high diversity of vegetation and wildlife found in the region is a result of soil, topographic, and microclimate variations that combine to promote relatively high levels of endemism.

Several parks, including the Presidio, Golden Gate Park, Twin Peaks, Lake Merced, and the Reserve, are scattered throughout San Francisco. During the last three decades of the nineteenth

[1] An area defined by ecological, geographic, and social criteria and consists of a system of related, interconnected ecosystems. The Bay-Delta Bioregion is the immediate watershed of the Bay Area and the Delta, not including the major rivers that flow into the Delta. It is bounded on the north by the northern edge of Sonoma and Napa Counties; extends east to the edge of the valley floor; and bounded on the south by the southern edges of San Joaquin, Santa Clara, and San Mateo Counties.

century, large areas of San Francisco from the Presidio to the Ocean Avenue area were planted with trees on what had previously been sand dunes or unforested hillsides. The trees at Stern Grove, Golden Gate Park, and the Presidio are all examples of the large-scale tree planting effort of the late nineteenth century of which portions continue to survive today. Eucalyptus, Monterey cypress, and Monterey pines were the three species predominantly planted to act as wind breaks and to anchor shifting sand dunes. The long history of land use changes that have altered the environment combined with soil, topographic, and microclimate variations has reduced the variation in local flora and fauna.

Mount Sutro Open Space Reserve

Survey and Database Review

The following sources were reviewed for information regarding biological resources within the Reserve:

- **California Natural Diversity Database (CNDDB).** Contains occurrences of special-status species in the plan area and their locations relative to the Reserve.
- **Mount Sutro Open Space Reserve Vegetation Management Plan**, revised January 20, 2017. Lists species observed during the forest inventory and species observed by Nature in the City and the Sutro Stewards (HortScience, Inc. and Matt Greene Forestry & Biological Consulting 2017).
- **Biological Resources Report, Mount Sutro Open Space Reserve.** Includes methodology and results from a biological survey conducted in the Reserve in 2011 (LSA Associates, Inc. 2011).
- **Biological Habitat Evaluation Report.** Includes methodology and results from the biological reconnaissance survey conducted in 2017, including a list of birds observed in the Reserve through eBird (Pacific Biology 2017).

Vegetation

General Types of Vegetation

During the biological reconnaissance survey performed in 2017, 26 plant taxa were identified that were not documented during previous botanical surveys (Pacific Biology 2017). Of the 195 plant taxa that have been documented in the Reserve, 83 (43 percent) are non-native, and of these, 41 (49 percent, or 21 percent of all plants) are invasive (Cal-IPC 2009). Although less than half of the species observed are non-native, most of the Reserve is dominated by introduced and invasive species. The biological survey report is included in Appendix 4.3 of this EIR.

Generally described, vegetation in the Reserve is dominated by a canopy of Tasmanian blue gum eucalyptus (*Eucalyptus globulus*). Blackwood acacia (*Acacia melanoxylon*) is the second most prevalent tree in the Reserve. Invasive, highly competitive herbaceous and woody vegetation dominate the shrub/vine stratum, including Himalayan blackberry (*Rubus armeniacus*), English ivy (*Hedera helix*), German ivy (*Senecio mikaniodes*), Cape ivy (*Delairea odorata*), and wild geranium (*Geranium maculatum*). Other common species in the shrub/vine stratum include red elderberry (*Sambucus racemosa*) and poison oak (*Toxicodendron diversilobum*). The most common and widespread introduced herbs include common chickweed (*Stellaria media*), panic veldt

grass (*Ehrharta erecta*), Bermuda buttercup (*Oxalis pes-caprae*), English plantain (*Plantago lanceolata*), and forget-me-not (*Myosotis* spp.). Pockets of remnant native vegetation communities are also present in the Reserve; native plants consist mostly of forbs, ferns, and California blackberry (*Rubus ursinus*).

Vegetation Communities

The Manual of California Vegetation (MCV) was adopted by the California Native Plant Society (CNPS) as a definitive system for describing vegetation throughout California (Sawyer, Keeler-Wold and Evens 2009). MCV vegetation communities present in the Reserve are described in Table 4.3-1. The other most common shrub/vine species in the Reserve are red elderberry, English ivy, and Cape ivy; however, these species are not treated as classes in the MCV.

Table 4.3-1 Vegetation Communities within the Reserve

Vegetation Community	Dominant Species	Description
Eucalyptus Grove *Eucalyptus Semi-Natural Woodland*	Tasmanian blue gum eucalyptus (*Eucalyptus globulus*) Blackwood acacia (*Acacia melanoxylon*)	Based on remnant native plant species within the understory, introduced eucalyptus and associated non-native plants have most likely displaced various incarnations of coastal scrub. The tree canopy is dominated by blue gum eucalyptus; however, blackwood acacia is most conspicuous in areas opened up by blue gum mortality. Other tree species are present in small numbers, including Monterey pine (*Pinus radiata*), Monterey cypress (*Callitropsis macrocarpa*), redwood (*Sequoia sempervirens*), plum (*Prunus domestica*), cherry (*Prunus* sp.), Bailey's acacia (*Acacia baileyana*), willow (*Salix* sp.), California bay laurel (*Umbellularia californica*), and coast live oak (*Quercus agrifolia*). The shrub/vine stratum is dominated by Himalayan blackberry, poison oak, English ivy, German ivy, Cape ivy, wild geranium, cotoneaster (*Cotoneaster* spp.), garden nasturtium (*Tropaeolum majus*), slender firethorn (*Pyracantha angustifolia*), and nightshade (*Solanum* sp.).
Himalayan Blackberry Brambles *Rubus armeniacus Semi-Natural Stands*	Himalayan blackberry (*Rubus armeniacus*)	More prevalent in open, sunny areas where blue gum eucalyptus mortality is high. Himalayan blackberry is dominant or co-dominant in the shrub canopy and is considered highly invasive by the California Invasive Plan Council (Cal-IPC) (Cal-IPC 2009).
Coastal Brambles *Rubus sp. Shrubland Alliance*	Thimbleberry (*Rubus parviflorus*) Salmonberry (*Rubus spectabilis*) California blackberry (*Rubus ursinus*)	More prevalent in open, sunny areas where blue gum eucalyptus mortality is high. Himalayan Blackberry Brambles may be confused with California blackberry in stands of Coastal Brambles. Thimbleberry, salmonberry, and California blackberry are dominant or form various mixtures with other species in the shrub/vine stratum. Other species in this vegetation community include bee plant (*Scrophularia californica*), twinberry (*Lonicera involucrata*), wild cucumber (*Marah fabaceous*), red elderberry, coyote brush (*Baccharis pilularis*), poison oak, and sword fern (*Polystichum munitum*).

Sources: (Pacific Biology 2017, LSA Associates, Inc. 2011)

Remnant Native Plant Communities

Patches of remnant native plant communities most commonly associated with coastal scrub are dispersed throughout the Reserve. The more common native plants are generally those that are well adapted to the shaded conditions beneath the eucalyptus tree canopy. The most prevalent native plant species among the shrub/vine stratum include red elderberry, California blackberry, thimbleberry, poison oak, snowberry (*Symphoricarpos albus* var. *laevigatus*), and pink honeysuckle (*Lonicera hispidula*). In a few areas, especially along western portions of the site, these species are sub-dominant or even dominant. Across most of the Reserve; however, they have been displaced by introduced and generally invasive shrubs and vines, many of which have likely escaped from landscaped yards and gardens near the Reserve.

Broad-leaved forbs and ferns are the primary native species in the herbaceous stratum. Common forbs include California figwort (*Scrophularia californica*), ridge hedge nettle (*Stachys ajugoides*), Pacific blacksnakeroot (*Sanicula crassicaulis*), creeping snowberry (*Symphoricarpos mollis*), and miner's lettuce (*Claytonia perfoliata*). Ferns include leather-leaf fern (*Polypodium scouleri*), western sword fern, coastal woodfern (*Dryopteris arguta*), and goldback fern (*Pentagramma triangularis*).

Large rock outcroppings throughout the Reserve support a predominance of native plants on their surfaces and within crevices. These native plants include leather-leaf fern, goldback fern, California Dutchman's pipe (*Aristolochia californica*), and a variety of native mosses. The thinner soils surrounding the outcrops also generally support a higher percentage of native plant species. Appendix 4.3 lists all plant taxa observed in the Reserve.

Sensitive Communities including Aquatic and Wetland Resources

The steep topography over most of the Reserve prevents the establishment of ponded depressions, seasonal wetlands, and other features that retain water long enough to support hydric soils and hydrophytic vegetation.

Woodland Creek, an intermittent swale on the eastern side of the Reserve, receives runoff from Medical Center Way via a storm drain and collects runoff from the surrounding hill slopes. The creek features bed and bank topography in the lower reaches within the Reserve but does not support a predominance of wetland vegetation; dominant species observed include Cape ivy, English ivy, Himalayan blackberry, and black nightshade (*Solanum nigra*). Based on the presence of bed and bank topography, Woodland Creek may be subject to jurisdiction by CDFW under Section 1602 of the California Fish and Game Code. Woodland Creek conveys storm flows to the City's storm water system during the rainy season. Since most, if not all, of the City's storm drains eventually lead to the San Francisco Bay, USACE could exert jurisdiction over the drainage since it could be considered a tributary to navigable waters of the U.S. (Pacific Biology 2017). No other sensitive natural communities are present within the Reserve (LSA Associates, Inc. 2011, Pacific Biology 2017).

Special-Status Plants

LSA Associates, Inc. identified 23 special-status plant species based on a review of the species that occur within 5 miles of the Reserve per CNDDB records or within the San Francisco North and San Francisco South USGS 7.5-minute quadrangles based on the CNPS Electronic Inventory of Rare and Endangered Plants of California (LSA Associates, Inc. 2011), which was reviewed and updated by Pacific Biology (Pacific Biology 2017). Of these 23 species, 22 of them are not expected to occur due to a lack of habitat in the Reserve. One plant species, coastal triquetrella, has a moderate potential for occurrence. Special-status plant species and the probability that that may occur in the Reserve are provided in Table 4.3-2.

Table 4.3-2 Potential for Special-Status Plant Species to Occur within the Reserve

Common Name *Scientific Name*	Federal/ State Status [a]	Habitat, Blooming Season, Elevation	Potential to Occur in the Plan Area
Bent-flowered fiddleneck *Amsinckia lunaris*	1B	Annual grasslands. Blooms April to May. 10-1,640 feet.	**Not Expected.** Closest record is located approximately 6.3 miles to the south at San Bruno Mountain. Low potential to occur due to density of and competition from exotic vegetation.
Franciscan manzanita *Arctostaphylos franciscana*	1B	Serpentine outcrops in chaparral. 200-990 feet.	**Not Expected.** Considered extinct until one plant was discovered during a road construction project in the Presidio of San Francisco. Lack of suitable serpentine habitat.
Presidio manzanita *Arctostaphylos hookeri* ssp. *ravenii*	FE, SE, 1B	Chaparral, coastal prairie, coastal scrub/serpentinite outcrop. Blooms February to March. 150-710 feet.	**Not Expected.** Closest extant record is attributed to a reintroduction of the plant at Baker's Beach near the WWII Memorial, approximately 2.6 miles from the Reserve. Lack of suitable habitat.
San Bruno manzanita *Arctostaphylos imbricata*	SE, 1B	Chaparral or coastal scrub on San Bruno Mountain; mostly known from a few sandstone outcrops Blooms February to May. 900-1,210 feet.	**Not Expected.** Lack of suitable habitat; species distribution limited to San Bruno Mountain.
Montara manzanita *Arctostaphylos montaraensi*	1B	Coastal chaparral, coastal scrub. Blooms January to March. 490-1,640 feet.	**Not Expected.** Habitat available is of marginal quality. Closest record is located approximately 4.9 miles to the south at San Bruno Mountain.
Pacific manzanita *Arctostaphylos pacifica*	SE, 1B	Coastal scrub associated with sandstone and other species of Arctostaphylos. Known only from San Bruno Mountain. Blooms February to April.	**Not Expected.** Closest record is located approximately 5.3 miles to the south at San Bruno Mountain. Species distribution limited to San Bruno Mountain.

Common Name *Scientific Name*	Federal/ State Status [a]	Habitat, Blooming Season, Elevation	Potential to Occur in the Plan Area
Franciscan thistle *Cirsium andwersii*	1B	Coastal bluff scrub, coastal prairie, broadleafed upland forest; sometimes occurs in serpentine seeps. Blooms March to July. 0-490 feet.	**Not Expected.** Closest presumed extant record is approximately 1.9 miles to the north near Mountain Lake in the Presidio. Lack of suitable habitat.
Compact cobwebby thistle *Cirsium occidentale* var. *compactum*	1B	Chaparral, coastal dunes, coastal prairie, coastal scrub. Blooms April to June. 15-490 feet.	**Not Expected.** Closest possibly extirpated record approximately 2.7 miles to the south near Lake Merced. Lack of suitable habitat and area was previously disturbed.
Presidio clarkia *Clarkia franciscana*	FE, SE, 1B	Coastal scrub, valley and foothill grassland, sometimes on serpentine. Blooms May to July. 80-1,100 feet.	**Not Expected.** Closest presumed extant record is attributed to a reintroduction of the plant to serpentine grasslands at the Presidio approximately 1.9 miles to the north. Lack of suitable habitat.
Round-headed Chinese-houses *Collinsia corymbosa*	1B	Coastal dunes. Blooms April to June. 0-65 feet.	**Not Expected.** Closest presumed extant record is attributed to a collection made in 1902 at the Presidio approximately 1.1 miles to the north. Lack of suitable habitat.
San Francisco collinsia *Collinsia multicolor*	1B	Closed-cone coniferous forest, coastal scrub and grassland on decomposed shale (mudstone) mixed with humus. Sometimes on serpentinite. Blooms March to May. 100-820 feet.	**Not Expected.** Closest presumed extant record is attributed to a collection made in 1929 at Glen Canyon Park approximately 0.6 miles to the southeast. Lack of suitable habitat and area was previously disturbed.
Fragrant fritillary *Fritillaria liliacea*	1B	Grasslands in coastal scrub and coastal prairie, often on serpentine and usually in clay soils but various soil types are reported. Blooms February to April. 10-1,350 feet.	**Not Expected.** Closest presumed extant record is attributed to an observation mentioned in an undated article by Mike Wood in Twin Peaks approximately 0.3 miles to the south. Lack of suitable habitat and area was previously disturbed.

Common Name *Scientific Name*	Federal/ State Status [a]	Habitat, Blooming Season, Elevation	Potential to Occur in the Plan Area
San Francisco gumplant *Grindelia hirsutula* var. *maritima*	1B	Coastal scrub, grassland; sandy or serpentine slopes, sea bluffs, valley and foothill grassland. Blooms June to September. 50-1,310 feet.	**Not Expected.** Closest extant record is on the west slope of Mount Sutro outside of the Reserve. Observed within the restored portions of Rotary Meadow. Although this plant is on the Sutro Stewards plant list, the known population is isolated from the Reserve habitat and it was not observed on the portions of the Reserve included in the plan during surveys.
Diablo helianthella *Helianthella castanea*	1B	Thin, rocky soils on grassy hillsides and in cismontane woodland, usually at the scrub/ chaparral/ oak woodland interface. Blooms April to May. 490-4,000 feet.	**Not Expected.** Closest presumed extant record is attributed to a collection made in 1899 at Bay View Hill approximately 3.6 miles to the southeast. Lack of suitable habitat and area was previously disturbed.
Marin western flax *Hesperolinon congestum*	FT, ST, 1B	Chaparral, valley and foothill grassland/serpentinite. Blooms April to July. 15-1,210 feet.	**Not Expected.** Closest extant record is attributed to an attempted reintroduction at Baker Beach, approximately 2.6 miles to the north. Lack of suitable habitat.
White-rayed pentachaeta *Pentachaeta bellidiflora*	FE, ST, 1B	Cismontane woodland valley and foothill grassland, often on open, dry rocky slopes. Blooms March to May. 110-2,030 feet.	**Not Expected.** The closest record is from the east edge of San Bruno Mountain, approximately 6.5 miles to the southeast. Lack of suitable habitat.
Choris' popcorn-flower *Plagiobothrys chorisianus* var. *chorisianus*	1B	Chaparral, coastal prairie, coastal scrub, mesic sites. Blooms March to June. 50-530 feet.	**Not Expected.** Closest presumed extant record is approximately 0.2 miles to the north in Golden Gate Park as documented in the Flora of San Francisco. Lack of suitable habitat and area was previously disturbed.
San Francisco popcorn flower *Plagiobothrys diffusus*	SE, 1B	Coastal prairie, valley and foothill grassland. Blooms March to June. 200-1,180 feet.	**Not Expected.** Closest presumed extant record is approximately 1.7 miles to the north on clay flats near Mountain Lake in the Presidio. Lack of suitable habitat and area was previously disturbed.
Oregon polemonium *Polemonium carneum*	2	Coastal prairie, coastal scrub, lower montane coniferous forest. Blooms April to September. 0-6,000 feet.	**Not Expected.** Closest presumed extant record is attributed to a 1939 collection from Point Bonita in Marin County, approximately 4.4 miles to the north. Lack of suitable habitat and area was previously disturbed.

Common Name *Scientific Name*	Federal/ State Status [a]	Habitat, Blooming Season, Elevation	Potential to Occur in the Plan Area
San Francisco campion *Silene verecunda* ssp. *verecunda*	1B	Coastal bluff scrub, grassland, chaparral, coastal prairie, sandy areas in valley and foothill grassland. Blooms March to June. 100-2,120 feet.	**Not Expected.** Closest presumed extant record is approximately 1 mile south at Mount Davidson on rock slopes of Franciscan greywacke, threatened by blue gum eucalyptus and German ivy. Lack of suitable habitat and area was previously disturbed.
Santa Cruz microseris *Stebbinsoseris decipiens*	1B	Broad-leafed upland forest, closed-cone coniferous forest, chaparral, coastal scrub, often in open areas and sometimes serpentine in valley and foothill grassland. Blooms April to May. 30-1,640 feet.	**Not Expected.** Closest record is approximately 7.3 miles to the north on Angel Island. Lack of suitable habitat.
San Francisco owl's-clover *Triphysaria floribunda*	1B	Coastal prairie, coastal scrub, usually on serpentine in valley and foothill grassland. Blooms April to June. 30-530 feet.	**Not Expected.** Closest extant record is attributed to a declining population at the Presidio, approximately 2.6 miles to the north. Lack of suitable habitat.
Coastal triquetrella *Triquetrella californica*	1B	Coastal bluff scrub, on soil in coastal scrub. 30-330 feet.	**Moderate.** Closest extant record is located less than 0.1 miles from the Reserve on Tank Hill. Like other mosses, coastal triquetrella grows over rocks, on soil, and within grassy areas on rocks. Although this moss was not observed during the fieldwork, it could have easily been overlooked and may be present on the project site.

Note:

[a] Federal/State Status:

- FE federally listed as endangered
- FT federally listed as threatened
- SE state listed as endangered
- ST state listed as threatened

California Rare Plant Rank:

- 1A Plants presumed extinct in California
- 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

Sources: (LSA Associates, Inc. 2011, Pacific Biology 2017)

Wildlife

Migratory Corridors

Wildlife corridors are pathways or habitat linkages that connect discrete areas of natural open space otherwise separated or fragmented by topography, changes in vegetation, and other natural or manmade obstacles such as urbanization. The Reserve is surrounded by dense urban development and does not physically connect discrete areas of open space. No drainages that

have flowing water for prolonged periods after storm events or that provide an aboveground connection with other drainages are found in the Reserve. The Reserve does not function as part of a wildlife movement corridor for terrestrial or aquatic species. The Reserve provides an "island" of habitat within an urban area and is used by bird species during migration.

Special-Status Wildlife Species

Special-status wildlife species with known occurrences within approximately 3 miles of the Reserve, and their probability for occurrence in the Reserve, are provided in Table 4.3-3. Several common wildlife species (i.e., not special-status species) were also observed during biological surveys and by independent organizations (e.g., Nature in the City). A discussion and list of these species is provided in Appendix 4.3 of this EIR and in the proposed plan.

Table 4.3-3 Potential for Special-Status Wildlife Species to Occur within the Reserve

Common Name *Scientific Name*	Federal/ State Status [a]	Habitat	Potential to Occur in the Plan Area
Invertebrates			
San Bruno elfin butterfly *Callophrys mossii bayensis*	FE	Steep, north-facing slopes within the fog belt. Larval host plant is stonecrop (*Sedum spathulifolium*). Mainly near San Bruno Mountain.	**Not Expected.** The larval food plant does not occur on the project site. Species distribution is generally limited to San Bruno Mountain, and the species has not been documented within 4 miles of the Reserve.
Mission blue butterfly *Plebejus icarioides missionensis*	FE	Grasslands of the San Francisco Peninsula; three larval host plants: *Lupinus albifrons*, *L. ariicolor*, and *L. formosus.*	**Not Expected.** The species has been documented in nearby areas outside of the Reserve, but suitable habitat and the larval food plants do not occur on the project site.
Callippe silverspot Butterfly *Pomatiopsis binneyi*	FE	Coastal scrub of the San Francisco Peninsula; host plant is *Viola pendunculata*; most adults found on east-facing slopes.	**Not Expected.** The species has been documented in nearby areas outside of the Reserve, but suitable habitat and the larval food plants do not occur on the project site.
Monarch butterfly (wintering roosts) *Danaus plexippus*	SA	Protected areas in groves of trees with dense canopy cover and nearby water sources.	**Moderate.** Dense eucalyptus trees in sheltered portions of the Reserve provide suitable winter roost habitat. However, winter roosts have not been documented in the Reserve.

Common Name *Scientific Name*	Federal/ State Status [a]	Habitat	Potential to Occur in the Plan Area
Amphibians			
California red-legged frog *Rana draytonii*	FT, CSC	Marshes, stream pools, reservoirs, ponds. Uses both riparian and upland habitats for foraging, shelter, cover, and non-dispersal movement.	**Not Expected.** Aquatic habitat does not occur in the Reserve, and dense understory vegetation would make dispersal through Reserve difficult. Known to occur in Golden Gate Park (approximately 1 mile from Reserve) but there is dense urban development separating the Reserve from documented populations and suitable habitat.
Reptiles			
Western pond turtle *Actinemys marmorata*	FS, CSC	Perennial ponds, deep slow moving streams, marshes and lakes below 6,000 feet. Eggs are laid in loose soil on land in oak woodlands, mixed coniferous forests, broadleaf forests and grasslands usually within 400 feet of ponds, lakes, slow streams, and marshes with vegetated borders, rocks, or logs. Logs, rocks, cattail mats, and exposed banks required for basking.	**Not Expected.** Aquatic habitat does not occur in the Reserve or in areas accessible to the Reserve.
San Francisco garter snake *Thamnophis sirtalis tetrataenia*	FE, SE	Freshwater marshes, ponds, and slow-moving streams in San Mateo County and extreme northern Santa Cruz County; prefers dense cover and water depths of at least 1 foot.	**Not Expected.** Suitable aquatic habitat does not occur in the Reserve or in areas accessible to the Reserve. Reserve is outside of known range of species and the species is not known to occur within 9 miles of the Reserve.
Birds			
Cooper's hawk *Accipiter cooperi*	WL	Mature forests, open woodland, riparian forest. Nests in coast live oak and other forest habitats.	**High.** Suitable nesting habitat present and species has been observed in Reserve.
Sharp-shinned hawk *Accipiter striatus*	WL	Mixed woodlands and forests. Nests in conifers or deciduous trees in dense woodlands or mountain forests.	**Not Expected (nesting).** Non-nesting individuals have been observed in the Reserve.

Common Name *Scientific Name*	Federal/ State Status [a]	Habitat	Potential to Occur in the Plan Area
Olive-sided flycatcher *Contopus cooperi*	FCC	Nests in trees, with preference for conifers, but also eucalyptus.	**High.** Suitable nesting habitat present and species has been observed in Reserve.
San Francisco Common Yellowthroat *Geothlypis trichas sinuosa*	FCC, CSC	Freshwater marsh, swale, etc.	**Not Expected.** Suitable marsh habitat not present. Species has not been documented in the Reserve according to eBird.
California black rail *Laterallus jamaicensis*	ST	Salt marshes bordering larger bays, also found in brackish and freshwater marshes.	**Not Expected.** Suitable marsh habitat not present in the Reserve or in nearby areas. Species has not been documented in the Reserve according to eBird.
Bank swallow *Riparia riparia*	SE	Vertical banks or cliffs with fine textured or sandy soils.	**Not Expected.** Suitable nesting habitat not present. Species has not been documented in the Reserve according to eBird.
Allen's hummingbird *Selasphorus sasin*	FCC	Semi-open habitats including open oak woods, streamside groves, and parks. Nests in small trees and shrubs.	**High.** Suitable nesting habitat present and species has been observed in Reserve.
Mammals			
Pallid bat *Antrozous pallidus*	BLM, FS, CSC	Most common in open dry lands with rocky areas for roosting. Prefers rocky outcrops, cliffs, and crevices with access to open habitat for foraging.	**Not Expected.** Eucalyptus trees seldom contain cavities, crevices or other features that could support colonial roosting bat species, and no such roosting features have been observed during field surveys; marginal habitat also due to scarcity of open habitat.
Townsend's big-eared bat *Corynorhinus townsendii*	SE (Proposed)	Variety of woodland and forest habitats, but prefers conifers. Roosts primarily in caves, mines, tunnels, and sometimes in buildings, bridges, or other human made structures.	**Not Expected.** Suitable roosting habitat (e.g., caves, mines, tunnels, buildings, bridges) not present.
Western red bat *Lasiurus blossevillii*	FS, CSC	Roosts in moderately dense foliage. Roost primarily in trees, less often in shrubs. Roost sites often are in edge habitats adjacent to streams, fields, or urban areas.	**Moderate.** Suitable roosting habitat is present for this foliage roosting species.

Common Name *Scientific Name*	Federal/ State Status [a]	Habitat	Potential to Occur in the Plan Area
Hoary bat *Lasiurus cinereus*	SA	Generally, roosts in dense foliage of medium to large trees. Solitary species and does not form large roosts.	**Moderate.** Suitable roosting habitat is present for this foliage roosting species.
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*	CSC	Woodland and chaparral habitats. Woodrats build nests (i.e., stickhouses), which are often the result of work by several generations of woodrats, by piling up sticks, rocks, and other available material.	**Moderate.** Evidence (i.e., stick houses/nests) of woodrats have been observed in the Reserve. Individuals of this species have not been documented within 12 miles of the Reserve. However, the Reserve is within the range of the species, and due to dense vegetation, all portions of the Reserve have not been searched for individuals.
American badger *Taxidea taxus*	CSC	Suitable habitat is characterized by herbaceous, shrub, and open stages of most habitats with dry, friable soils.	**Not Expected.** Suitable open habitat not present.

Note:

[a] Federal/ State Status:

FE	federally listed as endangered
FT	federally listed as threatened
FCC	Federal Bird of Conservation Concern
BLM	U.S. Bureau of Land Management sensitive species
FS	U.S. Forest Service sensitive species
SE	state listed as endangered
ST	state listed as threatened
WL	CDFW Watch List
CSC	California Species of Concern
CFP	California fully protected species
SA	CDFW Special Animals List

Source: (Pacific Biology 2017)

4.3.3 Regulatory Considerations

University of California, San Francisco

UCSF 2014 LRDP

The 2014 LRDP includes goals to improve and expand open space on land within the University's jurisdiction. Specifically, Objective 4 states:

> As part of UCSF's commitment to responsible stewardship of its physical resources and compliance with the UC Sustainable Practices Policy, LRDP project

> proposal will be evaluated for their environmental sustainability…UCSF also proposes to create additional open space to enhance the physical environment.

The 2014 LRDP also includes a goal to "preserve the Mount Sutro Open Space Reserve as permanent open space" and create new/restored trails within the Reserve.

The 2014 LRDP EIR identifies several mitigation measures related to biological resources. References to "construction" in these measures can be seen as equivalent to "activity" as it pertains to the plan. While plan activities are not technically construction, similar types of equipment and methods (e.g., grading, trucking) are employed to carry it out. These measures are considered part of the plan and are shown here.

BIO-PH-1a: Preconstruction Surveys for Monarch Butterfly Winter Roosts and Avoidance. Prior to demolition activities, a qualified biologist familiar with monarch butterfly aggregating behavior and habitat shall conduct a preconstruction survey for the presence of overwintering monarch butterfly aggregations. The survey shall be conducted in December or January during the period when overwintering aggregations appear. Should an overwintering aggregation be identified in trees adjacent to individual proposal sites within the Reserve, a 200-foot buffer shall be established around the occupied trees until the aggregation has dispersed.

BIO-PH-1b: Preconstruction Breeding Bird Surveys and Nest Avoidance. Should construction activities associated with vegetation management activities in the Reserve commence during breeding bird season (February 15 – August 15) annually, UCSF shall retain a qualified biologist to conduct preconstruction nesting bird surveys in surrounding habitat for nesting birds. Specific measures to avoid and minimize impacts on nesting birds include, but are not limited to, those described below.

- To avoid and minimize potential impacts on nesting raptors and other birds, preconstruction surveys shall be performed not more than two weeks prior to initiating vegetation removal and/or construction and demolition activities during the breeding season (i.e., February 15 through August 15).
- To avoid and minimize potential impacts on nesting raptors and other birds, a no-disturbance buffer zone shall be established around active nests during the breeding season until the young have fledged and are self-sufficient, when no further mitigation would be required. Typically, the size of individual buffers ranges from a minimum of 250 feet for raptors to a minimum of 50 feet for other birds but can be adjusted based on an evaluation of the site by a qualified biologist in cooperation with the USFWS and/or CDFW.
- Birds that establish nests after construction starts are assumed to be habituated to and tolerant of the indirect adverse impacts resulting from construction noise and human activity. However, direct take of nests, eggs, and nestlings is still prohibited and an appropriate buffer must be established around the nest according to species and proximity to plan activities in order to avoid nest abandonment or destruction.
- If construction or demolition activities ceases for a period of more than two weeks, or vegetation removal is required after a period of more than two weeks has

elapsed from the preconstruction surveys, then new nesting bird surveys must be conducted.

BIO-PH-1c: Avoidance and Minimization Measures for Special-Status Bats. A qualified wildlife biologist shall conduct preconstruction special-status bat surveys of suitable roost sites in the vicinity of construction and demolition sites that abut the forest of Mount Sutro Open Space Reserve. If active day or night roosts are found, the wildlife biologist shall take actions to make such roosts unsuitable habitat before construction and demolition activities begin. A no-disturbance buffer of 100 feet shall be created around active bat roosts being used for maternity or hibernation purposes. Bat roosts that are established during active construction or demolition are presumed to be unaffected by these activities, and no buffer would be necessary.

BIO-PH-1d: Presconstruction Surveys for Special-Status Plants and Plant Avoidance. Prior to construction activities, a qualified botanist shall conduct preconstruction surveys for special-status plants, coastal triquetrella and San Francisco gumplant, within the footprints of and in suitable habitat adjacent to locations of the new retaining wall, new trail alignments, and any access routes and staging areas to be used in support of these plans. Surveys for coastal triquetrella can be conducted at any time of the year however surveys for San Francisco gumplant shall occur in the summer (June – September). Should special-status plant species be found during surveys, occurrences shall be marked in the field for avoidance during construction.

BIO-PH-1e: Relocation of Special-Status Plants. If special-status plants are located within the retaining wall or new trails footprint and cannot be avoided, then a rare plant salvage and relocation plan shall be developed to relocate individuals to suitable habitat within the Reserve. A qualified botanist shall develop and implement the plan according to CDFW guidelines and in coordination with CDFW. At a minimum, the plan shall include collection of reproductive structures from affected plants, a full description of microhabitat conditions necessary for each affected species, seed germination requirements, restoration techniques for temporarily disturbed occurrences, assessments of potential transplant and enhancement sites, success and performance criteria, and monitoring programs, as well as measures to ensure long-term population viability. The mitigation methods shall include either salvage and transplantation or collection and propagation of seeds or other vegetative material. Any plant relocation shall be done under the supervision of a qualified restoration botanist.

Federal

Federal Endangered Species Act

The U.S. Fish and Wildlife Service (USFWS) has jurisdiction over federally listed threatened and endangered plant and animal species. The federal Endangered Species Act (ESA) protects listed species from harm or "take," broadly defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." Any such activity can be defined as a "take" even if it is unintentional or accidental. An endangered species is one that is considered in danger of becoming extinct throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

In addition to endangered and threatened species, which are legally protected under the ESA, the USFWS maintains lists of proposed and candidate species. Proposed species are those for which a proposed rule to list them as endangered or threatened has been published in the Federal Register. A candidate species is one for which the USFWS currently has enough information to support a proposal to list it as a threatened or endangered species. Proposed species could be listed at any time, and many federal agencies protect them as if they already are listed. Candidate species are not afforded legal protection under the ESA.

Clean Water Act

USACE is responsible under Section 404 of the Clean Water Act to regulate the discharge of fill material into waters of the U.S. Waters of the U.S. and their lateral limits are defined in 33 Code of Federal Regulations (CFR) Part 328.3(a) and include streams that are tributaries to navigable waters and their adjacent wetlands. The lateral limits of jurisdiction for a non-tidal stream are measured at the line of the Ordinary High Water Mark (OHWM) (33 CFR Part 328.3[e]) or the limit of adjacent wetlands (33 CFR Part 328.3[b]). Any permanent extension of the limits of an existing water of the U.S., whether natural or man-made, results in a similar extension of USACE jurisdiction (33 CFR Part 328.5). Waters of the U.S. fall into two broad categories: wetlands and other waters. Other waters include unvegetated waterbodies and watercourses such as rivers, streams, lakes, springs, ponds, coastal waters, and estuaries. Seasonally inundated or intermittent waterbodies or watercourses that do not exhibit wetland characteristics are often classified as other waters of the U.S. Wetlands include marshes, wet meadows, seeps, floodplains, basins, and other areas experiencing extended seasonal or permanent soil saturation that support wetland vegetation.

Seasonally or intermittently inundated features, such as seasonal ponds, ephemeral streams, and tidal marshes, are categorized as wetlands if they have hydric soils and support wetland plant communities.

Wetlands and other waters that cannot trace a continuous hydrologic connection to a navigable water of the U.S. are not tributary to waters of the U.S. These are termed “isolated” wetlands and waters. Isolated wetlands and waters are jurisdictional when their destruction or degradation can affect interstate or foreign commerce (33 CFR Part 328.3[a]). USACE may or may not take jurisdiction over isolated wetlands, depending on the specific circumstances.

In general, a Section 404 permit must be obtained from USACE before filling or grading jurisdictional wetlands or other waters of the U.S. Certain projects may qualify for authorization under a Nationwide Permit (NWP). The purpose of the NWP program is to streamline the evaluation and approval process throughout the nation for certain types of activities that have only minimal impacts to the aquatic environment. Many NWPs are only authorized after the applicant has submitted a pre-construction notification (PCN) to the appropriate USACE office. USACE is required to consult with the USFWS and/or the National Marine Fisheries Service under Section 7 of the ESA if the permitted activity may result in the take of federally listed species.

Migratory Bird Treaty Act
The federal Migratory Bird Treaty Act (MBTA) prohibits the taking, hunting, killing, selling, purchasing, etc. of migratory birds, parts of migratory birds, or their eggs and nests. As used in the MBTA, the term "take" is defined as "to pursue, hunt, shoot, capture, collect, kill, or attempt to pursue, hunt, shoot, capture, collect, or kill, unless the context otherwise requires." Most bird species native to North America are covered by this act (16 USC 703-712).

State

California Endangered Species Act
The California Department of Fish and Wildlife (CDFW) has jurisdiction over threatened or endangered species that are formally listed by the State under the California ESA. The California ESA is similar to the federal ESA both in process and substance; it is intended to provide additional protection to threatened and endangered species in California. Species may be listed as threatened or endangered under both acts (in which case the provisions of both state and federal laws apply) or under only one act. A candidate species is one that the Fish and Game Commission has formally noticed as being under review by CDFW for addition to the State list. Candidate species are protected by the provisions of the California ESA.

Porter-Cologne Water Quality Control Act
Under this Act (California Water Code Sections 13000–14920), the San Francisco Bay Regional Water Quality Control Board (RWQCB) is authorized to regulate the discharge of waste that could affect the quality of the State's waters. Therefore, even if a project does not require a federal permit, it may still require review and approval by the RWQCB (e.g., for impacts to isolated wetlands and other waters). When reviewing applications, the RWQCB focuses on ensuring that projects do not adversely affect the "beneficial uses" associated with waters of the State. In most cases, the RWQCB seeks to protect these beneficial uses by requiring the integration of water quality control measures into projects that will require discharge into waters of the State. For most construction projects, the RWQCB requires the use of construction and post-construction BMPs.

California Fish and Game Code
The CDFW is also responsible for enforcing the California Fish and Game Code, which contains several provisions potentially relevant to construction projects. For example, Section 1602 of the Fish and Game Code (CCR; Title 14, Div. 1) governs the issuance of Lake and Streambed Alteration Agreements by the CDFW. Lake and Streambed Alteration Agreements are required whenever project activities substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated as such by the CDFW. Section 1602 of the Fish and Game Code applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes in the state.

The Fish and Game Code also lists animal species designated as Fully Protected, which may not be taken or possessed at any time. The Fully Protected designation does not allow "incidental take" and is thus more restrictive than the CESA. Fully Protected species are listed in Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish) of the Fish and

Game Code, while protected amphibians and reptiles are listed in Chapter 5, Sections 41 and 42 (CCR; Title 14, Div. 1).

Section 3503 of the Fish and Game Code (CCR; Title 14, Div. 1) prohibits the take, possession, or needless destruction of the nest or eggs of most bird species. Subsection 3503.5 (CCR; Title 14, Div. 1) specifically prohibits the take, possession, or destruction of any birds in the orders Falconiformes (hawks and eagles) or Strigiformes (owls) and their nests. These provisions, along with the federal MBTA, serve to protect nesting native birds. Certain non-native species, including European starling and house sparrow, are not protected under the MBTA or California Fish and Game Code.

California Species of Special Concern

The CDFW maintains an administrative list of Species of Special Concern (SSC), defined as a "species, subspecies, or distinct population of an animal native to California that currently satisfies one or more of the following (not necessarily mutually exclusive) criteria: is extirpated from the State, or, in the case of birds, in its primary seasonal or breeding role; is listed as federally, but not State, threatened or endangered; meets the State definition of threatened or endangered but has not formally been listed; is experiencing, or formerly experienced, serious (noncyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it for State threatened or endangered status; and has naturally small populations exhibiting high susceptibility to risk from any factor(s), that if realized, could lead to declines that would qualify it for State threatened or endangered status."

The CDFW's Nongame Wildlife Program is responsible for producing and updating SSC publications for mammals, birds; and reptiles and amphibians. The Fisheries Branch is responsible for updates to the Fish SSC document and list. Section 15380 of the CEQA Guidelines indicates that SSC should be included in an analysis of project impacts if they can be shown to meet the criteria of sensitivity outlined therein. In contrast to species listed under the federal or California ESAs, however, SSC have no formal legal protective status.

California Rare Plant Ranks

Special-status plants in California are assigned to one of five "California Rare Plant Ranks" by a group of over 300 botanists in government, academia, non-governmental organizations, and the private sector. This effort is jointly managed by the CDFW and CNPS. The five California Rare Plant Ranks currently recognized by the CNDDB include the following:

- Rare Plant Rank 1A – presumed extinct in California
- Rare Plant Rank 1B – rare, threatened, or endangered in California and elsewhere
- Rare Plant Rank 2 – rare, threatened, or endangered in California but more common elsewhere
- Rare Plant Rank 3 – a review list of plants about which more information is needed
- Rare Plant Rank 4 – a watch list of plants of limited distribution

Substantial impacts to plants ranked 1A, 1B and 2 are typically considered significant based on Section 15380 of the CEQA Guidelines depending on the policy of the lead agency. Plants

ranked 3 and 4 may be evaluated by the lead agency on a case-by-case basis to determine significance thresholds under CEQA.

Local

City and County of San Francisco

Urban Forestry Ordinance

The San Francisco Urban Forestry Ordinance (i.e., Article 16 of the San Francisco Public Works Code) was enacted to ensure the protection of trees on private land within and adjacent to public areas. The City and County of San Francisco currently considers "Protected Trees" as landmark trees, significant trees, and street trees. These tree types are defined as follows:

- **Landmark trees.** These trees have the highest level of protection in the City, and meet criteria for age, size, shape, species, location, historical association, visual quality, or other contribution to the City's character and have been found worthy of landmark status after public hearings at both the Urban Forestry Council and the Board of Supervisors. Temporary landmark status is also afforded to nominated trees undergoing the public hearing process.
- **Significant trees.** These trees are those that are within 10 feet of the property edge of the sidewalk that are above 20 feet in height, or with a canopy greater than 15 feet in diameter, or with a trunk diameter greater than 12 inches at breast height.
- **Street trees.** These are trees within the public right-of-way and may be maintained by either the property owner or the City.

Removal of any of these trees on private land is not prohibited but requires a permit from the Department of Public Works, subject to review against certain criteria and public notification. If any construction activity is to occur within the dripline of any protected tree, a tree protection plan prepared by an International Society of Arboriculture (ISA)-certified arborist must be submitted to the Planning Department for review and approval prior to the issuance of a building permit. All permit applications that could potentially impact a protected tree must include a Planning Department "Tree Disclosure Statement" form, which constitutes the applicant's legal declaration of all trees on the property. As part of the Tree Disclosure Statement, applicants must identify and show accurately the size of the trunk diameter and canopy dripline in relation to the proposed project on site plans. The Reserve is not privately owned. It is designated permanent open space by the Regents, and is open to the public. UCSF is constitutionally exempt from local jurisdiction regulations whenever using property under its control in support of its educational mission. Therefore, UCSF would not be subject to this Ordinance.

4.3.4 Significance Standards and Methodology

Significance Criteria

Impacts of the proposed plan on biological resources would be considered significant if implementation of the plan would exceed the following standards of significance, in accordance with Appendix G of the State CEQA Guidelines and the UC CEQA Handbook:

1. 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 CDFW or USFWS;
2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFW or USFWS;
3. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
4. 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;
5. Conflict with any applicable policies protecting biological resources, included tree preservation policy or ordinance;
6. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other applicable habitat conservation plan; or
7. Exceed the applicable LRDP EIR standard of significance by damaging or removing heritage or landmark trees or native oak trees of a diameter specified in a local ordinance.

The IS for the proposed plan determined that the plan's effect on special-status species, riparian habitat, wildlife movement, and conflicts with policies and standards for the protection of biological resources should be evaluated in the EIR. The IS for the proposed plan also determined that the plan could exceed the applicable LRDP EIR standard of significance by damaging or removing heritage or landmark trees or native oak trees of a diameter specified in a local ordinance. These topics are analyzed in this section.

Issues Adequately Addressed in the Initial Study

The IS for the proposed plan found that implementation of the plan would (1) have no impact on wetlands as defined under Section 404 of the Clean Water Act (CWA), and (2) not conflict with an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. These issues are not discussed further in this section.

Analysis Methodology

The analysis of impacts on biological resources focuses on the potential impacts on special-status species and protected or sensitive habitats. Habitat types present within and bordering

the Reserve were generally evaluated and mapped. Information from biological surveys conducted in 2011 and 2016 was used to determine the potential for presence of special-status species likely to occur in the Reserve (LSA Associates, Inc. 2011, Pacific Biology 2017). Field visits focused on determining the presence or absence of suitable habitat for special-status plants and animals and sensitive resources including riparian areas.

As presented above in the CEQA significance criteria, CEQA only requires analysis of impacts on species identified as candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFW or USFWS. The analysis is not required by law to address impacts on common, non-native, or invasive species, except for common avian species covered by the MBTA, because they are not considered germane to discussion of impacts under CEQA. Special-status species can act as an indicator of how the proposed plan may impact the habitat and species within the plan area. Due to the typical rarity of special-status species and their habitat, identification of potential impacts can result in needed changes to the plan's scope or incorporation of mitigation measures.

4.3.5 Impacts

Impact Biology-1: The proposed plan could 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 CDFW or USFWS.	**Significance Determination**
	Less than significant with mitigation

Vegetation Management Activities

Direct Impacts

Overview

Impacts from implementation of the proposed plan would be caused by vegetation management activities and the equipment used to perform vegetation management activities. Typically, direct impacts are those that result in injury, mortality, or damage to habitat for special-status and protected species.

Special-status Plants

Coastal triquetrella, a bryophyte or moss, is the only special-status species identified with potential to occur in the plan area; however, other special-status plant species (CNPS rare species) may be planted during native restoration activities over the life of the plan.

Coastal triquetrella has a moderate potential to occur in the Reserve. Coastal triquetrella forms loose mats on exposed to shaded soil, rocks, in sand, or on gravel in moist environments. It has been found along trails, roadsides, picnic areas, playgrounds, and rock outcrops in other areas; however, it is known in fewer than 10 small coastal occurrences in California and is highly threatened by urbanization (CNPS 2010). Some populations appear to exist in disturbed areas, and are able to coexist with moderate recreational traffic. The loss of a population of coastal triquetrella would be considered a significant impact. Though no populations were found during biological surveys in 2011 or 2017, suitable habitat for coastal triquetrella is present in

the Reserve, and the species is known to occur within 0.1 mile of the Reserve on Tank Hill (Pacific Biology 2017, LSA Associates, Inc. 2011). Direct impacts could most likely occur from major ground disturbance, such as for grading for landing areas and widening of trails, as well as from other access by heavy equipment for tree removal or treatment sites, and from maintenance of vegetation around trails. Tree removal would not likely impact the moss, were it to occur in the Reserve, as the moss is not likely to occur on or in association with trees.

As required by the 2014 LRDP, UCSF must conduct a pre-construction survey for special-status plants and mark known occurrences for avoidance along any access routes and staging areas per **BIO-PH-1d: Preconstruction Surveys for Special-Status Plants and Plant Avoidance**, which would include trail widening areas, off-road access areas by heavy equipment, and landing areas. UCSF is also obligated to implement **BIO-PH-1e: Relocation of Special-Status Plants** as part of the 2014 LRDP, which requires UCSF to develop and implement a rare plant salvage and relocation plan in accordance with CDFW guidance for plants that cannot be avoided during implementation of the plan. This measure would also be applicable for any trail widening areas, off-road access areas by heavy equipment, and landing areas and would reduce impacts. Workers could still inadvertently impact special-status plants if they do not know what to look for in the field, and impacts would remain significant. **MM Biology-1: Worker Training** identified in this EIR requires worker training to recognize coastal triquetrella and other special-status plants. Impacts on coastal triquetrella and any other special-status plants that could occur in the future would be less than significant with implementation of the measures from the 2014 LRDP and **MM Biology-1: Worker Training**.

Olive-Sided Flycatcher, Cooper's Hawk, and Allen's Hummingbird

Olive-sided flycatcher, Cooper's hawk, and Allen's hummingbird were all observed during surveys of the Reserve, and suitable habitat is present in the Reserve for all these species (LSA Associates, Inc. 2011, Pacific Biology 2017). Impacts on these special-status avian species could occur from removal of nesting habitat from tree removal, trimming or removal of bushes and shrubs (Allen's hummingbird), and noise generated by heavy equipment such as chainsaws or graders. Olive-sided flycatcher, Cooper's hawk, and Allen's hummingbird most likely use the Reserve as nesting habitat. Vegetation management activities would generally occur from September and continue through February or the first rain of the season, avoiding the nesting season (February 15 – August 15). If the nesting season is not avoided, however, tree and vegetation removal could result in loss of nests and potential mortality for these special-status avian species if trees or shrubs that host nests are felled and removed. Noise from plan activities may also induce nest abandonment. Nest abandonment or mortality of adults or juveniles because of tree and vegetation removal activities would be considered a significant impact. **BIO-PH-1d: Preconstruction Surveys for Special-Status Plants and Plant Avoidance**, which UCSF is obligated to implement as part of the 2014 LRDP, requires UCSF to perform pre-construction nesting bird surveys prior to work in the nesting season, establish no-disturbance buffers for active nests, and repeat surveys if no work has occurred for two weeks in a given area. Impacts could remain significant if these species establish nests after the surveys and nests are not recognized by workers. **MM Biology-1: Worker Training** requires worker training to

describe special-status wildlife, including nesting birds, and for workers to notify a qualified biologist if signs of a special-status species are found. Impacts on olive-sided flycatcher, Cooper's hawk, and Allen's hummingbird would be less than significant with mitigation.

Monarch Butterfly

No monarch butterfly roosts were found during biological surveys; however, suitable habitat in the form of dense eucalyptus stands is present in the Reserve. Monarch butterfly migrants begin appearing on the coast of California in October and establish their overwintering sites by mid-November to mid-December. Implementation of forest treatments and management of defensible space that include eucalyptus tree removal could cause a significant impact on monarch butterfly by removing trees that monarch butterfly may use as roosts during winter months. UCSF is obligated to implement **BIO-PH-1a: Preconstruction Surveys for Monarch Butterfly Winter Roosts and Avoidance**, which requires a qualified biologist to conduct a pre-construction survey near demolition areas for the presence of overwintering monarch butterfly aggregations in December or January and to establish a 200-foot buffer around occupied trees until the aggregation has dispersed. Impacts would remain significant, however, because **BIO-PH-1a: Preconstruction Surveys for Monarch Butterfly Winter Roosts and Avoidance** does not apply to areas of the Reserve where tree removal would occur, as "demolition" doesn't clearly describe tree removal. The measure also does not cover when roosts may be established in November. **MM Biology-1: Worker Training** requires worker training. **MM Biology-2: Pre-activity Survey and Avoidance of Monarch Butterfly,** requires the pre-construction survey to occur in all areas of eucalyptus tree removal and the surveys to also occur in November, if work is to occur in November, in additional to December or January. Impacts on monarch butterflies would be less than significant with mitigation.

Western Red Bat and Hoary Bat

Western red bat and hoary bat were not observed during surveys; however, suitable habitat for these foliage roosting species is present in the Reserve. Forest treatments and management of defensible space could cause a significant impact on roosting habitat for these bats by removing dense foliage associated with extant trees or by causing maternity roost abandonment from the generation of noise by heavy equipment. As part of the 2014 LRDP, UCSF is obligated to implement **BIO-PH-1c: Avoidance and Minimization Measures for Special-Status Bats**, which requires a pre-construction survey for potential bat roosting sites, use of methods to make roosts unsuitable prior to roosting, and the establishment of a no-disturbance buffer around maternity and hibernation roosting sites. Impacts would remain significant, however, because **BIO-PH-1c: Avoidance and Minimization Measures for Special-Status Bats** applies only to demolition and construction sites that abut the Reserve and does not specify the methods that can be used to make roosts unsuitable for bats. **MM Biology-1: Worker Training** requires worker training, and **MM Biology-3: Minimization of Harm to Bat Species** requires a qualified biologist to perform pre-activity survey of areas scheduled for tree removal and specifies methods such as creating noise and vibration to make roosts unsuitable for bats. Impacts to special-status bat species would be less than significant with mitigation.

San Francisco Dusky Footed Woodrat

Stick nests have been observed on the Reserve, indicating presence of at least one species of woodrat. No evidence clearly indicating presence of San Francisco dusky-footed woodrat was found in the Reserve during surveys; however, the Reserve is within the range of the species, and dense undergrowth made it difficult to fully survey the Reserve to confirm absence (Pacific Biology 2017). Dense understory may provide habitat for woodrat nests. Tree removal activities, as well as the widening of trails, overland access by heavy equipment, the creation of landing areas, restoration work, and vegetation maintenance along trails could cause a significant impact if it resulted in damage or destruction of woodrat nests, mortality of individuals, or abandonment of young. **MM Biology-1: Worker Training** requires worker training. **MM Biology-4: San Francisco Dusky-Footed Woodrat Nest Management** requires UCSF to conduct a pre-activity survey to determine if active woodrat nests (stick houses) with young are present within areas scheduled for tree removal activities (plus a 50-foot buffer) and to establish a fenced area around the nest site if active nests are discovered. **MM Biology-4: San Francisco Dusky-Footed Woodrat Nest Management** also requires that, to the degree feasible, any identified woodrat nests is left undisturbed; if the relocation of a nest is required, UCSF must prepare a woodrat nest relocation plan and submit the plan to CDFW for review prior to implementation. Impacts on San Francisco dusky-footed woodrat would be less than significant with mitigation.

Indirect Impacts

Special-status plant and wildlife species may be indirectly impacted during vegetation management activities by the introduction and/or spread of invasive non-native plant species, or the introduction of weed seed inadvertently attached to equipment or materials used on site. Invasive species can out-compete native species and result in future loss of native species range. Invasive species can also result in loss of suitable habitat areas for special-status wildlife. Non-native plants would be removed during forest treatments and disposed of off-site to prevent seeds from establishing in the Reserve. A significant impact could still occur if invasive species were introduced to the Reserve. **MM Biology-5: Invasive Weed Control** requires that all equipment be power washed and all materials used for erosion control or other activities in the Reserve be certified weed-free. The impact on special-status species populations from introduction of invasive weeds would be less than significant with mitigation.

Tree removal, widening of trails, overland access, creation of landing areas, and restoration activities that require removal of vegetation and, therefore, the exposure of soils could cause sedimentation, erosion, and could generate dust that could substantially damage the viability of a nearby special-status plant population. Dust can adversely affect photosynthesis, resulting in reduced plant vitality and potentially, in turn, reducing forage available for wildlife. Erosion can expose plant roots or remove plants, resulting in plant damage or mortality. Sedimentation can bury small plants and seedlings. Erosion and sedimentation could have a significant impact on special-status species. **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** (refer to Section 4.9: Hydrology and Water Quality), requires incorporation of sediment control and BMPs into the required SWPPP, which would ensure

significant quantities of sediment are not mobilized that could damage young plants. The impact from dust, erosion, and sedimentation on special-status species would be less than significant with mitigation.

Activities such as forest management and undergrowth clearing could start a wildfire if a vehicle or piece of equipment were to spark and ignite nearby vegetation or because of worker smoking. Wildfires can destroy special-status plants and habitat, nests, and burrows of special-status wildlife. **MM Hazards-2: Fire Prevention Plan** requires implementation of fire prevention practices including training personnel and maintaining fire prevention equipment on site. Impacts from wildfire would be less than significant with mitigation.

Comparison of Impacts Across Phases

Overview
This section discusses the impacts from vegetation management activities as they would occur together by phase. The measures applicable to each phase are identified.

Phase I
Phase I would have the highest potential for impacts on special-status species because (1) landing areas and access roads would be created and (2) vegetation management activities, including tree removal, would occur at the highest intensity in comparison with the rest of the phases of plan implementation. Vegetation clearing for trail widening, the creation of landing areas, and the establishment of native restoration areas would only occur during Phase I. The combination of all activities would include habitat disturbance of approximately 4 acres within the Reserve during the first five years. Areas disturbed by tree removal and for landing areas would have the most impact on avian species, special-status plant species, and indirect impacts from sedimentation and erosion and spread of invasive species. Impacts on special-status species would be potentially significant. Although 4 acres would be disturbed during this phase, **BIO-PH-1a, 1b, 1c, 1d, and 1e** from the 2014 LRDP, and **MMs Biology-1**, **Biology-2**, **Biology-3**, **Biology-4**, and **Biology-5** would be implemented and would reduce impacts on special-status species to less than significant.

Phase II
Phase II activities would focus on maintaining and enhancing the management strategies implemented during Phase I, emphasizing forest regeneration and restoration of a healthy forest ecosystem. Tree removal and associated understory removal would occur in different areas than those identified for Phase I, and Phase I forest treatment areas would be maintained by controlling understory vegetation.

Fewer trees would be removed from defensible space because the majority of the work would have been performed during Phase I. Native restoration areas would continue to be maintained but with slightly less intensity since non-native ground cover would already be removed. Vegetation along trails would continue to be maintained at the same intensity as in Phase I. Seed tree and group selection treatment areas would also be created during Phase II that would likely involve a similar level of ground disturbance as treatments performed during Phase I.

Individual trees would be removed throughout the remainder of the Reserve, which would not substantially disturb the habitat of special-status species. While the intensity of activities would generally diminish, significant impacts could still occur because vegetation management activities would occur in new areas not disturbed during Phase I. UCSF would implement **BIO-PH-1a, 1b, 1c, 1d, and 1e** from the 2014 LRDP, and **MMs Biology-1**, **Biology-2**, **Biology-3**, **Biology-4**, and **Biology-5** to reduce impacts on special-status species to less than significant.

Phase III

Phase III would continue to shift the focus of activities from removal of vegetation and trees to continued restoration and management of previously treated areas. Thus, the intensity of vegetation management activities would continue to decrease. Native trees would be planted starting in Phase III, which may create habitat for native wildlife. While the intensity of management would decrease, trees and vegetation would continue to be removed to manage the forest, which could create a significant impact on special-status plants and wildlife. UCSF would continue to implement **BIO-PH-1a, 1b, 1c, 1d, and 1e** from the 2014 LRDP, and **MMs Biology-1**, **Biology-2**, **Biology-3**, **Biology-4**, and **Biology-5** to reduce impacts on special-status species to less than significant.

Impact Biology-2: The proposed plan could have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by CDFW or USFWS.	**Significance Determination**
	Less than significant with mitigation

Vegetation Management Activities

As noted in Section **Error! Reference source not found.**, Woodland Creek may be subject to CDFW jurisdiction. Woodland Creek, an intermittent swale that runs through Stanyan Canyon on the eastern side of the Reserve, receives runoff from Medical Center Way via a storm drain and collects runoff from the surrounding hill slopes. The drainage features bed and bank topography in its lower reaches. Riparian vegetation does not appear to be supported; dominant species observed include Cape ivy, English ivy, Himalayan blackberry, and black nightshade (Pacific Biology 2017). Woodland Creek may be subject to the CDFW 1602 Lake and Streambed Alteration requirements if proposed plan activities could impact the flow, bed or bank. Vegetation management activities would not result in any topographic modifications, except potentially for preparation of landing areas and access routes. Preparation of the landing areas or trail widening would not occur within Woodland Creek. No physical alteration of Woodland Creek is proposed under any of the vegetation management activities, except for potential planting of native riparian vegetation in or near the creek bed. As no existing riparian vegetation is present, planting would not significantly impact Woodland Creek. Ground-disturbing activities and forest treatments could substantially increase erosion and sediment loss. Increased sediment loads within Woodland Creek could significantly impact flow. **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** (refer to Section 4.9: Hydrology and Water Quality) requires incorporation of sediment control and BMPs into the required SWPPP to ensure significant quantities of sediment are not mobilized. The impact would be less than significant with mitigation.

Comparison of Impacts Across Phases

Ground-disturbing activities would occur during Phase I of the proposed plan to prepare landing areas and access roads and for tree and understory removal. Tree and understory removal would occur throughout plan implementation, but would be the greatest during Phase I. Sediment loss would likely be the greatest during Phase I and would decrease during Phases II and III, as described in greater detail in Section 4.9: Hydrology and Water Quality. Implementation of the SWPPP and **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** would be required for all three phases to reduce sediment and debris runoff that could impede flow in Woodland Creek. The proposed plan may involve planting of native riparian vegetation along Woodland Creek during Phase III of the plan. The installation of native vegetation would create native habitat not currently found along the drainage and would represent a positive change to Woodland Creek by adding natural communities that can support greater diversity of wildlife. Planting within Woodland Creek may necessitate a 1602 permit from CDFW. Impacts on Woodland Creek would be less than significant with mitigation.

Impact Biology-3: The proposed plan could 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.	**Significance Determination**
	Less than significant with mitigation

Vegetation Management Activities

The Reserve does not constitute a wildlife corridor because it does not facilitate wildlife movement through the urban landscape of San Francisco. The Reserve is surrounded by dense urban areas to the north, west, and south; the east side of the Reserve abuts a portion of the Interior Greenbelt. Together, the Reserve and adjacent Interior Greenbelt act as an island of green space surrounded by urban development isolated from other patches of habitat in San Francisco such as Mount Davison or Golden Gate Park. While the Reserve does not act as a migration corridor, migratory species such as birds likely use the Reserve as habitat. Bats, including hoary bat and Western red bat, are also migratory species. Impacts on these species are discussed above under Impact Biology-1. Woodland Creek does not support any fish species. No impact on migratory fish species would occur.

Vegetation management activities would involve tree and understory removal, grading to create access and landing areas, and use of other heavy equipment or saws that generate considerable noise. Native migratory birds are protected under the MBTA regardless of their sensitivity status. Impacts from vegetation management activities on migratory birds, could be significant if they resulted in loss of habitat, nest abandonment, destruction of nests, injury, or mortality. As part of the 2014 LRDP, UCSF must implement **BIO-PH-1d: Preconstruction Surveys for Special-Status Plants and Plant Avoidance**, and conduct a pre-construction survey for nesting birds, including migratory birds, and establish no-disturbance buffers around active nests. Impacts would remain significant because workers could fail to recognize signs of migratory bird nests. **MM Biology-1: Worker Training** requires worker training, which would reduce the impact on migratory birds to less than significant.

Comparison of Impacts Across Phases

Impacts in Phase I would be the greatest on migratory species because the forest would experience the most intense tree removal and landing areas and access routes would be created. Only 4 acres of migratory species habitat would be substantially impacted during Phase I. Although individual trees would be removed throughout the remainder of the Reserve, these areas would still be available for avian species to use.

The proposed plan would involve increasing biodiversity in the Reserve in each succeeding year, including the installation of native plant species into areas cleared of non-native vegetation. The plan would also involve creating structural diversity within the Reserve with the introduction of new age classes of trees. Both changes would become more established over time and could create additional and more varied habitat for migratory birds, which could improve habitat for migratory birds as well as attract new species that could utilize different parts of the forest (i.e., mid-story). These impacts would be considered beneficial effects of the proposed plan. Impacts on migratory species during all phases would be minimized to less than significant through **BIO-PH-1d: Preconstruction Surveys for Special-Status Plants and Plant Avoidance** and **MM Biology-1: Worker Training**, as previously discussed.

Impact Biology-4: The proposed plan could conflict with local policies and ordinances for the protection of biological resources, such as a tree preservation policy or ordinance.	**Significance Determination**
	Less than significant

Vegetation Management Activities

Although UCSF is not subject to City of San Francisco policies and regulations, UCSF strives to be consistent with City standards, where feasible. The San Francisco Urban Forestry Ordinance (Department of Public Works Code Article 16) protects various types of trees, including landmark, significant, and street trees. No landmark or street trees are located within the plan area; therefore, no impact on landmark or street trees would occur.

Individual trees that may meet the definition of a significant tree may be removed as part of forest treatments and management of defensible space under the proposed plan. The overall intention of the ordinance is to protect urban forests and important trees that provide shade, habitat, and aesthetic value to the San Francisco's residents, among other goals. Per the City ordinance, significant trees do not include those that appear dead, dangerous, or likely to fall; those that harbor a disease or infestation threatening the health of other trees; and those that pose any other significant hazard or potential hazard. Implementation of the plan focuses on the removal of dead, dying, unhealthy, and structurally unsound trees; however, to establish a healthy forest with sustainable tree density, some living trees would likely need to be removed. Forest inventories indicate that approximately 33 percent of the trees in the Reserve are dead or dying. These trees, which would be the focus of the forest treatments and management of defensible space, are not considered significant under the City ordinance. The remaining trees would be largely preserved; UCSF would avoid removing healthy trees that meet the definition of significant trees under the City ordinance to the extent that they would contribute to the health and structural diversity of the forest. As UCSF is constitutionally exempt from the local

tree ordinance whenever using property under its control in furtherance of its educational mission, impacts on significant trees would be less than significant.

Comparison of Impacts Across Phases

The greatest number of trees would be impacted during Phase I when vegetation management activities would be focused on the removal of dead and dying trees and the establishment of seed tree and group selection treatments. An estimated 6,000 primarily dead or dying trees would be removed during Phase I; however, approximately 310 trees would either be planted or are expected to germinate and grow. Living trees may be removed in Phase II and Phase III in order to meet plan goals of establishing a healthy forest. Since UCSF is exempt from the local ordinance for tree removal, impacts would be less than significant.

Impact Biology-5: The proposed plan could exceed the applicable LRDP EIR standard of significance by damaging or removing heritage or landmark trees or native oak trees of a diameter specified in a local ordinance.	**Significance Determination**
	Less than significant

Vegetation Management Activities

While UCSF is exempt from local ordinances regarding tree removal whenever using property under its control in furtherance of its educational mission, the 2014 LRDP EIR considers damage or removal of a heritage or landmark tree as defined in a local ordinance to be a significant impact. No currently designated heritage trees or landmark trees are present within the plan area. According to the 2007 Urban Forestry Ordinance, landmark trees are trees that have been designated by the Board of Supervisors as extra special. It may be due to the rareness of the species, their size or age, or extraordinary structure, or ecological contribution. In addition, historical or cultural importance can qualify a tree for landmark status. Property owners, any member of the Board of Supervisors, Planning Commission, the Historic Preservation Commission (formerly known as the Landmarks Preservation Advisory Board), and/or directors of a City department may nominate trees on public or private land to protect and preserve their value and presence in the community under the San Francisco Landmark Tree Program. It is unlikely that any trees in the Reserve would merit landmark status because (1) the trees are all part of a forest and not individually significant, and (2) it is unlikely that any of the trees would be nominated. If a potential landmark tree was to be nominated and designated in the future, it would be legally protected from physical damage and removal. No impacts on heritage or landmark trees would occur.

Native oaks are not identified specifically for protection, but would be protected per the San Francisco Public Works Code. The Public Works Code defines potentially significant trees as those within 10 feet of the public right-of-way that meet one of the following size requirements:

- 20 feet or greater in height
- 15 feet or greater canopy width
- 12 inches dbh or greater

Public right-of-way that abuts the Reserve is present along Christopher Drive, Crestmont Drive, and Clarendon Avenue. Through a City Cutbank Agreement, the City is responsible for maintaining trees along public rights-of-way in areas around the Reserve. If native oaks were to occur within areas covered in the Cutbank Agreement, the City would be responsible for their maintenance. Native oaks would only likely be removed if they were a hazard. Implementation of the plan should not impact native oaks considered significant by city ordinance. Impacts on significant native oaks would be less than significant.

Comparison of Impacts Across Phases

Impacts on native oaks or a potentially future designation of landmark tree would be the same for any phase of the plan. Any native oaks within 10 feet of public rights-of-way are the responsibility of the City and would only be removed if they are a hazard. Impacts would be less than significant.

Impact Biology-6: The proposed plan could result in significant impacts on biological resources in combination with past, present, and probable future development in the cumulative analysis study area.	**Significance Determination**
	Less than significant contribution with mitigation

Geographic Scope

The geographic scope for the biological resources cumulative analysis includes all similar habitats within 1 mile of the proposed plan area. This geographic scope is appropriate because it accounts for the cumulative degradation or loss of a particular vegetation community or special-status species population from all projects that have impacted or would impact vegetation communities of concern or special-status species.

Cumulative Analysis

Special-Status Plants

The Mount Sutro Reserve Improvements (#9) would involve vegetation removal and grading to create new trails within the Reserve. The SNRA Management Plan (#17) would involve management of several vegetated areas, including Tank Hill and the Interior Greenbelt. Coastal triquetrella, a special-status species, has a moderate potential to occur in the Reserve and SNRA management areas. This species could be impacted during ground-disturbing activities. Ground-disturbing activities as part of the proposed plan could damage or kill special-status plants. Implementation of the cumulative projects and the proposed plan (without protection measures or mitigation) could result in a significant cumulative impact on special-status plants were those projects to result in similar impacts to similar plants, therefore, further jeopardizing the plant populations in the region.

As required by the 2014 LRDP, UCSF must implement **BIO-PH-1d: Preconstruction Surveys for Special-Status Plants and Plant Avoidance**, and **BIO-PH-1e: Relocation of Special-Status Plants**, which require a pre-construction survey for special-status plants, marking known occurrences for avoidance, and development and implementation of a rare plant salvage and

relocation plan. Inadvertent impacts could occur if workers do not recognize coastal triquetrella. **MM Biology-1: Worker Training** requires worker training to recognize coastal triquetrella and other special-status plants. With implementation of these measures, implementation of the plan would have minimal if any impact on special status plants. Therefore, the proposed plan would not contribute considerably to a significant cumulative impact on special-status plants with mitigation.

Special-Status Animals

Olive-Sided Flycatcher, Cooper's Hawk, Allen's Hummingbird, and Other Migratory Birds

The Mt. Sutro Reserve Improvements (#9) and SNRA Management Plan (#17) would involve tree and shrub removal within areas where Olive-Sided Flycatcher, Cooper's Hawk, and Allen's Hummingbird individuals were observed or recorded breeding. Several other cumulative projects (Building Demolition [#1] and Surge, Woods, and EHS Open Space Restoration [#8]) could involve tree and shrub removal to permit access to construction sites. Although these species were not observed on the Kirkham Project (#15) and Overlook Project (#16) sites, due to proximity to the Reserve and the mobility of these avian species, they could be found on these cumulative project sites. Other species of migratory birds could nest or roost on many of the cumulative project sites. Each of the projects could remove nesting habitat during tree and shrub removal or trimming. Noise from heavy equipment and vehicles would be generated during construction and implementation of vegetation management activities. Tree removal and operation of heavy equipment from each of the cumulative projects could result in nest abandonment and mortality of individuals. As part of the SNRA Management Plan, management activities would generally occur outside the breeding season and a buffer would be established around active nests if management activities occur within the breeding season. Mitigation would be implemented to reduce impacts to nesting birds for several cumulative projects (Building Demolition [#1], Surge, Woods, and EHS Open Space Restoration [#8], Mt. Sutro Reserve Improvements [#9], Kirkham Project [#15], and Overlook Project [#16]), which requires pre-construction nesting bird surveys prior to work in the nesting season, establish no-disturbance buffers for active nests, and repeat surveys if no work has occurred for two weeks in a given area. However, birds could begin nesting after construction activities begin. Individuals could be harmed or nests abandoned if workers do not recognize the species or nests. Additionally, overlapping construction schedules or substantial cumulative loss of nesting habitat throughout the area could cumulatively impact special-status birds. Although unlikely, if multiple projects occurring at the same time resulted in injury or death to special-status birds, impacts could be considered cumulatively significant.

Vegetation management activities proposed in the plan would generally avoid the nesting season (February 15 through August 15). Should tree and vegetation removal occur during the nesting season, tree removal and noise from equipment use could result in nest abandonment or mortality of adults or juveniles. The proposed plan's contribution to a significant cumulative impact on special-status birds could be considerable. **BIO-PH-1d: Preconstruction Surveys for Special-Status Plants and Plant Avoidance**, which UCSF is obligated to implement as part of the 2014 LRDP, requires UCSF to perform pre-construction nesting bird surveys, establish no-

disturbance buffers for active nests, and repeat surveys if no work has occurred for two weeks in a given area. Impacts could remain significant if these species establish nests after the surveys and nests are not recognized by workers. **MM Biology-1: Worker Training** requires worker training to describe special-status wildlife, including nesting birds, and for workers to notify a qualified biologist if signs of a special-status species are found. Special-status birds would not be impacted with implementation of mitigation because they would be protected with disturbance free zones, if detected. The proposed project with mitigation, therefore, would not impact special status birds and would not contribute considerably to a significant cumulative impact on special-status birds.

Monarch Butterfly

Monarchs have a potential to occur within Golden Gate Park and the Reserve. Dense eucalyptus groves, which provide overwintering sites for Monarchs, are present within Golden Gate Park and the Reserve. Tree removal activities could occur within Golden Gate Park as part of the SNRA Management Plan (#17)[2] and would occur as part of the proposed plan. Loss of overwintering sites or mortality of individuals during vegetation and forest management activities could occur. Implementation of the cumulative projects and the proposed plan could result in a significant cumulative impact on Monarchs if several individuals across the population in the City is impacted.

Implementation of the proposed plan could result in loss of overwintering habitat and direct mortality of individuals within the plan area. The proposed plan's contribution to a potentially significant cumulative impact on monarchs across the City could be considerable, given the rarity of the species and rarity of habitat in the City. As required by the 2014 LRDP, UCSF must implement **BIO-PH-1a: Preconstruction Surveys for Monarch Butterfly Winter Roosts and Avoidance**, which requires a qualified biologist to conduct a pre-construction survey near demolition areas (work areas in the context of the plan) for the presence of overwintering monarch butterfly aggregations in December or January and to establish a 200-foot buffer around occupied trees until the aggregation has dispersed. **MM Biology-1: Worker Training** requires worker training. **MM Biology-2: Pre-activity Survey and Avoidance of Monarch Butterfly** requires a pre-construction survey to occur in all areas of eucalyptus tree removal and the surveys to also occur in November, if work is to occur in November, in additional to December or January. With implementation of these measures, impacts to Monarch butterfly from the proposed plan would be avoided. The proposed plan would not contribute considerably to an otherwise significant cumulative impact on Monarchs with inclusion of these measures.

[2] Monarchs are not present at other nearby SNRA management areas.

Western Red Bat and Hoary Bat

Western red bat and hoary bat have a potential to or were observed roosting within several cumulative project sites (Building Demolition [#1], Surge, Woods, and EHS Open Space Restoration [#8], Mt. Sutro Reserve Improvements [#9], and Kirkham Project [#15]). Although these species were not observed on the Overlook Project (#16) or nearby SNRA Management Plan (#17) sites, due to proximity to the Reserve and presence of roosting habitat, these species could roost on-site. Removal of roosting habitat in several natural areas across the City, specifically trees, would result in a potentially significant cumulative impact on special-status bat species because natural areas and habitat are rare in the City and bat populations are likewise, also rare. Mitigation would be implemented to reduce impacts to special-status bats for several cumulative projects (Building Demolition [#1], Surge, Woods, and EHS Open Space Restoration [#8], Mt. Sutro Reserve Improvements [#9], and Kirkham Project [#15]), which requires preconstruction surveys, use of bat eviction methods, avoidance of maternity roosts, and buffer around active maternity and hibernation roost sites. Mitigation to reduce potential impacts for the Overlook Project (#16) or nearby SNRA Management Plan (#17) sites is not identified. The cumulative impact on populations of special-status bats would remain potentially significant.

Vegetation management activities implemented within the Reserve as part of the proposed plan would include tree removal and removal of dense foliage. The proposed plan's contribution to a significant cumulative impact on special-status bats could be considerable. **BIO-PH-1c: Avoidance and Minimization Measures for Special-Status Bats**, which UCSF is obligated to implement as part of the 2014 LRDP, requires a pre-construction survey for potential roosting sites, use of methods to make roosts unsuitable prior to roosting, and the establishment of a no-disturbance buffer around maternity and hibernation roosting sites. **MM Biology-1: Worker Training** requires worker training. **MM Biology-3: Minimization of Harm to Bat Species** requires a qualified biologist to perform pre-construction survey of areas scheduled for tree removal and specifies methods such as creating noise and vibration to make roosts unsuitable for bats. Implementation of these measures would minimize impacts to bats such that individual bats would not be injured nor breeding impacted by implementation of the plan. The proposed plan, therefore, would not contribute to the potentially significant cumulative impact on special-status bats with mitigation.

San Francisco Dusky Footed Woodrat

None of the cumulative projects have been identified as within the range of the San Francisco dusky footed woodrat. The potential cumulative impact on the San Francisco dusky footed woodrat would be less than significant due to the low likelihood of impact on the San Francisco dusky footed woodrat from any cumulative project.

Sensitive Habitats and Wetlands

Sensitive habitats or wetlands have not been identified on any of the cumulative project sites. No potential cumulative impact on the sensitive habitats or wetlands would occur.

4.3.6 Mitigation Measures

MM Biology-1: Worker Training

All workers must receive environmental training from a qualified biologist or another qualified personnel before commencing vegetation management activities. Training can also be accomplished through a pre-recorded training by a qualified biologist or another qualified personnel. The training shall describe special-status plant and wildlife species including migratory birds, nesting habitats that could occur within areas covered by the plan, protection afforded to these species, and avoidance and minimization measures required to avoid and/or minimize impacts from vegetation management activities. Training shall describe the requirements and boundaries of the plan area and the importance of complying with mitigation measures. Each employee or contractor shall be provided with an informational training handout as well.

Locations: Entire Reserve

Performance Standards:

- **Before Activities:** Each worker receives training and/or training handout
- **During Activities:** General behavior requirements are enforced
- **After Activities:** N/A

MM Biology-2: Pre-activity Survey and Avoidance of Monarch Butterfly

Prior to tree removal or other tree management activities that would occur during the winter roosting season for Monarch butterflies (November – February), a qualified biologist familiar with monarch butterfly roosting behavior shall conduct a survey of the areas in which work would occur and surrounding areas within 200 feet. If any winter roosts are found, the roosting tree(s) shall be clearly marked, and no tree removal or tree management activities within 200 feet of the tree(s) shall occur until the aggregation has dispersed.

Locations: Active butterfly roosts within the Reserve where seed tree or group selection are implemented

Performance Standards:

- **Before Activities:** (1) Qualified biologist performs survey at the beginning of the roosting season, and (2) Butterfly roosts are flagged and buffers are established, if needed
- **During Activities:** Roost buffers are maintained and avoided until aggregation has dispersed
- **After Activities:** N/A

MM Biology-3: Minimization of Harm to Bat Species

Appropriate methods shall be used to minimize the potential of harm to bats during tree removal activities within the Reserve. A qualified biologist shall conduct a pre-activity survey for potential bat roosting areas. During the survey, individual trees shall be visually inspected with binoculars for any active roosts or large cavities or openings that could be used by colonial bat species. If an active roost or large cavity is observed that could support bats (with the exception of maternity or hibernation roosts, which are addressed in BIO-PH-1c), the wildlife biologist, in accordance with guidance from CDFW, shall take actions to make such roosts unsuitable habitat before tree removal activities. Actions may include:

- Removal of shrubs and very small trees one day prior to the removal of the tallest nearby or adjacent trees
- Use of a two-step tree removal process. On Day 1, noise and vibration are created by cutting nonhabitat branches and limbs from habitat trees using chainsaws only. On Day 2, the remainder of the tree is removed.
- Chipping of trees and/or limbs and other vegetation on-site

Locations: Entire Reserve where tree removal could occur

Performance Standards:

- **Before Activities:** (1) Qualified biologist conducts pre-activity special-status bat species, and (2) Actions are taken to make roosts unsuitable habitat prior to tree removal activities
- **During Activities:** N/A
- **After Activities:** N/A

MM Biology-4: San Francisco Dusky-Footed Woodrat Nest Management

No earlier than 30 days prior to the commencement of vegetation management activities in a given area, a qualified biologist shall conduct a pre-activity survey for San Francisco dusky-footed woodrat to determine if active woodrat nests (stick houses) with young are present within the area to be disturbed or within 50 feet of the area to be disturbed. All active nests shall be identified and their locations mapped and flagged for avoidance.

If active woodrat nests with young are identified, a fence shall be erected around the nest site at a distance adequate to provide the woodrat sufficient foraging habitat, at the discretion of a qualified biologist. Vegetation management activities within the fenced area shall be postponed or halted until young have left the nest. A qualified biologist shall serve as a monitor during those periods when disturbance activities would occur near active nest areas to ensure that no inadvertent impacts on the nests occur.

To the degree feasible, any identified woodrat nests shall be left undisturbed. If the relocation of a nest is required, UCSF shall prepare a woodrat nest relocation plan and submitted the plan to CDFW for review. The woodrat nest relocation plan may only be implemented after CDFW review and under the direction of a qualified biologist. No nest may be relocated while young are present in the nest.

Locations: Entire Reserve

Performance Standards:

- **Before Activities:** (1) A pre-activity survey for San Francisco dusky-footed woodrat is conducted, and (2) Fences are established around active nests
- **During Activities:** (1) Woodrat nest buffers are maintained until activities are complete or nest is vacated, and (2) A relocation plan is prepared if the nest cannot be avoided
- **After Activities:** N/A

MM Biology-5: Invasive Weed Control

UCSF shall power wash all equipment and vehicles to be used for vegetation management activities that have been used in areas outside the Reserve prior to entering the Reserve. All materials used for erosion control (e.g., gravel and fill material, straw mats, erosion control blankets) shall be certified weed free. Landing areas and access roads shall be periodically maintained to remove any invasive weeds that have established during vegetation management activities.

Locations: Entire Reserve

Performance Standards:

- **Before Activities:** (1) Equipment and vehicles and washed, and (2) Materials used for erosion control are certified weed-free
- **During Activities:** Landing areas and access roads are maintained to remove invasive weeds
- **After Activities:** N/A

4.3.7 References

California Invasive Plant Council (Cal-IPC). 2009. California Invasive Plant Inventory Database. Accessed March 1, 2017. http://cal-ipc.org/paf/.

California Native Plant Society (CNPS). 2010. Triquetrella californica. March 15. Accessed March 24, 2017. http://www.rareplants.cnps.org/detail/2068.html.

HortScience, Inc. and Matt Greene Forestry & Biological Consulting. 2017. "Vegetation Management Plan, Mount Sutro Open Space Reserve."

LSA Associates, Inc. 2011. "Biological Resources Report, Mount Sutro Openace Space Reserve, San Francisco, California."

Pacific Biology. 2017. "Biological Habitat Evaluation Report, Mount Sutro Open Space Reserve Project."

Sawyer, J.O., T. Keeler-Wold, and J.M. Evens. 2009. "A Manual of California Vegetation: Introduction." California Native Plant Society, hosted by University of California, Davis Herbarium. Accessed March 1, 2017. http://davisherb.ucdavis.edu/cnpsActiveServer/intro.html.

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4.4 CULTURAL AND TRIBAL CULTURAL RESOURCES

4.4.1 Introduction

This section describes the existing cultural and tribal cultural resources in the plan area and evaluates the potential impacts on cultural and tribal cultural resources from implementation of the proposed vegetation management activities. The section also provides a discussion of the applicable federal, state, regional, and local regulations that pertain to cultural and tribal cultural resources. The impacts associated with the proposed plan are compared with the thresholds of significance used by the University pursuant to CEQA.

Comments related to cultural and tribal cultural resources received during the public scoping process included concerns about the following:

- Consideration of the conditions prior to eucalyptus planting in late 1800s as a cultural landscape and restoration of historic views from Mount Sutro
- Presence of potential archaeological sites in the Reserve

4.4.2 Environmental Setting

Prehistory

Before Europeans settled in the San Francisco Bay Area, the San Francisco Peninsula to the East Bay and south to Monterey was part of the aboriginal lands of the Ohlone tribe. In the late 1700s, at the time of the Spanish occupation, approximately 1,400 Ohlone organized into several small, politically independent societal groups or tribes and lived in the San Francisco and San Mateo areas. Groups moved annually between temporary and permanent village sites in a seasonal round of hunting, fishing, and gathering. Ethnohistory suggests that small villages were maintained along the San Francisco Peninsula shoreline and marshlands, and it was these activities within the Ohlone's cultural beliefs and values that shaped the cultural landscape of the San Francisco Peninsula.

Spanish and Mexican Period (1776 – 1846)

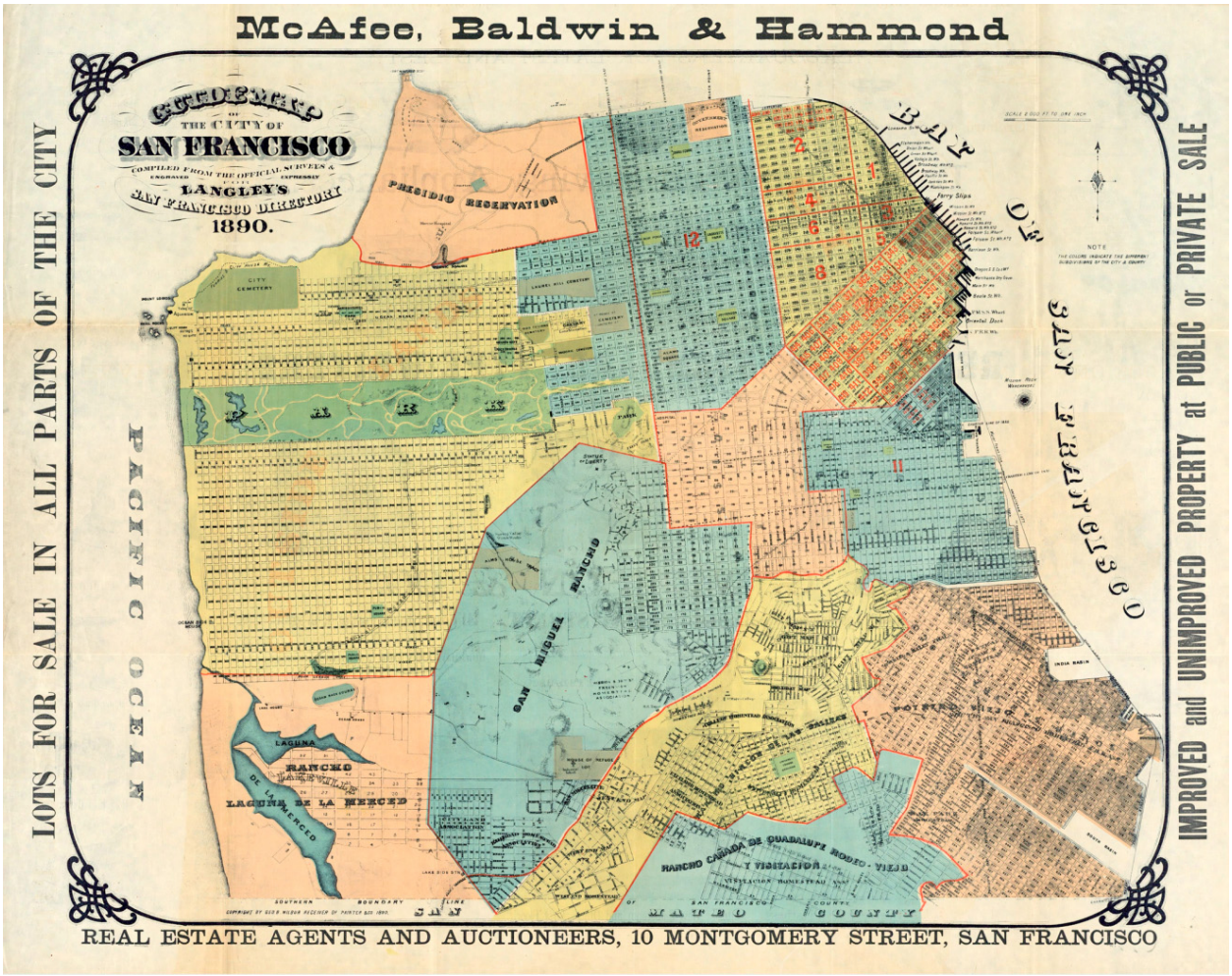
In the late eighteenth century, the Spanish expanded their empire into Alta California. Juan Bautista de Anza led 240 people from Tubac, Mexico to San Francisco in order to establish a permanent settlement in 1776. The permanent settlement consisted of three components: el Presidio de San Francisco, Castillo de San Joaquín, and Misión San Francisco de Asís (now known as Mission Dolores). El Presidio de San Francisco, located in the vicinity of today's Presidio, housed the Spanish garrison and supported administrative and training operations. Castillo de San Joaquín (present-day Fort Point) was established to guard the entry to the San Francisco Bay. The Spanish built Mission Dolores is several miles southeast of the Presidio in a location that had access to fresh water supply. The Mission was protected by the Presidio and in turn supplied the garrison stationed there with food.

Mount Sutro is located on land that was part of the original Mission Dolores landholdings. These landholdings were subsequently included in a land grant given to José de Jesus Noe for 4,400 acres of San Francisco known as San Miguel Rancho (refer to Figure 4.4-1). The Spanish and Mexican impact on the Mount Sutro landscape was limited to the alteration of vegetation communities by livestock grazing. At the time, Mount Sutro was likely covered with coastal scrub vegetation consisting of native grasses and small- to medium-sized shrubs; historic photographs from the mid-nineteenth century do not show trees on the peak.

American Period (1846 – 1880)

California became part of the United States in 1846 when it was conquered during the Mexican War. Like many Mexican ranchers, Noe had difficulty keeping his landholding after California became a part of the United States and began selling it piece-by-piece in 1848. The eastern part of the rancho was developed as early as the late 1800s, creating the residential neighborhoods of Noe Valley, Eureka Valley and Fairmont Terrace. The portion of San Miguel Rancho west of Twin Peaks remained relatively open and sparsely settled; settlement was hindered by

Figure 4.4-1 Rancho San Miguel



Source: (Bancroft 1881)

ownership disputes between the City of San Francisco and the federal government over the lands outside of the city's charter line of 1851 (i.e., lands west of Divisadero Street that were outside of the city's original 1851 charter known as the "Outside Lands"). The land that is currently Mount Sutro, known at the time as Mount Parnassus, changed hands several times until Adolph Sutro purchased a 1,200-acre tract in 1880, the remnant of the original 4,400-acre San Miguel Rancho.

History of Eucalyptus Planting in California and San Francisco

Afforestation in California

The massive immigration to California after the discovery of gold in 1849 resulted in an increased demand for lumber (for building material) and for firewood (the primary fuel for heating and cooking). As a result, California's forests were cut indiscriminately to provide for these needs. The state legislature passed a timber protection law in 1862 that prohibited cutting trees on both private land and public streets. The federal government also promoted tree planting; a federal law was passed in 1873 that gave 160 acres to anyone who planted 40 acres of trees and maintained them for eight years. By the late 1860s, tree planting had come to be viewed as a patriotic duty throughout the country.

In the late nineteenth century, afforestation practices were viewed as a way to address concerns over a diminishing resource and a way to improve the land. The importance of trees was partly based on the ideals of the romantic park design during this era and the urgent desire to protect forest and timber resources that had become a national and state focus in the 1860s. In the Department of Agriculture report for 1865, Reverend Frederick Starr wrote a paper that predicted a timber famine would occur within 30 years and advocated the management of forests and establishment of plantations, especially hardwood trees (Groenendaal 1983). The paper became an impetus of the forest movement that eventually founded the United States Forest Service (USFS). It also began the development of the "Eucalyptus Boom in California" (Groenendaal 1983), which occurred between the 1880s and 1912. By the end of the nineteenth century, eucalyptus could be seen almost anywhere in the state where the climate permitted. Although eucalyptus wood was not suitable for building materials because it was too brittle, it was still in vogue when the Sutro Forest plantings were underway in 1886 to 1898.

Afforestation in San Francisco

During the last three decades of the nineteenth century, large areas of San Francisco from the Presidio to the Ocean Avenue area were planted with trees on what had previously been sand dunes or unforested hillsides. The trees at Stern Grove, Golden Gate Park, and the Presidio are all examples of the large-scale tree planting effort of the late nineteenth century of which portions continue to survive today. Eucalyptus, Monterey cypress, and Monterey pines were the three species predominantly planted to act as wind breaks and to anchor shifting sand dunes. By the end of the 1870s, more than 135,000 trees and shrubs had been planted at Golden Gate Park, which led to forest growth issues associated with the dense planting. Similar issues occurred in the Presidio, where overcrowding resulted in low-light conditions that limited the establishment of an understory.

The trees of Stern Grove and Golden Gate Park continue to be character-defining features of the parks. The trees at Stern Grove have been identified as a contributing feature to the Stern Grove and Pine Lake Park National Register of Historic Places (NRHP)-eligible historic district. Golden Gate Park is also listed on the NRHP as a historic district.

Adolph Sutro and the Sutro Forest

Influence on the Landscape of San Francisco

Born in Prussia in 1830, Adolph Sutro immigrated to the United States in August 1850 and moved to San Francisco in November 1851. In the late 1860s and 1870s, Sutro made his fortune in the design and construction of a massive tunnel that drained and ventilated the flooded shafts of the Comstock Lode silver mines in Nevada. After Sutro was forced out of the tunnel company in the 1870s, he sold his stock and invested in San Francisco real estate; at one point, he owned holdings that equaled one twelfth of San Francisco's entire land area (2,200 acres). Although Sutro bought a significant amount of downtown property, his purchases were focused largely in the Outside Lands. During the last two decades of his life, Sutro became a principal force in transforming the character of this part of San Francisco's landscape.

In 1881, Sutro purchased a little over 100 acres of land at Point Lobos overlooking the Cliff House and Seal Rocks, an adjacent property that was a little over 21 acres, and 80 acres of shore lands bordering Fort Miley and part of the future Lincoln Park. Between Sutro's 1881 purchase of the property and his death in 1898, he was intimately involved in the development of this land and oversaw the creation of the gardens at Sutro Heights, construction of the Sutro Baths, rebuilding of the Cliff House as a chateau-style palace, and construction of a passenger railroad that provided an inexpensive means for the public to reach these facilities.

During the early 1880s, Sutro became a serious book collector whose goal was to "form a collection with sufficient range and depth across different branches of human knowledge and periods of history that it might serve as the basis for a leading public research library on the Pacific Coast" (Davidson 2012). Within 10 years, he had assembled the largest private library in the United States and decided to build a library to house his collection on a 26-acre tract on the north side of Mount Sutro along Parnassus Avenue. Sutro chose this site for his library because he believed the setting at Mount Sutro, where he intended to plant a forest, would form a beautiful background for the buildings and would inspire scholars to higher achievements (Sutro 1895). However, the plans for Sutro's library died with him in 1898, shortly after he served one term as mayor of San Francisco (1895 to 1896).

Sutro Forest

Sutro's single largest land acquisition in San Francisco was his 1880 purchase of the remnant 1,200-acre parcel of San Miguel Rancho. The parcel ran from the present-day UCSF Parnassus Heights campus site south along Stanyan Street, over Twin Peaks to the Ocean View district, then east to Junipero Serra Boulevard and north to Laguna Honda. The ranch contained the four peaks of the San Miguel Hills: Mount Sutro, Twin Peaks, and Mount Davidson. Between 1886 and 1898, Sutro implemented a massive tree planting effort within this 1,200-acre parcel that resulted in what became known as Sutro Forest, the largest tree planting effort in San Francisco.

An article in the San Francisco Chronicle estimated that Sutro Forest contained from 1,100,000 to 1,200,000 trees in 1898 (Ryder 1896). The main species for the new forest were eucalyptus, Monterey cypress, and Monterey pine supplemented with acacia, ash, beech, maple, and other species that for a number of reasons failed to become established. The fast-growing eucalyptus trees were well-adapted to the growing conditions of the site and became the dominant species in the forest. The trees were planted very close together based on assumptions that the high-density planting would provide the young trees protections from the elements while the stands were getting established and the stands would ultimately be thinned out to a lower density. However, the forest grew so rapidly that by 1896, many trees were 85 to 100 feet in height with trunks measuring one to two feet in diameter even after thinning the forest. A second major thinning operation was undertaken in 1909 (Vieno 1909), but by 1910, the forest was described as almost impenetrable in places (Baldwin 1910).

Adolph Sutro did not explicitly state his ultimate intent for the land use within the Sutro Forest. When initially planted, the forested area around Mount Sutro was private land but was informally used recreationally by the public for hiking, picnicking, and hunting. Sutro constructed a trail system around the peak that remained after his death and provided public access onto the property, helping to develop a local constituency for Mount Sutro as a public natural area. The offer letter he wrote to donate the western half of a tract along Parnassus Avenue to the University of California in 1895 seemed to indicate that he intended this trail system and the forest peak to have some type of public access in association with the college and his future library site. The present-day recreational and natural habitat land uses within the Reserve continue to provide a link to the historic land uses at Mount Sutro.

Sutro died on August 8, 1898 at the age of 68. His heirs battled over the terms of his will and the fate of his estate for over two decades. A court decision allowed the sale of the 1,200-acre tract and Sutro Forest in 1909, around the same time the peak was officially named Mount Sutro. In the division of the estate, one of Sutro's daughters, Rosa de Morbio, received the 90 acres of the tract that included Mount Sutro (the area between Parnassus and Clarendon Avenues). Another daughter, Clare de Choiseul-Praslin, received the 90-acre tract that included the southern and southwestern slopes of Mount Sutro (where Forest Knolls was ultimately constructed in the late 1950s); she subsequently willed the land to the Littler Sisters of the Poor.

Mount Sutro was impacted by intermittent fires, the vegetation thinning in 1909, public use, and logging in the 1930s. The Sutro heirs tried to find ways to limit public access because of the fires, but the public continued to use the forest for hiking, camping, and hunting. A 1930 map showed an unpaved trail that encircled the peak (likely what is identified today as the "Historic Trail") and another road along the lower reaches of the south and west slopes. The developing neighborhoods to the east, north, and west provided a distinctive contrast to Mount Sutro's forested slopes. In 1932, the extension of Clarendon Avenue west to 7th Avenue created a definitive boundary along the south side; until then the forest on the peak's south side extended unbroken into the larger Sutro Forest. The most dramatic impact on the landscape was the logging that occurred in the early 1930s. This operation ended in 1934 after a fire burned

10 acres that required 400 firemen to extinguish. Figure 4.4-2 presents an aerial photograph taken in 1935 that shows the extent of the logging operation.

UCSF Period (1953 – Present)

The University of California's effort to establish a new campus in San Francisco to house its schools of law, medicine, pharmacy, and dentistry coincided with Sutro's desire to locate his library on Mount Sutro. Sutro offered to deed the western half of his acreage to the University of California. The Regents accepted Sutro's offer in October 1895, and the present-day Parnassus Heights campus site opened in October 1898. UCSF later purchased the 90-acre tract that included Mount Sutro from Sutro's heir in 1953. This purchase initiated a period of accelerated development, which included the addition of new buildings, reduction of the overall forested area, and a redefined forest boundary.

In 1954, the federal government leased six acres from UCSF and constructed the control center for Nike Battery SF-89 (Nike SF-89) as part of the San Francisco Bay Area's Nike missile defense system. The forest at the summit and a portion of the south slope were clear-cut, and a road was constructed from Clarendon Avenue to the Nike structures at the summit. The Nike SF-89 site was active from 1955 through 1963, when the site was deactivated. After the nationwide Nike system was decommissioned in 1974, the site was returned to UCSF. The Nike buildings on the summit were removed between 1972 and 1977, and the summit was gradually invaded by woody shrubs. In 2005, the Sutro Stewards began a restoration effort on Rotary Meadow which is ongoing.

The landscape of Mount Sutro was altered through the construction of roads, the federal Nike SF-89 site, creation of trails, and introduction of housing and additional medical facilities. The first noticeable alteration of Mount Sutro came with the construction of the northern half of the Medical Center Way alignment from Parnassus Avenue to the vicinity of the present-day Woods Lot between 1948 and 1955. A rectangular section of the forest (roughly corresponding to the footprint of the present-day Woods Lot) was removed, and a University-related facility was added on the east slope at the end of the new road. A smaller area was cleared on the uphill slope at the west end of the road to make way for a University water treatment facility.

The southern side of Mount Sutro was dramatically altered by the construction of the Aldea complex and the Forest Knolls neighborhood. Medical Center Way was extended south to Johnstone Drive between 1958 and 1961 as part of the construction of the Aldea housing complex. By 1958, the forest had been clear-cut and graded for the development of Forest Knolls. Because of this development, the boundary of Mount Sutro was redefined by the boundary of the remaining forest and Christopher and Crestmont Drives, which were laid out as part of the Forest Knolls development. Remnants of the forest remain in Forest Knolls on the slopes west of Crestmont and Warren Drives.

Other alterations to Mount Sutro occurred during the 1960s as part of the expansion of the UCSF. The Woods Building (100 Medical Center Way) was built along the east side of Medical Center Way in 1962. The Surge Building (99 Medical Center Way) was added just south of the

Figure 4.4-2 1935 Aerial View of Mount Sutro



Source: HJW geospatial/Pacific Aerial Surveys

Woods Building complex in 1966; the associated parking lot resulted in the removal of an additional portion of the forest.

Trails within the Reserve were first informally mapped in the 1970s when an unimproved dirt trail system was maintained by UCSF for a brief period. UCSF renewed the trail maintenance effort in 1999 on most of the trails, an effort that has been fortified by the Sutro Stewards since 2005. In addition to changes for safety and erosion control, their work led to the rediscovery and repair of the Historic Trail and construction of new connector trails. The Historic and Fairy Gates Trails have constructed alignments that were laid out with the natural terrain. It is likely that these alignments were either built by Sutro or around 1878 just prior to his acquisition of the San Miguel Racho. At certain locations, the sides of the trail bed are built up and reinforced with low drystone retaining walls or edging that were installed by UCSF and the Sutro Stewards when they restored the trails within the last approximately 30 years. The four ridge trails, Mystery Trail, and Edgewood Trail likely began as informal trails and developed from use over time.

In 1976, the 61-acre Reserve was designated by The Regents as permanent open space accessible to the public. The Interior Greenbelt, the forested area between the eastern boundary of the University-owned Reserve and the residences along the west side of Stanyan Street, was historically part of the Sutro Forest and is now owned by the City and County of San Francisco. The Interior Greenbelt is managed as part of the Department of Parks and Recreation's Natural Areas Program and abuts the Reserve on its eastern edge. The two areas are physically and visually contiguous.

Mount Sutro as a Cultural Landscape

Defining the Cultural Landscape

A cultural landscape is defined as "a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values" (Birnbaum 1994). There are four general types of cultural landscapes, which are not mutually exclusive (Birnbaum 1994):

- **Historic designed landscape.** Consciously designed or laid out by a landscape architect, master gardener, architect, or horticulturalist per design principles, or an amateur gardener working in a recognized style of tradition. May be associated with a significant person, trend, or event in landscape architecture or may illustrate an important development in the theory and practice of landscape architecture. Aesthetics play a significant role in designed landscapes. Examples include parks, campuses, and estates.
- **Historic vernacular landscape.** Evolved through use by the people whose activities or occupancy shaped the landscape. Function plays a significant role in vernacular landscapes. Examples include rural villages, industrial complexes, and agricultural landscapes.
- **Historic site.** Significant for its association with a historic event, activity, or person. Examples include battlefields and the property around a political figure's house.

- **Ethnographic landscape.** Contains a variety of natural and cultural resources that associated people define as heritage resources. Examples include religious sacred sites, unique geologic features, and contemporary settlements.

Mount Sutro has characteristics of both a designed landscape and a vernacular landscape. Mount Sutro's historic designed landscape characteristics reflect its association with the late nineteenth century forest planted by Adolph Sutro, and its vernacular landscape characteristics reflect its evolution since Sutro's death in 1898. The cultural landscape resulted from the conscious intent of Adolph Sutro to plant a large-scale forest throughout his 1,200-acre tract. The development of Sutro Forest (and Mount Sutro as part of the larger forest) was directed by Sutro until his death, but his vision for the forest died with him. Emma Merritt Sutro's ability to maintain Sutro's vision for the forest was constrained by the 20-year battle within his family over the control of his estate and the lack of funds to properly maintain his properties. Consequently, the landscape began to evolve more organically than had been the case during Sutro's lifetime.

The evolution of Mount Sutro as a cultural landscape was a byproduct of the regeneration of the forest and the activities that occurred within its boundaries. The site's natural topography, Sutro's initial planting of the eucalyptus forest, and his construction of a trail system established the foundation of this landscape. Subsequent activities and land uses including logging, fires, Nike missile program, residential development, UCSF-related development, ongoing public recreational use, and trail development have all contributed to its current vernacular character. Though the landscape has changed over time, the forest, presence of trails, and natural topographic characteristics of the site have been consistently associated with its vernacular landscape character since the late 1880s.

Mount Sutro Cultural Landscape

The Mount Sutro Cultural Landscape, as referred to in the remainder of this section, refers to the 61-acre Reserve that is owned and managed by UCSF and the 12-acre portion of the Interior Greenbelt adjacent to and contiguous with the Reserve that is owned and managed by the City and County of San Francisco. No survey was conducted to document existing conditions in the Interior Greenbelt to evaluate its integrity in relation to the Mount Sutro Cultural Landscape because the Interior Greenbelt is not under UCSF's jurisdiction. However, the Interior Greenbelt is considered part of the Mount Sutro Cultural Landscape because it was historically created and managed as part of the Sutro Forest and remains physically and visually contiguous with the Reserve.

The Reserve appears to be significant as part of the Mount Sutro Cultural Landscape under California Register of Historical Places (CRHR) Criterion 2 for its association with Adolph Sutro and his development of Mount Sutro as part of the larger Sutro Forest (Denise Bradley and

Knapp & VerPlanck Preservation Architects 2013)[1]. The period of significance extends from 1886 when Sutro first began to plant Sutro Forest until his death in 1898. Sutro's vision for the Sutro Forest reflected late nineteenth century naturalistic landscape design ideals and the era's large-scale afforestation practices. Sutro planted a variety of trees in the late 1800s; eucalyptus became the dominant species and remains the dominant species today. As part of his development of the forest, Sutro appears to have constructed a trail system throughout the Mount Sutro area; the present-day Historic Trail and Fairy Gates Trail were likely created as part of this original trail system.

Since the late nineteenth century, San Franciscans have identified Mount Sutro not only as a geographical feature but as a specific place: a wooded retreat within the city that provides a naturalistic landscape experience and opportunities for recreation. The Reserve appears to be significant as part of the Mount Sutro Cultural Landscape under CRHR Criterion 1 for its association with the history of San Francisco and the informal development of this naturalistic landscape as a recreational area and green space for the city. The period of this significance extends from 1886 to the present.

Archaeological and Historic Features

No archaeological resources have been recorded within the Reserve. Two sites within the Reserve are unofficially associated with Ishi, the name given to the lone survivor of the northern California tribe of Yahi Indians, who lived and worked at the Anthropology Museum on the UCSF Parnassus Heights campus between 1911 and 1916. One site is the large rock outcropping, which creates an overhang located southeast of the Chancellor's residence. The second is a cave located northwest of the Chancellor's residence. UCSF retained an archaeologist to perform archaeological testing and excavation in these areas, but no artifacts that may have been attributable to Ishi were found (Holman & Associates Archaeological Consultants 1998).

Research was conducted on several rock walls and one rock pile that are present on the site to determine their origin and if they qualify as historic or archaeological resources (Denise Bradley and Knapp & VerPlanck Preservation Architects 2013). The rock walls occur along trails and were determined to be low drystone retaining walls constructed to reinforce the trailbed. The rock pile was created by UCSF to store rocks used to stabilize trails within the last 30 years; after this trail maintenance effort was complete, the rock pile was never dismantled. Given the origin

[1] For a property to be considered eligible for listing in the CRHR under Criteria 1 or 2, the property must retain the essential physical features or appearance during the period of its association with the important event, historical pattern, or person. The Mount Sutro Open Space Reserve Cultural Landscape Evaluation Report (2013) put more emphasis on the history and historic contexts associated with Adolph Sutro and the creation of the blue gum eucalyptus forest because key cultural landscape features associated with these aspects of Mount Sutro's history remain. Events and persons associated with Mount Sutro prior to the eucalyptus plantings in the late 1800s were not considered in the evaluation because Mount Sutro no longer retains integrity in relation to this earlier period of history.

and purpose of these features, neither the rock walls nor the rock pile qualify as historic or archaeological resources.

The Nike SF-89 site is not likely eligible for listing in the CRHP since it has no remaining structures or integrity and has been restored to a forest restoration site. Nike Road was a component of the larger missile site, but without the structures or features of the missile site, the road itself lacks significance. The features that led to the building of the road are now gone and portions of the road were removed when all structures associated with the Nike SF-89 site were removed from the summit. Neither the former Nike SF-89 site nor the road would be considered significant historic resources.

Records Search and Sacred Lands File

The Northwest Information Center performed a record search for known cultural resources in the Reserve in January 2008. A records search of the Sacred Lands File was also requested through the Native American Heritage Commission (NAHC) in 2008. No resources were identified during either records search. A more recent search was not undertaken because it is presumed that no other cultural studies have occurred in the Reserve since 2008 due to the University's continuous ownership of the parcel and the designation of the Reserve in 1976 as a permanent open space, which prohibits the construction of any type of structures within the Reserve.

Native American Coordination

Assembly Bill (AB) 52 defines requirements for consultation between the CEQA lead agency and Native American tribes. Recognizing that "California Native American tribes traditionally and culturally affiliated with a geographic area may have expertise concerning their tribal cultural resources" (Public Resources Code [PRC] §21080.3.1(a)), AB 52 requires CEQA lead agencies to provide notice to tribes of a proposed project if the tribe has requested notice by the lead agency for projects proposed in that geographic area.

The University of California requested a tribal consultation list from the NAHC across their entire jurisdiction (all university campus sites) in 2015. The NAHC responded on November 3, 2015 with a list of tribes traditionally and culturally affiliated with the University of California's campus sites. Five tribes traditionally and culturally affiliated with San Francisco County were included on the list:

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

One additional tribe, the Torres Martinez Desert Cahuilla Indians, requested consultation under AB 52 for all projects with the jurisdiction of the University of California. To comply with the requirements of PRC §21080.3.1(d), UCSF mailed AB 52 notification letters to the six tribes on

February 6, 2017. A record of the communication with Native American tribes is provided in Appendix 4.4. No responses were received from any of the tribes.

4.4.3 Regulatory Considerations

University of California, San Francisco

UCSF 2014 LRDP

The 2014 LRDP EIR identifies several measures related to cultural resource discovery. These measures are considered part of the plan and are shown here. References to "construction" in these measures can be seen as equivalent to "activity" as it pertains to the plan. While plan activities are not technically construction, similar types of equipment and methods (e.g., grading, trucking) are employed to carry it out. These measures are considered part of the plan and are shown here.

CUL-LRDP-3: Should an archaeological artifact be discovered during project construction and excavation, pursuant to CEQA Guidelines 15064.5 (f), "provisions for historical or unique archaeological resources accidentally discovered during construction" shall be instituted. In the event that any prehistoric or historic subsurface cultural resources are discovered during ground disturbing activities, all work within 100 feet of the resources shall be halted and UCSF shall consult with a qualified archaeologist or paleontologist to assess the significance of the find (per Public Resource Code Section 5024.1, Title 14 CCR, Section 4852 and/or Public Resource Code 21083.2 in the event of a unique archaeological find). If any find is determined to be significant and will be adversely affected by the project, representatives of UCSF and the qualified archaeologist and/or paleontologist shall meet to determine the appropriate avoidance measures or other appropriate mitigation (per CEQA Guidelines 15064.5 (b) and Public Resource Code 21083.2). All significant cultural materials recovered shall be subject to scientific analysis, professional museum curation, and documented by the qualified archaeologist according to current professional standards (per the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 Federal Register 44716)).

CUL-LRDP-5: If the discovery includes human remains, CEQA Guidelines 15064.5 (e)(1) shall be followed:

1. In the event of the accidental discovery or recognition of any human remains in any location other than a dedicated cemetery, the following steps should be taken:
2. There shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until:
    a. The coroner of the county in which the remains are discovered must be contacted to determine that no investigation of the cause of death is required, and
    b. If the coroner determines the remains to be Native American: (1) the coroner shall contact the Native American Heritage Commission within 24 hours. (2) The Native American Heritage Commission shall identify the person or persons it believes to be the most likely descended from the deceased Native

American. (3) The most likely descendent may make recommendations to the landowner or the person responsible for the excavation work, for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods as provided in Public Resources Code Section 5097.98, or

3. Where the following conditions occur, the landowner or his authorized representative shall rebury the Native American human remains and associated grave goods with appropriate dignity on the property in a location not subject to further subsurface disturbance.
   a. The Native American Heritage Commission is unable to identify a most likely descendent or the most likely descendent failed to make a recommendation within 24 hours after being notified by the commission.
   b. The descendant identified fails to make a recommendation; or
   c. The landowner or his authorized representative rejects the recommendation of the descendant, and the mediation by the Native American Heritage Commission fails to provide measures acceptable to the landowner.

Federal

No federal regulations are relevant to the analysis of impacts on cultural and tribal cultural resources for the proposed plan.

State

Cultural resources in the State of California are recognized as non-renewable resources that require management to assure their benefit to present and future Californians. Cultural resources are generally defined as prehistoric and historic sites, structures, landscapes, districts, and any other physical evidence associated with human activity considered important to a culture, a subculture, or a community for scientific, traditional, religious or any other reason. Cultural resources in CEQA are commonly categorized as either historical, archaeological, or tribal cultural resources because CEQA requires an analysis of a project's effect on historical and archaeological resources.

Historical Resources

CEQA's provisions governing analysis of historical resources are set forth in PRC §21084.1 and CEQA Guidelines Section 15064.5(a)-(b). CEQA includes objects of historical significance in its definition of "environment" (PRC §21060.5). Per CEQA Guidelines Section 15064.5, the term "historical resources" is defined as:

4. A resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the CRHR.
5. A resource included in a local register of historical resources or identified as significant in a historical resources survey shall be presumed to be historically or culturally significant. Public agencies must treat any such resource as significant unless the preponderance of evidence demonstrates that it is not historically or culturally significant.

6. Any object, building, structure, site area, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be a historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a cultural resource shall be considered by the lead agency to be "historically significant" if the resource meets the criteria for listing on the CRHR, including the following:
   a. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
   b. Is associated with the lives of persons important in our past;
   c. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
   d. Has yielded, or may be likely to yield, information important in prehistory or history.

Potential eligibility for the CRHR involves a consideration of the integrity of the resource (i.e., the retention of the resource's physical identity that existed during its period of significance). Integrity is determined through consideration of the setting, design, workmanship, materials, location, feeling, and association of the resource.

Archaeological Resources

CEQA includes detailed standards governing the analysis of impacts on archaeological resources (PRC §21083.2; CEQA Guidelines Section 15064.5(c)-(f)). If the lead agency determines that a project may have a significant effect on unique archaeological resources, the analysis must address those archaeological resources (PRC §21083.2(a)). An environmental document need not address effects on archaeological resources that are not unique (PRC §21083.2(a), (h)). The term "unique archaeological resource" under PRC §21083.2(g) refers to 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, or
3. Is directly associated with a scientifically recognized important prehistoric or historic event or person.

Tribal Cultural Resources

AB 52, enacted in September 2014, recognizes that California Native American tribes have expertise with regards to their tribal history and practices. The bill established a new category of cultural resources known as tribal cultural resources to consider tribal cultural values when

determining impacts on cultural resources. Tribal cultural resources have the following meaning under PRC §21074(a):

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:
   d. Included or determined to be eligible for inclusion in the CRHR.
   e. Included in a local register of historical resources as defined in PRC §5020.1(k).
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 PRC §5024.1(c). In applying the criteria set forth in PRC §5024.1(c), the lead agency shall consider the significance of the resource to a California Native American tribe.
3. A cultural landscape that meets the criteria of PRC §21074(a) is also a tribal cultural resource if the landscape is geographically defined in terms of the size and scope.
4. A historical resource as described in PRC §21084.1, a unique archaeological resource as defined in PRC §21083.2, or a non-unique archaeological resource as defined in PRC §21083.2 may also be a tribal cultural resource if it meets the criteria of PRC §21074(a).

Local

San Francisco General Plan
The San Francisco General Plan contains policies related to the preservation of cultural resources, including:

Recreation and Open Space Element
Objective 1, Policy 1.12 Preserve historic and culturally significant landscapes, sites, structures, buildings and objects.

Environmental Protection Element
Objective 2, Policy 4 Preserve notable landmarks and areas of historic, architectural or aesthetic value, and promote the preservation of other buildings and features that provide continuity with past development.

4.4.4 Significance Standards and Methodology

Significance Criteria

Impacts of the proposed plan on cultural and tribal cultural resources would be considered significant if implementation of the plan would exceed the following standards of significance, in accordance with Appendix G of the State CEQA Guidelines and the UC CEQA Handbook:

1. Cause a substantial adverse change in the significance of a historic resource as defined in Section 15064.5;

2. Cause a substantial adverse change in the significance of an archaeological resource as defined in Section 15064.5;
3. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature;
4. Disturb any human remains, including those interred outside of formal cemeteries; or
5. Cause a substantial adverse change in the significance of a tribal cultural resource as defined in PRC § 21074.

The IS for the proposed plan determined that the plan's effect on historical, archaeological, and tribal cultural resources should be evaluated in the EIR. These topics are analyzed in this section.

Issues Adequately Addressed in the Initial Study

The IS for the proposed plan found that implementation of the plan would have a less than significant impact on paleontological resources and human remains. These issues are not discussed further in this section.

Analysis Methodology

Historical, Archaeological, and Tribal Cultural Resources

Apart from the Mount Sutro Cultural Landscape (see discussion below), no known historical, archaeological, or tribal cultural resources have been identified within the Reserve. The impact analysis therefore focuses on potential impacts on previously undiscovered cultural resources in the plan area. Potential impacts on cultural resources are assessed first by determining whether the resource is considered significant pursuant to CEQA Guidelines Section 15064.5 (i.e., meets the criteria for a CRHR-eligible, unique archaeological, or tribal cultural resource). Impacts on CRHR-eligible, unique archaeological, and tribal cultural resources are considered significant if proposed vegetation management activities would physically damage, destroy, relocate, or alter a resource or its immediate surroundings such that the significance of the resource would be materially impaired.

Mount Sutro Cultural Landscape

Impacts on the Mount Sutro Cultural Landscape are assessed based on the effects that the proposed vegetation management activities may have on the integrity of the character-defining features of the landscape. There are three categories of character-defining features within the Mount Sutro Cultural Landscape that convey its historical significance:

1. **Eucalyptus-Dominant Forest (vegetation features).** Includes the presence of a predominantly eucalyptus forest that covers the overwhelming majority of the Reserve.
2. **Trail System (circulation features).** Includes the Historic and Fairy Gates Trails as part of a consciously laid out trail system and the presence of informal or social trails developed over time that provide connections into the Reserve from the surrounding neighborhoods.

3. **Topography (natural features).** Includes the steep terrain, rock outcrops, Stanyan Canyon, and the summit.

Impacts are considered significant if proposed vegetation management activities would adversely affect the characteristics that contribute to the cultural landscape's CRHR eligibility.

4.4.5 Impacts

Impact Cultural-1: The proposed plan could cause a substantial adverse change in the significance of a historic resource as defined in Section 15064.5.	Significance Determination
	Less than significant

Vegetation Management Activities

Mount Sutro Cultural Landscape

Overview

One known historic resource, the Mount Sutro Cultural Landscape, occurs within the Reserve. Impacts on the Reserve are described in relation to the three character-defining features that convey its historical significance: eucalyptus-dominant forest, trail system, and topographic features.

Eucalyptus-Dominant Forest

Forest treatments, including seed tree, group selection, and individual tree selection methods, would be implemented and defensible space would be managed as part of the proposed plan. Ideally, these silvicultural treatments would help create a healthy, safe, and self-regenerating forest. The creation of forest openings through the implementation of seed tree and group selection methods would introduce sunlight and reduce competition for nutrients and water, resources necessary for eucalyptus to regenerate (refer to Section 3.5: Forestry Resources). New, healthy eucalyptus seedlings would be planted throughout all phases of the plan and in all forest types to establish the next generation of blue gum eucalyptus trees, maintaining the Reserve as a eucalyptus-dominant forest. Starting in Phase III (Year 11), native tree (e.g., coast live oak, bay laurel) and eucalyptus seedlings would be planted at a 1:1 ratio to increase biodiversity in the Reserve; however, the forest would remain dominated by eucalyptus because some old trees would remain, and eucalyptus seedlings planted prior to Phase III would have ample time to establish. While the appearance of the Reserve may change over time as dead and dying trees are removed and new trees grow, the Reserve would remain a eucalyptus-dominated forest. The implementation of forest treatments and management of defensible space would not change the eucalyptus-dominant forest such that the forest would no longer contribute to the CRHR-eligibility of the Mount Sutro Cultural Landscape. Impacts on the character-defining eucalyptus forest would be less than significant.

Native plant restoration would only occur within the understory of the forest. Enhancing existing remnant native plant communities and increasing the overall area of native plant communities from 2 to 5 acres would not reduce or replace eucalyptus trees in the forest canopy. No impact would occur to the character-defining eucalyptus forest.

Existing and approved trails (i.e., Clarendon, Sunset, and Christopher Trails) in the Reserve would be maintained through trimming vegetation encroaching on trails. Trimming understory vegetation would have no impact on the eucalyptus canopy of the character-defining forest.

Trail System

The trail system in the Reserve contributes to both the designed and vernacular landscape characteristics of Mount Sutro. Damage to trails, removal of trails, or converting them to non-trail use would be a significant impact on the trails' contribution to the CRHR-eligibility of the Mount Sutro Cultural Landscape.

The Quarry Road Trail, South Ridge Trail, and part of the East Ridge Trail would be altered for equipment access during implementation of vegetation management activities. The South Ridge Trail is currently 15 feet wide, which is sufficient for equipment access; however, two small trees would be removed from the edge of the South Ridge Trail to accommodate equipment. The Quarry Road and part of the East Ridge Trail would be widened to a maximum of 10 feet. The removal of two small trees and trail widening would not change the use of the trails. Widening the trails would allow for easy passage of pedestrians, dog-walkers, and cyclists, consistent with the proposed plan. Impacts from trail widening would be less than significant.

The use of heavy equipment on the Quarry Road, South Ridge, and East Ridge Trails could cause rutting or other damage to the trails, resulting in a potentially significant impact. **MM Geology-1: Erosion Control Best Management Practices** (refer to Section 3.6: Geology and Soils) requires UCSF to implement BMPs such as installing water bars and using natural materials or mats to avoid rutting. Impacts on trails would be less than significant with implementation of **MM Geology-1: Erosion Control Best Management Practices**.

Sections of all trails in the Reserve could be temporarily closed for safety purposes during forest treatments and management of tree risk and defensible space. Trails would remain open near trail maintenance and native restoration areas because trail users could safely pass while these vegetation management activities are being implemented. Temporary trail closures would be restricted to those trails in the immediate vicinity of tree removal operations; all other trails in the Reserve would remain open for public use. The temporary closure of small sections of trails would not remove the trails from public use that comprise a landscaping-defining feature; impacts from trail closures on the historical significance of the cultural landscape would be less than significant.

Topographic Features

The plan would involve removing trees, planting seedlings and native species, and maintaining trails within the Reserve. None of these activities would involve altering the land such that Mount Sutro would no longer be a prominent point in San Francisco or such that rock outcroppings within the Reserve or Stanyan Canyon would be recontoured or removed from the landscape. Temporary landing areas would be created and trails would be widened to facilitate tree removal for forest treatments and maintenance of tree risk and defensible space. Landing areas would be located in areas of the Reserve that are currently flat or nearly flat, and

only minor grading would be necessary to flatten surfaces to stage equipment and logs. Trail widening would involve vegetation removal and minor grading or blading to smooth the ground surface to accommodate equipment. The creation of temporary landing areas and widening of trails would not change the characteristic topographic features of the Reserve (i.e., steep topography, Stanyan Canyon, rock outcroppings, summit) that contribute to its CRHR eligibility. Impacts would be less than significant.

Previously Undiscovered Historic Resources

The records searches conducted by the NAHC and Northwest Information Center did not identify any historic resources in the plan area; however, previously undiscovered historic resources may still be present in the Reserve. Proposed vegetation management activities, including forest treatments, management of tree risk and defensible space, native plant restoration, and trail maintenance, would include ground disturbance that could expose previously undiscovered historic resources that can be found on or below the ground surface. Vegetation management activities would include the use of heavy equipment during tree removal and hand shovels or augers during native plant restoration and trail maintenance that could damage a previously undiscovered historic resource, resulting in a significant impact. UCSF is required to implement **CUL-LRDP-3** as part of the 2014 LRDP, which requires UCSF to halt work within 100 feet of a resource if a resource is discovered, evaluate the resource, and avoid or implement other measures to protect any CRHR-eligible resources. Impact on previously undiscovered CRHR-eligible historic resources would be less than significant with implementation of **CUL-LRDP-3**; no additional mitigation is required.

Comparison of Impacts Across Phases

The impacts on the Mount Sutro Cultural Landscape would not be significant when considered by phase. Phase I would result in more intensive work activities and areas of greatest tree removal than succeeding years; however, given the temporary nature of the work, the overall impact on the cultural landscape would not be significant. The work would be performed to maintain the forest as a eucalyptus-dominant forest, although the greatest reduction in eucalyptus may occur during Phase I. Phase II and Phase III tree removal areas are not currently known and would depend on the results of Phase I work; however, tree removal, tree planting, and restoration efforts during Phases II and III would encourage the forest to regenerate and the overall health of the forest would improve. Impacts on the historic significance of the forest would not be significant for any phase of work.

As previously discussed, vegetation management activities would involve ground disturbance that could significantly impact a previously undiscovered historic resource. **CUL-LRDP-3**, which UCSF is required to implement as part of the proposed plan, would reduce the impact to less than significant.

Impact Cultural-2: The proposed plan could cause a substantial adverse change in the significance of an archaeological resource as defined in Section 15064.5.	Significance Determination
	Less than significant

Vegetation Management Activities

The records searches conducted by the NAHC and Northwest Information Center did not identify any archaeological resources in the plan area; however, previously undiscovered archaeological resources may still be present in the Reserve. Proposed vegetation management activities, including forest treatments, management of tree risk and defensible space, native plant restoration, and trail maintenance, would include ground disturbance that could expose previously undiscovered historic resources that can be found on or below the ground surface. Ground-disturbing activities would include:

- Vegetation clearing and grading for trail widening (access roads) and creation of temporary landing areas
- Use of heavy equipment during tree removal
- Use of hand shovels and/or augers during native plant restoration and trail maintenance

These ground-disturbing activities could damage a previously undiscovered archaeological resource, resulting in a significant impact. UCSF is required to implement **CUL-LRDP-3**, included in the 2014 LRDP, which includes halting work within 100 feet of a resource if a resource is discovered, evaluating the resource, and avoiding or implementing other measures to protect any significant resources. The impact on previously undiscovered archaeological resources would be less than significant with implementation of **CUL-LRDP-3**; no additional mitigation is required.

Comparison of Impacts Across Phases

Phase I would result in the greatest area of ground disturbance due to grading of landing areas and widening of trails in addition to the greatest amount of tree removal for forest treatments and the removal of hazardous trees. Phases II and III would disturb smaller areas of the Reserve. Ground disturbance during all three phases has the potential to damage a previously undiscovered archaeological resource, resulting in a significant impact. UCSF is required to implement **CUL-LRDP-3** as part of the 2014 LRDP. The impact on previously undiscovered archaeological resources would be less than significant with implementation of **CUL-LRDP-3**. No further mitigation is required.

Impact Cultural-3: The proposed plan could cause a substantial adverse change in the significance of a tribal cultural resource as defined in PRC §21074.	Significance Determination
	Less than significant

Vegetation Management Activities

On February 6, 2017, UCSF sent out formal AB 52 consultation letters to tribes identified by the NAHC to be traditionally and culturally affiliated with the proposed plan area. No comments

or requests for consultation were received. While no known tribal cultural resources are present in the Reserve, implementation of the proposed plan has the potential to significantly impact a previously undiscovered tribal cultural resource during ground-disturbing activities for forest treatments, management of tree risk and defensible space, native plant restoration, and trail maintenance (refer to Impacts Cultural-1 and Cultural-2). UCSF is required to implement **CUL-LRDP-3** from the 2014 LRDP, which includes halting work if a resource is discovered, evaluating the resource, and treating the resource to protect it from adverse effects. If human remains are unearthed during the implementation of vegetation management activities, UCSF is required to implement **CUL-LRDP-5** from the 2014 LRDP, which includes halting work, contacting the San Francisco County Coroner to examine the remains, and contacting the NAHC to identify the most likely descendant if the remains are determined to be Native American. Impacts on tribal cultural resources would be less than significant with implementation of **CUL-LRDP-3** and **CUL-LRDP-5**; no additional mitigation is required.

Comparison of Impacts Across Phases

Phase I would result in the greatest area of ground disturbance due to grading of landing areas and widening of trails in addition to the greatest amount of tree removal for forest treatments and the removal of hazardous trees. Phases II and III would disturb smaller areas of the Reserve. Ground disturbance during all three phases has the potential to damage a previously undiscovered tribal cultural resource, resulting in a significant impact. UCSF is required to implement **CUL-LRDP-3** and **CUL-LRDP-5** as part of the 2014 LRDP. The impact on previously undiscovered archaeological resources would be less than significant with implementation of **CUL-LRDP-3** and **CUL-LRDP-5**. No further mitigation is required.

Impact Cultural-4: The proposed plan could result in significant impacts on cultural resources in combination with past, present, and probable future development in the cumulative analysis study area.	**Significance Determination**
	Less than significant contribution

Geographic Scope

The geographic extent for the cultural resources cumulative analysis would encompass the culturally significant Mount Sutro Cultural Landscape, including the Reserve and the Interior Greenbelt. The proposed plan is not located in a historic or archaeological district.

Cumulative Analysis

Known Cultural Resources

Cumulative projects located within or adjacent to the Mount Sutro Cultural Landscape are Building Demolition (#1), Surge, Woods, and EHS Open Space Restoration (#8), Mount Sutro Reserve Improvements (#9), Kirkham Project (#15), Overlook Project (#16), and SNRA Management Plan (#17). The Mount Sutro Reserve improvements would include construction of three new trails. Management activities within the Interior Greenbelt would involve tree removal, invasive species removal, erosion control measures, and reintroduction of sensitive plants. Impacts on the Mount Sutro Cultural Landscape are described in relation to the three character-defining features that convey its historical significance: eucalyptus-dominant forest,

trail systems, and topographic features. Although tree removal and new trails would be constructed as part of the cumulative projects, these activities would not substantially change the eucalyptus dominance of the forest. The addition of new trails would not substantially affect the historical function of existing trails. Minor changes to the topography of the Interior Greenbelt and adjacent parcels (Kirkham Project [#15] and Overlook Project [#16]) would occur but would not substantially affect the cultural landscape. The implementation of vegetation management activities and construction of new trails as part of the cumulative projects would not change the forest composition or topographic features such that the forest would no longer contribute to the CRHR-eligibility of the Mount Sutro Cultural Landscape. Cumulative impacts would not occur.

Undiscovered Cultural Resources

Construction of the cumulative projects and implementation of the proposed plan could damage previously undiscovered CRHR-eligible cultural resources. If several unique archaeological or paleontological resources or human burials are all damaged by various construction projects, it could result in the loss of cultural or earth history, which would be considered a cumulatively significant impact. The proposed project's contribution to a significant cultural resources cumulative impact could be considerable.

UCSF is required to implement **CUL-LRDP-3** and **CUL-LRDP-5** as part of the 2014 LRDP, which requires UCSF to halt work if a resource is discovered, evaluate the resource, and avoid or implement other measures to protect any CRHR-eligible resources or human remains. The proposed plan would have a less than considerable contribution to the potentially significant cumulative impact on cultural resources with the incorporation of **CUL-LRDP-3** and **CUL-LRDP-5**.

4.4.6 Mitigation Measures

No mitigation measures would be required to reduce impacts to less than significant.

4.4.7 References

Baldwin, A.S. 1910. "Estate of Adolph Sutro [album]." San Francisco, California.

Bancroft, A.L. 1881. "Bancroft's Official Guide Map of City and County of San Francisco." A.L. Bancroft & Co.

Birnbaum, Charles A. 1994. "Protecting Cultural Landscapes: Planning, Treatment and Management of Historic Landscapes." *Preservation Briefs 36.* U.S. Department of the Interior, National Parks Service Cultural Resources, September.

Davidson, Russ. 2012. "Adolph Sutro as Book Collector." *California State Library Foundation Bulletin*, 6-37.

Denise Bradley and Knapp & VerPlanck Preservation Architects. 2013. "Final Mount Sutro Open Space Preserve Cultural Landscape Evaluation Report." *Prepared for University of California, San Francisco Campus Planning.* January 10.

Groenendaal, Gayle. 1983. *Part 1. History of Eucalypts in California: Eucaluptus Helped Solve a Timber Problem: 1853-1880.* Berkeley, California: Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S., Department of Agriculture.

Holman & Associates Archaeological Consultants. 1998. "Summary of Findings of the Archaeological Testing of the Proposed Handicapped Access Ramp at the Chancellor's Residence near the Rock Shelter Known as Ishi's Cave."

Ryder, E.S. 1896. "A Forest of Over a Million Trees in the Heart of San Francisco." *San Francisco Chronicle*, October 18.

Sutro, Adolph. 1895. "Letter to the Regents of the University of California and to the Committee of Affiliated Colleges on the Selection of a Site for the Affiliated Colleges."

Vieno, J.E. 1909. "Consolidated Eucalyptus Co. Explains Sutro Timber Contract." *San Francisco Chronicle*, March 27.

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4.5 FORESTRY RESOURCES

4.5.1 Introduction

This section describes the existing forestry resources in the plan area and an evaluation of the potential impacts on forestry resources from implementation of the proposed vegetation management activities. The section also provides a discussion of the applicable federal, state, regional, and local regulations that pertain to forestry resources. The impacts associated with the proposed plan are compared with the thresholds of significance used by the University pursuant to CEQA.

Comments related to forestry resources received during the public scoping process included concerns about the following:

- Conversion of the existing forest to non-forest use
- Impacts on the forest from vegetation management activities

4.5.2 Environmental Setting

Description of the Forest

The Reserve is considered a non-native forest in the UCSF 2014 LRDP. The Reserve hosts a forest dominated by blue gum eucalyptus. Blackwood acacia, Monterey cypress, and Monterey pine are also present in the canopy. Understory in the Reserve is mostly Himalayan blackberry, poison oak, non-native ivy, and red elderberry. Approximately 25 percent of the standing trees in the Reserve are dead, and live trees have been stressed by drought and forest pathogens. The upper crowns of most of the mature live trees have died back, resulting in live crown ratios of 20 to 30 percent across the forest. Little to no sprouting or natural regeneration is present.

Several remnant communities of native plants are present in the Reserve and include vegetation such as California sagebrush, sticky monkeyflower, and cow parsnip. Other native trees and shrubs planted during restoration efforts include California buckeye, toyon, and red elderberry.

Forest Functions and Values

The Reserve supports several forest functions and values, including undeveloped landscape that supports various plants and wildlife, open space that provides recreational opportunities and respite from the surrounding urban environment, and a unique visual experience characterized by the canopy and understory of the forest. The forest is not currently actively managed other than for safety and does not provide timber or harvest wood.

4.5.3 Regulatory Considerations

University of California, San Francisco

UCSF 2014 LRDP

The 2014 LRDP contains the following objective related to forestry resources:

Objective F — Preserve the Mount Sutro Open Space Reserve as permanent open space, and serve as the steward of the Reserve by maintaining and expanding the trail system and by ensuring the safety of visitors and neighboring structures

Federal

No federal regulations are relevant to the analysis of impacts on forestry resources for the proposed plan.

State

Forestry resources are defined in the PRC and California Government Code. Defined under PRC §12220(g), forest land is "land that can support 10 percent native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits."

Local

No local laws or regulations are relevant to the analysis of impacts on forestry resources for the proposed plan.

4.5.4 Significance Standards and Methodology

Significance Criteria

Impacts of the proposed plan on forestry resources would be considered significant if implementation of the plan would exceed the following standards of significance, in accordance with Appendix G of the State CEQA Guidelines and the UC CEQA Handbook:

1. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in PRC § 12220(g)), timberland (as defined in PRC § 4526), or timberland zoned Timberland Production (as defined in Government Code Section 51104(g));
2. Result in the loss of forest land or conversion of forest land to non-forest use; or
3. Involve other changes in the existing environment that, due to their location or nature, could result in conversion of forest land to non-forest use.

The IS for the proposed plan determined that the loss or conversion of forest land should be evaluated in the EIR. While the Reserve does not currently support at least 10 percent native tree cover, it is currently managed for more than one forest resource (e.g., recreation). Impacts on forest land are analyzed in this section.

Issues Adequately Addressed in the Initial Study

The IS found that the Reserve would not conflict with existing zoning or cause rezoning of timberland, timberland zoned Timberland Production, or forest land (item 1, above). This topic is not addressed further in the EIR.

Analysis Methodology

The analysis of impacts on forestry resources focuses on whether implementation of the proposed plan would remove forest land or convert the existing forest to non-forest use. Impacts consider if the forest would be affected as a whole; impacts on, for example, individual trees are not assessed because many individual trees constitute a forest. Impacts on portions of the forest, such as an area that would be treated using group selection, are also considered in context of the entire Reserve since the Reserve and the forest resources provided by the Reserve would be managed as a whole.

4.5.5 Impacts

Impact Forestry-1: The proposed plan could result in the loss of forest land or conversion of forest land to non-forest use.	**Significance Determination**
	Less than significant

Vegetation Management Activities

Overview

No permanent structures are allowed in the Reserve per the 1976 Regents' Resolution, which stated that the Mount Sutro Open Space Reserve was to be designated as permanent open space and kept free of any permanent structures or facilities except footpaths and appropriate landscape construction intended to enhance its use as a natural area. The plan does not include the construction of any new buildings or parking structures within the Reserve; no areas of the Reserve would be converted to non-forest use for the construction of new facilities.

Forest Treatments

Silviculture is the "art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society such as wildlife habitat, timber, water resources, restoration, and recreation on a sustainable basis" (USFS 2017). Silvicultural treatments are prescribed to enhance growth and quality of a forest while promoting forest regeneration; the treatments are not meant to convert forest to non-forest use. Silvicultural treatments, including seed tree, group selection, individual tree selection, and tree planting, would be implemented as part of the proposed plan to regenerate eucalyptus in the Reserve. Forest treatments could result in changes to the composition and appearance of the forest by removing dead, dying, unhealthy, and structurally unsound trees from the Reserve. To create a healthy and, ideally, self-regenerating forest, tree density would decrease in Forest Types 1, 3, and 4, and tree density would increase in Forest Type 2, over the 20-year implementation period of the plan.

Seed tree and group selection treatments would be utilized to establish a mosaic of small forest openings throughout the Reserve. Blue gum eucalyptus is shade intolerant and requires full sunlight to germinate and grow in the early stages of life; failure to regenerate in the absence of fire is related to low light intensities (Esser 1993). The introduction of forest openings, both temporarily during the first few years of the treatments and permanently to manage the health of the forest, would encourage newly planted seedlings to become established. The removal of dead and dying trees would also reduce stress on remaining trees in the forest; reducing tree density would reduce competition for vital resources including sunlight, nutrients, and moisture (UC Davis, Division of Agriculture and Natural Resources 2007). New, healthy seedlings would be planted to establish the next generation of blue gum eucalyptus trees, which would maintain the Reserve as a forest. While the appearance of the Reserve may change over the 20 years of plan implementation (refer to Section 4.1: Aesthetics), the removal and planting of eucalyptus, the reduction in density of trees, and the introduction of canopy openings across the Reserve would not convert the forest to a non-forest use; rather, the forest would be managed to ensure healthy regeneration. Impacts on the forest would be less than significant.

The creation of forest openings through the implementation of seed tree and group selection could temporarily alter some of the values of the forest, such as visual appeal as a forest. Impacts on values of the forest in seed tree and group selection treatment areas would be temporary as the areas regrow, and the areas where treatments would occur would continue to function as a forest with trails for recreationalists and habitat for wildlife. The plan also includes adaptive strategies including testing soils for their ability to support regrowth and using soil amendments if needed, as well as water, if needed. The openings created during forest treatments would not introduce a change in use of the forest or transform forest land into non-forest uses.

Forest treatments would also include planting a small number of native trees starting in Year 11 (Phase III) of plan implementation. Native trees would be planted after eucalyptus become established during Years 1 through 10 and would not interfere with early development of newly planted eucalyptus. The addition of native trees would not convert the forest to non-forest use or convert the forest from a eucalyptus-dominant forest; rather, planting native trees would serve to increase the biodiversity of the forest canopy within the Reserve. No impact would occur.

Non-native understory would also be removed as part of forest treatments. Species such as Cape ivy and Himalayan blackberry would be removed by hand or using equipment. Areas where non-native understory would be removed would be planted with eucalyptus, restored with native plants, or covered in mulch. While the appearance of the forest would be altered by the removal of ivy and blackberry (refer to Section 4.1: Aesthetics), the removal of non-native understory would not change the forest to non-forest use. No impact would occur.

Management of Tree Risk and Defensible Space

To ensure public safety, select structurally unsound trees would be removed from the forest during vegetation management activities. Defensible space would be maintained within 100 feet

of buildings adjacent to the Reserve by removing flammable ground vegetation and pruning trees. The removal of individual structurally unsound trees and tree pruning would not convert the forest to non-forest use. No other permanent structures or uses would be permitted in areas where trees are removed. No impact would occur.

Native Plant Restoration
Several remnant shrub, forb, and grass native plant communities are present in the Reserve. Existing communities would be enhanced and the overall area of native plant communities would be increased from approximately 2 to 5 acres through planting. Native shrubs, forbs, and grasses would be planted to enhance biodiversity in the understory; native plants would not replace eucalyptus or other trees in the forest canopy. The forest would not be converted to non-forest use, and no impact would occur.

Maintenance of Vegetation along Trails and Public Access
Vegetation would be trimmed within 5 feet of existing and approved trails within the Reserve, and non-woody vegetation would be trimmed to a height of 3 feet in order to maintain sight lines through the forest. Trail maintenance would be consistent with UCSF's goal to maintain the Reserve as an open space for public use. While some vegetation would be removed to widen trails and maintain sight lines, the removal of vegetation for trail maintenance would not alter the character of the forest or convert the forest to non-forest use. No impact would occur.

Comparison of Impacts Across Phases

The greatest number of trees would be removed during Phase I of the plan; Phase I would therefore have the greatest impact on the character and value of the forest. Forest openings from group selection and seed tree treatments would be created during all phases of the plan. Impacts on the character and value of the forest would not be permanent because planted eucalyptus and native trees (eucalyptus would be planted in all phases of the plan while native trees would be planted during Phases II and III) would grow to fill the openings. The intent of the tree removal would be to promote a healthy forest on the Reserve rather than convert the forest to a non-forest use. Healthy eucalyptus and native trees would be planted and maintained to ensure the longevity and vitality of the forest. Impacts on the forest would be less than significant.

Impact Forestry-2: The proposed plan could involve other changes in the existing environment that, due to their location or nature, could result in conversion of forest land to non-forest use.	**Significance Determination**
	No impact

The proposed vegetation management activities would involve the removal of dead, dying, unhealthy, and structurally unsound trees to promote forest regeneration and maintain public safety; planting native species in the understory to increase biodiversity; and maintaining trails for public use. As discussed under Impact Forestry-1 above, the plan would not result in the conversion of forest land to non-forest use. No impact would occur.

Impact Forestry-3: The proposed plan could result in significant impacts on forestry resources in combination with past, present, and probable future development in the cumulative analysis study area.	Significance Determination
	No contribution

Geographic Scope

The geographic extent for the analysis of cumulative impacts associated with forestry resources would encompass the Reserve and forested areas contiguous with the Reserve, including the Interior Greenbelt. The Reserve is identified by UCSF as a non-native forest, and the Interior Greenbelt is identified as an urban forest by the San Francisco Recreation and Park Department.

Cumulative Analysis

Two of the cumulative projects (Mt. Sutro Reserve Improvements [#9] and SNRA Management Plan [#17]) could result in tree removal within existing forested areas due to construction of new trails and land management activities. Trees removed as part of these cumulative projects and the proposed plan would not result in the conversion of forest land to non-forest use. The cumulative projects in combination with the proposed plan would not result in substantial loss or conversion of forest land to a non-forest use. No cumulative impacts would occur.

4.5.6 Mitigation Measures

No mitigation measures would be required to reduce impacts to less than significant.

4.5.7 References

Esser, Lora L. 1993. "Index of Species Information, Species: Eucalyptus globulus." Fire Effects Information System (FEIS), U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Accessed February 27, 2017. https://www.fs.fed.us/database/feis/plants/tree/eucglo/all.html.

University of California (UC) Davis, Division of Agriculture and Natural Resources. 2007. "Publication 8235, Forest Stewardship Series 5: Tree Growth and Competition." Agriculture and Natural Resources Publications.

4.6 GEOLOGY AND SOILS

4.6.1 Introduction

This section describes the existing geology and soils of the plan area and evaluates the potential impacts on geology and soils from implementation of the proposed vegetation management activities. The section also provides a discussion of the applicable federal, state, regional, and local regulations pertaining to geology and soils. The impacts associated with the proposed plan are compared with the thresholds of significance used by the University pursuant to CEQA.

Comments related to geology and soils received during the public scoping process included concerns about the following:

- Potential for increased risk of landslides during and following vegetation management activities
- Potential for erosion and loss of topsoil during and following vegetation management activities

4.6.2 Environmental Setting

Physiography and Topography

San Francisco is located at the northern tip of the San Francisco Peninsula within the Coast Ranges geologic province. The Coast Ranges is a northwest-trending series of mountain ranges and valleys that were created through tectonic forces associated with the plate margin. The San Francisco Bay, which was formed within a shallow, regional structural depression, is the predominant feature in the area that separates smaller northern and southern mountain ranges. Much of the Coast Range province is composed of marine sedimentary and volcanic rocks that form the Franciscan Complex, which underlays areas east of the San Andreas Fault including the San Francisco Peninsula. The Franciscan Complex generally consists of graywacke (sandstone), shale, chert, greenstone, and melange; in certain places, serpentine, an asbestos-containing rock-type, is found within the shale matrix.

San Francisco is generally characterized by bedrock hills bounded by broad valleys and underlain by unconsolidated deposits. Bedrock outcrops in hilly areas account for approximately 24 percent of the land surface in San Francisco.

The Reserve is located on Mount Sutro at elevations of 418 to 909 feet above mean sea level. Slopes in the Reserve range from 0 to 87 percent (grade), which are considered very to extremely steep. Approximately 60 percent of the Reserve is located on slopes that are 30 percent (grade) or greater.

Geologic Units

Bedrock on Mount Sutro is present at or very near the ground surface and is locally overlain by surficial materials (colluvium and shallow landslides) within drainages that have developed

along mountain flanks. The Reserve is underlain by Franciscan Complex bedrock comprised of chert, greenstone, meta-sandstone, and shale. Naturally occurring asbestos fibers are more associated with the mineral chrysotile commonly found in serpentinite; however, given the shallow depth to bedrock and the nature of the formation, it is assumed that asbestiform rocks may also occur. Greenstone in the Reserve is generally fractured, weathered, and altered to clay minerals where exposed to weathering, making it prone to landslides. Mapped geologic units on Mount Sutro are shown on shown on Figure 4.6-1.

Soil Types

Soils on Mount Sutro are generally thin and composed of sandy material. Less than one percent of the Reserve is located on cut and fill complex where urban development is located at the periphery (USDA 2017). The Reserve is almost entirely mapped as the Candlestick-Kron-Buriburi soil complex consisting of fine sandy loam, sandy loam, and gravelly loam (USDA 2017). The constituent soil types of this complex likely occupy different areas in the Reserve. The depth of soils on Mount Sutro are shallow and highly variable due to the steep slopes and presence of ridges and valleys. The depth of Candlestick fine sandy loam ranges from approximately 20 to 40 inches over bedrock, whereas Buriburi gravelly loam and Kron sandy loam range from approximately 10 to 40 inches over bedrock (USDA 2017). Mapped soil types on Mount Sutro are shown on Figure 4.6-2.

Geologic Hazards

Soil Erosion

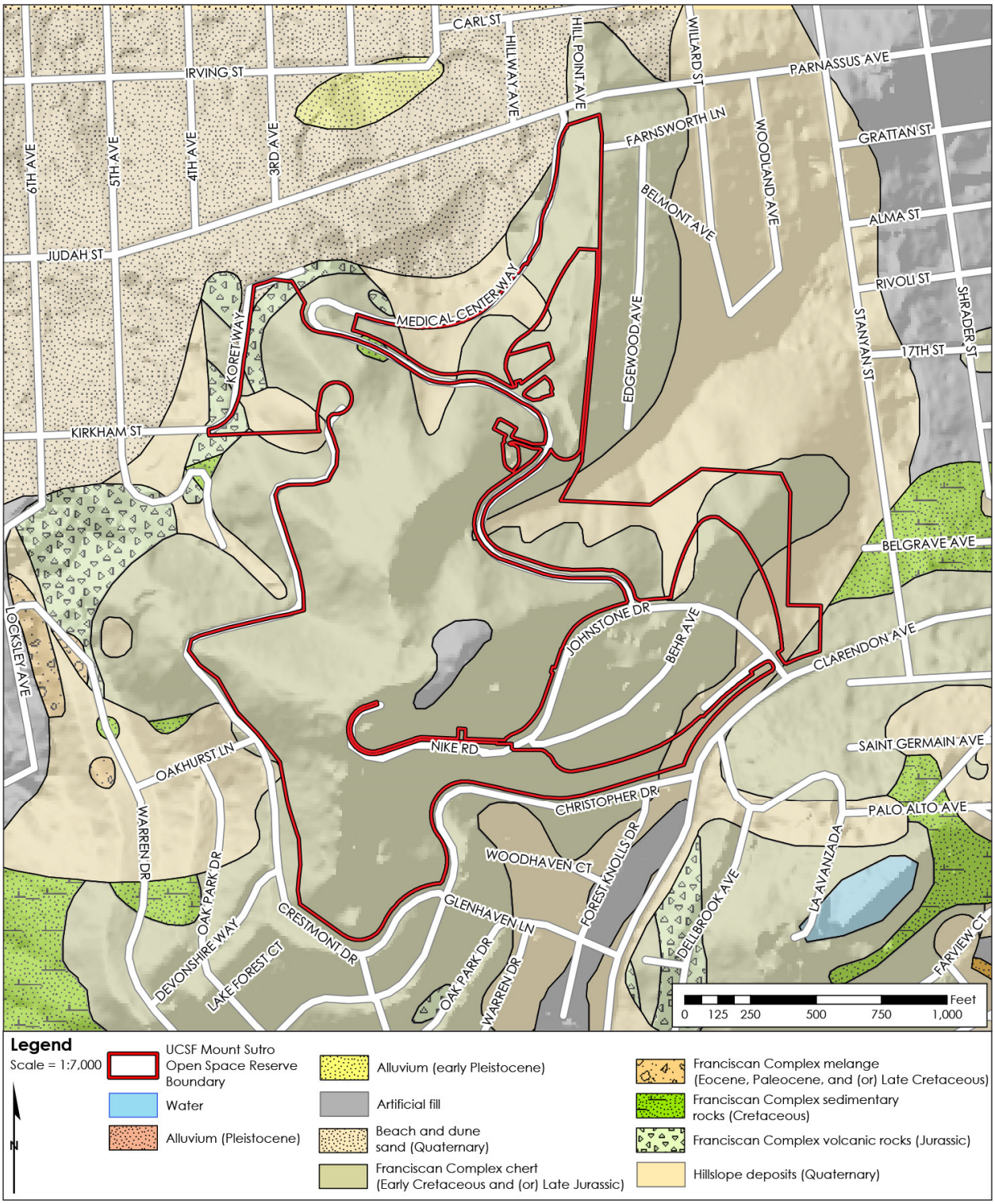
Erosion is the process by which the surface of the Earth is worn down. Soil and rock can be worn down naturally by processes such as mechanical or chemical weathering, mass wasting, and the action of waves, wind, and underground water. While erosion is a natural process, human activities can accelerate the rate at which erosion occurs by leaving areas of bare soil after activities such as construction or agricultural operations. Soils containing high amounts of silt or clay can be easily erodible, while sandy soils are less susceptible to erosion. Excessive soil erosion can eventually damage building foundations and roadways. Erosion susceptibility is greatest where loose and unstable soil is exposed, such is in unvegetated areas or immediately following vegetation removal. These factors increase as slope increases. The Reserve has a high susceptibility for soil erosion due to the presence of steep slopes.

Landslide Hazards and Slope Stability

A landslide is a mass of rock, soil, and/or debris displaced down-slope by sliding, flowing, or falling. The susceptibility of a slope to land failure is dependent on the slope and geology as well as the amount of precipitation, excavation, or seismic activity in the area. Saturation of slope soils with water, such as from a rain event, is the leading cause of landslides (USGS 2004). Landslides can also be triggered by earthquakes. A major earthquake affecting San Francisco could cause movement of active slides or could trigger new slides near previous slides. The Reserve is susceptible to earthquake-induced landslides because it is located on steep hills and is underlain by rock that is susceptible to landslides (i.e., the Franciscan Complex). Portions of the Reserve are also within a Seismic Hazard Zone for landslides identified by both the

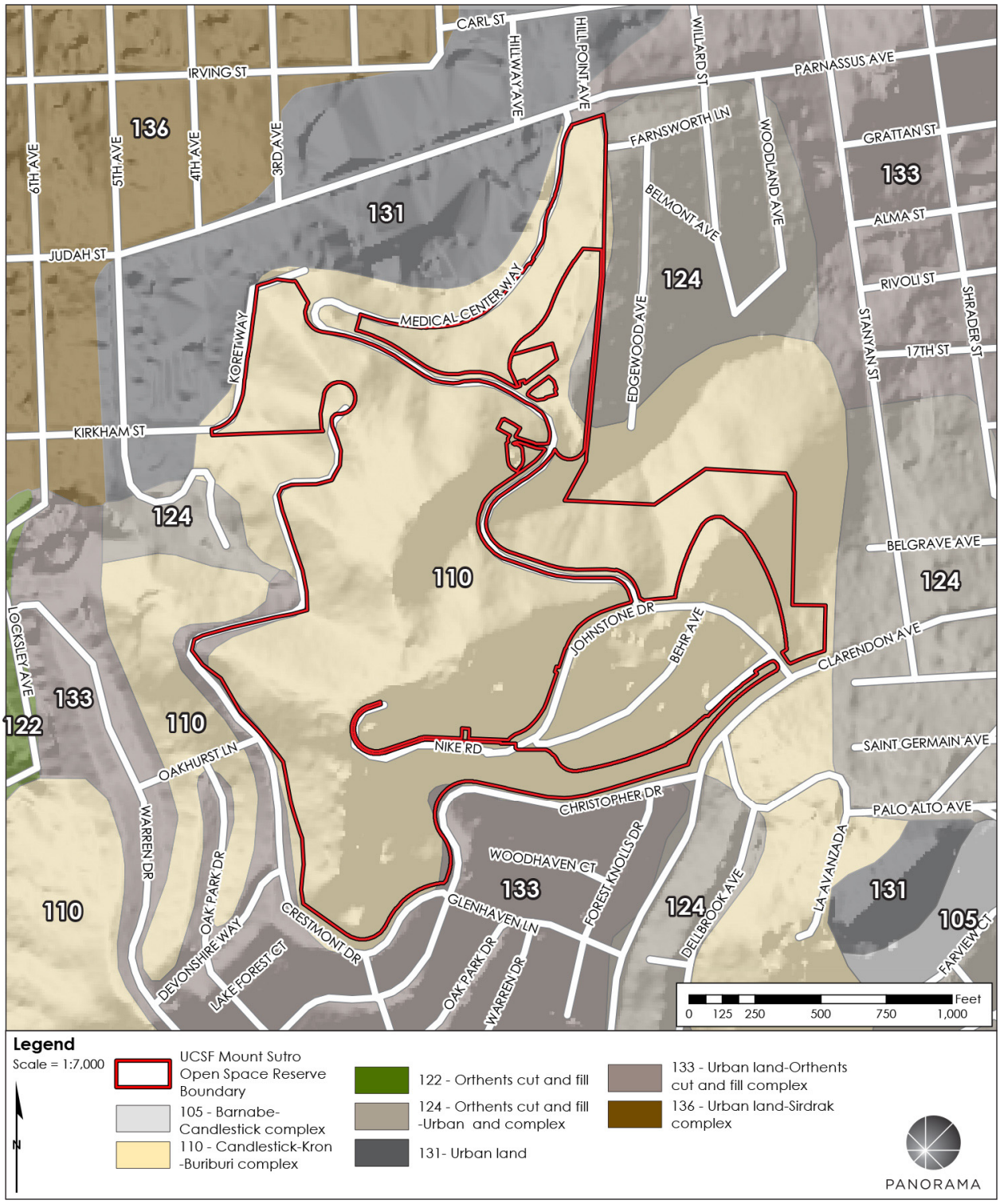
California Geologic Survey (CGS) (2000) and City and County of San Francisco (2012). Local planning considerations within these zones are described in the Regulatory Considerations.

Figure 4.6-1 Geologic Units on and Around Mount Sutro



Sources: (ESRI 2017, UCSF 2017, U.S. Geological Survey 2006, California Geological Survey 2011)

Figure 4.6-2 Soil Types on Mount Sutro



Sources: (ESRI 2017, UCSF 2017, USDA 2016)

The stability of slopes within the Reserve was evaluated and the results are depicted in Figure 4.6-3. Steeply sloped areas particularly with cut and fill soils are susceptible to destabilization. Evidence of several historic slope failures or rock fall is visible on the Reserve as shown in the figure (Rutherford + Chekene 2013).

4.6.3 Regulatory Considerations

University of California

Seismic Safety Policy

The University of California's Seismic Safety Policy requires the University to lease, license, acquire, build, maintain, repair and rehabilitate buildings and other facilities to provide an acceptable level of earthquake safety for students, employees, and the public who occupy those buildings and other facilities, to the maximum extent feasible using present earthquake engineering practices and University resources, at all locations where University operations and activities occur. Feasibility shall be determined by weighing practicality and the cost of protective measures against severity and probability of injury resulting from seismic occurrences.

UCSF 2014 LRDP

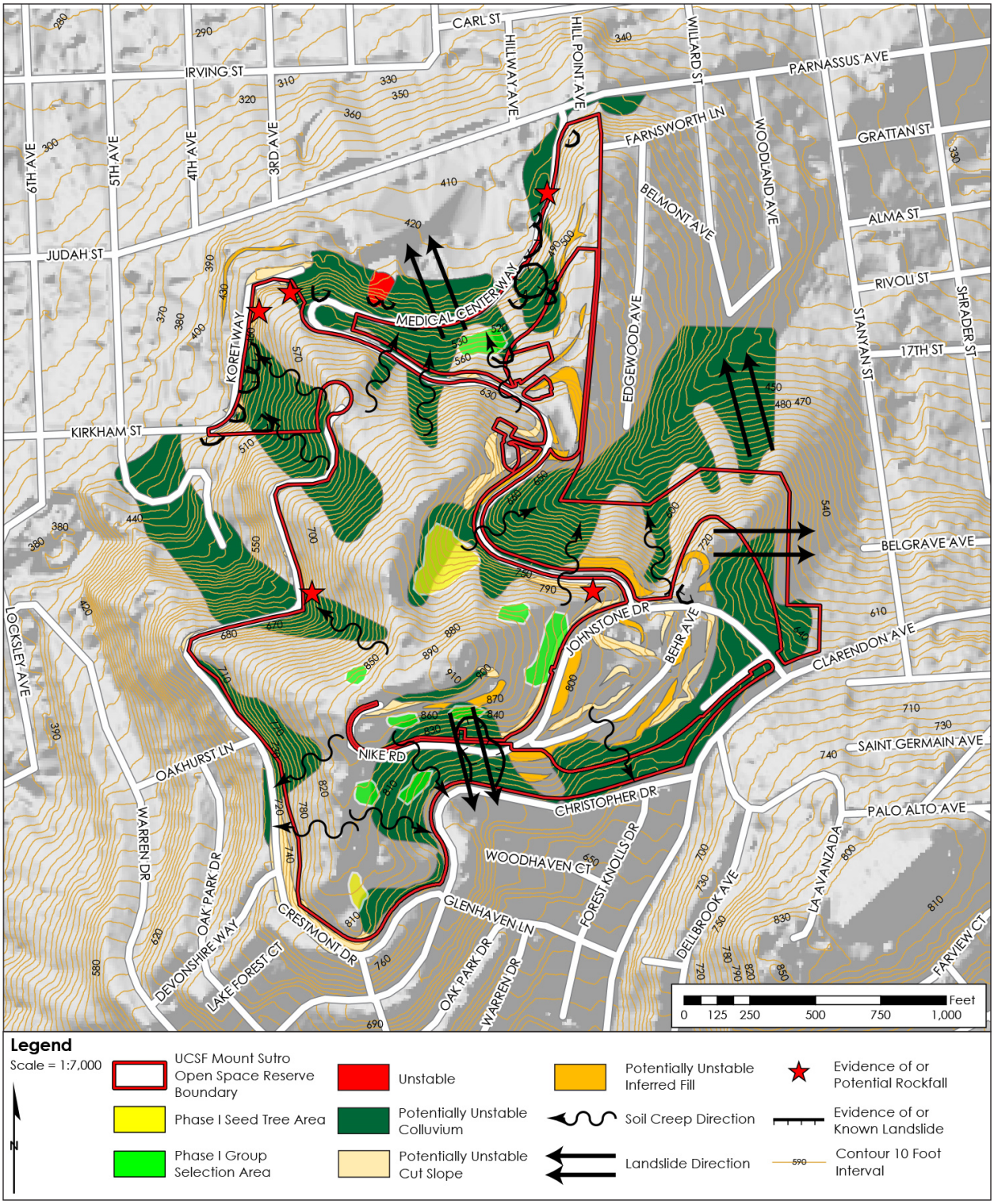
The 2014 LRDP includes one objective applicable to geologic hazards for the proposed plan. Objective 3 states that UCSF will comply with University of California's Seismic Safety Policy and the Alfred E. Alquist Hospital Facilities Seismic Safety Act to ensure a seismically safe environment for UCSF patients, visitors, physicians, and staff.

Federal

Earthquake Hazards Reduction Act

The Earthquake Hazards Reduction Act was enacted in 1997 to "reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program." The Act established the National Earthquake Hazards Reduction Program (NEHRP). NEHRP's mission includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improvement of building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improvement of mitigation capacity; and accelerated application of research results. The NEHRP designates the Federal Emergency Management Agency (FEMA) as the lead agency of the program and assigns it several planning, coordinating, and reporting responsibilities. Programs under NEHRP help inform and guide planning and building code requirements such as emergency evacuation responsibilities and seismic code standards.

Figure 4.6-3 Slope Stability in the Plan Area



Source: (ESRI 2017, UCSF 2017, City and County of San Francisco 2011, Rutherford + Chekene 2013)

State

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was developed to protect the public from the effects of strong ground shaking, liquefaction, landslides, or other ground failure, and from other hazards caused by earthquakes. This act requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. The CGS has completed seismic hazard mapping for portions of California most susceptible to liquefaction, ground shaking, and landslides, including San Francisco. Before a development permit is granted for a site within a seismic hazard zone, a geotechnical investigation of the site must be conducted and appropriate mitigation measures incorporated into the project design. Portions of the Reserve are within a Seismic Hazard Zone for earthquake-induced landslides (CGS 2000, City and County of San Francisco 2012).

Local

City and County of San Francisco

San Francisco General Plan

The Community Safety Element of the General Plan includes a Seismic Hazard Zone Map that matches the CGS map previously described. Consistent with the Seismic Hazards Mapping Act, the General Plan identifies Policy 1.6 that requires a geotechnical investigation to be conducted when making land use and permitting decisions for areas within a mapped Seismic Hazard Zone. Under such conditions, geotechnical investigations must contain design and construction features that would mitigate seismic hazards. As stated above, portions of the Reserve are within a Seismic Hazard Zone for earthquake-induced landslides, as shown on Figure 4.6-1 (CGS 2000, City and County of San Francisco 2012); however, a geotechnical investigation would not be required for the proposed plan because UCSF is not subject to local development permits when using property under its control in furtherance of its educational mission and the plan does not involve the building of structures.

4.6.4 Significance Standards and Methodology

Significance Criteria

Impacts of the proposed plan on geology and soils would be considered significant if implementation of the plan would exceed the following standards of significance, in accordance with Appendix G of the State CEQA Guidelines and the UC CEQA Handbook:

1. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
    a. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo earthquake Fault Zoning Map issues 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)
    b. Strong seismic ground-shaking

   c. Seismic-related ground failure, including liquefaction
   d. Landslides;
2. Result in substantial soil erosion or the loss of topsoil;
3. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the plan, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;
4. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property;
5. Have soils incapable of adequately supporting the use or septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater; or
6. Exceed the applicable LRDP EIR standard of significance by exposing people to structural hazards in an existing building rated Poor, or Very Poor, under the University's seismic performance rating system, or substantial nonstructural hazards.

The IS for the proposed plan determined that the plan's potential to expose people or structures to hazards from landslides, result in substantial soil erosion, and be located on unstable soil should be evaluated in the EIR. These topics are analyzed in this section.

Impacts Adequately Addressed in the Initial Study

The IS for the proposed plan found that implementation of the plan would have no potential to expose people or structures to substantial adverse effects from rupture of a fault, strong seismic shaking, or seismic-related ground failure; no impact from expansive soils; no impact from soils incapable of supporting wastewater systems; and would not exceed the applicable 2014 LRDP EIR standard for the University's seismic performance rating system. These issues are not discussed further in this EIR.

Analysis Methodology

The impact assessment evaluates the potential effects on geology and soils from potential landslides and erosion. Effects during implementation of the proposed plan would generally be limited to the potential for vegetation management activities to destabilize slopes resulting in localized landslides or cause soil erosion. Potential long-term effects following implementation of the plan are also evaluated, such as those that could result from reducing the density of trees in the forest.

4.6.5 Impacts

Impact Geology-1: The proposed plan could be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the plan, and potentially result in on-or off-site landslide. **and** **Impact Geology-2: The proposed plan could expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides.**	**Significance Determination** **Less than significant with mitigation**

Overview

The Reserve has a high potential for landslides to occur and high likelihood for slopes to destabilize. Portions of the Reserve are located in designated landside hazard zones as shown on Figure 4.6-3. The key contributing factors to the elevated risk for landslides are the underlying bedrock and steep slopes on Mount Sutro. Slope destabilization in the Reserve has the potential to result in on- or off-site landslides, which could expose people to a risk of injury or death and expose buildings to structural damage. An increase in landslide risk due to proposed plan activities could result in a significant impact.

Proposed vegetation management activities have the potential to destabilize existing soil conditions on slopes. Destabilizing soil on slopes could cause a substantial amount of erosion that could potentially result in slope failure (i.e., landslide, mudslide, or debris flow). Destabilizing soil could also increase the potential for induced slope failure, such as during heavy rains or a seismic event. Slope destabilization from plan activities that results in slope failure could be a significant impact if it affected trails, trees, or downslope areas (e.g., residences or roads).

Vegetation Management Activities

Forest Treatments, Management of Tree Risk and Defensible Space, and Native Plant Restoration

Slopes in the Reserve could be destabilized due to ground-disturbing activities associated with forest treatments, management of defensible space, and native plant restoration. Ground-disturbing activities associated with these activities would include:

- Vegetation removal and potential grading to widen trails and establish access routes
- Vegetation removal, grading, and smoothing to create landing areas
- Tree and vegetation removal (stumps would be ground below ground surface but roots would remain in place)
- Non-native understory removal (roots would be removed to the extent possible to limit the potential for plants to regrow)
- Planting of native species (limited ground disturbance to place plants in the ground)

Non-native plants would be removed from the understory, exposing bare soils. Grading activities for preparation of landing areas and access routes could remove vegetation as well. Root systems may or may not be left in place dependent on the type of vegetation and removal technique. Vegetation removal could destabilize slopes because the existing root systems are likely contributing to existing soil stability. Although soil depths in the Reserve are shallow (approximately 10 to 40 inches), removing the roots of vegetation could result in a substantial amount of erosion, which if left unaddressed could also result in slope failure. Slope failure could result in the mobilization of soil that could potentially cause tree fall, cover or damage existing trails, damage native plants and understory, or cover or damage roads and residences at the base of the Reserve.

The proposed plan would include forest treatments that could result in approximately 2.8 acres of tree removal. Trees would be removed at the base, and the stumps would be ground down to below the surface. The root systems of removed trees would be left intact to the greatest extent feasible, which would limit the potential for soil erosion and slope destabilization. Loss of root strength has a direct effect on soil stability (Ziemer 1981). The level at which retained roots reinforce soil stability is dependent upon soil type, slope, climate, health of the tree, and tree species. Landslide frequency often increases after tree removal but gradually decreases as the area revegetates. The rate at which roots lose strength after tree death has been studied in a variety of forest types. In North America, a 50 percent reduction in root reinforcement was observed to occur 14 to 66 months (just over 1 year to 5.5 years) after conifer tree removal, dependent upon species and other variables (O'Loughlin and Watson 1979).

Although the root strength of eucalyptus post-tree removal has not specifically been studied, it is likely somewhat similar to other species. Conservatively, a loss of 50 percent root strength could be expected after removal of healthy eucalyptus after a little more than a year. Most of the existing trees in the forest, however, are diseased and dying. Dependent upon the type of disease and duration of infection, the roots of diseased trees can become compromised and die (Penn State College 2017). Dead roots likely lose root strength at a similar rate as post-tree removal. Some living trees that may be removed could have root systems that are still intact enough to be contributing to soil stability. Without regrowth of young trees, shrubs, and other vegetation, substantial slope failure could occur after tree removal.

Seedlings and native species would be planted during forest treatments and native plant restoration. Assuming a modest growth rate, eucalyptus seedlings are anticipated to grow an average of 5 feet per year (refer to Section 4.5: Forestry Resources). Chips would be spread on areas of bare ground following vegetation and tree removal to stabilize topsoil. While these practices would help to stabilize the soil, soils would be vulnerable to destabilization following tree and vegetation removal given the intensity of ground disturbance. The risk for slope destabilization would be particularly high after trees and vegetation have been removed and before young trees have matured. Ground-disturbing activities would not occur during a

significant storm event[1], but could resume after the storm event. The risk of slope destabilization from vegetation removal and ground-disturbing activities would be the greatest after a significant storm event when the soil is saturated. Impacts from slope destabilization would be potentially significant.

MM Geology-1: Erosion Control Best Management Practices would be implemented to ensure appropriate erosion control BMPs for forestry activities are implemented during and after vegetation management activities. **MM Geology-1: Erosion Control Best Management Practices** includes procedures for stabilizing access roads, landing areas, and locations where trees are removed. After a significant storm event, **MM Geology-2: Unstable Slopes** requires inspection of soils for high moisture levels. If soils are saturated or nearly saturated, areas of historic slope failures and rock falls shall be flagged and activities that involve ground-disturbing or vegetation removal, avoided for at least 48 hours after the significant storm event. Implementation of mitigation measures requiring erosion control BMPs and avoidance of historically unstable areas, would reduce the impacts on slope stability from vegetation management activities to less than significant.

Maintenance of Trails and Public Access

Under the proposed plan, UCSF would continue to trim vegetation within 5 to 10 feet on either side of trails to maintain sight lines through the forest. Downed logs or logs felled during forest treatments would be used to define and support trails by placing logs on the downhill side, where necessary. Removal of vegetation would disturb soil along trails. The area of disturbance would be very small and would be unlikely to result in substantial slope instability. Continued maintenance of existing and planned trails would not change the potential for landslides compared to current conditions. The impact would be less than significant.

Comparison of Impacts Across Phases

Phase I

Activities that could contribute to slope destabilization would be the greatest during Phase I. The largest proportion of trees and vegetation would be removed during Phase I, and only during Phase I would vegetation removal and grading occur to prepare access routes and landings areas. The proposed plan would incorporate slope stabilization practices such as leaving the root systems of felled trees intact and planting new eucalyptus trees that would stabilize the soil as their root systems develop. As previously described, up to 50 percent of root strength could be lost within just over a year of tree removal, but annual growth of seedling would be substantial. The effectiveness of tree root systems to stabilize soils within the Reserve may already be compromised by the abundance of dead and dying trees whose root systems are

[1] A significant storm event is defined as 0.5 inches of rain with a 48-hour or greater period between rain events as defined in Appendix 5 to the 2009-0009-DWQ Construction General Permit, as amended by 2010-0014-DWQ and 2012-006-DWQ.

likely compromised and/or dead. Phase I would include the implementation of seven group selection areas up to 0.5 acre in size and two seed treatment areas up to 1 acre in size. Ground-disturbing activities would impact approximately 4 acres. Individual trees would be removed throughout the remainder of the Reserve, which would not substantially affect soil stability. Soils would be vulnerable to destabilization following tree and vegetation removal given the intensity of ground disturbance. The risk for slope destabilization would be particularly high after trees and vegetation has been removed and before new trees have matured. Vegetation management activities could lead to slope destabilization and increase the potential for a landslide.

Figure 4.6-3 shows the landslide hazard areas and soil flow directions in relation to Phase I forest treatment areas. The treatment areas where slope instability could increase would affect several existing areas that currently have unstable slopes. Increased instability could cause a landslide that would impact Crestmont Drive, Christopher Drive, and Johnstone Drive. An existing landslide scarp is visible above Christopher Drive. Some homes along Christopher Drive could be placed at additional risk from localized landslides due to plan implementation. Phase I activities would result in a potentially significant impact. **MM Geology-1: Erosion Control Best Management Practices** requires UCSF to implement BMPs such as spreading slash along access roads in addition to landing areas and using mats to stabilize soils. **MM Geology-2: Unstable Slopes** requires avoidance of historically unstable areas if soils are saturated. Implementation of mitigation would reduce the potential for slope destabilization and subsequent landslides. Impacts would be less than significant with mitigation.

Phase II

Tree and vegetation removal activities would be less intense than those that would occur during Phase I, but trees and understory vegetation would continue to be removed for forest treatments, management of defensible space, and native plant restoration. As in Phase I, root systems of felled trees would remain in place, and seedlings would continue to be planted that would stabilize the soil as they grow. Seedlings planted during Phase I would likely have established root systems by the start of Phase II, which would contribute to soil stability within the Reserve. However, vegetation and tree removal would occur in different areas of the Reserve than those treated in Phase I, and impacts from destabilization could be potentially significant in the new treatment areas. **MM Geology-1: Erosion Control Best Management Practices** and **MM Geology-2: Unstable Slopes** would reduce the impact to less than significant by requiring UCSF to implement forestry BMPs to stabilize slopes and avoid historically unstable areas, if soils are saturated.

Phase III

Ground disturbance would continue to decrease from Phase II to Phase III as activities continue to decrease in intensity. If the desired stand densities prescribed for the four forest types are achieved, the density of live trees in the Reserve would be less than existing conditions. Fewer live trees would be located within the Reserve, but the health of the live trees is projected to be substantially better than existing conditions. The roots of diseased trees can become compromised. The roots of healthy trees would likely have greater root strength. Even with

lower densities of trees, healthier trees would maintain soil stability better than diseased trees. Ground cover and native plant species would further stabilize soils where trees would no longer be present. Given that the slopes in the Reserve have been historically stable with fewer trees than existing conditions, the impact on slope stability from a permanent reduction in live tree density would be less than significant.

Impact Geology-3: The proposed plan could result in substantial soil erosion or the loss of topsoil.	Significance Determination
	Less than significant with mitigation

Overview

As explained under Impacts Geology-1 and Geology-2, the proposed plan would involve vegetation management activities that could destabilize soil on steep slopes in the Reserve. Destabilizing soil on steep slopes in the Reserve could result in substantial soil erosion or the loss of topsoil, which would be a significant impact.

Vegetation Management Activities

Forest Treatments, Management of Tree Risk and Defensible Space, and Native Plant Restoration

Grading for access routes and landing areas, as well as removing trees and vegetation from the Reserve, would expose bare soil. These activities could result in substantial erosion or the loss of topsoil. Slash and chipped materials would be spread over disturbed areas with exposed soil, which would minimize the potential for soil erosion. Vegetation management activities would also involve planting tree seedlings in areas of tree removal and native plants in areas of understory vegetation removal. The root systems of new trees and plants would become established as the root systems of removed trees lose strength over time, which would stabilize the soil. Vegetation activities would usually avoid wet periods when there is an increased risk of erosion. Unvegetated areas would remain prone to soil erosion and loss of topsoil while new trees and vegetation grow. The short-term impact due to loss of soil would be potentially significant.

MM Geology-1: Erosion Control Best Management Practices would be implemented to ensure appropriate erosion control BMPs for forestry activities are implemented during vegetation management activities, which include procedures for stabilizing access roads, landing areas, and locations where trees are removed. After a significant storm event, **MM Geology-2: Unstable Slopes** requires inspection of soils for high moisture levels and avoidance of areas of historic slope failures and rock falls for at least 48-hours after the significant storm event. Implementation of erosion control BMPs and avoidance of historically unstable areas, if soils are saturated, as required by mitigation would reduce short-term impacts from vegetation management activities on soil erosion to less than significant.

Following implementation of the proposed plan, the Reserve would not have a greater risk for soil erosion than existing conditions because disturbed areas would be revegetated with either

trees or native plant species. The long-term impact on soil erosion would be less than significant.

Maintenance of Trails and Public Access

Continued maintenance of the existing trail system and the three new trail segments under construction would occur as part of the proposed plan, including smoothing trails and removing ruts caused by water flowing along trails. Removal of vegetation would expose soils along trails, which could result in minor soil erosion. Downed logs would act as erosion control along trails by supporting the edges of trails along steep slopes. Ongoing maintenance could result in a small, insignificant increase in erosion. The impact would be less than significant.

Comparison of Impacts Across Phases

The risk of soil erosion would be the greatest during Phase I because (1) the most vegetation removal and ground-disturbing activities, such as preparation of landing areas and access routes, would occur, and (2) newly planted trees would not have had sufficient amount of time to mature and stabilize soils. The risk of erosion during Phases II and III would be less than Phase I because fewer ground-disturbing activities would occur and seedlings planted during each phase would grow into healthy trees, increasing soil stability as they grow. Implementation of **MM Geology-1: Erosion Control Best Management Practices** and **MM Geology-2: Unstable Slopes** would reduce erosion impacts to less than significant levels during all phases of the plan implementation.

Impact Geology-4: The proposed plan could result in significant impacts on geology and soil conditions in combination with past, present, and probable future development in the cumulative analysis study area.	**Significance Determination**
	Less than significant contribution with mitigation

Geographic Scope

The geographical extent for cumulative impacts on geology and soils includes areas in and immediately adjacent to the plan area because erosion and soil stability impacts from the proposed plan would be confined to immediately adjacent areas.

Cumulative Analysis

Several cumulative projects (Building Demolition [#1], Surge, Woods, and EHS Open Space Restoration [#8], Kirkham Project [#15], and Overlook Project [#16]) would involve demolition of existing buildings and/or construction of new buildings within or immediately adjacent to the plan area on Mount Sutro. These activities would involve activities that could destabilize slopes and soils, such as terracing. Directly adjacent construction and demolition activities in combination with the proposed plan could cumulatively result in slope destabilization resulting in a significant cumulative impact. The Kirkham Project (#15) and Overlook Project (#16) include measures to reduce the possibility of inducing landslides or other slope instability. However, the potential slope instability impacts from demolition of buildings and grading activities directly adjacent to the Reserve could remain cumulatively significant.

The proposed plan would involve tree and vegetation removal as part of the vegetation management activities within the Reserve. Although the root systems of removed trees would generally remain intact to limit the potential for soil erosion and slope destabilization, soils on the Reserve could become unstable due to the intensity of tree and vegetation removal. The proposed plan's contribution to a significant cumulative impact on slope stability could be considerable. **MM Geology-1: Erosion Control Best Management Practices** requires appropriate erosion control BMPs for forestry activities and procedures for stabilizing access roads, landing areas, and locations where trees are removed. After a significant storm event, **MM Geology-2: Unstable Slopes** requires inspection of soils for high moisture levels and avoidance of areas of historic slope failures and rock falls for at least 48-hours after a significant storm event. Implementation of these measures would stabilize the slopes associated with plan activities, such that they would not contribute to other slope instability effects from nearby projects. The proposed plan's contribution to potentially significant cumulative impact on geology and soils would be less than cumulatively considerable with mitigation.

4.6.6 Mitigation Measures

MM Geology-1: Erosion Control Best Management Practices

Best management practices (BMPs) for forestry shall be implemented to ensure vegetation management activities do not destabilize slopes in the Reserve and erosion is controlled appropriately. The following BMPs shall be implemented as applicable and appropriate during vegetation management activities:

Access Roads

- Create access roads that follow the contour of the land to avoid unnecessary cut and fill where feasible
- Limit major routes to 5-10% of the total area
- Install water bars at an appropriate spacing depending on slope and soil type (e.g., 300-500 feet for 2-5% slope; 200-300 feet for 6-10% slope; 100-200 feet for 11-15% slope; <100 feet for 16-20% slope)
- Use erosion control structures (e.g., culverts, French drains, gravel/rock) to reduce erosion
- Sow native grasses and other perennial herbs on access roads where natural colonization will not occur rapidly
- Use surface mounds, depressions, logs, rocks, trees and stumps, slash and brush, the litter layer, and native herbaceous vegetation downslope of access roads to reduce sedimentation and erosion
- Shut down skidding and truck traffic when soils become saturated and unable to support the machines
- Close off temporary access roads after their use
- Recontour to original contours after access roads are done being used
- Consider chiseling, scarification or disking to break up compacted road surfaces to reestablish soil porosity when hauling is complete

Landing Areas

- Locate landings on a gentle slope to ensure good surface drainage
- Sow native grasses and other perennial herbs on landings where natural colonization will not occur rapidly
- Close off landings after their use
- Recontour to original contours and restore with native vegetation after landing areas are done being used
- Consider chiseling, scarification or disking to break up compacted landing surfaces to reestablish soil porosity when hauling is complete

Tree Removal Areas • Stabilize steep slopes with mats or natural materials after tree removal and prior to planting
Locations: Access roads, landing areas, Woodland Creek, and tree removal areas
Performance Standards: • **Before Activities:** N/A • **During Activities:** Install and maintain erosion control BMPs during vegetation management activities • **After Activities:** N/A

MM Geology-2: Unstable Slopes
After a significant storm event (defined as 0.5 inches of rain within a 48-hour or greater period), the following conditions shall be met prior to any vegetation management activities: • The maps detailing areas of historic slope instability or rock fall in the *Final Geotechnical and Geological Evaluation Report for UCSF Mount Sutro* shall be reviewed (Rutherford + Chekene 2013) • If ground-disturbing or vegetation removal activities are proposed within or adjacent to areas of historic slope instability or rock fall, the saturation of the soils shall be estimated in the field; if muddy water drips from a handful of soil, the soil is considered saturated (Brouwer, Goffeau and Heibloem 1985) • The areas of historic slope instability or rock fall shall be flagged if the moisture content of the soils is determined to be high (i.e., muddy) and ground-disturbing or vegetation removal activities shall be avoided for a minimum of 48-hours after a significant storm event to permit soil drying
Locations: Areas of historic slope instability or rock fall
Performance Standards: • **Before Activities:** (1) After a significant storm event, review detailed maps showing areas of historic slope instability or rock fall, (2) determine moisture content of soils by hand, (3) flag areas of historic slope instability or rock fall, (4) avoid ground-disturbing or vegetation removal activities in these areas for 48-hours after a significant storm event • **During Activities:** N/A • **After Activities:** N/A

4.6.7 References

Brouwer, C, A Goffeau, and M Heibloem. 1985. Irrigation Water Management: Training Manual No. 1 - Introduction to Irrigation. Food and Agriculture Organization of the United Nations.

California Geological Survey (CGS). 2011. "San Francisco Landslide Susceptibility GIS dataset." May.

—. 2000. "State of California, Seismic Hazard Zones." City and County of San Francisco, Official Map. November 17.

City and County of San Francisco. 2012. "General Plan." Community Safety: An Element of the General Plan of the City and County of San Francisco. October.

—. 2011. "Building Footprints - City and County of San Francisco GIS dataset." San Francisco Enterprise GIS Program, Department of Technology and Pictometry, Inc.

ESRI. 2017. "Online GIS Vector and Raster Data."

O'Loughlin, Colin, and Alex Watson. 1979. "Root-Wood Strength Deterioration in Radiata Pine After Clearfelling." Forest Research Institute 3: 284-293.

Penn State College. 2017. Tree Diseases that Create Hazard. Accessed April 26, 2017. http://extension.psu.edu/pests/plant-diseases/all-fact-sheets/hazard-trees.

Rutherford + Chekene. 2013. "Final Report Geotechnical and Geological Evaluation UCSF Mount Sutro Management." January 7.

U.S. Geological Survey. 2006. "Geologic Map of the San Francisco Bay Region GIS dataset."

University of California, San Francisco (UCSF). 2017. "Mt Sutro Open Space Preserve GIS data."

United States Department of Agriculture (USDA). 2016. "Natural Resources Conservation Service." Soil Survey San Mateo County, Eastern Part, San Francisco County, California GIS dataset. September 12.

—. 2017. "Natural Resources Conservation Service." Custom Soil Resource Report for San Mateo County, Eastern Part, and San Francisco County, California. Mt Sutro. March 21.

United States Geological Survey (USGS). 2004. "Landslide Types and Processes." Fact Sheet 2004-3072. July.

Ziemer, R R. 1981. "Roots and the stability of forested slopes. Erosion and Sediment Transport in Pacific Rim Steeplands." IAHS Publ. No. 132: 343-361.

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4.7 GREENHOUSE GAS EMISSIONS

4.7.1 Introduction

This section describes the existing GHG emissions in the plan area and evaluates the potential impacts related to GHG emissions from implementation of the proposed vegetation management activities. The section also discusses the applicable federal, state, regional, and local regulations that pertain to GHG emissions. The impacts associated with the proposed plan are compared with the thresholds of significance used by the University pursuant to CEQA.

Comments related to GHG emissions received during the public scoping process included an interest in the inclusion of a carbon sequestration analysis in the EIR.

4.7.2 Definitions

Climate Change

Global climate change refers to significant changes in climate measurements, including temperature, precipitation, or wind, that occur over an extended period (i.e., decades or longer) (USEPA 2017a). Climate change may be caused by:

- Natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun;
- Natural processes within the climate system (e.g., changes in ocean circulation, reduction in sunlight from the addition of GHG and other gases to the atmosphere from volcanic eruptions); and
- Human activities that change the atmosphere's composition (e.g., through burning fossil fuels) and the land surface (e.g., deforestation, reforestation, urbanization, desertification).

The natural process through which heat is retained in the troposphere is called the greenhouse effect. The process through which the greenhouse effect traps heat in the troposphere is from energy from the sun (i.e., sunlight) entering the atmosphere, which is absorbed by the Earth. The energy, in the form of infrared radiation, is re-emitted by the Earth, but a certain portion is absorbed by GHGs, increasing the atmospheric temperature (USEPA 2016b).

The most common GHGs are carbon dioxide (CO_2) and water vapor. Other critical GHGs include methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). GHGs are released into the earth's atmosphere through a variety of natural processes and human activities. Examples of GHG sources are provided in Table 4.7-1.

Each GHG has its own potency and effect upon the earth's energy balance, which is expressed in terms of a global warming potential (GWP). GWP allows comparisons of the global warming impacts of different gases relative to the impact of CO_2, which is assigned a GWP of 1. As an

Table 4.7-1 Example Greenhouse Gas Emission Sources

Source Category	Example Source	GHG
Energy	Electricity generation	CO_2
	Transportation	N_2O
Industry	Refrigeration and cooling	HFCs
	Semi-conductor manufacturing	PFCs
	Substations	SF_6
Agriculture	Crop fertilization	N_2O
	Livestock	CH_4
Waste	Landfill operation	CH_4

example, SF_6, being several orders of magnitude stronger than CO_2, has a GWP of 23,500 (Intergovernmental Panel on Climate Change 2013). In GHG emission inventories, the weight of each gas is multiplied by its GWP and is measured in units of equivalent CO_2 (CO_2e). Details regarding several common GHGs are provided below.

Carbon Dioxide

Carbon dioxide is primarily emitted by fossil fuel combustion for energy and transportation. CO_2 is the greatest GHG emitted in the U.S. due to human activities (USEPA 2017b). In 2014, 84.3 percent of California's GHG emissions were CO_2. The transportation sector is responsible for the largest source of CO_2 in California, accounting for approximately 42 percent of CO_2 emissions in 2014 (CARB 2017a).

Methane

Methane is emitted from biogenic sources (resulting from the activity of living organisms) and anthropogenic sources (human activities). Primary human-related sources that generate CH_4 are industry, agriculture and waste management activities. Methane is second greatest GHG emitted in the U.S. due to human activities (USEPA 2017b). In 2014, 9 percent of California's GHG emissions were CH_4. The greatest source of CH_4 in California was from the agricultural sector (manure and enteric fermentation in livestock) accounting for approximately 56 percent of CH_4 emissions in 2014 (CARB 2017a).

Nitrous Oxide

Nitrous oxide is produced by natural and human-related sources. Primary human-related sources are agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuel, adipic acid production, and nitric acid production (USEPA 2017b). In 2014, N_2O accounted for 2.8 percent of California's GHG emissions. The greatest source of N_2O in California was from the agricultural sector (manure and agricultural soils), accounting for approximately 63 percent of N_2O emissions in 2014 (CARB 2017a).

Hydrofluorocarbons
HFCs typically are used as refrigerants in both stationary refrigeration and mobile air conditioning. The use of HFCs for cooling and foam-blowing is growing particularly as the continued phase-out of chlorofluorocarbons and hydrochlorofluorocarbons gains momentum. HFCs have a high GWP (USEPA 2017b). Most high GWP gases emitted during 2014 were HFCs, accounting for 98 percent (CARB 2017a).

Perfluorocarbons and Sulfur Hexafluoride
PFCs are compounds consisting of carbon and fluorine that are primarily created as a byproduct of aluminum production and semiconductor manufacturing. PFCs are potent GHGs with a high GWP, several thousand times that of carbon dioxide, and long atmospheric lifetime (up to 50,000 years) (USEPA 2017b). Sulfur hexafluoride is a colorless, odorless, nontoxic, nonflammable gas, most commonly used as an electrical insulator in high voltage equipment that transmits and distributes electricity. SF_6 has a high GWP and a long atmospheric lifetime (3,200 years) (USEPA 2017b). PFCs and SF_6 accounted for 2 percent of high global warming potential gases emitted in California in 2014 (CARB 2017a).

Carbon Sequestration

Carbon sequestration is the process by which atmospheric CO_2 is absorbed by vegetation through photosynthesis and stored as carbon in trunks, branches, foliage, roots, and soils. Carbon sequestration in terrestrial ecosystems is defined as the net removal of CO_2 from the atmosphere into long-lived stocks of carbon (Shaw, et al. 2009). Forests serve as large reservoirs of sequestered carbon as well as potential carbon sinks and sources to the atmosphere. In the United States, forest carbon sinks have been estimated to offset up to 24 percent of the fossil fuel source (Bousquet, et al. 2000).

Forests store carbon in virtually all their components: soils, litter (forest floor), understory, and trees (Wayburn, et al. 2000). Forest-soil carbon is a large, stable pool, accounting for some 50 percent of the total forest carbon and changing very slowly over hundreds of years (Kimmins 1997). For timeframes of 100 years and less, forest accounting can ignore this pool and focus on changes to more labile forest carbon components (i.e., trees, understory, litter). Most forest carbon accumulation is from photosynthesis by trees, with understory accounting for 5 percent or less (Kimmins 1997). Therefore, accumulation of carbon through tree growth and the release of carbon from timber harvest, including from decay of dead materials, constitutes the primary accounting focal points (Wayburn, et al. 2000). This sink must be quantified to determine how a project will impact GHG emissions.

4.7.3 Environmental Setting

Greenhouse Gas Emissions in California

Total gross estimated California GHG emissions in 2015[1] were 440.36 million metric tons of CO_2e (MT CO_2e), a decrease of 2.8 million MT CO_2e from 2013. Table 4.7-2 shows the Statewide GHG emissions for the years 1990 and 2015 (CARB 2017c). During the 2000 to 2015 period, per capita GHG emissions in California declined from a peak in 2001 of 13.9 metric tons per person to 11.3 metric tons per person in 2015, a 19 percent decrease. The reductions in California GHG emissions during this period are attributed to energy efficiency and conservation efforts (CARB 2017b).

Table 4.7-2 California Greenhouse Gas Inventory

Source Category	1990 (million MT CO_2e)	2015 (million MT CO_2e)
Total Energy Production	386.41	365.6
Industrial Processes and Product Use	18.34	32.5
Agriculture, Forestry, and Other Land Use	19.11	31.7
Waste	9.42	10.6
Total Gross California GHG Emissions	**433.29**	**440.36**

[a] Includes emissions from composting of organic waste.

Sources: (CARB 2007, CARB 2017c)

Regional Greenhouse Gas Emissions

Total GHG emissions in the SFBAAB have steadily increased by 29 percent between 1990 to 2011, to a total of 86.6 MT CO_2e in 2011 as shown in Table 4.7-3. Between 1990 and 2011, per capita emission rates have increased by approximately 5 percent (BAAQMD 2015). As of 2012, GHG emissions in San Francisco were 23.3 percent below 1990 levels, exceeding the 2020 reduction goals outlined in BAAQMD's 2017 CAP, Executive Order S-3-05, and Assembly Bill 32 (ICF International 2015).

Standing Carbon in the Reserve

Standard industry methods were used to estimate standing carbon in the Reserve, including the US Department of Agriculture (USDA) Forest Service General Technical Report PSW-GTR-160 (1997) and the Center for Urban Forestry Research (CURF) Tree Carbon Calculator developed by the USDA. Standing forest carbon (i.e., the carbon contained in standing trees, including dead trees) was estimated by measuring trees in 19, 1/5-acre randomly placed plots throughout the forest. US Forest Service equations, wood densities, and specific gravity values were used to estimate standing cubic volume and biomass of different tree species found on the Reserve

[1] The most recent year for which estimated GHG emissions are available.

(blue gum eucalyptus, blackwood acacia, Monterey cypress, Monterey pine, redwood). Dead trees represent

Table 4.7-3 SFBAAB Greenhouse Gas Inventory

Source Category	1990 (million MT CO_2e)	2011 (million MT CO_2e)
Transportation	28.6	34.3
Industrial/ Commercial	21.0	31.0
Electricity/ Co-Generation [a]	8.4	12.1
Residential Fuel Usage	7.0	6.6
Agriculture/ Farming	1.2	1.3
Off-Road Equipment	0.9	1.3
Total SFBAAB GHG Emissions	**67.1**	**86.6**

Note:
[a] Includes imported electricity emissions of 2.7 million MT CO_2e.

Source: (BAAQMD 2015)

approximately 33 percent of all standing trees. Trees with a live crown ratio of 25 percent or less were categorized as dying and included with the dead trees. Net standing carbon was calculated by subtracting dead and dying trees from the total standing carbon in the forest. Refer to Appendix 4.2 for specific metrics for cubic volume and biomass used to estimate standing carbon in the Reserve.

The CURF Tree Carbon Calculator was used to calculate CO_2 in pounds per tree per year by dbh class for the Reserve. Plot data was run through this model and converted to MT CO_2e per acre per year. The model estimated that the Reserve currently holds approximately 34,070 gross MT CO_2e (including dead and dying trees) or 22,920 net MT CO_2e (excluding dead and dying trees).

4.7.4 Regulatory Considerations

International

The World Meteorological Organization and United Nations Environmental Program established the International Panel on Climate Change (IPCC) in 1988. The goal of the IPCC is to evaluate the risk of climate change caused by human activities. Rather than performing research or monitoring climate, the IPCC relies on peer reviewed and published scientific literature to make its assessment. The IPCC assesses information (i.e., scientific literature) regarding human-induced climate change, impacts of human-induced climate change, and options for adaptation and mitigation of climate change. The IPCC reports its evaluations in special reports called "assessment reports," the latest of which was published in 2013. The IPCC stated that global temperature increases since the mid-20th century were likely substantially attributable to anthropogenic activities (IPCC 2013).

Federal

Massachusetts v. U.S. Environmental Protection Agency
On April 2, 2007, the Supreme Court found in *Massachusetts v. USEPA* that GHGs are air pollutants under the CAA. The USEPA, therefore, has the authority to regulate GHG emissions. The Supreme Court found that the CAA authorizes the USEPA to regulate motor vehicle GHG emissions if the USEPA determines they cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare (USEPA 2016a).

State

Executive Order S-3-05
Executive Order S-3-05, signed in June 2005 by Governor Arnold Schwarzenegger, states that California is vulnerable to the impacts of climate change and that increased temperatures could reduce the Sierra snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To address those concerns, the Executive Order established the state's first GHG emissions targets:

- Reduce GHG emissions to 2000 levels by 2010;
- Reduce GHG emissions to 1990 levels by 2020; and
- Reduce GHG emissions to 80 percent below 1990 levels by 2050.

This Executive Order requires biannual reports on progress made toward meeting these targets and the global warming impact on California.

Global Warming Solutions Act of 2006 (Assembly Bill 32)
The Global Warming Solutions Act of 2006 directed CARB to begin developing discrete early actions to reduce GHG emissions while also preparing the Climate Change Scoping Plan (Scoping Plan), which outlines a framework of measures that would eventually be adopted and implemented to reach AB 32 goals (CARB 2017b). CARB approved the Scoping Plan in 2008 and updated it in May 2014. In September of 2016, AB 32 was extended to achieve reductions in GHG of 40 percent below 1990 levels by 2030. The new plan, outlined in Senate Bill 32, involves increasing renewable energy use, putting more electric cars on the road, improving energy efficiency, and curbing emissions from key industries. Regulations are being phased in over time. Adopted regulations that correspond to elements of the Scoping Plan include the 33 percent Renewable Portfolio Standard by 2020 (Senate Bill X1-2), the Cap-and-Trade Program, and the Low Carbon Fuel Standard. Additional regulations have been adopted since the Scoping Plan that further the GHG emission reduction goals, including the 50 percent Renewable Portfolio Standard by 2030 (Senate Bill 350). Recommended actions of the updated Scoping Plan relevant to the plan, within CARB's purview, are related to transportation (CARB 2014).

Since the updated Scoping Plan, CARB has prepared the Mobile Source Strategy, which addresses the current and proposed programs for reducing all mobile source emissions including GHG emissions. The Mobile Source Strategy identifies programs that the state and federal government have or will adopt, which further the goals of the Scoping Plan. Some

programs provide incentives to facilitate increased purchase of new, lower emission light-, medium-, and heavy-duty vehicles to aid the state in achieving emission reduction goals. Other programs require certain engine years to upgrade the engine to newer, cleaner engines by specific dates or strict performance standards for specific model years. These programs for more stringent emission are required by state and federal law and monitored by CARB or USEPA (CARB 2016).

Senate Bill 97

Senate Bill 97 (SB 97) was passed by the state legislature and approved by Governor Schwarzenegger in August 2007. SB 97 acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA. The California Natural Resources Agency adopted amendments to the CEQA Guidelines to address the analysis and mitigation of GHG emissions. The amendments to the CEQA Guidelines implementing SB 97 became effective on March 18, 2010.

Senate Bill 375

SB 375 was passed by the state legislature and approved by Governor Schwarzenegger in September 2008. SB 375 created regional targets for GHG emissions reductions from cars and light trucks. Metropolitan planning organizations are required to develop a Sustainable Communities Strategy, a new element of the regional transportation plan, in an effort to reduce GHG emissions to established targets.

Assembly Bill 1826

Governor Brown signed AB 1826 (Chapter 727, Statutes of 2014) in October 2014. AB 1826 requires businesses to recycle their organic waste on and after April 1, 2016, depending on the amount of waste they generate per week. The bill also requires local jurisdictions across California to implement organic waste recycling programs to divert organic waste generated by businesses, including multifamily residential buildings that consist of five or more units. AB 1826 was enacted to reduce the disposal of organic waste in landfills in effort to reduce GHG emissions from landfills, which is a part of the CARB Climate Change Scoping Plan.

Executive Order B-30-15

In April 2015, Governor Brown signed Executive Order B-30-15, establishing a new interim statewide GHG emission reduction target of 40 percent below 1990 levels by 2030. The interim reduction target was established in order to ensure California meets its goal of reducing GHG emissions to 80 percent below 1990 levels by 2050. Executive Order B-30-15 requires state agencies to consider climate change in their planning and investment decisions, giving priority to actions that reduce GHG emissions.

Local

City and County of San Francisco

Overview

The City and County of San Francisco is committed to achieving GHG reductions and planning for the future to minimize the effects of climate change, such as sea level rise, on residents and

businesses. Many plans and regulations have been prepared and adopted to accomplish these commitments. The plans detailed below provide an adequate framework for understanding the goals set by San Francisco.

Strategies to Address Greenhouse Gas Emissions

The City and County of San Francisco prepared and adopted the Strategies to Address Greenhouse Gas Emissions (GHG Reduction Strategy) in 2010. The GHG Reduction Strategy presents a comprehensive assessment of policies, programs, and ordinances that collectively represent San Francisco's Qualified GHG Reduction Strategy in compliance with State CEQA Guidelines (City and County of San Francisco 2010). Four sectors are identified as areas where GHG emissions could be reduced; transportation, energy efficiency, renewable energy, and solid waste.

Climate Action Strategy

San Francisco prepared and adopted the Climate Action Strategy in 2013. Strategies for reducing GHG emissions are presented, focusing on energy use in buildings, transportation, zero waste, urban forest, and municipal operations. GHG emission reductions from implementation of each strategy are estimated for the year 2030 (City and County of San Francisco 2013).

University of California

Sustainable Practices Policy

The University of California Policy on Sustainable Practices (Policy) is a system-wide commitment to minimize the University of California's impact on the environment and reduce the University's dependence on non-renewable energy sources. The Policy promotes the principles of energy efficiency and sustainability in nine areas. The three climate change goals presented in the Policy are (University of California 2016):

- Climate neutrality from scope 1 (direct emissions) and 2 (indirect stationary sources) sources by 2025
- Climate neutrality from specific scope 3 (other indirect emissions) sources (as defined by the American College and University Presidents' Climate Commitment [ACUPCC]) by 2050 or sooner
- Reduce GHG emissions to 1990 levels by 2020, pursuant to the Global Warming Solutions Act of 2006.

UCSF Climate Action Plan

UCSF published the Climate Action Plan in December of 2009 to comply with the Policy as well as meet the requirements of the ACUPCC, of which the UC system is a signatory. The UCSF Climate Action Plan includes the UCSF GHG emissions baseline and projected inventories, sustainability efforts to date, and future reduction efforts. The UCSF Climate Action Plan informs practices throughout the campus including procurement, building operation and design, transportation, recycling, and education. As an intermediate target, University of California Office of the President established the goals of reducing GHG emissions to year 2000

levels by 2014; 1990 levels by 2020; and achieving climate neutrality as soon as possible after reaching the 2014 and 2020 reduction targets. More recently, UCSF committed to achieving climate neutrality by the year 2047. These goals pertain to Scope 1 and Scope 2 emissions of the six Kyoto greenhouse gases (carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons) originating from sources specified in the ACUPCC, as well as emissions from business airline travel and commuting by UCSF staff and students. The Regents' policy specifies that these goals will be pursued while maintaining the primary research and education mission of the University.

As part of this emissions reduction effort, UCSF regularly reports to the ACUPCC its emissions, progress towards reduction goals, and measures used or proposed to meet these goals (UCSF 2009).

UCSF Sustainability Action Plan

UCSF prepared the Sustainability Action Plan (SAP) in 2011, SAP 1.0, which was updated in 2014, SAP 2.0, to satisfy the UC Office of the President's request. The six strategic objectives defined in the SAP are toxics reduction, sustainable food, cultural shift, carbon neutrality, water conservation, and zero waste (UCSF 2014a).

UCSF Greenhouse Gas Reduction Strategy

The Greenhouse Gas Reduction Strategy (2014 UCSF GHGRS) was prepared in conjunction with the UCSF 2014 LRDP. The 2014 UCSF GHGRS presents a comparison of GHG inventories in 1990, 2008, and 2012. As of 2012, GHG emissions generated by UCSF are 40 percent greater than 1990 levels. Specific strategies for reducing GHG emissions in the energy and transportation sector and the projected annual GHG emission reductions associated with those strategies are identified in the UCSF GHGRS. Implementation of the identified GHG reduction measures would permit UCSF to achieve the goal of 1990 levels by 2020 (UCSF 2014c). UCSF prepares annual reports on progress towards meeting its emissions goals. The latest was prepared for FY2015-16. UCSF updated the GHGRS in April 2017 (2017 UCSF GHGRS), which presents a comparison of GHG inventories in 1990, 2008, and 2015 (UCSF 2017).

UCSF 2014 LRDP

The 2014 LRDP contains the following objective related to GHG emissions (UCSF 2014b):

Objective F — Facilitate growth in an environmentally responsible manner while reducing UCSF's greenhouse gas emissions in compliance with the UC Sustainable Practices Policy and the goals of Assembly Bill 32 (AB 32), the California Global Warming Solutions Act

The 2014 LRDP EIR identifies measures related to GHG emissions. These measures are considered part of the plan and are shown here.

GHG-LRDP-1: Construction-Related GHG Reduction Measures. The following BAAQMD-suggested measures shall be implemented during demolition and construction activities:

- Use alternative fueled (e.g., biodiesel, electric) construction vehicles/equipment where feasible;
- Use locally sourced building materials for at least 10% of overall materials brought to site; and
- Recycle or reuse at least 50% of construction waste or demolition materials.

4.7.5 Significance Standards and Methodology

Significance Criteria

Impacts of the proposed plan from GHG emissions would be considered significant if implementation of the plan would exceed the following standards of significance, in accordance with Appendix G of the State CEQA Guidelines and the UC CEQA Handbook:

1. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or
2. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emission of greenhouse gases

The IS for the proposed plan determined that the plan's effect from the generation of GHGs and potential conflicts with an applicable plan, policy, or regulation adopted to reduce GHG emissions should be evaluated in the EIR. These topics are analyzed in this section.

Analysis Methodology

BAAQMD Significance Criteria

BAAQMD is the regional agency tasked with managing air quality in the SFBAAB. BAAQMD published the 2017 CEQA Guidelines, which include thresholds for GHG emissions. BAAQMD thresholds are shown in Table 4.7-4.

Table 4.7-4 BAAQMD GHG Significance Threshold

Pollutant	Threshold
GHG – Projects other than Stationary Sources	Compliance with a Qualified GHG Reduction Strategy or 1,100 metric tons per year or 4.6 metric tons per capita per year

Source: (BAAQMD 2017)

Greenhouse Gas Emission Calculations

Proposed plan information was entered into CalEEMod, as recommended by BAAQMD, to generate GHG emissions data. The emissions data was used to identify and define potential impacts on GHG emissions that may be affected by implementation of the proposed plan. The analysis provides GHG emissions on a calendar year basis (i.e., January through December) rather than by years of the plan, which would span calendar years (vegetation management activities would be performed in September of one year through February of the next). GHG emissions are provided on a calendar year basis because the threshold for GHG emissions is for

one calendar year. The assumptions and results of the GHG emissions modeling are provided in Appendix 4.2.

Carbon Sequestration Calculations
The CUFRTree Carbon Calculator developed by the USDA was used to estimate current standing carbon in the Reserve and how standing carbon would change over the 20-year life of the plan. Only live trees (which continue to grow) were used to estimate annual carbon uptake, which was estimated by stand type based on tree composition and stand density. Forty percent of the vegetative material (and therefore 40 percent of the standing carbon) culled on site would remain in the Reserve as slash and chips. Stand growth estimates were projected to year 20 and discounted (i.e., deductions were made) for silvicultural prescriptions proposed in the plan. Subsequent years were grown from the post-treatment condition using the net growth data derived from the inventory.

Forest treatments were assumed to occur in all phases of the plan. The removal of standing carbon and reduction in carbon uptake was assumed to occur only during the working days for every year of each phase. The assumptions and results of the carbon sequestration analysis for implementation of the proposed plan are provided in Appendix 4.2.

4.7.6 Impacts

Impact GHG-1: The proposed plan could generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.	**Significance Determination**
	Less than significant

Vegetation Management Activities

Activities proposed in the plan include forest treatments, management of tree risk and defensible space, native plant restoration, and maintenance of trails and public access. GHG emissions are defined in this analysis as the combination of two sources: (1) equipment emissions and (2) the reduction in carbon stock/carbon uptake from the removal of trees from the Reserve.

Equipment used to perform vegetation management activities and decomposing chips would generate GHG emissions. Carbon stock would be removed from the Reserve's forest as felled logs or chipped trees are hauled off-site. Carbon uptake would be reduced when living trees are removed from the forest. GHG emissions would occur starting in November 2017 through February 2018, but would generally occur from September of one year through February of the next year for 20 years. GHG emissions in Year 1 (November 2017 through February 2018) and Year 2 (September through December 2018) of the plan were modeled to present a conservative analysis of the maximum GHG emissions that could be generated during any one calendar year of the plan. Only Year 1 would include grading for up to four new landing areas and widening of several existing trails and access roads, resulting in generation of the greatest GHG emissions in any year of the plan.

To analyze how carbon sequestration would change after the implementation of vegetation management activities, the forest, in its current condition, was assumed to have no net gain of carbon (i.e., the rate of carbon release from decomposition and rate of carbon sequestration from tree growth are equal). Thus, carbon stocks are assumed to be at a constant 34,070 MT CO_2e. This assumption presents a conservative analysis because the carbon sequestration rate of the forest is likely decreasing in its present state; the Reserve is experiencing a high tree mortality rate; dead trees are being decomposed, which releases carbon; and carbon sequestration rates are reduced from the abundance of dying and diseased trees within the Reserve. The total estimated GHG emissions are provided in Table 4.7-5 and divided by calendar year.

Approximately 40 percent of the vegetative materials cut in the Reserve would be chipped and spread across the Reserve to control erosion[2]. The remaining 60 percent of vegetative material would be removed from the Reserve in the form of chips or logs. These materials would be transported to an appropriate composting facility, such as Recology Blossom Valley Organics, Recology South Valley Organics, or Jepson Prairie Organics (City and County of San Francisco 2015). Chips would decay naturally over time, which would release carbon. The half-life[3] of eucalyptus species is around 5 years (Hernandez, et al. 2009, Duryea, English and Hermansen 1999). The carbon released from decomposition of chips was calculated using a half-life of 5 years for eucalyptus chips left on the Reserve and assuming that the chips sent off-site to a composting facility would be composted in the same year as delivered, as composting facilities are usually permitted to enhance decomposition conditions to accelerate the process.

Table 4.7-5 2017-2018 Proposed Plan GHG Emission Estimates (MT CO_2e)

Activity	Calendar Year 2017	Calendar Year 2018
Equipment and Hauling Emissions	66 [a]	121 [b]
Reduction in Carbon Stock/Uptake from Tree Removal	520	780
Carbon Sequestration from New Tree Growth and Increased Sequestration of Existing Trees	-	-745 [c]
Carbon Release from Decomposition of Chips [d]	416	624
Total GHG Emissions	**1,002**	**780**
BAAQMD Significance Threshold	1,100	1,100
Exceed Threshold?	No	No

[3] The time it takes for half of a material to decay.

Activity	Calendar Year 2017	Calendar Year 2018

Note:

[a] Emissions from Access Road and Landing Area Preparation Activities, and Vegetation Management Activities.

[b] Emissions from Vegetation Management Activities.

[c] The negative value refers to carbon uptake by the forest on the Reserve, resulting in less carbon in the atmosphere.

[d] Includes chips decomposing on the Reserve and off-site at a composting facility.

Source: (BAAQMD 2017)

Yearly plan activities would generate or remove less GHG emissions than the BAAQMD operational threshold of 1,100 MT CO_2e per year. The impact from the generation of GHG emissions and reduction in carbon uptake in a given calendar year would be less than significant. Although GHG emissions would not be significant and the plan activities are not considered construction, similar equipment types would be used during preparation and vegetation management activities. **GHG-LRDP-1: Construction-Related GHG Reduction Measures** would be incorporated in accordance with the 2014 LRDP, which requires use of alternative fuels where feasible. The impact would remain less than significant.

Comparison of Impacts Across Phases

Phase I

As discussed above and shown in Table 4.7-5, GHG emissions generated during the year of plan implementation with the greatest net GHG emissions, 2017,would not exceed the BAAQMD significance threshold. Phase I vegetation management activities would remove approximately 3,899 MT of CO_2e storage over 5 years (2017 to 2022), which represents only 11 percent of the current standing carbon in the forest. A portion of the carbon storage removed during vegetation treatments would be chipped and left on-site to decay, slowly releasing carbon, which is accounted for in Table 4.7-5 and Table 4.7-6. The removal of dead and dying trees would release remaining healthy trees from competition, allowing them to grow and sequester carbon at a higher rate. Newly planted trees would also sequester carbon; planted seedlings would initially uptake very little carbon (approximately 0.6 MT CO_2e in the first year), but their growth rate would increase over time as the trees grow. Average growth of the forest would amount to an approximately 2.35 percent increase in carbon uptake annually. The carbon storage removed/reduced by vegetation management activities and equipment emissions would be balanced by tree growth such that the total carbon removed/reduced in Phase I would be surpassed by carbon sequestration from tree growth by 2022 (Year 5/Year 6) of the plan, as shown in Table 4.7-6. The impact from GHG emissions generated by vegetation management activities during Phase I would be more than compensated for by carbon sequestration. The impact would be less than significant. **GHG-LRDP-1: Construction-Related GHG Reduction Measures** would be incorporated in accordance with the 2014 LRDP, which requires use of alternative fuels where feasible. The impact would remain less than significant.

Table 4.7-6 2019-2022 Proposed Plan GHG Emission Estimates (MT CO_2e)

Activity	Calendar Year 2019	Calendar Year 2020	Calendar Year 2021	Calendar Year 2022
Equipment and Hauling Emissions [a]	98	96	93	91
Reduction in Carbon Stock/Uptake from Tree Removal	780	780	780	315
Carbon Sequestration from New Tree Growth and Increased Sequestration of Existing Trees [c]	- 765	- 785	- 806	- 827
Carbon Release from Decomposition of Chips [d]	624	624	624	252
Total GHG Emissions	**736**	**714**	**691**	**-168**
BAAQMD Significance Threshold	1,100	1,100	1,100	1,100
Exceed Threshold?	No	No	No	No

Note:

[a] Emissions from Vegetation Management Activities.

[b] The negative value refers to carbon uptake by the forest on the Reserve, resulting in less carbon in the atmosphere.

[c] Includes chips decomposing on the Reserve and off-site at a composting facility.

Source: (BAAQMD 2017)

Phases II and III

Fewer GHG emissions would be emitted during Phases II and III of the plan because these phases would not involve the creation of landing areas or access roads and, generally, fewer trees would be removed from the Reserve. Although similar sizes of seed tree and group selection areas may be created in Phases II and III, fewer trees would be removed in Phases II and III because many of the hazardous trees in the Reserve would be removed during Phase I. Fewer trees removed per year would require fewer hours of equipment and vehicles use and consequently a decrease in annual equipment emissions. Impacts would be less than significant and further reduced through implementation of **GHG-LRDP-1: Construction-Related GHG Reduction Measures**.

Assuming an equivalent amount of area is treated with seed tree and group selection in Phase II as would be treated in Phase I, approximately 1,249 MT CO_2e storage would be removed/ reduced within the forest by tree removal. This removal/reduction in carbon storage would be replaced in a single year of healthy forest growth during Phases II and III. Forest growth would continue increasing carbon uptake at approximately 2.35 percent annually. Tree mortality would be the most significant source of biomass flux over the 20 years of plan implementation as older trees fall and are replaced with seedlings. Over the 20-year life of the plan, the Reserve is expected to accrue approximately 13,665 MT CO_2e (± 680 MT CO_2e) and reach 47,735 MT CO_2e in the year 2037. Additional treatments (including tree planting) and chip decay may alter this estimation, but if living trees continuously replace dying ones, the trend would remain

positive absent a catastrophic event such as a wildfire. The sequestration of carbon would be considered a beneficial effect from vegetation management activities. The impact of implementation of the plan on GHG emissions contributions would be less than significant. **GHG-LRDP-1: Construction-Related GHG Reduction Measures** would be incorporated in accordance with the 2014 LRDP, which requires use of alternative fuels where feasible. The impact would remain less than significant.

Impact GHG-2: The proposed plan could conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emission of greenhouse gases.	**Significance Determination**
	Less than significant

Climate Change Scoping Plan

The vehicles used during preparation and vegetation management activities are required to comply with the applicable GHG reduction programs for mobile sources. The contractor who owns the equipment and vehicles is required to provide verification of compliance to CARB or the USEPA under state and federal law. The proposed plan would conform with relevant programs and recommended actions detailed in the Scoping Plan and Mobile Source Strategy. The proposed plan would not conflict with regulations adopted to achieve the goals of the Scoping Plan. No impact would occur.

2010 Clean Air Plan

The proposed plan would not conflict with the 2010 Clean Air Plan because GHG emissions would be below the BAAQMD significance threshold for GHGs as shown in Table 4.7-5. The proposed plan would comply with BAAQMD thresholds identified to achieve the goals of the 2017 CAP. No impact would occur from exceedance of thresholds.

Policies and Plans of the UC Regents and University of California Office of the President

A future development project would be considered consistent with the revised GHGRS if it was consistent with the strategy assumptions regarding the amount and type of future development, and was consistent with the GHG reduction measures included in the revised GHGRS. Projects consistent with the revised strategy, including conformance with any performance measures applicable to the project, would not require additional GHG emissions analysis under CEQA Guidelines Sections 15064(h) and 15183.5(b)(2).

The GHGRS states a project is consistent with the overall strategy if it is consistent with the future development described in the plan and does not conflict with Tier 1 and Tier 2 measures. The plan is consistent as it would not result in an increase in building space, faculty or students, or visitors. Activities would not hinder implementation of any Tier 1 and Tier 2 measures that are intended to ensure that the campus reaches its 2020 GHG emissions goals. The plan would result in some increase in GHG emissions by the year 2020 over the current baseline levels through both equipment usage and the loss of carbon storage/ sequestration ability of the forest. The net GHG emissions attributable to the plan would comprise less than 0.5 percent of UCSF's overall 2020 GHG emission goal, which should be off-set by the gains obtained through implementing Tier 1 and Tier 2 measures campus-wide. Ultimately, the plan would result in a

net benefit after approximately 5 or 6 years (2022) of implementation, when forest regrowth allows for greater carbon sequestration than the baseline level that the forest currently provides and even greater sequestration than emitted by equipment used to manage the forest, as shown in Table 4.7-6. By 2022, the plan would provide a positive impact on UCSF's ability to meet its carbon neutrality goals by serving as a carbon sink. At the end of the 20-year plan implementation (2037), the forest would be sequestering a net of -1,113 MT CO_2e. The proposed plan would not conflict with the University of California's policies and plans.

San Francisco Climate Action Strategy

UCSF strives to be consistent with City standards, where feasible, although UCSF is not subject to City of San Francisco policies and regulations when using property under its control in furtherance of its educational mission. The Climate Action Strategy identifies two relevant strategies that require (1) an increase in the canopy of the urban forest to 25 percent of the city land area and (2) a 50 percent shift in automobile trips to non-automobile trips by 2017 and 80 percent by 2030. The proposed plan would remove and replace trees within the Reserve over the course of 20 years to promote a healthier forest. Although tree density would be reduced over the life of the plan, the Reserve would be maintained as a forest and would not decrease in size. The strategy identified to achieve a reduction in automobile trips would require investing in new transportation infrastructure to expand transit, bicycle, walking, and vehicle sharing. The way this strategy would be implemented would not directly apply to the proposed plan. The proposed plan would not conflict with the GHG reduction measures contained in the Climate Action Strategy. No impact would occur.

Impact GHG-3: The proposed plan could result in significant impacts on greenhouse gas emissions in combination with past, present, and probable future development in the cumulative analysis study area.	**Significance Determination**
	Less than significant contribution

Geographic Scope

GHGs are global pollutants and have long atmospheric lifetimes of one year to several thousand years, which permits dispersal of GHGs around the globe. In contrast to air quality, which generally is a regional or local concern, human-caused emissions of GHGs have been linked to climate change on a global scale. As such, the geographic extent for the GHG emissions cumulative analysis is global. The quantity of GHGs required to ultimately result in climate change is not precisely known. However, a single project is very unlikely to measurably contribute to a noticeable incremental change in the global average temperature, or to the global, local, or microclimate.

Cumulative Analysis

GHG emissions and climate change are inherently cumulative impacts. Past, present, and probable future projects worldwide contribute or would contribute to the cumulative conditions for GHG emissions. The cumulative impact of GHG emissions and climate change, generally, is significant.

Cumulative impacts from GHG emissions are addressed by the BAAQMD thresholds of significance for construction emissions of GHGs. The BAAQMD threshold represents the levels at which a project's individual emissions of criteria air pollutants and precursors would result in a cumulatively considerable contribution to GHGs. BAAQMD considered the cumulative nature of greenhouse gases when setting thresholds for GHGs. The BAAQMD GHG emissions threshold is 1,100 MT CO_2e per year.

Use of vehicles and equipment during implementation of the proposed plan would generate GHG emissions. Carbon stock would be removed from the forest as chips and trees are hauled off-site, and carbon uptake would be reduced when living trees are removed from the forest. The metric tons of CO_2e from GHG emissions generated and the reduction in carbon stock/uptake would not exceed the BAAQMD GHG emissions threshold in 2017. Carbon sequestration in the forest would exceed GHG emissions generated from equipment and loss of carbon stock/uptake from tree removal, for the remainder of plan implementation. The proposed plan's contribution to GHG emissions would be less than cumulatively considerable.

4.7.7 Mitigation Measures

No mitigation measures would be required to reduce impacts to less than significant.

4.7.8 References

Bay Area Air Quality Management District (BAAQMD). 2015. "Bay Area Emissions Inventory Summary Report: Greenhouse Gases Base Year 2011." January.

—. 2017. CEQA Air Quality Guidelines. May.

Bousquet, P., P. Peylin, P. Ciais, C. Le Quéré, P. Friedlingstein, and P. P. Tans. 2000. "Regional changes in carbon dioxide fluxes of land and oceans since 1980." Science 1342-1346.

California Air Resources Board (CARB). 2007. California Greenhouse Gas Inventory for 1990-2004 – by IPCC Category. November 29. Accessed May 10, 2016. http://www.arb.ca.gov/cc/inventory/archive/tables/ghg_inventory_ipcc_90_04_sum_2007-11-19.pdf.

—. 2014. Compost Emissions Air District VOC Rules. July 3. Accessed June 8, 2017. https://www.arb.ca.gov/cc/compost/rules.htm.

—. 2014. "First Update to the Climate Change Scoping Plan." May.

—. 2016. "Mobile Source Strategy." May.

—. 2017a. California Greenhouse Gas Emission Inventory - 2017 Edition. June 6. Accessed June 8, 2017. https://www.arb.ca.gov/cc/inventory/data/data.htm.

—. 2017b. California Greenhouse Gas Emission Inventory 2000-2015 – Trends of Emissions and Other Indicators. June 6. Accessed June 8, 2017.

https://www.arb.ca.gov/cc/inventory/pubs/reports/2000_2015/ghg_inventory_trends_00-15.pdf.

—. 2017c. California Greenhouse Gas Inventory for 2000-2015 — by IPCC Category. June 6. Accessed June 8, 2017. https://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_ipcc_sum_2000-15.pdf.

City and County of San Francisco. 2015. "Agreement for Disposal of San Francisco Municipal Solid Waste at Recology Hay Road Landfill in Solano County." Final Negative Declaration. July 20.

—. 2013. "San Francisco Climate Action Strategy."

—. 2010. "Strategies to Address Greenhouse Gas Emissions." November.

Duryea, M.L., R.J. English, and L.A. Hermansen. 1999. "A comparison of landscape mulches: chemical, allelopathic, and decomposition properties." Journal of Arboriculture 25 (2): 88-96.

Hernandez, J., A. del Pino, L. Salvo, and G. Arrate. 2009. "Nutrient export and harvest residue decomposition patters of a Eucalyptus dunnii Maiden plantation in temperate climate of Uruguay." Forest Ecology and Management 258 (2): 92-99.

ICF International. 2015. "Technical Review of the 2012 Community-wide GHG Inventory for the City and County of San Francisco." January 21.

International Panel on Climate Change (IPCC). 2013. "Climate Change 2013 The Physical Science Basis." Working Group I Contribution to the Fifth Assessment Report of IPCC.

Kimmins, J. P. 1997. Forest Ecology - A Foundation for Sustainable Management. Second. Prentice Hall.

Lee, C., P. Erikson, M. Lazarus, and G. Smith. 2010. Greenhouse gas and air pollutant emissions of alternatives for woody biomass residues - Final Draft Version 2.0. Stockholm Environmental Institute, Olympic Region Clean Air Agency.

Shaw, Rebecca, Linwood Pendleton, Dick Cameron, Belinda Morris, Greg Bratman, Dominique Bachelet, Kirk Klausmeyer, et al. 2009. "The impact of climate change on California's ecosystem services." California Climate Change Center, March.

University of California, San Francisco (UCSF). 2009. "Climate Action Plan." December.

University of California, San Francisco (UCSF). 2014a. "2014-2020 UCSF Sustainability Action Plan 2.0."

—. 2014b. "UCSF 2014 Long Range Development Plan." November.

—. 2014c. "UCSF Greenhouse Gas Reduction Strategy." August.

—. 2017. "UCSF Climate Action Plan - Greenhouse Gas Reduction Strategy." April.

University of California. 2016. "Policy Sustainable Practices." September 6.

United States Environmental Protection Agency (USEPA). 2016a. Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act. February 23. Accessed July 28, 2016. https://www3.epa.gov/climatechange/endangerment/.

—. 2016b. The Greenhouse Effect. March 3. Accessed March 2, 2017. https://www3.epa.gov/climatechange/kids/basics/today/greenhouse-effect.html.

—. 2017a. Climate Change: Basin Information. January 17. Accessed March 2, 2017. https://www.epa.gov/climatechange/climate-change-basic-information.

—. 2017b. Overview of Greenhouse Gases. February 14. Accessed March 3, 2017. https://www.epa.gov/ghgemissions/overview-greenhouse-gases.

Wayburn, Laurie A., Jerry F. Franklin, John C. Gordon, Clark S. Binkley, David J. Mladenoff, and Norman L. Christensen Jr. 2000. Forest Carbon in the United States: Opportuniteis and Options for Private Lands. Pacific Forest Trust, Inc.

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4.8 HAZARDS AND HAZARDOUS MATERIALS

4.8.1 Introduction

This section describes the hazards and hazardous materials in the plan area and the potential impacts from the introduction of hazards and the use of hazardous materials from implementation of the proposed vegetation management activities. The section also provides a discussion of the applicable federal, state, regional, and local regulations that pertain to hazards and hazardous materials. The impacts associated with the proposed plan are compared with the thresholds of significance used by the University pursuant to CEQA.

Comments related to hazards and hazardous materials received during the public scoping process included concerns about the following:

- Increased fire hazard from the removal of trees because existing trees hold moisture
- Public safety during tree felling and from hazard trees

4.8.2 Definitions

Hazardous Materials

Hazardous materials are chemical and non-chemical substances that can pose a threat to the environment or human health if misused or released. Hazardous materials occur in various forms and can cause death; serious injury; long-lasting health effects; and damage to buildings, homes, and other property. Hazardous materials are used in industry, agriculture, medicine, research, and consumer goods. Explosives, flammable and combustible substances, poisons, radioactive materials, pesticides, petroleum products, and other materials under the Resource Conservation and Recovery Act (RCRA) in 40 CFR 261 are considered hazardous materials. These substances are most often released during motor vehicle or equipment accidents or chemical accidents during industrial use. Hazardous substances have the potential to leach into soils, surface water, and groundwater if they are not properly contained.

Wildland Fire

A wildland fire is any non-structure fire that occurs in vegetation or natural fuels. Wildland fires include prescribed burns and wildfire. Wildfire is defined as an unplanned, unwanted fire including human-caused fires, escaped prescribed burns, and all other wildland fire events where the objective is to put the fire out (National Wildfire Coordination Group 2015). A fire can burn exclusively along the forest floor (surface fire), climb and consume the tree crown of an individual tree (torching), or reach into and spread through tree canopy to tree canopy (crown fire).

Abiotic and biotic factors influence fires. Biotic factors that influence flammability of a forest include moisture content in the foliage; size and shape of leaves; retention of dead leaves and branches; spatial arrangement of flammable vegetation; and presence of flammable oils, resins,

or other chemicals in leaves or branches. Shrubs and vines can act as fuel ladders, allowing a surface wildfire to travel up into the tree canopy. Dense forests with minimal horizontal separation between trees can spread flames more quickly (Doran, Randall and Long 2004). Abiotic factors include climate (dry or humid), winds, weather conditions, and topography. Fire spreads more quickly during high wind events and can also create their own wind patterns if they grow large enough. Fires in California are more likely to occur on hot, dry days most often in the summer or fall during periods of low precipitation. Slope, aspect, elevation, forest density, and large topographic features such as rock outcroppings influence fire spread; for example, fires tend to spread faster up a slope than down a slope.

4.8.3 Environmental Setting

Hazardous Materials

Existing Hazardous Materials Sites

The presence of suspected contamination in and within 0.25 mile of the Reserve was identified using the SWRCB GeoTracker and California Department of Toxic Substances Control's (DTSC) EnviroStor databases. There are no listed RCRA, Superfund National Priority Comprehensive Environmental Response, Compensation, and Liability Act sites, toxic or solid waste landfill sites, facilities with reported toxic chemical releases, or radioactive materials in the Reserve. One open military cleanup site, one inactive tiered permit, and seven closed cleanup sites are located within 0.25 mile of the Reserve (DTSC 2017, SWRCB 2017).

The former Nike SF-89 IFC site, located within the Reserve but not within the plan area, is identified as an open, military cleanup site. The Nike SF-89 IFC site was activated in 1955 and deactivated in 1963. This site housed ground-based radar but not missiles. A preliminary assessment was prepared in 2008, which yielded several areas of interest that may require further inspection. These areas include two possible underground storage tanks (USTs), a former electrical substation/transformer pad, and a former electrical power plant/generator building. Potential contamination could remain at these locations (USACE 2008). The Nike SF-89 IFC site is identified as a Containerized Hazardous, Toxic, and Radioactive Waste project (USACE 2013).

Naturally Occurring Asbestos

Asbestos is a group of naturally-occurring fibrous minerals that were commonly used in building materials because of their high tensile strength and flexibility. Asbestos was identified by CARB as a TAC and is classified as a known human carcinogen by State, federal, and international agencies (CARB 2011). Inhaled asbestos dust can contribute to eventual severe health problems such as mesothelioma and other cancers (WHO 2012). Six mineral types that have asbestiform habit (long thin hair-like fiber) include those from the chrysotile (serpentinite) and amphibole. San Francisco is among the identified counties where ultramafic bedrock materials are present and have the potential for naturally occurring asbestos fibers. According to statewide mapping, the Parnassus Heights campus site appears to be located east of any mapped ultramafic bedrock units for the City of San Francisco (Department of Conservation

2000) or where reported asbestos occurrences have been mapped (USGS 2011). According to a geotechnical report for the upland slope stability, the bedrock of Mount Sutro consists of Franciscan Complex bedrock (chert, greenstone and meta-sandstone and shale) (Rutherford + Chekene 2013). Naturally occurring asbestos fibers are more associated with the mineral chrysotile commonly found in serpentinite. However, it is still possible that some asbestiform rocks underlie the Reserve.

Fire Hazards in the Reserve

Wildfire History

Fires were commonplace in the Reserve in the late 1800s. One fire of note occurred on October 8, 1899, where 60 acres of Mount Sutro were destroyed by a fire event that threatened the Affiliated Colleges (which later became UCSF) on the north side of the mountain and the Alms House (which later became Laguna Honda Hospital) on the south side. A 10-acre fire was recorded to have occurred in 1934, prompting the cessation of logging efforts in the early 1930s (Brandi 2003). No fires of consequence have burned in the Reserve in recent history.

Characteristics that Influence Flammability

Climate

The Reserve is within three miles of the Pacific Ocean and has a coastal climate with seasonally varied precipitation in the form of both rain and fog. Rainfall is concentrated to the rainy season from November through April (WRCC 2016). Fog is present much of the year, but particularly during summer months. Dry conditions with above-normal temperatures typically occur in late summer and early fall. Temperatures during summer range from the low 40s to the high 90s. A semi-permanent, low-pressure system of the southwestern United States often weakens during the summer and fall and the North Pacific high-pressure system shifts inland, allowing hot, dry, high-intensity winds to blow in from the northeast. These winds, known as the "Santa Ana" or "Diablo" winds, in combination with unusually high air temperatures, low humidity, and dry vegetation increase the vulnerability of the Reserve to wildfire for several weeks in the summer and fall. Although the Reserve may not experience the high winds due to its location and topography, the Reserve does experience occasional episodes of still, stagnant air formed by stationary highs during summer months. During these periods, the weather pattern enhances the possibilities of ignition and extreme fire behavior.

Forest Composition and Health

Blue gum eucalyptus, the dominant species within the Reserve, poses a greater risk of fire hazard compared to other trees. The large fuel load, arrangement of branches and leaves, and volatile oils in the leaf litter are the main reasons eucalyptus trees present a significant fire hazard (NPS 2006). Fuel loads of eucalyptus stands measured in Sibley Regional Park, Angel Island, and the Golden Gate National Recreation Area range from 29 to 50 tons per acre; by comparison, grasslands range from 1 to 5 tons per acre, and northern coastal scrub rarely exceeds 5 tons per acre (Agee, et al. 1973, Martin, Finney and Valentino 1988, Rice 1985). The spatial distribution of flammable vegetation affects the fire hazard in any vegetation type; in eucalyptus stands, branches, leaves, and peeling bark drape over each other and create a near

optimum mixture of oxygen and fuel. Bark is a particularly important consideration for fire hazard of eucalyptus; in Australia, where blue gum eucalyptus originate, bark characteristics are routinely rated as part of the tree's overall fire hazard assessment. Finally, eucalyptus have a high oil content and volatile compounds that contribute to fire hazard. Oils have approximately three times the energy of cellulose, so vegetation with high oil contents burn hotter. Mutch (1970) found that the oil content of eucalyptus leaves range from approximately 10 to 20 percent of its dry weight compared to an average of around 3 percent for other tree species. Eucalyptus releases terpenes and phenolic acids, volatile compounds that are released as flammable gases at lower temperatures and therefore ignite easily.

The understory is thick with ivy, poison oak, elderberry, and Himalayan blackberry. Ivy has, in many places around the Reserve, grown up the trucks of trees. Unmanaged shrubs have grown tall in the Reserve. Understory ivy and tall shrubs act as ladder fuels, which aid the spread of surface fires into the tree canopy.

The health of the forest in the Reserve has been and continues to decline due to pests, drought, old age, blue gum eucalyptus monoculture, and high tree density. The trees in the Reserve have experienced drought stress and subsequent attack by pests, particularly beetles (Pacific Biology 2017). Heart rot has commonly been found to have affected trees in the Reserve. Stressed and diseased trees have a higher percentage of dead leaves and branches (Doran, Randall and Long 2004), which act as fuels in a forest fire. Most blue gum trees in the Reserve have arisen from stumps and are susceptible to decay, breakage, and blowdown. The health of the forest poses a wildfire risk because wildfire spreads more rapidly through forests with higher percentages of dead or dying trees.

Existing Fire Conditions in the Reserve

FlamMap Modeling

FlamMap was used to model existing fire conditions in the Reserve. FlamMap is a geographic-based software program used to predict fire behavior across the landscape. The program uses static weather parameters such as average wind speed, wind direction, temperature, and humidity as an input, which were obtained from a local weather station. Details about the fire analysis can be found in Appendix 4.8. The current fire conditions in the Reserve are summarized below.

Flame Length

Flame length is the length of the flame at the head of the fire. Flame length is often used as a proxy for fire intensity because it is highly correlated to fire intensity. High flame lengths are correlated to structural damage. A flame length of eight feet is usually a cut-off point for strategic firefighting decisions on whether to attack the fire directly (i.e., at the head of the fire where the fire is advancing fastest) or attempt to control the fire through indirect methods (i.e., fire retardants, setting a backfire).

Under current conditions, the model predicted that no fire would occur on approximately 62 percent of the Reserve (refer to Figure 4.8-1 for a pictorial representation of predicted existing

flame lengths). Fire would generally occur where very tall understory grows within the Reserve; no fire was predicted to occur in areas that are dominated by shrubs and grass or near buildings with defensible space. No fire was predicted to occur around the Aldea San Miguel Housing Complex and near buildings on the west and east sides of the Reserve. A large section of the southern part of the Reserve was also predicted to not burn. Where fire would occur, flame lengths of over 11 feet would occur on 22 percent of the Reserve, primarily within the northern part and center of the Reserve. Flame lengths are generally longer where very tall understory grows within the Reserve and can transmit the fire from the forest floor to the canopy.

Rate of Spread

Rate of spread is the forward rate of spread at the head of a surface fire. Rate of spread is measured in chains (a distance of 66 feet) per hour. Similar to the high predicted flame lengths, rate of spread is relatively high in locations where fire is modeled to potentially occur. Sixteen percent of the Reserve is predicted to experience a rate of spread greater than 10 chains (660 feet) per hour (refer to Figure 4.8-3 for a pictorial representation of the predicted existing rate of spread). Fast fire spread is predominantly predicted to occur in areas of high shrub understory. While a fast rate of spread does not necessarily mean that a fire will be problematic, a fast-moving fire coupled with high flame lengths cannot be suppressed with a hand crew.

Crown Fire Activity

Crowning activity indicates locations where fire is expected to travel into and possibly consume the crowns. Factors that influence whether a surface fire will transition to some form of crown fire include canopy base height, top of canopy height, canopy bulk density, and foliar moisture content. When a fire burns through tree crowns, embers are produced and distributed, sometimes at long distances. Hot fires create embers that loft ahead of the flaming front that ignite new fires called spot fires. "Spotting potential" and "crowning potential" describe the propensity of vegetation to create and disburse embers that have the potential to start new fires well in advance of the main fire.

The Reserve is identified as prone to crown fire because of its high understory. Should a fire occur within the Reserve, up to 38 percent of the Reserve is predicted to result in a torching fire and reach into the tree crowns (refer to Figure 4.8-5 for a pictorial representation of predicted existing crown fire activity).

Adjacent Uses

The Reserve is surrounded by primarily residential structures as well as structures within the UCSF campus, including the Aldea Housing complex, the Chancellor's Residence, Moffitt and Long Hospitals, the campus central utilities plant, and premier research and teaching facilities in buildings. A substantial number of residences are directly adjacent to the Reserve along Edgewood Avenue, Clarendon Avenue, Crestmont Drive, and Christopher Drive.

Wildfire Hazard Classification
The California Department of Forestry and Fire Protection (CalFire) has designated the Reserve as a moderate fire hazard severity zone (CalFire 2007). CalFire has identified urban areas surrounding the Reserve as a Community at Risk for fire hazards as part of the Wildland-Urban Interface program (CalFire 2013).

4.8.4 Regulatory Considerations

University of California

UCSF 2014 LRDP
The 2014 LRDP EIR identifies one measure related to naturally occurring asbestos. This measure is considered part of the plan and is shown here. References to "construction" in these measures can be seen as equivalent to "activity" as it pertains to the plan. While plan activities are not technically construction, similar types of equipment and methods (e.g., grading, trucking) are employed to carry it out. These measures are considered part of the plan and are shown here.

HAZ-LRDP-1: An Excavation Management Plan shall be prepared by a qualified consultant to include the California Air Resource Board (CARB) Asbestos Airborne Toxic Control Measure (ATCM) for Construction, Grading, Quarrying and Surface Mining Operations to minimize naturally occurring asbestos through the application of best management practices for fugitive dust from construction, grading and excavation operations. Unless site specific testing by a certified laboratory can demonstrate the absence of encountering naturally occurring asbestos, construction specifications shall include implementation of this CARB ATCM.

Federal

U.S. Environmental Protection Agency
Hazardous Waste Management
The USEPA is the lead agency responsible for enforcing federal laws and regulations governing hazardous materials that affect public health or the environment. In 1976, the RCRA was enacted to provide a general framework for USEPA to regulate hazardous waste from the time it is generated until its ultimate disposal. Under RCRA, a waste may be considered hazardous if it exhibits certain hazardous characteristics (ignitability, corrosivity, reactivity, or toxicity) or if it is included on a specific list of wastes that USEPA has determined are hazardous. In accordance with RCRA, any generator, transporter, or facility that treats, stores or disposes of hazardous waste is required to ensure that the waste is properly managed from "cradle to grave" by complying with the federal waste manifest system and other regulations regarding hazardous waste identification, classification, generation, management and disposal (40 CFR § 260-273).

Hazardous Materials Transportation Act
In 1990 and 1994, the federal Hazardous Materials Transportation Act was amended to improve the protection of life, property, and the environment from the inherent risks of transporting hazardous materials in all major modes of commerce. The US Department of Transportation

(US DOT) developed hazardous materials regulations, which govern the classification, packaging, communication, transportation, and handling of hazardous materials, as well as employee training and incident reporting (49 CFR § 171-180). The transportation of hazardous materials is subject to both RCRA and US DOT regulations.

Occupational Safety and Health Administration

Federal worker safety and health regulations are regulated under the Federal Occupational Safety and Health Act (United States Code § 651 *et seq.*) and enforced by the Occupational Safety and Health Administration (OSHA) through the implementing regulations under Title 29 of the CFR. OSHA regulations are intended to assure that employers maintain safe and healthful workplaces by setting and enforcing standards, and by providing training, outreach, education and assistance. The General Duty Clause requires employers to keep their workplace free of serious recognized hazards. OSHA's Hazard Communication Regulation (29 CFR § 1910.1200) requires that workers are trained and notified of specific hazards associated with hazardous workplace substances.

State

Hazardous Waste Management

In California, DTSC administers the RCRA program, as well as additional State-specific requirements for managing hazardous waste in accordance with the California Hazardous Waste Control Law (California Health and Safety Code Section 25100 *et seq.*). The State criteria for identifying hazardous waste based on characteristics of toxicity, flammability, reactivity, and corrosiveness are described in Title 22 CCR §§ 66261.10-66261.24 and are broader than the RCRA hazardous waste criteria; therefore, hazardous wastes in California can be identified as either RCRA hazardous waste or non-RCRA hazardous waste.

Hazardous Materials Release Sites

The California Environmental Protection Agency (CalEPA) has broad jurisdiction over hazardous materials management in the State. Under the authority of CalEPA, the SWRCB and DTSC are responsible for overseeing the remediation of contaminated soil and groundwater sites. The provisions of Government Code 65962.5 (also known as the Cortese List) require the SWRCB, DTSC, the California Department of Health Services, and the California Department of Resources Recycling and Recovery to submit information pertaining to sites associated with solid waste disposal, hazardous waste disposal, and/or hazardous materials releases to CalEPA.

Hazardous Materials Transportation

The California Highway Patrol, Caltrans, and DTSC are responsible for enforcing federal and State regulations pertaining to the transportation of hazardous materials. If a discharge or spill of hazardous materials occurs during transportation, the transporter is required to take appropriate immediate action to protect human health and the environment (e.g., notify local authorities and contain the spill), and is responsible for the discharge cleanup.

Worker Health and Safety
State worker health and safety regulations related to construction activities are enforced by the California Division of Occupational Safety and Health (CAL OSHA). Regulations include requirements for protective clothing, training, and limits on exposure to hazardous materials. Specific worker safety measures for excavation hazards (e.g., falling or cave-in of the excavation wall) are described in Title 8 CCR § 1541.

Local

San Francisco General Plan
The Community Safety Element was prepared to guide the City and County of San Francisco in preparation for, response to, and recovery from a major disaster, including fires. Fires are a threat for densely developed areas. The City and County of San Francisco is committed to increasing the San Francisco Fire Department's personnel and training to expand fire prevention and firefighting capability. Access to water supply when fighting fires is recognized as critical to achieve containment (City and County of San Francisco 2012).

City and County of San Francisco Hazard Mitigation Plan
The San Francisco Department of Emergency Management and 20 other City and County of San Francisco departments completed an update of the City's Hazard Mitigation Plan (HMP) in 2014. The HMP describes the City's natural and human-made hazards, identifies actions to reduce their effects, and establishes a process for implementing the HMP. Having a Federal Emergency Management Agency (FEMA)-approved plan makes San Francisco eligible for federal hazard and flood mitigation grant funding before and after a Presidentially-declared disaster. The HMP includes fire hazards and maps the Reserve as a Moderate wildfire hazard area consistent with CalFire's rating (City and County of San Francisco 2014).

4.8.5 Significance Standards and Methodology

Significance Criteria
Impacts of the proposed plan on hazards and hazardous materials would be considered significant if implementation of the plan would exceed the following standards of significance, in accordance with Appendix G of the State CEQA Guidelines and the UC CEQA Handbook:

1. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
2. 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;
3. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school;
4. Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, create a significant hazard to the public or the environment;

5. For a plan located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, result in a safety hazard for people residing or working in the plan corridor;
6. For a plan located within the vicinity of a private airstrip, result in a safety hazard for people residing or working in the plan corridor;
7. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or
8. Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

The Initial Study for the proposed plan determined that the plan could create a significant hazard to the public or the environment through the transport of hazardous materials or through reasonable foreseeable upset and accident conditions, and could expose people or structures to a significant risk of loss, injury, or death involving wildland fires. Impacts from wildfires are analyzed in this section.

Issues Adequately Addressed in the Initial Study

The Initial Study for the proposed plan found that implementation of the plan would have no impact from being located on a known hazardous site (the former Nike missile site is not located within the plan area, as the Rotary Meadow is not included in the plan) or being located near an airport, and would not impair the implementation of an adopted emergency response or evacuation plan. The Initial Study also determined that implementation of the plan would have a less than significant impact on schools from the emission or handling of hazardous materials within 0.25 mile of a school. Impacts from hazardous sites and airports, and on emergency plans and schools are not discussed further in this section.

Analysis Methodology

Hazardous Materials

The analysis of impacts from hazardous materials focuses on whether implementation of the activities proposed as part of the plan would result in exposure of the environment or public to hazardous materials. The types of equipment and vehicles as well as associated hazardous materials that would be used as part of plan implementation were analyzed to determine potential hazard.

Fire Hazard

FlamMap was used to predict fire behavior within the Reserve. The FlamMap fire behavior prediction simulation involves the input of several spatial data layers as well as settings for specific weather parameters. The base input layers for the model were compiled as part of the nation-wide Landscape Fire and Resource Management Planning Tools Project (LANDFIRE). LANDFIRE consists of data describing vegetation, wildland fuel, and fire regimes across the United States. This dataset was chosen for this assessment for its consistent, landscape-scale, cross-boundary strategic products for fire management planning. Modifications were made to the LANDFIRE dataset to reflect conditions within the Reserve, including forest stand

characteristics (e.g., canopy base height, top of canopy height, crown bulk density) and increasing the resolution to account for specific areas of restoration and forest treatments. Specific information regarding the fire modeling methodology are provided in Appendix 4.8.

Modeling was conducted for existing conditions (summarized previously), post-treatment after 5 years (Phase I), and post-treatment after 10 years (Phase II). Details regarding treatment activities after 5 years and after 10 years were inputted based on information in Section 3: Project Description. Modeling was not conducted for post-treatment conditions after 20 years, as the trends seen from Phase I to II would likely continue in Phase III, as described in the Impacts, below.

4.8.6 Impacts

Impact Hazards-1: The proposed plan could create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.	**Significance Determination**
	Less than significant with mitigation

Vegetation Management Activities

Vehicles and heavy equipment would be used during grading for landing area and access roads, and vegetation management activities. The equipment used during these activities, such as excavators, graders, loaders, masticators, and stump grinders, would involve the use of small quantities of hazardous materials to operate equipment, specifically fuel and oil. The routine transport, use, and disposal of hazardous materials could pose a threat to human health or the environment if not properly managed. Relatively small amounts of the listed materials, which are not considered acutely hazardous, would be transported, used, and disposed of. Workers handling hazardous materials are required to adhere to OSHA and CAL OSHA health and safety requirements. Hazardous materials must be transported to and from the Reserve in accordance with RCRA and US DOT regulations, managed in accordance with the City and County of San Francisco Department of Public Health's CUPA programs, and disposed of in accordance with RCRA at a facility that is permitted to accept the waste. Since compliance with existing regulations and programs are mandatory, the routine transport, use, and disposal of hazardous materials during grading of access roads and landing areas, and vegetation management activities are not expected to create a potentially significant hazard to the public or the environment.

The use and maintenance of equipment for grading and vegetation management activities within the Reserve could result in fuel leaks and spills. Spilled, leaking, or improperly disposed hazardous materials associated with preparation activities could create a hazard for contractors, the public, or the environment, which would be a potentially significant impact. **MM Hazards-1: Spill Containment and Countermeasure Plan** minimizes the accidental spill impact and hazardous materials exposure by requiring UCSF to prepare and implement a Spill Containment and Countermeasure Plan (SCCP). The SCCP would include measures to ensure that hazardous materials are properly stored on site and that any accidental releases of

hazardous materials would be properly controlled and quickly cleaned up. The impact from an accidental release of hazardous materials would be less than significant with mitigation.

Comparison of Impacts Across Phases

Fuel, oil, and other lubricating fluids would be used during all phases of the plan. Compliance with existing regulations and programs are mandatory and would ensure that routine transport, use, and disposal of hazardous materials would not create a hazard to the public or the environment. Equipment use would be greatest during Year 1 (Phase I) of plan implementation because landing areas and access roads would be created during Year 1. As such, the potential for leaks and spills from use of equipment would be greatest during Year 1. Subsequent years and phases would remove fewer trees and would not require the creation of landing areas or access roads; consequently, equipment would be used for fewer days than in Year 1. The overall potential for leaks and spills during all phases would be fairly minimal; however, fuel leaks and spills could create a hazard for contractors, the public, or the environment, which would be a potentially significant impact. **MM Hazards-1: Spill Containment and Countermeasure Plan** would be implemented to reduce the impact to less than significant. Refer to Section 4.9: Hydrology and Water Quality for additional stormwater control measures (e.g., straw waddles, sediment basins, silt fencing), which would further minimize the potential mobilization of contaminated soils and ensure impacts are less than significant.

Impact Hazards-2: The proposed plan could 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.	**Significance Determination**
	Less than significant with mitigation

Vegetation Management Activities

The impact from accidental spills or releases of hazardous materials during vegetation management activities is discussed under Impact Hazards-1. Accidental spills of hazardous materials used during vegetation management activities could create a significant hazard to the public or environment. The impact from accidental spill of hazardous materials would be less than significant with implementation of **MM Hazards-1: Spill Containment and Countermeasure Plan**. Ground-disturbing activities, including grading and tree removal would not occur outside of the plan area, specifically avoiding the Nike SF-89 site. Consequently, any potential remaining hazardous contamination in Rotary Meadow would not be disturbed and released into the environment under implementation of the plan. The impact from accidental spills of hazardous materials into the environment would be less than significant with implementation of **MM Hazards-1: Spill Containment and Countermeasure Plan**.

Any activity that involves excavation has some potential to encounter naturally occurring asbestos, if it is present. If present, groundbreaking activities could disturb these fibers causing them to be airborne and potentially adversely affect workers and the public. The likelihood of encountering asbestiform rocks is low; however, considering that bedrock is relatively shallow, UCSF is required to implement **HAZ-LRDP-1** as part of the 2014 LRDP, which would ensure

that disturbance of underlying materials would not expose workers or the public to naturally occurring asbestos, if present, for any earthwork activities. Impacts would be less than significant.

Comparison of Impacts Across Phases

The comparison of impact from accidental spills or releases of hazardous materials during each phase is discussed under Impact Hazards-1, above. Landing areas and access roads would be created during Year 1, and the greatest number of trees would be removed in the first few years of the plan. As such, the potential for leaks and spills from use of equipment would be greatest during Year 1. Subsequent years and phases would remove fewer trees and would not involve the creation of landing areas and access roads; consequently, equipment would be used for fewer days in other years and phases of the plan. However, accidental spills of hazardous materials used during vegetation management activities could create a significant hazard to the public or environment. **MM Hazards-1: Spill Containment and Countermeasure Plan** would be implemented to reduce the impact to less than significant.

Impact Hazards-3: The proposed plan could expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.	**Significance Determination**
	Less than significant with mitigation

Overview

The implementation of vegetation management activities would interact to change fire hazards and fire behavior within the Reserve. The areas that may burn would burn with larger flame lengths and an increased rate of spread; however, the overall risk of fire and risk of crown fires would decrease with the implementation of vegetation management activities.

Vegetation Management Activities

Vegetation management activities would alter the spatial arrangement of fuels within the Reserve. Seed tree and group selection treatments would introduce heterogeneity to the Reserve and would break up the landscape, making it more difficult for fire to spread across the Reserve. The rate of fire spread would increase, however, in areas of understory removal and tree plantings. Fire behavior would be particularly intense within areas of tree planting because young eucalyptus would burn quickly and may act as ladder fuels for the surrounding canopy. However, fire-fighting would be aided by the heterogeneous landscape rather than hindered by the increased rate of fire spread. Fire hazards would be relatively low within defensible space and along trails because ground vegetation and low branches that could act as ladder fuels would be removed from defensible space and lines of sight would be maintained along trails by trimming vegetation. Fires within the Reserve could be put out rather quickly because of the creation of defensible space and maintenance of trails. While planting eucalyptus would increase fire hazards in small localities across the Reserve, the management of defensible space and vegetation along trails would offset the hazard and generally be considered beneficial to reducing fire hazard within the Reserve. Fire hazard would generally decrease within the Reserve as a result of vegetation management activities.

Heat or sparks from vehicles or equipment use during plan implementation within the Reserve have the potential to ignite dry vegetation and cause wildfires. Personnel conducting vegetation management activities could smoke and improperly dispose of cigarettes. Implementation of the proposed plan has the potential to increase the risk of fire within the Reserve. The impact on people and structures due to the increased risk of fire ignition would be potentially significant. **MM Hazards-2: Fire Prevention Plan** requires implementation of fire prevention practices including training personnel and maintaining fire prevention equipment on site. The impact from increased risk of fire would be less than significant with mitigation.

Comparison of Impacts Across Phases

Fire behavior was modeled to understand how fire hazards may change in the Reserve after Phase I and Phase II vegetation management activities. After Phase I vegetation management activities are complete, fire would be expected to burn 5 percent less of the plan area than existing conditions. While a slight reduction in fire behavior would occur, fire would be expected to occur in areas of tree plantings that were not predicted to burn under existing conditions. Fire hazards would be reduced in areas of defensible space. The area that would experience high flames would be reduced by approximately 1.25 acres, and areas where a moderate to high rate of spread (between 1.1 chains [72 feet] and 20 chains [1,320 feet] per hour) are expected to occur would decrease by approximately 10 acres. However, the areas that may burn would burn with longer flame lengths and experience a faster rate of spread. The area where a torching fire is projected to occur would decrease by 26 percent compared to existing conditions. Existing fire conditions and post-Phase I fire conditions for predicted flame lengths, rate of fire spread, and torching fire activity are shown for comparison in Figure 4.8-1 through Figure 4.8-6.

Similar trends would continue after Phase II vegetation management activities are complete. Areas where very tall flame lengths (20 feet or more) are projected to occur after Phase II treatments would increase slightly (from 7.25 to 7.38 acres) compared to post-Phase I treatments. Areas projected to experience very high rates of spread (20 chains [1,320 feet] per hour or faster) would also slightly increase (from 5.03 to 5.80 acres). In contrast, the area projected to experience a torching fire would decrease from Phase I to Phase II; after Phase II treatments are complete, torching fires are expected to decrease by 42 percent from existing conditions. Compared to existing conditions, Phase II vegetation management activities would decrease the potential for a fire to spread within the Reserve due to the heterogeneity introduced by forest openings and the management of defensible space and vegetation along trails. As vegetation management activities continue to shape the forest, fire-fighting would become easier in the Reserve because defensible space and lines of sight would be maintained. Vegetation management activities in Phase III would continue to have beneficial impacts on managing fire risk as long as defensible space and lines of sight are maintained and eucalyptus are not allowed to become dense.

Despite vegetation management activities, equipment could spark, and workers smoking within the Reserve could also set a fire. Fires caused by plan activities within the Reserve could still generate embers that could spread fire into adjacent neighborhoods and create a significant

impact on the safety of people and structures, which would be a significant impact.
MM Hazards-2: Fire Prevention Plan requires personnel training and the maintenance of fire prevention equipment on site. Impacts from fire hazards would be less than significant with mitigation.

Impact Hazards-4: The proposed plan could result in significant impacts on hazards and hazardous materials in combination with past, present, and probable future development in the cumulative analysis study area.	**Significance Determination**
	Less than significant contribution with mitigation

Geographic Scope

The geographic extent for the analysis of cumulative impacts associated with hazards and hazardous materials is the area within approximately 0.25 mile of the proposed plan area. This geographic extent is appropriate to account for the small volume of hazardous materials that would be used for implementation of the proposed plan and the potential for that material to be transported offsite during upset or accident conditions. The 0.25-mile distance also accounts for the likelihood of encountering contaminated soil from existing hazardous material sites.

Cumulative Analysis

Routine Transport, Use, and Disposal of Hazardous Materials and Accidental Hazardous Materials Releases

Construction and operation of cumulative projects and implementation of the proposed plan would use equipment and vehicles that could leak hazardous materials, including gasoline and diesel fuel, engine oil, coolant, lubricants, and grease. Hazardous materials, particularly fuel, may be transported to and from each site, which would increase the risk of accident and release. The hazard to the public from fuel leaks from the cumulative projects would be highly localized geographically and temporally, due to the small amount of hazardous materials that typical vehicles and equipment would use and the quick response time to clean up any spill. The cumulative impact from accidental releases of hazardous materials would be less than significant.

Wildland Fire

Construction of several cumulative projects (Building Demolition [#1], Surge, Woods, and EHS Open Space Restoration [#8], Mt. Sutro Reserve Improvements [#9], Kirkham Project [#15], Overlook Project [#16], and SNRA Management Plan [#17]) would increase risk of starting a fire within the Reserve due to use of vehicles and equipment in a flammable area. These cumulative projects would involve conducting activities within or directly adjacent to the Reserve throughout implementation of the plan. The increase in fire risk during construction of cumulative projects could result in a significant cumulative impact.

Vegetation management activities implemented as part of the proposed plan would reduce the amount of area within the Reserve that could catch fire. The areas that would burn would tend to have longer flame lengths, spread faster, and would be capable of generating embers that

could spread fire into adjacent neighborhoods. Maintenance of defensible spaces and line of sight would ensure that fires could be put out easily and minimize spread of fires across the Reserve. Use of vehicles and equipment and improper disposal of cigarettes could increase the risk of fire within the Reserve. The proposed plan's contribution to a significant cumulative impact from increased fire risk could be considerable. MM Hazards-2 requires implementation of fire prevention practices including training personnel and maintaining fire prevention equipment on site. The proposed plan's contribution to a potentially significant cumulative impact from increased fire risk would be less than cumulatively considerable with mitigation.

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Figure 4.8-1 Flame Lengths under Existing Conditions

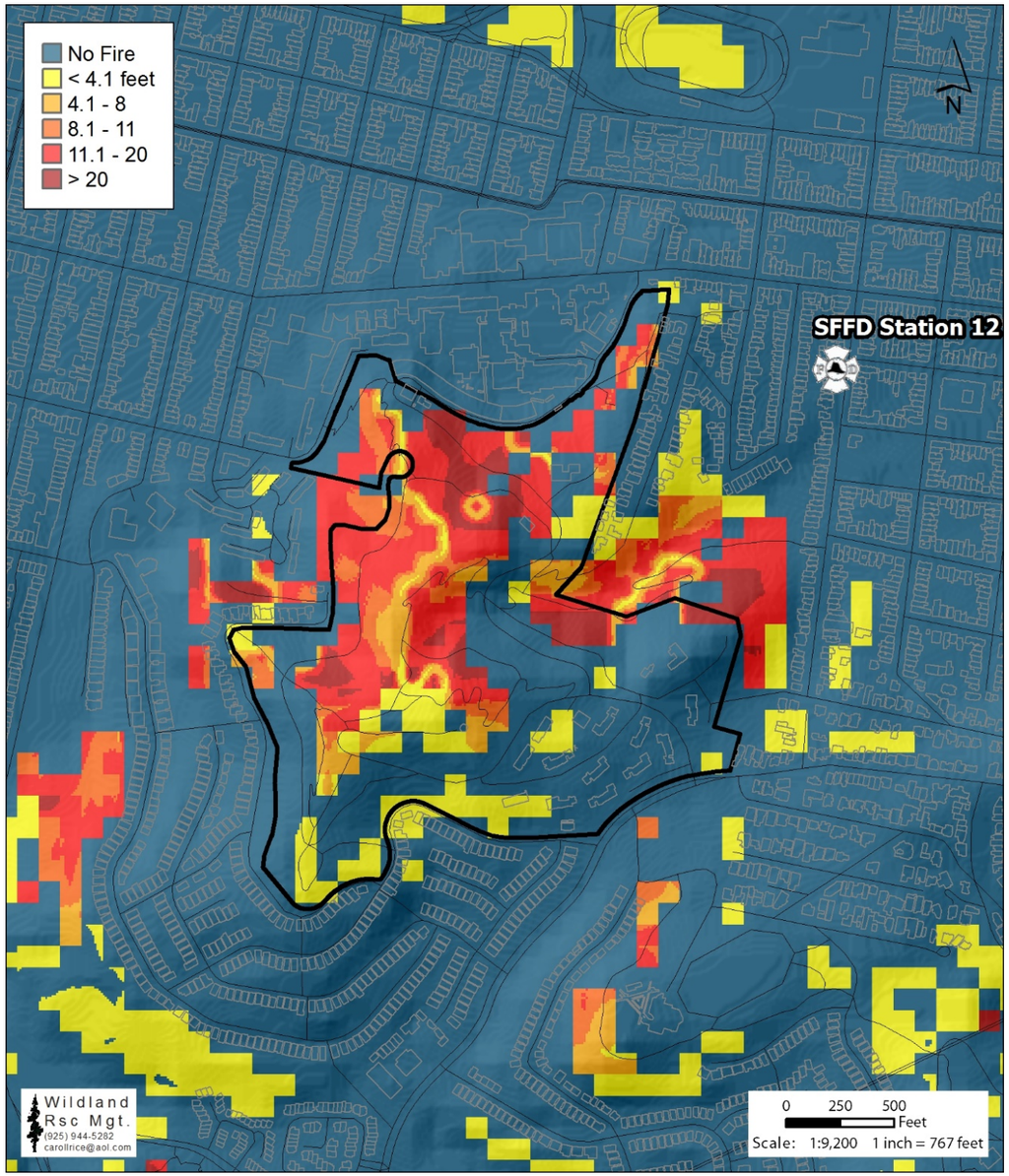


Figure 4.8-2 Flame Lengths after Phase I Vegetation Management Activities

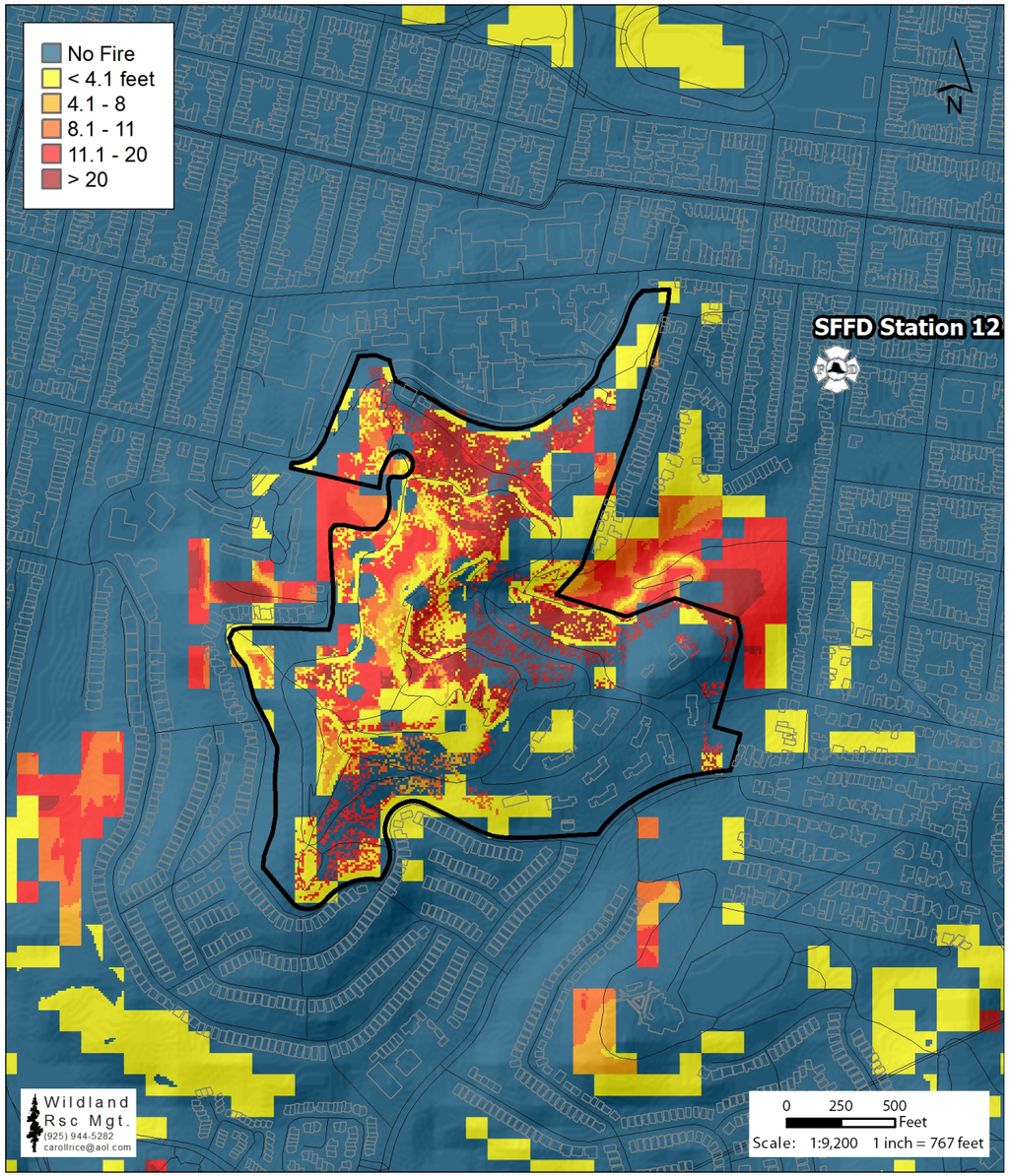


Figure 4.8-3 Rate of Fire Spread under Existing Conditions

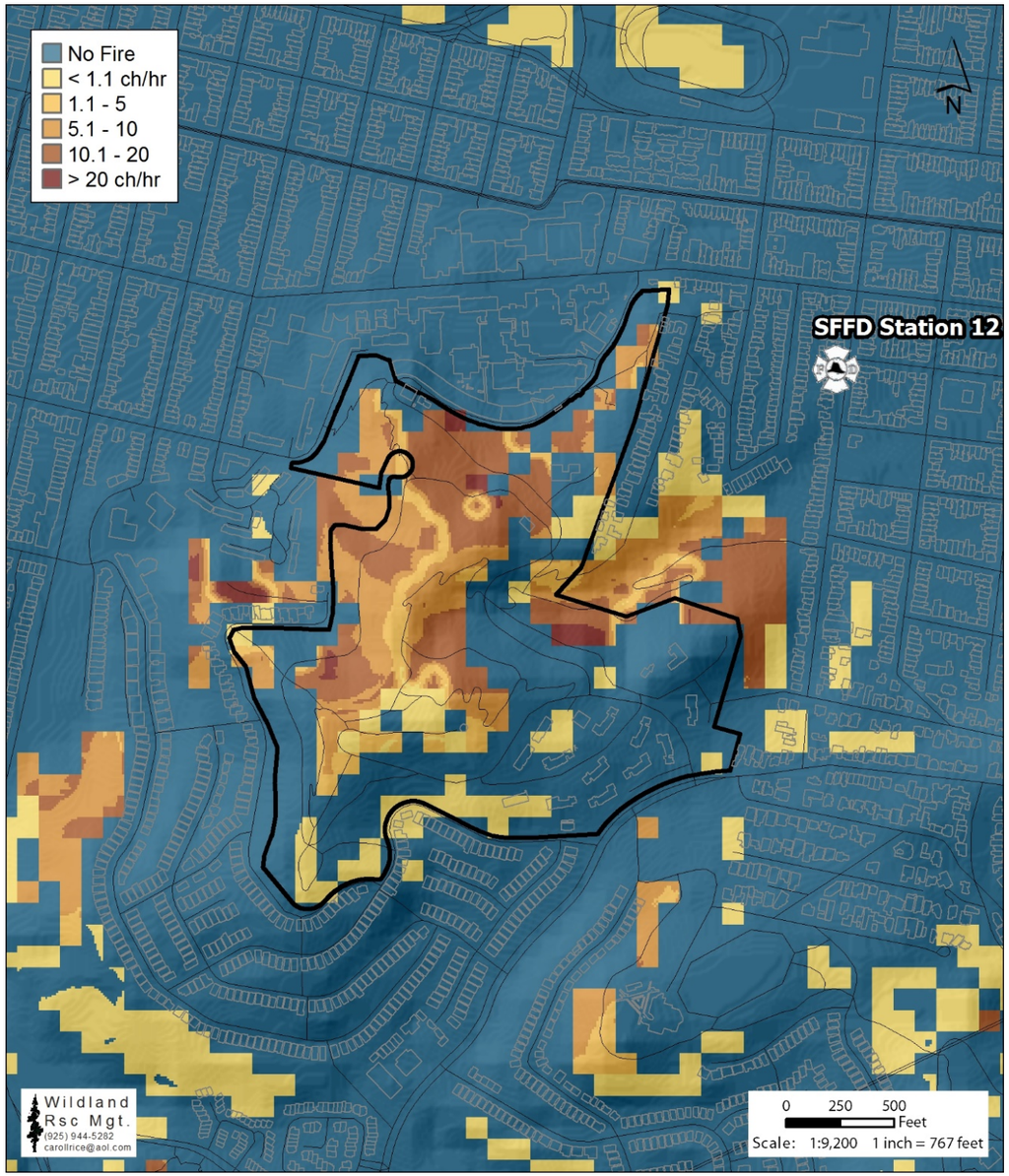


Figure 4.8-4 Rate of Fire Spread after Phase I Vegetation Management Activities

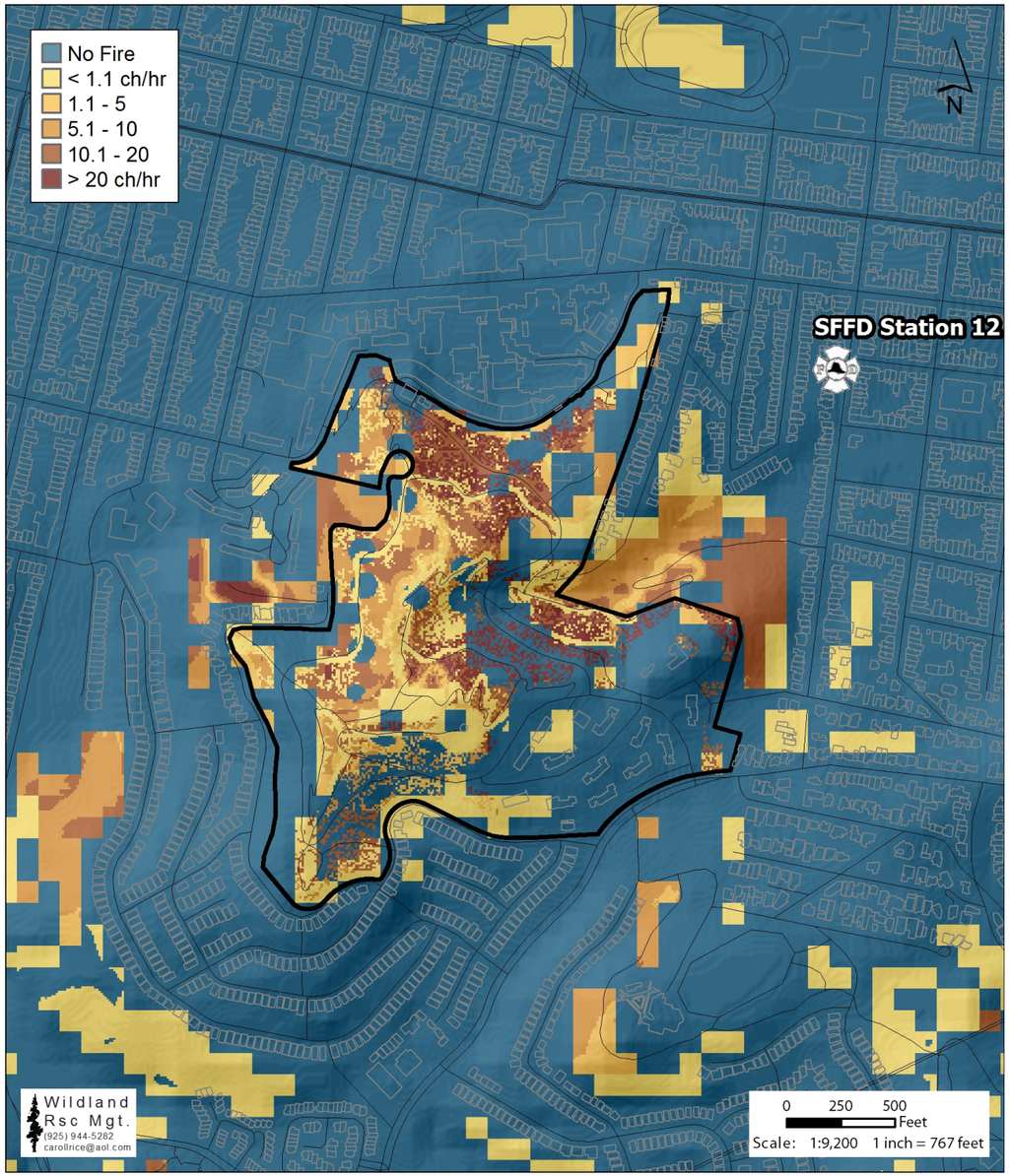


Figure 4.8-5 Torching Fire Activity under Existing Conditions

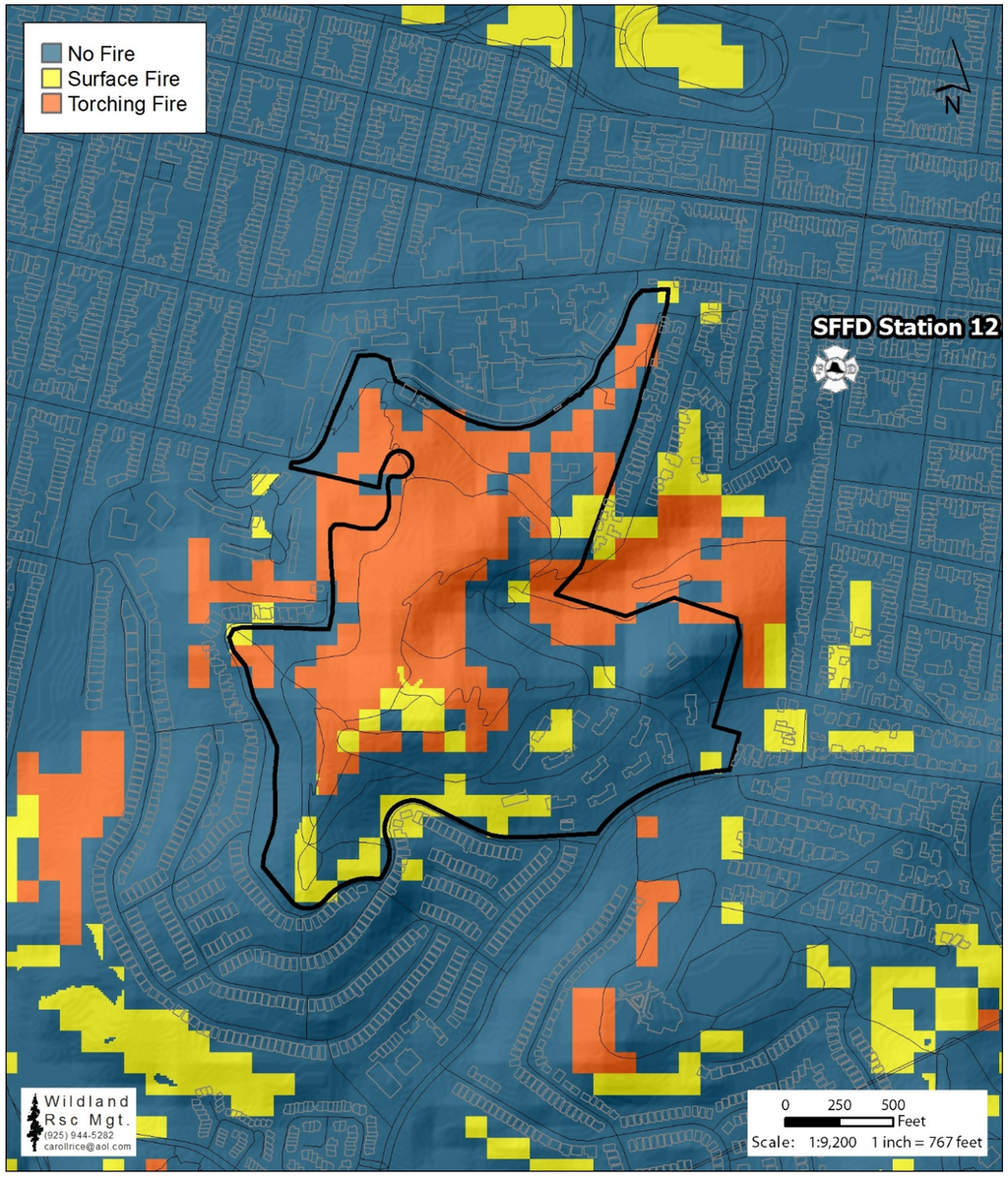
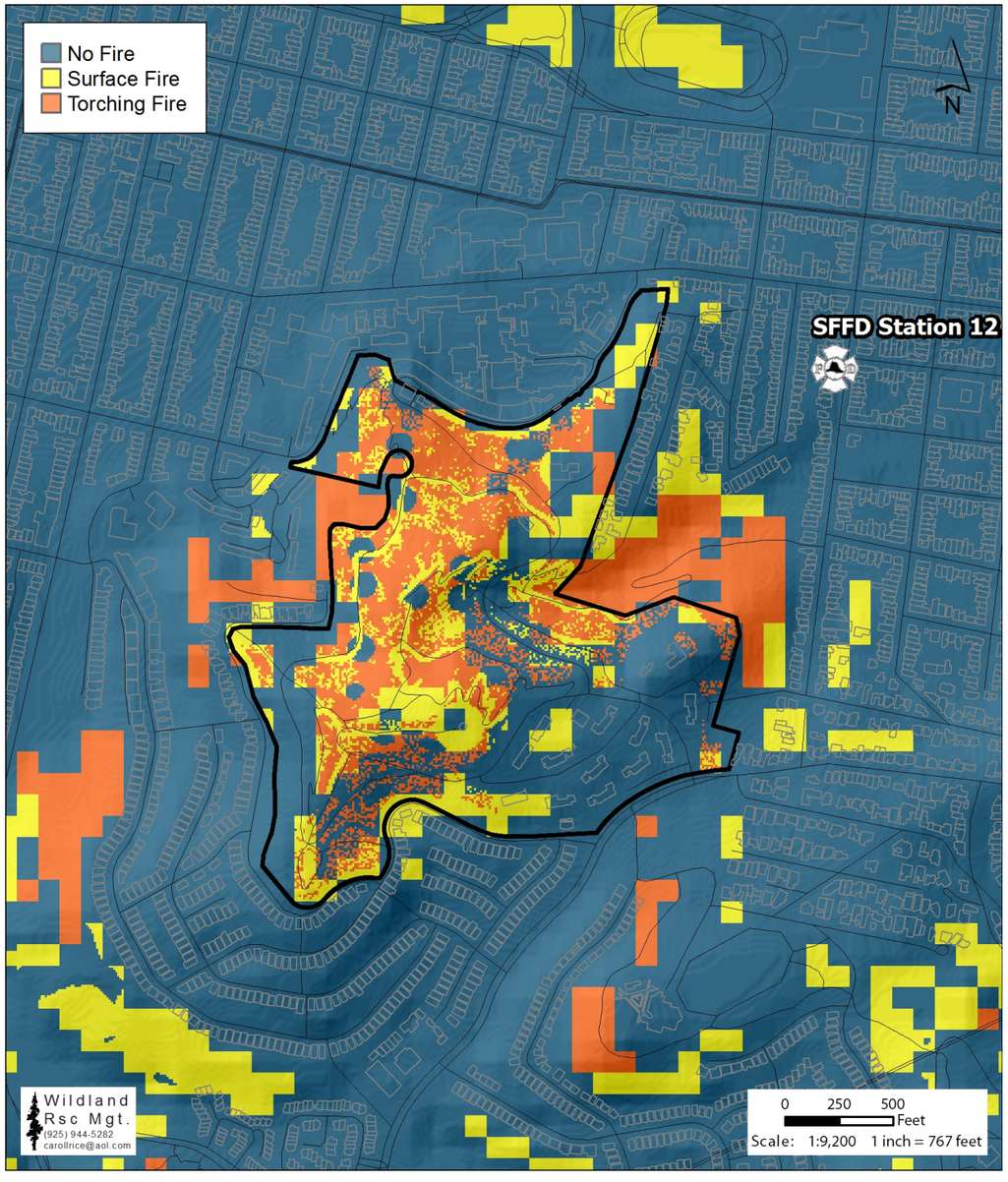


Figure 4.8-6 Torching Fire Activity after Phase I Vegetation Management Activities



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4.8.7 Mitigation Measures

MM Hazards-1: Spill Containment and Countermeasure Plan

UCSF shall prepare and incorporate methods and techniques to minimize the exposure of the public to potentially hazardous materials during implementation of the proposed plan into a Spill Containment and Countermeasure Plan (SCCP) to ensure hazardous materials are properly handled, stored, and transported and that any inadvertent leaks or spills are adequately cleaned and reported. At a minimum, the SCCP shall address the following procedures related to the use of hazardous materials during vegetation management activities and emergency response:

- Proper disposal of contaminated soils and materials (i.e., clean up materials)
- Daily inspection of vehicles and equipment for leaks particularly in landing areas and spill containment procedures
- Emergency response and reporting procedures to address hazardous material releases
- Fuels and lubricating oils for vehicles and heavy equipment will not be stored or transferred within 100 feet of any storm drains
- Emergency spill supplies and equipment shall be available to respond in a timely manner if an incident should occur
- Response materials such as oil-absorbent material, tarps, and storage drums shall be available in the plan area at all times during management activities and shall be used as needed to contain and control any minor releases
- The absorbent material shall be removed promptly and disposed of properly
- Placement of as needed, minor amounts of fuel, lubricants, and hydraulic fluid for equipment operation in appropriate storage tanks on the bed of fueling vehicles
- Location of bulk lubricating oil, hydraulic fluids, and other materials used for vehicle and equipment maintenance shall be stored at landing areas
- Use of secondary containment and spill rags when fueling
- Discourage "topping-off" fuel tanks
- Spill kits for all fuel trucks and fueling areas

All workers shall be trained on the specific procedures for hazardous materials and emergency response as an element of the required worker environmental training prior to working in the plan area.

Locations: Entire plan area

Performance Standards:

- **Before Activities:** SCCP is prepared
- **During Activities:** (1) Appropriate measures are implemented that limit the potential for spills, and (2) Any inadvertent spills are cleaned appropriately
- **After Activities:** N/A

MM Hazards-2: Fire Prevention Plan

UCSF shall prepare a Fire Prevention Plan that addresses procedures for fire prevention during active vegetation management. The Fire Prevention Plan shall include requirements for carrying emergency fire suppression equipment, restricting smoking, and idling vehicles. The Fire Prevention Plan shall address the following fire risk reduction measures:

- Personnel shall not be permitted to smoke within the Reserve during the implementation of vegetation management activities
- Training and briefing all personnel in fire prevention and suppression methods prior to performing vegetation management activities within the Reserve
- Storage of prescribed fire tools and water within or near large mechanical equipment or vehicles used for vegetation management activities
- Water sources shall be identified, including water storage tanks or water trucks that would be used in case of a fire

• All equipment shall have spark arrestors • Provisions for increasing fire safety tools and availability of water during times of high fire potential (i.e., a combination of low relative humidity, high temperatures, and high wind); the use of fuel- and diesel-powered equipment shall not be permitted during Red Flag Warning Days
Locations: Entire plan area
Performance Standards: • **Before Activities:** Fire Prevention Plan is prepared • **During Activities:** (1) Workers receive fire prevention training, and (2) Fire prevention tools and water are maintained on the Reserve • **After Activities:** N/A

4.8.8 References

Agee, J.K., R.H. Wakimoto, E.F. Darley, and H.H. Biswell. 1973. "Eucalyptus fuel dynamics and fire hazard in the Oakland Hills." California Agriculture 27 (9): 13-15.

Brandi, Richard. 2003. "Farms, Fire and Forest: Adolph Sutro and Development "West of Twin Peaks"."

California Department of Forestry and Fire Protection (CalFire). 2007. "San Francisco County Draft Fire Hazard Severity Zones in LRA." October 5.

—. 2013. Communities at Risk List. Accessed April 6, 2017. http://osfm.fire.ca.gov/fireplan/fireplanning_communities_at_risk.

California Air Resources Board (CARB). 2011. "Toxic Air Contaminant Identification List." July 18.

City and County of San Francisco. 2012. "Community Safety Element." San Francisco General Plan. October.

—. 2014. "Hazard Mitigation Plan." An Element of the CCSF Emergency Management Program. November.

Department of Conservation. 2000. "A General Location Guide for Ultramafic Rocks in California - Areas More Likely to Contain Naturally Occurring Asbestos." August.

Doran, J. Douglas, Cotton K. Randall, and Alan J. Long. 2004. Fire in the Wildland-Urban Interface: Selecting and Maintaining Firewise Plants for Landscaping. University of Florida IFAS Extension.

California Department of Toxic Substances Control (DTSC). 2017. EnviroStor. Accessed April 6, 2017. http://www.envirostor.dtsc.ca.gov/.

Martin, R.E., M.A. Finney, and J.J. Valentino. 1988. "Fuel Conditions and Potential Fire Behavior of Angel Island State Park." In Focused Environmental Study: Restoration of Angel Island Natural Areas Effects by Eucalyptus, by California State Park System, 173-194.

Mutch, R.W. 1970. "Wildland fires and ecosystems -- a hypothesis." Ecology 51 (6): 1040-1050.

National Wildfire Coordination Group. 2015. Glossary of Wildland Fire Terminology. October. Accessed April 26, 2017. https://www.nwcg.gov/glossary-of-wildland-fire-terminology.

National Park Service (NPS). 2006. Eucalyptus Newsletter. Accessed April 6, 2017. https://www.nps.gov/goga/learn/management/fire_edu_newsletter_eucalyptus.htm.

Pacific Biology. 2017. "Biological Habitat Evaluation Report." Mount Sutro Open Space Reserve Project. February.

Rice, C.L. 1985. "Use of BEHAVE on Shrublands at the Urban Interface." Conference of Fire and Forest Meteorology. Detriot, Michigan. 270-274.

Rutherford + Chekene. 2013. "Final Report Geotechnical and Geological Evaluation UCSF Mount Sutro Management." January 7.

State Water Resources Control Board (SWRCB). 2017. GeoTracker Database. Accessed April 6, 2017. http://geotracker.waterboards.ca.gov/.

United States Army Corps of Engineers (USACE). 2008. "Final Preliminary Assessment Report Former San Francisco Nike Battery 89." April.

—. 2013. "Formerly Used Defense Sites (FUDS) Per State, California." September 30. http://www.usace.army.mil/Portals/2/docs/Environmental/FUDS/FUDS_Inventory/FUDS_Inventory_California.pdf.

United States Geological Survey (USGS). 2011. "Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Other Natural Occurrences of Asbestos in California, Open File Report 2011-1188."

World Health Organization (WHO). 2012. "Arsenic, Metals, Fibres, and Dusts A Review of Human Carcinogens." IARC Monographs - 100C.

Western Regional Climate Center (WRCC). 2016. San Francisco Oceansd, California (047767). May 19. Accessed March 6, 2017. http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7767.

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4.9 HYDROLOGY, WATER QUALITY, AND WATER SUPPLY

4.9.1 Introduction

This section discusses the existing hydrology and water quality on the site and evaluates the potential impacts on hydrology and water quality from implementation of the proposed vegetation management activities. The section also provides discussion of the applicable federal, state, regional, and local regulations that pertain to hydrology and water quality. The impacts associated with the proposed plan are compared with the thresholds of significance used by UCSF pursuant to CEQA.

Comments related to hydrology and water quality received during the public scoping process included concerns about the following:

- Concern that activities could cause alteration of Woodland Creek and associated effects downstream of the Reserve within the Interior Greenbelt

4.9.2 Existing Environment

Surface Water Hydrology

Climate and Precipitation

Mean annual rainfall for north central San Francisco (Richmond District gage) is 19.99 inches (WRCC 2016). Local orographic influences in the uplands of Mount Sutro elevate this total to 21 to 22 inches. The rainy season for San Francisco's Mediterranean-type climate normally extends from October through March; however, the Reserve maintains relatively moist soil conditions during those summer months when fog and related fog drip are persistent wherever dense stands of vegetation occur. The highest temperatures (and therefore the driest conditions) tend to occur from late August through early October. In San Francisco, substantial floods may occur in low-lying areas in response to Pacific frontal-system storms of three to five days in duration with nested bursts of high-intensity rainfall. For the higher elevation zones of San Francisco, such as the Reserve, flooding is localized and occurs periodically due to obstructed storm drains, plugged catch basin inlets, or undersized drain segments.

Drainage

City of San Francisco Sewer System

The City of San Francisco has a combined sewer system (CSS) that is comprised of a network of pipes and tunnels that convey combined stormwater and sanitary sewage flows, referred to as combined sewer discharge, to City water treatment plants. The San Francisco Public Utilities Commission (SFPUC) monitors and maintains the CSS facilities within City limits; oversees system operation, system component upgrades (i.e., replacement) to major force main, and transport/storage structures; and oversees the operation of the principal water treatment plants including the Oceanside and Southeast Water Treatment Plans.

Cumulatively, during non-storm conditions, the City's CSS collects and treats up to 80 million gallons per day (mgd) of wastewater, primarily municipal sewage. During rainstorms, these facilities can collect and treat more than 500 mgd. The treatment plants normally employ a minimum of secondary treatment to the combined inflows before discharging the effluent to the San Francisco Bay or the Pacific Ocean. Depending on individual storm characteristics as well as the timing between storms, the treatment plant capacities can be overwhelmed, resulting in the discharge of minimally treated flows to the San Francisco Bay and/or the Pacific Ocean. Since 1987, SFPUC has had three overflow events that warranted enforcement action by the SFBRWQCB, the most recent of which occurred in 2007 (SFBRWQCB 2014).

Stormwater Flows from the Reserve

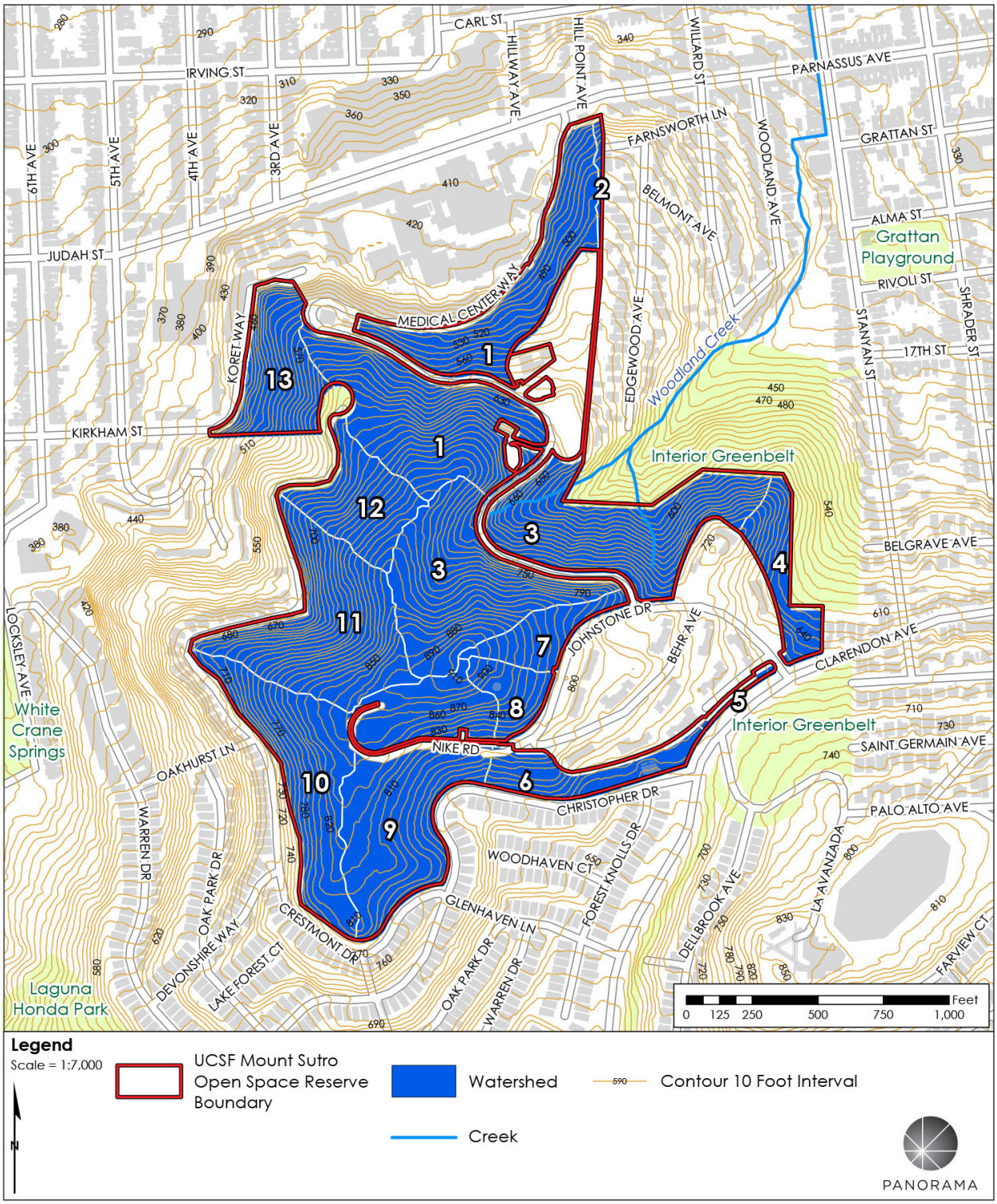
The Reserve occupies 61 acres (59 of which are in the plan area) of ridgeline and hillslopes adjoining the drainage divide that forms the boundary between the San Francisco Bay and the Pacific Ocean watersheds in the city. Accordingly, runoff in the Reserve derived from rainfall ultimately drains to storm drain inlets in the headwaters of either the Channel Basin or the Sunset Basin. Runoff is conveyed east or west, respectively, into the City's CSS to either the Southeast or Oceanside Water Treatment Plants, where it is treated prior to being discharged to Central San Francisco Bay or to the Pacific Ocean.

The Reserve can be divided into 13 smaller watersheds, based on the mapped topography and the location of local storm drainage outlets, typically storm drain catch basins (including curbside and drainage inlets on roads in the Reserve itself). These watersheds in the Reserve are shown on Figure 4.9-1. Elevations of Reserve area watersheds range from 915 feet along the ridgeline to 450 feet on Koret Way. Aside from the principal ridgeline and several contiguous spur ridges, watershed slopes typically exceed grades of 20 percent and reach as high as 60 percent. Watersheds 1, 5, and 6 are partially located within the Reserve as shown on Figure 4.9-1; however, the majority of these watersheds are located on developed areas that drain to three of the established watershed outlets that are not shown as mapped because since they lie outside of the Reserve boundary and would not be subject to modification as part of the plan. The locations of catch basins and/or storm drain inlets or outlets were determined by reviewing maps provided by UCSF, discussions with the principal on-site facilities engineer at the Reserve, and on-site inspections of the watershed and adjoining perimeter lands. Of the 13 delineated watersheds, 8 (Watersheds 1, 6, and 8 through 13) are contained within the Sunset Basin and 5 (Watersheds 2 through 5, and 7) within the Channel Basin.

Surface runoff typically encompasses overland flow, shallow concentrated flow and channel or storm drain flow components. Overland flow occurs in the zones along and immediately adjacent to ridgelines. Runoff then concentrates into swales or other small channels and eventually reaches roadways either within or contiguous to the Reserve. Runoff is typically directed to storm drain catch basins and conveyed in the CSS to the Oceanside or Southeast Water Treatment Plans.

The exception is Watershed 3, which ultimately discharges to an intermittent swale known as Woodland Creek, via either overland flow or a storm drain outfall structure. This outfall

Figure 4.9-1 Watersheds in the Proposed Plan Area



Sources: (ESRI 2017, UCSF 2017, City and County of San Francisco 2011a)

structure collects upslope and roadway runoff that enters a roadside catch basin along Medical Center Way. Field inspection of the outfall structure indicated that it was either completely filled

with sediment or, more likely, was intended to infiltrate the collected runoff into the coarser substrate underlying the base of Woodland Creek. During more significant runoff-producing storms, the infiltration capacity of this coarse sediment within the outfall pipe is overwhelmed by the incoming stormwater discharge, and runoff overflows onto the adjoining vegetated slope and drains overland to the channel. Woodland Creek flows through the Interior Greenbelt and eventually discharges to the CSS in the vicinity of Stanyan Street. Woodland Creek is shown in Figure 4.9-1. No other permanent surface water bodies are found in the Reserve.

Flooding Potential

The Reserve primarily occupies ridgeline lands and steep adjoining uplands at elevations well above the 100- and 500-year flood zones[1]. However, roadway catch basins obstructed by sediment or debris (e.g., eucalyptus bark or trash) may cause localized ponding of stormwater and nuisance flooding. Such localized flooding is typically not considered or depicted in regional flood mapping; as such, the Reserve lands are not shown as areas subject to flooding on maps prepared by the City of San Francisco Department of Emergency Management.

Erosion and Sedimentation

Soils in the Reserve are mapped by the Natural Resources Conservation Service (NRCS) under a single map unit: Candlestick-Kron-Buriburi complex, 30 to 75 percent slopes. These soils are typically fine to gravelly loams and belong to the "D" hydrologic soil group, which indicates rapid runoff generation and a high erosion hazard. A prior slope stability risk assessment prepared for the UCSF Parnassus Heights campus site noted that on-site soils were thin over primarily chert bedrock of the Franciscan formation and typically measured a few feet or less in thickness.

The Reserve's predominantly fine to coarse-grained loam soils are relatively shallow and occupy moderate to steep slopes. These soils are susceptible to erosion, particularly when exposed to concentrated surface flow or when established vegetation is disturbed or removed. Under existing land use conditions, infrequent mass wasting processes pose the greatest risk for erosion and downstream sedimentation, although erosion along steeper hiking trail segments within the Reserve can occur during more intense rainstorms. The March 2017 field inspection of site drainageways and culvert inlets and outlets suggested the prevalence of relatively stable swales in the bulk of the Reserve's watersheds. No evidence was observed of any significant instability within the on-site portion of Woodland Creek. The more mildly sloping terraces adjoining the Woodland Creek channel provide some opportunities for deposition of sediments transported by upslope surface runoff. The March 2017 inspection showed some minor sedimentation along roadway gutters, but all catch basin inlets were clear of obstructing debris.

[1] Flood zones are geographic areas defined by FEMA according to varying levels of flood risk. A 100-year flood zone would experience a flood once every 100 years.

Sediment yield from the Reserve is variable and corresponds in magnitude to the intensity of rainfall and antecedent soil moisture conditions in the site watersheds, as well as to local slope steepness and geomorphic features. Vegetation in the Reserve is a mix of native and non-native woodland and coastal scrub. The nearly continuous vegetal cover maintains relatively low rates of soil loss from the Reserve; however, there are some localized areas where frequent erosion occurs.

Water Quality

Section 303(d) of the 1972 federal Clean Water Act requires states to identify water bodies that do not meet water quality objectives and are not supporting their beneficial uses. Each state must submit a list of waters that are not meeting water quality objectives (303[d] list) to the USEPA every two years. In addition to identifying the water bodies that are not supporting beneficial uses, the list also identifies the pollutant(s) causing impairment and establishes a priority for developing a control plan known as Total Maximum Daily Load (TMDL) to address the impairment. The TMDL process provides a quantitative assessment of water quality problems, contributing sources of pollution, and the pollutant load reductions or control actions needed to restore and protect the beneficial uses of an individual waterbody impaired from loading of a pollutant. The San Francisco Bay RWQCB (SFBRWQCB) is responsible for defining beneficial uses of surface waters and groundwater and identifying impaired water bodies (identified on the 303[d] list) in the study area.

The 2007 303(d) list of impaired water bodies cites the Central San Francisco Bay as impaired for pesticides chlordane, DDT, and dieldrin, and for dioxins, mercury (dissolved and sediment), furan compounds, exotic species, PCBs and selenium. Amendments to the 303(d) list in April 2017 apply a generalized "Toxicity" impairment listing for the Central San Francisco Bay. The Toxicity impairment covers all forms of pesticide and herbicide toxicity. The SFBRWQCB currently defines TMDLs for mercury, PCBs, and urban creeks pesticide toxicity. These TMDLs are not applicable to the proposed plan.

The quality of stormwater runoff under existing watershed conditions is likely excellent over most the Reserve, although no actual field data were available for review. Vehicle operation in the Reserve is limited and generally restricted to secondary roadway and driveway segments. Consequently, the Reserve is relatively free of automotive pollutants. Developed areas adjoining the Reserve include moderate- to high-density residential and campus land uses that typically yield elevated levels of stormwater contaminants, including heavy metals and pesticides.

Water Supply

Water is not currently supplied to the Reserve except for the residential and building uses, including the Aldea San Miguel Housing Complex, the Surge and Woods buildings, and the Chancellor's residence. No water is supplied for irrigation or vegetation management uses at this time. The SFPUC maintains a water tank within the Reserve.

Existing and Planned Water Supply

The SFPUC supplies water to the entire City and County of San Francisco, including UCSF campuses, as well as customers in Santa Clara, Alameda, San Mateo, and Tuolumne Counties. San Francisco owns and operates the Hetch Hetchy Regional Water System, which provides the delivery system for much of the drinking water SFPUC customers use. About 85 percent of the water delivered to SFPUC customers comes from Tuolumne River water stored in Hetch Hetchy Reservoir in the Sierra Nevada, and the remaining 15 percent comes from runoff in the Alameda and Peninsula watersheds captured in reservoirs located in San Mateo and Alameda Counties, supplemented with local groundwater and recycled water.

SFPUC serves water to both retail and wholesale customers, with about one third of its water supplies for retail customers (primarily located in San Francisco). The average annual supply of Regional Water System water available for retail customers through 2018 is 81 mgd. By the end of 2018, SFPUC will need to reevaluate water supply needs and supply options. Groundwater and recycled water accounts for a small portion of SFPUC water supplies as shown in Table 4.9-1.

Table 4.9-1 Retail Supplies

Retail Supply	Actual Supply (mgd)	Projected Supply (mgd)	
	2015	2020	2030
Regional Water System	67.7	70.5	73.2
Groundwater	2.2	5.0	5.0
Recycled Water	0.2	1.9	3.9
TOTAL	**70.1**	**77.4**	**82.1**

Source: (SFPUC 2016)

Existing and Projected Water Demand

Total water consumption and per capita water use has generally been declining since the mid-1970s. Retail demand in 2015 reached a historic low compared to previous years, as shown in Table 4.9-2. Water demand projections for 2015 were 15 percent higher than real demand. The decrease in demand was likely due to water conservation measures implemented during the multi-year drought.

Table 4.9-2 Retail Demands

Retail Sector	Actual Demand (mgd)			Projected Demand (mgd)	
	2005	2010	2015	2020	2030
In-City	81.5 [a]	73.6 [a]	65.6	72.5	77.3
Suburban	5.2	4.1	4.5	5.0	5.0
TOTAL	**86.7**	**77.7**	**70.1**	**77.5**	**82.3**

Note:

[a] Includes groundwater customers.

Sources: (SFPUC 2011, SFPUC 2016)

4.9.3 Regulatory Considerations

University of California

Sustainable Practices Policy

The Sustainable Practices Policy is a system-wide commitment to minimize the University's impact on the environment and reduce the University's dependence on non-renewable energy sources. The Policy promotes the principles of energy efficiency and sustainability in nine areas, including sustainable water systems. The applicable goal in the Policy, which is stated in the Annual Report on Sustainable Practices 2016, is (University of California 2016):

- Locations within the UC system will reduce growth-adjusted potable water consumption 20 percent by 2020 and 36 percent by 2025, when compared to a three-year average baseline of FY2005/06, FY2006/07, and FY2007/08.

UCSF

UCSF 2014 LRDP

The 2014 LRDP does not include goals, policies, or objectives that are applicable to hydrology and water quality impacts for the proposed plan.

Water Action Plan

The UCSF 2014 Water Action Plan is the blueprint for attaining the Policy's goal of 20 percent reduction in potable water consumption per capita by 2020. The Water Action Plan identifies projects, such as reducing potable water consumption for irrigation, and projected water reductions associated with projects (UCSF 2014a).

Federal

The federal Water Pollution Control Act (commonly referred to as the Clean Water Act) of 1972, as amended in 1987, prohibits the discharge of pollutants into waters of the U.S. unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. Section 402(p) of the 1987 amendments established a framework for regulating municipal, industrial and construction stormwater discharges under the NPDES program. In San Francisco, NPDES permits are issued through the State Water Resources Control Board (SWRCB) and the SFBRWQCB.

Section 404 of the Clean Water Act regulates the discharge of fill into Waters of the U.S., including adjacent wetlands. Filling and/or disturbing wetlands requires a Fill Permit issued by the USACE. Channel maintenance activities such as streambank protection and construction of outfall structures are routinely covered by Nationwide Permits, while more significant disturbance typically requires more substantial regulatory involvement and oversight, including approval of adequate impact mitigation.

As described under Water Quality above, Section 303(d) of the Clean Water Act requires states to identify water bodies that do not meet water quality objectives and are not supporting the beneficial uses of the water body. Each state must submit an updated list, called the 303(d) list, to the USEPA every two years. In addition to identifying the water bodies that are not

supporting beneficial uses, the list also identifies the pollutant or stressor causing impairment and establishes a schedule for developing a control plan to address the impairment. States are required to prioritize impaired water bodies for development of TMDLs. TMDLs are defined for the Central San Francisco Bay as previously described. Discharge into impaired water bodies generally can require additional permitting and mitigation procedures.

State

Porter-Cologne Water Quality Control Act

The quality of surface waters in San Francisco Bay and the territorial waters of the Pacific Ocean, as well as groundwater, are also regulated under provisions of California's Porter-Cologne Water Quality Control Act, which was enacted in 1969 to maintain water quality in California. The Porter-Cologne Water Quality Control Act, Water Code Section 13260, requires that "any person discharging waste, or proposing to discharge waste, within any region that could affect the 'waters of the State' file a report of discharge" with the appropriate Regional Water Quality Control Board. Waters of the State, as defined in the Porter-Cologne Act (Water Code Section 13050(e)), are "any surface water or groundwater, including saline waters, within the boundaries of the state."

In California, the SWRCB and the nine RWQCBs issue NPDES permits. Communities with populations over 100,000, high-risk industries identified by the USEPA, and construction projects of one or more acre must obtain an NPDES permit under NPDES Phase I regulations. Consequently, developments, redevelopments or construction disturbance of one acre or more require the filing of a Notice of Intent, Stowmwater Pollution Prevention Plan (SWPPP), and other compliance-related documents with the SWRCB, as well as the appropriate permit fee.

Section 1602 of the State Fish and Game Code vests permitting authority to CDFW for any activity that will divert or obstruct the natural flow or change the bed, channel, or bank of any river, stream, or lake or proposing to use any material from a streambed. Typically, CDFW will take jurisdiction over small creeks and drainageways with defined bed and banks. The notification requirement generally applies to any work undertaken within the annual high water mark of a wash, stream, or lake that contains or once contained fish and wildlife, or supports riparian vegetation.

Local

Regional Water Quality Control Plans

The Reserve is within the jurisdictional drainage area boundaries referenced in the Water Quality Control Plan for both the San Francisco Bay Basin (Basin Plan) and the Water Quality Control Plan for Ocean Waters of California (Ocean Plan) (SFBRWQCB 2015, SWRCB and Cal EPA 2012). The San Francisco Bay Basin includes all watershed lands that drain directly to San Francisco, San Pablo, and Suisun Bays, as well as substantial portions of coastal Marin, San Francisco, and San Mateo counties. The Basin Plan is intended to protect and enhance water quality and the beneficial uses identified for the significant water bodies that receive

stormwater runoff from the Basin. The Ocean Plan applies to point source discharges to the territorial waters of the State outside of enclosed bays, estuaries, and coastal lagoons.

Control of Construction Site Runoff Ordinance and San Francisco Municipal Code
To reduce the discharge of pollution to the local storm drain system, the City adopted the Construction Site Runoff Ordinance in 2013. The SFPUC now manages the Construction Site Runoff Control Program to ensure that all construction sites implement BMPs to control construction site runoff.

Article 4.2 of the San Francisco Municipal Code, entitled "Sewer System Management," defines a development project as any activity that cumulatively disturbs 5,000 square feet or more of land (City and County of San Francisco 2011b). Additionally, projects that create and/or replace 5,000 square feet or more of impervious surface are required to prepare a Stormwater Control Plan (SCP) for on-site and off-site water quality maintenance that adheres to guidelines adopted by the SFPUC and the San Francisco Port Commission. These guidelines specify requirements pertinent to the selection, design, and maintenance of post-construction stormwater BMPs. While the stormwater ordinance would generally be applicable to the plan, an SCP would not be required because the plan does not include any increases in impervious surfaces.

A land-disturbing activity is considered in violation of Sections 146 – 146.11 of Article 4.2 if eroded sediment has been deposited onto adjacent properties, a public right-of-way, a publicly controlled wetland, or the sewage system.

4.9.4 Significance Standards and Methodology

Significance Criteria

Impacts of the proposed plan on hydrology and water quality would be considered significant if implementation of the plan would exceed the following standards of significance, in accordance with Appendix G of the State CEQA Guidelines:

1. Violate any water quality standards or waste discharge requirements;
2. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted);
3. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on or off site;
4. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site;

5. Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
6. Otherwise substantially degrade water quality;
7. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
8. Place within a 100-year flood hazard area structures that would impede or redirect flood flows;
9. Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam; or
10. Cause inundation by seiche, tsunami, or mudflow.

One additional criteria from Utilities and Service Systems is addressed here:

11. Have sufficient water supplies available to serve the plan from existing entitlements and resources, or are new or expanded entitlements needed.

The Initial Study for the proposed plan determined that the plan's effect on erosion and surface runoff from the alteration of drainage patterns on the Reserve as well as the potential for proposed activities to create or contribute runoff or polluted runoff should be evaluated in the EIR. These topics are analyzed in this section. Water supply for future irrigation, if needed, is also addressed in this section.

Issues Adequately Addressed in the Initial Study

The IS for the proposed plan found that implementation of the plan would have (1) no impact on water quality standards; waste discharge requirements; housing or structures within a 100-year floodplain; or flooding or inundation by seiche, tsunami, or mudflow; and (2) a less than significant impact on groundwater supplies and other impacts on water quality. The IS also found that the proposed plan would have no or a less than significant impact on all significance criteria under Utilities and Service Systems, except for those related to water supplies available to serve the plan from existing entitlements and resources. These issues are not discussed further in this section.

Analysis Methodology

Overview

Impacts addressed in this section cover changes in stormwater runoff flow and volume within and off the Reserve, as well as changes in mobilized sediment amounts (known as sediment yield) that could impact downstream uses and the storm drain system surrounding the Reserve. Modeling methods were used to reasonably estimate these changes in stormwater flow and volume and sediment yield. The impact assessment first includes a description of how vegetation management activities could affect drainage patterns and sediment yields, followed by a discussion of the modeling results for Phase I and relative results for the remaining phases of plan implementation.

Assumptions and Modeling Limitations

Several assumptions were made to conduct the modeling. Assumptions were based on knowledge of the proposed vegetation management activities, the areas of disturbance, the type of cover that would remain after vegetation management treatments are implemented, and the regrowth of treatment areas. The parameters values assigned in the modeling were watershed-specific and approximated the vegetation types, densities and treatment conditions identified in the Plan. Post-plan soil and cover complexes, including prescribed erosion control actions, were simulated using similar descriptors referenced in the hydrograph and sediment yield models. The interpretation of the existing and treated site conditions, and the hydrologic and sediment yield modeling were conducted by expert hydrologist Bill Vandivere of Clearwater Hydrology. The modeling represents the worst-case scenario, which would occur at approximately the end of Year 2 of plan implementation when the most areas would be disturbed and before that disturbance is countered by regrowth. The assumptions and limitations of the modeling effort are described in Appendix 4.9 of this EIR.

Hydrograph Modeling

For this analysis, pre- and post-plan peak flow rates and runoff volumes for the delineated Reserve watersheds were assessed. Due to the suite of vegetation management actions that could be employed, the flood hydrograph package HEC-HMS, developed by USACE, was chosen for the simulation of rainfall and runoff characteristics. HEC-HMS includes a Soil Conservation Service (now NRCS) unit hydrograph rainfall-runoff option, which allows for the modeling of different soil and land use types, vegetation condition, and land management actions, such as land clearing, mulch application, and grading practice, where applicable.

The vegetation management activities described in the plan do not constitute a typical "construction project." All activities would occur in an unbuilt environment and the plan would not include, nor would it be subject to provisions of, new drainage. Of primary concern are any increases in stormwater flows and increases in drainage that could impact downstream (i.e., at the base of Mount Sutro) stormdrains, streets, and residences on a regular basis. A 5-year, 24-hour rainstorm event was modeled. The City's drainage design guidelines require that this storm event be modeled for projects that entail new development. While not directly applicable because the plan would not include the creation of any new drainage systems or development, this storm event was modeled to give a sense of a maximum impacts. The 5-year, 24-hour storm event could reasonably occur during Phase I of the plan, which is five years long. Detailed modeling assumptions, input parameter values, and computed peak flows and runoff volumes are included in Appendix 4.9.

Sediment Yield Calculations

Implementation of the plan would alter the areal coverage and condition of a significant portion of the Reserve, potentially increasing the sediment yield at the downslope watershed outlets. The Modified Universal Soil Loss Equation (MUSLE) was used to compute the pre- and post-Year 2 watershed sediment yields. The MUSLE is an event-based equation, utilizing the parameters of the general Universal Soil Loss Equation and watershed peak flow rate and runoff volume to compute sediment eroded from the landscape and delivered to the watershed

outlet. Use of the MUSLE allowed the assessment to be linked directly to the peak flow and runoff volume results of the event-based HEC-HMS hydrograph modeling. The detailed parameters and equations used for the modeling are provided in Appendix 4.9.

4.9.5 Impacts

Impact Hydrology-1: The proposed plan could substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on or off site.	Significance Determination
	Less than significant with mitigation

Vegetation Management Activities

Overview

Vegetation management activities would result in modification to the hydrologic condition of the 13 Reserve watersheds. The impacts would accrue primarily from the activities associated with forest treatments, non-native brush and vine removal, and low branch pruning and plantings for stand regeneration. No physical alteration of the one existing drainageway in the Reserve, Woodland Creek, is proposed under any of the forest treatment activities, except for potential planting of native riparian vegetation in or near the creek bed. Woodland Creek may be subject to the CDFW 1602 Lake and Streambed Alteration requirements if vegetation management activities impact the flow, bed, bank, or riparian vegetation. All treatment activities would involve targeted at-ground and above-ground disturbance and would not result in any topographic modification, except potentially for landing areas. Two existing trail segments would be widened to a minor extent to allow for safe equipment passage. However, these trail segments are positioned along existing ridgelines and would not create any significant changes in local drainage patterns. No ground disturbing activities would occur during significant storm events in order to minimize sedimentation of stormwater runoff. General impacts on erosion and generation of sediment yield for each of the vegetation management activities are described here. The following section describes the composite impacts of these activities per phase.

Forest Treatments

Forest treatments could result in changes to existing drainage patterns, which could in turn result in erosion and siltation or sedimentation off-site. Forest treatments involving land-altering activities include the creation of landing areas and widening of trails. These areas would remain tree- and brush-free, but would be covered with chip and slash. These areas would remain in the same un-vegetated condition for the duration of the plan. Table 4.9-3 provides a summary of the results of the flood hydrograph modeling conducted for the plan area for the 5-year, 24-hour storm event under the pre- and post-Year 2 conditions. As shown in the table, the post-Year 2 condition would result in reductions in both peak flow rates and runoff volumes for each of the Reserve watersheds. The reductions range from 0 to 13 percent for peak flows and 0 to 7 percent for runoff volumes. Reductions were primarily seen because, in the model, the mulch and small tree/brush condition of the cleared areas more effectively

slowed water flow than trees because the mulch and seedlings are closer to the ground than a tree canopy for a woodland condition.

Table 4.9-3 Pre-Plan and Post-Year 2 Watershed Conditions

Watershed	Area (square miles)	Pre-Plan Peak Runoff (cubic feet per second)	Post-Year 2 Peak Runoff (cubic feet per second)	Pre-Plan Runoff Volume (acre-feet)	Post-Year 2 Runoff Volume (acre-feet)
1	0.021	3.34	3.31	1.44	1.43
2	0.001	0.12	0.11	0.05	0.05
3	0.022	2.94	2.87	1.44	1.42
4	0.004	0.59	0.51	0.25	0.25
5	0.000	0.07	0.06	0.03	0.02
6	0.003	0.46	0.43	0.20	0.19
7	0.003	0.42	0.36	0.20	0.18
8	0.002	0.32	0.31	0.15	0.15
9	0.014	1.72	1.66	0.89	0.87
10	0.008	1.03	1.01	0.49	0.48
11	0.010	1.41	1.35	0.65	0.63
12	0.005	0.68	0.66	0.30	0.30
13	0.005	0.80	0.78	0.35	0.35

Although peak runoff and runoff volumes would be reduced after Year 2 of plan implementation, sediments loads would increase as shown in Table 4.9-4. The worst-case increase in the total sediment yield for the 5-year, 24-hour storm event was computed to be 19.4 tons, or a 29 percent increase. While the modeling generally accounts for variations in the topography and negates the need to apply a sediment delivery factor (i.e., efficiency of delivery), small undulations in the topography, particularly along the mildly sloping ridgeline areas, are likely to trap some of the sediment entrained in runoff. This condition would reduce the computed sediment yields from the Reserve watersheds for both the pre- and post-Year 2 conditions by 10 to 20 percent.

Sediment transport would likely increase after forest treatments because more areas of bare ground (e.g., landing areas) would be present than before implementation of forest treatments. Storm events could mobilize sediment in landing areas, although landing areas would be fairly level. Seed tree and group selection areas could vary in number and size over the life of the plan. Seed tree and group selection activities would involve removal of most trees and understory in areas up to 1 acre in size. The treated areas would be covered in a few inches of mulch or chip and replanted with small seedlings of eucalyptus and potentially native or other plants. Seed tree and group selection areas would be mainly located on slopes. Trees would be removed but the trunk base and roots would be left in place, acting as a soil binder for several

years until the roots decay. Leaving root systems in place would provide some protection from erosion and sedimentation, but since the treatment areas are on slopes and would generally be

Table 4.9-4 Sediment Yields for the 5-year, 24-hour Storm Event at the End of Year 2

Watershed	Area (acres)	Pre-Plan Y (tons)	Post-Plan Y (tons)	Difference Y (tons)
1	13.36	15.63	17.92	2.29
2	0.47	0.10	0.13	0.03
3	14.21	19.90	25.55	5.65
4	2.49	1.61	1.68	0.07
5	0.26	0.04	0.06	0.02
6	1.93	0.60	0.96	0.36
7	1.94	0.97	2.09	1.12
8	1.50	0.85	1.13	0.28
9	8.87	6.16	9.00	2.84
10	4.83	3.70	4.61	0.91
11	6.44	8.86	12.43	3.57
12	2.99	2.89	3.62	0.73
13	3.46	4.96	6.44	1.48
Total		**66.27**	**85.64**	**19.37**

open to undampened rainfall, erosion and sediment loss could still occur at a higher rate than currently experienced. The creation of landing areas and access roads, and the implementation seed tree and group selection treatments could have a significant impact on sedimentation during storm events.

A SWPPP would be required because, as a whole, the plan would impact more than 1 acre of land. Specific additional measures would need to be taken, however, to ensure that sediment mobilized off the Reserve from landing areas and forest treatment areas would not be greater than current conditions. **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** requires the design and implementation of sediment control and retention BMPs to reduce the amount of mobilized sediment or entrap sediment before it leaves the Reserve and ensure no net increase in sediment reaching stormdrains surrounding the Reserve due to plan activities. Approximately 19 tons of sediment would need to be entrained using BMPs to not cause an increase in downstream siltation or sedimentation during a 5-year, 24-hour storm event (refer to Table 4.9-4). BMPs could include use of straw waddles below seed tree and group selection treatment areas; creating sediment collection basins in the treatment areas and landing areas, if feasible; and/or increasing mulch or other soil cover to reduce soil exposure. With implementation of BMPs identified in the SWPPP and as specified by

MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection, impacts would be less than significant.

Management of Tree Risk and Defensible Space
Removal of hazard trees would not generate any substantial impacts associated with erosion and off-site siltation. Hazard trees may be removed but would generally be removed individually and would be cut, leaving the stump and roots in place. Since this activity only creates very small open areas, not unlike when an individual tree dies and falls, erosion and sedimentation is not anticipated to substantially increase as a result of this activity. Impacts from management of tree risks and defensible space on erosion and sedimentation would be less than significant.

Native Plant Restoration
Native plant restoration areas could occur throughout the Reserve and would involve minimal ground disturbance since restoration would generally involve planting by hand. The planting of new trees and shrubs would have a positive effect on soil binding and soil protection and would not increase erosion or off-site siltation. Impacts would be less than significant.

Maintenance of Trails and Public Access
Trail corridors are already maintained within 5 feet to 10 feet to either side of existing trails, and this practice would be continued under the plan. Felled logs would be used where necessary to shore-up trail margins to control runoff. Impacts related to changes in drainage patterns from trail maintenance would be less than significant.

Comparison of Impacts Across Phases

Phase I
Table 4.9-4 shows the rates of sediment yield computed for Phase I treatments applied to the Reserve during the modeled 5-year, 24-hour storm event. The post-Year 2 estimates show an increase of up to 29 percent in Reserve sediment yield for that storm event; this level of increase is less than typical post-Year 2 conditions at residential and development sites. The MUSLE-predicted sediment yields would likely overstate the actual yields during the modeled event by 10 to 20 percent due to local microtopographic variations along the broad ridgeline areas. Also, the 5-year, 24-hour storm event is expected to only occur once during Phase I, which is five years long. Most normal storms would generate much less sediment yield.

Phase I treatments applied to the steeper slopes adjoining drainageways, including Woodland Creek, could trigger hillslope/creekbank instability if insufficient care is taken to minimize disturbance of the soil surface within the immediate drainage area, or if cut pieces of trunk roll downslope into a flow path and are not retrieved. While the sediment yields modeled for Phase I, Year 2, represented worst-case conditions, the potential impact on creek stability and on-site and downstream sedimentation could be significant. Development and implementation of a SWPPP and specifically designed BMPs for sediment retention and containment, as specified in **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection**, would reduce impacts to less than significant levels. By Year 3 of the Phase

1 treatments, additional low canopy cover and rooting accompanying planted tree seedlings would begin to return the treated areas to an "undisturbed" hydrologic condition, which would further lower site sediment yields.

Phase II
Phase II forest treatments would include similar rates of dead/dying tree removal as Phase I over all forest types. The same gradual process of forest treatments and brush and vine removal would apply to Phase II as were conducted in Phase I. By Phase II, most of the seed tree and group selection treatment areas would be expected to have grown back a sufficient amount to provide protection against erosion in those areas. New areas cleared would be susceptible in the same way as described for Phase I. Impacts associated with Phase II sediment yield were not modeled, but for the reasons just discussed, are expected to be similar or less than those described for Phase I. Implementation of the SWPPP and **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** would still be required and would reduce impacts to less than significant.

Phase III
Phase III treatments would include similar rates of dead/dying tree removal as Phases I and II over all forest types. New areas would be defined for seed tree and group selection. Surface treatments (mulch, erosion control blankets) would be employed to minimize erosion and sediment risk in those seed tree and group selection areas. As for Phases I and II, the potential impact of Phase III treatments on drainage patterns and on-site and downstream sedimentation would be potentially significant. Implementation of the SWPPP and **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** would still be required and would reduce impacts to less than significant.

Impact Hydrology-2: The proposed plan could substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site.	**Significance Determination**
	Less than significant with mitigation

Vegetation Management Activities

Forest Treatments
Vegetation management activities would result in some changes in stormwater peak flow and runoff volumes. Flow rates and runoff volumes would be affected by the change in vegetation cover associated with the creation of landing areas and trail widening, and from seed tree and group selection treatments. These activities would result in most trees and understory removed in areas up to 1 acre in size. Seed tree and group selection treatment areas would be planted with seedlings and covered in chips or mulch, which would slow runoff flows in these areas to a greater extent than the existing tree and understory cover. Landing areas would similarly be covered in chip and would generally be level. Nuisance flooding could still occur in situations where organic material or other debris accumulated at culvert or storm drain inlets and obstructed stormwater evacuation. Cut trees would be felled and left in place, and chip or slash

would be left on-site. Given the slopes in the Reserve and in areas where seed tree and group selection treatments could occur, slash, logs, and chip could flow downstream and clog stormdrains. **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** would be implemented, which includes measures to ensure that larger materials and chip do not block stormdrains. Impacts from forest treatments would be less than significant with mitigation.

Management of Tree Risk and Defensible Space, Native Plant Restoration, and Maintenance of Vegetation along Trails and Public Access

Management of tree risks and defensible space, planting of native species, and maintenance of trails would not significantly affect the stormwater flow rates or volumes in drainages because these activities would be very localized. Restoration activities may include the planting of riparian native species in or near the banks of Woodland Creek. If planting would occur, a 1602 permit from CDFW may be required. The planting of more native riparian vegetation, however, would have a beneficial impact to slow and reduce stormwater flows and the sediment in those flows. Impacts would be less than significant.

Comparison of Impacts Across Phases of Work

Phase I

Table 4.9-3 provides a summary of the results of the flood hydrograph modeling conducted for the Reserve for the 5-year, 24-hour storm event under the pre- and post-Year 2 watershed conditions, which is the worst-case scenario condition during Phase I of the plan. As shown, the post-Year 2 condition would result in reductions in both stormwater peak flow rates and runoff volumes for each of the project watersheds. The reductions range from 0 to 13 percent for peak flows and 0 to 7 percent for runoff volumes. Reductions were primarily seen because, in the model, the mulch and small tree/brush condition of the cleared areas more effectively slowed water flow than trees because the mulch and seedlings are closer to the ground than a tree canopy in a woodland condition. The existing woodland understory may not be as accurately accounted for in the modeling and may further slow the stormwater flow for the existing conditions. Model limitations aside, the change in peak stormwater flows and runoff volumes would be insubstantial and less than significant.

Similarly, post-Year 2 runoff volumes would decrease by up to 7 percent compared to existing conditions. Lesser rainstorm events would yield reductions in post-project peak flows and runoff volumes, albeit proportionately lower due to the lower rainfall intensities typical of such storms.

The results of the modeling show a decrease in runoff volume and flow rates because, conceptually, woodland in good condition dampens flow rates and volumes less than brush in good condition. Since only a limited number of clearings (up to 1 acre in size) would be implemented for the Phase I seed tree and group selection method treatments, the bulk of the Reserve would remain in the same hydrologic condition. Individual tree removals would also result in minimal reduction in the overall tree canopy, given the height of the remaining Reserve trees. The combined effects of the treatments on the hydrologic character of drainage

and peak flows and runoff volumes would therefore be less than significant for Phase I implementation.

Flooding is not currently a significant issue within the Reserve and would remain at or below existing levels with implementation of activities identified in Phase I. Nuisance flooding would continue to occur only in situations where organic material or other debris accumulated at culvert or storm drain inlets to obstruct stormwater evacuation. **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** would reduce this impact to less than significant.

Phase II

Based on an extrapolation of the Phase I conditions and the rates of tree removals and plantings shown in Table 3.5-3 of Section 3: Project Description, Phase II impacts on peak flow rates, runoff volumes and flooding are expected to be similar to Phase I, albeit attended by reductions less than those computed for Phase I treatments. The gradual replacement of stressed forest stands by pockets of brush in good condition, including new eucalyptus trees and native tree and brush species, and mulch and chips applied to areas disturbed by forest treatment area would maintain post-project peak flows and runoff volumes at levels equal to or less than pre-plan conditions. A multi-story forest canopy would provide the maximum absorptive capacity for rainfall because the canopy and the litter/duff layer that develops atop the ground surface would mute the erosive energy of rainfall at the ground surface and would increase the surface moisture storage capacity (i.e., rainfall abstraction). Increasing these rainfall abstractions would reduce runoff volumes and peak flow rates. Thus, Phase II impacts on peak flow rates, runoff volumes and flooding would be even less than those in Phase I. Impacts would be less than significant.

Nuisance flooding would continue to occur in situations where organic material or other debris accumulated at culvert or storm drain inlets to obstruct stormwater evacuation and may result in a significant impact. **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** would reduce this impact to less than significant.

Phase III

Based on an extrapolation of the Phase I and Phase II conditions and the rates of tree removals and plantings cited in Table 2.5-3, Phase III impacts on peak flow rates, runoff volumes and flooding are expected to be similar to those described for Phase II. As indicated above for the developing conditions under Phase II, expansion of healthier, multi-story forest canopy through increasing portions of the Reserve would improve the storage of soil moisture in the watershed and reduce peak flow rates and runoff volumes in the Reserve watersheds. Phase III impacts on peak flow rates, runoff volumes and flooding would be less than those for Phase I and II and less than significant.

Nuisance flooding would continue to occur in situations where organic material or other debris accumulated at culvert or storm drain inlets to obstruct stormwater evacuation and may result

in a significant impact. **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** would reduce this impact to less than significant.

Impact Hydrology-3: The proposed plan could create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.	**Significance Determination**
	Less than significant with mitigation

Vegetation Management Activities

The soils in the plan area, which excludes the Nike SF-89 site, are not anticipated to contain contaminants since the Reserve has been, largely, an unmanaged natural area for over a century and has not experienced any development since the 1970s. All above-ground facilities associated with the Nike SF-89 site were removed in the 1970s. Potential contamination may remain on the Nike SF-89 site. The proposed plan would not involve ground-disturbing activities within the area where contamination could be found. Potentially polluted runoff from the Nike SF-89 site would not increase over existing conditions.

As described under Impact Hydrology-1 and Impact Hydrology-2, plan activities could increase sediment yields but the volume and peak flow of stormwater that could entrain this sediment would decrease compared to existing conditions. Sedimentation associated with plan activities is not expected to result in an increase in polluted runoff compared to existing conditions. The decrease in runoff as a result of plan activities could minimize sources of polluted runoff, if there is any on the Nike SF-89 site. The proposed plan could result in increased erosion of soil and off-site sedimentation, as described in greater detail above, and a potentially significant impact. Sediment in the form of total suspended solids can be considered a pollutant. Implementation of the SWPPP and **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection**, which would require implementing BMPs and other soil and sediment containment methods, would reduce total suspended solids that could reach the stormdrain systems to acceptable levels. Impacts would be less than significant with mitigation.

Comparison of Impacts Across Phases

Refer to the analysis of sediment and flows by phase under Impact Hydrology-1 and Impact Hydrology-2. Impacts on stormwater drainage systems would be minimized through the application of BMPs as defined in the SWPPP and **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection**. Impacts would be less than significant with mitigation.

Impact Hydrology-4: The proposed plan could require new or expanded water supply entitlements.	Significance Determination
	Less than significant

Vegetation Management Activities

Irrigation of seedlings and native understory plants would not occur as part of the proposed plan unless plants fail to thrive after the first few years of implementation. If needed, backpack sprayers would be used to provide plants with additional water to encourage survival. Other options for a water source may include the SFPUC's water tank in Rotary Meadow or other nearby potable water sources and distributing water using temporary, aboveground piping or a temporary water storage tank at the summit that could be used to fill watering trucks. No permanent storage structures would be built in association with the plan.

Water consumption for all UCSF facilities was calculated as 1.00 mgd for 2015, which comprises approximately 1 percent of retail demands for SFPUC (UCSF 2014b). Using a conservative assumption, the proposed plan could require up to 6,000 gallons[2] of water a year, or an average of 16 gpd, to water newly planted trees (Grant 2016). The amount of supplemental water that may be required would be minimal, comprising substantially less than a 1 percent increase in SFPUC's average daily consumption.

The potential requirement for supplemental water would not necessitate expanded water supply entitlements. The impact would be less than significant. As incorporated into the proposed plan by AIR-LRDP-1: Best Management Practices for Controlling Particulate Emissions, water would be applied twice a day for dust control during grading activities and on actively used unpaved areas, such as bare landing areas and access routes. Where visible mud or dirt track-out on public roads is visible, a wet power vacuum street sweeper would be used. These practices would increase the amount of water required by up to 132,000 gallons[3] a year during implementation of the 20-year plan. The total amount of supplemental water that may be required would still comprise substantially less than a 1 percent increase in SFPUC's daily consumption. The impact would remain less than significant.

The University of California Sustainable Practices Policy has a goal for all campuses, including UCSF, to reduce potable water consumption by 20 percent per capita by 2020. Water consumption per campus user[4] decreased over 4 percent from the 2007-2010 benchmark to 2013.

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2 Calculated assuming eucalyptus seedlings could require 2 gallons of water, once a week, during the dry months of May through October, for the first 2 years of life.

3 Calculated assuming a 2,000-gallon water truck used every work day for application only during the dry months of August through October.

4 Weighted campus user is defined as: Housing + (0.75 x (Students + Full-Time Campus Staff) + 0.5 x Part-Time Campus Staff)

Given that the 378 gpd[5] average required for the proposed plan comprises a 0.04 percent increase in UCSF's daily consumption, this demand for water would not considerably affect UCSF's attainment of this goal. Optionally, UCSF could investigate ways to use non-potable water such as through the use of temporary stormwater collection tanks kept on-site seasonally. No permanent structures are allowed within the Reserve.

Comparison of Impacts Across Phases

Water consumption would vary throughout plan implementation, depending upon the status of newly planted seedlings and drought conditions in the area. Water would not be applied for the first few years (Phase I). The seedlings planting during the first few years of Phase I, would be monitored to identify whether watering is necessary. An average of 16 gpd may be applied throughout plan implementation, after the first few years, if plants are not thriving. It is not possible to foretell whether watering would be necessary and by how much watering would vary during each phase. The impact on existing water supply entitlements; however, would be less than significant for all phases. As required by AIR-LRDP-1 Best Management Practices for Controlling Particulate Emissions, areas with exposed soils would be watered during active use for plan activities and a wet power vacuum street sweeper would be used as necessary. The water required to fulfill this measure would not appreciably vary between phases. The impact would remain less than significant.

	Significance Determination
Impact Hydrology-5: The proposed plan could result in significant impacts on water resources in combination with past, present, and probable future development in the cumulative analysis study area.	**Less than significant contribution with mitigation**

Geographic Scope

The geographic extent for this cumulative analysis is defined as the watersheds located within the Reserve. Thirteen watersheds were delineated and are identified in Figure 4.9-1. These watersheds represent both the hydrologic and administrative units for water quality control and protection of beneficial uses for water resources in the plan area.

Cumulative Analysis

Drainage Pattern Alterations

Construction and operation of several cumulative projects (Building Demolition [#1], Surge, Woods and EHS Open Space Restoration [#8], Mount Sutro Reserve Improvements [#9], Kirkham Project [#15], Overlook Project [#16], and SNRA Management Plan [#17]) would change the topography in the same watersheds and downstream areas that would be affected by the proposed plan. Ground-disturbing activities could temporarily or permanently change drainage patterns, affecting areas downstream from the plan area. Construction activities and

[5] Calculated assuming 138,000 gallons per year would be used for irrigation and dust suppression.

tree removal as part of the cumulative projects could expose bare soil and increase runoff as well as sediment load. Debris from construction and vegetation removal activities implemented as part of the cumulative projects could clog storm drainage features, leading to flooding downstream of the plan area. The cumulative impact on downstream flooding and sedimentation from implementation of cumulative projects could be significant.

Preparation of landing areas and access routes would change the topography and expose bare soil within the plan area. Forest treatments would temporarily expose bare soils. Stormwater runoff volume and flow rate would decrease with implementation of the plan; however, sediment yield and transport would increase. The proposed plan's contribution to a significant cumulative impact on siltation could be considerable if it were to increase the sediment amounts that reached storm drains around the Reserve. A SWPPP would be required and **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** requires the design and implementation of sediment control and retention BMPs to reduce the amount of mobilized sediment or to entrap sediment before it leaves the Reserve. Implementation of a SWPPP and **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** would reduce sedimentation such that the plan activities would not increase the amount of sediment that reaches the storm drains beyond existing conditions. The proposed plan's contribution to potentially significant cumulative impact from sedimentation would be less than cumulatively considerable with mitigation.

Vegetation management activities of the plan would result in a decrease in stormwater flows and off-site flows; therefore, the plan would not contribute to cumulative impacts associated with flooding from increased stormwater flows.

Increased debris due to plan activities and construction activities of cumulative projects could clog storm drains and cause localized flooding, resulting in a significant cumulative impact. The proposed plan's impact would be mitigated from implementation of BMPs as part of the SWPPP and **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection**, which would entrap debris before reaching the stormdrains. With mitigation, plan implementation would not contribute to an otherwise significant cumulative impact related to localized flooding.

Increased or Polluted Runoff

Use of vehicles and equipment during construction or operation of the cumulative projects could release hazardous materials due to leaks or spills. Other sources of contaminants are not anticipated from implementation of the cumulative projects and the proposed plan. The quantity of pollutants from use of equipment and vehicles would be minimal and would not result in a substantial source of polluted runoff. None of the cumulative projects would disturb the areas within the Nike SF-89 site where contamination could remain. The potential cumulative increase in polluted runoff would be less than significant.

Water Supply

The water supply demands for many of the cumulative projects, primarily projects analyzed in the 2014 LRDP, were incorporated into SFPUC's 2015 water demand and supply plan. As described previously, water use has been less than projected in recent years. Though irrigation is not currently proposed, seedlings may be irrigated if they show signs of water stress or are not growing. The proposed plan may require up to 138,000 gallons of water a year for irrigation and dust control throughout plan implementation. This increased demand for SFPUC water would comprise less than 1 percent, a comparatively small quantity of water. The proposed plan may implement stormwater catchment to supply irrigation demands. The small increase in demand for water, even assuming all water would come from SFPUC, would not require new or expanded water supply entitlements. The proposed plan would not have a considerable contribution to a cumulative impact on water supply.

4.9.6 Mitigation Measures

MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection

Best Management Practices (BMPs) for erosion control and water quality protection shall be applied wherever the soil surface is disturbed by vegetation management activities, including trail widening, landing preparation and use, tree removal, and invasive brush and vine removal. BMPs shall be implemented prior to, during, and after annual vegetation management activities for erosion control and water quality protection as specified here. These measures should be incorporated into the SWPPP, but these measures may be altered, supplemented, or deleted during the San Francisco Bay RWQCB's review process, as it has final authority over the terms of the SWPPP.

Pre-Activity BMPs:

- For trail widening and landing preparation, install devices or structures to control runoff, which could include but are not limited to silt fencing, French drains or waterbars
- For seed tree and group selection treatment areas, install flagging to delineate treatment areas to minimize vegetation disturbance outside of the areas designated for treatment. As needed, such as on very steep slopes, install sediment transport barriers downstream (such as but not limited to coir logs) of the treatment areas to catch mobilized sediment and potentially chips or other slash and larger debris and maintain until seedlings have stabilized the area
- If coir logs are used, they should be embedded in the soil surface by 50 to 60 percent of their diameter and staked at close intervals to minimize slumping and localized failures
- For landing areas use gravel, logs, or other materials to prevent heavy equipment from settling down into forest soils and to reduce runoff

Activity BMPs:

- Sweep up loose soil and other debris tracked in on any paved areas at the end of each work day. Dispose of removed material at an approved off-site location
- Clean-up any spills immediately. If spills occur on earthen treatment sides or access trails, segregate the spill and remove both the spill material and the contaminated surface soil and dispose of at an approved off-site landfill for such material
- For downed trees, remove any large, loose slash material (such as loose limbs and branches or bark), as feasible, that could become mobilized in a big storm event
- After major storms, check sediment retention BMPs and clean and restore as needed

Post-Activity BMPs:

- For individual tree removal on steeper slopes, install coir logs or other equivalent methods, along the downslope grading perimeter to trap sediment, if erosion is observed post-removal
- Disturbed soil surfaces should be covered with 3 to 4 inches of wood mulch or weed-free straw

- Remove water bars or other water diversion structures and fill ruts; clear landing areas of excess debris once vegetation is established or it is determined that erosion and sedimentation is no longer occurring, and seed landing areas (per MM Aesthetics-1)

Woodland Creek

- Prohibit the removal of trees or other ground disturbance within 20 feet of Woodland Creek when the creek has flow
- Require directional felling away from the stream
- Immediately remove any logging debris from the stream and away from the banks
- Maintain sufficient ground cover along the stream to trap sediment

Locations: Areas of ground disturbance across the Reserve

Performance Standards:

- **Before Activities:** BMPs are designed
- **During Activities:** BMPs are installed, inspected, and maintained
- **After Activities:** N/A

4.9.7 References

City and County of San Francisco. 2011a. "Building Footprints - City and County of San Francisco GIS dataset." San Francisco Enterprise GIS Program, Department of Technology and Pictometry, Inc.

—. 2011b. "Public Works Code." Article 4.2. Sewer System Managment. August 31. https://law.resource.org/pub/us/code/city/ca/SanFrancisco/0-snapshots/S-38/PublicWorks.html.

ESRI. 2017. "Online GIS Vector and Raster Data."

Grant, Bonnie L. 2016. Eucalyptus Tree Watering: Information on Irrigating Eucalyptus Trees. Accessed April 27, 2017. https://www.gardeningknowhow.com/ornamental/trees/eucalyptus/eucalyptus-tree-watering.htm.

San Francisco Bay Regional Water Quality Control Board (SFBRWQCB). 2014. "Sanitary Sewer Improvement Program -- Status Report."

—. 2015. "Water Quality Control Plan (Basin Plan) for the San Francisco Bay Basin." March. http://www.waterboards.ca.gov/sanfranciscobay/basin_planning.shtml#basinplan.

San Francisco Public Utilities Commission (SFPUC). 2011. "2010 Urban Water Management Plan for the City and County of San Francisco." June.

—. 2016. "2015 Urban Water Management Plan for the City and County of San Francisco." June.

State Water Resources Control Board (SWRCB) and California Environmental Protection Agency (Cal EPA). 2012. "Water Quality Control Plan, Ocean Waters of California." California Ocean Plan. http://www.swrcb.ca.gov/water_issues/programs/ocean/docs/cop2015.pdf.

University of California, San Francisco (UCSF). 2017. "Mt Sutro Open Space Preserve GIS data."

—. 2014a. "Water Action Plan FY2013/2014."

—. 2014b. "Water Supply Assessment for the UCSF Long Range Development Plan." November.

University of California. 2016. "Policy Sustainable Practices." September 6.

Western Regional Climate Center (WRCC). 2016. San Francisco OceanSD, California -- Climate Summary. May 19. Accessed January 16, 2017. http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7767.

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4.10 NOISE

4.10.1 Introduction

This section discusses ambient noise levels and evaluates the potential impacts from noise increases associated with proposed vegetation management activities. The section also provides a discussion of the applicable federal, state, regional, and local regulations that pertain to noise. The impacts associated with the proposed plan are compared with the thresholds of significance used by the University pursuant to CEQA.

Comments related to noise received during the public scoping process included concerns about the following:

- Potential for increased noise after implementation of vegetation management activities
- Noise during vegetation management activities, including the use of trucks and wood chippers

4.10.2 Definitions

Noise Concepts

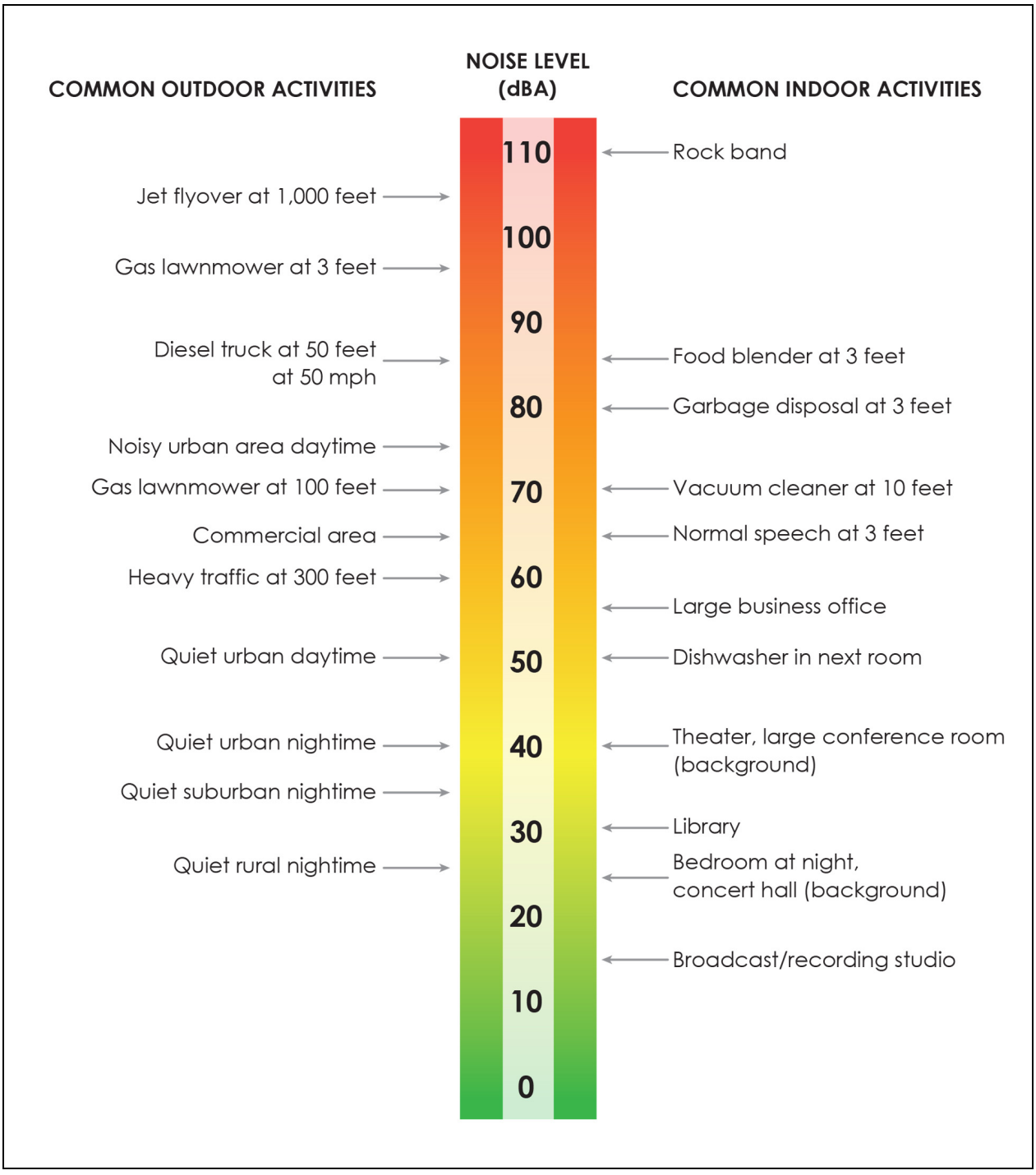
Audible Sound

Sound is characterized by various parameters that describe the rate of oscillation (frequency) of sound waves, the distance between successive troughs or crests in the wave, the speed that it travels, and the pressure level or energy content of a given sound. The sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound, and the decibel (dB) scale is used to quantify sound intensity. A logarithmic loudness scale is used to keep sound intensity numbers at a convenient and manageable level because sound can vary in intensity by over one million times within the range of human hearing.

Human response is factored into sound descriptions in a process called "A-weighting," expressed as "dBA," since the human ear is not equally sensitive to all sound frequencies within the entire spectrum. The dBA, or A-weighted decibel, refers to a scale of noise measurement that approximates the range of sensitivity of the human ear to sounds of different frequencies. On this scale, the normal range of human hearing extends from about 0 dBA to 140 dBA. The noise levels presented herein are expressed in terms of dBA, unless otherwise indicated. Figure 4.10-1 shows common outdoor and indoor activities and their corresponding noise levels in dBA.

Studies have shown that under controlled conditions in an acoustics laboratory, a healthy human ear is able to discern changes in sound levels of 1 dBA. In a quiet environment with average background noise, a healthy human ear can detect changes of about 2 dBA; however, it is widely accepted that changes of 3 dBA in the normal environment are considered just noticeable to most people, and that an increase of 3 dBA is perceived as approximately a

Figure 4.10-1 Common Noise Levels



Source: (Caltrans 1998)

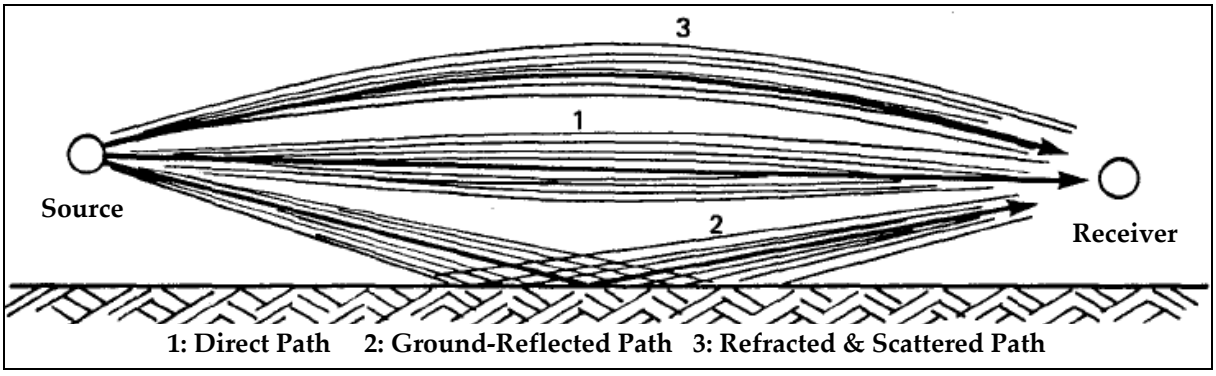
25 percent increase in noise level. A change of 5 dBA is readily perceptible, and a change of 10 dBA is perceived as being twice as loud. Accordingly, a doubling of sound energy (e.g., doubling the volume of traffic on a highway) resulting in a 3 dBA increase in sound would generally be just detectable.

Sound Transmission

Sound transmission near the earth's surface involves essentially three types of sound paths from a source to a receiver (also referred to as a receptor), listed below and shown conceptually in Figure 4.10-2.

- **Path 1 – Direct.** The most direct path is the normal path by which most sound energy travels.
- **Path 2 – Ground-Reflected.** Some of the ground-reflected sound may arrive at the receiver either in or out of phase (or at various other phase angles) with the direct sound (path 1) and can either increase or decrease the received sound level. The texture and density of the ground surface can affect the phase and magnitude of the reflected sound path. Harder and smooth surfaces generally reflect more sound than softer and textured surfaces.
- **Path 3 – Refracted & Scattered.** The remaining sound that may arrive at a receiver is made up of relatively low-level sound that is refracted (bent) or scattered back to earth by numerous small patches of inhomogeneous air of varying temperature, speed, direction, density, or other factors. Sound from path 3 may become significant; however, paths 1 and 2 usually determine the sound levels at a receiver because they contribute a much greater amount of sound that reaches a receiver than path 3[1]. A solid barrier, such as intervening terrain or dense woods can intercept and practically eliminate these paths.

Figure 4.10-2 Sound Paths near the Earth's Surface



Source: (Hoover & Keith 1981)

[1] Studies on sound transmission have shown that when paths 1 and 2 are virtually eliminated the remaining reflected sound levels traveling from path 3 are about 20 to 25 dB below the path 1 and 2 sound levels (Hoover & Keith 1981).

Attenuation
Sound from line and point noise sources attenuates (lessens) at varying rates based on the inverse square law and the equation for spreading of noise waves over hard and soft surfaces. Sound from line sources of noise, such as roadway traffic, attenuates at a rate of 3.0 to 4.5 dBA per doubling of distance from the source (cylindrical spreading equation). Sound from point sources of noise, including stationary mobile sources such as idling vehicles or onsite construction equipment, attenuates at a rate of 6.0 to 7.5 dBA per doubling of distance from the source (spherical spreading equation). Conversely, sound increases at the same rates every time the distance from a source is reduced by half.

For the purposes of the analysis in this section, it is assumed that noise from line and point sources to a distance of 200 feet attenuates at respective rates of 3 and 6 dBA per doubling of distance. In areas where sound travels over acoustically absorptive ground surfaces (e.g., soft dirt, grass, bushes, or intervening structures), it is assumed that noise from line and point sources at distances greater than 200 feet attenuates at a rate of 4.5 to 7.5 dBA per doubling of distance, which accounts for a greater loss of sound as distance increases (Caltrans 2013).

Building Insulation, Topography, and Other Noise Barriers
The exterior walls of residences and buildings typically reduce outdoor noise levels by 12 to 15 dBA if windows are open and between 20 to 25 dBA if windows are closed, depending on the age of the structure. An acoustically well-insulated structure can provide around 35 dBA of noise attenuation when windows and doors are kept closed (Wyle Laboratories 1994).

Vegetation, topography, and other structures can reduce noise levels that reach a receiver by serving as a barrier that deflects or absorbs sound. The effects of vegetation on noise levels varies widely based on the type, height, and density of the vegetation in relation to the location of a noise receptor. Generally, the forest floor provides the greatest noise attenuation due to absorption within a forest. A lower level of noise attenuation occurs within the canopy of a forest primarily because tree stems and branches scatter rather than absorb noise (Herrington and Brock 1977). Provided shrubs are taller than the noise receptor, dense shrubs can appreciably reduce noise levels (Chih-Fang Fang 2003). The effect topography has on noise levels varies substantially and is highly dependent upon the complexity of the terrain, location of the source of noise, and location of receptor. Topography, such as a hill, can serve as a noise barrier for receptors on the opposite side of the hill from a source of noise. Topography must be at least high enough to obscure line of sight between a noise source and receptor to serve as a noise barrier. The area behind the hill where noise would be dampened is considered the shadow region (Salomons 2001). Conversely, sound can reverberate or reflect off of topography, increasing noise on the side of the hill where the noise was created (Truax 1999).

Noise Descriptors
Time variations in noise exposure are typically expressed in terms of a steady-state energy level (L_{eq}) that represents the acoustical energy of a given measurement. Successive additions of sound to the community noise environment varies from instant to instant requiring the measurement of noise exposure over a period to accurately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of

environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors include the following:

- **L_{eq}.** The equivalent sound level is used to describe noise over a specified period, typically one hour, in terms of a single numerical value. The L_{eq} is the constant sound level, which would contain the same acoustic energy as the varying sound level, during the same period (i.e., the average noise exposure level for the given period).
- **Maximum Noise Level (L_{max}).** The instantaneous maximum noise level for a specified period.
- **L_{01}.** The noise level that is equaled or exceeded 1 percent of the specified time. This level is often considered the perceived maximum noise level.
- **L_{10}.** The noise level that is equaled or exceeded 10 percent of the specified time. This level is commonly called the "intrusive sound level."
- **L_{50}.** The noise level that is equaled or exceeded 50 percent of the specified time. This is the median noise level during the specified time.
- **L_{90}.** The noise level that is equaled or exceeded 90 percent of the specified time. The L_{90} is often considered the background noise level averaged over the specified time.
- **Day/Night Average Sound Level (L_{dn}).** L_{dn} is the 24-hour day and night A-weighed noise exposure level, which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night. Noise between 10:00 pm and 7:00 am is weighted (penalized) by adding 10 dBA to take into account the greater annoyance from nighttime noise.
- **Community Noise Equivalent Level (CNEL).** Similar to L_{dn}, CNEL adds 5 dBA between 7:00 pm and 10:00 pm in addition to between the hours of 10:00 pm and 7:00 am.

4.10.3 Environmental Setting

Existing Noise Conditions

Existing Noise Environment

Land uses near the Reserve contribute to environmental noise levels within and surrounding the Reserve, including noise from campus activities, residential activities, and vehicle traffic. The primary sources of noise in the area are from mechanical equipment associated with campus building operations, and a wide array of other activities associated with the campus such as maintenance and renovation activities, truck deliveries, car doors shutting, and people walking or talking. Mobile sources of noise in the project vicinity include traffic noise along adjacent streets.

Community Noise Survey

A community noise survey was conducted by Illingworth & Rodkin, Inc., in February and March 2017 to assess existing noise levels and predominant noise sources surrounding the Reserve. Outdoor ambient noise measurements were collected at eight sites around the perimeter of the Reserve that best characterize current land uses that contribute to existing noise

levels in the area. Long-term measurements were collected for 49 hours at four locations (LT-1, LT-2, LT-3, and LT-4) surrounding the Reserve. Short-term measurements were collected for 10 minutes during daytime hours at four separate locations (ST-1, ST -2, ST-3, and ST-4). Noise measurement locations are listed in Table 4.10-1 and shown on Figure 4.10-3. Existing daytime and nighttime noise levels at each location, including a description of dominant noise sources, are listed in Table 4.10-1. Detailed data and charts from the community noise survey are provided in Appendix G.

Noise-Sensitive Receptors

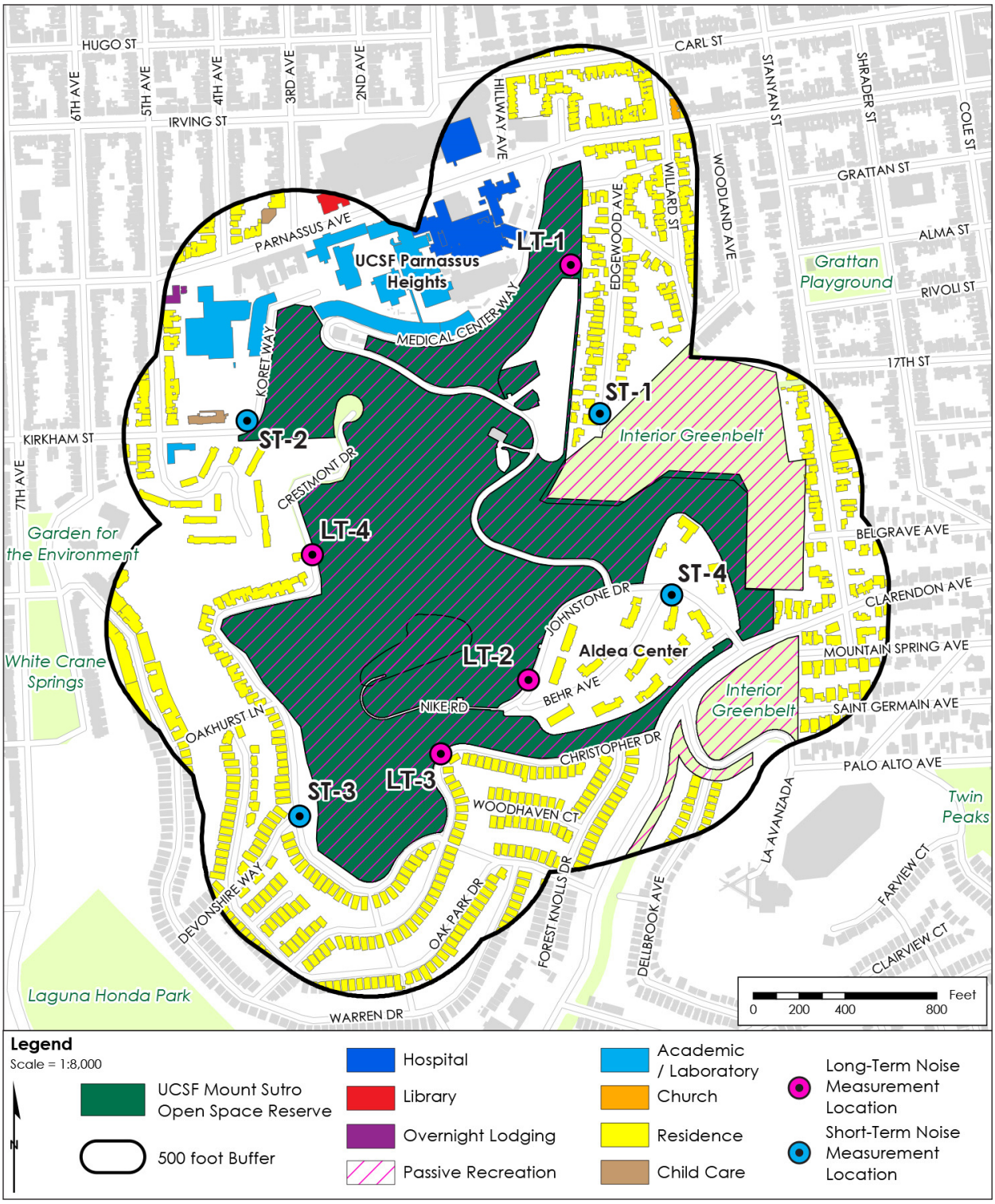
Noise-sensitive receptors are land uses where elevated noise could interfere with normal human activities. Noise-sensitive receptors are generally considered to include convalescent homes (i.e., nursing homes and senior citizen centers), schools (i.e., preschool and elementary), churches, libraries, hospitals, single and multifamily residences, and other uses which function as overnight lodging such as motels, hotels, and hospital rooms. Recreational facilities that support passive recreational activities, such as trail uses in the Reserve and Interior Greenbelt, are also frequently considered noise-sensitive receptors. Noise-sensitive receptors within 500 feet of the Reserve are shown on Figure 4.10-3. A description of the noise-sensitive receptors and distance to the closest receptor are listed in Table 4.10-2.

Table 4.10-1 Outdoor Ambient Noise Measurements

Site ID	Location	Time Period	L_{max} (dBA)	Average L_{eq} (dBA)	Dominant Noise Sources
Long-Term (49 Hours)					
LT-1	Unnamed trail between Farnsworth Lane and Surge parking lot	Day Night	76 80	54 53	UCSF mechanical equipment, parking lot activities, birds in trees, distant tree-trimming/forest work and adjacent residential uses
LT-2	Johnston Drive (West)	Day Night	99 86	52 42	Parking lot activities, roadway traffic, adjacent residential uses, distant tree-trimming/forest work and birds in trees
LT-3	Crestmont Drive (East)	Day Night	87 86	53 41	Roadway traffic, adjacent residential uses, distant tree-trimming/forest work and birds in trees
LT-4	Crestmont Drive (North)	Day Night	88 68	50 43	Roadway traffic, distant tree-trimming/forest work and birds in trees
Short-Term (10 Minutes)					
ST-1	Edgewood Tail Head	Day	64	52	Birds in trees and distant tree-trimming/forest work
ST-2	Johnston Drive at Behr Ave (East)	Day	64	52	Roadway traffic, birds in trees and distant tree-trimming/forest work
ST-3	Crestmont Drive at Devonshire Way (West)	Day	56	46	Roadway traffic and distant tree-trimming/forest work
ST-4	Koret Way	Day	61	47	Roadway traffic and distant tree-trimming/forest work

Source: (Illingworth & Rodkin, Inc. 2017a)

Figure 4.10-3 Noise Measurement Locations and Noise-Sensitive Receptors within 500 Feet of the Reserve



Sources: (ESRI 2017, UCSF 2017, SFGIS 2011, Google, Inc. 2017, Illingworth & Rodkin, Inc. 2017a)

Table 4.10-2 Proximity of Noise-Sensitive Receptors within 500 Feet of the Reserve

Receptors/Sensitive Land Uses	Description	Closest Facility to Reserve Boundary	Approximate Distance
Residences	Private Residences (numerous)	135 Edgewood Avenue	< 5 feet (property line) ~20 feet (dwelling)
	UCSF Aldea Center Housing Complex	50 Johnstone Drive	~20 feet (dwelling)
Overnight Lodging	UCSF Faculty Alumni House	745 Parnassus Avenue	420 feet
Hospital	UCSF Medical Center	505 Parnassus Avenue	125 feet
	UCSF Langley Porter Psychiatric Institute	401 Parnassus Avenue	40 feet
Child Care	UCSF Kirkham Child Development Center	10 Kirkham Street	104 feet
	UCSF Marilyn Reed Lucia Child Care	610 Parnassus Avenue	366 feet
Library	UCSF Kalmanovitz Library	530 Parnassus Avenue	415 feet
Academic/ Laboratory	UCSF Dolby Regeneration Medicine	35 Medical Center Way	35 feet
Passive Recreation	UCSF Mount Sutro Open Space Reserve	N/A	< 5 feet
	Interior Greenbelt	N/A (abuts reserve)	< 5 feet

Sources: (Google, Inc. 2017, ESRI 2017)

Health Effects of Environmental Noise

Recent Research and Exposure Limits

A number of studies have linked increases in noise with health effects, including hearing impairment, sleep disturbance, cardiovascular effects, psychophysiological effects, and potential impacts to fetal development (Babisch 2005). Potential health effects appear to be caused by both short and long-term exposure to very loud noises and long-term exposure to lower levels of sound (chronic exposure). Acute exposure to sound levels greater than 120 dBA can cause mechanical damage to hair cells of the cochlea (the auditory portion of the inner ear) and hearing impairment (Babisch 2005). As noted in Figure 4.10-1, sound levels greater than 120 dBA are equivalent to a rock concert or a jet plane flying overhead at approximately 1,000 feet.

An analysis of 43 epidemiological studies on the effects of noise exposure and associated blood pressure and ischemic heart disease (Van Kempen EE 2002) found no statistically significant correlation between community exposure and heart disease, although, small but statistically significant correlations were found for occupational exposures. The analysis found a positive correlation between high blood pressure and elevated noise exposure in the workplace;

however, a noise exposure threshold was not identified that would result in significant health effects in the general population. The analysis concluded that "epidemiological evidence on noise exposure, blood pressure, and IHDs [ischemic heart diseases] is still limited" (Van Kempen EE 2002).

The World Health Organization (WHO) and the USEPA consider 70 dBA (L_{eq}) to be a safe daily average noise level for the ear. However, even noise at this level may cause disturbance to sleep and mental concentration and may have an effect on chronic health impacts, such as hypertension and heart disease (Babisch 2006). According to the WHO, sleep disturbance can occur when continuous indoor noise levels exceed 30 dBA or when intermittent interior noise levels reach 45 dBA, particularly if background noise is low. To avoid effects on sleep, the WHO suggest that exterior continuous (ambient) noise levels during nighttime hours (approximately 10:00 pm and 7:00 am) should be 45 dBA or below, and short-term events should not generate noise in excess of 60 dBA (WHO 1999).

There appears to be a relationship between exposure to higher than normal noise levels and some health effects, though the evidence is inconsistent at this time. Recent research has not unequivocally identified community noise levels above which specific health effects may occur. In the absence of more definitive research, a sound level of 120 dBA may be a suitable threshold above which acute exposure would be health threatening. Similarly, chronic exposures above a 70-dBA threshold used by the WHO and USEPA may potentially be health threatening.

Community Reaction and Annoyance

In addition to the health effects described above, noise can cause annoyance and can trigger emotional reactions like anger, depression, and anxiety. People have a relatively broad tolerance to noise, but elevated noise levels lasting for either short or long periods can be expected to result in an adverse community reaction. The WHO reports that, during daytime hours, few people are seriously annoyed by activities with noise levels below 55 dBA or moderately annoyed with noise levels below 50 dBA. Although, noise above these levels may result in annoyance, local municipalities generally define acceptable daytime noise levels that are higher. The City and County of San Francisco defines a range of acceptable noise levels from 60 to 70 dBA depending on land use (described further under Regulatory Considerations below).

Vehicle traffic and continuous sources of machinery and mechanical noise contribute to ambient noise levels. Short-term noise sources, such as truck backup beepers, the crashing of material being loaded or unloaded, car doors slamming, and engines revving, contribute very little to 24-hour noise levels, but are capable of causing sleep disturbance and severe annoyance. The importance of noise to receptors depends on both time and context. For example, long-term high noise levels from large traffic volumes can make conversation at a normal voice level difficult or impossible, while short-term peak noise levels, if they occur at night, can disturb sleep.

4.10.4 Regulatory Considerations

University of California, San Francisco

UCSF 2014 LRDP

The 2014 LRDP includes one relevant guideline associated with community planning goals for environmental planning and safety. Goal EP3 establishes that UCSF intends to meet or exceed, city, state, and federal standards with respect to health and safety, noise, and construction related environmental impacts.

The 2014 LRDP identifies two measures related to noise. These measures are considered part of the project (plan) and are shown here. References to "construction" in these measures can be seen as equivalent to "activity" as it pertains to the plan. While plan activities are not technically construction, similar types of equipment and methods (e.g., grading, trucking) are employed to carry it out. These measures are considered part of the plan and are shown here.

Mitigation Measure NOI-LRDP-1a: Construction Noise Control Measures. UCSF contractors shall employ site-specific noise attenuation measures during construction to reduce the generation of construction noise. These measures shall be included in a Noise Control Plan that shall be submitted for review and approval by UCSF to ensure that construction noise is consistent with the standards set forth in the City's Noise Ordinance. Measures specified in the Noise Control Plan and implemented during plan construction shall include, at a minimum, the following noise control strategies:

- Equipment and trucks used for construction shall use the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds.
- Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 a-weighted decibels (dBA). External jackets on the tools themselves shall be used where feasible; this could achieve a reduction of 5 dBA. Quieter procedures, such as use of drills rather than impact tools, shall be used where feasible.
- Stationary noise sources shall be located as far from adjacent receptors as possible, and they shall be muffled and enclosed within temporary sheds, incorporate insulation barriers, or include other measures.

Mitigation Measure NOI-LRDP-1b: Construction Hours. Construction hours are restricted to the hours listed in the table below. In rare circumstances, work may need to occur outside of these work hour limits. In such cases, UCSF Community and Government Relations will receive advance notice from the plan manager, at least one week in advance, as feasible, and will engage the community to identify measures to minimize potential impacts.

Days of the Week	Construction Hours			
	"Not Noisy" Work [a]		Noisy Work	
	Regular Hours	**Extended Hours [b]**	**Regular Hours**	**Extended Hours [b]**
Monday – Friday	7:00 am to 5:00 pm	5:00 pm to 8:00 pm	8:00 am to 5:00 pm	N/A
Saturday	N/A	8:00 am to 5:00 pm	N/A	9:00 am to 4:00 pm
Sunday	N/A	8:00 am to 5:00 pm	N/A	N/A

Notes:

[a] "Not Noisy" work = 80 decibels or less at 100 feet; "Noisy" work = more than 80 decibels at 100 feet.

[b] Extended hours to be considered by UCSF Community and Government Relations with advance notice from the plan manager.

Federal and State

No federal or state regulations are relevant to the analysis of noise impacts for the proposed plan.

Local

San Francisco General Plan

The Environmental Protection Element of the San Francisco General Plan contains Land Use Compatibility Guidelines for Community Noise (City and County of San Francisco 1996). The City's guidelines indicate exterior noise levels that might be inappropriate for sensitive land uses and would therefore require additional noise insulation considerations beyond standard practices. A range of noise levels are considered compatible or incompatible with various land uses, but the maximum "satisfactory" noise level for sensitive land uses are as follows:

- 60 dBA (L_{dn}) for residential and hotel uses;
- 65 dBA (L_{dn}) for school classrooms, libraries, churches, and hospitals;
- 70 dBA (L_{dn}) for playgrounds, parks, office buildings, retail commercial uses, and noise-sensitive manufacturing/communications uses; and
- 77 dBA for other commercial uses such as wholesale, some retail, industrial/manufacturing, transportation, communications, and utilities.

If these uses are proposed to be located in areas with noise levels that exceed these guidelines, a detailed analysis of noise reduction requirements would normally be necessary prior to the City and County's final review and approval of projects, when required.

San Francisco Noise Ordinance

Article 29 of the Police Code (Regulation of Noise) states that the City's policy is to prohibit unnecessary, excessive, and offensive noises from all sources subject to police power. Sections 2907 and 2908 of Article 29 regulate construction equipment and construction work at night. Sections 2907 and 2908 are enforced by the Department of Building Inspection.

Sections 2907(a) and (b) of the Police Code state that it shall be unlawful for any person to operate any powered construction equipment if the operation of such equipment emits noise at a level more than 80 dBA when measured at a distance of 100 feet from such equipment, or an equivalent sound level at some other convenient distance (e.g, 86 dBA at 50 feet for stationary

equipment). Exemptions from this requirement include (1) impact tools and equipment with intake and exhaust mufflers recommended by the manufacturers and approved by the Director of Public Works as best accomplishing maximum noise attenuation; and (2) pavement breakers and jackhammers equipped with acoustically attenuating shields or shrouds recommended by the manufacturers and approved by the Director of Public Works as best accomplishing maximum noise attenuation.

Section 2908 prohibits any person, between the hours of 8:00 pm of any day and 7:00 am of the following day, from erecting, constructing, demolishing, excavating for, altering, or repairing any building or structure if the noise level created is in excess of the ambient noise level by 5 dBA at the nearest property line unless a special permit has been applied for and granted by the Director of Public Works.

4.10.5 Significance Standards and Methodology

Significance Criteria

Noise impacts of the proposed plan would be considered significant if implementation of the plan would exceed the following standards of significance, in accordance with Appendix G of the State CEQA Guidelines and the UC CEQA Handbook:

1. Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies;
2. Expose persons to or generate excessive groundborne vibration or groundborne noise levels;
3. Result in a substantial permanent increase in ambient noise levels in the plan vicinity above levels existing without the plan;
4. Result in a substantial temporary or periodic increase in ambient noise levels in the plan vicinity above levels existing without the plan;
5. For a plan located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, expose people residing or working in the plan corridor to excessive noise levels;
6. For a plan within the vicinity of a private airstrip, expose people residing or working in the plan corridor to excessive noise levels; and
7. Exceed an applicable LRDP EIR standard of significance by contributing to an increase in average daily noise levels (L_{dn}) of 3 dBA or more at property lines, if ambient noise levels in areas adjacent to proposed development already exceed local noise levels set forth in local general plans or ordinances for such areas based on their use.

The IS for the proposed plan determined that implementation of the plan could generate noise levels that exceed local standards, result in a substantial permanent increase in ambient noise levels, result in a substantial temporary or periodic increase in ambient noise levels, and exceed the LRDP EIR standard for average daily noise levels. These impacts on noise are analyzed in this section.

Issues Adequately Addressed in the Initial Study

The IS for the proposed plan found that implementation of the plan would not expose persons to excessive noise levels from airports because the Reserve is not located within the vicinity of a public or private airstrip. Implementation of the plan would have a less than significant impact on persons from the generation of groundborne vibration. Impacts from airports and groundborne vibration are not discussed further in this section.

Analysis Methodology

Significance Criteria

Temporary Construction Noise

The City defines standards and permitting requirements for temporary construction noise during daytime and nighttime hours in their noise ordinance, Police Code Article 29. The following standards would apply to vegetation management activities in the Reserve because these activities would involve the use of motorized equipment on a temporary basis. Applicable construction noise standards and permitting thresholds defined by the City include the following:

- **Daytime (7:00 am to 8:00 pm).** Police Code Article 29, Section 2907, establishes an 80-dBA noise level limit for construction equipment when measured at a distance of 100 feet from the construction site boundary, or an equivalent sound level at some other convenient distance (e.g, 86 dBA at 50 feet for stationary equipment).
- **Nighttime (8:00 pm to 7:00 am).** Police Code Article 29, Section 2908, establishes a maximum allowable increase of 5 dBA above existing ambient noise levels measured at the nearest property line.

Exceeding these thresholds would normally require construction permits from the Department of Building Inspection and/or the Department of Public Works, which are ministerial permits, but UCSF may not be required to obtain such permits for vegetation management activities on land that it owns. If such permits were applicable, the permits would require noise reduction measures to limit noise impacts at the discretion of Public Works officials. The permit conditions would not necessarily reduce project noise levels below thresholds; noise exceeding the thresholds is not prohibited, nor necessarily significant, but projects that generate noise above the thresholds must be subject to additional measures. For the purposes of this analysis, the proposed plan would result in a significant impact if it exceeded an applicable noise level threshold at receptors identified in the City's noise ordinance and if the proposed plan did not include any measures to reduce noise.

Permanent Ambient Noise

For permanent noise, the standard of significance established by the LRDP EIR dictates that a project would be considered to generate a significant impact if it resulted in a permanent increase in ambient noise levels greater than 3 dBA (L_{dn}) in the project vicinity above levels existing without the project for areas already impacted by noise. The proposed plan would result in a significant impact if vegetation removal caused existing ambient noise levels to increase by 3 dBA (L_{dn}) in residential areas outside of the Reserve.

4.10.6 Impacts

Impact Noise-1: The proposed plan could expose persons to or generate noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies. and Impact Noise-2: The proposed plan could result in a substantial permanent increase in ambient noise levels in the plan vicinity above levels existing without the plan.	Significance Determination
	Less than significant

Overview

The noise impact assessment addresses the effects of temporary construction noise and permanent ambient noise increases on noise-sensitive receptors within 500 feet of the Reserve, which include private residential dwellings, UCSF Medical Center, and UCSF's Aldea San Miguel Housing Complex. Temporary construction noise would occur during annual vegetation management activities from the use of various motorized equipment. Noise from vegetation management activities would be a temporary impact because such activities would occur periodically for up to approximately six months each year for the 20-year plan period. The locations and focus of annual vegetation management activities would also rotate progressively through different areas within the Reserve and would not be focused to one area for extended periods of time. Vegetation management activities would involve removing a substantial number of trees as well as other vegetation that would permanently reduce the density of the forest. Permanently reducing forest density has the potential to permanently increase ambient noise levels for adjacent receptors if the vegetation functions as a substantial noise barrier between receptors and existing sources.

Vegetation Management Activities

Temporary Construction Noise

Daytime Activities

Vegetation management activities identified in the proposed plan would involve the use of noise-generating equipment, including handheld tools, heavy machinery, and vehicles (i.e., pick-up trucks and log trucks). Cumulative noise levels for vegetation management activities were estimated using the Roadway Construction Noise Model[2] (RCNM v.1.1), which involves identifying and using values for the following factors:

- The types of noise-generating equipment that would be used, including the maximum noise level (L_{max}) of each piece of equipment or an equivalent piece of equipment;

[2] RCNM equipment usage factors represent the typical percentage of time that the equipment would be operating at full power during an hour of use. This construction noise model includes representative sound levels for the most common types of construction equipment and the approximate usage factors of such equipment that were developed based on an extensive database of information gathered during the construction of the Central Artery/Tunnel Project in Boston, Massachusetts (CA/T Project or "Big Dig").

- The time of day when the construction activities would occur;
- The duration of noise generating activities, including the hourly use percentage of each piece of equipment; and
- The distance between construction noise sources and noise-sensitive receptors.

Sound from a source decreases as distance increases (attenuation) and conversely increases as distance decreases. Most noise-generating equipment involved with vegetation management activities would be stationary or individual slow-moving noise sources, which are best classified as 'point' or singular noise sources. For the purposes of this impact analysis, it is conservatively assumed that noise levels from equipment would decrease by 6 dBA per doubling of distance and increase by 6 dBA per halving of distance. For example, a noise level of 80 dBA at 50 feet would decrease to approximately 74 dBA at 100 feet and increase to approximately 86 dBA at 25 feet.

Table 4.10-3 lists approximate noise levels for key noise-generating equipment that would be used during each vegetation management activity in a one-hour period. In cases where noise levels for the specific proposed equipment was not available, a suitable noise level was selected from a similar piece of equipment. A complete list of equipment that may be used during vegetation management activities is provided in Section 3: Project Description. A reference distance of 50 feet was selected so the noise levels of each activity and piece of equipment could be compared. The actual distance from noise-sensitive receptors would vary, which would increase or decrease the noise levels based on a change in distance from 50 feet.

Table 4.10-3 Estimated Noise Levels for Key Equipment Used during Vegetation Management Activities

Vegetation Management Activity	Key Equipment/ Activity Noise [a]	Hourly Use Factor	Noise Levels at 50 Feet (dBA)	
			L_{max}	L_{eq} [b]
Landing Area Creation and Access Road Widening	Grader	40%	85 [c]	81 [c]
	Excavator	40%	81 [c]	77 [c]
Management of Defensible Space and Tree Risk, and Forest Treatments [d]	Scraper (similar noise level to Masticator)	40%	77	80
	Tractor	20%	84	80
	Gradall (similar noise level to Feller Buncher)	40%	83	79
	Dozer	40%	74	78
	Chain Saw	40%	82	77
	Excavator	40%	79	77
	Front End Loader	40%	84	75
	Backhoe	40%	78	74
	Crane	40%	81	73
	Dump Truck (similar noise level to Log Truck)	40%	77	73

Vegetation Management Activity	Key Equipment/ Activity Noise [a]	Hourly Use Factor	Noise Levels at 50 Feet (dBA)	
			L_{max}	L_{eq} [b]
	Pickup Truck	40%	84	71
	Flat Bed Truck (similar noise level to water truck)	40%	75	70
	Wood Chipper	40%	85	81
Native Plant Restoration	Hand Tools (voices & tool scraping)	60%	50	48
Management of Vegetation Along Trails and Public Access	Tractor (similar noise level to Trail Grader)	40%	84	80
	Hand Tools (voices & tool scraping)	60%	50	48

Notes:

[a] Various pieces of equipment may be utilized in the process of removing trees. This table identifies noise levels for key equipment that would be used during each activity, or an equivalent noise level for a similar piece of equipment.

[b] The hourly L_{eq} is based on the hourly use factor and L_{max}.

[c] Access road widening would occur 100 feet or greater from the boundary of the Reserve. Noise levels for equipment at 100 feet would be approximately 6 dBA less than the values listed in this table at 50 feet.

[d] The same equipment would generally be used during activities associated with management tree risks and defensible space and forest treatments.

Source: (Illingworth & Rodkin, Inc. 2017b)

Table 4.10-4 lists cumulative noise levels at 50 feet for all equipment that would be used during vegetation management activities based on the maximum noise level and hourly use factor for each piece of equipment listed in Table 4.10-3.

Access road widening and the creation of landing areas would be the loudest activity because it would involve using the loudest piece of construction equipment, a grader. Access road widening would be limited to Quarry Trail and a portion of East Ridge Trail to accommodate equipment access and would only occur at the beginning of vegetation management activities. At 50 feet, access road widening would exceed the 80-dBA threshold; however, the trails that would be widened are located approximately 100 feet or greater from receptors. At 100 feet, noise levels from access road widening would be below the 80-dBA threshold.

Native plant restoration activities would involve the use of handheld equipment and would not involve the use of motorized equipment. The only noise expected during native plant restoration would come from workers speaking and scraping tools (approximately 48 dBA at 50 feet), which would not exceed the 80-dBA threshold at any distance.

Table 4.10-4 Estimated Cumulative Noise Levels during Vegetation Management Activities

Vegetation Management Activity	Noise Levels from Key Equipment at 50 Feet (dBA) [a]	
	Low/High Maximum Noise Levels (L_{max})	Low/High Average Noise Levels (L_{eq}) [c]
Landing Area Creation and Access Road Widening	71 – 85	77 – 81
Management of Defensible Space and Tree Risk, and Forest Treatments	74 – 84	70 – 80
Native Plant Restoration	50	48
Management of Vegetation Along Trails and Public Access	50 – 84	48 – 80

Note:

[a] L_{eq} period is one hour. Construction noise estimates are obtained by combining the noise levels and hourly usage from key noise-producing equipment that would operate during an activity.

Source: (Illingworth & Rodkin, Inc. 2017b)

Major tree and vegetation removal would occur during activities associated with management of defensible space and forest treatments identified in the proposed plan. Trees would also be chipped on-site using a wood chipper. These activities could occur anywhere within the Reserve, but would primarily occur more than 50 feet from the Reserve boundary. The noise levels associated with tree and vegetation removal and chipping would not exceed the 80-dBA threshold at 50 feet; however, these activities could occur up to the boundary of the Reserve and immediately adjacent to noise-sensitive receptors. Noise levels at the closest receptors during major tree and vegetation removal are listed in Table 4.10-5. As shown in Table 4.10-5, the 80-dBA daytime threshold would be exceeded at all receptors except UCSF Medical Center. Exceeding the threshold would be a significant noise impact if appropriate procedures were not implemented to reduce noise levels and limit noise nuisance.

The UCSF 2014 LRDP includes **NOI-LRDP-1a: Construction Noise Control Measures** and **NOI-LRDP-1b: Construction Hours**. **NOI-LRDP-1a: Construction Noise Control Measures** requires all UCSF contractors to employ site-specific noise attenuation measures during construction to reduce the generation of construction noise. Note that while implementation of the plan is not standard "construction," the types of equipment used resemble or are most similar to equipment used for construction and, thus, the 2014 LRDP measures have been deemed applicable. Such measures would be included in a Noise Control Plan that would be submitted to UCSF for review and approval to ensure construction noise is consistent with the standards set forth in the City's noise ordinance. **NOI-LRDP-1b: Construction Hours** also establishes daytime work-hour restrictions for regular and "noisy" construction (activities that generate noise more than 80 dBA at 100 feet), and requires advanced notice to be provided to persons that may be affected by construction during sensitive evening and weekend periods. **NOI-LRDP-1b: Construction Hours** would generally restrict all vegetation management activities to weekdays between 7:00 am and 8:00 pm and weekends between 8:00 am to 5:00 pm; however, in rare circumstances, work may need to occur outside of these work hour limits.

Potential nighttime activities between 8:00 pm and 7:00 am are discussed separately below. "Noisy" activities within approximately 50 feet of the Reserve boundary would be restricted to weekdays between 7:00 am and 5:00 pm and weekends between 9:00 am to 4:00 pm. Advanced notification would be required for properties that may be affected by noise from vegetation management activities between 5:00 pm to 8:00 pm on weekdays and anytime on weekends. The impact from temporary construction noise during daytime hours would be less than significant with incorporation of **NOI-LRDP-1a: Construction Noise Control Measures** and **NOI-LRDP-1b: Construction Hours**.

Table 4.10-5 Temporary Noise Levels at Closest Noise-Sensitive Receptors

Receptors	Description	Approximate Distance to Closest Receptor	Loudest Activity at Distance (L_{eq})	Existing Day/Night Ambient Noise in the Vicinity (L_{eq})
Residences	Private Residences (numerous)	< 5 feet (property line) ~20 feet (dwelling)	>100 dBA (property line) >87 dBA (dwelling)	54/53 dBA
	UCSF Aldea San Miguel Housing Complex	~20 feet (dwelling)	>87 dBA	52/42 dBA
Hospital	UCSF Medical Center	125 feet	72 dBA	> 54/53 dBA [a]
Academic/ Laboratory	UCSF Dolby Regeneration Medicine	35 feet	83 dBA	> 54/53 dBA [a]
Passive Recreational Facility	UCSF Mount Sutro Open Space Reserve	< 5 feet	>100 dBA	50/43 dBA
	Interior Greenbelt	< 5 feet	>100 dBA	52/42 dBA [b]

Notes:

[a] Ambient noise levels near the UCSF Medical Center are likely much higher than the values listed because the closest noise measurement locate was taken on the opposite side of a large vegetation barrier from the power facilities located along Medical Center Way.

[b] Only a short-term measurement was collected near the Interior Greenbelt, which did not include nighttime noise measurements. An estimated nighttime noise level of 42 dBA was used for analysis purposes.

Sources: (Google, Inc. 2017, ESRI 2017)

Nighttime Activities

The construction hours established in **NOI-LRDP-1b: Construction Hours** would generally restrict vegetation management activities from occurring during nighttime hours identified in the City's noise ordinance between 8:00 pm and 7:00 am. It is unlikely that vegetation management activities would occur during nighttime hours, but under very rare circumstances work may need to occur during these hours. In an unlikely event that work needed to occur during nighttime hours, the City's nighttime construction threshold of 5 dBA (L_{dn}) above existing ambient noise levels could be exceeded, which would be a significant impact.

NOI-LRDP-1b: Construction Hours requires contractors to provide UCSF Community and Government Relations with notice of any unique nighttime work requirements at least one

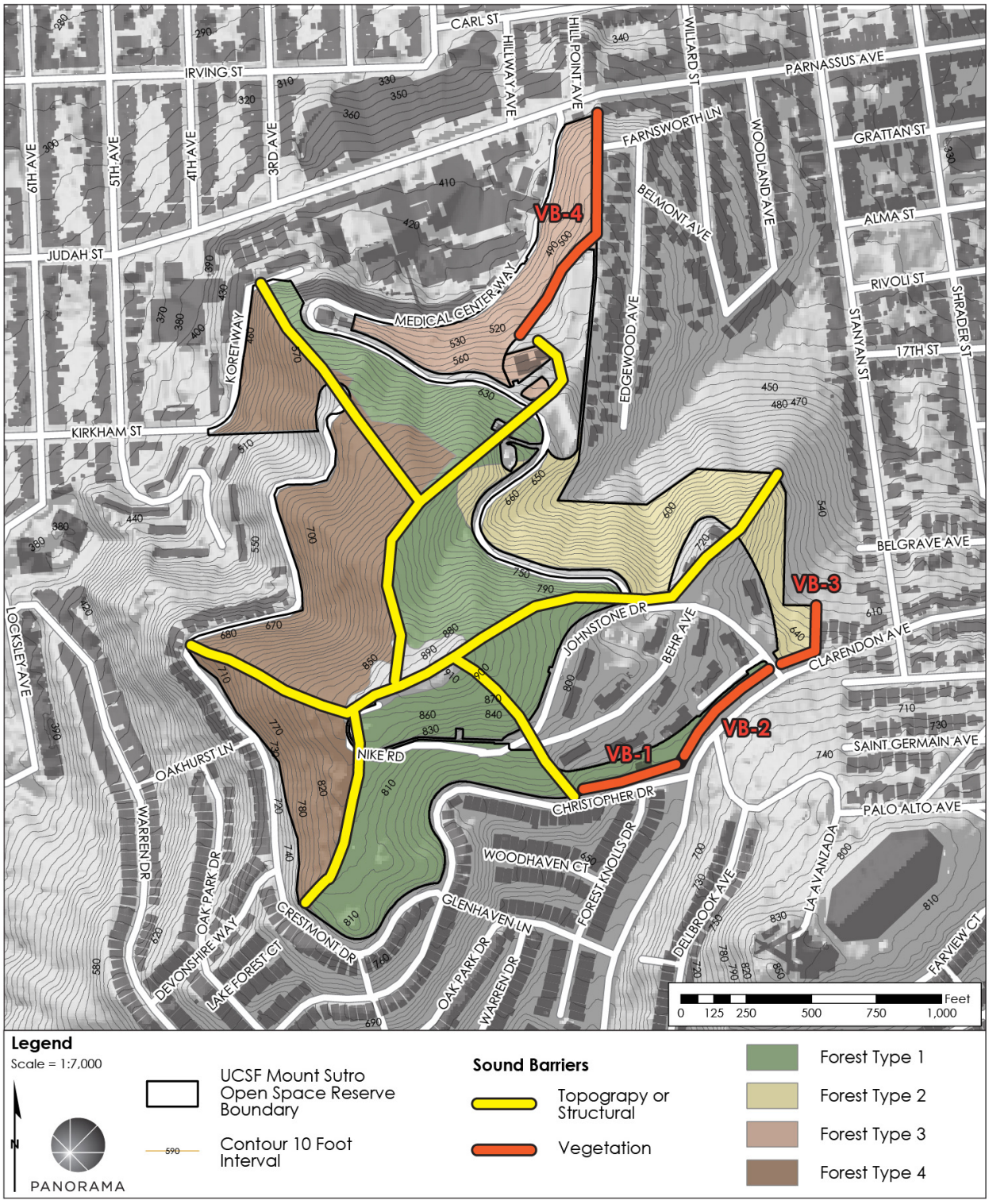
week in advance, to the extent feasible. Prior to the work activities, UCSF would engage with members of the community that may be affected by the associated noise to identify feasible noise reduction measures that would minimize potential noise impacts. The impact from temporary construction noise during nighttime hours would be less than significant with incorporation of mitigation.

Permanent Ambient Noise

Several factors, including but not limited to topography, soils, and vegetation, contribute to the Reserve's ability to act as a noise barrier. Topography likely plays a large role in noise protection within the Reserve because of the prevalence of steep slopes on all sides of the Reserve. Areas where topography likely plays a major role in noise protection are shown on Figure 4.10-4. Sensitive receptors (e.g., residences, Aldea San Miguel Housing Complex) on the leeward side of topographic noise boundaries would not experience a substantial increase in ambient noise levels because sound would be deflected by the Reserve's steep topography. Impacts along topographic noise boundaries would be less than significant.

Both alive and dead standing trees in the Reserve contribute to the existing noise environment to some degree by serving as a sound barrier between existing noise sources at UCSF building facilities, within the Reserve (i.e., trail uses), or from traffic and residential activities in the vicinity of the Reserve. The precise noise shielding properties of existing vegetation barriers in the Reserve are not known; other factors such as topography and soils also contribute to noise shielding within the Reserve. Reductions in tree density could affect how noise travels through the Reserve. The proposed plan would involve removing dead and dying trees from the Reserve as well as planting new trees to achieve the final desired tree diversity and density for each forest type. Maximum reductions in tree stem density would range from 9 percent in Forest Type 2 to 80 percent in Forest Type 1. Reducing tree density in the Reserve could result in some permanent loss of intervening sound attenuation, which has the potential to permanently increase ambient noise levels at receptors. Such increases in ambient noise levels would only occur if the trees serve as a major barrier between substantial noise sources and the receptors, and there is an absence of other topographic and/or structural shielding of noise. Figure 4.10-4 shows the general locations where vegetation may be contributing to sound attenuation to nearby residences. Per the significance criteria, the proposed plan would result in a significant impact if implementation of vegetation management activities causes ambient noise levels at adjacent sensitive land uses to permanently increase by 3 dBA (L_{dn}).

Figure 4.10-4 Major Natural Sound Barriers that Provide Noise Shielding



Sources: (ESRI 2017, UCSF 2017, SFGIS 2011, Google, Inc. 2017)

The most substantial tree removal would occur during seed tree and group selection treatment activities that would generally be located within the interior of the Reserve. Fewer trees would also be removed within proximity to buildings, roadways, and trails during management of

defensible space and tree risk. Forest treatment areas would be scattered throughout the Reserve. It is unlikely that forest treatments would occur along VB-1, VB-2, or VB-3 because these areas are relatively narrow strips of forest and/or on very steep terrain. Although substantial tree removal is unlikely at vegetation barriers VB-1, VB-2, or VB-3, some trees could still be removed during tree risk management, if necessary, because these areas are located immediately adjacent to buildings and roadways where hazard trees could be identified. Tree removal activities are more likely to occur west of vegetation barrier VB-4 because VB-4 consists of approximately two thirds of Forest Type 3 from the Surge building to the northern end of the Reserve. Forest treatments and hazardous tree removal could occur in this area and result in the removal of a substantial number of trees.

Studies have shown that sound traveling through medium-dense woods can attenuate at a rate of approximately 5 to 6 dBA per 100 feet of such woodlands (Beranek 1971), however, this attenuation is attributed to both distance and the vegetation. Charles M. Salter Associates, Inc. (2010) conducted a noise study within the Reserve and collected noise measurements at two points near the Surge parking lot to determine the extent to which existing trees and vegetation provide a noise buffer to the residences on Edgewood Avenue. One measurement location included an unobstructed line of sight (and sound) between the residences along Edgewood Avenue and the UCSF campus, and the other location was obstructed by approximately 75 feet of trees and vegetation. The unobstructed noise measurement was 59 dBA and the obstructed measurement was 57 dBA (Charles M. Salter Associates, Inc. 2010). It was therefore estimated that trees and vegetation at the location reduced noise at a level of 2 dBA over a distance of 75 feet. Based on this data, Illingworth & Rodkin (2017a) developed a scale for noise reduction potential for tree density within the Reserve over a given distance. It is estimated that reducing tree density in half (e.g., from 120 to 60 trees per acre) would reduce noise shielding potential by 1 dBA. The scale is presented in Table 4.10-6.

Table 4.10-6 Estimated Noise Reduction Potential by Tree Density

	Tree Density (trees/acre)				
	50	55	75	120	370
Thickness/ Distance (feet)	**Noise Reduction Potential (dBA)**				
25	0	0	0	0	0
75	1	1	2	2	3
100	4	4	4	4	5
150	7	7	8	8	9
175	9	9	9	9	10
250	12	12	12	12	13

Sources: (Charles M. Salter Associates, Inc. 2010, Illingworth & Rodkin, Inc. 2017a)

Table 4.10-7 provides values for estimated noise shielding potential for the major vegetation sound barriers identified on Figure 4.10-4 before and after implementation of the proposed plan. Noise shielding values were estimated based on the relationship between the thickness or distance of the vegetation barrier and the before and after tree density per acre identified for

each forest type. The values for existing tree density are averages for the entire forest type; the actual densities at VB-1 and VB-2 are likely much lower because these areas are very narrow strips of land that do not support the same high tree densities found elsewhere in the Reserve.

Table 4.10-7 Major Vegetation Sound Barriers and Estimated Noise Shielding Potential

Vegetation Barrier	Width of Trees/ Distance (feet)	Forest Type	Average Existing Tree Density (trees/acre)	Lowest Final Desired Tree Density (trees/acre)	Existing Noise Shielding Potential (dBA)	Noise Shielding Potential After Plan (dBA)	Maximum Potential Ambient Noise Increase (dBA)
VB-1	75-150	1	370	75	3 - 9	3 - 8	1
VB-2	25-100				0 - 5	0 - 4	1
VB-3	150-175	2	55	50	7 - 9	7 - 9	0
VB-4	75-250	3	120	75	2 -12	2 -12	0

Sources: (Charles M. Salter Associates, Inc. 2010, Beranek 1971, HortScience, Inc. and Matt Greene Forestry & Biological Consulting 2016)

Tree removal would not substantially change the ambient noise levels at the nearest residences around the Reserve. The noise reduction potential at VB-1 and VB-2 would decrease by approximately 1 dBA, and the noise reduction potential at VB-3 and VB-4 would not change given the maximum tree density reduction proposed. It is widely accepted that changes of 3 dBA in the normal environment are considered just noticeable to most people; a change in 1 dBA would likely not be perceptible to the human ear. The relatively low effect on noise reduction potential is because distance plays a larger role than vegetation in reducing noise; doubling distance reduces noise by 6 dBA, whereas, doubling tree density only reduces noise by approximately 1 dBA. Because only tree density would be reduced and the distance from the noise source to homes would not change, there would be little effect on the ambient noise levels at the nearest residences.

To substantiate this claim, the noise reduction over distance has been calculated without regard to vegetation in the area where the likely highest noise source is nearest to homes, across the northeastern part of Forest Type 3 at Edgewood Avenue. In this area, a section of Forest Type 3 is located between the HVAC equipment on the UCSF buildings and the homes on Edgewood Avenue. As previously stated, the noise measurement taken by Charles M Salter Associates in 2010 provided a noise level of 59 dBA at approximately 200 feet from the HVAC mechanical equipment on the UCSF buildings nearest to Medical Center Way in an area with a clear line of sight to the HVAC equipment (representing no vegetation sound insulation). Given the noise level and conservatively assuming all noise was generated by the HVAC equipment at that location, the HVAC equipment is generating approximately 71 dBA of noise at 50 feet. This level is consistent with studies on noise generated by rooftop HVAC systems for industrial facilities found by Wilson Ihrig (Wilson, Ihrig & Associates, Inc. 2002). The Wilson Ihrig study found HVAC systems generally generate noise at between 60 and 75 dBA at 50 feet.

The nearest backyard on Edgewood Avenue is approximately 275 feet away from the HVAC equipment. If there were no intervening trees or vegetation, the noise from the rooftop equipment would attenuate to 56 dBA at the nearest property solely based on distance, and even more for most properties that are further away. The vegetation is likely providing some noise attenuation. Noise measurement LT-1 found daytime levels to be about 54 dBA L_{eq} at about 275 feet away from the HVAC equipment, about 2 dBA less than expected if there were no vegetation. Existing ambient noise levels were measured at locations around the Reserve between approximately 41 and 54 dBA (average L_{eq}) (refer to Table 4.10-1). Implementation of the plan would not result in the loss of all vegetation between the campus and the homes on Edgewood Avenue. Thinning of trees could have some effect on noise attenuation; however, it would likely be even less than a 2 dBA difference. A less than 2 dBA (L_{dn}) increase in ambient noise at the nearest homes on Edgewood Avenue would not cause existing noise levels to exceed the threshold in the LRDP for permanent ambient noise level increases. . Impacts would be less than significant.

Comparison of Impacts Across Phases

Temporary Construction Noise

As described above, vegetation management activities during Phase I would generate significant temporary noise. The most concentrated activities would be focused at locations where forest treatments would occur, which would primarily be located within the interior of the Reserve. Forest treatments during Phase I would progress through the Reserve on an annual basis and would not occur in the same location year after year. Forest treatments in Phases II and III would likely be similar in magnitude and intensity as those in Phase I. The locations of forest treatments would also be generally located within the interior of the Reserve and would not be in the same locations as previous treatment areas. Hazardous tree removal would also occur on an as needed basis within and near the perimeter of the Reserve. Hazardous tree removal would be less concentrated than the forest treatment areas and would not last for more than a few weeks at each location. It is expected that vegetation management activities would exceed thresholds for temporary construction noise during all three phases of the plan. **NOI-LRDP-1a: Construction Noise Control Measures** and **NOI-LRDP-1b: Construction Hours** would be implemented to address temporary construction noise for the entire plan duration regardless of the intensity or location of vegetation management activities. With incorporation of these measures, impacts would be less than significant.

Permanent Ambient Noise

As described above, substantial tree removal would occur during all three phases of the proposed plan. Seed tree and group selection treatment areas for Phase I would not be located at any of the locations where vegetation barriers are identified. Forest treatments would also occur during Phases II and III, but the specific locations of the treatment areas are not known at this time and would be determined as the forest responds to vegetation management activities. New trees would be planted on an as needed basis during all three phases and would take several years to mature to a point where they would have similar noise shielding properties as the existing trees that would be removed (approximately 5 to 10 years, depending on the species). It is possible that maturing trees may have a greater potential to shield noise because

young trees would act similarly to tall, dense shrubs as a noise barrier. Although the resulting forest would be less dense than the existing forest, the forests ability to shield noise would not be substantially reduced (i.e., 1 dBA or less). The impact would be less than significant.

Impact Noise-3: The proposed plan would result in a substantial temporary or periodic increase in ambient noise levels in the plan vicinity above levels existing without the plan.	**Significance Determination**
	Less than significant

Overview

Impact Noise-3 addresses similar temporary construction noise impacts as Impact Noise-1, but focuses on temporary ambient increases rather than exposing persons to or generating noise levels in excess of local standards. As described in Impact Noise-1, noise standards established by the City identify maximum noise thresholds for temporary construction noise during daytime hours, as well as ambient noise thresholds for construction at night and permanent ambient noise level thresholds for sensitive land use. The City does not identify ambient noise thresholds for temporary construction noise during daytime hours compared to existing ambient noise levels. Only maximum noise levels are identified for construction equipment during daytime. Therefore, Impact Noise-3 focuses on analyzing temporary ambient noise increases during daytime hours.

For the purposes of this analysis, temporary ambient noise increases would be considered substantial if they exceeded existing ambient noise conditions by 10 dBA during daytime hours (7:00 am and 8:00 pm). Refer to Impact Noise-1 for an analysis of temporary ambient noise increases during nighttime hours (8:00 pm and 7:00 am), which uses a 5 dBA threshold established by the City. Temporarily exceeding these noise levels would be a significant impact.

Vegetation Management Activities

As described above, vegetation management activities identified in the proposed plan would involve the use of noise-generating equipment, including handheld tools, heavy machinery, and vehicles (i.e., pick-up trucks and log trucks). Cumulative noise levels at 50 feet for all equipment that would be used during vegetation management activities is listed Table 4.10-4.

The loudest activity that would occur within 100 feet of noise-sensitive receptors would be major tree and vegetation removal associated with tree risk management and forest treatments. At 50 feet, noise levels from these activities would be 80 dBA; however, tree removal could occur less than 50 feet away from noise-sensitive receptors along the perimeter of the Reserve, which would increase these noise levels. Noise levels at the closest receptor during tree removal are listed in Table 4.10-5, as well as existing ambient noise levels in the vicinity of each receptor. As shown in Table 4.10-5, tree removal activities would exceed existing ambient noise levels at receptors by more than the 10-dBA daytime threshold. Temporarily exceeding the threshold would be a significant impact without implementation of appropriate noise reduction measures and other procedures to reduce potential noise nuisance.

NOI-LRDP-1a: Construction Noise Control Measures and **NOI-LRDP-1b: Construction Hours** would be implemented to address all forms of temporary construction noise impacts, including exceeding the City's noise ordinance for maximum noise levels (Impact Noise-1) as well as

existing ambient noise by 10 dBA (Impact Noise-2). The impact from temporary construction noise during daytime hours would be less than significant with incorporation of **NOI-LRDP-1a: Construction Noise Control Measures** and **NOI-LRDP-1b: Construction Hours**.

Comparison of Impacts Across Phases of Work

As described above, vegetation management activities would generate temporary noise from the use of motorized equipment during all three phases. The most concentrated activities would be focused at locations where forest treatments would occur, which are primarily located within the interior of the Reserve; however, other vegetation management activities would occur on an as needed basis both within and near the perimeter of the Reserve. These activities would be less concentrated than the forest treatment areas and would not last for more than a few weeks at each location. It is expected that vegetation management activities would exceed thresholds for temporary construction noise during all three phases of the plan. **NOI-LRDP-1a: Construction Noise Control Measures** and **NOI-LRDP-1b: Construction Hours** would be implemented to address temporary construction noise for the entire plan duration regardless of the intensity or location of vegetation management activities. With incorporation of these measures, impacts would be less than significant.

Impact Noise-4: The proposed plan could exceed an applicable LRDP EIR standard of significance by contributing to an increase in average daily noise levels (L_{dn}) of 3 dBA or more at property lines, if ambient noise levels in areas adjacent to proposed development already exceed local noise levels set forth in local general plans or ordinances for such areas based on their use.	**Significance Determination**
	No impact

Impact Noise-4 establishes a threshold for substantial ambient noise increases from the LRDP EIR. The proposed plan would result in a significant impact if existing ambient noise levels at noise-sensitive receptors increased by 3 dBA (L_{dn}) or more following vegetation removal if those areas already exceed local noise levels set forth in the local general plan. The lowest "satisfactory" noise levels established in the general plan is 60 dBA (L_{dn}) for residential and hotel uses. As shown in Table 4.10-1, existing ambient noise levels in the vicinity of the Reserve range between approximately 46 and 54 dBA during the day and 41 and 43 dBA at night. Because existing noise levels are below the lowest limit defined in the general plan the proposed plan would not exceed the 2014 LRDP threshold. No impact would occur.

Impact Noise-5: The proposed plan could result in significant impacts on noise in combination with past, present, and probable future development in the cumulative analysis study area.	**Significance Determination**
	Less than significant contribution

Geographic Scope

The geographic extent for the analysis of cumulative impacts associated with noise is limited to areas within 500 feet of the proposed plan area. This geographic extent is appropriate because noise levels attenuate rapidly with distance and the noise generated by activities greater than 500 feet from the proposed plan would not combine with the noise generated by proposed vegetation management activities.

Cumulative Analysis

Noise Standards

Noise generated from simultaneous construction or demolition of several cumulative projects, such as the Kirkham Project (#15) and the Overlook Project (#16), could compound with noise generated by equipment and vehicles used during implementation of the proposed plan. The cumulative daytime noise level could exceed the City and County of San Francisco's construction noise standards. The SNRA Management Plan (#17) would involve thinning of trees within the Interior Greenbelt, in combination with the tree thinning proposed as part of the plan, could cumulatively reduce the noise dampening effects of the forest at nearby residences. Operation of new residences (i.e., Kirkham Project [#15], Overlook Project [#16]) and new or renovated UCSF campus facilities (i.e., Long Hospital Addition [#2], Clinical Sciences Renovation [#10], Millberry Union Towers Conversion [#19]) could permanently increase traffic and the quantity of mechanical equipment. The cumulative increase in ambient noise could be in excess of the City and County of San Francisco's noise standards. The cumulative impact from conflict with City and County of San Francisco noise standards would be potentially significant.

UCSF is obligated to implement **NOI-LRDP-1a: Construction Noise Control Measures** and **NOI-LRDP-1b: Construction Hours** as part of the 2014 LRDP, which require UCSF contractors to employ site-specific noise attenuation measures during construction to reduce the generation of construction noise, establish daytime workhour-restrictions for regular and certain construction, and require advanced notice to be provided to persons that may be affected by construction during sensitive evening and weekend periods. These measures would reduce the proposed plan's contribution to a significant cumulative impact from construction noise exceeding the City and County of San Francisco's standards such that the proposed plan would not substantially contribute to a significant cumulative impact from conflict with the City and County of San Francisco's ambient noise standards.

Temporary and Periodic Increases in Ambient Noise

As discussed above, construction or demolition activities that would occur as part of the cumulative projects would generate significant noise. The noise from these activities could increase ambient noise temporarily. The cumulative impact from temporary increases in ambient noise would be potentially significant. Equipment and vehicles used during implementation of the proposed plan would temporarily increase ambient noise throughout the 20-year lifetime of the plan. Due to the proximity of proposed plan activities to cumulative project sites, the proposed plan's contribution to a significant cumulative impact from temporary increases in ambient noise could be considerable. UCSF is obligated to implement **NOI-LRDP-1a: Construction Noise Control Measures** and **NOI-LRDP-1b: Construction Hours** as part of the 2014 LRDP, which would reduce the proposed plan's contribution to a significant cumulative impact to less than significant.

Permanent Increases in Ambient Noise

As discussed above, several cumulative projects could permanently increase ambient noise at sensitive receptors adjacent to the Reserve. The cumulative impact from a permanent increase in ambient noise would be potentially significant. The proposed plan would involve reducing the

density of trees in the forest, which would reduce the noise shielding that the trees provide by approximately 2 dBA (L_{dn}). A reduction of 2 dBA would not be perceptible to the human ear; the proposed plan would not substantially contribute to a significant cumulative impact on a permanent increase in ambient noise.

4.10.7 Mitigation Measures

No mitigation measures would be required to reduce impacts to less than significant.

4.10.8 References

Babisch, Wolfgang. 2005. "Guest Editorial Health and Noise." Environmental Health Perspective 113: A14-A15.

—. 2006. "Road Traffic Noise and Cardiovascular Risk." Noise and Health, Volume 10, page 1.

Beranek, Leo L. 1971. "Noise and Vibration Control." Chapter 7 on "Sound Propogation Outdoors" by Ulrich Kurze and Leo L. Beranek. McGraw-Hill Book Co.

California Department of Transportation (Caltrans). 1998. "Technical Noise Supplement." A Technical Noise Supplement to the Traffic Noise Analysis Protocol. October.

—. 2013. "Technical Noise Supplement to the Traffic Noise Analysis Protocol." September.

Charles M. Salter Associates, Inc. 2010. "UCSF Parnassus Equipment Noise Study DRAFT." CSA Project No. 10-0042. July 21.

Chih-Fang Fang, Der-Lin Ling. 2003. "Investigation of the noise reduction provided by tree belts." Landscape and Urban Planning 63 (2003) 187–195.

City and County of San Francisco. 1996. "San Francisco General Plan, adopted on June 27, 1996." June. http://www.sf-planning.org/ftp/General_Plan/index.htm.

ESRI. 2017. "Online GIS Vector and Raster Data."

Google, Inc. 2017. "Google Earth Pro."

Herrington, L.P., and C. Brock. 1977. "Propagation of Noise over and through a Forest Stand." Proceedings of the conference on metropolitan physical environment. Upper Darby, Pennsylvania: Department of Agriculture, U.S. Forest Service, Northeastern Forest Experiment Station. 226-228.

Hoover & Keith. 1981. "Noise Control for Buildings, Manufacturing Plants, Equipment and Products." Lecture Notes, 9th Printing, 1996. Pages 6-5 to 6-7.

HortScience, Inc. and Matt Greene Forestry & Biological Consulting. 2016. "Draft Vegetation Managment Plan, Mount Sutro Open Space Reserve."

Illingworth & Rodkin, Inc. 2017a. "Community Noise Survey." Noise measurements collected between Monday, Februrary 27 and Wednesday, March 1, 2017. April 20.

—. 2017b. "Cumulative construction noise estimates." April 20.

Salomons, E.M. 2001. Computational Atmospheric Acoustics. Kiluwer Academic Publishers.

Truax, B. 1999. Handbook for Acoustic Ecology. Simon Fraser University.

Van Kempen EE, Kruize H, Boshuizen HC, Ameling CB, Staatsen BA, de Hollander AE. 2002. "The association between noise exposure and blood pressure and ischaemic heart disease: A meta-analysis." Environ Health Perspectives; 2002 March; 110(3):307-17.

Wilson, Ihrig & Associates, Inc. 2002. "Balfour Center Safeway Noise Analysis - Brentwoord, California." June 6.

Wyle Laboratories. 1994. "Wyle Research Report WR 94-23." Raleigh-Durham International Airport New Construction Acoustical Design Guide. September 30.

4.11 RECREATION

4.11.1 Introduction

This section discusses existing recreational resources and evaluates the potential impacts on recreation from implementation of the proposed vegetation management activities. The section also provides a discussion of the applicable federal, state, regional, and local regulations pertaining to recreation. The impacts associated with the proposed plan are compared with the thresholds of significance used by the University pursuant to CEQA.

Comments related to recreation received during the public scoping process included concerns about the following:

- Minimizing trail closures
- Whether trail improvements would occur
- Suggestion that recreation would be improved by opening view corridors

4.11.2 Environmental Setting

UCSF Recreational Facilities

The proposed plan would be implemented within the 61-acre Reserve, which is owned and maintained as an open space by UCSF. Recreational uses in the Reserve include a system of public, multi-use trails that are jointly maintained by UCSF and the Sutro Stewards. The Reserve serves hikers, trail runners, dog walkers, and cyclists (UCSF 2017a). Three new trails in the Reserve were approved for construction as part of the 2014 LRDP; the Clarendon Trail is currently under construction, and the Sunset and Christopher trails are in the design phase. The Clarendon Trail is expected to be completed in summer 2017.

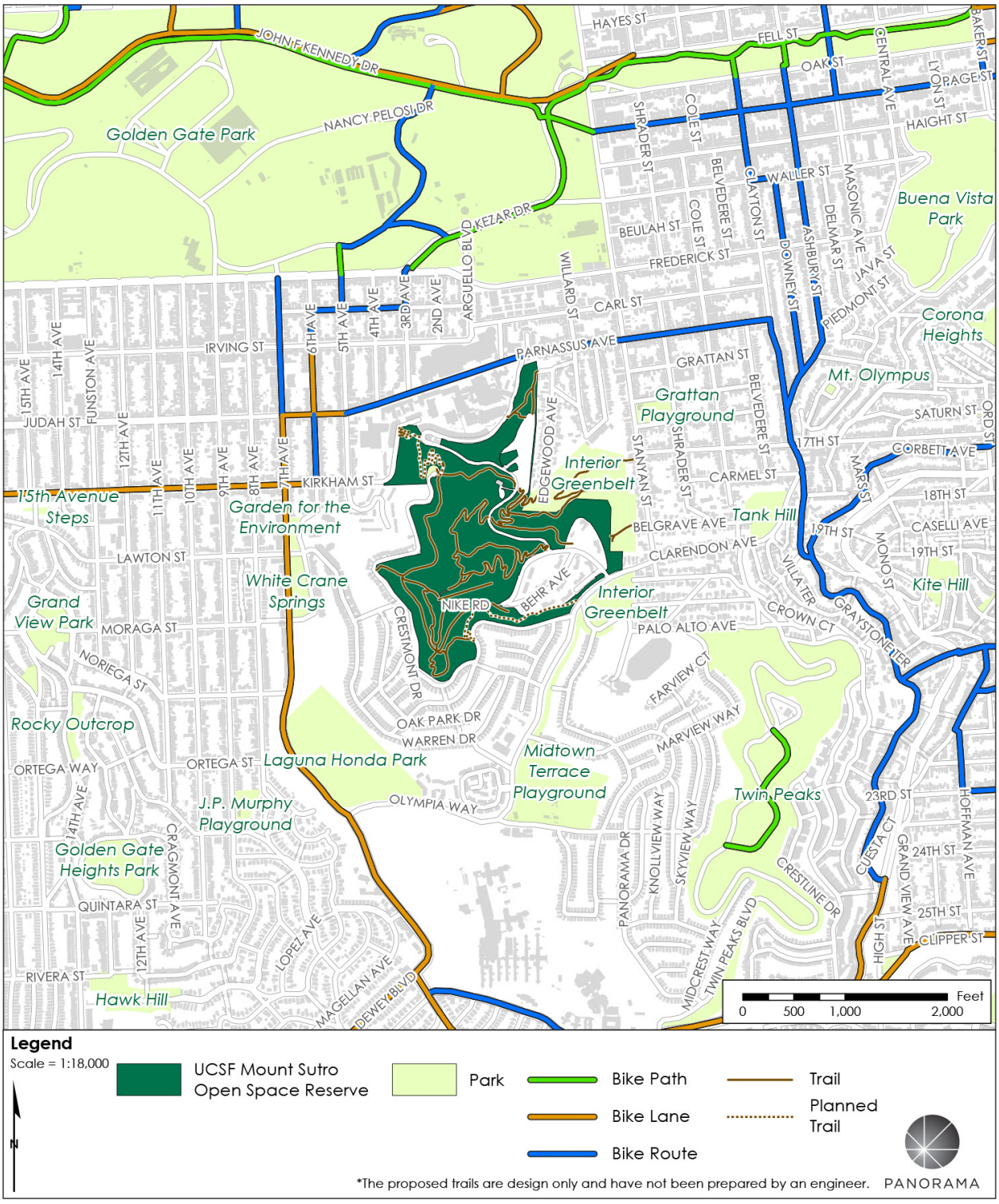
City and County of San Francisco Recreational Facilities

The Interior Greenbelt, managed by SFRPD, is a park located on Mount Sutro adjacent to the Reserve. The Interior Greenbelt features multi-use recreational trails for hikers, cyclists, trail runners, and dog walkers. Parks and trails within and near the Reserve are depicted in Figure 4.11-1.

Bicycle Access

Bicycle paths and lanes near the Reserve that are located along potential truck routes are described in Section 4.12: Transportation and Traffic and shown on Figure 4.11-1.

Figure 4.11-1 Recreational Resources in the Proposed Plan Area



Sources: (ESRI 2017, UCSF 2017b, SFMTA 2017)

4.11.3 Regulatory Considerations

University of California, San Francisco

UCSF 2014 LRDP

The 2014 LRDP includes the following community planning goal applicable to recreation:

A1. Enrich the quality of life in the community by extending access to UCSF-provided services, facilities, and activities to the wider community neighboring UCSF, as capacity and availability allow. These services could include childcare, public safety, meeting and event space, recreation and other support activities appropriate to the goals of UCSF and the community. UCSF will seek opportunities for partnering with other entities when appropriate, to provide these mutually desirable services, facilities and activities.

Federal, State, and Local

No federal, state, or local laws or regulations are relevant to the analysis of impacts on recreation for the proposed plan.

4.11.4 Significance Standards and Methodology

Significance Criteria

Impacts of the proposed plan on recreation would be considered significant if implementation of the plan would exceed the following standards of significance, in accordance with Appendix G of the State CEQA Guidelines and the UC CEQA Handbook:

1. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated; or
2. Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.

The IS for the proposed plan determined that the plan's effect on the increased use of existing neighborhood and regional parks should be evaluated in the EIR.

Issues Adequately Addressed in the Initial Study

The IS for the proposed plan found that implementation of the plan would not have an adverse physical effect on the environment from the construction of new facilities or expansion of existing facilities. Impacts from new or expanded recreational facilities are not discussed further in this section; however, the effects from alterations to the Reserve are discussed in Section 4.4: Biological Resources, Section 4.5: Cultural and Tribal Cultural Resources, Section 4.6: Geology and Soils, and Section 4.9: Hydrology and Water Quality.

Analysis Methodology

The impact analysis evaluates the potential for effects on recreational resources from trail closures, which could increase the use of other existing recreational facilities, and on physical deterioration of recreational resources from vegetation management activities.

The proposed plan describes three phases of vegetation management that would be implemented over a 20-year period. The analysis discusses how the impact on recreational resources would vary over the course of the 20-year plan.

4.11.5 Impacts

Impact Recreation-1: The proposed plan could increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.	**Significance Determination**
	Less than significant with mitigation

Vegetation Management Activities

Forest Treatments, and Management of Tree Risk and Defensible Space

Two trails, Quarry Road Trail and a portion of the East Ridge Trail, would be widened and used as access roads during forest treatments and management of defensible space. A third trail, the South Ridge Trail, would also be used for equipment access. Five landing areas in the Reserve would be cleared of vegetation and used to stage equipment and vegetation removed during vegetation management activities. The South Ridge Trail, North Ridge Trail, and Nike Road landing areas would be located adjacent to or on trails used by recreationists. Ground disturbance would occur during widening of trails discussed above for use as access roads, the use of trucks and heavy machinery along those trails, and the creation and use of the South Ridge Trail, North Ridge Trail, and Nike Road landing areas. These activities could cause physical deterioration of the trails and landing areas within the Reserve, which could result in a significant recreational impact. Trails would be maintained as part of the proposed plan; however, access roads require more intensive maintenance to effectively prevent erosion or other physical deterioration of the recreational facility. **MM Geology-1: Erosion Control Best Management Practices** requires UCSF to implement BMPs to limit ground disturbance, spread chips or slash on bare landing areas, avoid unnecessary cut and fill, and recontour access roads and landing areas after completion of the plan. Planned trail maintenance and the implementation of **MM Geology-1: Erosion Control Best Management Practices** would reduce the impact to less than significant. **MM Aesthetics-1: Sowing at Landing Areas**, which requires sowing of native grasses or other fast-growing plants at the South Ridge Trail, North Ridge Trail, and Nike Road landing areas when not in use, would further minimize the impact from deterioration of the Reserve as a recreational facility.

Trail closures would be required where trees are felled for public safety. The widening and use of trails as access roads would also require temporary trail closures; however, closure of a few trails within the Reserve is not expected to cause an increase in use of other facilities and parks

such that a significant deterioration of those facilities would occur. Impacts from trail closures in the Reserve would be less than significant.

Native Plant Restoration
Native plant restoration areas would be dispersed throughout the Reserve. Non-native plants would be removed by hand or with equipment such as weed whackers prior to planting natives. No trail closures would be required to remove and plant plants. Native plant restoration is intended to enhance the Reserve by increasing the biodiversity of understory plants; the Reserve would not suffer substantial physical deterioration from native plant restoration. Impacts from native plant restoration would be less than significant.

Maintenance of Trails and Public Access
As part of the proposed plan, UCSF would actively maintain vegetation along trails to allow for passage of bicycles and people. Downed logs or logs felled during forest treatments would be used to define and support trails by placing logs on the downhill side, where necessary. The placement of downed logs is intended to enhance trails within the Reserve and prevent physical deterioration (i.e., erosion) of trails. Temporary trail closures would be required while logs are being placed; however, closures would be short-term (i.e., a couple of hours) and would not significantly impair public use of the Reserve. Impacts from maintenance of trails would be less than significant.

Comparison of Impacts Across Phases

Phase I
During Phase I, trails would be widened for access, temporary landings areas would be created, and dead, dying, and hazardous tree removal would be the most extensive of the three phases. These activities would result in ground disturbance and temporary trail closures, which could result in substantial physical deterioration of the Reserve and significantly impact the use of the Reserve, as previously discussed. **MM Geology-1: Erosion Control Best Management Practices** requires UCSF to implement BMPs to properly create and maintain access roads and landing areas. The implementation of **MM Geology-1: Erosion Control Best Management Practices** would reduce the impacts from trail closures and ground disturbance to less than significant. **MM Aesthetics-1: Sowing at Landing Areas**, which requires installation of benches and/or picnic tables at South Ridge Trail, North Ridge Trail, and Nike Road landing areas when not in use, would further minimize the impact from deterioration of the Reserve as a recreational facility.

Phase II
In Phase II, trails would continue to be used as access roads, landing areas would continue to be used, and trail closures would continue to be implemented for public safety. The frequency and intensity of tree removal activities would be lesser in Phase II than in Phase I; however, impacts from ground disturbance and temporary trail closures would still be potentially significant. The implementation of **MM Geology-1: Erosion Control Best Management Practices** would reduce the impacts from trail closures and ground disturbance to less than significant. **MM Aesthetics-1: Sowing at Landing Areas** would further reduce the impact.

By the end of Phase II, UCSF hopes to provide improved access and enhanced visitor experience of recreational trails and parks. The enhancement of the trail system in the Reserve would be a beneficial impact on the Reserve and for the users that frequent the Reserve.

Phase III

The intensity and frequency of vegetation management activities would continue to decrease in Phase III. Where trail closures are required and ground disturbance along trails and landing areas continues to occur, impacts could be potentially significant. The implementation of **MM Geology-1: Erosion Control Best Management Practices** would reduce the impacts from trail closures and ground disturbance to less than significant. **MM Aesthetics-1: Sowing at Landing Areas** would further reduce the impact.

Impact Recreation-2: The proposed plan could result in significant impacts on recreational resources in combination with past, present, and probable future development in the cumulative analysis study area.	**Significance Determination**
	No contribution

Geographic Scope

The geographic extent for the analysis of cumulative impacts associated with recreation includes areas within 1 mile of the proposed plan area. A geographic distance of 1 mile is appropriate because neighbors are expected to use recreational facilities in proximity to their community. A 1-mile-area surrounding the proposed plan includes the parks that are most likely to be used by the same community that uses the parks affected by the proposed plan.

Cumulative Analysis

Mount Sutro Reserve Improvements (#9) includes the construction of three new trails within the Reserve. SNRA Management Plan (#17) would involve closures of social trails, also referred to as undesignated trails, and construction of new trails in several of the management areas, including the Interior Greenbelt. Minor short-term cumulative impacts could occur due to use of heavy machinery diminishing recreational experiences. Recreational experiences within the Reserve and SNRA Management Plan sites would improve in the long-term. Construction of cumulative projects within recreational facilities would not restrict use of those facilities and would not cause significant physical deterioration of other recreation areas. The resulting cumulative impact would be less than significant.

4.11.6 Mitigation Measures

No mitigation specific to Recreation are required. MM Geology-1 and MM Aesthetics-1 would otherwise reduce Recreational impacts to less-than-significant.

4.11.7 References

ESRI. 2017. "Online GIS Vector and Raster Data."

San Francisco Municipal Transportation Agency (SFMTA). 2017. "SFMTA Bikeway Network GIS dataset." February 18.

University of California, San Francisco (UCSF). 2017a. Mount Sutro Open Space Reserve. Accessed March 21, 2017. https://www.ucsf.edu/about/locations/mount-sutro-open-space-reserve.

—. 2017b. "Mt Sutro Open Space Preserve GIS data."

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4.12 TRANSPORTATION AND TRAFFIC

4.12.1 Introduction

This section discusses the existing transportation and traffic conditions, and evaluates the potential impacts on transportation and traffic from implementation of the proposed vegetation management activities. This section also provides discussion of the applicable federal, state, regional, and local regulations that pertain to transportation and traffic. The impacts associated with the proposed plan are compared with the thresholds of significance used by the University pursuant to CEQA.

No comments related to transportation and traffic were received during the public scoping process.

4.12.2 Environmental Setting

Roadway Facilities

Regional Freeways

Interstate 80 (I-80) via the San Francisco-Oakland Bay Bridge, State Route 1 (SR-1)/19th Avenue via the Golden Gate Bridge, and U.S. Highway 101 (US-101) and Interstate 280 (I-280) via the San Francisco Peninsula provide regional access to the UCSF Parnassus Heights campus site and the Reserve.

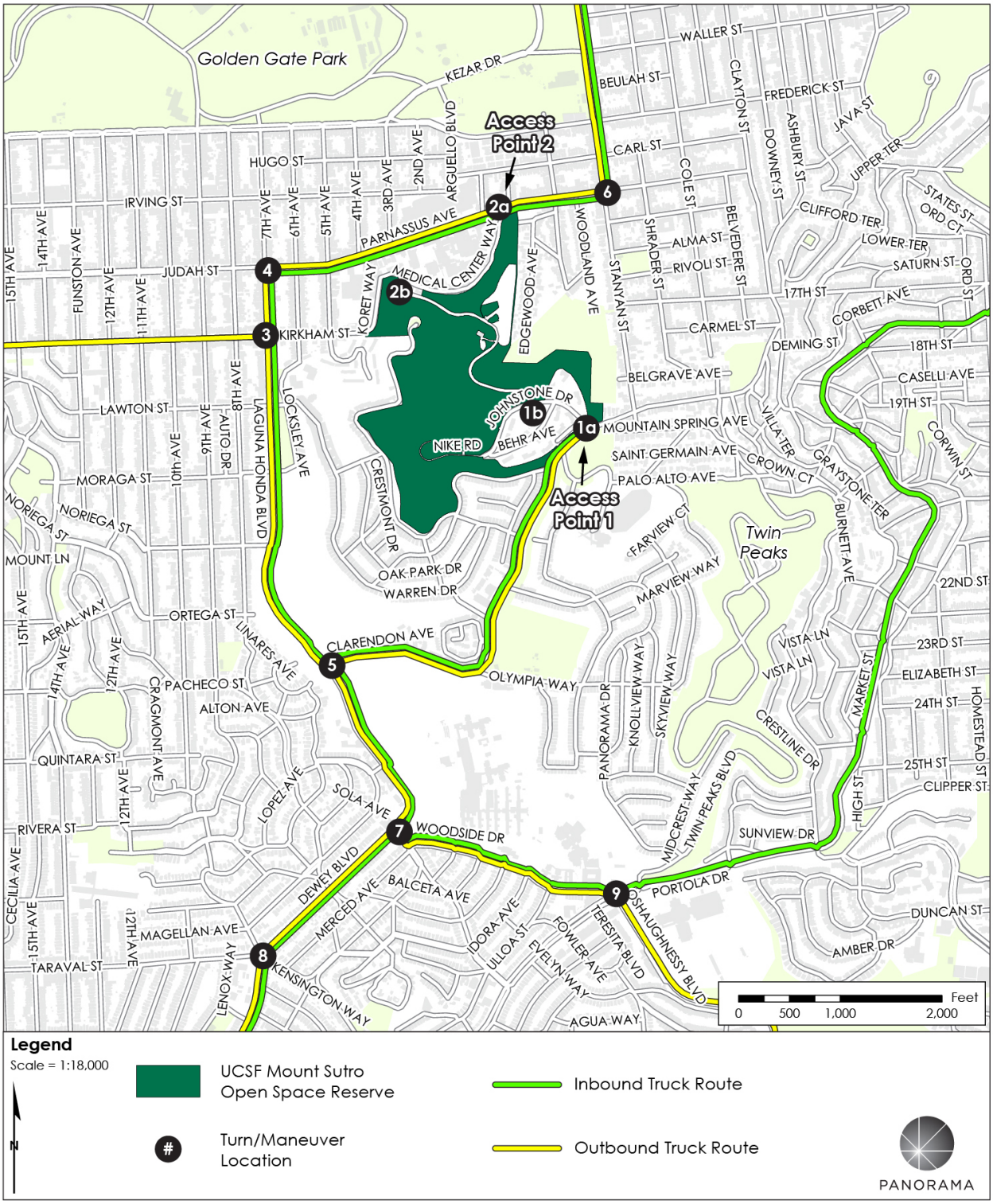
Local Roadways

A network of local roadways that include urban city streets and private campus streets would be used to enter the Reserve. Trucks would enter the UCSF Parnassus Heights campus site from either the south at Johnstone Drive via Clarendon Avenue (herein referred to as Access Point 1) or the north at Medical Center Way via Parnassus Avenue (herein referred to as Access Point 2). These two access points are shown on Figure 4.12-1. Potential inbound and outbound truck routes between regional freeways and the two access points were identified in collaboration with UCSF staff using the following selection criteria considerations for large trucks:

- Use major arterials or secondary arterials designated in the City and County of San Francisco's General Plan
- Avoidance of streets with weight restrictions per San Francisco Municipal Transportation Agency (SFMTA) Transportation Code Section 501
- Avoidance of streets with transit lines or designated bicycle lanes
- Avoidance of residential streets
- Avoidance of streets with steep grades
- Avoidance of streets with physical constraints such as a tight turning radius
- Routes that minimized the number of right-hand turns needed

Roadways that may be used as truck routes in the study area are identified on Figure 4.12-1 and summarized in Table 4.12-1. A complete list of inbound and outbound truck routes between regional freeways and the Reserve can be found in Appendix 4.12.

Figure 4.12-1 Truck Routes in the Study Area



Sources: (ESRI 2017, SFGIS 2011, UCSF 2017, CHS Consulting Group 2017a, CHS Consulting Group 2017b)

Table 4.12-1 Characteristics of the Roads along Truck Routes for the Proposed Plan

Roadway	Lanes	Public Transit Lines [a]	Bicycle Facilities [b]
City Streets			
Clarendon Avenue	4	36	–
7th Avenue	2	43, 44	Class II
Laguna Honda Boulevard	2	36, 43, 44	Class II (separated)
Woodside Avenue	4	36, 44, 52	Class III
Portola Drive	4	37, 48, 52	Class II (separated)
Market Street	4	33, 37	Class III
O'Shaughnessy Boulevard	4	44	Class I
Kirkham Street	2	–	Class II
Judah Street/Parnassus Avenue	2	6, 43, UCSF Shuttles	Class III
Stanyan Street	2	7/7R, 7X	–
Dewey Boulevard	2	–	Class II
Claremont Boulevard	2	–	Class II
Campus Streets			
Johnstone Drive	2	–	–
Medical Center Way	2	UCSF Bronze Shuttle	–
Nike Road	1	–	–

Note:

[a] The classes of bikeways (Class I, Class II, and Class III) are described in Table 4.12-3 below.

Sources: (SFMTA 2016a, SFMTA 2016b)

Traffic Volume

Traffic volumes in San Francisco vary significantly depending on the design and function of the roadway, and the time of day. Freeways and major roadways (i.e., major arterials and secondary arterials) are designed to accommodate greater traffic volume; traffic volume on smaller collector and residential streets is substantially less. Traffic volume is typically greatest during weekday peak commute periods between 7:00 am and 9:00 am ("AM Peak") and 4:00 pm and 7:00 pm ("PM Peak"). Traffic volumes at major intersections near the Reserve are listed in Table 4.12-2.

Parking Facilities

There are several UCSF-managed off-street parking facilities (i.e., garages and surface lots) that serve the Parnassus Heights campus site. UCSF surface parking lots located immediately adjacent to the Reserve could be used as landing areas, including the Surge lot, Woods lot, and Aldea Center lots. The occupancy rate of the parking facilities is about 88 percent between

Table 4.12-2 Traffic Volumes at Major Intersections near the Reserve

Intersection	Direction	AM Peak Hour [a]	PM Peak Hour [a]
Judah Street and 7th Avenue	E-W	672	752
	N-S	1,228	1,260
Parnassus Avenue and Medical Center Way	E-W	775	801
	N-S	71	57
Parnassus Avenue and Stanyan Street	E-W	666	613
	N-S	926	819
Kirkham Street and 7th Avenue	E-W	547	673
	N-S	1,436	1,352
Clarendon Street and Laguna Honda Boulevard [b]	E-W	329	360
	N-S	2,317	2,229

Note:

[a] The traffic counts represent the volumes during the peak 60-minute period of the AM Peak and PM Peak commute periods (7:00 to 9:00 a.m. and 4:00 to 6:00 p.m.).

[b] All traffic counts were collected in 2013 as part of the LRDP Traffic Impact Study, except the counts for Clarendon Street and Laguna Honda Boulevard intersection which were collected by CHS Consulting on March 1, 2017. The LRDP Traffic Impact Study (Section 2.3.1.3) states that the traffic counts collected in 2013 showed that traffic volumes on Parnassus Avenue have remained mostly unchanged since 2007. It is therefore assumed that existing traffic volume in the vicinity would be similar to 2013 levels and not substantially greater.

Sources: (SFMTA 2014, Fehr & Peers and Adavant Consulting 2014, CHS Consulting Group 2017c)

10:00 and 2:00 pm, and about 50 percent between 6:00 pm and 8:00 pm (Fehr & Peers and Adavant Consulting 2014). The parking spaces in these lots are reserved for UCSF staff and students, and are available by permit only.

Public Transit Network

San Francisco Municipal Railway

San Francisco Municipal Railway (Muni) provides transit service in San Francisco, including bus, light rail, cable car, and electric streetcar lines. Muni operates numerous surface rail and bus lines on roadways identified as potential truck routes (refer to Table 4.12-1).

Muni lines near the Reserve generally operate on both weekdays and weekends between approximately 6:00 am and midnight, depending on the line. The frequencies of each line vary between approximately 7 and 30 minutes during weekdays and between 12 and 30 minutes on weekends (SFMTA 2016a).

UCSF Shuttle System

The UCSF shuttle system provides transportation service for staff and students between UCSF facilities and affiliated hospitals in San Francisco. The Gold, Blue, Black, Tan, Purple, Grey, Lime, Pink, and VA-Parnassus shuttles provide service to and from the UCSF Parnassus

Heights campus site via stops on Parnassus Avenue; these shuttles generally operate on weekdays only between approximately 5:30 am and 8:40 pm. The Bronze shuttle provides service for the Parnassus Heights campus site only between facilities on Parnassus Avenue and Aldea Housing on Behr Drive via stops along Medical Center Way. The Bronze shuttle operates on weekdays only from approximately 6:45 am to 6:49 pm at a 20-minute frequency. The Westbound and Eastbound Shuttles also provide daily on demand shuttle service within 0.5 mile of the Parnassus Heights campus site between approximately 3:45 pm and 1:00 am. UCSF shuttle lines and stops are shown on Figure 4.12-2.

Pedestrian Facilities

Pedestrian traffic on roadways surrounding the Reserve is most concentrated on Parnassus Avenue where most of the Parnassus Heights campus site and medical buildings are located; however, nearly every local roadway (i.e., city and campus streets) supports some form of pedestrian access, and most include pedestrian facilities such as sidewalks, crosswalks, curb ramps, and pedestrian signals that support greater levels of pedestrian traffic.

Multiple signalized crosswalks are located on Parnassus Avenue between Medical Center Way and 4th Avenue. The Traffic Impact Study conducted for the 2014 LRDP documented an average of 26,000 pedestrian crossings on Parnassus Avenue between 7:00 am and 7:00 pm (Fehr & Peers and Adavant Consulting 2014). Substantially lower levels of pedestrian traffic occur on other roadways near the Reserve, including campus streets.

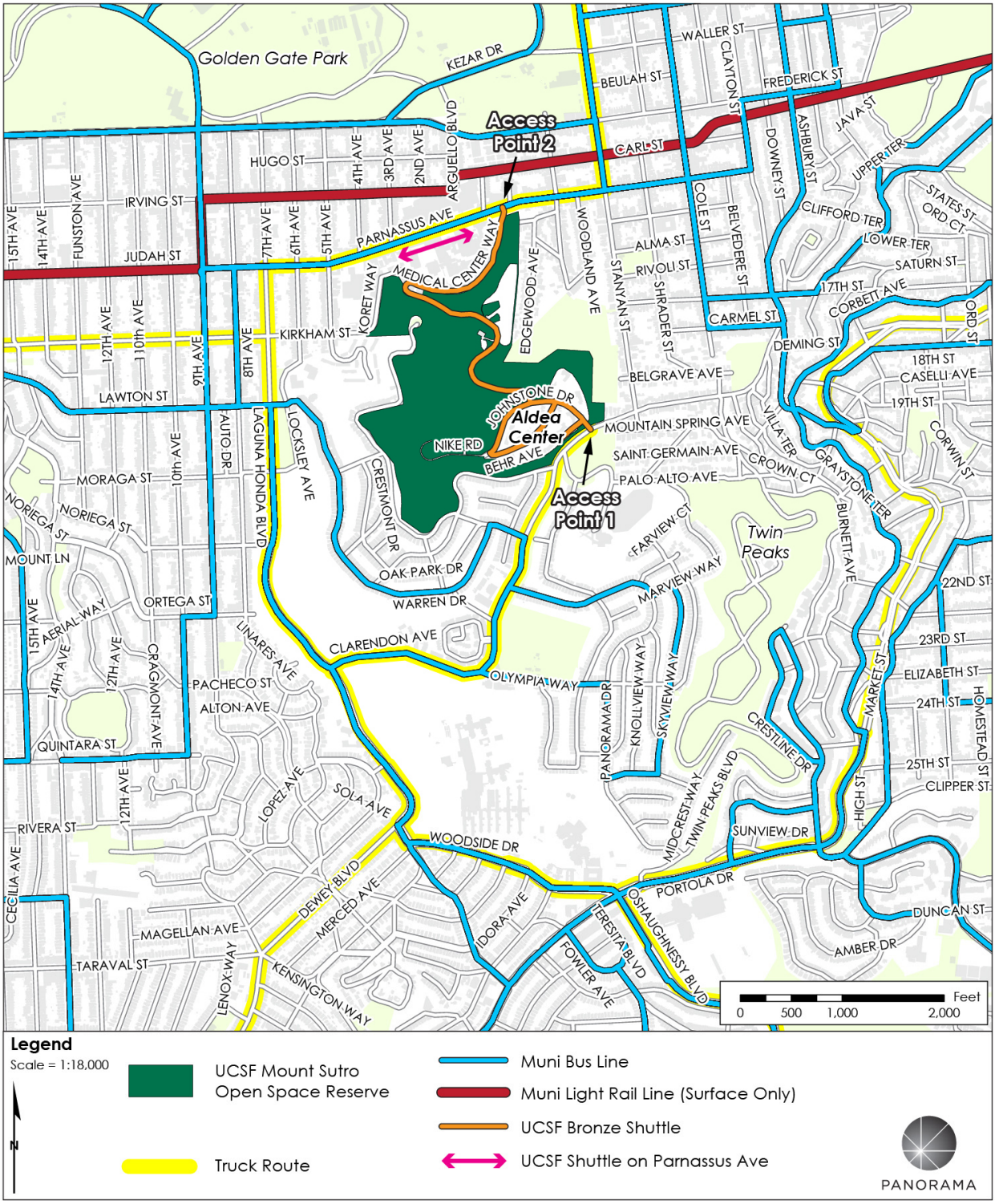
Paved pathways and stairways provide pedestrian-only access from roadways surrounding the Reserve. Paved stairways near the Reserve include Oakhurst Stairway and stairways on Blairwood Lane, Glenhaven Lane, Farnsworth Lane, and between Medical Center Way and the Surge parking lot. One partially paved pathway is located on the eastern side of Medical Center Way between Johnstone Drive and the Environmental Health & Safety building. A guard rail separates the pathway from vehicle traffic on Medical Center Way.

Public access into the Reserve is provided primarily through a network of unpaved multi-use trails that support recreational activities including hiking, running, and biking. In addition to the existing trails, three new trails were proposed as part of the 2014 LRDP (e.g., Sunset Trail, Christopher Trail, and Clarendon Trail). These trails are either under construction or will be constructed in the next few years as part of the 2014 LRDP and were analyzed in the 2014 LRDP EIR. Trails in the Reserve connect to trails in the City's Interior Greenbelt east of the Reserve. Existing and proposed trails in the Reserve are shown on Figure 4.12-3.

Bicycle Facilities

Designated bicycle facilities near the Reserve are shown on Figure 4.12-4. The types of designated bicycle facilities in San Francisco are described in Table 4.12-3; however, nearly every local roadway (i.e., city and campus streets) supports some form of bicycle access, regardless of the steep topography in the area. Designated bicycle facilities are also located along potential truck routes as listed in Table 4.12-1.

Figure 4.12-2 Surface Transit in the Study Area



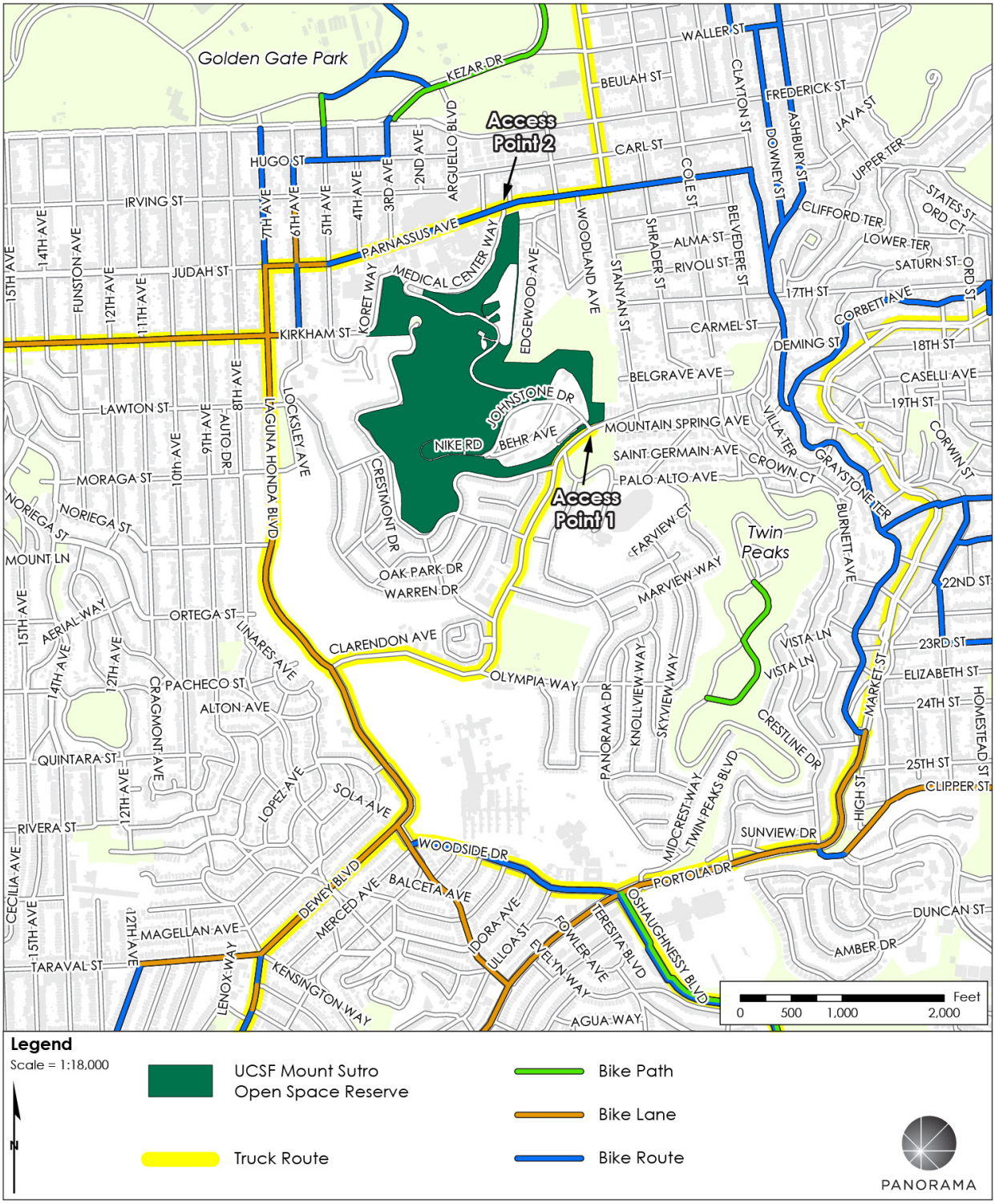
Sources: (ESRI 2017, UCSF 2017, SFMTA 2017, City and County of San Francisco 2011, SFMTA 2016c)

Figure 4.12-3 Pedestrian Facilities and Circulation at the Parnassus Heights Campus



Source: (UCSF 2014)

Figure 4.12-4 Bicycle Facilities in the Study Area



Sources: (ESRI 2017, UCSF 2017, SFMTA 2017, City and County of San Francisco 2011)

Table 4.12-3 Designated Bicycle Facilities

Bicycle Facilities	Class	Description
Bicycle Paths (Separated)	Class I	Class I bicycle paths provide a completely separated right-of-way for the exclusive shared use of cyclists and pedestrians. These facilities are off-street and minimize cross-flow traffic, but they can be adjacent to an existing roadway.
Bicycle Lanes (Separated/ Unseparated)	Class II	Class II bicycle lanes provide a striped, marked, and signed bicycle lane for bicycle travel. Separated bicycle lanes are buffered from adjacent vehicular lanes.
Bicycle Routes (Unseparated)	Class III	Class III bicycle routes provide a shared travel lane marked and signed for shared use with motor vehicle traffic. These facilities may or may not be marked with white lines in the lane ("sharrows") to emphasize that the roadway space is shared.

Source: (Fehr & Peers and Adavant Consulting 2014)

Emergency Services

Emergency vehicle access to the Reserve is currently provided along Parnassus Avenue, Clarendon Avenue, and campus roadways. The nearest San Francisco Fire Department (SFFD) fire stations are Fire Station No. 12 located at 1145 Stanyan Street (about 0.4 mile north of the Reserve) and Fire Station No. 20 located at 285 Olympia Way (about 0.7 mile south of the Reserve).

The nearest San Francisco Police Department (SFPD) Police Station is located at 1899 Waller Street (about 0.5 mile north of the project site). Through a cooperative agreement, the UC Police Department (UCPD) is in charge of law-enforcement duties within the UCSF Parnassus Heights campus site and provides assistance to SFPD within a one-mile radius of Parnassus Heights. UCPD for the Parnassus Heights campus site is located at 500 Parnassus Avenue.

The UCSF Medical Center provides emergency medical services to the community at large. The loading area located on Parnassus Avenue in front of Medical Building 1 (about 550 feet west of Medical Center Way) provides direct access to the emergency room via Parnassus Avenue.

UCSF has designated 18 Emergency Assembly Areas scattered around the UCSF Parnassus Heights campus site where people gather in the event of an emergency requiring a major evacuation, such as an earthquake (UCSF Police 2017). Emergency Assembly Areas for the Parnassus Heights campus include courtyards, parking lots, streets, and sidewalks adjacent to buildings.

4.12.3 Regulatory Considerations

University of California, San Francisco

UCSF 2014 LRDP

The 2014 LRDP includes the following objectives and guidelines that are relevant to transportation and traffic impacts for the proposed plan:

- Regularly monitor UCSF-generated traffic to ensure that traffic volumes do not increase beyond what is projected in the LRDP EIR; if it does, mitigate per LRDP EIR measures.
- Reduce truck deliveries to campus sites, and reduce the impact of such deliveries on neighbors.
- Prioritize scarce parking for use by patients and essential healthcare providers at those sites with Medical Center facilities, and keep parking-space-to-building-space ratios low.
- Restore the Surge, Woods, and Environmental Health and Safety footprint areas to open space, and add to the Reserve; the existing adjacent surface parking lots and Annex building would remain.
- Continue to manage the Mount Sutro Open Space Reserve as permanent open space; maintain existing trails and create new/restored trails.

The 2014 LRDP identifies one measure related to transportation and traffic. The relevant parts of the measure are considered part of the plan and are shown here. References to "construction" in this measure can be seen as equivalent to "activity" as it pertains to the plan. While plan activities are not technically construction, similar types of equipment and methods (e.g., grading, trucking) are employed to carry it out. These measures are considered part of the plan and are shown here.

TRAF-LRDP-1: Construction Coordination and Monitoring Measures.

Traffic Control Plan for Construction – In order to reduce potential conflicts between construction activities and pedestrians, transit and autos during construction activities at the four campus sites, UCSF shall require construction contractor(s) to prepare a traffic control plan for major phases of plan construction (e.g. demolition, construction, or renovation of individual buildings). UCSF and its construction contractor(s) will meet with relevant City agencies to coordinate feasible measures to reduce traffic congestion, including temporary transit stop relocations (e.g. Parnassus Avenue (Parnassus Heights), Sutter Street (Mount Zion), etc.) and other measures to reduce potential traffic and transit disruption and pedestrian circulation effects during major phases of construction of the 2014 LRDP Plans. For any work within the public right-of-way, the contractor would be required to comply with the City of San Francisco's Regulations for Working in San Francisco Streets (the Blue Book), which establish rules and permit requirements so that construction activities can be done safely and with the least possible interference with pedestrians, bicyclists, transit, and vehicular traffic. In addition to the regulations in the Blue Book, UCSF shall require the construction contractor(s) to comply with all state and federal codes, rules and regulations.

In the event that the construction timeframes of the major phases and other development plans adjacent to UCSF overlap, UCSF shall coordinate with City Agencies through the Transportation Advisory Staff Committee (TASC) and the adjacent developers to minimize the severity of any disruption to adjacent land uses and transportation facilities from overlapping construction transportation impacts. UCSF, in conjunction with the adjacent developer, shall propose a construction traffic control plan that includes measures to reduce potential construction traffic conflicts, such as staggering start and end times, coordinated material drop offs, collective worker parking and transit to job site and other measures.

Federal

No federal regulations are relevant to the analysis of transportation and traffic impacts for the proposed plan.

State

California Department of Transportation

The California Department of Transportation (Caltrans) has jurisdiction over the state highway system including those highways located in San Francisco (e.g., I-80, I-280, SR-1, and US-101). Transportation permits are required for operating trucks that exceed certain size and weight limits, depending on the number of axels and their width and spacing.

Log trucks are exempt from normal weight limits per California Vehicle Code Section 35552, which allows the total weight of logging vehicles to reach 35,500 pounds on one set of tandem axels and 69,000 pounds on two sets of tandem axels. Weight-exempted log haulers may not operate on highways identified in the National Network without a Caltrans transportation permit. The highway segments identified in the National Network include I-80 between the US-101/I-80 Interchange and Sacramento/Placer County line, US-101 between the San Mateo/San Francisco County Line and US-101/I-80 Interchange, and I-280 between the San Mateo/San Francisco County Line and Brannan Street in San Francisco. Caltrans transportation permits may be required for logging trucks to haul logs from the Reserve on state highways if they exceed these parameters or cannot avoid traveling on highways in the Nation Network.

Local

San Francisco Municipal Transportation Agency

The SFMTA's Transportation Code Section 501 provides restricted traffic streets for vehicles weighing more than three tons or nine tons on select residential streets around the City. Parking commercial vehicles with gross weight over 10,000 pounds is also restricted in areas zoned for residential use.

In addition, SFMTA requires an Extralegal Truck Permit for a vehicle travelling on local streets for any distance within the City of San Francisco if the overall dimensions and/or weight exceed 8.5 feet in width, 65 feet in length, 14 feet in height and up to 34,000 pounds in weight on any

one axle. Permits for extralegal vehicles traveling in or through San Francisco are also subject to the following conditions:

- Provide one pilot car or flag person for each vehicle exceeding 12 feet in width or 90 feet in length.
- Install a slider or skidding board, when deemed necessary by SFMTA, for any vehicle over 15.5 feet in height when traveling on certain designated streets.
- Prior to the move, drive the route to locate any turning and/or height obstructions.
- Comply with all the applicable requirements and restrictions stipulated in the Caltrans Transportation Permit.
- Extralegal weight moves are not permitted across the China Basin bridges on 3rd street and 4th Street.
- Moves are allowed Monday through Friday, between the hours of sunrise and sunset excluding the peak traffic hours (7:00 am to 9:00 am and 4:00 pm to 6:00 pm), unless otherwise permitted.

4.12.4 Significance Standards and Methodology

Significance Criteria

Impacts of the proposed plan on transportation and traffic would be considered significant if implementation of the plan would exceed the following standards of significance, in accordance with Appendix G of the State CEQA Guidelines and the UC CEQA Handbook:

1. Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including, but not limited to, intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;
2. Conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;
3. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
4. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
5. Result in inadequate emergency access;
6. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities; or
7. Exceed the applicable LRDP EIR standard of significance by causing substantial conflict among autos, bicyclists, pedestrians, and transit vehicles.

Implementation of the plan could substantially increase hazards from truck traffic, causing a substantial conflict with automobiles, bicyclists, pedestrians, and transit vehicles. Implementation of the plan could also result in inadequate emergency access. These topics are analyzed in this section.

Issues Adequately Addressed in the Initial Study

The IS for the proposed plan found that implementation of the plan would have (1) a less than significant impact on an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, (2) a less than significant impact on an applicable congestion management program, (3) no impact on air traffic, and (4) no impact on adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, and would not otherwise decrease the performance or safety of such facilities. These issues are not discussed further in this section.

Analysis Methodology

This impact assessment evaluates the potential for effects on traffic safety due to the presence of large vehicles on public roadways, a potential obstruction to emergency access, and potential conflicts with other modes of transportation on public roadways. The study area for transportation facilities addressed in the section is focused on regional freeways and the area near the Reserve bounded by 12th Avenue to the west, Portola Avenue to the south, Market Street to the east and Haight Street to the north.

Effects during implementation of the proposed plan would be for the 20-year plan implementation period. The proposed plan would involve intermittent impacts on traffic when vegetation management is occurring but would not add a permanent new source of traffic to the roadway networks in the same manner as, for example, a development project.

4.12.5 Impacts

	Significance Determination
Impact Traffic-1: The proposed plan could substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment). **and** **Impact Traffic-2: The proposed plan could exceed the applicable LRDP EIR standard of significance by causing substantial conflict among autos, bicyclists, pedestrians, and transit vehicles.**	**Less than significant with mitigation**

Vegetation Management Activities

Overview

Vegetation management activities in the Reserve would require the transport of people and equipment to the site, as well as large haul vehicles to move chips and logs off the Reserve for disposal outside of the city limits. Implementation of the plan would generate up to a maximum

of approximately 49 daily vehicle and truck trips[1] (two-way[2]); however, the average daily trips would likely be much lower. Table 4.12-4 lists the maximum daily vehicle and truck trips that would occur during annual vegetation management activities. Regular work hours would generally last from 7:00 am to 5:00 pm, Monday through Friday. As shown in Table 4.12-4, it is assumed that up to 4 truck trips would occur during peak commute periods, when traffic congestion would be greatest.

Table 4.12-4 Maximum Daily Vehicle and Truck Trips

Vehicle/Purpose	Daily Vehicle Trips (Two-Way)	AM/PM Peak (Two-Way)
Worker Vehicles (Commuting)	35	18
Log Trucks (Hauling) [a]	8	1
Chip Vans (Hauling) [a]	4	1
Water Truck	1	1
Equipment Delivery [b]	1	1
TOTAL	**49**	**22**

Notes:

[a] Log trucks and chip vans would be used for hauling vegetation material from the Reserve. This table provides values for the maximum daily log truck and chip van haul trips (up to a total of 12 trips per day); however, such occasions would not occur regularly. It is anticipated that haul trips would be limited to a total of approximately 36 individual trips per year (where 0 to 12 trips could occur in any one day) based on the estimated volume of vegetation material that would be removed from the Reserve on an annual basis.

[b] Equipment delivery and removal are expected to occur during the mobilization and demobilization periods only. For analysis purposes, it is assumed that one equipment delivery truck trip would occur on a daily basis.

Workers commuting in passenger vehicles and pick-up trucks would access the Reserve via Access Points 1 or 2 using any public roadway facilities. Up to 35 daily worker trips on any roadways would not substantially increase traffic hazards or conflict with transportation facilities (roadways, parking facilities, transit network, pedestrian facilities, or bike facilities). Passenger vehicles are compatible with the roadways. The number of passenger vehicles accessing the Reserve during peak commute periods would be about 18, or one vehicle every two minutes, in a worst-case scenario. The use of passenger vehicles to access the site and park on-site would not create a significant transportation hazard because the travel would be compatible with existing road uses.

[1] The 49 daily vehicle and truck trips used in this analysis includes haul trips, worker commute trips, and all other anticipated daily truck trips associated with the proposed plan.

[2] A two-way trip is a round trip.

Workers operating large trucks, including equipment delivery trucks, log trucks, chip vans, and water trucks, would access the Reserve via Access Points 1 or 2 using the potential truck routes listed in Appendix 4.12. The use of large trucks (e.g., trucks that are greater than approximately 55 feet in length) during vegetation management activities could increase traffic hazards because large trucks take up a greater area in roadways and have larger blind spots than typical passenger vehicles. Large trucks also have various maneuverability and stopping limitations, particularly when hauling heavy loads, and can slow traffic movement when turning due to their large turning radii. Operating large trucks on busy urban roadways would increase the risk and severity of traffic hazards and conflicts with transportation facilities. The potential for traffic hazards and conflicts with transportation facilities from large truck operation would be the greatest during peak commute periods when traffic volume is generally greater for all modes of transportation.

The impact from operating large trucks on regional freeways and several major roadways identified in Appendix 4.12 would be less than significant because these roadways are well-established trucking routes with relatively gradual turns and the roadways support high levels of traffic volume. Large truck trips on such roadway facilities would not substantially increase traffic hazards.

A potentially significant impact could occur at multiple locations where additional space would be required to accommodate the large turning radii of large trucks. Intersections and sharp turns where additional space would be required for trucks to maneuver, such as the use of more than one traffic lane, are identified in Table 4.12-5 and shown on Figure 4.12-1. Turning movements are analyzed at each location in the table, and the significance of potential hazards with other vehicles, transit facilities, bicycles facilities, and pedestrian facilities are discussed below. Figures illustrating truck turning movements at each location are provided in Appendix 4.12.

Traffic Hazards for Other Vehicles

The turning movements of large trucks would increase traffic hazards for other vehicles at almost all of the locations identified in Table 4.12-5, as well as within the Surge and Woods parking lots where landing areas would be located. Large trucks would require the use of more than one lane and/or the on-street parking lane to maneuver, which would temporarily increase the risk of vehicle accidents. Findings from the turning movement analysis for large trucks indicate that trucks over 55 feet in length would not be able to make the right turn at Laguna Honda Boulevard and Clarendon from the designated right turn lane. Trucks over 55 feet would have to start the turn from the bike lane or the through-traffic lane to the left of the right turn only lane. Vehicles in the right turn only lane could get clipped if turning on the inside lane while a heavy truck is turning from the outside lane. Increasing traffic hazards and the risk of vehicle accidents would be a potentially significant impact.

UCSF is obligated to implement the components of **TRAF-LRDP-1: Construction Coordination and Monitoring Measures** that are relevant to the plan activities, as part of the 2014 LRDP. **TRAF-LRDP-1: Construction Coordination and Monitoring Measures** requires UCSF to

prepare a Traffic Control Plan (TCP) that ensures compliance with the City of San Francisco's Regulations for Working in San Francisco Streets (the Blue Book) and to coordinate with relevant City agencies (e.g., SFMTA) to define feasible measures to reduce traffic hazards. Impacts would remain significant, however, because **TRAF-LRDP-1: Construction Coordination and Monitoring Measures** specifies that the TCP would apply to demolition, construction, or renovation of individual buildings, which does not quite describe the activities proposed in the plan. **MM Traffic-1: Traffic Control Plan Special Provisions** requires that the TCP specifically address reducing turning hazards for other vehicles at Laguna Honda Boulevard and Clarendon Avenue; at Parnassus Avenue and Stanyan Street; and at Laguna Honda Boulevard, Dewey Boulevard, and Woodside Road. Measures could include having a flagger positioned at those intersections to direct traffic when the trucks pass through or a pilot vehicle.

Impacts could still be significant due to the level of traffic on these roadways during peak commute periods. During times of high congestion and high traffic volume, trucks would have greater difficulty finding the time and space needed to safely make the turns. To specifically address these traffic hazards from incompatible uses, **MM Traffic-2: Prohibit Large Truck Trips During Peak Commute Periods** would also be implemented at all intersections. This measure requires that all large haul trucks only operate outside of peak commute periods. For several intersections, as shown in Table 4.12-5, large vehicle turns would still require maneuvering in on-coming traffic lanes or the use of multiple lanes to make right turns; if these maneuvers are performed when fewer vehicles are on the streets, truck drivers can take the time and space needed to make the turns safely.

To address specific hazards for vehicles and trucks at the intersection of Laguna Honda Boulevard and Clarendon Avenue, **MM Traffic-3: Truck Turn Restriction** prohibits trucks over 55 feet in length from operating at this intersection at any time and in either direction. Impacts on vehicle safety would be less than significant with implementation of mitigation.

Traffic Hazards for Transit Facilities

Muni bus and UCSF shuttle routes, including associated stops, are located at all but three of the turning locations identified in Table 4.12-5. The turning movements of large trucks would increase traffic hazards for transit vehicles in the same way as described for other vehicles; however, given the infrequency of large trucks on the streets, the likelihood for conflict is low. Most transit stops are located at the intersections where trucks could overrun the shoulder or curb. Hazards for transit facilities would be less than significant for most stops.

Two stops of the UCSF Bronze shuttle route along Medical Center Way could be encroached upon during turns at Parnassus Avenue and Medical Center Way and at Medical Center Way at the UCSF Environment Health & Safety (EHS) Building. Traffic hazard impacts at these stops could be significant. To minimize hazards to transit riders, MM Traffic-1 requires provisions for these two stops to be added to the TCP. The stops may need to be moved back from the intersection or a warning sign installed to indicate to transit riders to watch for large trucks

turning and to move out of the way. With implementation of MM Traffic-1, impacts would be less than significant.

Traffic Hazards for Bicycle Facilities

Designated bicycle facilities are located at all but two of the locations identified in Table 4.12-5. Bicycles are also frequently used along Medical Center Way, which connects to several trails in the Reserve and provides connectivity between Johnstone Drive and Parnassus Avenue. The turning movements of large trucks at intersections and travel along Medical Center Way could create potentially hazardous conditions for bicyclists; however, a limited number of trucks would use Medical Center Way, and trucks would be clearly visible to bicyclists, allowing bicyclists to modify their movement to avoid hazards. For most locations, hazards to bicyclist would be less than significant. While not required to ensure bicyclist safety, **MM Traffic-2: Prohibit Large Truck Trips During Peak Commute Periods**, which prohibits large trucks in intersections during peak commute periods, would further reduce potential impacts.

Trucks may need to cross over or into bicycle lanes during turns at two locations: the intersection of Laguna Honda Boulevard and Clarendon Avenue, and the intersection at Laguna Honda Boulevard, Dewey Boulevard, and Woodside Road. Bicyclists may not be able to modify their movements safety around the trucks at these locations, creating a potentially significant hazard to bicyclists. **MM Traffic-1: Traffic Control Plan Special Provisions** requires that the TCP specifically address reducing turning hazards for bicyclists at Laguna Honda Boulevard and Clarendon Avenue, and at Laguna Honda Boulevard, Dewey Boulevard, and Woodside Road. Measures to address traffic hazards when the trucks pass through those intersections could include having a flagger positioned to direct traffic and bicycles, utilizing a pilot vehicle, and/or installing warning signs. Impacts would be less than significant with implementation of **MM Traffic-1: Traffic Control Plan Special Provisions** at these locations.

Traffic Hazards for Pedestrian Facilities

Designated pedestrian facilities (e.g., sidewalks, crosswalks, curb ramps, and pedestrian signals) are located at or in close proximity to the locations identified in Table 4.12-5. There are also pathways along Medical Center Way, as well as trails that connect to the roadway at multiple locations. Truck turning movements could create potentially hazardous conditions for pedestrians crossing at the intersections due to their slower movements and larger turning radii. Generally, though, the number of large trucks would be limited to at most a few days and trucks would be clearly visible to pedestrians, allowing pedestrians to modify their movements to avoid hazards. Impacts at most intersections would be less than significant.

Large truck turning movements at one intersection, Laguna Honda Boulevard and Clarendon Avenue, would present potentially significant hazard impacts on pedestrians. Truck turning movements at the Laguna Honda Boulevard and Clarendon Avenue intersection would encroach onto the existing 'pork-chop' pedestrian island. MM Traffic-3 would prohibit trucks over 55 feet in length from using this intersection, which would reduce the impact to less than significant.

Comparison of Impacts Across Phases

The proposed plan would involve annual vegetation management activities that would occur from approximately September through February over a 20-year period beginning in late fall/winter 2017. The proposed plan describes three phases of vegetation management, during which the estimated maximum daily vehicle and truck traffic would be approximately the same. The use of large trucks could also be reduced in later phases once most of the dead and dying trees are removed in Phase I and the landing areas are created. Impacts from truck traffic on traffic hazards could be significant across all phases of the plan even with reduced truck traffic because of the hazards associated with right turns along the identified truck routes. Implementation of **TRAF-LRDP-1: Construction Coordination and Monitoring Measures**, as required by the 2014 LRDP, and **MM Traffic-1: Traffic Control Plan Special Provisions**, **MM Traffic-2: Prohibit Large Truck Trips During Peak Commute Periods**, and **MM Traffic-3: Truck Turn Restriction** would reduce hazard impacts on other vehicles, transit facilities, bicyclists, and pedestrians to less than significant.

Table 4.12-5 Summary of Analysis for Potential Truck Maneuvering Hazards and Transportation Conflicts

Location Number and Roadways	Significant Potential Temporary Conflict?			
	Other Vehicles	Transit Facilities	Bicycle Facilities	Pedestrian Facilities
#1a (Access Point 1): Clarendon Avenue and Johnstone Drive	**Potentially Significant**. Turning would require encroaching onto parking lane and trucks making a right-turn from Johnstone Drive to Clarendon Avenue would utilize the eastbound and the westbound travel lanes on Johnstone Drive and the two southbound lanes on Clarendon Avenue. If traffic is light, this turn can be maneuvered safely through proper timing. However, it may not be as safe during the peak commute periods when less breaks in traffic occur. ***Mitigation: MM Traffic-2***	**No Impact**. There are no transit facilities that could be impacted at this intersection.	**Less than Significant**. There are no designated bicycle facilities through this intersection.	**Less than Significant**. Truck turning movements at the Clarendon Avenue and Johnstone Drive intersection would not encroach onto the adjacent sidewalks. However, truck turning movements could create potentially hazardous conditions for pedestrians crossing at the intersection due to their slower movements and larger turning radii. The limited number of trucks and the visibility of the trucks by pedestrians would allow pedestrians to modify their movements to avoid hazards.
#1b: Medical Center Way and Johnston Drive	**Potentially Significant**. Trucks making turns at the intersection of Medical Center Way and Johnston Drive would overrun the adjacent vegetation on the west side or the pedestrian walk way. ***Mitigation: MM Traffic-1, MM Traffic-2, and MM Traffic-3***	**Potentially Significant**. UCSF's Bronze shuttle route operates along Medical Center Way and Johnstone Drive with stops near the Surge and Woods Lots and UCSF EHS Building along Medical Center Way, and Aldea Center on Johnstone Drive. Truck turning movements would potentially encroach onto the shuttle stops. ***Mitigation: MM Traffic-1***	**Less than Significant**. There are no designated bicycle facilities along Medical Center Way or Johnston Drive; however, there is a high potential for bicyclists to use the roadways. Trucks operating along Johnston Drive and turning on Medical Center Way could create potentially hazardous conditions for bicyclists due to trucks' obstructed rear sight lines, large turning radii, and the tendency for rear wheels to follow a smaller circle than front wheels; however, there would be a limited number of trucks and they would be clearly visible to bicyclists allowing bicyclists to modify their movement to avoid hazards.	**Potentially Significant.** There are pedestrian pathways along the east side of Medical Center Way. Truck turning movements at the Johnstone Drive and Medical Center Way intersection would encroach onto the existing pedestrian pathways and create potentially hazardous conditions for pedestrians. ***Mitigation: MM Traffic-1, MM Traffic-2, and MM Traffic-3***
#2a (Access Point 2): Parnassus Avenue and Medical Center Way	**Potentially Significant**. Trucks making turns at the intersection of Parnassus Avenue and Medical Center Way would utilize both travel lanes on Parnassus Avenue and Medical Center Way. If traffic is light, this turn can be maneuvered safely through proper timing. However, it may not be as safe during the peak commute periods when less breaks in traffic occur. ***Mitigation: MM Traffic-2***	**Potentially Significant**. UCSF's Bronze shuttle route operates along Medical Center Way with stops near the Surge and Woods Lots and UCSF EHS Building along Medical Center Way. Truck turning movements would potentially encroach onto the shuttle stops, which could be hazardous to pedestrians waiting for buses. ***Mitigation: MM Traffic-1***	**Less than Significant**. Bicycle routes are located along Parnassus Avenue, and truck turning movements at the Parnassus Avenue and Medical Center Way intersection could create potentially hazardous conditions for bicyclists due to trucks' obstructed rear sight lines, large turning radii, and the tendency for rear wheels to follow a smaller circle than front wheels; however, there would be a limited number of trucks and they would be clearly visible to bicyclists allowing bicyclists to modify their movement to avoid hazards.	**Less than Significant.** Truck turning movements at this intersection would not encroach onto the adjacent sidewalks. However, truck turning movements could create potentially hazardous conditions for pedestrians crossing Medical Center Way at Parnassus Avenue and between trails due to trucks' slower movements and larger turning radii. The number of trucks would be limited and trucks would be clearly visible to pedestrians allowing pedestrians to modify their movements to avoid hazards.
#2b: Medical Center Way at the UCSF EHS Building	**Potentially Significant.** Trucks making a sharp turn around the UCSF EHS Building on Medical Center Way would also utilize both travel lanes. If traffic is light, this turn can be maneuvered safely through proper timing. However, it may not be as safe during the peak commute periods when less breaks in traffic occur. ***Mitigation: MM Traffic-2***	**Potentially Significant**. UCSF's Bronze shuttle route operates along Medical Center Way with stops near the Surge Woods Lots and UCSF EHS Building. Truck turning movements would potentially encroach onto the shuttle stops. ***Mitigation: MM Traffic-1***	**Less than Significant**. There are no designated bicycle facilities along Medical Center Way; however, there is a high potential for bicyclists to use Medical Center Way. Trucks operating along Medical Center Way could create potentially hazardous conditions for bicyclists due to trucks' obstructed rear sight lines, large turning radii, and the tendency for rear wheels to follow a smaller circle than front wheels; however, there would be a limited number of trucks and they would be clearly visible to bicyclists allowing	**Less than Significant.** Pathways are located along Medical Center Way, as well as trails that connect to the roadway at multiple locations. Trucks on Medical Center Way could create potentially hazardous conditions for pedestrians crossing the street. The number of trucks would be limited and trucks would be clearly visible to pedestrians allowing pedestrians to modify their movements to avoid hazards.

Location Number and Roadways	Significant Potential Temporary Conflict?			
	Other Vehicles	Transit Facilities	Bicycle Facilities	Pedestrian Facilities
			bicyclists to modify their movement to avoid hazards.	
#3: 7th Avenue and Kirkham Street	**Potentially Significant.** Trucks making turns at this intersection would utilize both travel lanes on 7th Avenue and Kirkham Street. If traffic is light, this turn can be maneuvered safely through proper timing. However, it may not be as safe during the peak commute periods when less breaks in traffic occur. ***Mitigation: MM Traffic-2***	**No Impact.** No transit facilities are located at this intersection.	**Less than Significant.** Bicycle lanes are located on both sides of 7th Avenue and Kirkham Street. Truck turning movements at the 7th Avenue intersection and Kirkham Street intersection could create potentially hazardous conditions for bicyclists due to trucks' obstructed rear sight lines, large turning radii, and the tendency for rear wheels to follow a smaller circle than front wheels; however, there would be a limited number of trucks and they would be clearly visible to bicyclists allowing bicyclists to modify their movement to avoid hazards.	**Less than Significant.** There are sidewalks on both sides of 7th Avenue and Kirkham Street. Truck turning movements at the 7th Avenue and Kirkham Street intersection would not encroach onto the adjacent sidewalks. However, truck turning movements could create potentially hazardous conditions for pedestrians crossing at the intersection due to their slower movements and larger turning radii. The number of trucks would be limited and trucks would be clearly visible to pedestrians allowing pedestrians to modify their movements to avoid hazards.
#4: 7th Avenue and Judah Street	**Potentially Significant.** Trucks making turns at this intersection would utilize both travel lanes on 7th Avenue and Judah Street. If traffic is light, this turn can be maneuvered safely through proper timing. However, it may not be as safe during the peak commute periods when less breaks in traffic occur. ***Mitigation: MM Traffic-2***	**Less than Significant.** Muni bus routes 6 and 43 operate along Judah Street through the 7th Avenue and Judah Street intersection. There is a Muni bus stop on the northwest corner of this intersection. Truck turning movements would not encroach onto this bus stop.	**Less than Significant**. Bicycle lanes are located on both sides of 7th Avenue and on Judah Street east of 7th Avenue. Truck turning movements at the Judah Street and 7th Avenue intersection could create potentially hazardous conditions for bicyclists due to trucks' obstructed rear sight lines, large turning radii, and the tendency for rear wheels to follow a smaller circle than front wheels; however, there would be a limited number of trucks and they would be clearly visible to bicyclists allowing bicyclists to modify their movement to avoid hazards.	**Less than Significant.** Sidewalks are located on both sides of 7th Avenue and Judah Street. Truck turning movements at the 7th Avenue and Judah Street intersection would not encroach onto pedestrian facilities. However, truck turning movements could create potentially hazardous conditions for pedestrians at the intersection due to their slower movements and larger turning radii. The number of trucks would be limited and trucks would be clearly visible to pedestrians allowing pedestrians to modify their movements to avoid hazards.
#5: Laguna Honda Boulevard and Clarendon Avenue	**Potentially Significant.** Trucks making a left-turn from westbound Clarendon Avenue to southbound Laguna Honda Boulevard or the trucks making a right-turn from the westbound Clarendon Avenue to the northbound Laguna Honda Boulevard would utilize one travel lane on Clarendon Avenue and two travel lanes on Laguna Honda Boulevard. Trucks making a right turn from northbound Laguna Honda Boulevard to eastbound Clarendon Avenue or the trucks making a left-run from southbound Laguna Honda Boulevard to the eastbound Clarendon Avenue would overrun the raised 'pork-chop' pedestrian refugee island. ***Mitigation: MM Traffic-1, MM Traffic-2, and MM Traffic-3***	**Less than Significant**. Muni bus routes 36, 43 and 44 operate along Laguna Honda Boulevard through the Laguna Honda Boulevard and Clarendon Avenue intersection. The nearest Muni bus stop is located on the west side of Laguna Honda Boulevard approximately 120 feet south of the intersection. Truck turning movements not encroach onto the bus stop.	**Potentially Significant.** There are bicycle lanes on both sides of Laguna Honda Boulevard with approximately 40 bicyclists during the peak commute periods. Truck turning movements at the Laguna Honda Boulevard and Clarendon Avenue intersection could create potentially hazardous conditions for bicyclists due to trucks' obstructed rear sight lines, large turning radii, and the tendency for rear wheels to follow a smaller circle than front wheels. Trucks making a right turn would need to cross into the bicycle lane, causing a direct hazard to bicyclists and bicyclists may not have the ability to modify their movement to avoid the trucks. ***Mitigation: MM Traffic-1, MM Traffic-2, and MM Traffic-3***	**Potentially Significant**. There are sidewalks on both sides of Laguna Honda Boulevard and Clarendon Avenue with approximately 24 pedestrians during the peak commute periods. Truck turning movements at the Laguna Honda Boulevard and Clarendon Avenue intersection would encroach onto the existing 'pork-chop' pedestrian refugee island and create potentially hazardous conditions for pedestrians. ***Mitigation: MM Traffic-1, MM Traffic-2, and MM Traffic-3***
#6: Parnassus Avenue and Stanyan Street	**Potentially Significant**. Trucks making turns at this intersection would utilize both travel lanes on Parnassus Avenue and Stanyan Street. Stanyan Street is designated as a High Injury Corridor in the Vision Zero Network. Truck turning movements at this intersection could substantially increase safety hazards for these vehicles due to an intermittent reduction in	**Less than Significant**. Muni bus routes 6 and 43 operate along Parnassus Avenue and Stanyan Street through the intersection. A Muni bus stop is on the southwest corner of this intersection. Truck turning movements would potentially obstruct buses using the bus stop during truck turning. However, the disruption would be brief and less than significant. Transit users are protected by a shelter at this location.	**Less than Significant.** Bicycle routes are along Parnassus Avenue. Truck turning movements at the Parnassus Avenue and Stanyan Street intersection could create potentially hazardous conditions for bicyclists due to trucks' obstructed rear sight lines, large turning radii, and the tendency for rear wheels to follow a smaller circle than front wheels. Few trucks; however, there would be a limited number of trucks and they would be clearly visible to bicyclists allowing	**Less than Significant.** Sidewalks are on both sides of Parnassus Avenue and Stanyan Street. Truck turning movements at the Parnassus Avenue and Stanyan Street intersection would not encroach onto the adjacent sidewalks. However, truck turning movements could create potentially hazardous conditions for pedestrians crossing at the intersection due to their slower movements and larger turning radii. The number of trucks would be limited and trucks would be clearly

Location Number and Roadways	Significant Potential Temporary Conflict?			
	Other Vehicles	Transit Facilities	Bicycle Facilities	Pedestrian Facilities
	roadway capacity or obstruction of traffic during truck turning. ***Mitigation: MM Traffic-1 and MM Traffic-2***		bicyclists to modify their movement to avoid hazards.	visible to pedestrians allowing pedestrians to modify their movements to avoid hazards.
#7: Laguna Honda Boulevard, Dewey Boulevard, and Woodside Avenue	**Potentially Significant**. Trucks making turns at this intersection would utilize two travel lanes on Laguna Honda Boulevard and Woodside Avenue. ***Mitigation: MM Traffic-1 and MM Traffic-2***	**Less than Significant.** Muni bus routes 36, 43, 44, and 52 operate along Laguna Honda Boulevard and Woodside Avenue through the intersection. There is a Muni bus stop on the northeast corner of the Laguna Honda Boulevard and Woodside Avenue intersection. Trucks making a right-turn from Woodside Avenue to Laguna Honda Boulevard would potentially obstruct buses using this bus stop during truck turning. However, the disruption would be brief and less than significant. Transit users are protected by a shelter at this location.	**Potentially Significant.** Bicycle lanes are along Laguna Honda Boulevard and Dewey Boulevard and bicycle routes are along Woodside Avenue. Truck turning movements at the Laguna Honda Boulevard, Dewey Boulevard, and Woodside Avenue intersection could create potentially hazardous conditions for bicyclists as the far right right turn lane is also a shared bicycle lane. Large trucks may turn into this lane from the left, right-turn lane, creating a hazard to bicyclists, where bicycles may not be able to modify their movements on time. ***Mitigation: MM Traffic-1 and MM Traffic-2***	**Less than Significant.** Sidewalks are on both sides of Laguna Honda Boulevard, Dewey Boulevard and Woodside Avenue. Truck turning movements at the Laguna Honda Boulevard, Dewey Boulevard, and Woodside Avenue intersection would not encroach onto the adjacent sidewalks. However, truck turning movements could create potentially hazardous conditions for pedestrians crossing at the intersection due to their slower movements and larger turning radii. The number of trucks would be limited and trucks would be clearly visible to pedestrians allowing pedestrians to modify their movements to avoid hazards.
#8: Dewey Boulevard, Claremont Boulevard, Taraval Street, Kensington Way, and Montalvo Avenue	**Potentially Significant.** Trucks making turns at this intersection would utilize one travel lane on Claremont Avenue and Dewey Boulevard as well as the truck apron provided around the roundabout at the intersection. Truck turning movements would not obstruct the movements of vehicles in other lanes; however, they could potentially increase the risk of accidents with vehicular traffic due to large turning radii and slow turning movements around the roundabout. If traffic is light movement through this roundabout can be maneuvered safely through proper timing. However, it may not be as safe during the peak commute periods when more vehicles could be in the roundabout at the same time. ***Mitigation: MM Traffic-2***	**No Impact.** No transit facilities are located in this roundabout.	**Potentially Significant.** Bicycle lanes are along Dewey Boulevard, Taraval Street, and Claremont Boulevard. Truck turning movements at the Dewey Boulevard, Claremont Boulevard, Taraval Street, Kensington Way, and Montalvo Avenue intersection could create potentially hazardous conditions for bicyclists due to trucks' obstructed rear sight lines, large turning radii, and the tendency for rear wheels to follow a smaller circle than front wheels. The entire roundabout is a shared with bicycles. If traveling in a peak period with more traffic in the circle, bicycles may not be able to modify their movement around large trucks. ***Mitigation: MM Traffic-2***	**Less than Significant.** There are sidewalks on both sides of Dewey Boulevard, Claremont Boulevard, Taraval Street, Kensington Way, and Montalvo Avenue. Truck turning movements at this intersection would not encroach onto these sidewalks. However, truck turning movements could create potentially hazardous conditions for pedestrians crossing Claremont Boulevard or Dewey Boulevard due to trucks' slower movements and larger turning radii. The number of trucks would be limited and trucks would be clearly visible to pedestrians allowing pedestrians to modify their movements to avoid hazards.
#9: Woodside Avenue, Portola Drive, and O'Shaughnessy Boulevard	**Less than Significant.** Trucks traveling through this intersection would utilize one travel lane on Woodside Avenue and O'Shaughnessy Boulevard, which is generally straight and does not have a major right turn. Truck turning movements at this intersection would not obstruct the movements of vehicles in other lanes.	**Less than Significant**. Muni bus routes 36, 44, and 52 operate along Woodside Avenue and O'Shaughnessy Boulevard through the intersection. A Muni bus stop is on the northwest corner of the Woodside Avenue, Portola Drive, and O'Shaughnessy Boulevard intersection. Trucks making traveling from Woodside Avenue to O'Shaughnessy Boulevard would potentially obstruct buses using this bus stop during truck turning. However, the disruption would be brief and less than significant. Transit users are protected by a shelter at this location	**Less than Significant.** There are bicycle lanes along Portola Drive and bicycle routes along Woodside Avenue and O'Shaughnessy Boulevard. Truck turning movements at the Woodside Avenue, Portola Drive, and O'Shaughnessy Boulevard could create potentially hazardous conditions for bicyclists due to trucks' obstructed rear sight lines, large turning radii, and the tendency for rear wheels to follow a smaller circle than front wheels; however, there would be a limited number of trucks and they would be clearly visible to bicyclists allowing bicyclists to modify their movement to avoid hazards.	**Less than Significant.** Sidewalks are on both sides of Woodside Avenue, Portola Drive, and O'Shaughnessy Boulevard. Truck turning movements at this intersection would not encroach onto these sidewalks. However, truck turning movements could create potentially hazardous conditions for pedestrians crossing Woodside Avenue or O'Shaughnessy Boulevard due to trucks' slower movements and larger turning radii. The number of trucks would be limited and trucks would be clearly visible to pedestrians allowing pedestrians to modify their movements to avoid hazards.

Sources: (CHS Consulting Group 2017a, CHS Consulting Group 2017b)

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Impact Traffic-3: The proposed plan could result in inadequate emergency access.	Significance Determination
	Less than significant with mitigation

Vegetation Management Activities

The street network in the vicinity of the Reserve and within the Parnassus Heights campus site provides access for emergency vehicles in the event of an emergency, such as police, fire, or medical emergency response. Frequent ambulance traffic occurs along Parnassus Avenue where the UCSF Medical Center is located at 505 Parnassus Avenue. The emergency department entrance is located approximately 450 feet from the Parnassus Avenue and Medical Center Way intersection (Access Point 2).

Vegetation management activities would not require lane or road closures that would block access for emergency vehicles; however, large truck movements would periodically slow traffic movement. Trucks and other project vehicles would yield to emergency vehicles as required by California Vehicle Code Section 21806; however, if emergency vehicles entered a location after large trucks began maneuvering through a turn, emergency access could be briefly delayed until the trucks could completed the turn. Any delays would likely not last more than a few minutes. Although unlikely, emergency access delays lasting up to a few minutes could be a potentially significant impact in life-threatening situations.

The storage of equipment and vegetation material at landing areas located at the Surge lot, Woods lot, and Aldea Center lots has the potential to prevent emergency vehicles from accessing buildings, designated Emergency Assembly Areas, and fire hydrants. Preventing emergency vehicles from accessing these areas during an emergency would be a significant impact.

UCSF is obligated to implement **TRAF-LRDP-1: Construction Coordination and Monitoring Measures** as part of the 2014 LRDP, which requires UCSF to coordinate with relevant City agencies (e.g., SFMTA) to implement measures to reduce traffic hazards, which could include procedures for positioning flaggers or pilot cars to allow safe and priority passage of emergency vehicles along truck routes consistent with the Blue Book. Impacts would remain significant, however, because emergency service providers could still face delays even with flaggers or pilot cars to guide them. **MM Traffic-4: Access for Emergency Vehicles** requires the contractor to coordinate with administrators of the UCSF Medical Center, SFFD, SFPD, and UCPD prior to vegetation management activities to ensure equipment and other materials at landing areas are not stored in a manner that would result in inadequate emergency access. Impacts on emergency access would be less than significant with implementation of **MM Traffic-4: Access for Emergency Vehicles**.

Comparison of Impacts Across Phases

Impacts related to emergency access would be the same across all phases. **MM Traffic-4: Access for Emergency Vehicles** would reduce these impacts to less than significant levels.

Impact Traffic-4: The proposed plan could result in significant impacts on the transportation network and level of traffic in combination with past, present, and probable future development in the cumulative analysis study area.	Significance Determination
	Less than significant contribution with mitigation

Geographic Scope

The geographic extent for the transportation and traffic cumulative analysis includes the local and regional roadways and highways that would be utilized for transportation of proposed plan materials. The extent of the analysis specifically includes all projects within 1 mile of the proposed plan because these projects are expected to use the same roads for access.

Cumulative Analysis

Traffic Hazards and Alternative Transportation

Construction of the cumulative projects would increase truck traffic to and from work sites likely along the same roadways identified as truck routes for the proposed plan. Several cumulative projects, specifically UCSF projects, would result in temporary closures of sidewalks, roads, or lanes during construction. Overlapping timelines between the cumulative projects and the proposed plan would increase the potential for conflict between large trucks along the truck routes, particularly if lanes or roads are closed. Measures incorporated into the UCSF cumulative projects would ensure that information regarding lane and road closures are announced. The haul trucks for other cumulative projects are required to avoid trips during PM Peak hour, if feasible, to avoid conflicts with traffic. The cumulative traffic hazard impact; however, still could be potentially significant if several projects introduced very large trucks carrying oversized loads at the same time as the proposed project. Projects such as the Kirkham Project [#14], the 5th and Kirkham Traffic-Calming Project [#18], and the Overlook Project [#16] could generate large vehicles hauling demolition materials, or could require oversized vehicles to bring in specialized construction materials. The number, size, and timing of trucks needed for the cumulative projects is not known at this time. If several large trucks end up on the same city streets at the same times, hazards to other vehicles, pedestrians, and bicyclists could be cumulatively significant due to the volume of trucks, which would increase the hazard.

For implementation of the proposed plan, large trucks would access the Reserve using local roadways throughout the 20-year lifetime of the plan. A maximum of 12 haul trucks in a single day would traverse local streets to reach the plan area, but only 36 haul truck trips would occur during one season. The probability that haul truck trips would use the same intersection at the same time as the cumulative project's haul trucks, would be low and the volume of trucks generated by plan activities would likely be minimal compared with the larger construction projects. Lane and road closures would not be required for implementation of the proposed plan. Nonetheless, the proposed plan's contribution to a significant cumulative impact from increased traffic hazards could be considerable. **MM Traffic-1: Traffic Control Plan Special Provisions** would require special provisions to reduce hazards at certain high-risk intersections, **MM Traffic-2: Prohibit Large Truck Trips During Peak Commute Periods** would prohibit

large trucks during am and pm peak commute hours, and **MM Traffic-3: Truck Turn Restriction** would prohibit trucks over 55 feet from making turns from Johnstone Drive to Medical Center Way and from Laguna Honda Boulevard to Clarendon Avenue. The proposed plan's contribution to potentially significant cumulative impact on traffic hazards would be less than cumulatively considerable with mitigation.

The proposed plan includes using a portion of the Surge Lot as a landing area, which could conflict with the demolition of the Surge Building and restoration of those areas [#8]. Since both are UCSF projects/plans, coordination would ensure that conflicts would be avoided.

Emergency Access

Lane or road closures may be required during construction of several cumulative UCSF projects. Closures have the potential to restrict or slow down emergency vehicles and responders. Several cumulative projects, specifically UCSF projects, would result in temporary closures of sidewalks, roads, or lanes during construction. Impacts to emergency access could be cumulatively considerable.

The proposed plan could contribute to significant cumulative impacts to emergency access. The storage of equipment and vegetation material at landing areas located at the Surge lot, Woods lot, and Aldea Center lots has the potential to prevent emergency vehicles from accessing buildings, designated Emergency Assembly Areas, and fire hydrants. **MM Traffic-4: Access for Emergency Vehicles** requires the contractor to coordinate with administrators of the UCSF Medical Center, SFFD, SFPD, and UCPD prior to vegetation management activities to ensure equipment and other materials at landing areas are not stored in a manner that would result in inadequate emergency access. Impacts on emergency access would be less than significant with implementation of **MM Traffic-4: Access for Emergency Vehicles**. With this mitigation, the traffic associated with the plan would have very limited impacts on emergency access and, therefore, would not contribute considerably to a cumulative impact.

4.12.6 Mitigation Measures

MM Traffic-1: Traffic Control Plan Special Provisions

The Traffic Control Plan (TCP), as required by TRAF LRDP-1, shall specifically address traffic control measures for large trucks (e.g., trucks hauling machinery, wood chips, or logs exceeding 55 feet in length) making turns at Johnstone Drive and Medical Center Way; Laguna Honda Boulevard and Clarendon Avenue; Parnassus Avenue and Stanyan Street; and Laguna Honda Boulevard, Dewey Boulevard, and Woodside Road to address conflicts with or hazards to other vehicles from large turning movements. Measures shall be consistent with the City and County of San Francisco Blue Book, and could include (but are not limited to) having a flagger positioned at those intersections to direct traffic when the trucks pass through or using a pilot vehicle ahead of large loads to control traffic. These control measures shall also address bicycle hazards for large truck turns at Laguna Honda Boulevard and Clarendon; and at Laguna Honda Boulevard, Dewey Boulevard, and Woodside Road.

Safety provisions shall be added to the TCP that address stops of the UCSF Bronze shuttle along Medical Center Way and Johnstone Drive. The stops may need to be moved back from turning locations or a warning sign installed to indicate to transit riders to watch for large trucks turning and to move out of the way.

Locations: Intersections of Johnstone Drive and Medical Center Way; Laguna Honda Boulevard and Clarendon Ave; Parnassus Avenue and Stanyan Street; and Laguna Honda Boulevard, Dewey Boulevard, and Woodside Road and the UCSF Bronze shuttle route along Medical Center Way and Johnstone Drive

Performance Standards:

- **Before Activity:** N/A
- **During Activity:** Traffic controls and safety measures are implemented at the identified intersections to protect other vehicles, bicyclists, and pedestrians during large truck movements
- **After Activity:** N/A

MM Traffic-2: Prohibit Large Truck Trips During Peak Commute Periods

Large trucks (e.g., trucks hauling machinery, wood chips, or logs exceeding 55 feet in length) shall be prohibited from traveling to and from the Reserve during the peak commute hours of 7:00 am and 9:00 am and 4:00 pm to 7:00 pm unless otherwise allowed through consultations with the City and County of San Francisco.

Locations: All travel routes

Performance Standards:

- **Before Activity:** N/A
- **During Activity:** Large trucks are prohibited from traveling to and from the Reserve during peak commute periods
- **After Activity:** N/A

MM Traffic-3: Truck Turn Restriction

Trucks exceeding 55 feet in length shall be prohibited from making turns from Johnstone Drive to Medical Center Way and from Laguna Honda Boulevard to Clarendon Avenue.

Locations: Intersections of Johnstone Drive and Medical Center Way, and Laguna Honda Boulevard and Clarendon Avenue

Performance Standards:

- **Before Activity:** N/A
- **During Activity:** Trucks exceeding 55 feet in length do not turn at the Laguna Honda Boulevard and Clarendon Avenue intersection
- **After Activity:** N/A

MM Traffic-4: Access for Emergency Services

The contractor shall coordinate with administrators of the UCSF Medical Center, SFFD, SFPD, and UCPD prior to vegetation management activities to ensure equipment and vegetation material at landing areas are not stored in a manner that would result in inadequate emergency access. The administrators shall be provided with information about the locations and durations of annual vegetation management activities, and where truck routes and landing areas could temporarily affect emergency access.

Landing areas shall not prevent emergency vehicles from passing through roadways, parking lots, or fire access roads. Adequate access to fire hydrants shall be maintained at all times, as determined through coordination with SFFD.

Locations: Landing areas, truck routes, and fire access roads

Performance Standards:

- **Before Activity:** Contractor coordinates with administrators of the UCSF Medical Center, SFFD, SFPD, and UCPD
- **During Activity:** (1) Adequate space for emergency access is provided through roadways, parking lots, and fire access roads, and (2) Access to all fire hydrants is maintained
- **After Activity:** N/A

4.12.7 References

CHS Consulting Group. 2017a. "AutoTurn truck turning analysis for truck maneuvering hazards and transportation conflicts." March.

—. 2017b. "Potential Truck Route Review and Selection." March.

—. 2017c. "Traffic counts collected at the intersection of Clarendon Street and Laguna Honda Boulevard." March 1.

City and County of San Francisco. 2011. "Building Footprints - City and County of San Francisco GIS dataset." San Francisco Enterprise GIS Program, Department of Technology and Pictometry, Inc.

ESRI. 2017. "Online GIS Vector and Raster Data."

Fehr & Peers and Adavant Consulting. 2014. "Transportation Impact Study for the UCSF Long Range Development Plan." August.

San Francisco Municipal Transportation Agency (SFMTA). 2014. "SFMTA Traffic Count Data 1993-2013." March 25. Accessed February 23, 2017.

—. 2016a. "Muni Map."

—. 2016b. "San Francisco Bike Map." Accessed February 23, 2017. https://www.sfmta.com/sites/default/files/maps/2016/SFMTA%20Retail%20Map%20-%207.7.16-Online.pdf.

—. 2016c. "SFMTA Bus and Light Rail Routes GIS dataset." March 15.

—. 2017. "SFMTA Bikeway Network GIS dataset." February 18.

University of California, San Francisco (UCSF). 2014. "Final UCSF 2014 Long Range Development Plan." Building on 150 Years: UCSF Plans for 2035. November.

—. 2017. "Mt Sutro Open Space Preserve GIS data."

University of California, San Francisco (UCSF) Police. 2017. "Emergency Assembly Areas (EAAs) for the Parnassus Heights Campus." https://police.ucsf.edu/system/files/eaas.pdf.

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4.13 WIND

4.13.1 Introduction

This section describes the existing wind patterns in the plan area and evaluates the potential impacts from windthrow that may occur from implementation of the proposed vegetation management activities. The impacts associated with the proposed plan are compared with the thresholds of significance used by the University pursuant to CEQA.

Comments related to wind and windthrow received during the public scoping process included concerns about the following:

- Removing trees will remove windbreaks
- Removing trees will increase wind and adversely affect the forest

4.13.2 Environmental Setting

Wind Patterns in San Francisco

Westerly winds are the predominant wind direction in San Francisco. Wind directions and gust directions may differ, however, based on shifts in the local weather pattern. In the winter, when the Pacific high-pressure system weakens and moves towards the south, low pressure systems frequently pass through San Francisco. The counterclockwise wind flow around low-pressure systems create a sometimes easterly flow during the winter months. Average wind speeds between 1996 and 2006 are provided in Table 4.13-1. The average wind direction is westerly (Western Regional Climate Center 2002). Gusts often emanate from the south or west (Western Regional Climate Center 1990).

Mount Sutro Open Space Reserve Wind Station Data

Wind in the Reserve is influenced by two wind patterns. Diurnal (daily) wind patterns occur around elevated terrain in the Reserve as air heats and cools during the day to create upslope (i.e., wind flows from sea level towards higher elevations) and downslope (i.e., wind flows from

Table 4.13-1 San Francisco International Airport Wind Data

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Wind												
Mean Speed (mph)	6.7	8.2	10.2	12.1	13.6	14.1	12.9	12.3	10.6	9.0	7.2	7.2
Gust												
Peak Speed (mph)	61	69	64	54	58	51	52	45	44	58	60	74

Sources: (Western Regional Climate Center 1990, Western Regional Climate Center 2006)

higher elevations to sea level) winds. Onshore (i.e., wind flows from water to land) and offshore (i.e., wind flows from land to water) winds also influence wind patterns at the Reserve.

To investigate the wind environment in the Reserve, Vantage Pro2 Weather Stations (manufactured by Davis Instruments) were installed in the Reserve in 2012. The stations were established in two paired plots for a total of four wind stations. The goal in placement of the paired plots was to locate one station in an area of sparse tree cover and the other nearby (within 150 feet) in an area of dense tree cover, controlling for the other major variables that impact wind speed and direction (e.g., topo-position, aspect, elevation) wherever possible.

Results indicated that wind data from the different stations on Mount Sutro were highly variable, though higher wind speed gusts consistently occurred in afternoon to late evening hours, and calmer winds generally occurred during night hours when the atmosphere was less turbulent. Variable wind direction measurements seemed to depend on obstructions found near each weather station, such as vegetation or topographic features. The measurements were taken during the summer months when average wind speeds tend to be higher; however, no major wind events occurred during data collection. Average wind speeds in the densely-forested area were 0.02 miles per hour compared to 5.2 miles per hour in the sparsely-forested area. Wind gusts were similarly greater in the sparsely-forested area, where the maximum gust speed was 36 miles per hours compared to 9 miles per hour in the densely-forested area. The data also suggested that topography and local obstructions can be overriding factors to tree density in controlling wind speeds.

Windthrow

Overview

One potential result of high winds is windthrow, defined as the uprooting and overthrowing of trees by wind. Windthrow events, often referred to as blowdown, typically occur during storm or high wind events. While high and low wind speeds are not officially defined, wind speeds were classified for the purposes of this section based on definitions from Arenas (1981). Low winds have average wind speeds of less than 8 miles per hour where wind can be felt lightly on the face. Moderately low winds (8 to 13 miles per hour) will disturb hair, can cause clothing to flap, or can extend a light flag mounted on a pole. Moderately high winds (13 to 26 miles per hour) can raise loose paper and dry soil from the ground and can be felt on the body. High wind events (greater than 26 miles per hour) are defined as those that impede walking and lift items larger than loose paper from the ground.

High wind velocities are common along the north coast of California; high velocity wind gusts sometimes reach 100 miles per hour in the San Francisco area and are highest in the winter months of November to March (Western Regional Climate Center 1990). A severe windstorm occurred in San Francisco on December 13, 1995, with winds of 93 miles per hour recorded on the Golden Gate Bridge. The storm resulted in the windthrow of an estimated 6,000 trees in the Presidio, causing damage to many structures, road closures, and one death (McBride and Leffingwell 2006). McBride and Leffingwell evaluated the role of the three most important

landscape characteristics associated with windthrow of the Presidio trees: soil type, topography, and tree species. These variables are discussed below.

Windthrow Risk Factors

Factors Affecting Wind Throw

Wind disturbances, from small-scale to stand-replacing, can exert strong impacts on forest structure in forested ecosystems (White and Pickett 1985, Kramer, et al. 2001, Foster 1988). Many factors affect windthrow. Research has shown that both biotic (of or related to living things) and abiotic (physical rather than biological) factors determine how windstorms impact forested ecosystems (Everham and Brokaw 1996). Abiotic factors affecting the amount of wind damage include wind speed, topography, and soils; biotic factors include tree composition, interactions with other mortality factors such as forest pathogens and pests, and tree density. These factors interact in complex patterns and their relative importance can change with each new wind event.

Abiotic Factors

Windthrow is often associated with shallow soils that are subject to saturation; shear strength of soils decreases with increasing moisture content and is lower in soil textures dominated by sand. One soil complex, the Candlestick-Kron-Buriburi complex (30 to 75 percent slopes), is present within the Reserve (refer to Section 3.6: Geology and Soils for more information). This soil complex has a primarily loam texture with soil texture varying from fine sandy loam to sandy clay loam. Overall, the soils are not excessively shallow nor are they excessively sandy. However, soil shear strength could decrease sufficiently after a significant precipitation event in areas of shallower soils (i.e., areas covered by the Kron soil series). Significant precipitation and shallow soils lead to increased risk of windthrow.

Areas with unstable geology are prone to landslide events and could be higher risk areas for windthrow. Figure 3.6-1 in Section 3.6: Geology and Soils presents landslide hazard areas that would have increased risk of windthrow.

The topographic setting of a site can also greatly influence exposure to wind. Sites located on high ridges, in topographic saddles, and at the heads of canyons experience high wind velocities (Harris 1999). Areas more prone to windthrow are expected to be slopes directly facing prevailing winds (Harris 1999). Wind damage in forests most often occurs in valleys and mountain saddles, particularly in valleys parallel to the wind direction (Navratil 1995). Mid- and upper slopes are more prone to wind damage than lower slopes (Navratil 1995). Winds blowing perpendicular to forest edges are most damaging (Ruel 1995). Topography varies throughout the Reserve and may play an important role in wind speeds within the Reserve.

Biotic Factors

Tree density influences windthrow risk. Windthrow risk is exacerbated by the opening of forests stands to accommodate roads and provide building sites during urbanization (McBride and Leffingwell 2006). In a comparison of thinned plots versus plots that had not been thinned, Roberts, Harrington, and Buermeyer (2007) found that the overall level of wind damage across

all thinned plots after two growing seasons was not statistically greater than in unthinned plots. However, where thinned areas were located in topographically vulnerable positions, greater wind damage did occur (Roberts, Harrington and Buermeyer 2007).

While thinning can initially increase the risk of wind damage to trees, trees can become adapted to their new environment. Trees eventually adjust the allocation of stem and crown growth, resulting in a more stable configuration (Wonn and O'Hara 2001). Thinning promotes diameter growth more than height growth, so thinned stands develop lower height to diameter ratios over time. The risk of wind damage can be greatly reduced following thinning as trees adapt, and studies have shown that reducing stand density can lead to a greater long-term wind-firmness (Wonn and O'Hara 2001, Cremer, et al. 1982).

Species composition also affects risk of windthrow. Tree species vary in their susceptibility to windthrow due to factors like shear strength of wood, root structure, and canopy structure (McBride and Leffingwell 2006). McBride and Leffingwell (2006) found that, based on these factors, Monterey cypress and Monterey pine had a relatively high risk of windthrow compared to blue gum eucalyptus, which was the most robust. The Reserve is dominated by blue gum eucalyptus; smaller numbers of other trees including Monterey pine, Monterey cypress, and blackwood acacia. Although blue gum eucalyptus fares well compared to other species found in the Reserve, their shallow root systems are of concern. Trees with shallower root systems are more susceptible to windthrow than trees with deeper root systems (Burns and Honkala 1990). Tree failure is common in the Reserve; downed eucalyptus trees, particularly windthrow of entire trees, have been observed throughout the Reserve, which is likely attributed to poor tree health.

Windbreaks

A windbreak is defined as a tall, dense, continuous wall of vegetation. Trees may serve as windbreaks that can reduce wind speeds in adjacent areas. Tree height determines how far wind protection extends, and tree density determines the degree of protection. A windbreak will generally reduce wind to a distance 10 times its height and reduce wind speed by 70 to 80 percent immediately inside the barrier (Kansas State University 2004, Wisconsin Department of Natural Resources, Division of Forestry 2003). The degree of protection from a windbreak gradually decreases with distance (Kansas State University 2004). Four basic factors are considered when designing a windbreak: its orientation in relation to the prevailing winds, its width, plant and density arrangement, and the species of plants selected (Santiago and Rodewald n.d.).

Windbreak density affects the pattern of air movement around the windbreak. Wind velocity is reduced as the density of the windbreak is increased, and, as a result, the area protected by the windbreak tends to be increased. Density depends upon the type of trees and shrubs and the number of rows planted. Density within a windbreak can be increased by planting multiple rows of evergreen trees. Finally, wind eddies (small-scale air turbulence) will form around the edges of a windbreak. Therefore, windbreaks should extend at least 100 feet beyond the area to

be protected. Any gaps will funnel the wind, eliminating much of the windbreak's effectiveness (Kansas State University 2004).

4.13.3 Regulatory Considerations

University of California

UCSF 2014 LRDP

No applicable goals, policies, or measures in the UCSF 2014 LRDP are relevant to windthrow.

Federal and State

No federal or state regulations are relevant to the analysis of windthrow for the proposed plan.

Local

City and County of San Francisco

The City of San Francisco has established standards and criteria for the evaluation of wind impacts in downtown and the Van Ness Avenue Corridor; however, these standards are not considered relevant as they were developed for new buildings rather than for vegetation management projects.

4.13.4 Significance Standards and Methodology

Significance Criteria

Impacts of the proposed plan on wind would be considered significant if implementation of the plan would exceed the following standard of significance, in accordance with the UC CEQA Handbook:

1. Exceed the LRDP EIR significance standard by substantially reducing sunlight or significantly increasing shadows in public open space areas, or by increasing pedestrian-level wind speeds above the hazard level set forth in the San Francisco Planning Code

CEQA does not identify any specific criterion for the evaluation of windthrow effects of a project. However, based on the extensive literature review of impacts related to windthrow, for the purposes of this analysis, the proposed plan would have a significant effect from windthrow if it would:

- Have a substantial adverse short-term or long-term windthrow-related effect on the safety of people or structures; or
- Have a substantial adverse effect on wind environments in local neighborhoods.

Issues Adequately Addressed in the Initial Study

The IS for the proposed plan found that implementation of the plan would not substantially reduce sunlight or increase shadows. The plan would not substantially increase pedestrian-level wind speeds either; however, the plan could potentially have an impact from windthrow hazards. Impacts from windthrow are analyzed in this section.

Analysis Methodology

Impacts from windthrow are assessed by examining how vegetation management activities influence wind penetration and wind speeds within the Reserve. Because no studies have been conducted within the Reserve that observed how the forest responds to forest treatments, academic studies are used to predict the ways in which the forest may respond to vegetation management activities.

Impacts on the wind environment in local neighborhoods are discussed by neighborhood. It was assumed that strong winds can emanate from any direction in any season; however, impacts on the wind environment are only discussed if the Reserve influences the wind environment in each neighborhood. For example, the Reserve comprises the southern portion of UCSF Parnassus Heights campus site; all other sides of the campus site are surrounded by residential and commercial areas. The Reserve would influence the wind environment at the UCSF Parnassus Heights campus site north of the Reserve if winds originated from the south but would not influence the wind environment at the northern portion of the UCSF Parnassus Heights campus site if the winds originated from the north; therefore, only impacts from winds originating from the south would be discussed.

4.13.5 Impacts

Impact Wind-1: The proposed plan could have a substantial adverse short-term windthrow-related effect on the safety of people or structures.	**Significance Determination**
	Less than significant with mitigation

Overview

Factors affecting the risk of windthrow include wind speeds, topography, soils, forest tree composition, tree health, and tree density. Vegetation management activities would affect the risk of windthrow in several ways. Removal of dead, dying, unhealthy, and structurally unsound trees would reduce safety risks by removing trees with a high likelihood of failure. However, tree removal would create gaps within the forest, which could increase the risk of windthrow in the Reserve.

Vegetation Management Activities

Forest Treatments and Management of Tree Risk and Defensible Space

Tree removal activities would alter the risk of windthrow in the Reserve. Windthrow events in the Reserve would most likely occur during storm or high wind events. Dead and dying trees are most susceptible to windthrow because they lack structural integrity; these trees would be most likely to fail during high wind events and may even fall during moderate wind events. Trees often fall on other trees, including healthy trees, increasing the risk of failure for the damaged trees (Harris 1999). When trees fall naturally, they may fall in any direction; in contrast, foresters are able to set the direction in which a tree falls during mechanical removal and avoid or minimize damage to other trees. Removing dead and dying trees from the forest

would reduce the risk of windthrow from the removed trees and reduce damage to other, healthy trees. The impact from dead and dying tree removal would be beneficial.

Removing dead and dying trees may increase wind within the Reserve by creating gaps in the forest canopy. Roberts, Harrington, and Buermeyer (2007) observed that small gaps in the forest were not statistically more prone to windthrow than areas of the forest where trees had been removed; however, gaps were more prone to windthrow when they were situated in areas subject to other abiotic and biotic windthrow risk factors (e.g., topographically exposed areas). As observed in the 2012 wind study, gusts were up to four times stronger in sparsely-forested areas than in densely-forested areas; increasing wind speeds in the Reserve could be particularly harmful because many trees in the Reserve are unhealthy and structurally unsound. In addition, many parts of the Reserve are either topographically exposed or situated on steep slopes with somewhat shallow soils or unstable geology; it is therefore possible that tree removal, particularly in these areas, could increase windthrow risk.

As part of tree removal activities, UCSF would determine which trees to remove with guidance from a professional urban forester or arborist who would consider the size and health of the tree, location relative to other trees and vegetation, effect on windthrow, and aesthetics, among other considerations. The removal of hazardous trees would reduce short-term windthrow risks; however, the potential adverse effect from the creation of forest gaps would outweigh the beneficial effect of removing hazardous trees. The plan includes implementation of group selection and seed tree forest treatments, which would result in the creation of forest gaps up to 1 acre in size. These small- to medium-sized forest gaps would be dispersed throughout the Reserve across the life of the plan. Trees at the periphery of the treatment areas could be more susceptible to windthrow. A significant impact could occur if tree removal caused wind speeds and windthrow risk to increase and threaten the safety of people and structures within and adjacent to the Reserve. **MM Wind-1: Monitor Tree Removal Areas** requires UCSF to monitor areas where trees have been removed to assess tree health and remove any trees considered a hazard to people or structures. This measure would require that any hazard trees between seed tree or group selection areas and trails or infrastructure would be examined for stability and removed if they are determined to be a hazard. Impacts would be less than significant with implementation of **MM Wind-1: Monitor Tree Removal Areas**.

Native Plant Restoration and Maintenance of Trails and Public Access

Native plant restoration and vegetation trimming for maintenance of trails would be performed at ground level. Of the biotic features in the Reserve, the tree canopy has the greatest influence on wind speed and penetration because of its height; ground vegetation has little influence on winds, particularly in the interior of the Reserve. While the removal and trimming of ground vegetation may affects microclimates around native plant restoration areas and trails, wind penetration or speed in the Reserve would not be affected such that the risk of windthrow would be increased. Impacts from native plant restoration and trail maintenance on windthrow would be less than significant.

Comparison of Impacts Across Phases

Phase I

Windthrow risk would be greatest during Phase I of the plan. The first forest gaps would be created during Phase I, which may have an initial shock effect on the forest before remaining trees have been given time to adapt to the new wind environment and before newly planted trees have been given time to grow. As previously discussed, the removal of dead and dying trees would reduce the risk of windthrow, but the creation of forest gaps for seed tree and group selection treatments may increase wind speeds and wind penetration at the periphery of these areas such that the potential for windthrow would increase. Increasing windthrow risk would be a significant impact. **MM Wind-1: Monitor Tree Removal Areas** requires UCSF to monitor areas where trees have been removed and to remove hazardous trees that threaten the safety of people and structures. Impacts would be less than significant with mitigation.

Phases II and III

Windthrow risk around forest gaps created during Phase I would decrease in Phases II and III of the plan as seedlings planted in forest gaps grow. Young trees would reduce wind penetration and wind speeds in the forest, reducing the risk of windthrow. However, forest gaps would be created during Phases II and III in new locations throughout the Reserve, and wind impacts described above would occur during Phases II and III. Impacts from windthrow could be potentially significant. UCSF would implement **MM Wind-1: Monitor Tree Removal Areas**, which requires monitoring of tree removal areas and removal of hazardous trees. Impacts would be less than significant with mitigation.

Impact Wind-2: The proposed plan could have a substantial adverse long-term windthrow-related effect on the safety of people or structures.	**Significance Determination**
	Less than significant

Similar to impacts described under Impact Wind-1, tree removal activities may have both positive and negative short-term windthrow risks by reducing hazard trees, creating forest gaps through seed tree and group selection treatments, and altering the Reserve's tree composition through the planting of native tree species during Phase III. While tree removal can initially increase the risk of wind damage to trees, trees can become adapted to their new environment and become more resilient to windthrow (Wonn and O'Hara 2001). The removal of dead and dying trees that are most likely to fail in high wind events would reduce long-term windthrow risk by allowing the remaining healthy trees to grow larger by releasing them from competition for light, nutrients, and moisture. After tree removal, trees have been observed to increase growth in diameter rather than height, making them more structurally stable (Wonn and O'Hara 2001); the same phenomenon is likely to occur in the Reserve, and the remaining trees would be more robust to windthrow. The removal of dead and dying trees would also allow eucalyptus seedlings planted in forest gaps to grow, which would reduce wind penetration and speed and reduce the risk for windthrow over time. Studies have shown that reducing stand density can lead to greater long-term wind-firmness (Wonn and O'Hara 2001, Cremer, et al. 1982); it is therefore likely that the Reserve would eventually become more windfirm than

current conditions since tree density would decreased over the 20-year implementation period of the plan. Finally, the addition of a limited number of native tree species that are more robust to windthrow (e.g., coast redwood, coast live oak) in Phases II and III may further improve the wind-firmness of the Reserve. Vegetation management activities would, in the long-term, have a beneficial impact on wind-firmness in the Reserve and reduce the risk of windthrow; impacts would be less than significant.

Impact Wind-3: The proposed plan could have a substantial adverse effect on wind environments in local neighborhoods.	**Significance Determination**
	Less than significant

Overview

The Reserve serves as a windbreak to many neighborhoods surrounding Mount Sutro, and tree removal under the proposed plan may increase wind speeds in the neighborhoods. Wind speed effects would depend on several factors, including wind gust direction, wind velocity, the configuration of the Reserve and local neighborhoods, and the local topography. Higher wind velocities could result in greater impacts on the local neighborhoods.

Vegetation Management Activities

Wind Directions

Regional climate data shows that the strongest wind gusts observed at the San Francisco International Airport occur during winter and that these gusts generally come from the south. During spring and summer (April through September), peak gusts are consistently lower and derive from the west or northwest. Although these are the peak gust directional patterns observed in San Francisco, strong gusts could emanate from any direction in any season. Neighborhoods on the leeward side (the protected side or opposite side from which the wind blows) of wind events would differ depending on wind direction. Representative streets within the neighborhoods located on each side of the Reserve include:

- **North.** Northern portion of the UCSF Parnassus Heights campus site
- **Northeast.** Edgewood Avenue, Woodland Avenue, and Belmont Avenue
- **Southeast.** Woodhaven Court, Christopher Drive, Clarendon Avenue, and Forest Knolls Drive
- **South.** Crestmont Drive and Christopher Drive
- **West.** Crestmont Drive, Oak Park Drive, Koret Way, and 5th Avenue

Effects on the wind environment in each neighborhood are discussed below.

Forest Treatments, and Management of Tree Risk and Defensible Space

Wind data collected in 2012 during the Mount Sutro wind study revealed that topographical variations between the monitoring stations as well as local obstructions played a strong role in determining wind speed and may have overshadowed any differences in wind speed produced by differences in tree density. Given this observation, proposed tree removal may have a limited effect on the wind environments in surrounding neighborhoods. The minimum

recommended width for a windbreak is 300 feet (Kansas State University 2004). Most areas of the Reserve would greatly exceed this threshold such that proposed changes in tree density (i.e., tree removal) would have limited to no impact on the wind environment on the leeward side of the Reserve.

The Reserve provides wind protection for the UCSF Parnassus Heights campus site from the south. The topography of the Reserve likely blocks much of the wind that originates from the south. Trees would be removed for forest treatments and management of defensible space from the slopes immediately south of the campus site. The windbreak provided by trees on these slopes would be far wider than 300 feet (i.e., the entire length of the Reserve, or approximately 1,200 feet); thus, tree removal would have a less than significant impact on the wind environment at the UCSF Parnassus Heights campus site.

The Edgewood Avenue, Belmont Avenue, and Woodland Avenue neighborhoods receive wind protection from the Reserve from a narrow strip to the west. These neighborhoods currently have limited protection from the Reserve because this strip of trees is narrow (approximately 200 feet wide) and because of the presence of the Surge and Woods paved parking lots. Similar to the UCSF Parnassus Heights campus site, the majority of wind protection is likely provided by the topography of the Reserve, which includes a ridge in this narrow strip of trees that blocks winds from the west. While the removal of some trees from this strip may slightly increase wind speeds, the topography of the Reserve would remain unchanged and would continue to afford wind protection to Edgewood Avenue, Belmont Avenue, and Woodland Avenue. Impacts from tree removal would be less than significant.

The Reserve provides wind protection to the neighborhoods southeast of the Reserve (Woodhaven Court, Christopher Drive, Clarendon Avenue, and Forest Knolls Drive) for winds that originate from the west/northwest and north. The Interior Greenbelt, Aldea San Miguel Housing development, and topography of the Reserve also contribute to wind protection in these neighborhoods; the protection afforded by these features would remain unchanged as a result of proposed tree removal activities. Tree removal may affect the wind environment in neighborhoods southeast of the Reserve; however, the windbreak created by the Reserve for winds from the west/northwest and north would be at least 400 feet wide and up to approximately 1,200 feet wide. Tree removal would therefore not significantly affect the wind environment in the neighborhoods southeast of the Reserve; impacts would be less than significant.

Crestmont and Christopher Drives, located immediately south of the Reserve, could be affected by strong north/northeast winds; however, these winds are less common than those originating from the west/northwest or south. The Reserve extends more than 1,200 feet north of these neighborhoods and would therefore continue to provide wind protection after tree removal. Impacts on the wind environment south of the Reserve would be less than significant.

Neighborhoods west of the Reserve would receive wind protection from winds originating from the east. The topography of the Reserve likely plays a significant role in protecting

neighborhoods west of the Reserve from easterly winds; in addition, easterly winds are uncommon and likely only associated with storm events. The windbreak created by the Reserve for winds from the east would be at least 400 feet wide and up to 800 feet wide; tree removal within the Reserve would therefore have little effect on the wind environment west of the Reserve. Impacts on the wind environment would be less than significant.

Native Plant Restoration and Maintenance of Trails and Public Access
As discussed under Impact Wind-1, native plant restoration and vegetation trimming for maintenance of trails would have little effect on wind speeds in the Reserve because these activities would be performed at ground level. Ground-level vegetation has little influence on wind environments because they do not have the height to greatly influence winds. Additionally, native plant restoration and vegetation trimming along trails would occur in the interior of the Reserve, which would not be close enough to surrounding neighborhoods to influence wind environments in those neighborhoods. Native plant restoration and trail maintenance would have no impact on wind environments in surrounding neighborhoods.

Comparison of Impacts Across Phases

Phase I
Tree removal during Phase I could influence the wind environment in surrounding neighborhoods by reducing the effectiveness of the windbreak created by the trees in the Reserve. Of the abiotic and biotic factors present in the Reserve, the steep slopes present on all sides of the Reserve likely provide the greatest amount of wind protection to surrounding neighborhoods. Seed tree and group selection treatments, which would remove the largest numbers of trees in a single area, would be performed in small- to medium-sized pockets around the Reserve but would be largely interior to the Reserve. The windbreak created by the forest would continue to provide wind protection for surrounding neighborhoods despite tree removal during Phase I. Impacts on the wind environment in surrounding neighborhoods would be less than significant.

Phases II and III
The windbreak created by the forest would continue to be altered in Phases II and III of the proposed plan. Forest treatments would be implemented in parts of the forest that were not previously treated but would continue to be implemented in a non-contiguous fashion such that no one area of the Reserve would be devoid of trees. Planted eucalyptus seedlings would grow to fill in seed tree and group selection treatment areas from Phase I and contribute to the windbreak created by the Reserve. The removal of dead and dying trees would reduce competition for remaining healthy trees, which would allow remaining healthy trees to grow and likely increase their potential to act as a windbreak as they become more windfirm (refer to the discussion under Impact Wind-2). While the forest would continue to be altered through tree removal, the spatial distribution of tree removal would not significantly increase wind speeds for surrounding neighborhoods, and the recovering forest would likely grow to create a more effective windbreak than what currently exists. Impacts on the wind environment in surrounding neighborhoods would be less than significant.

Impact Wind-4: The proposed plan could result in significant impacts on wind in combination with past, present, and probable future development in the cumulative analysis study area.	Significance Determination
	Less than significant contribution with mitigation

Geographic Scope

The geographic extent for the analysis of cumulative impacts from wind is an area within approximately 0.25 mile of the proposed plan area. This geographic extent is appropriate to account for changes in surface-level wind dynamics and potential increases in windthrow hazard.

Cumulative Analysis

Windthrow Hazards

Construction of several cumulative projects (Mt. Sutro Reserve Improvements [#9], Kirkham Project [#15], Overlook Project [#16], and SNRA Management Plan [#17]) would involve tree removal and/or construction of new buildings directly adjacent to the Reserve. These activities could change wind patterns and consequently increase risk of windthrow within the Reserve. The potential for windthrow to increase within the Reserve due to implementation of cumulative projects could be cumulatively significant.

Gaps created due to tree removal proposed as part of the plan, primarily during seed tree and group selection treatments, could increase the risk of windthrow in the short-term due to the topography, shallow soils, and unstable geology of the Reserve. In the long-term, removal of dead and dying trees would reduce the windthrow risk compared to existing conditions. The proposed plan's contribution to a significant cumulative impact from increased risk of windthrow could be considerable. **MM Wind-1: Monitor Tree Removal Areas** requires UCSF to monitor areas where trees have been removed to assess tree health and remove any trees considered a hazard to people or structures. The proposed plan's contribution to potentially significant cumulative impact from increased short-term windthrow risk would be less than cumulatively considerable with mitigation.

Wind Environment

Cumulative projects located adjacent to the Reserve could change wind conditions due to construction of new buildings and tree removal. Several cumulative projects (Kirkham Project [#15], Overlook Project [#16], and SNRA Management Plan [#17]) have been analyzed and would not result in noticeable changes to wind speeds outside of the project site boundaries. Construction or demolition of buildings as part of other cumulative projects (Building Demolition [#1], Long Hospital Addition [#2], Fifth and Parnassus [#5], Proctor Demolition and Housing/Open Space Development [#6], and Surge, Woods, and EHS Open Space Restoration [#8]), could result in noticeable change in wind patterns but would not accumulate with the proposed plan due to the existing topography of the Reserve. The cumulative projects in combination with the proposed plan would not result in substantial changes to wind patterns in local neighborhoods. No cumulative impacts would occur.

4.13.6 Mitigation Measures

MM Wind-1: Monitor Tree Removal Areas
A forester or arborist shall monitor areas where trees are removed from the Reserve (i.e., defensible space and individual tree removal, group selection, and seed tree areas) on a quarterly basis (i.e., four times a year) to assess tree health and condition. Trees prone to windthrow (e.g., dead or diseased trees) and considered a hazard to people or structures shall be removed.
Locations: Areas of tree removal
Performance Standards: • **Before Activities:** N/A • **During Activities:** N/A • **After Activities:** (1) Areas of tree removal are monitored quarterly, and (2) Hazardous trees are removed

4.13.7 References

Arens, E. 1981. "Designing for an acceptable wind environment." Transportation Engineering Journal, ASCE 107: 127-141.

Burns, R.M., and B.H. Honkala. 1990. "Silvics of North America." United States Department of Agriculture, Forest Service Agriculture Handbook 654. December. Accessed April 14, 2017. https://www.na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm.

Cremer, K.W., C.J. Borough, F.H. McKinnell, and P.R. Carter. 1982. "Effects of stocking and thinning on wind damage in plantations." New Zealand Journal of Forestry Science 12 (2): 244-268.

Everham, E.M. III, and N.V.L. Brokaw. 1996. "Forest damage and recovery from catastrophic wind." Botanical Review 62 (2): 113-185.

Foster, D.R. 1988. "Disturbance history, community organization, and vegetation dynamics of the old-growth Pisgah forest, southwestern New Hampshire." Journal of Ecology 76: 105-134.

Harris, A.S. 1999. "Wind in the forests of southeast Alaska and guides for reducing damage." U.S. Forest Service, Pacific Northwest Research Station General Technical Report, July: 1-63.

Kansas State University. 2004. "Windbreaks for Kansas." Kansas Forest Service. May. Accessed April 14, 2017. https://bookstore.ksre.k-state.edu/pubs/MF2120.pdf.

Kramer, M.G., A.J. Hansen, M.L. Taper, and E.J. Kissinger. 2001. "Abiotic controls on long-term windthrow disturbance and temperate rainforest dynamics in southeastern Alaska." Ecology 82 (10): 2749-2768.

McBride, J., and J. Leffingwell. 2006. "Assessing wind throw potential in urban forests of coastal California." Society of American Foresters Newsletter.

Navratil, S. 1995. Minimizing Wind Damage in Alternative Silviculture Systems in Boreal Mixedwoods. Edmonton, Alberta, Canada: Canadian Forest Service and Land and Forest Service.

Roberts, S.D., C.A. Harrington, and K.R. Buermeyer. 2007. "Does variable-density thinning increase wind damage in conifer stands on the Olympic Peninsula?" Western Journal of Applied Forestry 22 (4): 285-296.

Ruel, Jean-Claude. 1995. "Understanding windthrow: Silvicultural implications." The Forestry Chronicle 71 (4): 434-445.

Santiago, M.J., and A.D. Rodewald. n.d. "Extension Factsheet: Shelterbelts for Wildlife." The Ohio State University Extension, School of Natural Resources. Accessed April 14, 2017. https://woodlandstewards.osu.edu/sites/woodlands/files/imce/0016.pdf.

Western Regional Climate Center (WRCC). 1990. San Francisco, California, International Airport: Normal, Means, and Extremes. Accessed April 17, 2017. http://www.wrcc.dri.edu/cgi-bin/clilcd.pl?ca23234.

—. 2002. Average Wind Direction, San Francisco Int'l AP CA 1992-2002. http://www.wrcc.dri.edu/climatedata/climtables/westwinddir/.

—. 2006. Average Wind Speeds - MPH, San Francisco Intl AP 1996-2006. http://www.wrcc.dri.edu/climatedata/climtables/westwind/.

White, P.S., and S.T.A Pickett. 1985. Natural Disturbance and Patch Dynamics. San Diego, California: Academic Press, Inc.

Wisconsin Department of Natural Resources, Division of Forestry. 2003. "Windbreaks that work." Wisconsin Department of Natural Resources. Accessed April 14, 2017. http://dnr.wi.gov/topic/ForestManagement/documents/pub/FR-070.pdf.

Wonn, H.T., and K.L. O'Hara. 2001. "Height:Diameter Ratios and Stability Relationships for Four Northern Rockey Mountain Tree Species." Western Journal of Applied Forestry 16 (2): 87-94.

5 ALTERNATIVES

5.1 INTRODUCTION

This section of the EIR presents the alternatives analysis to the proposed plan. CEQA requires that an EIR describe a range of reasonable alternatives to the project (or plan, in this case) that could feasibly avoid or lessen any significant impacts while attaining most of the basic objectives of the project. An EIR should also evaluate the comparative merits of the alternatives. This section sets forth potential alternatives to the proposed plan and evaluates them, as required by CEQA.

Key provisions of the CEQA Guidelines Section 15126.6 pertaining to the alternatives analysis are summarized below:

- The discussion of alternatives shall focus on alternatives to the project that are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly (CEQA Guidelines Section 15126.6(b)).
- The range of alternatives required in an EIR is governed by a "rule of reason" (CEQA Guidelines Section 15126.6(f)) that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice.
- The No Project Alternative shall be evaluated along with its impacts. The No Project Alternative analysis shall discuss the existing conditions at the time the Notice of Preparation is published. Additionally, the analysis shall discuss what would be reasonably expected to occur in the foreseeable future if the project were not approved based on current plans and practices and consistent with available infrastructure and community services (CEQA Guidelines Section 15126.6(e)).
- An EIR need not consider an alternative whose effects cannot be reasonably ascertained and whose implementation is remote and speculative (CEQA Guidelines Section 15126.6(f)).

The range of feasible alternatives should be selected and discussed in a manner intended to foster meaningful public participation and informed decision-making.

5.2 APPROACH TO ALTERNATIVES ANALYSIS

5.2.1 Plan Objectives

Consistent with the requirements of CEQA, each alternative was evaluated to determine if it would meet most of the basic plan objectives. The basic plan objectives are to:

- Protect the safety of Reserve users and adjacent campus and residential properties
- Improve and enhance the health and stability of the ecosystem
- Enhance the long-term visual design and aesthetic experience in the Reserve
- Maintain and ensure public access to the Reserve

5.2.2 Feasibility

Each alternative was evaluated to determine if it would be feasible. Feasibility was assessed from economic, environmental, legal, social, and technological standpoints (CEQA Guidelines Section 15364). Considerations include, but are not limited to, whether (1) regulatory restrictions would limit successful implementation, (2) technical constraints can be overcome, (3) cost of the alternative would be prohibitive, (4) the alternative would be consistent with existing plans, or (5) implementation of the alternative would cause substantially greater environmental damage than the proposed plan.

5.2.3 Impacts of the Proposed Plan

Pursuant to CEQA, alternatives were evaluated for whether they would avoid or substantially lessen any significant impacts of the proposed plan. The evaluation considered whether the alternative would create significant environmental impacts potentially greater than those of the plan as proposed. To evaluate the impacts that could be avoided or substantially lessened through an alternative, UCSF first identified the potentially significant impacts of the proposed plan. The IS prepared for the proposed plan (published February 6, 2017) included an evaluation of the potential impacts of the proposed plan related to all CEQA topics (refer to Appendix A). The plan was found to have no impact or less than significant impacts on several environmental resource topics. These resource topics were not carried forward for analysis in the EIR. The following resource topics were evaluated further in this EIR (refer to Section 4: Environmental Setting, Impacts, and Mitigation Measures):

- Aesthetics
- Air Quality
- Biological Resources
- Cultural and Tribal Cultural Resources
- Forestry Resources
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology, Water Quality, and Water Supply
- Noise
- Recreation
- Transportation and Traffic
- Wind

The environmental impact analysis revealed that with the implementation of pertinent mitigation measures contained in the 2014 LRDP and mitigation measures formulated specifically for the proposed plan, the proposed plan would result in only one significant and

unavoidable impact, which would be on visual quality. A summary discussion of all proposed plan impacts is presented in Table 5.2-1.

Table 5.2-1 Summary of Environmental Impacts of the Proposed Plan

Resource Topic	Environmental Impacts
Aesthetics	• **Significant and unavoidable** temporary impact on visual quality from the removal of trees in seed tree and group selection areas • **Potentially significant** impact on visual quality from the creation of landing areas and access roads. Impacts would be reduced to a less-than-significant level with mitigation • **Less than significant** impact on scenic vistas
Air Quality	• **Less than significant** impact from criteria air pollutant and TAC emissions, and from exposing sensitive receptors to substantial pollutant concentrations • **No impact** from conflicting with an applicable air quality plan
Biological Resources	• **Potentially significant** impact on special-status species, migratory species, and wildlife nursery sites. Impacts would be reduced to a less-than-significant level with mitigation • **Less than significant** impact on riparian habitat, conflicting with a local policy or ordinance for the protection of biological resources, and removal of heritage or landmark trees
Cultural and Tribal Cultural Resources	• **Less than significant** impact on historic resources, archaeological resources, and tribal cultural resources
Forestry Resources	• **Less than significant** impact on forest land
Geology and Soils	• **Potentially significant** impact from unstable soils, erosion, and landslides. Impacts would be reduced to a less-than-significant level with mitigation
Greenhouse Gas Emissions	• **Less than significant** impact on generation of GHG emissions and conflicting with an applicable plan, policy, or regulation adopted for the purpose of reducing the emission of GHGs
Hazards and Hazardous Materials	• **Potentially significant** impact from creating a significant hazard through the routine transport, use, or disposal of hazardous materials; creating a significant hazard through reasonably foreseeable upset and accident conditions involving the release of hazardous materials; and wildfires. Impacts would be reduced to a less-than-significant level with mitigation
Hydrology and Water Quality	• **Potentially significant** impact on existing drainage patterns that could result in substantial erosion, existing drainage patterns that could cause on- or off-site flooding, and impact on stormwater from polluted runoff. Impacts would be reduced to less-than-significant with mitigation • **Less than significant** impacts on water supply
Noise	• **Less than significant** impact on sensitive noise receptors from temporary and permanent noise increases
Recreation	• **Potentially significant** impact on recreational facilities. Impacts would be reduced to a less-than-significant level with mitigation
Transportation and Traffic	• **Potentially significant** impact on traffic hazards; conflicts among autos, bicyclists, pedestrians, and transit vehicles; and emergency access. Impacts would be reduced to a less-than-significant level with mitigation

Resource Topic	Environmental Impacts
Wind	• **Potentially significant** impact from windthrow in the short-term. Impacts would be reduced to a less-than-significant level with mitigation • **Less than significant** impact on windthrow in the long-term and wind environments in local neighborhoods

5.3 ALTERNATIVES CONSIDERED BUT NOT EVALUATED IN DETAIL

CEQA Guidelines Section 15126.6(c) states that an EIR should briefly describe the rationale for selecting the alternatives to be discussed in an EIR and the reasons for eliminating alternatives from detailed consideration. Alternatives are eliminated if they did not meet the basic project objectives, were not feasible, and/or would not avoid or substantially lessen the significant environmental effects of the proposed plan. UCSF considered several alternatives that were subsequently eliminated from further consideration.

Table 5.3-1 provides a description of each rejected alternative and the rationale for rejection.

Table 5.3-1 Rejected Alternatives

Description of Alternative	Rationale for Rejection
No Tree Planting Dead and dying trees would be removed, but no seedlings (eucalyptus or natives) would be planted to replace removed trees. Tree removal areas would be revegetated with native shrubs and grasses, and eucalyptus seedlings would not be allowed to establish. Source: Scoping	Does not meet two project objectives (enhance existing ecosystem or improve visual experience) and would result in increased impacts on visual quality, windthrow, wind environment, carbon sequestration, erosion, water quality, fire, noise, and forestry resources from removing but not replacing trees within the Reserve.
Only Remove Dead Trees Only dead trees would be removed during forest treatments and within defensible space. Dying and diseased trees would remain in the forest and would not be cut. Source: UCSF	Does not meet three project objectives (protect public safety, improve the health of the forest, or maintain public access); dying trees would still present hazards to the public, impede growth of new seedlings and maintain diseased trees within the Reserve, and reduce public access if portions of trails are closed due to hazardous tree conditions. This alternative would not be legally feasible because it would conflict with PRC §4291, which requires the removal of both dead and dying trees adjacent to buildings if the trees are considered a hazard. This alternative would also result in greater environmental impacts on fire hazards, windthrow, recreation, and emergency access.

Description of Alternative	Rationale for Rejection
Increase Intensity of Forest Treatments More areas would be treated with seed tree and group selection methods and more non-native understory would be removed in Phases I and II to accelerate forest treatments. Forest treatments would focus on areas of heavy decline and low tree density due to tree mortality. Source: Scoping	Would not avoid or reduce the significant and unavoidable temporary aesthetic impact; rather, the significant and unavoidable temporary impact on visual quality would be increased by conducting more forest treatments in the Reserve. This alternative would also result in greater environmental impacts on erosion, water quality, air quality, GHG emissions, traffic, and temporary noise.
Decrease Intensity of Forest Treatments Fewer and smaller areas would be treated with seed tree and group selection methods in Phases I and II. Like the proposed plan, forest treatments would focus on areas of heavy decline and low tree density due to tree mortality. Fewer areas of non-native understory would be removed, and fewer trees would be planted to establish regeneration. Management of defensible space would remain the same as the proposed plan. Source: Scoping	Does not meet the project objective to improve the health of the forest or improve public safety; forest treatments would not occur at the rate necessary to reduce fuel load in the understory to reduce fire risk, which would also affect public safety from fire, or enhance growing conditions for planted trees. While the alternative could reduce the significant and unavoidable temporary aesthetic impact by reducing the intensity and size of forest treatments areas, it could result in long-term significant impacts on fire hazard, windthrow, recreation, and emergency access.
Leave All Culled Vegetation Material On-Site Instead of transporting approximately 60 percent of removed vegetation to an off-site composting facility, all vegetative materials from tree and understory removal would be chipped or chopped into slash and spread across the Reserve, including non-native and invasive understory plants. Source: UCSF	Does not meet three of four project objectives (protect public safety, enhance the health of the Reserve, or enhance the visual design of the Reserve). Leaving more chips on site would increase fire hazards by spreading fuels across the Reserve, which would negatively affect public safety. The areas of plantings would be reduced because too much slash left on site would not leave sufficient cleared areas to plant new trees. This alternative would result in greater environmental impacts on visual quality from increased amounts of slash left around the Reserve; on fire hazards; and from invasive weeds spreading non-native, invasive vegetative materials across the Reserve.
Use Herbicides Herbicides would be used to control non-native understory and prevent grow-back of diseased eucalyptus. Source: Scoping	UCSF has made a commitment to the community to not use herbicides within the Reserve for vegetation management purposes. This alternative would also result in increased impacts on air quality, hazardous materials, and water quality.
Increase Management Space around Trails The area of managed space around trails would increase from 30 to 100 feet. Source: UCSF	Would not avoid or reduce significant and unavoidable impact on aesthetics; impacts on aesthetics would be increased because more trees would be removed along trails. Would also result in greater environmental impacts from erosion, water quality, air quality, GHG emissions, noise, and recreation due to greater tree removal than the proposed plan.

5.4 ALTERNATIVES EVALUATED IN DETAIL

Alternatives were assessed for their ability to reasonably achieve most of the basic project objectives, their feasibility, and their potential to avoid or reduce significant environmental impacts of the proposed plan. Based on the assessment, the alternatives described in this section were selected for further analysis. CEQA Guidelines Section 15126.6(e) also requires an analysis of the No Project Alternative, which is also included in this section. Table 5.5-1, presented at the end of this section, contains a summary comparing the proposed plan and the four alternatives evaluated in detail.

5.4.1 Alternative 1: No Project Alternative

Description of Alternative 1

Pursuant to CEQA Guidelines Section 15126.6(e), an EIR must include an evaluation of a No Project Alternative so decision makers can compare the impacts of approving the proposed project with the impacts of not approving the proposed project. The evaluation of the No Project Alternative must discuss the existing conditions at the time the Notice of Preparation was published (February 2017 for this EIR) as well as "what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services" (CEQA Guidelines Section 15126.6(e)(2)). Therefore, the No Project Alternative considers the reasonably foreseeable actions that would be implemented by UCSF if the proposed plan is not approved.

Under the No Project Alternative, the proposed plan would not be implemented. If the proposed plan is not approved by the Regents, it is reasonable to assume that UCSF would continue to conduct ongoing maintenance in the Reserve to reduce fire hazards and hazards to people and structures from falling trees. Ongoing maintenance would include, but would not necessarily be limited to, pruning trees and bushes, removing hazardous trees, removing debris, and maintaining trails.

Aesthetics

Unlike the proposed plan, the No Project Alternative would not involve forest treatments. Consequently, the No Project Alternative would not result in a significant and unavoidable impact on visual quality from forest treatments. However, if eucalyptus continue to die, the visual quality of the Reserve would decline as the forest naturally thins and the canopy becomes patchier. A greater number of dead standing trees would be present in views from outside of and from within the Reserve. Certain areas may become more brush-like if understory plants are allowed to colonize areas of eucalyptus dieback; other areas may become dominated by blackwood acacia. Eucalyptus sprouts from diseased trees may proliferate and create the appearance of a regenerating forest; however, these sprouts may not have the same growth pattern as the parent trees because they would inherit any heart rot or other pathogen that the parent tree had. The resulting forest may be patchy, shorter, and less alive than the forest that would result from the proposed plan's vegetation management activities. Under the No Project Alternative, impacts on visual quality would be significant and unavoidable.

Air Quality

Criteria pollutant and TAC emissions generated from use of equipment would be significantly reduced with implementation of the No Project Alternative. The only emissions that would be generated would occur during removal of hazardous trees from the Reserve, which would represent only a small fraction of the emissions that would be created from the proposed plan. The emissions from implementing the proposed plan would be minimized by the No Project Alternative. Impacts would be less than significant.

Biological Resources

As the forest declines and either understory vegetation or blackwood acacia colonize areas of eucalyptus dieback, habitat across the Reserve would change. Non-native understory would cover more areas of the Reserve. Dead eucalyptus would no longer provide nesting or roosting habitat for special-status bird and bat species that require live branches. No additional native plant restoration would occur; thus, habitat for native species would not be enhanced. The No Project Alternative would increase impacts on special-status species, habitat, and nursery sites.

Cultural and Tribal Cultural Resources

The No Project Alternative would disturb fewer areas of the forest because it would only involve the removal of hazardous trees from the Reserve. As a result, the No Project Alternative would result in a lesser impact on previously undiscovered historical, archaeological, and tribal cultural resources than the proposed plan. Mitigation measures from the 2014 LRDP would be implemented, and impacts on previously undiscovered cultural resources would be less than significant.

If the forest ages naturally and the understory and blackwood acacia come to dominate areas of eucalyptus die back, it is possible that eucalyptus may one day not be the dominant tree species in the forest. Since the Reserve is part of the Mount Sutro Cultural Landscape and considered significant, in part, because it hosts a eucalyptus-dominant forest, loss of the eucalyptus would adversely affect one of the primary characteristics that contribute to the cultural landscape's eligibility for listing on the CRHR. Thus, unlike the proposed plan, the No Project Alternative could create a significant and unavoidable impact on the Mount Sutro Cultural Landscape in the long term.

Forestry Resources

Unlike the proposed plan, the forest would be allowed to change without intervention. If blackwood acacia and the understory grow to dominate areas of eucalyptus dieback and eucalyptus sprouts, the forest would continue to be forest land, albeit riddled with patches of more brush-like areas. Although the dominant species in the forest may change, the Reserve would likely continue to be forest land under the No Project Alternative, similar to the proposed plan. Impacts would be less than significant.

Geology and Soils

Under the No Project Alternative, landslides would have the same potential to occur as the proposed plan in areas of defensible space because hazardous trees could be removed in the same manner as the proposed plan. However, landslide hazards and erosion would increase as

a result of the No Project Alternative in the rest of the Reserve. When trees fall naturally, they often pull up large pockets of soil as the roots are upended. Removing roots from the ground would increase erosion potential and therefore landslide potential because fewer roots would be available to hold the soil in place. As eucalyptus die and fall, more areas of the forest would be subject to erosion and possible landslides before understory vegetation colonizes and stabilizes the area. Impacts from erosion and landslides could be greater under the No Project Alternative than the proposed plan and would be potentially significant and unavoidable.

Greenhouse Gas Emissions

Similar to criteria pollutant emissions, GHG emissions would be far less under the No Project Alternative than the proposed plan. Landing areas and access road improvements would not be created or made under the No Project Alternative. GHG emissions would only be generated from equipment use for hazardous tree removal. The No Project Alternative would result in fewer GHG emissions compared to the proposed plan; impacts would be less than significant.

The carbon sequestration rate of the forest would be reduced as eucalyptus continue to die, which would have an overall detrimental effect on global GHG emission levels. Blackwood acacia would likely sequester carbon at a similar rate as eucalyptus in the early years of development; however, overall carbon sequestration from blackwood acacia would be less than eucalyptus because acacia do not grow as tall and do not live as long as eucalyptus. Growth of blackwood acacia and eucalyptus sprouting from diseased trees would sequester less carbon than a healthy eucalyptus forest; acacia and sprouting eucalyptus would be shorter than healthy eucalyptus, and eucalyptus growth would be impeded by any diseases transferred from the parent tree to the sprouts. Therefore, acacia and sprouting eucalyptus would not have the same carbon sequestration potential as a healthy eucalyptus forest. The No Project Alternative would have a greater impact on the ability of the forest to sequester carbon than the proposed plan because less carbon would be sequestered under the No Project Alternative due to the changes in forest type that would occur. Impacts would be greater than for the proposed project, but would remain less than significant.

Hazards and Hazardous Materials

The No Project Alternative would involve the use of hazardous materials for equipment (e.g., fuels, coolant, etc.) to remove hazardous trees from the Reserve. Compared to the proposed plan, fewer hazardous materials would be brought into the Reserve under the No Project Alternative because the No Project Alternative would not involve the use of equipment for forest treatments or the creation of landing areas and access roads. The No Project Alternative would have a lesser impact from accidental spill or release of hazardous materials than the proposed plan. UCSF would implement measures to clean up spills as required by law, which would ensure less than significant impacts.

Fire hazards would likely increase under the No Project Alternative compared to the proposed plan. While dead trees would increase fuel load in the forest, they would not present the greatest fire hazard because they are large diameter fuels that do not catch fire as easily as, for example, brush. Fire hazard may decrease in more brush-like areas of the Reserve because

understory vegetation such as vines have a high moisture content and canopy fires would not occur. If eucalyptus die and sprout and blackwood acacia becomes the dominant tree species, the forest would become shorter. Eucalyptus sprouts would act as ladder fuels for the acacia, which would light more easily than tall eucalyptus because they are closer to the ground and require a shorter flame length to ignite from a ground fire. Overall, fire hazard would increase in the Reserve from eucalyptus sprouts and blackwood acacia. Impacts from the No Project Alternative would be greater than the proposed plan and would be potentially significant and unavoidable.

Hydrology and Water Quality

Impacts on hydrology would generally be less for the No Project Alternative than for the proposed plan. Much of the hydrologic impacts associated with the proposed plan are related to land clearing for both landing areas and forest treatments. Under the No Project Alternative, these cleared areas would not be created. However, as eucalyptus continued to die and fall, sloped root systems could still generate erosion (as discussed under Geology and Soils), which could run-off and be a source of sedimentation in downstream storm drains. If brush and other species were to grow in place of where eucalyptus die off, roots from these species could reduce erosion by binding the soil. Impacts would likely be less than significant.

Slash and debris from dead trees would likely flow downslope, affecting storm drains and causing periodic storm drain blockages and localized flooding. The degree of soil loss and downstream flooding is unknown but would be similar to existing conditions and would be less than significant.

Noise

Noise impacts would generally be reduced for the No Project Alternative. While defensible space tree removal and trimming would still occur, it would be performed in a manner similar to existing conditions so there would be no temporary increase in noise associated with equipment use to perform vegetation management activities. Permanent noise levels throughout the Reserve may or may not increase, depending on how trees grow back. If eucalyptus die off and overall tree and brush density decrease, noise levels could increase in the same way as would be seen under implementation of the proposed plan. If brush and understory trees were to remain and grow into opening created by dead eucalyptus, forest density may actually increase and ambient noise levels within and surrounding the Reserve may decrease. Noise impacts would be less than significant.

Recreation

The No Project Alternative would involve trail closures for public safety during hazardous tree removal within the Reserve. Unlike the proposed plan, the No Project Alternative would not involve trail closures for forest treatments or the creation of landing areas or access routes. Impacts on recreational resources from the No Project Alternative would be less than impacts from the proposed plan. Impacts would be less than significant.

Transportation and Traffic

Traffic hazards for other vehicles, bicyclists, pedestrians, and public transit facilities would be created by logging and chip trucks. Fewer trucks would be required to haul vegetative materials off site because far fewer trees would be removed from the Reserve under the No Project Alternative. Compared to the proposed plan, the No Project Alternative would have fewer impacts on traffic hazards. Impacts would be less than significant.

Wind

As eucalyptus trees die, the risk of windthrow would increase because (1) the dying trees would become structurally unstable and therefore more susceptible to wind, and (2) falling trees may injure other trees, increasing their susceptibility to wind, or cause other trees to also fall. As trees fall, more wind would be able to penetrate through the forest and affect other trees such as blackwood acacia. The trees may eventually adapt to greater wind speeds; however, short-term impacts from windthrow would be significant and greater than the proposed plan.

Long-term wind impacts may decrease under the proposed plan since new blackwood acacia and sprouting eucalyptus would grow in a higher wind environment and adapt to their environment. Though the resulting forest would likely be shorter than the existing forest, the No Project Alternative would have a similar effect on the wind environment in surrounding neighborhoods to the proposed plan because the topography of the Reserve plays a large role in creating a windbreak for homes around the Reserve, and topography would not change. Like the proposed plan, impacts would be less than significant.

Conclusion and Relationship to Project Objectives

The No Project Alternative would result in greater environmental impacts than the proposed plan, including impacts on aesthetics, biological resources, cultural resources, landslides and topsoil loss, fire hazards, emergency access, and windthrow. The No Project Alternative would be environmentally inferior to the proposed plan.

The No Project Alternative would meet the project objective to maintain and ensure public access in the Reserve by maintaining trails. Through the removal of hazardous trees, the No Project Alternative would also meet the objective to protect the safety of Reserve users and adjacent campus and residential properties. The No Project Alternative would not meet the objectives to improve and enhance the health of the Reserve or to enhance the visual design and aesthetic experience.

5.4.2 Alternative 2: Modified Forest Treatments

Description of Alternative 2

Alternative 2 would involve modifying seed tree and group selection treatments in the Reserve and restricting areas of forest treatments. All other vegetation management activities, including management of defensible space and tree risk, trail maintenance, and native restoration, would remain the same as for the proposed plan. Tree planting within forest treatment areas and spreading chips in areas of bare soil would also occur in the same manner as the proposed plan.

Under Alternative 2, seed tree and group selection areas would be set back a minimum distance of 30 feet from trails and roads. Individual tree selection would be used to create feathered edges around group and seed tree treatment areas, and native shrubs would be planted along the edges to screen the treatment areas. For group selection, groups would be restricted to no larger than 0.25 acre in size.

Aesthetics

Unlike the proposed plan, Alternative 2 would not result in a significant and unavoidable impact on visual quality from the creation of forest gaps from seed tree and group selection treatments. Seed tree and group selection treatment areas would be screened from viewers along trails by maintaining at least 30 feet between trails/roads and treatment areas, planting native shrubs, creating feathered edges around treatment areas by removing individual trees around the border of treatment areas, and restricting the size of forest gaps created by group selection. While the treatment areas may still be visible, viewers would not be subject to significant changes in the visual quality of the forest because forest treatment areas would be at least partially (if not fully) screened by remaining vegetation, sharp forest edges would not be created, and group treatment areas would be limited in size. Alternative 2 would have a lesser impact on visual quality from forest treatments than the proposed plan and would not result in a significant and unavoidable impact.

Landing areas and access roads would still be created under Alternative 2 that could have a significant effect on visual quality of the Reserve. The impact would be reduced through implementation of the proposed plan's mitigation measures, but like the proposed plan, the staging of heavy equipment and use of landing areas for up to 6 months per year would have a significant and unavoidable impact on visual quality.

Air Quality

Criteria pollutant and TAC emission quantities would be similar between Alternative 2 and the proposed plan. A similar level of tree removal would occur under Alternative 2, and landing areas and access roads would still be created to stage equipment and store culled vegetative materials. Similar to the proposed plan, impacts from emissions and exposure to TACs would be less than significant, and no conflicts with applicable air quality plans or other standards would occur.

Biological Resources

Similar to the proposed plan, Alternative 2 would involve the disturbance of existing habitat that could affect special-status species present or likely present in the Reserve and wildlife nursery sites. The areas of disturbance would be similar to the proposed plan; although group selection treatment areas would be restricted to 0.25 acre in size, individual trees would be disturbed to create feathered edges around treatment areas. Alternative 2 would also have a similar effect on heritage, landmark, native oak, and significant trees as the proposed plan since tree removal activities would also occur under Alternative 2. Alternative 2 would have a significant impact on special-status species, wildlife nursery sites, and significant trees; impacts

would be reduced to less than significant through the implementation of mitigation measures identified for the proposed plan.

Native habitat would be enhanced through the planting of native shrubs to screen seed tree and group selection treatment areas. Similar to the proposed plan, Alternative 2 would involve the installation of native vegetation along Woodland Creek. These impacts on biological resources would be considered beneficial and less than significant.

Cultural and Tribal Cultural Resources

Like the proposed plan, Alternative 3 would involve ground-disturbing activities such as the creation of landing areas and access roads that could significantly impact previously undiscovered historical, archaeological, and tribal cultural resources. Measures from the 2014 LRDP would be implemented to reduce impacts on cultural resources, and the impact would be less than significant.

Alternative 2 would also involve tree removal that could impact the Mount Sutro Cultural Landscape; however, similar to the proposed plan, the forest would be maintained as a eucalyptus-dominant forest, trails would be maintained, and the topographical features of the Reserve would remain unchanged. Impacts on cultural resources from implementation of Alternative 2 would be similar to the proposed plan and less than significant.

Forestry Resources

Alternative 2 would involve tree removal and tree planting similar to the proposed plan. Tree removal would not convert the forest to non-forest use because trees would be planted and the Reserve would be maintained as a forest. Impacts from Alternative 2 on forestry resources would be similar to the proposed plan and less than significant.

Geology and Soils

Like the proposed plan, Alternative 2 would involve the creation of forest gaps through tree removal and soil disturbance from the creation of landing areas and access roads. The landing areas and access roads would be the same under the proposed plan and Alternative 2, and the extent of tree removal activities would be similar to the proposed plan. A significant impact could occur from landslides and erosion as a result of slope destabilization, and top soil could be lost as a result of vegetation management activities. Like the proposed plan, chips would be spread to reduce erosion; however, impacts would remain significant. Impacts would be reduced to less than significant with the implementation of the proposed plan's mitigation measures that require several BMPs to stabilize soils.

Greenhouse Gas Emissions

GHG emissions generated from implementation of Alternative 2 would be similar to those generated from implementation of the proposed plan because Alternative 2 would involve a similar intensity of equipment use to carry out vegetation management activities. The carbon stock in the forest would undergo similar changes as under the proposed plan because roughly the same number of trees would be removed for forest treatments under Alternative 2 as the proposed plan. Carbon sequestered by the forest would balance out any GHG emissions

produced by equipment, and after trees are planted under Alternative 2, the forest would sequester carbon at a similar rate to the proposed plan. Carbon sequestration would represent a beneficial impact on global GHG emission levels. Impacts would be less than significant.

Hazards and Hazardous Materials

Alternative 2 would involve the use of similar equipment to the proposed plan and roughly the same intensity of equipment use for vegetation management activities. Hazardous materials for equipment would be used within the Reserve that could, similar to the proposed plan, result in an accidental spill or release. Impacts would be significant but mitigated to a less than significant level with implementation of the proposed plan's mitigation measures.

Similar to the proposed plan, Alternative 2 would create a fire hazard through the planting of eucalyptus within forest treatment areas that could act as ladder fuels for the canopy. Compared to the proposed plan, impacts from fire hazards may be slightly reduced under Alternative 2 because the forest gaps created from group selection would be smaller than under the proposed plan, which would allow fewer eucalyptus to be planted that could act as ladder fuels. However, impacts would still be significant because a fire in the Reserve could be catastrophic. Mitigation measures proposed for the proposed plan would reduce the impact to less than significant.

Hydrology and Water Quality

Like the proposed plan, Alternative 2 would involve the creation of forest gaps through tree removal and stormwater runoff changes from the creation of landing areas and access roads. The landing areas and access roads would be the same under the proposed plan and Alternative 2, and the extent of tree removal activities would be similar to the proposed plan. A significant impact could occur from sediment entrained in stormwater runoff and/or the blocking of stormdrains with downed debris and chip. Impacts would be significant. Impacts would be reduced to less than significant with the implementation of the proposed plan's mitigation measures.

Noise

Under Alternative 2, temporary noise from the use of construction equipment and permanent changes in ambient noise levels from the reduction in forest density would have similar impacts as the proposed plan. A similar level of tree removal would occur under Alternative 2, and landing areas and access roads would still be created to stage equipment and store culled vegetative materials. Similar to the proposed plan, impacts from noise within most of the Reserve would be less than significant.

Recreation

Temporary trail closures would occur under Alternative 2 to protect the public while trees are removed from forest treatment areas, similar to the proposed plan. Impacts from trail closures may be slightly reduced because fewer trees would be removed from group selection areas. Impacts from trail closures are expected to be less than significant, similar to the proposed project. However, significant physical deterioration of the Reserve could still occur through tree

removal and the creation of landing areas and access roads. Impacts would be reduced to less than significant through the implementation of the proposed plan's mitigation measures.

Transportation and Traffic

Significant traffic hazards and effects on the response time of emergency vehicles similar to those described for the proposed plan could occur under Alternative 2 because Alternative 2 would involve a similar number of truck trips to haul chipped and culled vegetative materials off site and would utilize the same routes as the proposed plan. Impacts on response times of emergency vehicles and impacts from traffic hazards on other vehicles, bicyclists, pedestrians, and transit facilities would be reduced to less than significant with the implementation of the proposed plan's mitigation measures.

Wind

Alternative 2 would involve a similar intensity of tree removal as the proposed plan, which could increase the potential for windthrow in the Reserve immediately after tree removal. Impacts on windthrow would be significant in the short-term and could be mitigated to less than significant with implementation of the proposed plan's mitigation measures. In the long-term, the recovering and regenerating forest likely could become more windfirm than the existing forest. Like the proposed plan, impacts on windthrow in the long-term would be less than significant.

Alternative 2 would also affect the wind environment in surrounding neighborhoods in a similar fashion as the proposed plan. Tree removal would not significantly affect the wind environment in surrounding neighborhoods because removing small patches of the forest would not remove the effectiveness of the forest or the topography of the Reserve to act as a windbreak. Like the proposed plan, impacts on the wind environment would be less than significant.

Conclusion and Relationship to Project Objectives

Alternative 2 would avoid part of the significant and unavoidable impact on visual quality by setting back seed tree and group selection areas at least 30 feet from trails and including other management activities to screen these treatment areas. It would not eliminate the significant unavoidable impact on visual quality as viewed from within the Reserve from landing areas. Alternative 2 would also reduce fire hazard and impacts on recreational facilities within the Reserve. Planting native shrubs would have a beneficial impact on habitat by enhancing native vegetation.

Alternative 2 would meet all basic project objectives.

5.4.3 Alternative 3: Increased Native Tree Planting

Description of Alternative 3

Alternative 3 would involve planting native tree seedlings as well as eucalyptus seedlings in group selection areas during all phases of the plan. Tree removal activities would remain the same as the proposed plan; only the mix of species planted after tree removal would differ from

the proposed plan. Healthy eucalyptus trees that currently exist in the forest would remain in place.

Instead of re-planting group selection areas with only eucalyptus, 25 percent of the trees planted during Phase I and 50 percent of the trees planted during Phases II and III would be native tree species. Native trees would be planted in separate group selection areas than eucalyptus to reduce competition among eucalyptus and native tree species and to create pockets of native vegetation. Native trees planted in group selection areas may include live oak, California laurel, redwood, and madrone, among others. Forest treatments would otherwise remain the same as the proposed plan. All other vegetation management activities, including the management of defensible space and tree risk, trail maintenance, and native restoration, would remain the same as the proposed plan.

Aesthetics

Similar to the proposed plan, tree removal would have a significant effect on the visual quality of the Reserve as viewed from within the Reserve. Seed tree and group selection areas would be visible from trails; a stark contrast with the surrounding forest would occur in these areas immediately after tree removal and result in a significant impact. Mitigation measures identified for the proposed plan would be implemented to reduce the impact; however, like the proposed plan, Alternative 3 would have a significant and unavoidable temporary impact on visual quality from seed tree and group selection treatments since they would be highly visible from trails.

Visual quality would improve as trees grow to fill in the forest gaps, dead trees are removed from the forest, and remaining healthy eucalyptus trees improve in vigor, eventually creating a livelier forest. Alternative 3 would have an additional long-term benefit from the introduction of native species within gaps in the forest, which would introduce visual variety to the Reserve.

The same landing areas and access roads would be created under Alternative 3 that could have a significant effect on visual quality of the Reserve as viewed from within the Reserve. The impact would be reduced through implementation of the proposed plan's mitigation measures, but like the proposed plan, the staging of heavy equipment and use of landing areas for up to 6 months per year would have a significant and unavoidable impact on visual quality.

Air Quality

Vegetation management activities under Alternative 3 would require a similar level of equipment use as the proposed plan and therefore would generate a similar amount of criteria air pollutant and TAC emissions. Like the proposed plan, impacts from emissions and exposure to TACs would be less than significant, and no conflicts with applicable air quality plans would occur.

Biological Resources

Similar to the proposed plan, Alternative 3 would involve the disturbance of existing habitat that could affect special-status species present or likely present in the Reserve and wildlife nursery sites. The area of disturbance would be the same as the proposed plan because forest

treatment areas, landing areas, and access roads would be the same under Alternative 3. Alternative 3 would also have a similar effect on heritage, landmark, native oak, and significant trees as the proposed plan since tree removal activities would also occur under Alternative 3. Alternative 3 would have a significant impact on special-status species, wildlife nursery sites, and significant trees; impacts would be reduced to less than significant through the implementation of mitigation measures identified for the proposed plan.

Unlike the proposed plan, Alternative 3 would enhance native oaks within the Reserve through the planting of oak trees. Similar to the proposed plan, Alternative 3 would involve the installation of native vegetation along Woodland Creek. These impacts on biological resources would be considered beneficial and less than significant.

Cultural and Tribal Cultural Resources

Like the proposed plan, Alternative 3 would involve ground-disturbing activities such as the creation of landing areas and access roads that could significantly impact previously undiscovered historical, archaeological, and tribal cultural resources. Measures from the 2014 LRDP would be implemented to reduce impacts on cultural resources, and the impact would be less than significant.

Alternative 3 would involve tree removal that could impact the Mount Sutro Cultural Landscape. Unlike the proposed plan, native trees would be planted in pockets of the forest, which may affect the character-defining feature of the Reserve as a eucalyptus-dominant forest. However, a much larger percentage of eucalyptus would be planted (75 percent eucalyptus versus 25 percent native tree species in Phase I), which would ensure that the forest would be maintained as a eucalyptus-dominant forest. Eucalyptus would be planted separately from natives and would not face competition from native trees, which would help their success to grow in the Reserve. Like the proposed plan, trails would be maintained, and the topographical features of the Reserve would remain unchanged. Impacts on cultural resources from implementation of Alternative 3 would be less than significant.

Forestry Resources

Alternative 3 would involve tree removal and tree planting similar to the proposed plan. Tree removal would not convert the forest to non-forest use because trees would be planted to replace removed trees. While native trees would replace some of the eucalyptus, native trees would still maintain the Reserve as a forest. Impacts from Alternative 3 on forestry resources would be similar to the proposed plan and less than significant.

Geology and Soils

Like the proposed plan, Alternative 3 would involve the creation of forest gaps through tree removal and soil disturbance from the creation of landing areas and access roads. The landing areas and access roads created under Alternative 3 would be the same as the proposed plan, and the extent of tree removal activities would be similar to the proposed plan. A significant impact could occur from landslides and erosion as a result of slope destabilization, and top soil could be lost as a result of vegetation management activities. Like the proposed plan, chips would be spread to reduce erosion. Impacts would be reduced to less than significant with the

implementation of the proposed plan's mitigation measures that require several BMPs to stabilize soils.

Greenhouse Gas Emissions

GHG emissions from Alternative 3 would be similar to the proposed plan because Alternative 3 would involve a similar intensity of equipment use to carry out vegetation management activities. GHG emissions from Alternative 2 would be less than significant.

The carbon stock in the forest would undergo similar changes under Alternative 3 as to the proposed plan because roughly the same number of trees would be removed for forest treatments under Alternative 3 as the proposed plan. Like the proposed plan, carbon sequestered by the forest would balance out any GHG emissions produced by equipment. The growth rates of native trees such as oaks and redwood are slower than that of eucalyptus; it follows that carbon sequestration would also be slower in areas of native tree planting. However, long-term carbon sequestration of the forest may increase with native tree planting because native tree species such as oak and redwood live longer than eucalyptus and could therefore sequester more carbon. While blue gum eucalyptus can live a long time (sometimes greater than 200 years), the 85-year-old trees on the Reserve are in rapid decline, which may be an indication of their longevity specific to this site. Despite a slower carbon accrual rate from native trees, native trees may sequester more carbon than eucalyptus alone. Carbon sequestration would represent a beneficial impact on GHG emissions. Impacts would be less than significant.

Hazards and Hazardous Materials

Alternative 3 would involve the use of similar equipment and intensity of equipment use for vegetation management activities as the proposed plan. Hazardous materials for equipment would be used within the Reserve that could, similar to the proposed plan, result in an accidental spill or release. Impacts would be significant but mitigated to a less than significant level with implementation of the proposed plan's mitigation measures.

Like the proposed plan, Alternative 3 would create a fire hazard through (1) tree removal and the increase in brush area within the forest and (2) the planting of eucalyptus within forest treatment areas that could act as ladder fuels and contribute to the risk of a canopy fire. Impacts would be significant, but mitigation identified for the proposed plan would reduce the impact to less than significant.

Compared to the proposed plan, Alternative 3 would have a lesser long-term effect on fire hazards because pockets of native tree species would be planted under Alternative 3. Native tree species have a lesser risk of fire because (1) they do not produce as much litter as eucalyptus, and therefore reduce fuel load and (2) eucalyptus produce a high concentration of flammable oils, which are not present in native trees (Agee, et al. 1973, Martin, Finney and Valentino 1988, Rice 1985, NPS 2006, Mutch 1970). Pockets of native tree species would reduce fire spread by acting similar to fire breaks. Long-term fire risk would be substantially reduced under Alternative 3.

Hydrology and Water Quality

Like the proposed plan, Alternative 3 would involve the creation of forest gaps through tree removal and stormwater runoff changes from the creation of landing areas and access roads. The landing areas and access roads would be the same under the proposed plan and Alternative 3, and the extent of tree removal activities would be similar to the proposed plan. A significant impact could occur from sediment entrained in stormwater runoff and/or the blocking of stormdrains with downed debris and chip. Impacts would be significant. Impacts would be reduced to less than significant with the implementation of the proposed plan's mitigation measures.

Noise

Noise levels, both temporary from vegetation management activities and permanent from forest thinning, would be similar between Alternative 3 and the proposed plan. A similar level of tree removal would occur under Alternative 3, and landing areas and access roads would still be created to stage equipment and store culled vegetative materials. Final tree densities are assumed to be similar, so permanent impacts on sound levels are also anticipated to be similar. Similar to the proposed plan, impacts from noise would be less than significant.

Recreation

Temporary trail closures would occur under Alternative 3 for public safety while trees are removed from forest treatment areas, similar to the proposed plan. Significant physical deterioration of the Reserve could occur through tree removal and the creation of landing areas and access roads. Impacts would be reduced to less than significant through the implementation of the proposed plan's mitigation measures.

Transportation and Traffic

Significant traffic hazards and effects on the response time of emergency vehicles similar to those described for the proposed plan could occur under Alternative 3 because Alternative 3 would involve a similar number of truck trips to haul chipped and culled vegetative materials off site and would utilize the same routes as the proposed plan. Impacts on response times of emergency vehicles and impacts from traffic hazards on other vehicles, bicyclists, pedestrians, and transit facilities would be reduced to less than significant with the implementation of the proposed plan's mitigation measures.

Wind

Alternative 3 would involve a similar intensity of tree removal as the proposed plan, which could increase the potential for windthrow in the Reserve immediately after tree removal. Impacts on windthrow would be significant in the short-term and could be mitigated to less than significant with implementation of the proposed plan's mitigation measures. In the long-term, the recovering and regenerating forest likely could become more windfirm than the existing forest. Like the proposed plan, impacts on windthrow in the long-term would be less than significant.

Alternative 3 would also affect the wind environment in surrounding neighborhoods in a similar fashion as the proposed plan. Tree removal would not significantly affect the wind

environment in surrounding neighborhoods because removing small patches of the forest would not remove the effectiveness of the forest or the topography of the Reserve to act as a windbreak. Like the proposed plan, impacts on the wind environment would be less than significant.

Conclusion and Relationship to Project Objectives

Between the proposed plan and alternatives evaluated in detail, Alternative 3 would have the largest influence on reducing fire hazards within the Reserve. Alternative 3 would have additional benefits of introducing visual variety to the Reserve through the planting of native trees, enhancing native vegetation and native oaks within the forest, and resulting in greater carbon sequestration from planting longer-lived species than eucalyptus. Alternative 3 would not reduce impacts to visual quality from landing areas as viewed from within the Reserve. Impacts on visual quality would remain significant and unavoidable, as for the proposed plan.

Alternative 3 would meet all basic project objectives. This alternative would accelerate achieving the goal of enhancing the Reserve's ecosystem with increased biodiversity by planting more native tree species in earlier phases of the plan.

5.4.4 Alternative 4: Modified Forest Treatments and Increase Native Tree Planting

Description of Alternative 4

Alternative 4 would be a combination of Alternatives 2 and 3. All activities described for Alternatives 2 and 3 would occur under Alternative 4:

- Seed tree and group selection treatment areas would be set back at least 30 feet from trails, native shrubs would be planted around the edges of treatment areas that abut trails, and individual tree selection would be used to create feathered edges around treatment areas
- 25 percent of the trees planted during Phase I and 50 percent of the trees planted during Phases II and III would be native tree species, and native species would be planted in separate group selection areas than eucalyptus

All other vegetation management activities, including management of defensible space and tree risk, trail maintenance, and native restoration, would remain the same as for the proposed plan. Tree planting within forest treatment areas and spreading chips in areas of bare soil would also occur in the same manner as the proposed plan.

Environmental Impacts

The environmental impacts under Alternative 4 would be similar to those described under Alternatives 2 and 3 because Alternative 4 would incorporate all of the activities described for Alternatives 2 and 3. Like the proposed plan and Alternatives 2 and 3, Alternative 4 would have less than significant impacts on air quality and GHG emissions, riparian areas, hazardous materials, cultural and tribal cultural resources, recreational facilities, noise, and the wind environment in surrounding neighborhoods. Impacts on biological resources, erosion,

landslides, fire hazards, runoff and drainage, traffic hazards, and windthrow would be potentially significant; however, impacts could be reduced to less than significant with the implementation of the proposed plan's mitigation measures.

Like Alternative 3, Alternative 4 would reduce fire hazards within the Reserve through the planting of native trees. The planting of native trees under Alternative 4 would have additional beneficial impacts, including increasing habitat diversity, visual variety, and potentially increasing carbon sequestration in the long-term within the Reserve, similar to Alternative 3. Like Alternative 2, Alternative 4 would avoid the significant and unavoidable impact on aesthetics from seed tree and group selection treatments. Like Alternatives 2 and 3, Alternative 4 would still have a significant and unavoidable impact on visual quality from the use of landing areas even after implementation of the proposed plan's mitigation measures.

Conclusion and Relationship to Project Objectives

Alternative 4 would reduce fire hazards to the same level as described for Alternative 3 and, like Alternative 2, would avoid the significant and unavoidable aesthetic impact from seed tree and ground selection treatments of the proposed plan. Alternative 4 would still have a significant and unavoidable impact on visual quality from the use of landing areas. Alternative 4 would have the beneficial impacts of increasing habitat diversity, visual variety, and increased long-term carbon sequestration from planting native tree species similar to Alternative 3.

Alternative 4 would meet all basic project objectives. This alternative would accelerate achieving the goal of enhancing the Reserve's ecosystem with increased biodiversity by planting more native tree species in earlier phases of the plan.

5.5 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA requires the identification of the environmentally superior alternative among the alternatives to the proposed plan that were evaluated in detail. The environmentally superior alternative must be an alternative to the proposed plan that reduces some of the environmental impacts of the proposed plan, regardless of the financial costs associated with this alternative. Identification of the environmentally superior alternative is an informational procedure. The alternative identified as the environmentally superior alternative may not be that which best meets the goals or needs of the proposed plan. Determination of the environmentally superior alternative does not preclude the proposed plan or the other alternatives from being selected for implementation. The lead agency may adopt a statement of overriding considerations which expresses the agency's views on the merits of approving a project despite its significant adverse environmental impacts. The statement of overriding considerations provides the justification for proceeding with a project despite its environmental impacts. The statement reflects the balancing of competing public objectives including factors such as environmental concerns, legal issues, technical, social, and economic factors.

Table 5.5-1 Comparison of Alternatives

Project Impact	Proposed Plan		Alternative 1: No Project Alternative	Alternative 2: Modified Forest Treatments	Alternative 3: Increased Native Tree Planting	Alternative 4: Modified Forest Treatments and Increased Native Tree Planting
	Before Mitigation	After Mitigation				
Impact Aesthetics-2: The proposed plan could substantially degrade the existing visual character or quality of the site and its surroundings and the associated recreational experience.	Significant	Significant and unavoidable	Avoided, but new significant and unavoidable impact created	Avoids significant and unavoidable impact from forest treatments but significant and unavoidable impact would remain for landing areas	Significant and unavoidable, but with added benefit of adding visual variety	Avoids significant and unavoidable impact from forest treatments but significant and unavoidable impact would remain for landing areas. Additional benefit of adding visual variety
Impact Biology-1: The proposed plan could 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 CDFW or USFWS.	Potentially significant	Less than significant	Increased, potentially significant and unavoidable	Similar (less than significant with mitigation), with added benefit of enhancing native vegetation	Similar (less than significant with mitigation), with added benefit of enhancing native vegetation	Similar (less than significant with mitigation), with added benefit of enhancing native vegetation
Impact Biology-3: The proposed plan could 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.	Potentially significant	Less than significant	Increased, potentially significant and unavoidable	Similar (less than significant with mitigation), with added benefit of enhancing native vegetation	Similar (less than significant with mitigation), with added benefit of enhancing native vegetation	Similar (less than significant with mitigation), with added benefit of enhancing native vegetation
Impact Cultural-1: The proposed plan could cause a substantial adverse change in the	Less than significant	N/A	Increased, potentially	Similar, less than significant	Similar, less than significant	Similar, less than significant

Project Impact	Proposed Plan		Alternative 1: No Project Alternative	Alternative 2: Modified Forest Treatments	Alternative 3: Increased Native Tree Planting	Alternative 4: Modified Forest Treatments and Increased Native Tree Planting
	Before Mitigation	After Mitigation				
significance of a historic resource as defined in Section 15064.5.			significant and unavoidable			
Impact Geology-1: The proposed plan could be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the plan, and potentially result in on-or off-site landslide.	Potentially significant	Less than significant	Increased, potentially significant and unavoidable	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation *
Impact Geology-2: The proposed plan could expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides.	Potentially significant	Less than significant	Increased, potentially significant and unavoidable	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation
Impact Geology-3: The proposed plan could result in substantial soil erosion or the loss of topsoil.	Potentially significant	Less than significant	Increased, potentially significant and unavoidable	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation
Impact GHG-2: The proposed plan could conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emission of greenhouse gases.	Less than significant	N/A	Increased, less than significant	Similar, less than significant	Reduced, less than significant	Reduced, less than significant
Impact Hazards-1: The proposed plan could create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.	Potentially significant	Less than significant	Reduced, less than significant	Similar, less than significant	Similar, less than significant	Similar, less than significant

Project Impact	Proposed Plan		Alternative 1: No Project Alternative	Alternative 2: Modified Forest Treatments	Alternative 3: Increased Native Tree Planting	Alternative 4: Modified Forest Treatments and Increased Native Tree Planting
	Before Mitigation	After Mitigation				
Impact Hazards-2: The proposed plan could 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.	Potentially significant	Less than significant	Reduced, less than significant	Similar, less than significant	Similar, less than significant	Similar, less than significant
Impact Hazards-3: The proposed plan could expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.	Potentially significant	Less than significant	Increased, potentially significant and unavoidable	Reduced, less than significant with mitigation	Reduced, less than significant with mitigation	Reduced, less than significant with mitigation
Impact Hydrology-1: The proposed plan could substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on or off site.	Potentially significant	Less than significant	Reduced, less than significant	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation
Impact Hydrology-2: The proposed plan could substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or	Potentially significant	Less than significant	Reduced, less than significant	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation

Project Impact	Proposed Plan		Alternative 1: No Project Alternative	Alternative 2: Modified Forest Treatments	Alternative 3: Increased Native Tree Planting	Alternative 4: Modified Forest Treatments and Increased Native Tree Planting
	Before Mitigation	After Mitigation				
amount of surface runoff in a manner that would result in flooding on or off site.						
Impact Hydrology-3: The proposed plan could create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.	Potentially significant	Less than significant	Reduced, less than significant	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation
Impact Recreation-1: The proposed plan could increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.	Potentially significant	Less than significant	Reduced, less than significant	Reduced, less than significant	Similar, less than significant with mitigation	Similar, less than significant with mitigation
Impact Traffic-1: The proposed plan could substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).	Potentially significant	Less than significant	Reduced, less than significant	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation
Impact Traffic-2: The proposed plan could exceed the applicable LRDP EIR standard of significance by causing substantial conflict among autos, bicyclists, pedestrians, and transit vehicles.	Potentially significant	Less than significant	Reduced, less than significant	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation

Project Impact	Proposed Plan		Alternative 1: No Project Alternative	Alternative 2: Modified Forest Treatments	Alternative 3: Increased Native Tree Planting	Alternative 4: Modified Forest Treatments and Increased Native Tree Planting
	Before Mitigation	After Mitigation				
Impact Traffic-3: The proposed plan could result in inadequate emergency access.	Potentially significant	Less than significant	Reduced, less than significant	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation
Impact Wind-1: The proposed plan could have a substantial adverse short-term windthrow-related effect on the safety of people or structures.	Potentially significant	Less than significant	Increased, potentially significant and unavoidable	Similar, less than significant with mitigation	Similar, less than significant with mitigation	Similar, less than significant with mitigation

Based on the analysis above, Alternative 4 is the environmentally superior alternative because it would (1) avoid the significant and unavoidable aesthetics impact from seed tree and group selection treatment areas, and (2) reduce the potentially significant impact from fire hazards of the proposed plan without significantly increasing other impacts across other environmental parameters. Alternative 4 would also be an environmental improvement over the proposed plan and Alternatives 1 and 2 because it would improve GHG sequestration, native habitat, and visual resources within portions of the Reserve without causing any greater impacts.

5.6 REFERENCES

Agee, J.K., R.H. Wakimoto, E.F. Darley, and H.H. Biswell. 1973. "Eucalyptus fuel dynamics and fire hazard in the Oakland Hills." *California Agriculture* 27 (9): 13-15.

Martin, R.E., M.A. Finney, and J.J. Valentino. 1988. "Fuel Conditions and Potential Fire Behavior of Angel Island State Park." In *Focused Environmental Study: Restoration of Angel Island Natural Areas Effects by Eucalyptus*, by California State Park System, 173-194.

Mutch, R.W. 1970. "Wildland fires and ecosystems -- a hypothesis." *Ecology* 51 (6): 1040-1050.

National Park Service (NPS). 2006. *Eucalyptus Newsletter.* Accessed April 6, 2017. https://www.nps.gov/goga/learn/management/fire_edu_newsletter_eucalyptus.htm.

Rice, C.L. 1985. "Use of BEHAVE on Shrublands at the Urban Interface." *Conference of Fire and Forest Meteorology.* Detriot, Michigan. 270-274.

6 CEQA STATUTORY SECTIONS

6.1 INTRODUCTION

CEQA Guidelines Section 15126 and 15126.2(c) require an EIR to include a discussion of the following topics:

- Significant environmental effects that cannot be avoided if the proposed project (plan, in this case) is implemented
- A discussion of significant irreversible changes due to the proposed project
- Growth-inducing impacts of the proposed project

Section 15128 of the State CEQA Guidelines requires a brief statement of the reasons that various possible effects of a project have been determined not to be significant and, therefore, are not evaluated in the EIR.

The following sections address these discussion topics based on the analyses in the IS and Section 4: Environmental Setting, Impacts, and Mitigation Measures.

6.2 SIGNIFICANT AND UNAVOIDABLE ENVIRONMENTAL IMPACTS

As discussed in Section 4.1: Aesthetics, implementation of the proposed plan would result in the following significant impacts that cannot be mitigated with certainty to a less-than-significant level:

- **Impact Aesthetics-2:** The proposed plan could substantially degrade the existing visual character or quality of the site and its surroundings and the associated recreational experience.
- **Impact Aesthetics-3:** The proposed plan could result in significant impacts on visual resources in combination with past, present, and probable future development in the cumulative analysis study area.

6.3 SIGNIFICANT IRREVERSIBLE CHANGES

6.3.1 CEQA Requirements for Significant Irreversible Changes

Section 15126.2(c) of the CEQA Guidelines states that an EIR must include a discussion of any significant irreversible environmental changes that would be caused by a proposed project. Generally, a project (or plan, in this case) would result in significant irreversible environmental changes if:

- The direct and indirect impacts would generally commit future generations to similar uses;
- The proposed consumption of natural resources is not justified (e.g., the project would involve the wasteful use of energy);
- The project would involve a large commitment of nonrenewable resources; or
- The project would involve uses in which irreversible damage could result from any potential environmental accidents associated with the project.

6.3.2 Changes in Land Use that Commit Future Generations

The proposed plan does not include a change in land use that would commit future generations to a single use. The proposed vegetation management activities are meant to preserve and enhance the existing land within the Reserve, which is currently and would continue to be used for recreational and educational purposes. The project site contains a forested open space reserve that the Regents has committed to maintaining as open space available to the public. Previous actions by the University have committed the land use to this use.

6.3.3 Consumption of Non-renewable Resources

An EIR must address potential energy impacts from a proposed project (or plan in this case) with an emphasis on avoiding or reducing the inefficient, wasteful, and unnecessary consumption of energy. Appendix F: Energy Conservation in the CEQA Guidelines describes the goal of energy conservation as the wise and efficient use of energy. The means to achieving the goal include:

- Decreasing overall per capita energy consumption;
- Decreasing reliance on natural gas and oil; and
- Increasing reliance on renewable energy sources.

Implementation of the plan would require the use of fossil fuels, a non-renewable resource, for vehicles and construction equipment. Vehicles and construction equipment would be required to widen trails to establish access routes, grade and smooth landing areas, remove trees, haul culled vegetation materials to an off-site composting facility, transport workers to the Reserve, and possibly to maintain trails and public access. Implementation of vegetation management activities would require the use of non-renewable resources; however, the proposed plan would not result in a significant production of GHGs from vegetation management activities. The proposed plan would only use the amount of fuel necessary to perform vegetation management activities and would not involve the unnecessary consumption of energy.

Limited water consumption may be required for new plantings until they are established. The use of water would be beneficial for the establishment of plants and would not be considered wasteful.

Other non-renewable resources include consumption of agricultural lands and loss of access to mining reserves. As identified in the IS, the proposed plan area contains no areas used for agricultural purposes or designated as agricultural land, nor does it contain any significant mineral deposits. Implementation of the proposed plan would not result in irreversible changes related to the consumption of those types of resources.

6.3.4 Irreversible Damage from Environmental Accidents

During implementation of the proposed plan, potential accidents could occur that could result in significant irreversible changes to the environment that cannot be reversed or completely mitigated. The use of trucks and heavy machinery could result in an accidental spill of hazardous materials that could potentially result in significant irreversible changes. The potential impacts that could occur from accidental spills is discussed in Section 4.8: Hazards and Hazardous Materials. **MM Hazards-1: Spill Containment and Countermeasure Plan** requires UCSF to prepare a SCCP that would include procedures to follow to prevent a spill and to properly clean up a spill should one occur. The implementation of **MM Hazards-1: Spill Containment and Countermeasure Plan** would reduce the impact from a potential accident to less than significant.

As discussed in Section 4.8: Hazards and Hazardous Materials, the use of trucks and heavy machinery within the Reserve or workers smoking in the Reserve has the potential to start a wildfire. A wildfire could cause a significant irreversible change to the environment. **MM Hazards-2: Fire Prevention Plan** requires implementation of fire prevention practices including training personnel and maintaining fire prevention equipment on site. The impact from plan activities increasing risk of fire within the Reserve would be reduced to less than significant with implementation of **MM Hazards-2: Fire Prevention Plan**.

6.4 GROWTH-INDUCING IMPACTS

CEQA Guidelines Section 15126.2(d) requires that the discussion on growth-inducing impacts address ways in which the proposed plan could "foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment." The CEQA Guidelines do not provide specific criteria for evaluating growth inducement and state that it must not be assumed that growth in an area is necessarily beneficial, detrimental, or of little significance to the environment. Growth inducement is generally not quantified but is instead evaluated as either occurring or not occurring with implementation of the proposed plan. The identification of growth-inducing impacts is generally informational, and mitigation of growth inducement is not required by CEQA. The CEQA Guidelines require that an EIR "discuss the ways" a project could be growth-inducing and "discuss the characteristics of some projects that may encourage activities that could

significantly affect the environment." However, the CEQA Guidelines do not require that an EIR predict or speculate specifically where such growth would occur, in what form it would occur, or when it would occur. Growth-inducing effects of the proposed plan are considered significant if the plan would remove an obstacle to population growth or cause economic expansion and population growth through employment expansion and/or the construction of new housing.

Implementation of the proposed plan would not remove obstacles to population growth or result in permanent population growth in the area. The proposed plan is designed to enhance an existing urban forest used by recreationalists and educational groups and would not involve the construction of new housing. Personnel that would perform vegetation management activities would come from a combination of UCSF in-house staff, contractors, and volunteers. Additional housing to accommodate these workers would not be required as workers would commute from locations within the San Francisco Bay Area. Implementation of the proposed plan would not result in direct or indirect impacts on population growth.

6.5 EFFECTS FOUND NOT TO BE SIGNIFICANT

CEQA Guidelines Section 15128 requires an EIR to briefly describe any potential environmental effects that were determined not to be significant during the IS and EIR scoping process and were, therefore, not discussed in detail in the EIR. A discussion of these less than significant effects of the proposed plan on land use and planning, mineral resources, and population and housing is presented in the IS (refer to Appendix A). Other impacts found to be less than significant in the EIR are discussed in detail in Section 4.1 through Section 4.13.

7 REPORT PREPARATION

7.1 LIST OF PREPARERS

7.1.1 Lead and Participating Agencies

This section lists the individuals who either prepared or participated in the preparation of this EIR. UCSF is serving as the CEQA lead agency for preparation of this EIR.

University of California

Table 7.1-1 identifies the UCSF and UC staff, or persons representing UCSF, that participated in the preparation of this EIR.

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Consultant Team

This EIR was prepared by Panorama Environmental, Inc. of San Francisco, California, under the direction of UCSF. Table 7.1-2 identifies staff that contributed to this document.

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Jeff Thomas	Senior Review	Public Outreach, Initial Study
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Table 7.1-3 identifies subconsultants that contributed to the preparation of the document.

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7.2 AGENCIES AND ORGANIZATIONS CONTACTED

Federal, state, and local agencies and tribes were consulted during the preparation of the EIR. The agencies and individuals that were consulted during the preparation of this document include the following:

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- Emily Morgan, Native Plant Program Scientific Aid, CDFW

The following tribes were notified about the proposed plan and preparation of this document:

- Amah Mutsun Tribal Band of Mission San Juan Bautista
- Coastanoan Rumsen Carmel Tribe
- Indian Canyon Mutsun Band of Coastanoan
- Muwekma Ohlone Indian Tribe of the San Francisco Bay Area
- Ohlone Indian Tribe
- Torres Martinez Desert Cahuilla Indians

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APPENDIX 1.0

Notice of Preparation and Initial Study





University of California, San Francisco

Vegetation Management Plan for the Mount Sutro Open Space Reserve

Notice of Preparation and Initial Study

February 2017

PANORAMA ENVIRONMENTAL, INC.

One Embarcadero Center, Suite 740 San Francisco, CA 94111 650-373-1200 **www.panoramaenv.com**

University of California, San Francisco

Vegetation Management Plan for the Mount Sutro Open Space Reserve

Notice of Preparation and Initial Study

February 2017

Prepared for:
University of California, San Francisco
Campus Planning
654 Minnesota Street
San Francisco, California 94143-0286

Prepared by:
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LIST OF ACRONYMS

A

ACUPCC	American Colleges and University Presidents Climate Commitment
ACOE	United States Army Corps of Engineers
ATCM	Airborne Toxic Control Measure

B

BAAQMD	Bay Area Air Quality Management District
BMP	best management practice
BOD5	5-day biological oxygen demand

C

CAP	Climate Action Plan
CARB	California Air Resources Board
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CSS	combined sewer system

E

EIR	Environmental Impact Report

G

GHG	greenhouse gas

I

I-280	Interstate 280
IS	Initial Study

L

LRDP	UCSF's Long Range Development Plan
LSAA	Lake or Streambed Alteration Agreement

M

mgd	million gallons per day

R

Regents	The Regents of the University of California
Reserve	Mount Sutro Open Space Reserve

S

SFBAAB	San Francisco Bay Area Air Basin
SR-35	State Route 35
SVP	Society of Vertebrate Paleontology

T

TASC	Transportation Advisory Staff Committee
TSS	total suspended solids

U

UCSF	University of California, San Francisco

W

WDR	waste discharge requirement
WTP	water treatment plant

ORGANIZATION OF THIS NOTICE OF PREPARATION AND INITIAL STUDY

This Notice of Preparation (NOP) and Initial Study (IS) is organized into the following sections:

- **Section 1: Plan Information.** Provides information about the University of California, San Francisco (UCSF) Mount Sutro Open Space Reserve (Reserve) Vegetation Management Plan (plan), including the lead agency and contact information.
- **Section 2: Plan Location and Description.** Describes the location that the plan covers, the elements included in the plan, and plan approvals.
- **Section 3: Environmental Factors Potentially Affected.** Identifies the environmental factors that would be affected by the plan, including those that involve at least one potentially significant impact.
- **Section 4: Determination.** Indicates whether impacts associated with the proposed plan are significant, and what, if any, additional environmental documentation is required.
- **Section 5: Evaluation of Environmental Impacts.** Contains the Environmental Checklist form from Appendix G of the California Environmental Quality Act (CEQA) Guidelines for each resource area. The checklist is used to assist in evaluating the potential environmental impacts of the proposed plan. This section also presents an explanation of all checklist answers and identifies the impacts that will be addressed in detail in an Environmental Impact Report (EIR).
- **Section 6: Supporting Information Sources.** Lists the references used in the preparation of this document.

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1 PLAN INFORMATION

1.1 PLAN TITLE

Vegetation Management Plan for the UCSF Mount Sutro Open Space Reserve

1.2 LEAD AGENCY AND ADDRESS

University of California, San Francisco
Campus Planning
654 Minnesota Street
San Francisco, California 94143-0286

1.3 CONTACT PERSON

Diane Wong, Environmental Coordinator
UCSF Campus Planning
(415) 502-5952
eir@planning.ucsf.edu

1.4 PLAN LOCATION

UCSF Parnassus Heights campus site
City and County of San Francisco
Coordinates: 37° 45′ 29.2″ N, 122° 27′ 27.66″ W

1.5 PLAN SPONSOR'S NAME AND ADDRESS

See "Contact Person"

1.6 CUSTODIAN OF THE ADMINISTRATIVE RECORD FOR THIS PLAN

See "Contact Person"

1.7 IDENTIFICATION OF ALL APPLICABLE LONG RANGE DEVELOPMENT PLAN AND PROPOSED PLAN ENVIRONMENTAL IMPACT REPORTS AND ADDRESS WHERE A COPY IS AVAILABLE FOR PUBLIC INSPECTION DURING BUSINESS HOURS

UCSF Long Range Development Plan (LRDP), available at
https://campusplanning.ucsf.edu/sites/campusplanning.ucsf.edu/files/reports/FullLRDP_0.pdf

Draft UCSF Mount Sutro Open Space Reserve Vegetation Management Plan, available at
https://www.ucsf.edu/cgr/cgr-projects/mount-sutro-open-space-reserve

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2 PLAN LOCATION AND DESCRIPTION

2.1 INTRODUCTION

UCSF proposes to implement several vegetation management actions in the Mount Sutro Open Space Reserve (Reserve). The University-owned Reserve is a largely undeveloped 61-acre forest located within UCSF's Parnassus Heights campus site at the center of San Francisco (see Figures 2.1-1 and 2.1-2). The Reserve is surrounded by UCSF's hospital, research, educational and support structures to the north/northwest, and by urban residential neighborhoods to the south, east, and west. The Interior Greenbelt area, owned by the City and County of San Francisco (San Francisco), is adjacent to the east side of the Reserve. The Reserve, designated as permanent open space by The Regents of the University of California (Regents), is open to the public and serves as a point of respite and recreation not only for UCSF, but for the greater community.

The primary purposes of the proposed Vegetation Management Plan (plan) fall into four broad categories:

1. Protect the safety of Reserve users and adjacent campus and residential properties
2. Improve and enhance the health and stability of the ecosystem
3. Enhance the visual design and aesthetic experience in the Reserve
4. Maintain and ensure public access to the Reserve

UCSF has prepared this IS in accordance with CEQA (California Public Resources Code, Sections 21000-2117) and the Guidelines for Implementation of CEQA (California Code of Regulations, Title 14, Sections 15000-15387). This IS evaluates potential environmental impacts associated with the proposed management actions across the entire 61-acre Reserve. The purposes of this IS are to:

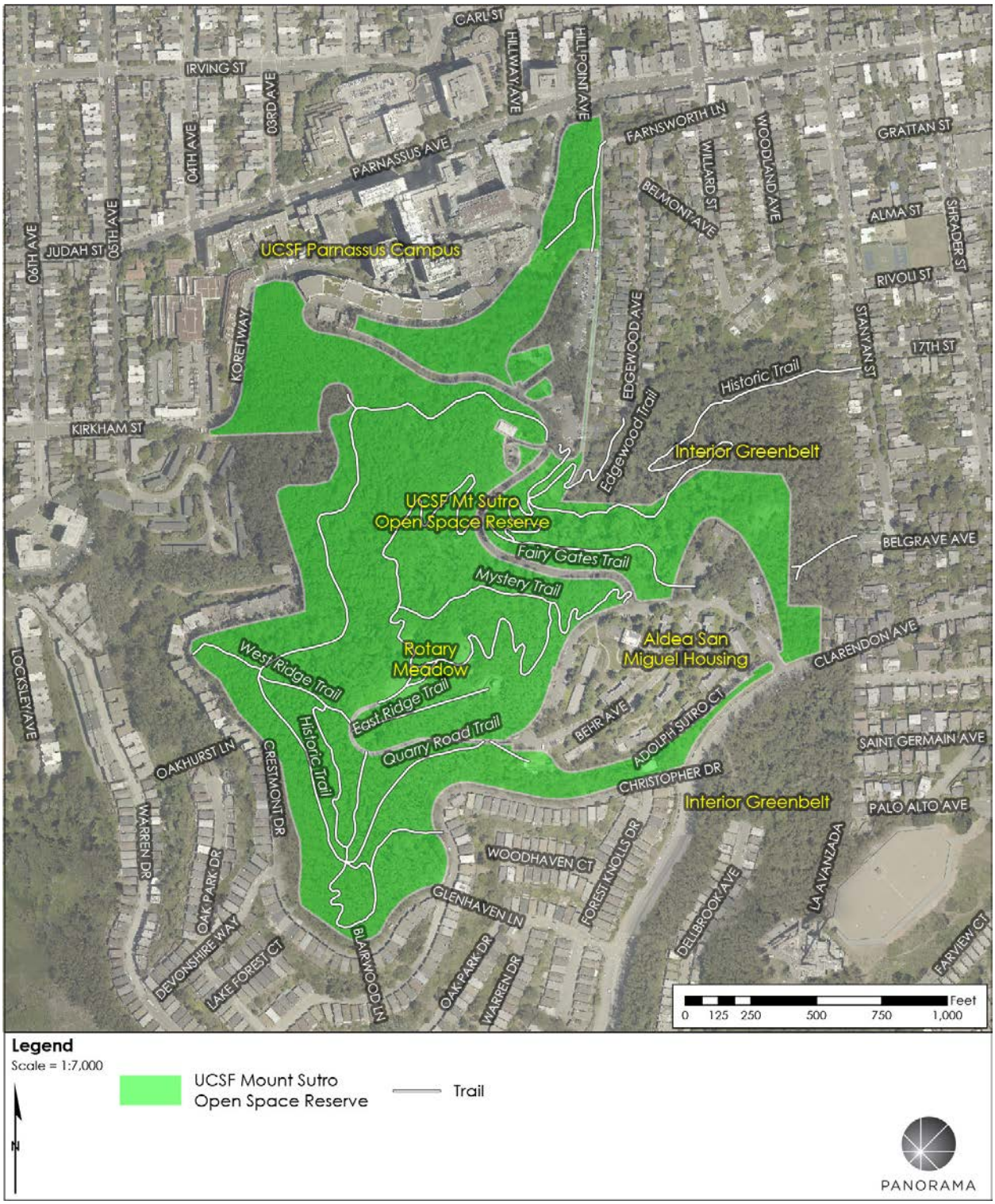
- Identify the environmental topics that would not be affected by the plan, would be affected at a less than significant level, or would be significantly affected but the effect could be mitigated to a less than significant level; and
- Identify the environmental topics that would potentially be significantly affected.

The preliminary evaluation of environmental impacts was used to determine that the proposed plan may have a significant adverse effect on the environment that requires further analysis in an EIR. Those environmental topics for which the plan would have no impact or a less than significant impact will not be analyzed further in the EIR, based on the analysis in this IS. Potentially significant environmental impacts identified in this IS will be the focus of the EIR.

Figure 2.1-1 Location of the UCSF Mount Sutro Open Space Reserve



Figure 2.1-2 UCSF Mount Sutro Open Space Reserve



2.2 BACKGROUND

2.2.1 UCSF Parnassus Heights

The UCSF Parnassus Heights campus site is home to a network of comprehensive patient care services for adults through UCSF Medical Center, Langley Porter Psychiatric Institute and Clinics, and the UCSF Dental Center. The facilities treat both inpatients and outpatients. The UCSF research enterprise spans many locations, but the Parnassus Heights and Mission Bay campus sites are the two principal sites. Parnassus Heights is the site of several centers, institutes, and laboratories that focus on specific areas within the health sciences.

UCSF owns and manages the Reserve, which is located on the south side of the Parnassus Heights campus site. In 1976, the Regents designated the Reserve as "permanent open space to be kept free of any permanent structures or facilities except footpaths and appropriate landscape construction intended to enhance its use as a natural area." The slopes of Mount Sutro have limited development of the Parnassus Heights campus site to three main areas: the Aldea student housing complex near the summit of Mount Sutro, the Lower Campus shelf at the northern end of the site, and the Woods parcel on the hillside in the center of the site. The Reserve is covered by a dense stand of trees, except for the Rotary Meadow at the summit clearing.

2.2.2 UCSF 2014 Long Range Development Plan

UCSF's LRDP guides the University's physical development to support its mission of advancing health worldwide. The 2014 LRDP guides the University's growth through 2035 and replaces UCSF's 1996 LRDP. The 2014 LRDP was approved by the Regents in November 2014. The 2014 LRDP reflects the culmination of five years of planning, including extensive consultation both within UCSF and with UCSF's neighbors and other stakeholders.

The 2014 LRDP reaffirms UCSF's commitment to the Reserve's designation as permanent open space and its availability for public use. One of the site-specific objectives in the 2014 LRDP is to:

> "Preserve the Mount Sutro Open Space Reserve as permanent open space, and serve as the steward of the Reserve by maintaining and expanding the trail system and by ensuring the safety of visitors and neighboring structures."

Proposals included in the 2014 LRDP include continuing to manage the Reserve as permanent open space and creating new/restored trails. The LRDP also describes the vegetation management planning efforts and community process to address key issues including safety, fire hazards, and user experience.

2.2.3 History of the Reserve

In the 1800s, Mount Parnassus (later renamed Mount Sutro) was covered predominantly with coastal scrub chaparral consisting of native grasses, wildflowers, and shrubs that provided habitat for a wide variety of wildlife. Trees likely included willow and bay along streams. It is

possible that coast live oak and coast redwood were also present. In 1886, Adolph Sutro, a successful mining engineer, planted the mountain with blue gum eucalyptus, Monterey pine, Monterey cypress, and possibly fruit trees and other species. The blue gum eucalyptus were the most successful trees in adapting to the site conditions, and they soon shaded out smaller trees of other species. Over time, blue gum eucalyptus became the dominant tree species. Vine and shrubs species arose naturally or were planted and dominated the understory in many areas. Native vegetation disappeared as the eucalyptus and non-native understory became established. By the turn of the 20th century, the entire mountain was covered with blue gum eucalyptus trees, and it became commonly known as Sutro Forest.

The vegetation in the Reserve is currently neither healthy nor diverse. Over 25 percent of the blue gum eucalyptus are dead and many of the remaining trees are dying or are structurally unsound. Too many blue gum eucalyptus trees are in the Reserve to support a sustained healthy canopy. The health of the blue gums has declined over time, and small blue gums are not being recruited into the canopy due in part to the dense understory of non-native vines. The last several years of drought, forest pathogens infestation, and the age of the stand have all contributed to the decline in health of the remaining trees.

The forest will not recover on its own. The existing eucalyptus will likely die and other types of trees and vegetation will take over due to the current dense understory. The data show a continuing trend of declining eucalyptus tree health (see the Draft Vegetation Management Plan, January 20, 2017). Recent years have seen below-average rain, which may continue, and forest pathogens are extensive. UCSF has concluded that the only path to healthy, diverse vegetation involves active management and silvicultural[1] treatment.

2.3 PROPOSED PLAN

2.3.1 Overview of Plan

The purpose of the plan is to provide a management framework for protecting, enhancing, and restoring vegetation in the Reserve. UCSF staff worked with consultants and a Technical Advisory Committee (TAC) to develop the plan, including holding four public meetings with the TAC.

To achieve a healthy and stable ecosystem, the plan outlines strategies for increasing the biodiversity of vegetation, conserving existing native vegetation, improving the regeneration and recruitment of tall tree species, managing insect and disease pressure on blue gum

[1] Silviculture is the "art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society such as wildlife habitat, timber, water resources, restoration, and recreation on a sustainable basis" (USFS 2017). Silvicultural treatments are designed to enhance growth and quality of a forest while promoting forest regeneration.

eucalyptus, and improving structural diversity. In accordance with UCSF's already established risk-reduction program, the plan outlines the goal of protecting the safety of Reserve users and adjacent structures with vegetation management to reduce the risk of both tree failure and fire. Along trails, vegetation management would be implemented to clear sight lines.

The plan also seeks to enhance the visual design and aesthetics of the Reserve by establishing a mosaic of trees, shrubs and ground cover of different types, with gaps in the canopy that create patterns of sun and shade and offer views of the ocean and Golden Gate Park, and protect users from the wind. The desired outcome is to maintain a "forest" experience. UCSF provides for public access into the Reserve through a system of multi-use trails, built and maintained in partnership with the non-profit Sutro Stewards. New trails have been and will be developed as identified in the LRDP and analyzed in the LRDP EIR; the vegetation management plan proposes only to maintain vegetation around trails.

The draft plan is available at https://www.ucsf.edu/cgr/cgr-projects/mount-sutro-open-space-reserve and serves as the description of the plan upon which this IS is based. This IS also includes any relevant mitigation from the UCSF LRDP EIR (2014), as discussed in Section 2.4, which is a certified EIR that also covers the Reserve and any actions taken in the Reserve.

2.3.2 Existing Forest Conditions

Following a comprehensive inventory of the Reserve, the Reserve was divided into four forest types as shown in **Error! Reference source not found.** and **Error! Reference source not found.**. These forest types were determined based on similar characteristics with respect to tree species composition, health, and density. The Reserve contains approximately 10,000 live and 3,500 dead trees, based on the size of each forest type and the density of trees per acre. Blue gum eucalyptus is the dominant tree species but was not found to be regenerating in sufficient numbers to provide for canopy replacement.

Figure 2.3-1 Forest Type Map Created from 2016 Forest Inventory

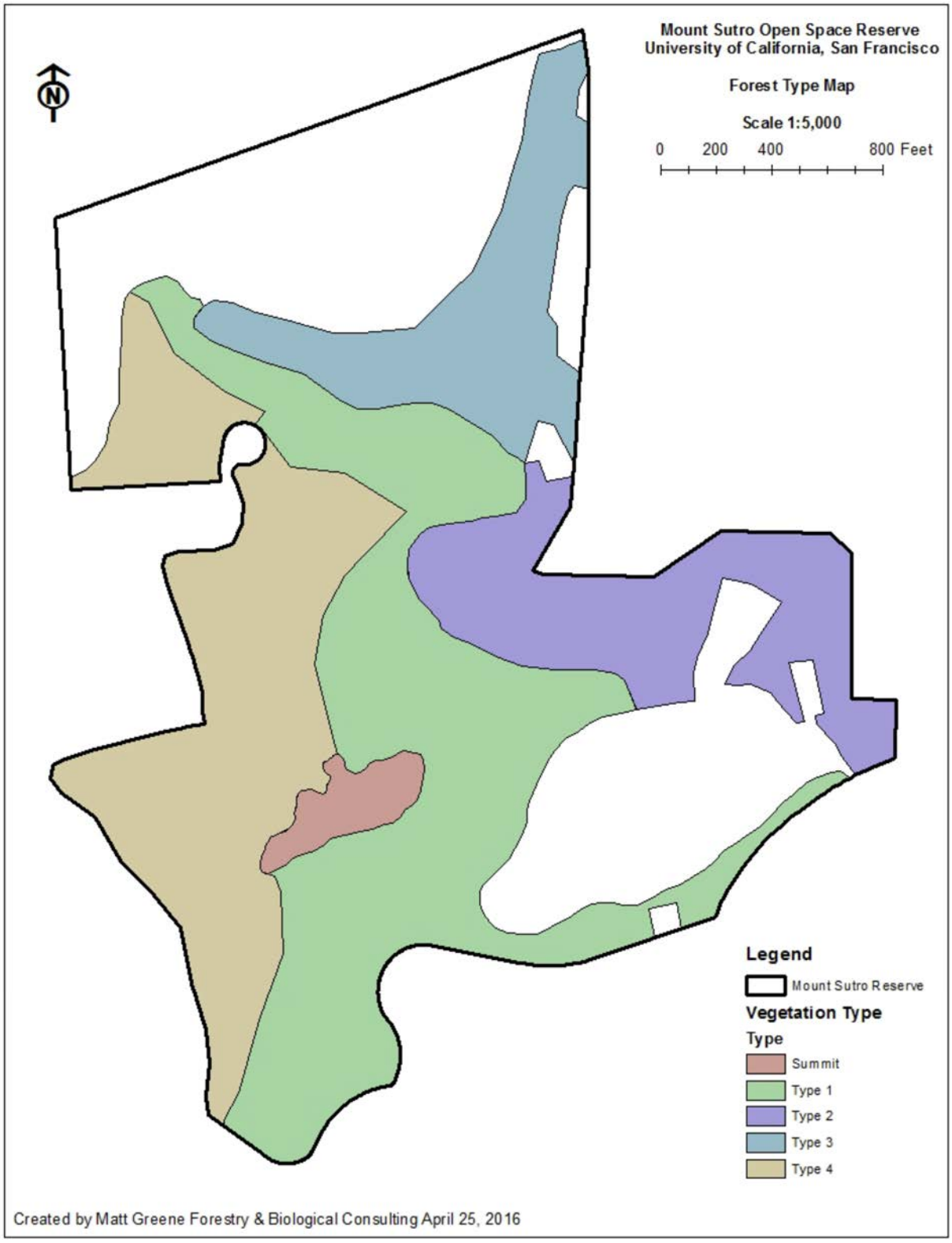


Table 2.3-1 Forest Types in the Reserve

Forest Type	Size (acres)	Trees per acre		Live Crown Ratio [a] (percent)	Tree Species	
		Live	Standing Dead		Dominant	Secondary
1	24	270	100	≤ 20	Blue gum eucalyptus, blackwood acacia	Monterey cypress, Monterey pine, coast redwood, plum, cherry, California bay, coast live oak, willow
2	9	45	10	≤ 20	Blue gum eucalyptus, Monterey cypress	Monterey pine, blackwood acacia, coast redwood, willow
3	8	110	10	20 to 30	Blue gum eucalyptus, blackwood acacia	Willow, plum
4	18	50	50	≥ 40	Blue gum eucalyptus	Monterey cypress, cherry, coast live oak, willow

Note:

[a] Live crown ratio is the ratio of the size of the live crown (i.e., the part of the tree with green leaves) to its total height. Live crown ratio is used to estimate tree health and level of competition with neighboring trees (dominant, codominant, etc.). A live crown ratio of 30 percent or below is considered poor; trees with a live crown ratio of 30 percent or below often respond poorly to release (i.e., removal of surrounding competing trees).

2.3.3 Plan Actions and Phasing

Desired Future Conditions

The plan identifies a series of forest treatments and management actions to meet its goals. The desired future conditions of the Reserve include:

- A restored eucalyptus canopy
- Healthy, diverse vegetation
- Uneven stand of trees (i.e., trees of many ages) that follows an inverse J-shaped curve of ideal tree size distribution
- Two to three snags (standing dead trees) per acre
- Control of invasive understory vegetation
- Additional native plant restoration areas

The plan continues the University's existing programs of tree risk assessment and hazard tree removal, creation and management of defensible space, maintaining trail access, and conservation and stewardship of native plants.

Treatments by Forest Types and Phases

Given the current conditions of each of the forest types, the following treatments are recommended in the plan:

- **Forest Type 1.** This forest type is currently too dense to sustain the number of existing trees. Dead, dying, unhealthy, and structurally unsound trees should be

removed and new trees should be planted to replace dead and dying trees to achieve a final density of between 75 and 100 trees per acre.

- **Forest Type 2.** No small diameter trees are present in this forest type; insufficient regeneration is occurring to sustain the forest canopy. A second age class should be established to maintain between 50 and 75 trees per acre. A long-term goal is to establish new age classes every 10 to 15 years.
- **Forest Type 3.** Most trees have low live crown ratios (i.e., only a small portion of the canopy is alive). Dead, dying, unhealthy, and structurally unsound trees should be removed and trees should be planted to replace dead and dying trees to achieve a final density of between 75 and 100 trees per acre. A long-term goal is to establish new age classes every 10 to 15 years.
- **Forest Type 4.** This forest type is currently in the best condition; drought stress is mitigated by summer fog. Dead and dying trees should be removed, and new trees should be planted to sustain between 80 and 100 trees per acre.

The plan identifies three phases during which management activities would be implemented to treat the forest. Forest treatments are summarized in Table 2.3-2. Seed tree[2], group selection[3], and individual tree selection[4] treatments would be used to thin the forest and promote regeneration. Forest treatments involving dead and dying tree removal would be most intensive in Phase I to reduce safety hazards within the Reserve and to promote regeneration of the forest as quickly as possible. Phase I seed tree and ground selection treatment areas are shown on Figure 2.3-2. Treatment types implemented in Phase I would continue in Phases II and III in different areas, and seed tree and group selection treatments would occur across the Reserve. Because it is difficult to predict how the conditions of the forest would change over the life of the plan, particularly in response to climate change, the forest treatments are defined to be adaptive and responsive to the changing forest conditions. The plan recommends updating the forest inventory prior to starting treatments during Phase III to ensure that forest treatments are appropriate for the future forest conditions.

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[2] Seed tree treatments involve the removal of dead, dying, unhealthy, and structurally unsound trees in areas between 0.5 and 5 acres. Healthy trees are retained to restock the forest.

[3] Group selection treatments involve the removal of dead, dying, unhealthy, and structurally unsound trees in clusters so that forest gaps (i.e., openings in the canopy) of various shapes and sizes are created to promote revegetation. Group selection treatments also promote the growth of remaining trees by increasing available light and moisture.

[4] In individual tree selection, individual trees are removed to promote the growth of remaining trees, reduce the number of dead trees, and provide space for regeneration.

Figure 2.3-2 Phase I Forest Treatment Areas

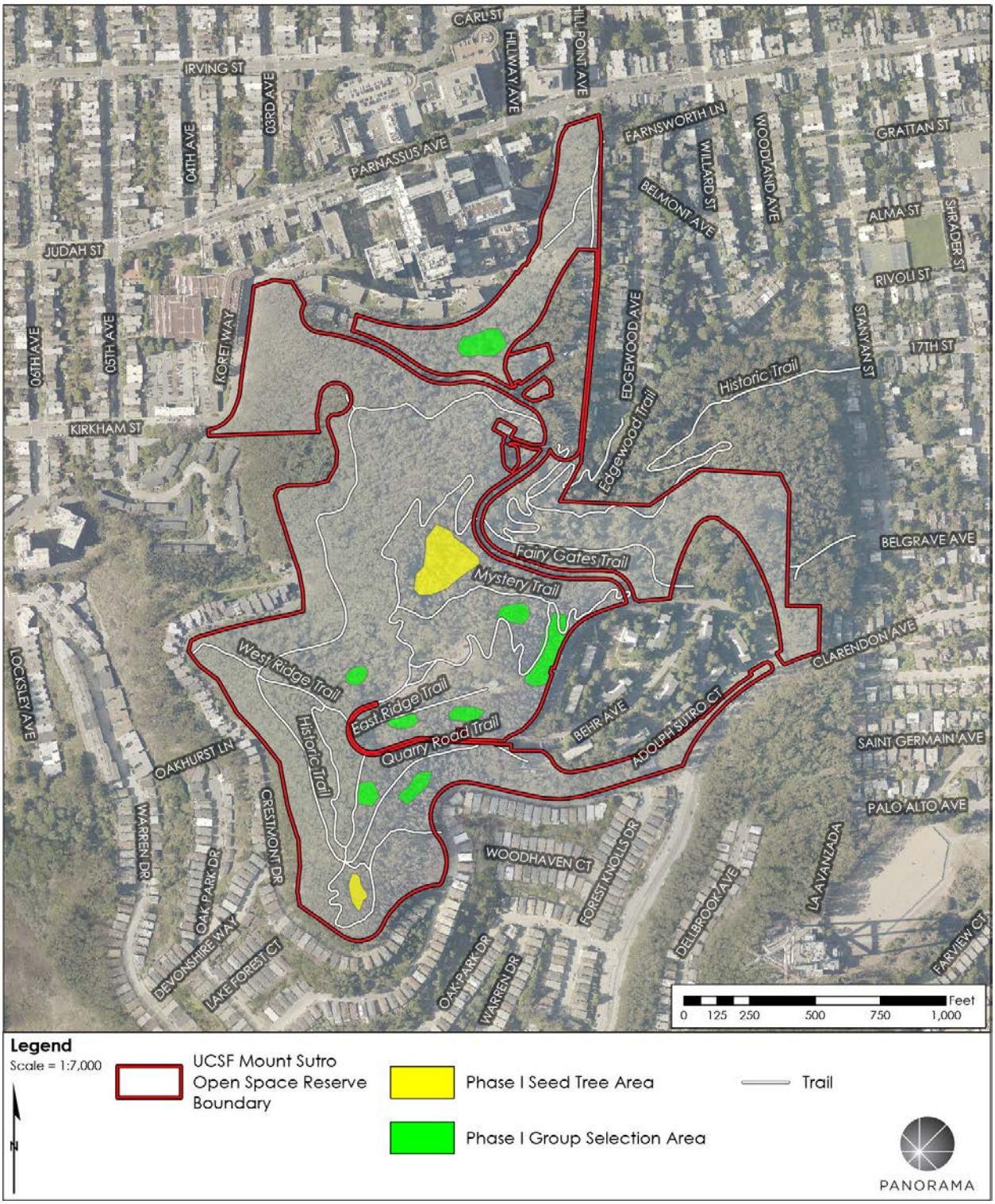


Table 2.3-2 Forest Treatments by Phase

Treatment Phase	Treatment
Phase 1 *Initial 5 years* *Focuses on managing risk of hazard trees and initiating forest treatments*	• Establish two seed tree treatment areas (1.5 acres in total) and eight group selection treatment areas (2.5 acres in total) in Forest Type 1 to remove dead and dying trees (shown in Figure 2.3-2) • Plant blue gum eucalyptus across Forest Types 1, 2, and 3 with an approximately 20-foot by 20-foot spacing • Manage tree risk by removing individual dead and dying structurally unsound trees in all four forest types • Control low-growing vines and shrubs that compete with native plants in all four forest types • Continue conservation and enhancement of native plants, and expand native plant conservation from 2 to 5 acres • Remove and/or trim trees to maintain defensible space between buildings and Reserve vegetation • Remove and/or trim vegetation along trails to maintain trails and public access
Phase 2 *6 to 10 years* *Focuses on forest restoration and regeneration*	• Remove dead and dying trees across Forest Types 1, 3, and 4 • Establish group selection or seed tree treatments in areas of low tree density in all four forest types • Plant blue gum and other species of eucalyptus in Forest Types 1, 2, and 3 with an approximately 20-foot by 20-foot spacing • Continue treatments started in Phase 1 (manage tree risk, plant natives, maintain defensive space, maintain trails) in all forest types
Phase 3 *11+ years* *Focuses on diversifying forest canopy and establishing new generation of trees*	• Update forest inventory prior to starting treatments • Continue removing dead and dying trees in all four forest types • Treat with a mix of individual tree selection, group selection, and seed tree treatments in all forest types • Continue treatments started in Phase 1 (manage tree risk, plant natives, maintain defensive space, maintain trails) in all forest types

Methods to Implement Forest Treatments

Vegetation Management Methods

Vegetation would be managed to:

- Remove dead, dying, unhealthy and structurally unsound trees,
- Control low-growing vines and shrubs that would compete with desired vegetation,
- Prevent sprouts from decayed eucalyptus stumps (these sprouts would also contain decay), and
- Plant new trees.

Work would be completed using manual and mechanical methods only. No herbicides would be used. Equipment used to implement the treatments would include, but would not be limited to, hand saws, pole saws, chainsaws, D-6 tractors or similar, excavators, backhoes, loaders, masticators, feller bunchers, pick-up trucks, skidders, forwarders, water trucks, log trucks, chip vans, chippers, tub grinders, stump grinders, and cranes.

Typically, up to three crews of up to five workers each would implement the vegetation management activities, including tree removal. They would operate up to two pieces of larger equipment per crew. Work would occur from August through the start of the rainy season, which could be anytime from early October through the end of January.

Access, Staging, and Water Usage
Temporary access roads would be established in the Reserve to facilitate management activities. Access road creation may require tree removal and surface grading or excavation. Existing trails and access may need to be widened by approximately three to four feet to accommodate equipment. Temporary trail closures and detours following a Trails Closure Plan would also be established for the safety of recreational users in the Reserve while vegetation management activities occur.

Staging areas (also called landing areas) for storage of felled trees, equipment, and other materials to be removed off-site would need to be established in the Reserve. Felled trees would be removed either by chipping the trees and dispersing the chipped vegetation materials on site or bucking and transporting the logs or chips to a disposal facility in log or chip trucks. These trucks would transport materials to an appropriate facility, located outside of San Francisco.

The plan currently does not include irrigation in the initial years of forest treatment. The goal is to establish new trees by planting just prior to the wet season so that irrigation is not needed. If planting and restoration efforts were unsuccessful, some form of irrigation may be used and will be identified in the EIR.

2.4 MITIGATION MEASURES FROM 2014 LRDP RELEVANT TO THE PLAN

An EIR was prepared for the 2014 LRDP which was certified by the Regents in November 2014 (State Clearinghouse Number 2013092047). The EIR identified the environmental impacts of the implementation of the LRDP, including any envisioned plans or activities that could occur across the UCSF campus sites. UCSF is bound to implement these mitigation measures where relevant to the work that it undertakes on its campus sites. Several of the measures are relevant to the plan for the Reserve. These measures are identified throughout Section 5 of this IS, with the text of the measures included here. Note that only the relevant parts of the measures are shown.

Mitigation Measure AIR-LRDP-1: Best Management Practices for Controlling Particulate Emissions. The following BAAQMD[5] Best Management Practices for particulate control will be required for all construction activities. These measures will reduce particulate emissions

[5] Bay Area Air Quality Management District, CEQA Air Quality Guidelines, Table 8-1, 2012.

primarily during soil movement, grading and demolition activities but also during vehicle and equipment movement on unpaved plan sites.

1. All exposed surfaces *that are under construction* (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
3. 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.
4. All vehicle speeds on unpaved roads shall be limited to 15 mph.
5. [Not relevant]
6. 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, § 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
7. 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.
8. Post a publically visible sign with the telephone number and person to contact at UCSF regarding dust complaints. This person shall respond and take corrective action within 48 hours. BAAQMD's telephone number shall also be visible to ensure compliance with applicable regulations.

Mitigation Measure AIR-LRDP-3: Off-Road Equipment Control Measures for NOx. All off-road equipment greater than 25 hp and operating for more than 20 total hours over the duration of construction activities shall have engines that meet or exceed U.S. EPA Tier 3 off-road emission standards.

Mitigation Measure BIO-PH-1a: Preconstruction Surveys for Monarch Butterfly Winter Roosts and Avoidance. Prior to demolition activities, a qualified biologist familiar with monarch butterfly aggregating behavior and habitat shall conduct a preconstruction survey for the presence of overwintering monarch butterfly aggregations. The survey shall be conducted in December or January during the period when overwintering aggregations appear. Should an overwintering aggregation be identified in trees adjacent to individual proposal sites within the Reserve, a 200-foot buffer shall be established around the occupied trees until the aggregation has dispersed.

Mitigation Measure BIO-PH-1b: Preconstruction Breeding Bird Surveys and Nest Avoidance. Should construction activities associated with the new retaining wall, new trails, demolition of buildings, relocation, expansion, and replacement of the medical gas and diesel fuel tank storage, and construction of the new hospital addition within the Parnassus Heights campus

site, commence during breeding bird season (February 15 – August 15) annually, UCSF shall retain a qualified biologist to conduct preconstruction nesting bird surveys in surrounding habitat for nesting birds. Specific measures to avoid and minimize impacts on nesting birds include, but are not limited to, those described below.

- To avoid and minimize potential impacts on nesting raptors and other birds, preconstruction surveys shall be performed not more than two weeks prior to initiating vegetation removal and/or construction and demolition activities during the breeding season (i.e., February 15 through August 15).
- To avoid and minimize potential impacts on nesting raptors and other birds, a no-disturbance buffer zone shall be established around active nests during the breeding season until the young have fledged and are self-sufficient, when no further mitigation would be required. Typically, the size of individual buffers ranges from a minimum of 250 feet for raptors to a minimum of 50 feet for other birds but can be adjusted based on an evaluation of the site by a qualified biologist in cooperation with the USFWS and/or CDFW.
- Birds that establish nests after construction starts are assumed to be habituated to and tolerant of the indirect adverse impacts resulting from construction noise and human activity. However, direct take of nests, eggs, and nestlings is still prohibited and an appropriate buffer must be established around the nest according to species and proximity to plan activities in order to avoid nest abandonment or destruction.
- If construction or demolition activities ceases for a period of more than two weeks, or vegetation removal is required after a period of more than two weeks has elapsed from the preconstruction surveys, then new nesting bird surveys must be conducted.

Mitigation Measure BIO-PH-1c: Avoidance and Minimization Measures for Special-Status Bats. A qualified wildlife biologist shall conduct preconstruction special-status bat surveys of suitable roost sites in the vicinity of construction and demolition sites that abut the forest of Mount Sutro Open Space Reserve. If active day or night roosts are found, the wildlife biologist shall take actions to make such roosts unsuitable habitat before construction and demolition activities begin. A no-disturbance buffer of 100 feet shall be created around active bat roosts being used for maternity or hibernation purposes. Bat roosts that are established during active construction or demolition are presumed to be unaffected by these activities, and no buffer would be necessary.

Mitigation Measure BIO-PH-1d: Preconstruction Surveys for Special-Status Plants and Plant Avoidance. Prior to construction activities, a qualified botanist shall conduct preconstruction surveys for special-status plants, coastal triquetrella and San Francisco gumplant, within the footprints of and in suitable habitat adjacent to locations of the new retaining wall, new trail alignments, and any access routes and staging areas to be used in support of these plans. Surveys for coastal triquetrella can be conducted at any time of the year however surveys for San Francisco gumplant shall occur in the summer (June – September). Should special-status

plant species be found during surveys, occurrences shall be marked in the field for avoidance during construction.

Mitigation Measure BIO-PH-1e: Relocation of Special-Status Plants. If special-status plants are located within the retaining wall or new trails footprint and cannot be avoided, then a rare plant salvage and relocation plan shall be developed to relocate individuals to suitable habitat within the Reserve. A qualified botanist shall develop and implement the plan according to CDFW guidelines and in coordination with CDFW. At a minimum, the plan shall include collection of reproductive structures from affected plants, a full description of microhabitat conditions necessary for each affected species, seed germination requirements, restoration techniques for temporarily disturbed occurrences, assessments of potential transplant and enhancement sites, success and performance criteria, and monitoring programs, as well as measures to ensure long-term population viability. The mitigation methods shall include either salvage and transplantation or collection and propagation of seeds or other vegetative material. Any plant relocation shall be done under the supervision of a qualified restoration botanist.

Mitigation Measure CUL-LRDP-3. Should an archaeological artifact be discovered during plan construction and excavation, pursuant to CEQA Guidelines 15064.5 (f), "provisions for historical or unique archaeological resources accidentally discovered during construction" shall be instituted. In the event that any prehistoric or historic subsurface cultural resources are discovered during ground disturbing activities, all work within 100 feet of the resources shall be halted and UCSF shall consult with a qualified archaeologist or paleontologist to assess the significance of the find (per Public Resource Code Section 5024.1, Title 14 CCR, Section 4852 and/or Public Resource Code 21083.2 in the event of a unique archaeological find). If any find is determined to be significant and will be adversely affected by the plan, representatives of UCSF and the qualified archaeologist and/or paleontologist shall meet to determine the appropriate avoidance measures or other appropriate mitigation (per CEQA Guidelines 15064.5 (b) and Public Resource Code 21083.2). All significant cultural materials recovered shall be subject to scientific analysis, professional museum curation, and documented by the qualified archaeologist according to current professional standards (per the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 FR44716)).

Mitigation Measure CUL-LRDP-4. If paleontological resources, such as fossilized bone, teeth, shell, tracks, trails, casts, molds, or impressions are discovered during ground-disturbing activities, all ground disturbing activities within 50 feet of the find shall be halted until a qualified paleontologist can assess the significance of the find and, if necessary, develop appropriate salvage measures in consultation with UCSF and in conformance with Society of Vertebrate Paleontology Guidelines (SVP, 1995; SVP, 1996).

Mitigation Measure CUL-LRDP-5. If the discovery includes human remains, CEQA Guidelines 15064.5 (e)(1) shall be followed:

> In the event of the accidental discovery or recognition of any human remains in any location other than a dedicated cemetery, the following steps should be taken:

(1) There shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until:

(A) The coroner of the county in which the remains are discovered must be contacted to determine that no investigation of the cause of death is required, and

(B) If the coroner determines the remains to be Native American: (1) the coroner shall contact the Native American Heritage Commission within 24 hours. (2) The Native American Heritage Commission shall identify the person or persons it believes to be the most likely descended from the deceased Native American. (3) The most likely descendent may make recommendations to the landowner or the person responsible for the excavation work, for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods as provided in Public Resources Code Section 5097.98, or

(2) Where the following conditions occur, the landowner or his authorized representative shall rebury the Native American human remains and associated grave goods with appropriate dignity on the property in a location not subject to further subsurface disturbance.

(A) The Native American Heritage Commission is unable to identify a most likely descendent or the most likely descendent failed to make a recommendation within 24 hours after being notified by the commission.

(B) The descendant identified fails to make a recommendation; or

(C) The landowner or his authorized representative rejects the recommendation of the descendant, and the mediation by the Native American Heritage Commission fails to provide measures acceptable to the landowner.

Mitigation Measure GHG-LRDP-1: Construction-Related GHG Reduction Measures. The following BAAQMD-suggested measures shall be implemented during demolition and construction activities:

- Use alternative fueled (e.g., biodiesel, electric) construction vehicles/equipment where feasible;
- [Not relevant]

Mitigation Measure HAZ-LRDP-1. An Excavation Management Plan shall be prepared by a qualified consultant to include the California Air Resource Board (CARB) Asbestos Airborne Toxic Control Measure (ATCM) for Construction, Grading, Quarrying and Surface Mining Operations to minimize naturally occurring asbestos through the application of best management practices for fugitive dust from construction, grading and excavation operations. Unless site specific testing by a certified laboratory can demonstrate the absence of encountering naturally occurring asbestos, construction specifications shall include implementation of this CARB ATCM.

Mitigation Measure NOI-LRDP-1a: Construction Noise Control Measures. UCSF contractors shall employ site-specific noise attenuation measures during construction to reduce the generation of construction noise. These measures shall be included in a Noise Control Plan that shall be submitted for review and approval by UCSF to ensure that construction noise is consistent with the standards set forth in the City's Noise Ordinance. Measures specified in the Noise Control Plan and implemented during plan construction shall include, at a minimum, the following noise control strategies:

- Equipment and trucks used for construction shall use the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds.
- Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 a-weighted decibels (dBA). External jackets on the tools themselves shall be used where feasible; this could achieve a reduction of 5 dBA. Quieter procedures, such as use of drills rather than impact tools, shall be used where feasible.
- Stationary noise sources shall be located as far from adjacent receptors as possible, and they shall be muffled and enclosed within temporary sheds, incorporate insulation barriers, or include other measures.

Mitigation Measure NOI-LRDP-1b: Construction Hours. Construction hours are restricted to the hours listed in the table below. In rare circumstances, work may need to occur outside of these work hour limits. In such cases, UCSF Community and Government Relations will receive advance notice from the plan manager, at least one week in advance as feasible, and will engage the community to identify measures to minimize potential impacts.

Days of the Week	Construction Hours			
	"Not Noisy" Work[a]		Noisy Work	
	Regular Hours	Extended Hours	Regular Hours	Extended Hours
Monday – Friday	7:00 am to 5:00 pm	5:00 pm to 8:00 pm	8:00 am to 5:00 pm	N/A
Saturday	N/A	8:00 am to 5:00 pm	N/A	9:00 am to 4:00 pm
Sunday	N/A	8:00 am to 5:00 pm	N/A	N/A

Notes:

[b] "Not Noisy" work = 80 decibels or less at 100 feet; "Noisy" work = more than 80 decibels at 100 feet.

[c] Extended hours to be considered by UCSF Community and Government Relations with advance notice from the plan manager.

Mitigation Measure TRAF-LRDP-1: Construction Coordination and Monitoring Measures. ***Traffic Control Plan for Construction*** –In order to reduce potential conflicts between

construction activities and pedestrians, transit and autos during construction activities at the four campus sites, UCSF shall require construction contractor(s) to prepare a traffic control plan for major phases of plan construction (e.g. demolition, construction, or renovation of individual buildings). UCSF and its construction contractor(s) will meet with relevant City agencies to coordinate feasible measures to reduce traffic congestion, including temporary transit stop relocations (e.g. Parnassus Avenue (Parnassus Heights), Sutter Street (Mount Zion), etc.) and other measures to reduce potential traffic and transit disruption and pedestrian circulation effects during major phases of construction of the 2014 LRDP Plans. For any work within the public right-of-way, the contractor would be required to comply with the City of San Francisco's Regulations for Working in San Francisco Streets (the Blue Book), which establish rules and permit requirements so that construction activities can be done safely and with the least possible interference with pedestrians, bicyclists, transit, and vehicular traffic[6]. In addition to the regulations in the Blue Book, UCSF shall require the construction contractor(s) to comply with all state and federal codes, rules and regulations.

In the event that the construction timeframes of the major phases and other development plans adjacent to UCSF overlap, UCSF shall coordinate with City Agencies through the Transportation Advisory Staff Committee (TASC) and the adjacent developers to minimize the severity of any disruption to adjacent land uses and transportation facilities from overlapping construction transportation impacts. UCSF, in conjunction with the adjacent developer, shall propose a construction traffic control plan that includes measures to reduce potential construction traffic conflicts, such as staggering start and end times, coordinated material drop offs, collective worker parking and transit to job site and other measures.

Reduce SOV Mode Share for Construction Workers – In order to minimize parking demand and vehicle trips associated with construction workers, UCSF shall require the construction contractor to include in the Traffic Control Plan for Construction methods to encourage walking, bicycling, carpooling and transit access to the campus sites by construction workers in the coordinated plan.

Plan Construction Updates for Adjacent Residents and Businesses – In order to minimize construction impacts on access for nearby residences, institutions and businesses, UCSF shall provide nearby residences and adjacent businesses with regularly-updated information regarding plan construction, including construction activities, peak construction vehicle activities (e.g., concrete pours), travel lane closures, and lane closures via a newsletter and/or website.

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[6] The SFMTA Blue Book, 8th Edition (2012), is available online through SFMTA (sfmta.com).

2.5 DISCRETIONARY APPROVALS

- Action by the University: Upon certification of the EIR, the University will consider whether to approve the proposed management actions.
- Action by Other Agencies: There are no responsible agencies that have approval authority over the proposed plan. Trustee agencies include the California Department of Fish and Wildlife.

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3 ENVIRONMENTAL IMPACTS CHECKLIST

The environmental factors checked below could potentially be affected by implementation of the plan:

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

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4 ENVIRONMENTAL DETERMINATION

On the basis of this initial evaluation:

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

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

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

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

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



02/06/2017

Diane Wong
Environmental Coordinator
UCSF Campus Planning

Date

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5 EVALUATION OF ENVIRONMENTAL IMPACTS

5.1 IMPACT CATEGORIES

During the completion of the environmental evaluation presented in this IS, the following categories of impact noted as column headings in the IS checklist were relied upon:

A. "Potentially Significant Impact" is appropriate if there is substantial evidence that the plan's effect may be significant. If there are one or more "Potentially Significant Impacts" a EIR will be prepared.
B. "Less Than Significant with Mitigation" applies where the incorporation of LRDP EIR or plan-specific mitigation measures will reduce an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." All mitigation measures must be described, including a brief explanation of how the measures reduce the effect to a less than significant level.
C. "Less Than Significant Impact" applies where the plan will not result in any significant effects. The plan impact is less than significant without the incorporation of mitigation.
D. "No Impact" applies where a plan would not result in any impact in the category or the category does not apply. "No Impact" answers need to be adequately supported by the information sources cited, which show that the impact does not apply to plans like the one involved (e.g., the plan falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on plan-specific factors as well as general standards (e.g., the plan will not expose sensitive receptors to pollutants, based on a plan specific screening analysis).

The impact questions identified in this Section are the same as those in Appendix G of the CEQA Guidelines. Additionally, in several impact topics there are impact questions that relate to significance standards established in UCSF's LRDP Final EIR, where they are not otherwise covered by Appendix G.

The impact questions consist of two types: those that require a qualitative evaluation and those that require a quantitative analysis. The impact questions themselves constitute the standards of significance. Where applicable, additional explanation and/or quantitative thresholds are provided under the appropriate environmental topic.

5.2 SUMMARY OF FOCUSED EIR CONTENT

Table 5.2-1 summarizes the resources and topics that are currently anticipated to be addressed in the EIR based on the impact assessment provided in Section 5.3 of this IS. Topics may be adjusted based on agency and public feedback on this IS during the public scoping period.

Table 5.2-1 Anticipated Content of the EIR

Resources	Included in the EIR?	Impact/Topic to be Addressed in the EIR or Rationale for Focusing out Topic from EIR
Aesthetics	Yes	• Substantial adverse effect on a scenic vista • Substantially degrade the visual character or quality of the plan site and its surroundings • Substantially reduce sunlight or significantly increase shadow in open spaces areas, or increase pedestrian level wind speeds above the hazard level set forth in the San Francisco Planning Code
Agriculture and Forestry Resources	Yes	• Result in the loss of forest land or conversion of forest land to non-forest use? • Involve other changes in the existing environment that, due to their location or nature, could result in conversion of forest land to non-forest use
Air Quality	Yes	• Conflict with an applicable air quality plan • Violate an air quality standard or contribute to an existing or planned air quality violation • Result in a cumulatively considerable net increase of any criteria pollutant for which the plan region is in nonattainment under an applicable federal or state ambient air quality standard • Expose sensitive receptors to substantial pollutant concentrations • Exceed the applicable LRDP EIR standard of significance by exposing receptors to toxic air contaminant emissions that (1) result in a cancer risk greater than 10 cancer cases per 1 million people exposed in a lifetime; or (2) for acute or chronic effects, result in concentrations of toxic air contaminant emissions with a Hazard Index of 1.0 or greater
Biological Resources	Yes	• 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 Wildlife or the U.S. Fish and Wildlife Service • Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service • Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites • Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance

Resources	Included in the EIR?	Impact/Topic to be Addressed in the EIR or Rationale for Focusing out Topic from EIR
Cultural Resources, Tribal Cultural, and Paleontological Resources	Yes	• Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5 • Cause a substantial adverse change in the significance of an archaeological resource as defined in §15064.5 • Cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code 21074
Geology and Soils	Yes	• Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides • Result in substantial soil erosion or the loss of topsoil • Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the plan, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse
Greenhouse Gases	Yes	• Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment • Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emission of greenhouse gases
Hazards and Hazardous Materials	Yes	• Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials • Release of hazardous materials as a result of upset or accident conditions • Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands
Hydrology and Water Quality	Yes	• Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on or off site • Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site • Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff
Land Use and Planning	No	The proposed plan would not involve a change in use or create an incompatibility with existing land uses.
Mineral Resources	No	No mineral resources occur in the plan area.

Resources	Included in the EIR?	Impact/Topic to be Addressed in the EIR or Rationale for Focusing out Topic from EIR
Noise	Yes	• Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies • Result in a substantial permanent increase in ambient noise levels in the plan vicinity above levels existing without the plan • Result in a substantial temporary or periodic increase in ambient noise levels in the plan vicinity above levels existing without the plan • Exceed an applicable LRDP EIR standard of significance by contributing to an increase in average daily noise levels (Ldn) of 3 dB(A) or more at property lines, if ambient noise levels in areas adjacent to proposed development already exceed local noise levels set forth in local general plans or ordinances for such areas based on their use
Population and Housing	No	The plan does not include the addition of homes, businesses, or the infrastructure needed to induce population growth. The plan would not require construction of new homes, remove homes, or displace any homes or people.
Public Services	Yes	• Result in impacts associated with acceptable service ratios, response times, or other performance objectives for fire protection, police protection, and parks
Recreation	Yes	• Cause or accelerate substantial physical deterioration of existing neighborhood or regional parks • Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment
Traffic and Transportation	Yes	• Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment) • Result in inadequate emergency access • Exceed the applicable LRDP EIR standard of significance by causing substantial conflict among autos, bicyclists, pedestrians, and transit vehicles
Utilities and Service Systems	Yes	• Have sufficient water supplies available to serve the plan from existing entitlements and resources, or are new or expanded entitlements needed
Mandatory Findings of Significance	Yes	• Cumulative Impacts

5.3 IMPACT ANALYSIS

5.3.1 Aesthetics

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
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 or designated scenic roadway?	☐	☐	☐	☒
C) Substantially degrade the existing visual character or quality of the site and its surroundings?	☒	☐	☐	☐
D) Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?	☐	☐	☒	☐
E) Exceed the LRDP EIR significance standard by substantially reducing sunlight or significantly increasing shadows in public open space areas, or by increasing pedestrian-level wind speeds above the hazard level set forth in the San Francisco Planning Code?	☒	☐	☐	☐

A) Would the plan have a substantial adverse effect on a scenic vista?

The Reserve is visible from several public vantage points in San Francisco, such as from Twin Peaks, where the Reserve is one component of the scenic vistas from these pubic vantage points. The plan would include implementing vegetation management activities, such as the removal of dead and dying trees, that may affect the appearance of the Reserve as viewed from public vistas or other public areas. The Reserve would continue to be an open space and forested hill that would contrast against the surrounding man-made urban environment. The visual appearance of the Reserve from those vistas, however, could significantly change due to treatment activities and at least temporary reduction in forest density. The EIR will address the degree and significance of the visual change as viewed from public vantage points outside of the Reserve.

Implementation of the plan would also include the creation of openings in existing forest cover that would create public views/scenic vistas from within the Reserve looking outward toward other parts of San Francisco and beyond, including potentially the ocean, the Farallon Islands, and the Golden Gate bridge. Creation of these vistas would represent a visual change compared

with the current forest experience. This visual change and its potential significance will also be addressed in the EIR.

Conclusion: Implementation of the plan could have a potentially significant impact on scenic vistas. This topic will be addressed in the EIR.

B) Would the plan substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway or designated scenic roadway?

Nearby designated state scenic highways include Interstate 280 (I-280) and State Route 35 (SR-35). The nearest segment of I-280 is approximately 2 miles south of the plan site; the closest segment of SR-35 ends at 19th Avenue and Sloat Boulevard, over 1.5 miles south of the Reserve. The Reserve is not prominently visible from I-280 or SR-35; intervening topography, vegetation, and buildings obstruct or obscure views of the Reserve from these highways. Therefore, no impact would occur.

Conclusion: Implementation of the plan would have no impact on scenic resources within a state scenic highway. Effects on scenic highways will not be evaluated further in the EIR.

C) Would the plan substantially degrade the existing visual character or quality of the site and its surroundings?

Vegetation management activities, including forest treatments, removing dead and dying trees, initiating restoration plans, and constructing access roads and staging areas for maintenance activities could affect the appearance of the Reserve when viewed from adjacent properties and roadways and from within the Reserve. Tree removal, understory clearing, new plantings, and work on existing and new trails could change the appearance and the density of the forest as it currently stands. Changes to the visual quality of the Reserve as a forest could occur, which could be considered a potentially significant impact. An evaluation of the plan's short- and long-term impacts on visual quality within the Reserve will be addressed in the EIR using standard visual assessment methodologies and visual simulations.

Conclusion: Implementation of the plan could result in potentially significant impacts on the visual character and quality of the site and its surrounding. This topic will be addressed in the EIR.

D) Would the plan create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Implementation of the plan would not include the use of substantial or permanent lighting. Most management activities would occur during daytime hours and, therefore, would not create a new source of substantial light or glare that could adversely affect day or nighttime views in the area.

The plan includes several activities that include the removal of dead, dying, unhealthy, and structurally unsound trees, removal of thick non-native understory that prohibits new growth such as ivy, and establishment of new age classes of eucalyptus in different forest types over

time. This work would result in additional light passing through the forest, creating light gaps for new trees to grow. Additional light within the forest would not adversely affect daytime views; however, it could change the character of the forest. The change in visual character will be addressed in the EIR under topics C and E.

Work would also include the management of trees within proximity to streets, driveways, buildings, parking lots, and trails. Tree removal would be limited to individual hazard trees and would not cause an increase in light that could impact day or nighttime views. The nighttime sky is generally difficult to see across all of San Francisco due to light pollution from the dense development across the city. Impacts would be less than significant.

Conclusion: Implementation of the plan would have less than significant impacts associated with light or glare. Effects from light and glare will not be evaluated further in the EIR.

E) Would the plan exceed the LRDP EIR significance standard by substantially reducing sunlight or significantly increasing shadows in public open space areas, or by increasing pedestrian-level wind speeds above the hazard level set forth in the San Francisco Planning Code?

The plan would involve implementing several vegetation management activities that could change and generally reduce the density of the trees and understory in the forest at least in the short-term to enable greater sunlight exposure for newly planted young trees within the Reserve. Once the forest is established, its overall density of canopy cover may be greater. However, to maintain a healthy forest, gaps in the canopy must be established to allow sunlight to reach sprouts so that different age classes of eucalyptus can grow. Shadow patterns are affected by canopy density (i.e., live crown ratios) and the size and number of trees in the forest. Shadows within the Reserve could decrease in some areas as a result of tree removal and reduced tree density (such as in Forest Type 1) and increase in other areas as a result of new tree development and a general increase in tree density (such as in Forest Type 2). Sunlight and shadow changes within the Reserve could be significant.

The proposed activities generally would not change shadows on surrounding areas because management activities would not change the overall location and nature of the Reserve as a forest. Tree work would not significantly alter shadows in public or open space areas outside of the Reserve. The nearest open space area to the Reserve is the Interior Greenbelt, operated by the San Francisco Recreation and Parks Department. The Interior Greenbelt is a similar forest to the Reserve. Management of trees in the Reserve would not change shadows in the Interior Greenbelt because new structures or new forested areas that could cast shadows would not be created. Sunlight and shadow impacts would be less than significant on areas outside the Reserve.

The pedestrian-level wind speed hazard criterion set forth in the San Francisco Planning Code applies to new buildings generally 100 feet in height or taller in certain zoning districts and as such would not apply as a significance standard to the plan. Proposed vegetation management activities are not expected to create hazardous winds. Winds in San Francisco predominantly come from the west and northwest. Increases in wind speeds may occur when winds are intercepted by a large plane, such as a dense stand of trees, and are redirected. A permeable

stand of trees may be more effective in functioning as a wind break than a dense stand of trees. Wind speeds could increase temporarily in forest openings as trees are removed. Over time, as existing tree canopies expand and new trees grow, wind speeds would tend to be reduced. The proposed plan would not expose persons or adjacent properties to substantially increased wind speeds in the long-term; impacts from increased wind within the Reserve would be less than significant.

Removal of dead and dying trees may result in increased exposure to existing winds at the edges of the Reserve and within forest openings created in the Reserve. The increased winds at the edge of the forest and within forest openings can result in turbulence and potential windthrow hazard (i.e., the uprooting of trees). The windthrow hazard resulting from removal of dead and dying trees is potentially significant. Additional study and review will be undertaken and presented in the EIR to assess the significance of potential windthrow hazard impacts.

Conclusion: Implementation of the plan could have a potentially significant impact associated with reduction of sunlight in the Reserve and windthrow. These topics will be addressed in the EIR.

5.3.2 Agriculture and Forestry Resources

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
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 in Public Resource Code section 4526), or timberland zoned Timberland Production (as defined in 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 that, due to their location or nature, could result in conversion of Farmland to nonagricultural use or conversion of forest land to non-forest use?	☒	☐	☐	☐

A) Would the plan convert Prime Farmland, Unique 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) Would the plan conflict with existing zoning for agricultural use or a Williamson Act contract?

The Reserve does not contain any lands zoned for agricultural use. Therefore, no impact on agricultural lands would occur.

Conclusion: Implementation of the plan would have no impact on agricultural resources. Effects on agricultural resources will not be evaluated further in the EIR.

C) Would the plan conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined in Public Resource Code section 4526), or timberland zoned Timberland Production (as defined in Government Code section 51104 (g))?

California Public Resource Code § 12220 defines forest land as land that can support 10 percent native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources including biodiversity, water quality, and recreation. The Reserve does not currently support 10 percent native tree cover. While it does not meet the definition of a forest by the Public Resources Code, it is considered a non-native forest in the 2014 LRDP for UCSF.

Conclusion: Implementation of the plan would have no impact on the zoning or use of forest land or timberland and this topic will not be evaluated further in the EIR.

D) Would the plan result in the loss of forest land or conversion of forest land to non-forest use?

The plan supports a commitment to maintaining the Reserve as a eucalyptus forest; however, the plan is adaptive and may include the increase in native species over time, especially around natural drainages. The plan would involve changes to the forest. The potential significance of these changes will be addressed in the EIR.

Conclusion: Implementation of the plan could alter the forest and these changes could be significant. Changes in forest land will be addressed in the EIR.

E) Would the plan involve other changes in the existing environment that, due to their location or nature, could result in conversion of Farmland to nonagricultural use or conversion of forest land to non-forest use?

The Reserve does not contain any agricultural uses. No impact on agricultural uses would occur. As described under item D), the plan is adaptive and could result in changes in the forest. The potential significance of these changes will be addressed in the EIR.

Conclusion: Implementation of the plan could alter the forest and these changes could be significant. Changes in forest land will be addressed in the EIR.

5.3.3 Air Quality

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
A) Conflict with or obstruct implementation of the applicable air quality plan?	☒	☐	☐	☐
B) Violate any air quality standard or contribute substantially to an existing or planned air quality violation (e.g., induce mobile source carbon monoxide (CO) emissions that would cause a violation of the CO ambient air quality standard)?	☒	☐	☐	☐
C) Result in a cumulatively considerable net increase of any criteria pollutant for which the plan region is in nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?	☒	☐	☐	☐
D) Expose sensitive receptors to substantial pollutant concentrations?	☒	☐	☐	☐
E) Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐
F) Exceed the applicable LRDP EIR standard of significance by exposing receptors to toxic air contaminant emissions that (1) result in a cancer risk greater than 10 cancer cases per 1 million people exposed in a lifetime; or (2) for acute or chronic effects, result in concentrations of toxic air contaminant emissions with a Hazard Index of 1.0 or greater?	☒	☐	☐	☐

A) Would the plan conflict with or obstruct implementation of the applicable air quality plan?

B) Would the plan violate any air quality standard or contribute substantially to an existing or planned air quality violation?

C) Would the plan result in a cumulatively considerable net increase of any criteria pollutant for which the plan region is in nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?

D) Would the plan expose sensitive receptors to substantial pollutant concentrations?

and

F) Would the plan exceed the applicable LRDP EIR standard of significance by exposing receptors to toxic air contaminant emissions that (1) result in a cancer risk greater than 10 cancer cases per 1 million people exposed in a lifetime; or (2) for acute or chronic effects, result in concentrations of toxic air contaminant emissions with a Hazard Index of 1.0 or greater?

The Reserve is located within the San Francisco Bay Area Air Basin (SFBAAB), which is under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). The SFBAAB is

in non-attainment of state and federal standards for ozone and is in non-attainment of the state standards for particulate matter less than 10 microns in diameter (PM_{10}) and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$).

BAAQMD sets emissions thresholds for several criteria pollutants, including ozone precursors and particulate matter. Plans that do not result in emissions of air pollutants that exceed the thresholds are not considered to have a significant impact on air quality and would also be consistent with air quality plans for the region.

Implementation of vegetation management activities would result in emissions of air pollutants. Heavy equipment used for vegetation management activities would emit criteria pollutants and could cause temporary air quality impacts on sensitive receptors. Mitigation from the LRDP EIR, including *Mitigation Measure AIR-LRDP-1 Best Management Practices for Controlling Particulate Emissions* and *Mitigation Measure AIR-LRDP-3 Off-Road Equipment Control Measures for NOx*, as well as the BAAQMD basic construction measures would be implemented during implementation of the plan. The mitigation from the LRDP EIR requires several measures to reduce airborne particulate matter such as watering exposed surfaces, covering haul trucks, cleaning track-out, minimizing vehicles speeds, reducing idling times, posting a number for dust complaints, and using United States Environmental Protection Agency Tier 3 off-road emission standards. Impacts on air quality could be still be significant. Additional modeling is required to adequately determine whether plan activities would exceed criteria pollutant levels or contribute to existing air quality violations. The air quality modeling and analysis will be presented in the EIR.

BAAQMD also recommends the implementation of applicable ATCMs for all construction. UCSF implements these measures on all plans, where applicable. The EIR will include the quantification and analysis of cancer risks from toxic air contaminants given the implementation of these measures.

Conclusion: Implementation of the plan could result in potentially significant impacts on air quality and from emissions of toxic air contaminants. These topics will be addressed in the EIR.

E) Would the plan create objectionable odors affecting a substantial number of people?

Odorous substances are regulated under BAAQMD Regulation 7. This regulation prohibits the emission of odorous chemical compounds that remain odorous after dilution with a specified quantity of odor-free air. Chipping of wood materials could result in a menthol odor in the surrounding area. Menthol odors are naturally occurring compounds that are not regulated by BAAQMD and are not classified as objectionable odors. Management activities would emit limited odors from the use of heavy equipment; however, odors emitted by management activities would not exceed limits set in this regulation. The plan would have a less than significant impact from the creation of objectionable odors.

Conclusion: Implementation of the plan would have less than significant impacts related to odors. Effects from odors will not be evaluated further in the EIR.

5.3.4 Biological Resources

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
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 Wildlife or the U.S. Fish and Wildlife Service?	☒	☐	☐	☐
B) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?	☒	☐	☐	☐
C) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
D) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☒	☐	☐	☐
E) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☒	☐	☐	☐
F) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒
G) Exceed the applicable LRDP EIR standard of significance by damaging or removing heritage or landmark trees or native oak trees of a diameter specified in a local ordinance?	☐	☐	☐	☒

A) Would the plan 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 Wildlife or the U.S. Fish and Wildlife Service?

A limited number of special-status plant and animal species could be present in the Reserve, including San Francisco gumplant (*Grindelia hirsutula* var. *maritima*), coastal triquetrella (*Triquetrella californica*), monarch butterfly (*Danaus plexippus*), western red bat (*Lasiurus*

blossevillii) and olive-sided flycatcher (*Contopus cooperi),* based on surveys conducted in 2011 (LSA 2011). Tree removal and other management activities could have potentially significant impacts on these species through direct impacts from equipment usage and indirect impacts from habitat alteration. Additional surveys to update potential habitat and species that could occur in the Reserve will be undertaken. Analysis of impacts on these species will be presented in the EIR.

Conclusion: Implementation of the plan could result in potentially significant impacts on special status plant and animal species. This topic will be addressed in the EIR.

B) Would the plan have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?

No riparian habitat or other sensitive natural communities are currently present in the Reserve; however, the plan includes restoration activities to introduce native plants in drainages and thus could create new riparian habitat that could be impacted by future and ongoing maintenance activities. An intermittent stream known as Woodland Creek, on the eastern side of the Reserve, may be subject to California Department of Fish and Wildlife (CDFW) jurisdiction under Section 1602 of the California Fish and Game Code.

Restoration or vegetation management activities within CDFW jurisdiction below the top of bank, were it to occur, would be limited to possible removal of vegetation and planting of new vegetation. Although an LSAA may be required for such activities, the proposed plan is not expected to have a substantial adverse effect on Woodland Creek and would result in long-term benefits associated with increased wildlife habitat and native plant diversity through native plant riparian restoration.

Short-term impacts associated with construction-related disturbance could cause sedimentation of Woodland Creek, which would be considered a potentially significant impact. Mitigation to control stormwater runoff during implementation of plan activities could reduce these impacts but would need to be addressed in the EIR.

Conclusion: Implementation of the plan could have impacts on Woodland Creek and riparian habitat. Effects will be evaluated in the EIR.

C) Would the plan have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

No wetlands potentially subject to the U.S. Army Corps of Engineers (ACOE) and/or Regional Water Quality Control Board jurisdiction have been previously identified (LSA 2011). The steep topography over most of the site prevents the establishment of ponded depressions, seasonal wetlands, or other features that retain water long enough to support hydric soils and hydrophytic vegetation. The channel of Woodland Creek may be subject to ACOE jurisdiction.

The plan would not include the discharge of any fill material into the jurisdictional channel of Woodland Creek. A Section 404 permit would not be required, and impacts on federally protected wetlands would be less than significant.

Conclusion: Implementation of the plan would have no impact on federally protected wetlands or waters of the U.S. Effects on wetlands and waters of the U.S. will not be evaluated further in the EIR.

D) Would the plan 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?

The Reserve does not constitute a wildlife corridor because it does not facilitate wildlife movement through the urban landscape of San Francisco. While it provides habitat for many urban-adapted wildlife species, it is isolated from other patches or areas of similar habitat in San Francisco due to dense development in the intervening urban spaces. Migratory species, however, such as birds and bats, likely utilize the Reserve as habitat. Management activities that involve tree removal, planting, and understory alteration could have potentially significant impacts on bats and avian species. The impacts on migration of birds and bats will be addressed in the EIR.

Conclusion: Implementation of the plan could result in potentially significant impacts on migratory species. This topic will be addressed in the EIR.

E) Would the plan conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Pursuant to the University of California's constitutional autonomy, development and uses on property owned or leased by the University that are in furtherance of the University's educational purposes are not subject to local land use regulation, including City of San Francisco General Plan policies regarding the protection of biological resources. Although UCSF is not subject to City policies and regulations, UCSF strives to be consistent with City standards, where feasible.

The City of San Francisco maintains an Urban Forestry Ordinance (DPW Code Article 16) that protects various types of trees on private land, including:

- **Landmark Trees.** UCSF has no landmark trees on its Parnassus Heights campus site, including the Reserve.
- **Significant Trees.** Defined as trees within 10 feet of a public right-of-way that are taller than 20 feet, with a canopy greater than 15 feet, or with a trunk diameter greater than 12 inches at breast height. Requirements for the removal of significant trees do not apply if the trees are deemed hazard trees, defined as any tree that poses an imminent hazard to person or property after maintenance activities such as pruning or the replacement of dead or damaged trees have occurred. A tree may be hazardous if it or any part of it (1) appears dead, dangerous, or likely to fall, even after proper maintenance activities are performed to eliminate dead or

dangerous parts, (2) obstructs or damages a street, sidewalk, or other existing structure, (3) harbors a serious disease or infestation threatening the health of other trees, (4) interferes with vehicular or pedestrian traffic, or (5) poses any other significant hazard or potential hazard. Individual trees meeting these criteria may be removed as part of the proposed plan.

- **Street Trees.** No street trees would be removed as part of this plan.

Removal of significant trees, per the ordinance, typically requires a permit and public review. The overall intention of the ordinance is to protect urban forests and important trees that provide shade, habitat, and aesthetic value to the City of San Francisco's residents, among other goals. Implementation of the plan focuses on the removal of dead, dying, unhealthy, and structurally unsound trees; however, to manage the vegetation to establish a healthy forest, other trees would likely need to be removed. Final tree densities to maintain a healthy forest would be less than current densities in Forest Types 1 and 3; final densities for Forest Types 2 and 4 would be greater than current densities. Impacts from the removal of trees, some of which may meet City definitions of Significant Trees, could be potentially significant. The EIR will address the types and numbers of trees that may be removed and the significance of the associated impacts.

Conclusion: Implementation of the plan could conflict with local policies or ordinances related to tree removal. Effects from conflicts with local plans or ordinance will be evaluated in the EIR.

F) Would the plan 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 federally protected wetlands are located in the Reserve. No adopted Habitat Conservation Plans, Natural Community Conservation Plans, or other applicable habitat conservation plans exist that are applicable to the plan. No impact would occur.

Conclusion: Implementation of the plan would not conflict with adopted Habitat Conservation Plans, Natural Community Conservation Plans, or other plans. Effects from conflicts with plans to protect biological resources will not be evaluated further in the EIR.

G) Would the plan exceed the applicable LRDP EIR standard of significance by damaging or removing heritage or landmark trees or native oak trees of a diameter specified in a local ordinance?

The site does not contain any heritage or landmark trees or native oak trees of a diameter specified in any San Francisco ordinance. The Urban Forestry Ordinance does not specify protection of native oaks. No impact on heritage or landmark trees would occur. Removal of other trees that could be considered Significant Trees by the City and County of San Francisco are addressed under impact E.

Conclusion: Implementation of the plan would have no impact on heritage or landmark trees or native oak trees of a diameter specified in a local ordinance. Effects on protected trees will not be evaluated further in the EIR.

5.3.5 Cultural and Tribal Cultural Resources

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
A) Cause a substantial adverse change in the significance of an archaeological resource as defined in Section 15064.5?	☒	☐	☐	☐
B) Cause a substantial adverse change in the significance of a historic resource pursuant to Section 15064.5?	☒	☐	☐	☐
C) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☒	☐
D) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☒	☐
E) Cause a substantial adverse change in the significance of a tribal cultural resource as defines in Public Resources Code 21074?	☒	☐	☐	☐

A) Would the plan cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?

and

B) Would the plan cause a substantial adverse change in the significance of an archaeological resource as defined in §15064.5?

A records search was previously conducted in 2008 that covered the entire Reserve and a 0.5-mile buffer around the Reserve. The purpose of a cultural resources records search is to discover if any previous cultural resource surveys have been conducted in the area, and if significant historical or archaeological resources that were eligible for listing in the California Register of Historic Resources (CRHR) were found during the surveys. The records search conducted in 2008 identified that no previous studies had been conducted in the Reserve (prior to 2008) (URS, Inc. 2008). Holman and Associates (1998) studied a rock shelter near the Chancellor's Residence that was purportedly used by Ishi, the last survivor of the Native American Yahi tribe who resided in the Anthropology Museum of the University of California Affiliated Colleges (now UCSF) on Parnassus Heights in the early 1900s. The study found that the site was not a historic resource per §15064.5. This study did not appear in the records search but was provided by UCSF staff.

Since the Reserve has not been surveyed for historical and archaeological resources, the sensitivity for finding significant resources during vegetation management activities is unknown. Trees proposed to be removed would be cut at ground surface, stumps would be ground, but root systems would remain in place. Road improvements including trail widening through vegetation removal, and potential grading, and new plantings could require disturbance of soils that may contain significant historical and archaeological resources. The City and County of San Francisco's Recreation and Parks Natural Areas Management Plan EIR

(2016) found that the Interior Greenbelt, located adjacent on the east side of the Reserve, has a high sensitivity for archaeological resources. The potential for encountering previously undiscovered archaeological and historical resources in the Reserve may therefore also be high. If historical or archaeological resources were discovered and damaged during implementation of the plan, a significant impact could occur. Historical resources, such as rock walls, are known in the Reserve but have never been evaluated for their significance or eligibility for listing in the CRHR. If implementation of the plan were to damage or remove these rock wall features and the features were eligible for listing in the CRHR, a significant impact could occur.

Mitigation Measure CUL-LRDP-3 from the 2014 LRDP would be applicable to the plan. This measure requires work to stop and a qualified archaeologist to assess the significance of any cultural resource (archaeological or historical) find. Additional mitigation may be required to reduce potential impacts to less than significant levels since there may be a high sensitivity for finding significant cultural resources. Additional mitigation could include surveying areas where ground disturbance may occur prior to disturbance and avoiding any resources found, known to occur (such as rock walls), or otherwise evaluating the resources and if they are significant and cannot be avoided, collecting their historical information. Impacts to historical and archaeological resources will be addressed further in the EIR.

In additional to potentially significant historical and archaeological resources that may be found in the Reserve, the Reserve itself may be considered a significant cultural landscape eligible for listing in the CRHR. The Reserve was previously evaluated for its cultural significance as a landscape in the 2013 Draft EIR. The Mount Sutro Cultural Landscape was determined to be potentially eligible for listing on the CRHR because of its association with Adolph Sutro and his development of the Sutro Forest (Criteria 2 and 3). The vegetation management activities in the plan include the removal and planting of trees across the Reserve and changing the forest density and types. This management of the Reserve could significantly impact the aspects of the Reserve that contribute to its potential eligibility for listing on the CRHR as a cultural landscape, the significance of which would need to be evaluated further in the EIR.

Conclusion: Implementation of the plan could result in potentially significant impacts on a historic resource as defined in §15064.5 or other archaeological resources. These topics will be addressed in the EIR.

C) Would the plan disturb any human remains, including those interred outside of formal cemeteries?

Implementation of the plan is unlikely to result in disturbance of previously undiscovered human remains. Human remains are not known to occur in the Reserve, and the plan activities would not include extensive excavation. Soils are also very shallow and therefore not well suited for burials. If human remains were unearthed during plan activities, the San Francisco County Coroner would be contacted, and the disposition of Native American remains would comply with CEQA Guidelines Section 15064.5(e), as required under the California Public Resources Code as well as mitigation in the LRDP EIR (ESA 2014), under *Mitigation Measure*

CUL-LRDP-5. Impacts from disturbance of any human remains would, therefore, be less than significant.

Conclusion: Implementation of the plan would have a less than significant effect on human remains. Effects on human remains will not be evaluated further in the EIR.

D) Would the plan directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

There are no known paleontological resources on Mount Sutro. While unlikely, if resources are identified during ground disturbing activities or tree removal, mitigation from the LRDP would be implemented to minimize effects. *Mitigation Measure CUL-LRDP-4* requires that work stop if paleontological resources are discovered within 50 feet of the find until it can be evaluated by a paleontologist and avoided or salvaged according to SVP Guidelines (SVP 1995, SVP 1996). Given the nature of the plan, the low likelihood for encountering paleontological resources of significance, and the implementation of *Mitigation Measure CUL-LRDP-4*, impacts on paleontological resources would be less than significant.

Rock outcroppings are found atop the hill that add to its unique character. These rock outcroppings would not be removed or altered during vegetation management activities. Therefore, no impact on unique geologic features are anticipated.

Conclusion: Implementation of the plan would have a less than significant effect on paleontological resources and no impact on unique geologic features. Effects on paleontological resources and unique geological features will not be evaluated further in the EIR.

E) Would the plan cause a substantial adverse change in the significance of a tribal cultural resource as defines in Public Resources Code 21074?

Assembly Bill 52 introduced a new category of cultural resources known as tribal cultural resources in September 2014; tribal cultural resources were therefore not defined at the time of the 2013 Draft EIR. Tribal consultation has been initiated for the proposed plan. During consultation, tribes will have the opportunity to identify potential tribal cultural resources, which would require additional analysis. Impacts on tribal cultural resources and the significance of those impacts will be evaluated in the EIR.

Conclusion: Implementation of the plan could result in potentially significant impacts on tribal cultural resources. This topic will be addressed in the EIR.

5.3.6 Geology and Soils

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
A) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
ii) Strong seismic ground-shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☒	☐	☐	☐
B) Result in substantial soil erosion or the loss of topsoil?	☒	☐	☐	☐
C) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the plan, 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 risks to life or property?	☐	☐	☐	☒
E) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒
F) Exceed the applicable LRDP EIR standard of significance by exposing people to structural hazards in an existing building rated Poor, or Very Poor, under the University's seismic performance rating system, or substantial nonstructural hazards?	☐	☐	☐	☒

A) Would the plan expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?

ii) Strong seismic ground shaking?

iii) Seismic-related ground failure, including liquefaction?

iv) Landslides?

The San Francisco Bay Area contains both active and potentially active faults and is considered a region of high seismic activity. The nearest known active fault to the plan area is the San Andreas fault, which trends offshore north of Colma and continues northwest through the Pacific Ocean approximately six miles due west of the Golden Gate bridge. Like the entire San Francisco Bay Area, the plan site is subject to groundshaking in the event of an earthquake. However, the plan site is not within an Alquist-Priolo Special Studies zone. Proposed management activities would not affect the exposure of persons to strong seismic ground shaking or seismic-related ground failure from liquefaction because (1) the plan site is not within a liquefaction zone and (2) the removal and planting of trees and road and trail maintenance would not create any liquefaction hazards in the area. Impacts would be less than significant.

Implementation of the plan would not include the construction of homes or facilities where people would congregate and would not introduce a substantially greater number of people to the Reserve than are currently using it. Implementation of plan activities would, therefore, not expose people or structures to strong seismic ground shaking, including from being located on an active fault, seismic-related ground failure, or liquefaction. There would be no impact.

Parnassus Heights is within the City of San Francisco's Special Geologic Study Area for potential ground failure hazards and the California Geologic Survey Seismic Hazard Zone for landslides. Any activities that disturb the ground surface or remove vegetation cover or trees, particularly near trails that are adjacent to landslide areas, could result in loss of topsoil and destabilization of the soil, resulting in a landslide. Impacts on recreationalists and workers could be potentially significant. The EIR will include a detailed evaluation of the potential landslide hazards from plan implementation.

Conclusion: Implementation of the plan could expose people to substantial risk of landslides. Effects from landslides will be evaluated further in the EIR.

B) Would the plan result in substantial soil erosion or the loss of topsoil?

Bedrock occurs at or very near the ground surface throughout much of the Reserve. In general, the soils overlaying the bedrock on Mount Sutro are thin and comprised of sandy materials, which makes them prone to erosion. Proposed management activities that include the removal of dead, dying, and unhealthy trees, creation or widening of access roads, and use of equipment on steep slopes could result in substantial soil erosion and topsoil loss. Impacts from erosion and topsoil loss will be evaluated in detail in the EIR.

Conclusion: Implementation of the plan could result in potentially significant impacts from soil erosion and topsoil loss. These topics will be addressed in the EIR.

C) Would the plan be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the plan, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

Soils on the site are not subject to lateral spreading, subsidence, or collapse, and proposed plan activities would have no effect on these subject areas. Groundwater is not present near the surface within the Reserve, and soils are not prone to liquefaction. The management actions would not increase the risk of liquefaction within the Reserve; the soil types and depth to groundwater within the Reserve would not be affected. Soils in the Reserve are not expansive. Impacts regarding these topics would be less than significant.

As previously noted, the soils in the Reserve are thin and sandy, and the topography is steep. Any activities that disturb the ground surface or remove vegetation cover or trees, particularly near trails that are adjacent to landslide areas, could result in loss of topsoil and destabilization of the soil, resulting in a landslide. Impacts on recreationalists and workers could be potentially significant. The EIR will include a detailed evaluation of the potential landslide hazards from plan implementation.

Conclusion: Implementation of the plan could result in potentially significant impacts from landslides. This topic will be addressed in the EIR.

D) Would the plan be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?

and

E) Would the plan have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

As discussed above, the plan site is not located on soils subject to lateral spreading, subsidence, liquefaction, or collapse. No septic tanks or wastewater disposal systems are proposed in the plan. Proposed plan activities would have no effect on these subject areas.

Conclusion: Implementation of the plan would have no impacts related to expansive soils or soils incapable of supporting wastewater systems. Effects from expansive soils and wastewater will not be evaluated further in the EIR.

F) Would the plan exceed the applicable LRDP EIR standard of significance by exposing people to structural hazards in an existing building rated Poor, or Very Poor, under the University's seismic performance rating system, or substantial nonstructural hazards?

The proposed vegetation management activities would not affect the exposure of persons to seismically Poor or Very Poor buildings. Hazard trees would be removed from the Reserve, effectively reducing exposure to nonstructural hazards. There would be no impact.

Conclusion: Implementation of the plan would have no impacts from structural or nonstructural hazards. Effects from structural or nonstructural hazards will not be evaluated further in the EIR.

5.3.7 Greenhouse Gas Emissions

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
A) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☒	☐	☐	☐
B) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emission of greenhouse gases?	☒	☐	☐	☐

A) Would the plan generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Implementation of the plan would result in episodic construction-phase greenhouse gas (GHG) emissions from operation of diesel- and fuel-powered worker vehicles and heavy equipment used for vegetation management activities. The LRDP EIR includes *Mitigation Measure GHG-LRDP-1: Construction-Related GHG Reduction Measure*, which includes the use of alternative fuel (e.g., biodiesel, electric) construction vehicles where feasible. The measure would reduce some impacts, but emissions should still be quantified. Proposed management activities, such as the removal of dead, dying, unhealthy, and structurally unsound trees, may affect the ability of the forest to sequester GHGs in the short-term. However, the removal of dying and unhealthy trees would likely increase carbon sequestration in the long-term because removing unhealthy trees would reduce competition for healthy trees, and healthy trees would increase sequestration. Planting of new trees would also likely improve sequestration in the long-term by introducing new, healthy trees to sequester carbon. Impacts from GHG emissions are potentially significant. The quantification of both emissions and carbon sequestration will be addressed in the EIR.

Conclusion: Implementation of the plan could result in potentially significant impacts related to GHGs. This topic will be addressed in the EIR.

B) Would the plan conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emission of greenhouse gases?

UCSF published its Climate Action Plan (CAP) in December of 2009 in order to comply with the University of California Policy on Sustainable Practices as well as to meet the requirements of the American Colleges and University Presidents Climate Commitment (ACUPCC), of which the University of California system is a signatory. UCSF has prepared annual reports on its

progress every year since 2009[7]. In addition, UCSF prepared a Sustainability Action Plan in financial year 2013-2014 and a GHG reduction strategy in 2014, which updated the GHG analysis in the 2009 CAP. The GHG reduction strategy analyzes the actions proposed under the 2014 LRDP. UCSF is currently working on an update to its plans to meet the system-wide goal of carbon neutrality by 2025.

The UCSF CAP includes the UCSF GHG emissions baseline and projected emissions, sustainability efforts to-date, and future reduction efforts. The CAP informs practices throughout the campus site including procurement, building operation and design, transportation, recycling and education. Through its participation in the ACUPCC, UCSF is committed to reduce its GHG emissions from all its operations to the 1990 level by 2020 with the eventual goal of achieving carbon neutrality for the campus site by 2025 consistent with the President's Carbon Neutrality Initiative. As part of this emissions reduction effort, UCSF regularly reports to the ACUPCC its emissions, progress towards reduction goals, and measures used or proposed to meet these goals.

Other applicable University plans include the UCSF Sustainable Practices Policy and the UCSF GHG reduction strategy. The UC Sustainable Practices Policy establishes goals in nine areas of sustainable practices to address climate change: green building, clean energy, transportation, climate protection, sustainable operations, waste reduction and recycling, environmentally preferable purchasing, sustainable foodservice, and sustainable water systems. The UCSF GHG reduction strategy is implemented with the 2014 LRDP in alignment with the UC Sustainable Practices Policy directives on GHGs.

State and regional plans that govern GHG emissions include the CARB Climate Change Scoping Plan and San Francisco Climate Action Strategy. These plans include limits for GHG emissions and goals for carbon sequestration from urban forests.

Implementation of management activities would generate GHG emissions; the loss of biomass that could sequester carbon may also conflict with plans in the short-term. These impacts are potentially significant and will be investigated further through a detailed emissions model and modeling of carbon sequestration from plan implementation. The results and analysis will be presented in the EIR to evaluate potential conflicts with University, State of California, and City and County of San Francisco plans and policies for reducing GHG emissions. An evaluation of City and County of San Francisco plans and policies will be provided for informational purposes only since UCSF activities are not subject to City and County of San Francisco plans and policies.

[7] http://sustainability.ucsf.edu/what_ucsf_is_doing_2

Conclusion: Implementation of the plan could result in potentially significant impacts related to conflicts with greenhouse gas policies and plans. This topic will be addressed in the EIR.

5.3.8 Hazards and Hazardous Materials

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
A) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☒	☐	☐	☐
B) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☒	☐	☐	☐
C) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?	☐	☐	☒	☐
D) Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, create a significant hazard to the public or the environment?	☐	☐	☐	☒
E) For a plan located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, result in a safety hazard for people residing or working in the plan corridor?	☐	☐	☐	☒
F) For a plan located within the vicinity of a private airstrip, result in a safety hazard for people residing or working in the plan corridor?	☐	☐	☐	☒
G) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
H) Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☒	☐	☐	☐

A) Would the plan create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

and

B) Would the plan 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?

Herbicides would not be used during vegetation management activities. There would be no impact from herbicide use.

The use of heavy equipment for vegetation management activities could potentially lead to fuel leaks and spills of hazardous materials. The overall quantities of these materials on-site at any one time would be limited to the volume contained in construction equipment and fuel containers that may be stored at landing areas on the plan site. Given the size and nature of the equipment, the amounts could be in the hundreds of gallons. If spilled or leaking hazardous materials were not properly contained and removed from the site, the hazardous materials could contaminate the soil or groundwater and result in a potentially significant impact. A mitigation measure requiring a Spill Containment and Countermeasure Plan could mitigate these impacts and will be included in the EIR.

Naturally-occurring asbestos may be contained within the rock outcrops on Mount Sutro. The general geologic setting of San Francisco is characterized by bedrock hills bounded by broad valleys. The bedrock consists of consolidated rocks of the Franciscan Complex, which generally consists of sandstone, shale, chert, greenstone, and mélange. In certain places, serpentine, an asbestos-containing rock-type, is found within the Franciscan Complex. Vegetation removal could occur in areas underlain by the Franciscan complex; however, vegetation removal would be limited to soils above the bedrock and would not disturb the actual bedrock. Were the rock to be disturbed, potentially significant impacts could occur; however, the LRDP EIR includes mitigation (*Mitigation Measure HAZ-LRDP-1*) that would be implemented to address any proposed earthwork activities in areas of naturally-occurring asbestos. The measure requires preparation and implementation of an Excavation Management Plan that includes the CARB ATCM for Construction, Grading, Quarrying, and Surface Mining Operations. Impacts would be less than significant.

Conclusion: Implementation of the plan would have a potentially significant effect associated with the routine transport, use of, and exposure to hazardous materials and release of hazardous materials from accident conditions. This topic will be addressed in the EIR.

C) Would the plan emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?

There are several schools located within one-quarter mile of the Reserve. While there may be net changes in the amount and type of hazardous materials handled, stored, and disposed of, implementation of the plan would not result in a substantive change in emissions or handling of hazardous materials, and all practices would continue to adhere to federal, state, local and UCSF policies and regulatory requirements. In general, existing hazardous materials use for maintenance activities does not involve large enough quantities of hazardous materials and

does not emit large quantities of pollutants that would represent potential health hazards to schools near the Reserve. Adherence to current regulatory requirements and UCSF policies and plans would provide sufficient control to minimize potential exposure to hazardous materials to a less than significant level.

Conclusion: Implementation of the plan would have a less than significant effect associated with emitting hazardous materials near a school. Effects from emitting hazardous materials near a school will not be evaluated further in the EIR.

D) Would the plan be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, create a significant hazard to the public or the environment?

A search of the Geotracker database maintained by the State Water Resources Control Board was performed for the plan site for the LRDP EIR (ESA 2014). A search of the ACOE Formerly Used Defense Sites inventory was also performed (ACOE 2013). No hazardous material sites were located within the Reserve. There would be no impact related to hazardous materials sites.

Conclusion: Implementation of the plan would have no impact from hazardous materials sites. Effects from being located on a hazardous site will not be evaluated further in the EIR.

E) Would the plan be located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, result in a safety hazard for people residing or working in the plan corridor?

and

F) Would the plan be located within the vicinity of a private airstrip where it would result in a safety hazard for people residing or working in the plan corridor?

The Reserve is not part of an airport land use plan or located within the vicinity of a private airstrip. The proposed management activities would not involve the use of aircraft that could interfere with air traffic or tall structures that would be subject to Federal Aviation Administration requirements. There would be no impact from safety hazards related to air traffic.

Conclusion: Implementation of the plan would have no impacts associated with safety hazards from air traffic. Effects from safety hazards associated with air traffic will not be evaluated further in the EIR.

G) Would the plan impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

Access for emergency response personnel along roadways around and within the Reserve would remain unchanged from current conditions. While heavy equipment would utilize the roadways around and within the Reserve, minimal road closures would occur during management activities. Tree removal, removal of understory vegetation, and improved trails may enhance exit routes for evacuation, and visibility and access for emergency personnel who may need to enter the Reserve in response to an emergency. The plan would therefore not conflict with an emergency response or evacuation plan. Note that emergency vehicle access is addressed under the Traffic and Transportation topic.

Conclusion: Implementation of the plan would have no impact regarding conflicts with emergency response or evacuation plans. Effects on emergency response and evacuation plans will not be evaluated further in the EIR.

H) Would the plan expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

The plan would include treatments to maintain defensible space between vegetation in the Reserve and surrounding buildings. Consistent with direction from the San Francisco Fire Department and Cal Fire, within 30 feet of buildings, flammable ground vegetation (shrubs and ground cover) would be removed and lower tree branches within 10 feet of the ground would be pruned. Between 30 and 100 feet from buildings, low branches (ladder fuels) would be pruned. Removing dead, dying, and unhealthy trees, pruning branches, and removing shrubs and vines in the understory would reduce standing fuel available that could allow a fire to reach the forest canopy, improving the defensibility of the Reserve against forest fire. Immediately following management actions, there would be a short-term build-up of fuel sources at ground level from chipping dead or dying trees and spreading chips as ground cover; however, overall moisture in the Reserve would increase because (1) chips would act as an insulator to protect the soil from evaporation and maintain soil moisture, (2) the removal of dying and unhealthy trees would reduce competition for live trees to uptake water, increasing the trees' defense against fire, and (3) the removal of dead, dying, and unhealthy trees in the forest would increase the amount of open space between trees, reducing the ability of fire to spread to the canopy.

The use of heavy equipment could increase the risk of fire during vegetation management activities. Equipment could spark and start a fire. The fire risk of the use of heavy equipment will be analyzed in the EIR.

Public comments to-date have included concerns that the existing fire risks in the Reserve are overstated and the plan could increase fire risks by increasing forest dryness through the removal of understory and increased wind from vegetation thinning. Further study is needed to assess the potentially significant impact of management activities on fire risk. Modeling of existing fire risks and behavior will be performed and compared against modeling of the same risks and behavior during and after implementation of the plan to substantially support any conclusions regarding fire impacts.

Conclusion: Implementation of the plan could result in potentially significant impacts related to the spread of wildfire. This topic will be addressed in the EIR.

5.3.9 Hydrology and Water Quality

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
A) Violate any water quality standards or waste discharge requirements?	☐	☐	☒	☐
B) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☒	☐
C) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on or off site?	☒	☐	☐	☐
D) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site?	☒	☐	☐	☐
E) Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☒	☐	☐	☐
F) Otherwise substantially degrade water quality?	☐	☐	☒	☐
G) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
H) Place within a 100-year flood hazard area structures that would impede or redirect flood flows?	☐	☐	☐	☒
I) Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☒
J) Cause inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒

A) Would the plan violate any water quality standards or waste discharge requirements? and

F) Would the plan otherwise substantially degrade water quality?

Implementation of the plan would not add residential or commercial structures, paved roadways or driveways, or other forms of impervious surfaces to the Reserve lands. Herbicides would not be used. Plan implementation would not increase pollutant loads from heavy metals, pesticides, or nutrients in runoff and downstream waters because these materials would not be used for the vegetation management activities. Impacts on water quality standards for heavy metals, pesticide, or nutrients would not occur.

All storm water runoff exiting the plan site would eventually enter San Francisco's combined sewer system (CSS) in route to either the Southeast Water Treatment Plant (WTP) or the Oceanside WTP. Waste discharge requirements (WDRs) adopted for these treatment plants include influent monitoring requirements and sampling protocols for 5-day biological oxygen demand (BOD5), total suspended solids (TSS) and pH. Measured constituents for TSS include soil particles, as well as sanitary sewage, dissolved solids (e.g., salts, sulfides) and other particulates. The more serious contaminants that are monitored in WTP influent, such as ammonia, oil and grease, pesticides, polychlorinated biphenyls, polycyclic aromatic hydrocarbons, and other selected inorganic and organic contaminants would not be introduced to the storm drain systems from the vegetation management activities. In the rare event of a large landslide, sediment could reach storm drains and run off into the sewer system, increasing TSS. However, the amount that could enter stormdrains would be limited to the size and number of stormdrains downstream of the slide. Given the total volume of water collected during storms at the WTPs, the amount contributed by a sediment entering the storm drains from a landslide point source would not be significant.

Implementation of the plan would not result in a violation of existing WDRs for San Francisco's WTPs. However, because the plan would include the removal of trees, widening of trails for equipment access, and chipping and spreading of chips and mulch on the ground surface where they could run off into storm drains, the San Francisco Bay Regional Water Quality Control Board could require an individual WDR for the activities. Compliance with this WDR, if it is required, would prevent a violation of water quality standards. Impacts would be less than significant.

Conclusion: Implementation of the plan would not violate waste discharge requirements and water quality standards. This topic will not be addressed further in the EIR.

B) Would the plan substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)?

No proven or established groundwater supplies are located within the Reserve. Implementation of the plan would not introduce any impervious surfaces or significantly reduce rainfall

infiltration rates or groundwater recharge. Thus, the plan would have no impact on groundwater supplies or groundwater recharge rates or volumes.

Conclusion: Implementation of the plan would have no impact related to groundwater. Effects to groundwater will not be evaluated further in the EIR.

C) Would the plan substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site?

and

D) Would the plan substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?

and

E) Would the plan create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

Implementation of the plan would not result in the alteration of a stream course. Only one ephemeral stream, Woodland Creek, is found within the Reserve. None of the proposed vegetation management activities would significantly alter this creek. Planting of riparian vegetation, however, could have a positive impact with regards to erosion and siltation by protecting and binding soils around the creek during periods of high water flow.

Proposed management activities could result in changes in overall surface water flow rates from the Reserve due to the reduction in understory and the density of trees that may currently slow or absorb flows. Storm water flows likely move overland, ultimately to the streets and sewer system at the base of and surrounding the Reserve. Increase in flow rates due to vegetation removal could cause off-site flooding during initial states of forest treatment. These impacts would likely be reduced over time as planted, live trees would uptake water. Additional analysis that includes a peak flow and runoff volume assessment will be undertaken to quantify impacts and to determine if impacts related to increased runoff would be significant.

Implementation of the plan is not likely to result in alterations that could cause on- or off-site flooding. Some increase in site sediment yield could occur from proposed activities; however, unless sediment conveyed in site runoff were accompanied by substantial organic debris, it is not likely that roadway flooding would be triggered by obstructed culvert inlets. A rare, large landslide could block a storm drain or culvert inlet, and could cause minor flooding in surrounding streets; however, it would be localized and temporary. More than likely, the reduction in dead and dying eucalyptus throughout the Reserve would reduce the volume of slash delivered downslope to such roadway culverts, which is likely the most common cause of culvert or storm drain obstruction. However, these potentially significant impacts will be studied further in the EIR.

Conclusion: Implementation of the plan could result in potentially significant impacts associated with changes in surface runoff that could cause erosion and sedimentation and potential flooding. These topics will be addressed in the EIR.

G) Would the plan place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

H) Place structures within a 100-year flood hazard area, which would impede or redirect flood flows?

I) Would the plan expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?

and

J) Would the plan cause inundation by seiche, tsunami, or mudflow?

The Reserve is located on a low mountain (909 feet in elevation at the peak). The site is not within a 100-year flood hazard area, or near a levee or dam, and the plan does not involve building housing or structures. The site is not within an area with the potential to be inundated by seiche, tsunami, or mudflow. No impacts associated with these significance criteria would occur.

Conclusion: Implementation of the plan would have no impact associated with 100-year flood hazards, a seiche, tsunami, or mudflow. Effects from floods, seiches, tsunamis, and mudflows will not be evaluated further in the EIR.

5.3.10 Land Use and Planning

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
A) Physically divide an established community?	☐	☐	☐	☒
B) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the plan (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
C) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒
D) Exceed an applicable LRDP EIR standard of significance by being substantially incompatible with existing land uses, or by substantially conflicting use, density, height and bulk restrictions of local zoning, although UCSF is exempt from such restrictions?	☐	☐	☐	☒

A) Would the plan physically divide an established community?

The proposed vegetation management activities would take place within the existing open space Reserve and would therefore not physically divide an established community.

Conclusion: Implementation of the plan would have no impacts on established communities. Effects on established communities will not be evaluated further in the EIR.

B) Would the plan conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the plan (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

The proposed plan would not involve a change in use or create an incompatibility with existing land uses, nor would it conflict with local zoning, which does not regulate forest management.

UCSF's applicable land use plan, the 2014 LRDP, calls for maintaining the Reserve as permanent open space and investigating an appropriate maintenance and restoration program for trees and vegetation in the Reserve. It also calls for improving and increasing hiking trails in the Reserve. The plan, which seeks to maintain and enhance the Reserve through vegetation management, would be consistent with the LRDP.

Conclusion: Implementation of the plan would have no impacts from conflicts with applicable plans, policies, or regulations. Effects from conflicts with plans, policies, or regulations will not be evaluated further in the EIR.

C) Would the plan conflict with any applicable habitat conservation plan or natural community conservation plan?

The proposed plan would not conflict with any applicable habitat conservation plan or natural community conservation plan.

Conclusion: Implementation of the plan would have no impacts on habitat conservation plans or natural community conservation plans. Effects from conflicts with these types of plans will not be evaluated further in the EIR.

D) Would the plan exceed an applicable LRDP EIR standard of significance by being substantially incompatible with existing land uses, or by substantially conflicting use, density, height and bulk restrictions of local zoning, although UCSF is exempt from such restrictions?

The City of San Francisco Recreation and Parks Department has developed a Natural Areas 20-Year Management Plan that seeks to restore and enhance its collection of remnant natural open spaces, including the Interior Greenbelt Natural Area abutting the Reserve on its eastern border. Similar to the proposed plan, the Natural Areas Plan includes tree removal, trail maintenance, and native plant enhancement within the Interior Greenbelt. The actions proposed within the Interior Greenbelt include removing invasive trees, maintaining and enhancing scrub habitat, augmenting sensitive plant populations, reintroducing sensitive plants, developing new hiking trails, and enhancing the urban forest. The proposed plan is consistent with and would not conflict with the proposed actions for the Interior Greenbelt. The plan would have no impact on land use.

Conclusion: Implementation of the plan would have no impacts on land use. Effects from land use conflicts will not be evaluated further in the EIR.

5.3.11 Mineral Resources

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
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?	☐	☐	☐	☒
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?	☐	☐	☐	☒

A) Would the plan 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?

and

B) Would the plan 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?

The proposed plan site is not in an area of known mineral resources and would not otherwise conflict with mineral resources recovery. No impact would occur on mineral resources.

Conclusion: Implementation of the plan would have no impact on mineral resources. Effects on mineral resources will not be evaluated further in the EIR.

5.3.12 Noise

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
A) Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies?	☒	☐	☐	☐
B) Expose persons to or generate excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
C) Result in a substantial permanent increase in ambient noise levels in the plan vicinity above levels existing without the plan?	☒	☐	☐	☐
D) Result in a substantial temporary or periodic increase in ambient noise levels in the plan vicinity above levels existing without the plan?	☒	☐	☐	☐

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
E) For a plan located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, expose people residing or working in the plan corridor to excessive noise levels?	☐	☐	☐	☒
F) For a plan within the vicinity of a private airstrip, expose people residing or working in the plan corridor to excessive noise levels?	☐	☐	☐	☒
G) Exceed an applicable LRDP EIR standard of significance by contributing to an increase in average daily noise levels (Ldn) of 3 dB(A) or more at property lines, if ambient noise levels in areas adjacent to proposed development already exceed local noise levels set forth in local general plans or ordinances for such areas based on their use?	☒	☐	☐	☐

A) Would the plan expose persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Mechanical equipment noise would be generated by heavy equipment during vegetation management activities. Residences abut the Reserve to the east, south, and west. Hospital patients are also potential sensitive receptors. It is possible that trees and vegetation would not provide a sufficient noise buffer for residences and hospital patients, and chipping and other activities that generate considerable noise would occur near these sensitive receptors. The LRDP EIR includes mitigation to reduce impacts from "construction" equipment that could be applicable to the work under the plan. *Mitigation Measure NOI-LRDP-1a: Construction Noise Controls Measures* and *1b: Construction Hours* require using best available noise controls on equipment, not using tools that generate noise from compressed air release, locating any stationary noise as far as possible from receptors, and limiting work hours. Impacts could still be significant and therefore, an analysis of noise impacts on residents and other sensitive receptors from use of heavy equipment compared against standards will be included in the EIR.

Conclusion: Implementation of the plan could result in potentially significant impacts associated with noise generation and standards. This topic will be addressed in the EIR.

B) Would the plan expose persons to or generation of excessive groundborne vibration or groundborne noise levels?

The proposed plan would not expose persons to or generate excessive groundborne vibration or groundborne noise. Short-term groundborne vibrations may be felt from heavy equipment use; however, vibrations dissipate rapidly with distance (a few feet) and would be limited to the immediate vicinity of the activity where people would not be located for safety purposes.

Heavy ground-breaking equipment would not be used within close proximity of buildings that could be susceptible to vibration damage (e.g., historic structures). Tree falling would occur during tree removal, which could cause short-term groundborne vibrations in the immediate vicinity of felled trees. For safety reasons, no one would be allowed in areas where tree falling would occur. The impact of tree falling would not expose persons to excessive groundborne vibration. The impact would be less than significant.

Conclusion: Implementation of the plan would have a less than significant impact related to groundborne vibration. Effects from vibration will not be evaluated further in the EIR.

C) Would the plan cause a substantial permanent increase in ambient noise levels in the plan vicinity above levels existing without the plan?

and

G) Would the plan exceed an applicable LRDP EIR standard of significance by contributing to an increase in average daily noise levels (Ldn) of 3 dB(A) or more at property lines, if ambient noise levels in areas adjacent to proposed development already exceed local noise levels set forth in local general plans or ordinances for such areas based on their use?

Forests provide a barrier for noise, and the removal of vegetation from vegetation management activities could change the ability of the forest to act as a noise buffer. The Reserve occupies a large area of land. Equipment on the rooftops of the campus site buildings at Parnassus Heights generates noise that is currently shielded and reduced by topography and vegetation. The shielding of this noise could change due to changes in forest density, which could result in a significant permanent increase in noise levels in the forest. The effectiveness of the forest as a noise buffer would increase as remaining trees recover and grow and as planted trees become established and increase the canopy density of the forest; however, impacts will be assessed in the EIR.

Conclusion: Implementation of the plan could result in impacts from permanent increases in noise. Effects from permanent increases in noise will be evaluated in the EIR.

D) Would the plan cause a substantial temporary or periodic increase in ambient noise levels in the plan vicinity above levels existing without the plan?

Heavy equipment used for management activities could result in temporary increases in ambient noise levels in the plan vicinity. Chainsaws and chippers would be used to fell and mulch trees and other vegetation, causing short-term increases in noise levels during equipment operation. Noise in San Francisco is regulated by the San Francisco Noise Ordinance. Although UCSF is not bound by the San Francisco Noise Ordinance, it endeavors to comply. The Noise Ordinance states that powered construction equipment, other than impact tools, must not exceed 80 decibels at 100 feet (Article 20 of the City Police Code, Section 2907a). The Noise Ordinance also prohibits construction work at night from 8:00 pm until 7:00 am if noise from such work would exceed the ambient noise level by 5 decibels at the property line, unless a special permit is authorized by the San Francisco Department of Public Works. While proposed management activities are not "construction" activities, the noise impacts from proposed management activities would be analogous to construction noise impacts with the use of heavy equipment. Given the proximity of nearby residences and other sensitive receptors, impacts

from temporary increases in noise levels are potentially significant. Noise generation and the resultant levels at the nearest sensitive receptors will be addressed in the EIR.

Conclusion: Implementation of the plan could result in potentially significant temporary noise impacts. This topic will be addressed in the EIR.

E) For a plan located within an airport land use plan, or where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the plan expose people residing or working in the plan area to excessive noise levels?

and

F) For a plan within the vicinity of a private airstrip, would the plan expose people residing or working in the plan area to excessive noise levels?

The Reserve is not included in an airport land use plan or located within the vicinity of a private airstrip. There would be no impact.

Conclusion: Implementation of the plan would have no impacts related to noise near an airport or airstrip. Effects on noise related to an airport or airstrip will not be evaluated further in the EIR.

5.3.13 Population and Housing

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
A) Induce substantial population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?	☐	☐	☐	☒
B) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
C) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
D) Exceed the LRDP EIR standard of significance by creating a demand for housing outside the market area where the facilities or site are located?	☐	☐	☐	☒

A) Would the plan induce substantial population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?

B) Would the plan displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

C) Would the plan displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

and

D) Would the plan exceed the LRDP EIR standard of significance by creating a demand for housing outside the market area where the facilities or site are located?

The plan does not include the addition of homes, businesses, or the infrastructure needed to induce population growth. Vegetation management activities do not involve the displacement or removal of existing housing, and no replacement housing would need to be built. Proposed management activities would not induce substantial population growth in the area, displace a substantial number of existing housing, displace a substantial number of people, or create a demand for housing; no impact would occur.

Conclusion: Implementation of the plan would have no impact on housing and displacement. Effects on housing and displacement will not be evaluated further in the EIR.

5.3.14 Public Services

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
A) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered government 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:				
(i) Fire protection?	☒	☐	☐	☐
(ii) Police protection?	☒	☐	☐	☐
(iii) Schools?	☐	☐	☐	☒
(iv) Parks?	☒	☐	☐	☐
(v) Other public facilities?	☐	☐	☐	☐

A) Would the plan result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:

i) Fire protection?

ii) Police protection?

iii) Schools?

iv) Parks?

v) Other Public Facilities?

Proposed vegetation management activities would not require the construction or alteration of new public service facilities to maintain acceptable response times or service ratios. Vegetation management activities would involve felling trees that could temporarily block access roads within the Reserve. Temporary closure of these access roads could result in a potentially significant impact on response times for emergency service providers, which will be addressed in the EIR under the Traffic and Transportation analysis.

After the management activities have been implemented, access for fire or police protection personnel along roadways around and within the Reserve would remain unchanged from current conditions. Dead, dying, and unhealthy tree removal, removal of understory vegetation, and improved trails may enhance visibility and access for emergency personnel who may need to enter the Reserve in response to an emergency. There would be no long-term impact on fire or police protection services, and implementation of the plan would not require the construction of new facilities or reduce response times. Other fire hazards will be addressed in the EIR under the Hazards and Hazardous Materials analysis.

Implementation of the plan would not attract more people such that new schools would be needed and would not affect any of the buildings, including hospitals, on UCSF's Parnassus Heights campus site. There would be no impacts on school or other public facilities.

Vegetation removal activities could impact recreational use by requiring the temporary closure of trails during tree felling and chipping for safety purposes. Closures would be short-term, and trails in the rest of the Reserve would remain open. However, trail closures could occur for up to several months at a time, and multiple crews could work in different areas of the Reserve such that several trail segments would be closed, potentially displacing recreationalists due to the limited availability of trails. Impacts on performance objectives for the Reserve as a recreational facility would be potentially significant.

Conclusion: Implementation of the plan would have a potentially significant effect on emergency response services and parks. This topic will be evaluated in the Transportation and Traffic and Recreation sections of the EIR.

5.3.15 Recreation

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
A) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☒	☐	☐	☐
B) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☒	☐	☐	☐

A) Would the plan increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

The plan seeks to improve the Reserve as an open space resource for UCSF and the community at large. Vegetation management activities endeavor to improve the health and visual quality of the Reserve, which could increase use of the Reserve. During vegetation management activities, tree removal, chipping, and trail maintenance could temporarily block access to some trails. Blocked trails and open forest areas could encourage recreationalists to travel off trail into revegetated areas. As discussed under Geology and Soils above, tree removal, chipping, and access road widening could cause erosion. Removal of trees and changes in the forest densities, composition, and understory may be considered a significant physical change. The impact from increased erosion and new access roads could cause physical deterioration of the Reserve. Impacts on recreational facilities could be potentially significant.

Conclusion: Implementation of the plan could have a significant effect on existing parks and recreational facilities. This topic will be addressed in the EIR.

B) Does the plan include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

Vegetation would be removed from the sides of trails to maintain and improve existing trails, but no new trails are proposed as part of this plan. The Aldea trail, part of the LRDP, will be completed by the time the plan would take effect. No impact would occur from the construction or expansion of recreational facilities.

The plan would include widening of existing trails and creating new maintenance access roads for equipment. The widening of trails and creation of maintenance access roads could result in adverse physical effects on the environment associated with potential impacts on biological and/or cultural resources located along the road, and increased erosion. These impacts would be addressed in the Biological Resources, Cultural and Tribal Cultural Resources, Geology and Soils, and Hydrology and Water Quality sections of the EIR, as appropriate. The plan would not otherwise require the construction or expansion of recreational facilities.

Conclusion: Implementation of the plan would have no impacts associated with the need to construct new recreational facilities or expansion of recreational facilities. The plan includes alterations to a recreational facility, which could have an adverse physical effect on the environment. These physical effects on the environment will be addressed in the Biological Resources, Cultural and Tribal Cultural Resources, Geology and Soils, and Hydrology and Water Quality sections of the EIR.

5.3.16 Transportation and Traffic

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
A) Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including, but not limited to, intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☒	☐
B) Conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☒	☐
C) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
D) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☒	☐	☐	☐
E) Result in inadequate emergency access?	☒	☐	☐	☐
F) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒
G) Exceed the applicable LRDP EIR standard of significance by causing substantial conflict among autos, bicyclists, pedestrians, and transit vehicles?	☒	☐	☐	☐

A) Would the plan conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including, but not limited to, intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

and

B) Would the plan conflict with an applicable congestion management program, including, but not limited to, level of service standard and travel demand measures or other standards established by the county congestion management agency for designated roads or highways?

The plan would result in a minor temporary increase in traffic. Some large truck traffic would be generated from transporting felled logs and chips off the Reserve to a disposal facility. Heavy equipment vehicles would also be expected at the site to deliver trees for planting and tree/vegetation removal equipment (i.e., chainsaws, chippers, masticators). Off-site hauling would be limited, resulting in less than 12 haul trucks per day at the site for the removal of logs and chips. Up to 15 crew members may also travel to the site to work during the most active periods of vegetation management. Vehicles may access the Reserve from Medical Center Way at Parnassus Avenue and/or Johnstone Drive at Clarendon Avenue, although travel routes will be identified in the EIR Project Description. City-designated truck routes would be used. Worker parking would be accommodated on campus at either the Aldea or Surge Woods parking lots. The addition of up to 27 trucks and personal vehicles per day would not substantially increase traffic or cause conflicts with level of service standards and traffic plans. Impacts on traffic would be less than significant.

Conclusion: Implementation of the plan would have a less than significant effect associated with applicable transportation plans and policies and congestion management plans. Effects on traffic management plans will not be evaluated further in the EIR.

C) Would the plan result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that result in substantial safety risks?

The plan does not involve the use of any aircraft. There would be no impact on air traffic patterns.

Conclusion: Implementation of the plan would have no impact on air traffic patterns. Effects on air traffic patterns will not be evaluated further in the EIR.

D) Would the plan substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

and

G) Would the plan exceed the applicable LRDP EIR standard of significance by causing substantial conflict among autos, bicyclists, pedestrians, and transit vehicles?

Trucks would haul trees, vegetation, and equipment used for felling trees and chipping vegetation. Haul trucks would need to enter and exit the Reserve along specific roads, some of which are narrow and steep and could, therefore, have potentially significant impacts on safety of motorists, pedestrians, and bicyclists. The LRDP EIR includes a measure to address traffic, but the measure is geared more towards building projects. Elements of *Mitigation Measure*

TRAF-LRDP-1: Construction Coordination and Monitoring Measures would be applicable to work conducted under the plan. However, impacts could still be significant and a more detailed traffic analysis will be prepared and presented in the EIR that addresses the designated routes of travel and the management of truck and worker access routes that would minimize vehicle, pedestrian, and bicycle conflicts in consideration of the access and parking needs of UCSF.

Conclusion: Implementation of the plan could result in potentially significant impacts from the use of heavy trucks and the associated hazards to motorists, pedestrians, public transit, and bicyclists. This topic will be addressed in the EIR.

E) Would the plan result in inadequate emergency access?

Access for fire or police protection personnel along roadways around and within the Reserve could be blocked temporarily by felled trees during implementation of vegetation management activities. Heavy equipment would utilize the roadways around and within the Reserve and could cause temporary road closures during management activities. Impacts on emergency access from temporary blocked or closed roads could be potentially significant.

Conclusion: Implementation of the plan would have a potentially significant impact on emergency access. This topic will be addressed in the EIR.

F) Would the plan conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

At present, conflicts sometimes occur on narrow trails between pedestrians, bike users, and dog walkers. The plan includes measures to widen trails to reduce user conflicts consistent with the LRDP. There are no public bus routes through the Reserve. There would be no conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, and the plan would not decrease the performance of trails in the Reserve.

Conclusion: Implementation of the plan would have no impact on alternative transit plans. Effects on alternative transit plans will not be evaluated further in the EIR.

5.3.17 Utilities and Service Systems

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
A) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☒	☐
B) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
C) Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐
D) Have sufficient water supplies available to serve the plan from existing entitlements and resources, or are new or expanded entitlements needed?	☒	☐	☐	☐
E) Result in a determination by the wastewater treatment provider that serves or may serve the plan that it has adequate capacity to serve the plan's planned demand in addition to the provider's existing commitments?	☐	☐	☒	☐
F) Be served by a landfill with sufficient permitted capacity to accommodate the plan's solid waste disposal needs?	☐	☐	☒	☐
G) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☒	☐
H) Result in the wasteful, inefficient and unnecessary consumption of energy (see CEQA Statutes Section 21100(b)(3))?	☐	☐	☒	☐
I) Exceed the applicable LRDP EIR standard of significance by requiring or resulting in the construction of new electrical or natural gas facilities, which would cause significant environmental effects?	☐	☐	☐	☒

A) Would the plan exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

B) Would the plan require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

C) Would the plan require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

and

E) Would the plan result in a determination by the wastewater treatment provider, which serves or may serve the plan, that it has adequate capacity to serve the plan's planned demand in addition to the provider's existing commitments?

As discussed under Hydrology and Water Quality, proposed management activities could alter total volumes of flow to surrounding areas. A Peak Flow and Runoff Volume study will be

undertaken as described under Hydrology and Water Quality. While volumes may change, vegetation management activities would not increase impervious surfaces or substantially alter the topography or area of run-off. Any changes in flow would not result in exceedances of wastewater treatment requirements or the need to construct new water or wastewater treatment facilities or expand existing facilities.

All stormwater runoff exiting the plan sites would eventually enter San Francisco's CSS in route to either the Southeast Water WTP or the Oceanside WTP. WDRs adopted for these treatment plants include influent monitoring requirements and sampling protocols for BOD5, TSS, and pH. Measured constituents for TSS include soil particles, as well as sanitary sewage, dissolved solids (e.g., salts, sulfides) and other particulates. The minor increase in sediment yield predicted for the proposed tree removal and understory thinning would not have a significant impact on the turbidity or TSS of wet weather flows conveyed by the City of San Francisco CSS, which typically totals 500 million gallons mgd. The more serious contaminants that are monitored in WTP influent, such as ammonia, oil and grease, pesticides, PCBs, PAHs and other selected inorganic and organic contaminants would be absent in plan area stormwater runoff. Impacts on stormwater drainage and wastewater treatment facilities would be less than significant.

Conclusion: Implementation of the plan would have a less than significant effect on wastewater treatment and requirements, and stormwater drainage facilities. Effects on wastewater treatment and requirements, and stormwater drainage facilities will not be evaluated further in the EIR.

D) Would the plan have sufficient water supplies available to serve the plan from existing entitlements and resources, or are new or expanded entitlements needed?

Irrigation is not proposed for the initial phase of the plan but may be required if new plantings fail. The source of water would need to be determined and could have significant impacts on existing entitlements and resources or require expanded entitlements. Any sources and estimated quantities of water needed for irrigation, were it to be used in the future, will be addressed in the EIR.

Conclusion: Implementation of the plan could have a potentially significant impact on water supplies. Effects on water supplies will be evaluated f in the EIR.

F) Would the plan be served by a landfill with sufficient permitted capacity to accommodate the plan's solid waste disposal needs?

and

G) Would the plan comply with federal, state, and local statutes and regulations related to solid waste?

Large felled tree trunks would be left on site or hauled off-site, and any removed understory vegetation would be mulched and left on site as ground cover. Any greenwaste would be composted and recyclable materials would be sent to a recycling center. Any material that cannot be composted, reused, or recycled would be disposed of at a permitted landfill as required in compliance with all statutes and regulations related to solid waste and hazardous

waste. UC's goal is zero waste by 2020. Felled trees are considered green waste, which would need to be composted at an appropriate facility. All diverted greenwaste would be reported to the UCSF recycling coordinator for annual reporting as required. Impacts would be less than significant.

Conclusion: Implementation of the plan would have a less than significant effect on landfills and conflicts with statutes and regulations for solid waste. Effects on landfills and conflicts with solid waste requirements will not be evaluated further in the EIR.

H) Would the plan result in the wasteful, inefficient and unnecessary consumption of energy (see CEQA Statutes Section 21100(b)(3))?

Fuel would be used to power worker vehicles and heavy equipment; however, vehicles would only be run to transport workers, and equipment would only be run when it is in use for vegetation management activities. Fuel would not be used unnecessarily or in a wasteful or inefficient manner. Impacts from energy consumption would be less than significant.

Conclusion: Implementation of the plan would have a less than significant effect on energy use. Effects on energy use will not be evaluated further in the EIR.

I) Would the plan exceed the applicable LRDP EIR standard of significance by requiring or resulting in the construction of new electrical or natural gas facilities, which would cause significant environmental effects?

Proposed vegetation management activities would not require the construction of new electrical or natural gas facilities or new chilled water or steam generation facilities. There would be no impact.

Conclusion: Implementation of the plan would have no impacts associated with new electrical or natural gas facilities. Effects associated with new electrical or natural gas facilities will not be evaluated further in the EIR.

5.3.18 Mandatory Findings of Significance

The lead agency shall find that a plan may have a significant effect on the environment and thereby require an EIR to be prepared for the plan where there is substantial evidence, in light of the whole record, that any of the following conditions may occur. Where prior to commencement of the environmental analysis a plan proponent agrees to mitigation measures or plan modifications that would avoid any significant effect on the environment or would mitigate the significant environmental effect, a lead agency need not prepare an EIR solely because without mitigation the environmental effects would have been significant (per CEQA Guidelines Section 15065):

Would the plan:	Potentially Significant Impact	Less than Significant Impact with Mitigation	Less than Significant Impact	No Impact
A) Have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☒	☐	☐	☐
B) Have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a plan are significant when viewed in connection with the effects of past plans, the effects of other current plans, and the effects of past, present and probable future plans)?	☒	☐	☐	☐
C) Does the plan have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐

Implementation of the plan has the potential to affect habitat, wildlife, and plants. Impacts will be addressed and included in the EIR. Implementation of the plan could have impacts on cultural and historic resources that represent important examples of major periods of California history or prehistory. Impacts will be addressed in the EIR.

Several impacts from the implementation of the plan have the potential to be significant alone, and may combine with other plans to produce a significant cumulative effect. These cumulative impacts will be addressed in the EIR.

Implementation of the plan has the potential to result in hazards that could affect human beings including hazardous air quality emissions and wildfire. Impacts will be addressed in the EIR..

6 SUPPORTING INFORMATION AND SOURCES

ACOE (Army Corps of Engineers). 2013. Formerly Used Defense Sites: California. September 30. http://www.usace.army.mil/Portals/2/docs/Environmental/FUDS/FUDS_Inventory/FUDS_Inventory_California.pdf. Accessed January 26, 2017.

City and County of San Francisco Planning Department. 2011. Draft EIR for the Natural Areas Management Plan. Case No. 2005.1912E. August 2011.

City and County of San Francisco Recreation and Park Department. 2006. Final Draft of the Significant Natural Resource Areas Management Plan. February 2006.

Denise Bradley, ASLA and Knapp & VerPlanck Preservation Architects. 2011. Final Mount Sutro Open Space Reserve Cultural Landscape Evaluation Report, October 3, 2011; revised January 10, 2013.

Department of Conservation Division of Mines and Geology. 2000. Seismic Hazard Zone Report for the city and County of San Francisco, California. Seismic Hazard report 043. 2000

_____. 2016. Regulatory Maps Portal. Website: http://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=regulatorymaps. Accessed December 5, 2016.

Holman and Associates. 1998. Letter to Michelle Schaefer, Environmental Coordintor, UCSF. Summary of Findings of the Archaeological Testing of the Proposed Handicapped Access Ramp at the Chancellor's Residence, Near the Rock Shelter Known as Ishi's Cave. May 7, 1998.

Hort Sciences. 2016 Draft Vegetation Management Plan for the UCSF Mount Sutro Open Space Reserve.

LSA. 2011. Biological Resources Report for the Mount Sutro Open Space Reserve, San Francisco, CA.

SFMTA (San Francisco Municipal Transit Agency). 2012. Blue Book 8th Edition.

SVP (Society of Vertegrate Paleontology). 1995. Society of Vertebrate Paleontology News Bulletin. Number 163. February 1995.

_____. 1996. Society of Vertebrate Paleontology News Bulletin. Number 166. February 1996.

_____. 2009. UCSF Climate Action Plan.

_____. 2014a. 2014 UCSF Long Range Development Plan.

_____. 2014b. Final Environmental Impact Report for the 2014 UCSF Long Range Development Plan, certified by The Regents in November 2014. State Clearinghouse Number 2013092047.

URS Inc. 2008. Cultural Resources Technical Report for the Mount Sutro Vegetation Management. UCSF FEMA PDMC-PJ-09-2007-10. July 2008.

PANORAMA
ENVIRONMENTAL, INC.

SUMMARY OF VERBAL SCOPING COMMENTS

Date: February 23, 2017

Subject: Mount Sutro Vegetation Management Plan Scoping Meeting

Brian Braden

- Would like assurance or guarantee that there will not be any development of buildings or housing within the Reserve as part of the project

Louis Blumberg

- Lives in Cole Valley (Stanyan Street)
- Has observed the abundance of wildlife decrease as the health of the forest has declined
- Public safety was not addressed in the plan or IS—EIR should address public safety. A tree fell on a house recently.
- Impacts post-implementation of the vegetation management activities should be addressed, including impacts on noise
- Coordinate management activities with the City of San Francisco for the Interior Greenbelt and the Reserve
- Would like to explore an alternative that moves up vegetation management activities they are completed sooner and that increases the intensity of treatments
- Is there any historic data of wildlife abundance that the EIR can present? EIR should use historic data
- Will any trail improvements occur?
- Would like to explore an alternative with no re-planting of eucalyptus—Reserve needs more diversity of vegetation
- Interested in current and projected carbon stock of the forest and the rate of forest decay

George Freeborn

- Where will trees be removed? The trees that would be removed for public safety are not shown on a map. Would like to see some clarifications on a map.
- What will be happening at the summit? Why wasn't it described in the plan?
- Concern for significant reduction in tree density within Forest Type #1

Alicia Noyola

- Why will new eucalyptus be planted? Puzzled by planting of new eucalyptus

- Requested that UCSF work with the City of San Francisco to ensure management of the Interior Greenbelt and the Reserve is consistent
- Does the process stop at the certification of the EIR? Kudos to UC so far at involving the public. Worried because biology of the forest is constantly changing—how will the plan adapt? How can we quickly react to changes in the forest? Is there a mechanism to allow the community to react quickly to changes in the forest once the plan is in place? Stressed the importance of proactive planning.

Karen Hanning

- Are there any plans for surveying archaeological resources? Are there any potential archaeological sites within the Reserve?
- Has ancestors that had a homestead on Mount Sutro that grazed cattle

Matt O'Grady

- Cole Valley resident and hikes daily in the Reserve
- Plan is long overdue—the forest needs attention
- Request to coordinate management of the Interior Greenbelt and Reserve with the City of San Francisco. Particular concern for Woodland Creek, which originates in the Reserve but becomes a defining riparian feature in the Interior Greenbelt. Efforts to manage Woodland Creek should be coordinated with the City
- Conflict within the plan: proposing to increase biodiversity but also proposing to plant eucalyptus
- An alternative is needed that would increase native species—an increase to 5 acres seems modest

Rupa Bose

- Sutro is a difficult environment—there are thin soils, steep slopes, and it is windy but the forest has been thriving nevertheless for the past 100+ years
- Environmental analysis should view the forest as a whole ecosystem rather than a collection of individual trees
- Thinning will impact the forest as a whole
- Need an analysis of landslides in the Reserve—suggested we consider a landslide in Washington where logging that occurred 5 or 10 years prior to the landslide was a large contributing factor
- Suggested looking at the Reserve as part of a greater ecosystem and landscape including Mount Davidson and the Presidio
- Dense forests are important for wildlife as corridors and safe havens, particularly for migratory species

Anastasia Glikshtern

- Thinning is probably not good for the forest as a living organism

- Forests tend to become one dominant species such as the redwood grove in Muir Woods, which is not a bad thing and would not be a bad thing for Mount Sutro
- Restoring native plants cuts down existing trees
- An analysis of carbon sequestration would be good
- Concern that removing trees will dry out the forest and create a fire hazard
- Concern that restoring native plants and removing trees will push out existing wildlife onto streets and people's backyards
- The list of native vegetation is speculative—there is no proof that those species grew in the Reserve and they shouldn't be re-planted because they were here 250 years ago

Dennis Mosgofian

- Given the recent rainfall, how will the EIR address cumulative landslide impacts with the Kirkham Heights project and other project along Crestmont? How will it mitigate for erosion and landslides?

Liza Kachko

- Please perform further biological surveys
- Half a dozen locally rare species exist in the Reserve that were not covered in the IS. Genera include Maianthemum, Hieracium, Carex, Triteleia, Aristolochia, Grindelia, Dichelostemma, and Stachys
- Need further study of existing remnant plant communities
- Look at native plant species list on Mike Woods Consulting website
- It is possible there is actually 5-9 acres of existing natives (fairly contiguous understory)

Mount Sutro Environmental Impact Report Scoping Meeting
Public Comment Form 2/23/2017

Thank you for coming tonight. UCSF values your input, and we welcome your comments on the scope of The Draft EIR for the Mount Sutro Vegetation Management Plan. This Public Comment Card is provided for your convenience. Please return this card to UCSF staff at the end of the meeting, or if you prefer to send it to us at a later date, please return to: Christine.Gasparac@ucsf.edu. You may also email your comments.

Recreation Impacts - Please strive to minimize trail closures, maintain bicycle access. Also, please consider efforts by the Bay Area Ridge Trail to create connectivity between open spaces in SF by creating the new BART segments up historic and down the new trail above Christopher Drive.

Forestry/Bio recources - Please thin & replant trees, but not eucalyptus. Consider Coastal Chaparral, Bay Laurel, redwood, and more native bushes like toyon - there is a huge habitat value lost by replanting eucalyptus.

ultural/Tribal - Preserve traces of khi, the cave, although keeping it obscure / off the main trails might be the best way to preserve it

etical - Please coordinate & work with, share resources with the Sutro Stewards as much as possible.

Name Ryan "retz" Sakhavar, Sutro Stewards ~~SF URBAN RIDERS~~

Address 2127 42ND Ave 94116
Street Zip

Email rrrrrrrr@fastmail.fm

Mount Sutro Environmental Impact Report Scoping Meeting
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1. It would be very important for people, to voice their comments and concerns, that are relevant to the Mount Sutro Environmental Impact Report.
2. Everyone needs to get a good visual perspective, that, pertains to removing dangerous trees, and, other plant species, ~~that pertains to the~~ the identified perimeters for the Mount Sutro EIR.
3. Mount Sutro, is a large urban forest, ~~that~~ which is located high above the U.C.S.F Parnassus Medical Center campus, and, this urban forest has its ~~own~~ environmental and noise concerns, that, need to be addressed, by the general public.
4. The scope of this Mount ~~Sutro~~ Sutro EIR, needs to be taken, into serious consideration, along, with the pro-active ~~planning~~ planning.

Name Frank Vallecillo

Address 1978-35TH AVE., SAN FRANCISCO, CA. 94116
Street Zip

Email fvallecillo1960@gmail.com

5. The plans for the Mount ~~Soto~~ Sutro EIR, needs, immediate and ~~unnecessary~~ necessary attention, to its cumulative impacts, and the potential for erosion.

March 7, 2017

Diane Wong, Environmental Coordinator
UCSF Campus Planning
654 Minnesota Street
San Francisco, CA 94143-0286
EIR@planning.ucsf.edu

Dear Diane Wong,

Thank you for the opportunity to provide comments on the Initial Study and EIR scoping of the UCSF Mount Sutro Open Space Reserve Vegetation Management Plan. The UCSF Mount Sutro Open Space Reserve is of great interest to me for several reasons; I have lived in the neighborhood since 1975 and am now a homeowner and I have been an active member of the Sutro Stewards for years. My great loves include bird watching and conservation of California habitat as well as enjoyment of the local walking community.

I am very pleased that action is being planned, in the form of the Notice of Preparation and the CEQA Initial Study Checklist, that will lead to proper management of the open space. The UCSF Mount Sutro Open Space Reserve is a wonderful jewel in the City and I am happy to be a part of its stewardship.

My comments in response to the Initial Study show my perspective as a neighbor. The first comments are key points related to the **primary purposes** of the proposed Vegetation Management Plan categories. The latter comments are related to the checklist.

- Safety
  - I am a homeowner who is at risk if a poorly maintained forest of volatile eucalyptus trees creates a fire that imperils the neighborhood.
- Ecosystem
  - I am an active Sutro Steward, promoting restoration and conservation of California native habitat and ecosystem.
- Aesthetics
  - I look forward to unobstructed views from the Mt. Sutro Preserve
  - The aesthetic experience is enhanced by understanding of the world around us. I hope signage will be installed explaining the natural history, similar to what is seen at Devil's Slide in San Mateo, information that can be easily provided by Bay Nature. (See references below.)
  - I request that action be taken to minimize noise. Leaf blower-like sounds are very disruptive to the aesthetic experience and to bird watchers who are listening for bird song. Similarly, the alarms on public service vehicles (such as the back-up alert on trucks) must not be overly loud. (I would request that machines that chip wood be silent, however that would be unreasonable.) Noise reduction can only be beneficial to bird life in the Reserve.
- Public Access
  - I hope that usage of the "Bronze" UCSF van, serving Aldea San Miguel Housing will be made available to the public, especially during non-peak hours.

Anticipated Content of the EIR	Aesthetics	I look forward to unobstructed views I look forward to the removal of dead, dying, unhealthy trees as described. I look forward to the blunting of offshore winds with California native

	trees and scrubs, such as toyon and coast-live oak, i.e., having less reliance upon eucalyptus trees. I look forward to seeing much fewer eucalyptus trees, and that the remaining eucalyptus be healthy and well managed, as defined by best practices in the forestry community. I look forward to coordination with the Interior Greenbelt, as possible. I hope signage will be installed in order to explain the natural history of the Mt. Sutro Reserve, similar to what is seen at Devil's Slide in San Mateo. This information can be easily provided by Bay Nature. (See references below.) I request signage because the aesthetic experience is enhanced by understanding of the world around us.
Agriculture and Forestry Resources	I look forward to an alteration in the forest, promoting the increase of native species and a marked decrease in the number of eucalyptus, particularly dense and unhealthy stands of eucalyptus.
Air Quality	It is reasonable to pay attention to minimizing emissions as outlined.
Biological Resources	Particular attention to special status organisms (A) is appropriate in order to obtain positive impacts. The watershed impacts(B) are in need of particular attention as the long term benefits are large, particularly during this time of climate change. Attention to migrating species (C) is important as is the action to remove trees (D) as indicated. Attention to nesting season should be done with the help of experts as to when tree removal occurs.
Cultural Resources	I am aware that there are several possible cultural artifacts to be found, yet have no useful comments on the topic.
Geology and Soils	Earthquakes, landslides and maintenance of good topsoil are to be considered as action is taken.
Greenhouse Gases	I am a homeowner and property manager who is at risk if a poorly maintained forest of volatile eucalyptus trees creates a fire that imperils the neighborhood. I am convinced that the risks of fire are not "overblown" as stated in public comment.
Hazards and Hazardous Materials	I look forward to vegetation management along the sides of Woodland Creek in order to have a positive impact on the stream and ecosystem. These impacts are related to erosion and sedimentation and potential flooding. The impact of the removal of dead and dying eucalyptus, managed correctly, will be positive related to storm run-off.
Land Use and Planning	-
Mineral Resources	-

Noise	I request that action be taken to minimize noise throughout the project. Leaf blower-like sounds are very disruptive to the aesthetic experience and to bird watchers who are listening for bird song. Similarly, the alarms on public service vehicles (such as the back-up alert on trucks) must not be overly loud. (I would request that machines that chip wood be silent, however that would be unreasonable.) Noise reduction can only be beneficial to bird life in the Reserve. It may be reasonable to haul away materials that need to be chipped so that the noise will not be on site.
Population and Housing	-
Public Services	-
Recreation	I look forward to the positive impact upon recreation that the project will bring.
Traffic and Transportation	I hope that usage of the "Bronze" UCSF van, serving Aldea San Miguel Housing will be made available to the public, especially during non-peak hours.
Utilities and Service Systems	In the "noise" section, I made comment about the noise generation that occurs when leaf-blowing-like machines are used. In this section, (G), green waste is addressed. I hope that noise generation is considered when green waste is managed.
Mandatory Findings of Significance	-

Thank you for the opportunity to provide comment on the Initial Study and EIR scoping of the UCSF Mount Sutro Open Space Reserve Vegetation Management Plan. Please contact me if I can be of any assistance to the development of the plan. I intend to continue to pay attention and to attend the meetings that you arrange.

Sincerely,

Maryann Rainey

1318 4th Ave
San Francisco, CA 94122-2616
(415)225-7814

References:

http://parks.smcgov.org/locations/visiting-devils-slide-trail
This reference is the location of the signage but does not include a model of what I have in mind.
https://baynature.org/



STOP DESTRUCTION OF SAN FRANCISCO TREES

NATIONAL MUSEUM OF AFRICAN AMERICAN HISTORY & CULTURE

SMITHSONIAN INSTITUTION

Ms Linda Bazan
1151 Post St Apt 20
San Francisco CA 94109-5549

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San Francisco CA 94143

Help share the stories of these icons of history—support the National Museum of African American History and Culture at go.si.edu/postcard.

From: Max Valerio
To: Campus Planning - EIR
Subject: Mount Sutro Forest
Date: Tuesday, February 21, 2017 10:46:02 PM

Hi Urban Planners,

I understand you will be killing more trees on Mt. Sutro in San Francisco and attempting to return at least some of the habitat to the state it was found in -- a more natural state. That natural state does not include as many trees and is more barren. The Eucalyptus trees, while not native, provide moisture, habitat for raptors and other birds, and are beautiful. They bring down moisture and create that canopy of beauty that is our Mt. Sutro cloud forest. Please do not destroy this. Future generations will be angry that such a place of beauty was disturbed and destroyed.

I lived in San Francisco for almost 40 years and visit often. I recently relocated but may go back in a few years again to live if I can. I don't want to look at a bald or diminished Mt. Sutro. Please understand that these Eucalyptus trees are not a fire hazard and that we have been managing them so well for so long. Please do reconsider these plans.

Thank you,
Max Valerio
(415) 316-9150

From: Herbert Dunmeyer
To: Campus Planning - EIR
Date: Friday, February 24, 2017 8:15:42 PM

Diane,

I arrived "just as the chairs were starting to be removed in the meeting room"!

My home at 345 Warren Drive has eucalyptus trees right behind the back fence. I can't recall ever seeing "bird life" in those trees since 1978, other than a "landing" at times by some birds.

As a East Coast native I greatly prefer trees that provide for bird nesting, et cetera, I'll "cope" with those who enjoy the "appearance" of eucalyptus trees, but if I had my say "they'd be removed ... and soon forgotten"!
\
Good luck with your project ... as we witness the demise of native wild birds!!

Herbert W. Dunmeyer

From: Denise Louie
To: Yamauchi, Lori; Campus Planning - EIR
Subject: Mt. Sutro Open Space Reserve NOP and Initial Study
Date: Wednesday, March 1, 2017 3:43:42 PM
Attachments: image002.png
image004.png
Fire problem - 1.pdf
Fire problem - 2.pdf

Dear Associate Vice Chancellor Lori Yamauchi and Environmental Coordinator Diane Wong,
I am commenting on the Mt. Sutro Open Space Reserve Vegetation Management Plan NOP and Initial Study. I object to the plan calling for a regeneration of a eucalyptus canopy and a relatively narrow 90' safety perimeter. I object to UCSF's prohibition against pesticides. I urge you to plan to plant plants that evolved here.

Neighbors and I live in fear of catastrophic fire and of falling trees and limbs. During a community meeting, a member of the Technical Advisory Committee said very clearly that under the right conditions, yes a catastrophic fire could occur here. We should be removing eucalyptus and replacing them with species that represent little or less risk to human life and property.

Recall how embers from the Oakland Hills fire of 2001 flew across the Bay to SF. My house is made of wood, as are most houses in the City. Flying embers from the tops of our hills could leave us devastated and homeless. My family cannot afford to buy a house like ours again at today's prices. We have no place to go if our house becomes uninhabitable. While the City struggles to create additional, affordable housing, we should be protecting our existing housing stock.

Failing to abate a known risk makes you and your institution financially liable in the event of a catastrophe. It could be argued that planting more eucalyptus trees on Mt. Sutro is tantamount to ignoring the risks that these trees represent.

I believe UCSF students and faculty understand science and biology. I hope you understand ecology, which is a branch of science and biology. Eucalyptus trees are a non-native, invasive, problematic species. The California Invasive Plant Council lists eucalyptus as invasive in California and Monterey pine and cypress as invasive in coastal areas like San Francisco. There are many plants to choose from and only a relative few to avoid. The world is not at risk of losing invasive species, but we are at risk of losing native species. We should avoid those few for the sake of plants native to San Francisco and wildlife that co-evolved with them. Members of the California Native Plant Society and the Recreation and Park Department's Natural Resources Division are excellent resources. On neighboring Twin Peaks, habitat is successfully being restored for the locally rare Mission Blue Butterfly, which used to occur more widely around the City.

Plant biology informs us that plants like eucalyptus, which can absorb many gallons of water everyday, don't do well in drought. Mature eucalyptus is of particular concern, because of its height and shallow roots. As it shrinks back during drought, its shallow

and shrunken roots can easily fail on a windy day. Planting more of these trees would likely be a waste of time, money and energy in the City going forward, as the saplings would be subject to consecutive years of drought due to climate change. Instead, planting plants that evolved here is the most sustainable option.

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Politically, objections of some citizens were shot down yesterday, when the SF Board of Supervisors rejected the SF Forest Alliance's appeal regarding the SF Recreation and Park Department's Natural Resource Areas Management Plan and related EIR. Objections to the cutting of trees and the use of pesticides were outweighed by the need to manage stands of trees in open spaces and the City's elimination or minimization of the use of the most hazardous pesticides and pesticides in general.

I urge you to remove from the plan planting more eucalyptus trees. I urge you to increase the safety perimeter. These two ideas are a compromise, as I am not asking for removal of all eucalyptus trees from the Reserve.

I urge you to reconsider a limited use of pesticides. Over the past few years, the City has reduced its use of pesticides and eliminated the most hazardous ones. In weighing the use of herbicides against the re-generation of eucalyptus trees, it seems practical to use herbicides. Limited use should be allowed in the plan. UCSF's policy is an ideal one, but not practical.

I urge you to make it part of the plan to replace removals with plants that evolved here, to make a serious commitment to protect and enhance what little remains of our natural heritage--habitat for native plant species and wildlife that co-evolved with them. San Francisco is an important part of the biodiversity hotspot that is California, meaning we are blessed to have an abundance of naturally occurring species, many of which are at risk of extinction due to human activities. Our city is named for St. Francis, patron saint of ecology--a reminder that we have an ethical duty to care for species other than our own. As I mentioned, we are at risk of losing our native plants, which are the bases of whole ecosystems. California is one of only 36 internationally recognized hotspots. What you do here matters, not least because eyes around the world are watching. Moreover, I hope you are concerned with your legacy. Will you burden future generations with the problems, risks and conflicts we are experiencing now, or can you leave them a decent bit of our natural heritage?

A month ago, I communicated my concerns about funding the vegetation management plan to Chancellor Hawgood, recognizing that removing the dead, diseased and dangerous trees is very expensive. I advocated setting aside funds from the $500 million from the Helen Diller Foundation and hope you will do likewise.

Thank you,
Denise Louie
Neighbor

On Saturday, January 28, 2017 10:19 AM, Denise Louie <denise_louie_sf@yahoo.com> wrote:

Dear Chancellor Hawgood,
The email sent to me by Beth Mooney provides me no comfort.

First, the so-called vegetation management **plan does not address the fact that a large number of trees need immediate attention**. The plan even calls for planting more problematic trees, which will push the same problems onto future generations. The planting of problematic trees was included in deference to a few persistent critics with a hidden agenda, despite the facts that blue gum eucalyptus trees are invasive and California is one of 36 internationally recognized biodiversity hotspots (indigenous species are at risk of extinction due to human activities, including the introduction of invasive species). Eyes around the world are watching to see what we do here.

Secondly, the **plan does not address funding**, which is likely a separate issue. Management of a large number of trees requires huge amounts of money.

To address these issues, I again urge you to set aside funds for managing the trees in UCSF's Open Space Reserve. I suggest **starting with $10 million**.

In addition, I urge you to **develop and implement a sustainability policy not to plant invasive plants and to plant indigenous plants**. City College of San Francisco's Sustainability Plan says CCSF will (a) avoid and remove invasive plants and (b) plant native (indigenous) plants.

Thanks,
Denise

****
sent by me on January 15th:
Dear Chancellor Hawgood,
Congratulations on UCSF's award of $500 million from the Helen Diller Foundation.

I urge you to set aside some of that money for managing UCSF's Open Space

Reserve, where at least 25% of the standing trees are dead. The trees in the Reserve are not what they once were. They have experienced 5 consecutive years of drought. They are infested with disease and bark beetles. They pose a risk for catastrophic fire. They can easily topple or drop branches; their roots are shallow and would have shrunk due to drought. They can even slide downhill after falling. Neighbors and I live in fear of fire and injury due to these trees. The 90-foot "safety perimeter" is no comfort.

All trees need maintenance. The trees of the Open Space Reserve are UCSF's and your responsibility. Please set aside money to manage these trees.

Thank you and
Happy New Year!
Denise Louie
Neighbor

On Friday, January 27, 2017 9:39 AM, "Mooney, Beth" <bmooney@ucsf.edu> wrote:

Sent on Behalf of Barbara J. French

Dear Denise:

Thank you for your email to UCSF Chancellor Sam Hawgood about the safety and forest management needs for Mount Sutro. As you may know, UCSF is in the middle of a public process to develop a vegetation management plan for the Mount Sutro Open Space Reserve. The proposed plan will address the concerns that you raise in your email. In developing the plan, UCSF consulted with a panel of technical experts and held two community open houses to invite expert and community feedback on our proposed management plan for the Reserve. Starting next month, we will begin the environmental review process and expect to certify the EIR and begin implementing the plan in fall 2017.

UCSF has allocated funds to the public process and has money set aside to fund the implementation in the near term and will continue to evaluate funding sources to ensure the long-term management of the Reserve.

If you have any questions or would like to comment on the proposed plan, please contact Christine Gasparac at christine.gasparac@ucsf.edu.

Sincerely,

Barbara

Beth Mooney
Business Manager
Strategic Communications & University Relations

University of California, San Francisco

3333 California Street, Suite 103, Box 0462 | San Francisco, CA 94118
tel: 415.476.6134
beth.mooney@ucsf.edu

UCSF

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(continued from page 44) advise against removing all of the trees in any area, for exactly the reasons that Maloney cites.

Still, both documents say there is a fire hazard. So do all the experts I spoke with, including the ones with no prior knowledge of the FEMA grant. The roughly two dozen Australian and American wildfire experts, eucalyptus experts, and fire ecologists I communicated with while reporting this story (the majority of them with no personal connection to the local debate) were unanimous in their verdict: Blue gum eucalyptus is especially, dangerously flammable. "Anybody who wants to encourage really flammable plants in an urban mix has to do it with their eyes open," David Bowman told me. There is no single, knockout paper or study that shows that blue gums are drastically more dangerous fire-hazards than other local species, that's true, but that's probably too much to ask anyway. Ross Bradstock, a wildfire expert at the University of Wollongong, says that while being able to empirically compare the flammability of different trees would be useful, it's not currently possible. Leaves or other components, meanwhile, can tell you only so much about the whole, and individual trees only so much about the forest. "We're in our infancy in understanding how flammability can be practically measured and scaled up," he says.

NOW IMAGINE A FIRE. Not just any fire, but *the* fire, the fire that all this is about. It's late September, in a eucalyptus grove on the ridgeline above the UC Berkeley campus. The grove is one of those that were logged off after the 1972 freeze, and the trees grew back just a few feet apart, hung with bark and knee-deep in fallen leaves, bark, and twigs. For most of the year, these trees would collect fog and slow the breeze, and they might indeed make a fire less likely, Scott Stephens says. But not today. The summer fogs have faded, and it's been unseasonably hot for a week. Relative humidity is in the low teens, and any moisture hidden in the debris below the trees has long wicked away. A strong wind begins blowing over the hills from the east. And then somehow—maybe a spark from a car, maybe a tossed cigarette—the whole dry, airy mess catches fire.

Now the flames on the ground are 30 feet high and even higher off the boughs, roaring like a jet engine. At the fire's edges, trees appear to explode as the volatile oils in their leaves reach their boiling point and vaporize. The heat of the fire forms a convection column, with 60-mile-per-hour winds that rip burning strips of bark from the trees and toss them upward. This is another of blue gums' talents—its bark makes ideal braziers. Tucked away inside a rolled-up strip of bark, a fire might live for close to an hour and fly 20 miles. Native species and grasses produce sparks and firebrands too, Stephens says, but not of the same quantity and quality as eucalyptus. The shower of firebrands tossed from the ridgeline by the 100-foot-tall trees foils any attempt to create a firebreak.

At this point, there's nothing anyone can do to stop the fire, Brad Gallup says. "Nature's going to put that out." We're on a

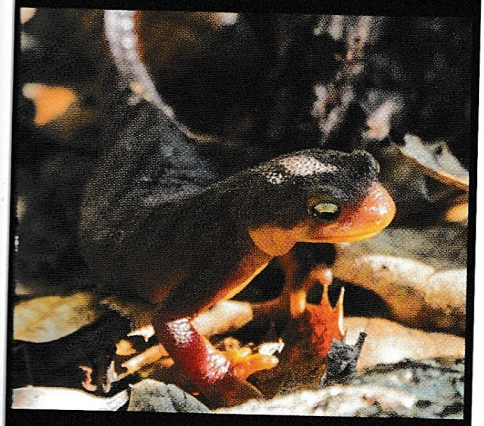


ridgeline above UC Berkeley, across the street from the grove in question. I met him that morning at the park district fire station at the edge of Tilden Regional Park, and we've driven together into the park, stopping first at this overlook along Grizzly Peak Boulevard. Gallup, who has gray hair and thin-frame glasses, is dressed head-to-toe in navy and wears black leather fire boots. He is persistently neutral: "Everybody's right, everybody's wrong," he says at one point. It is true, he says, that—as Maloney argues—a fire would spread through the grass covering the hillside on this side of the road much faster than through the eucalyptus opposite. It might indeed get away, or catch houses on fire. But even under the worst conditions, there is the possibility of containing a grass fire, he says. That's the idea in thinning the eucalyptus—not to prevent fire, but merely to create the possibility of keeping it from growing out of control even in those rare instances when conditions are at their worst. "We're trying to change fire behavior," he says, "to make it easier to put the fire out, to give people more time to evacuate."

We drive along the ridgeline and re-enter the park, and into what looks and feels like a vast eucalyptus forest. Gallup parks his truck and we get out to walk down the fire trail. We pass a man in an excavator stacking eucalyptus logs. The air begins to smell of fresh sawdust. And then from somewhere down in the woods there is the sound of a saw.

The East Bay Regional Park District is taking something of a middle approach to fire prevention in the eucalyptus groves it manages, thinning the trees rather than clearing them outright. (This is the approach that Jerry Kent predicts will cost the most, and native plant advocates say will result in a monoculture, though it is acceptable to the Hills Conservation Network.) The goal, Gallup says, is to get to less than 100 trees per acre, down from as many as 1,700 per acre in some areas. After arborists thin the smaller trees, youth crews will clean *(continued on page 48)*

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Greywater Action

info@baymaples.com

From:	Denise Louie
To:	Campus Planning - EIR; Yamauchi, Lori
Subject:	Re: Mt. Sutro Open Space Reserve NOP and Initial Study
Date:	Friday, March 3, 2017 9:22:35 PM
Attachments:	image001.png image003.png

Hello again,
I have an addendum. I urge you to reduce the number of trees per acre--in the vegetation management plan as well as in the Open Space Reserve. I recall a Technical Advisory Committee member from the Presidio stated the number in the plan is rather ambitious, and the number used in the Presidio is maybe half the number in the plan. Overcrowding is bad for the trees, while thinning creates "the possibility of keeping [a fire among the trees] from growing out of control", as stated in the attached article.

Please do everything you can to make us feel safe and to actually reduce risks to our property by managing the Open Space Reserve based on what we already know about the trees and associated risks.

Thanks,
Denise Louie

On Wednesday, March 1, 2017 4:08 PM, Campus Planning - EIR <eir@planning.ucsf.edu> wrote:

Thank you Ms. Louie. Your comments have been received, will be shared with the project team, and will be considered in preparing the Draft Environmental Impact Report for the project.

Diane

From: Denise Louie [mailto:denise_louie_sf@yahoo.com]
Sent: Wednesday, March 1, 2017 3:43 PM
To: Yamauchi, Lori <Lori.Yamauchi@ucsf.edu>; Campus Planning - EIR <eir@planning.ucsf.edu>
Subject: Mt. Sutro Open Space Reserve NOP and Initial Study

Dear Associate Vice Chancellor Lori Yamauchi and Environmental Coordinator Diane Wong,
I am commenting on the Mt. Sutro Open Space Reserve Vegetation Management Plan NOP and Initial Study. I object to the plan calling for a regeneration of a eucalyptus canopy and a relatively narrow 90' safety perimeter. I object to UCSF's prohibition against pesticides. I urge you to plan to plant plants that evolved here.

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A month ago, I communicated my concerns about funding the vegetation management plan to Chancellor Hawgood, recognizing that removing the dead, diseased and dangerous trees is very expensive. I advocated setting aside funds from the $500 million from the Helen Diller Foundation and hope you will do likewise.

Thank you,
Denise Louie
Neighbor

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Secondly, the **plan does not address funding**, which is likely a separate issue. Management

of a large number of trees requires huge amounts of money.

To address these issues, I again urge you to set aside funds for managing the trees in UCSF's Open Space Reserve. I suggest **starting with $10 million**.

In addition, I urge you to **develop and implement a sustainability policy not to plant invasive plants and to plant indigenous plants**. City College of San Francisco's Sustainability Plan says CCSF will (a) avoid and remove invasive plants and (b) plant native (indigenous) plants.

Thanks,
Denise

****
sent by me on January 15th:
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I urge you to set aside some of that money for managing UCSF's Open Space Reserve, where at least 25% of the standing trees are dead. The trees in the Reserve are not what they once were. They have experienced 5 consecutive years of drought. They are infested with disease and bark beetles. They pose a risk for catastrophic fire. They can easily topple or drop branches; their roots are shallow and would have shrunk due to drought. They can even slide downhill after falling. Neighbors and I live in fear of fire and injury due to these trees. The 90-foot "safety perimeter" is no comfort.

All trees need maintenance. The trees of the Open Space Reserve are UCSF's and your responsibility. Please set aside money to manage these trees.

Thank you and
Happy New Year!
Denise Louie
Neighbor

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Sent on Behalf of Barbara J. French

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If you have any questions or would like to comment on the proposed plan, please contact Christine Gasparac at christine.gasparac@ucsf.edu.

Sincerely,

Barbara

Beth Mooney
Business Manager
Strategic Communications & University Relations

University of California, San Francisco
3333 California Street, Suite 103, Box 0462 | San Francisco, CA 94118
tel: 415.476.6134
beth.mooney@ucsf.edu

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Please consider the environment before printing this e-mail

From:	Wong, Diane C.
To:	Campus Planning - EIR
Subject:	FW: Mt. Sutro plan
Date:	Monday, March 6, 2017 9:50:11 AM

From: Greg Gaar <dunetansy@yahoo.com>
Date: March 4, 2017 at 7:51:23 AM PST
To: <lori.yamauchi@ucsf.edu>
Subject: Mt. Sutro plan
Reply-To: Greg Gaar <dunetansy@yahoo.com>

Hi Lori,
Replanting eucalyptus (Tasmanian blue gum) on Mt. Sutro is crazy and belittles the reputation of a great university.

I've volunteered with the National Park Service, the Natural Areas Program and with the Sutro Stewards on habitat restoration projects.
Anyone who has worked on restoring native plant communities in California knows the adverse impacts of Tasmanian blue gum when trying to increase biodiversity. The trees change the chemical composition of the soil and promote the spread of invasive exotics such as English ivy, Algerian ivy, yellow oxalis and erharta erecta. The ivy climbs and inundates the planted trees. The trees die from the inability to photosynthesize. The planting of eucalyptus in California is non-sustainable and literally sows the seeds of it's own destruction.

Go to Mt. Sutro or Mt. Davidson and see the destructive results of planting blue gum. Where hundreds of species native plants and wildlife thrived for hundreds of thousands of years, we now have a biological wasteland.

I'm amazed that one of the world's great educational institutions fails to understand basic scientific facts.

Thanks
Greg Gaar
San Francisco

339 Frederick Street
San Francisco, CA 94117-3913
415-661-6760
jrmscdme@pacbell.net

March 6, 2017

Diane Wong
UCSF Campus Planning
PO Box 0286
San Francisco, CA 94143

Re: Sutro Forest Plan

Dear Ms. Wong:

We write as fairly near neighbors for past 35 years and occasional grateful, enthusiastic walkers on Sutro Forest trails. We have been alarmed by downhill riders of bicycles on these trails more than once, particularly on the trail leading down to the Stanyan Street access point.

We do understand that at least part of that trail runs through City park land and perhaps the concerns of this letter should also be addressed to SF Rec & Park. Nonetheless, the concern is valid and should be considered in any plan for Sutro Forest.

Specifically, riders move too fast for conditions (wet, rocky, etc.) and visibility (often nonexistent on curves) and, in the interests of safety should be banned from many of the Sutro Forest trails.

Thank you for consideration of our views,

John & Barbara Manning

March 6, 2017

Ms. Diane Wong, Environmental Coordinator
UCSF Campus Planning
Box 0286
San Francisco, CA 94143-0286
EIR@planning.UCSF.edu

Re: Scoping for Environmental Impact Report for the Vegetation Management Plan

Dear Ms. Diane Wong,

Thank you for the opportunity to comment on the scope of the EIR for the new Vegetation Management Plan. As a native San Franciscan, raised on the south slope of Mount Sutro in Forest Knolls, I've experienced a lifetime of enjoyment from Sutro Forest. As a founding member of the Sutro Stewards program and currently the Executive Director I have a profound knowledge of the Mount Sutro Open Space Reserve that predates that designation.

Over the last decade I have traveled up, down, over and through the reserve in a continuous and focused effort to learn about the potential of the area and create access for the public to experience the beauty and adventure available on Mount Sutro.

I wish provide comments on the overlooked cultural history of Mount Sutro and make a case that the historic vistas from Blue Mountain (Mount Sutro) that are currently missing and should be restored.

Cultural History and Enhancements for Improved Visual Design and Aesthetic Experience

- The previous archaeological assessment (FEMA 2008-2009) consisted of a literature review to identify the previously recorded archaeological sites that could be impacted by the plans. This review did not reach back to the first recorded scientific voyages to enter into San Francisco Bay and the settlement of Yerba Buena. By omission of the early 1800's documentation of Blue Mountain (later renamed Mount Sutro), a formidable amount of cultural history has been neglected. This omitted history pertains to the first extensive botanical history of San Francisco from William Jackson Hooker as well as scientific documentation, charts and credit for the name Blue Mountain from Captain Frederick William Beechey.
https://books.google.com/books?id=7YcBAAAAYAAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

- The significant cultural history of Mount Sutro began well before Adolph Sutro's arrival in San Francisco must be considered in this project. Rancho San Miguel and the San Miguel Hills are a significant part of the cultural history that predates Sutro and directly pertains to the land on which Mount Sutro is located. *Rancho San Miguel by Mae Silver* © 1992

- Explorer William Beechey arrived in SF in 1820's and created the first charts and maps of the San Francisco Bay Area. His scientific explorations are well documented and include the naming of Blue Mountain (later renamed Mount Sutro) that was used as a

significant navigational beacon to locate the entrance to San Francisco Bay during the gold rush of 1849. Blue Mountain was the first sight of the miner's destination after many months at sea.
https://en.wikipedia.org/wiki/Frederick_William_Beechey

- William Jackson Hooker, author of "Captain Beechey's Voyage" published in 1841 contains early accounts of the area and it's botany. Many of Mount Sutro's endemic plants have been included, including the first accounts of Poison Oak, Ribes sanguineum, and Fairy Bells (prosartes hookeri). *Botany of Beechey's Voyage to the Pacific and Behring's Straits* (with Dr Arnott, 1841)
https://en.wikipedia.org/wiki/William_Jackson_Hooker

  https://books.google.com/books?id=V7HuvtYs6J4C&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

- The views and vistas from Blue Mountain (Mount Sutro) in the early 1800's must be included in the cultural history evaluation for the purpose of restoring these historic vistas and re-exposing of the rock outcrop features once visible from afar in areas surrounding the San Miguel Hills, including Cole Valley, Haight Ashbury, the Sunset and Richmond districts as well as Golden Gate Park.

The historic views from Mount Sutro should be restored.
In conclusion the contributions of Beechey and Hooker play a considerable role in advancing the settlement of Yerba Buena and promoting the explosive growth of San Francisco in the mid 1800's with virtually every ship using Beechey's map to guide them safely to port. The views of a costal scrub covered Blue Mountain greeted early settlers arriving by ship during the gold rush, and were likely a popular vantage point to observe ships traveling into the Bay from the Pacific Ocean, the costal Headlands of the Marin, and the sweeping vistas of the Bay. **Today, by restoring the Historic vistas from Mount Sutro's summit, visitors could again enjoy an unobstructed view to view the Farallon Islands, Marin Headlands to Drakes Bay, Mount Tam and the Golden Gate, Yerba Buena, Angel, and Alcatraz Islands, Mount Diablo and the East Bay shoreline. The public is entitled to once again experience first hand these historic vistas that were slowly removed over the last century by Sutro's alteration of our cultural environment through the introduction of the blue gum eucalyptus plantation on Rancho San Miguel.**

ADDITIONAL COMMENTS TO VMP:

FUNDING
Long term uninterrupted funding is a critical component for in success of this proposed management plan and for the safety of surrounding neighborhoods and the City as a whole. This funding should not be left to the discretion of the University's annual budget process, constraints, and personnel changes, that may defund aspects of the program at times of need.

I recommend that UCSF organize a quasi endowment fund for the long-term permanent funding of the Mount Sutro Open Space Reserve. This endowment would remain unencumbered by the University's annual financial plans and would guarantee that a pre-determined minimum and maximum amount be expended annually to ensure the goals of this Vegetation Management Plan can be met for perpetuity.

Page 31: Ecosystem Health
Page 37: Understory Removal
In both sections referenced above, there is an urgent need to include a complete list of Invasive Species found at proposed work sites prior to beginning any action, and proposed treatments to eliminate and contain invasive species within those sites. Monitoring should be paramount at all work sites to rapidly determine effectiveness of proposed treatments and escalation should be immediate if treatments prove ineffective. Escalation plans need to be developed and documented in this VMP. The two most noxious invasive species that need to be added and specifically considered in treatment plans and escalation criteria are ehrharta (*Ehrharta erecta*) and yellow oxalis (*Oxalis pes-caprae*).

ADDITIONAL COMMENTS TO APPENDIX A:
Page 49: Invasive Species
Add:
ehrharta (*Ehrharta erecta*)
yellow oxalis (*Oxalis pes-caprae*).

ADDITIONAL COMMENTS TO APPENDIX D:
Page 62:
Mammals: Add Skunk, Possum, Mountain Lion, Bobcat
Butterflies: Add Pipevine Swallowtail
Amphibians: Add Tiger salamander, yellow-eyed salamander (E. escholtzi xanthopicta)



Craig Dawson
Executive Director, Sutro Stewards

From:	Rk Bose
To:	Campus Planning - EIR
Subject:	Opposing the Plan
Date:	Tuesday, March 7, 2017 6:25:54 PM

Dear Diane,

I am writing to oppose the new Plan, which will effectively destroy the forest on Mount Sutro.

It will reduce the forested acreage by a third, and require removal of thousands of trees. When this happens, the supportive ecosystem of the forest is destroyed, so instead of an actual integrated forest, it becomes isolated trees growing in a very challenging environment. Lack of moisture, destruction of the intergrafted root system and the mycorrhizal connections and increased wind will all adversely impact the trees. All this will be worsened by the aggressive removal of the understory and midstory vegetation.

Please also include long-term hillside destabilization in your EIR assessment. Research shows this can take place years after the removal of vegetation - or immediately, if the weather conditions are conducive to landslides.

Rupa Bose

Ms. Diane Wong, Environmental Coordinator
UCSF Campus Planning
Box 0286
San Francisco, CA 94143-0286
EIR@planning.UCSF.edu
Re: Scoping for Environmental Impact Report for the Vegetation Management Plan

Dear Ms. Diane Wong,

We are writing to you on behalf of the Yerba Buena Chapter of the California Native Plant Society. The California Native Plant Society (CNPS) is dedicated to celebrating California's native plant heritage and preserving it for future generations.

Thank you for the opportunity to comment on this plan and for considering the inclusion of native biodiversity in UCSF's stewardship plans.

We urge maximizing biodiversity as a primary objective of the Mount Sutro Vegetation Management Plan and UCSF policy should support this goal.

CNPS identified 56 species of San Francisco native plants as surviving on Mt. Sutro as of 15 years ago. These native plant species are not only beautiful to see but vitally important to native butterflies, birds and other species that have evolved for millennia with them and depend upon them for food or habitat. We also think that the Vegetation Management Plan should expand and augment these native plant species and numbers in order to achieve the primary objective of the plan.

Some invasive plant issues that we would like for UCSF to consider: Our experience is that aggressive weeds will defeat biodiversity goals if not controlled. Chief among the invasive plants—besides Himalayan Blackberry and English/Algerian Ivy, are ehrharta (*Ehrharta erecta*) and yellow oxalis (*Oxalis pes-caprae*). Both of these are well documented by the California Invasive Plant Council. Conditions on Mt. Sutro are ideal for ehrharta, and the mountain is heavily infested with this noxious weed. The ehrharta is a problem because it spreads rapidly, outcompeting native grasses and other plants. The allelopathic oxalis quickly muscles out other plants. Oxalis is widely distributed at Mount Sutro and both it and ehrharta will dramatically expand in the wake of ground disturbance attendant on restoration activities.

The spread of ehrharta and yellow oxalis will overwhelm volunteer efforts; our extensive past experience with native plant restoration has shown herbicide employment will be necessary in areas where other methods don't work. The plan should include native species plantings simultaneously as the tree and weed removal and trail work is conducted.

Having a great variety of plants, animals, and other organisms enhances human pleasure and health. Health is a primary mission of UCSF and we applaud the University's efforts in this regard. Mt. Sutro has great potential for complementing and bolstering the work of the University's medical functions.

Recreation would be served by opening view corridors; currently spectacular panoramic views are well concealed by eucalyptus trees which, left on their own in a California ecosystem that lacks associated balancing mechanisms, tend to become a monoculture and grow well beyond the bounds they would in their native Australian environment where biological checks have co-evolved with these species.

Finally we urge the project team to minimize the impacts of erosion when removing dead trees and other vegetation from the site. Where they do not pose a safety hazard, biodiversity is increased by allowing some dead trees to remain standing for cavity nesters or leaving logs on the ground to rot. Cavities and rotting wood attract a wide variety of arthropods, decaying agents and other organisms that greatly enrich the biota.

Thanks again for considering our comments which we hope your team will find value in.

Eddie Bartley, Board Member CNPS Yerba Buena Chapter

On behalf of all CNPS Yerba Buena Chapter board members

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March 7, 2017

Ms. Diane Wong, Environmental Coordinator
UCSF Campus Planning
Box 0286
San Francisco, CA 94143-0286
EIR@planning.UCSF.edu

Re: Scoping for Environmental Impact Report for the Vegetation Management Plan

Dear Ms. Diane Wong,

Thank you for the opportunity to comment on the scope of the EIR for the new Vegetation Management Plan as announced on the UCSF website. The Golden Gate Audubon Society is a non-profit organization with members in San Francisco and the East Bay. Golden Gate Audubon's mission is **to engage people to experience the wonder of birds and translate that wonder into action and to protect native bird populations and their habitats**.

We are a chapter of the National Audubon Society whose mission is **to conserve and restore natural ecosystems, focusing on birds, other wildlife, and their habitats for the benefit of humanity and the earth's biological diversity.**

In general, we support

- active stewardship of our local open spaces that have habitat value for native fauna and flora,
- opportunities to connect people with nature and our local natural heritage,
- best management practices for tree maintenance and weed management,
- science based policies and programs,
- and compliance with all Federal, State and Local laws and regulations.

Golden Gate Audubon appreciates and supports UCSF's long term, often frustrating, effort to manage the Mount Sutro Reserve, and we welcome this new effort. Mount Sutro Reserve is within the Pacific Flyway, a major migratory route for birds each spring and fall. Many birds from Alaska and Canada come to San Francisco to spend the winter. Other species migrate south in the winter but return in the summer to nest at Mt. Sutro. Some bird species are year round residents. All of these birds depend on this site as habitat within the City and many people visiting Mount Sutro hike the trails to see and hear these birds.

The health of the eucalyptus 'forest' that covers most of the Reserve has been declining for years, and the recent severe drought was particularly devastating to the condition of the trees.

The overview of the Vegetation Plan (2.3.1 in the scoping document) calls for 'increasing the biodiversity of vegetation, conserving existing native vegetation, improving the regeneration and recruitment of tall tree species, managing insect and disease pressure on blue gum eucalyptus, and improving structural diversity'. It also seeks to establish 'a mosaic of trees, shrubs and ground cover of different types, with gaps in the canopy that create patterns of sun and shade'. As stated, these changes would improve bird habitat in the Mount Sutro Reserve.

The Reserve currently has relatively low bird diversity for an open space of its size in San Francisco. The best comparison is Mount Davidson, which has a similar elevation and

microclimate, and an area of ~2/3 the size of Mount Sutro Reserve. A fraction of the Davidson peak was never planted with eucalyptus and remains coastal prairie. As of February 24, 2017, 80 bird species were documented in ebird on Mount Sutro. Ebird is Cornell University's citizen science database. The corresponding number for Mount Davidson was 175 species. Habitat diversity is not the only factor in the difference in the observed bird species diversity; however it is likely a major factor in this case. It is also likely important that much of that diversity is the remaining native vegetation on Mt Davidson. If the stated goals of the new management plan are carried out, bird diversity on Mount Sutro would certainly increase and might grow to rival Mount Davidson

The overview describes a plan for increasing biodiversity, but the details are not so optimistic. The only trees proposed for planting during Phase 1 are eucalyptus. The plan talks about native plant acreage increasing from 2 to 5 acres, but it is not clear what kind of acreage this refers to. The summit meadow is a 2- acre native plant bird oasis in the Reserve. Does the 2 acres refer to this or to the extensive mini plantings along trails instituted in recent years by the Sutro Stewards? Does the additional 3 acres proposed refer to additional meadow-like openings in the forest to be vegetated with native plants? If an increase of 3 acres is a total limit for the entire Reserve, it seems woefully inadequate, especially if it includes the trail-side plantings. Red Elderberry is widely disseminated, along with many other native plants that are adapted to the understory, in the forest. It is likely that this native plant community, with its insect predators, rather than the eucalyptus, is an important foundation for the current bird population. We urge you to allow planting of extensive native plant communities that include streamside, coastal scrub and meadow-like spaces. We also urge you to accelerate the planting diversity discussed in later phases of the management plan.

The current condition of the forest requires tree removal so extensive that road building and use of heavy equipment are discussed in the scoping document. Mitigation with respect to the breeding bird population for these activities is discussed beginning on pages 2-13. Golden Gate Audubon considers the breeding season to extend from January through August; February 15-August 15 is not a realistic estimate. We strongly advise that these highly disruptive activities in the reserve should be confined to the non-breeding season of September-December to the extent possible. If construction and tree removal must take place during the breeding season, stringent biological monitoring must be instituted. The mechanical and noise disruption is likely to be extremely stressful to birds; only very careful monitoring and shifting activities can hope to minimize the effects.

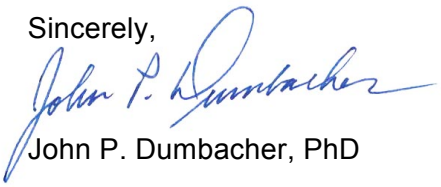
The scoping document recognizes that the management activities described the plan will have an impact on migrating birds. Migratory species include those that pass through, and also those for whom San Francisco is the winter destination. The breeding birds that remain here through the winter also need to be considered. The numbers of species in the Reserve reported to ebird during migration and during the winter is higher than during the summer. All of these populations need to be considered when accounting for the impact of vegetation removal and the construction activities required to carry it out.

The plan documents leaving 2-3 snags per acre for breeding birds; since at least four species that utilize snags are observed regularly in the reserve, and more species are observed occasionally, we advocate increasing that number wherever the tree is not a risk to humans or human built structures nor where the snag would contribute to fire hazards.

Golden Gate Audubon supports UCSF's management efforts in the Reserve, and advocates greater emphasis on the goals of the plan. We look forward to the EIR where the detailed description of mitigation policies for birds can be evaluated.

Please feel free to contact us regarding these comments.

Sincerely,



John P. Dumbacher, PhD

Golden Gate Audubon Society

Member, Board of Trustees and Chair of the San Francisco Conservation Committee

From: Jake Sigg
To: Campus Planning - EIR
Subject: Mt Sutro scoping comments
Date: Tuesday, March 7, 2017 6:31:02 PM

Brief biographical information:

I began gardening as an occupation in 1957, and have an unbroken record of 60 years experience. I know a lot about weeds.

1. For 15 years I was Invasive Exotics Chair for the statewide California Native Plant Society.
2. A founding member of the California Invasive Plant Council.
3. Have had all-expenses-paid trips to Washington D.C. by the USDA Agricultural Research Service for assistance in setting research priorities, and by the U.S. Fish & Wildlife Service in regard to release of biocontrol organisms on tamarisk or salt cedar, *Tamarix ramosissima*.
4. Served on Advisory Committee for UC Davis for establishing research priorities for federally-funded projects in agriculture and wildlands.
5. A founding member of the San Francisco Weed Management Area, and member of the San Mateo Weed Management Area for four years.
6. I recruit volunteers to work alongside San Francisco Recreation and Park Natural Areas Program volunteers every Wednesday ever since the Program's founding in 1997. Our volunteers average contributions are about 1,000 hours per year.

The University is aware of the desirability of promoting biodiversity. Two "decisions" (?) seem to have been made that work against this:

1. Replanting with Tasmanian blue gum or other eucalyptus species.

In spite of the very wet winter we are experiencing, projections of scientists is for the southwest United States to become increasingly drier, perhaps returning to its historic climate. The last 700-800 years have been abnormally moist. As we have seen, these behemoths are not suited to a long-time dry regime, and planting them may be a waste of resources—and do nothing for biodiversity.

2. Having a policy of not using herbicides. That is unrealistic, unless the University is willing to devote more resources to weed control than I think it is. Exotic species, such as ehrharta and oxalis, have no natural predators here, which gives them a tremendous competitive advantage. The native plants do not have a level playing field, and they proliferate faster than volunteers or paid staff can control them.

Strike while the iron's hot, and prevent further build-up of weed seedbank. If it once builds up beyond a critical point you will never be able to control it.

3. Leaving some trees standing, as well as lying on the ground to rot will greatly enhance both animal and plant diversity, even providing sustenance for species not currently present.

Jake Sigg
338 Ortega Street
San Francisco 94122
415-731-3028

From: apglk@comcast.net
To: Campus Planning - EIR
Subject: Mount Sutro Vegetation Management Plan
Date: Wednesday, March 8, 2017 4:15:27 PM

To whom it may concern:

I oppose the new Mount Sutro Open Space Reserve Vegetation Management Plan. The Plan will effectively destroy the forest on Mount Sutro.

As the Plan mentions, "by the turn of the 20th century the entire mountain was covered with trees and it became commonly known as Sutro Forest." It should remain a forest.
The Plan does not want the forest. The place is now called the Open Space Reserve. According to the Plan forest acreage will be reduced by a third, thousands of trees will be removed. The supportive ecosystem of the forest will be destroyed, and integrated forest will become just the group of isolated trees growing in a very challenging environment. Destruction of the intergrafted root system and the mycorrhizal connections, lack of moisture and increased wind will adversely impact the trees. All this will be worsened by the aggressive removal of the understory and midstory vegetation.

So many environmental crimes are committed in the name of "native" vegetation. "Native" is vegetation which might have been growing in that particular place approximately 250 years ago.
The plan calls for more than doubling the area for "native" plants - expanding it from the current 2 acres to 5 acres. This is unacceptable. We need to keep this historic forest as forest. We need trees. The trees sequester carbon and clear air pollution - grasslands cannot provide the same service. The current wildlife doesn't need the "native" restoration - which means the destruction of the current habitat - it will be harmed by it.

Please include long-term hillside destabilization in EIR assessment. Research shows this can take place years after the removal of vegetation - or immediately, if the weather conditions are conducive to landslides.

Tanks to the "native" restorations a mudslide had happened on Mt. Davidson last week. There are more to come.

Sincerely,
Anastasia Glikshtern

From: Patricia Greene
To: Campus Planning - EIR
Subject: Sutro EIR Scoping
Date: Wednesday, March 8, 2017 7:46:27 AM

Dear Ms. Wong,

I support the efforts by UCSF to manage the Mt. Sutro Reserve. I have been following these efforts since the demise of the last EIR.

I attended 2 of the 3 Technical Advisory Committee meetings (I was out of town for the 3rd) and the workshop. I was very excited by the recommendations of the committee, and these seem to be reflected in the goals of the Vegetation Management Plan as stated in the Overview in the EIR scoping document. However, the details of the plan seem to deviate from the goals in that native plant acreage is severely limited, and no species of tree other than eucaltypus is slated to be planted in the first phase.

I'm a neighbor, and I walk frequently on Mt Sutro trails. I am also a birder, and I lead bird walks on Mt. Sutro, sponsored by Golden Gate Audubon and listed in the Sutro Stewards calendar. I do this to introduce people to the Reserve and the need for management, not because Mt Sutro is an excellent birding site. In its current condition, the reserve has relatively low bird diversity--due mainly to it's relatively low plant diversity. I expect that bird diversity would improve greatly if the openings in the forest that the TAC members spoke about were included in the management plan, especially if these areas were planted with native plants that support native insects, and provide for a food chain that supports bird life. I urge you to accelerate the plant diversity referred to in later phases into the initial phase.

The trees in the reserve have suffered greatly from the recent drought, and by now many are dead and require removal. As discussed in the scoping document, this project is so large that road building and the use of heavy equipment are required. Golden Gate Audubon considers the breeding season to be longer than February 15-August 15. I urge you to accept their determination of Jan to Sep as a more realistic breeding season, and minimize highly disruptive activities in the reserve during this period to the extent possible.

The scoping document recognizes that the management activities described the plan will have an impact on migrating birds. Migratory species include those that pass through, and also those for whom San Francisco is the winter destination. Resident birds, that is those that live here through all seasons, also need to be considered.

Biological monitoring of all these populations of birds needs to be careful and stringent, and if disruption is found to be occurring, accommodation should be considered.

I look forward to the outcome of management in the reserve.

Yours,

Pat Greene

****

Patricia Greene
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San Francisco, CA
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Sutro Stewards
1128 Irving St.
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415-665-1077
www.sutrostewards.org

March 8, 2017

Diane Wong, Environmental Coordinator
UCSF Campus Planning, Box 0286
San Francisco, CA 94143-0286
EIR@planning.UCSF.edu

Re: Scoping for Environmental Impact Report for the Vegetation Management Plan

Dear Ms. Diane Wong,

Sutro Stewards works in partnership with UCSF to steward Mount Sutro Open Space Reserve (MSOSR) by working with approximately 1,000 volunteers annually to build and maintain trails, remove invasive plants, propagate native plants in the onsite nursery, and carry out habitat restoration by planting native species along trails and in Rotary Meadow.The goal of our work is to conserve extant native plant population on Mt. Sutro, restore native plant communities, and increase native biodiversity and habitat while providing quality recreational access for open space users.

Our comments are primarily regarding impacts to Biological Resources, and plants specifically. According to our recent surveys from August 2016, there are 18 acres of predominantly native plant understory (50% or greater) throughout the MSOSR, see attached map. The EIR needs to further study the impacts of implementing the Vegetation Management Plan on extant native plant communities, which we refer to as “conservation sites” as well as planted “restoration sites” throughout the open space. The 18 acres of understory dominated by native plant species that was surveyed also included the over 25 small trailside restoration sites that are maintained by Sutro Stewards with volunteers. This also includes the 2 acre native plant area, mentioned in the Vegetation Management Plan, that we assume refers to the Rotary Meadow sites only. As you can see on the map (attached) there are other areas throughout MSOSR that have predominantly native understorey, and potentially others that have yet to be surveyed, that contain locally rare and sensitive species that could be impacted in the implementation of the Vegetation Management Plan.

The current impacts on biological resources does not take into account impacts to all of the locally rare plants that occur in MSOSR. According to the criteria outlined in these documents (http://www.wood-biological.com/san-francisco-plant-checklist/locally-significant-plants-of-sf/). Mt. Sutro has several known **locally significant plant species**, ranked A2, and impacts to these plant species must be analyzed pursuant of CEQA. Further study is needed on impacts to these locally significant plants that grow on Mt. Sutro: *Maianthemum stellatum, Hieracium albiflorum,Triteleia laxa, Dichelostemma capitatum, Trillium* sp.*, Aristolochia californica, Grindelia* sp. *(G. hirsutula and G. stricta var. platyphylla), Salvia spathacea, Umbellularia californica, Prosartes hookeri,* and possibly two species of Carex that need further identification. Additionally, any impacts to Rotary meadow, the largest restoration site that is now over 10 years old and contains the biggest population of Grindelia sp., a CNPS listed plant, need to be further studied and addressed in the EIR.

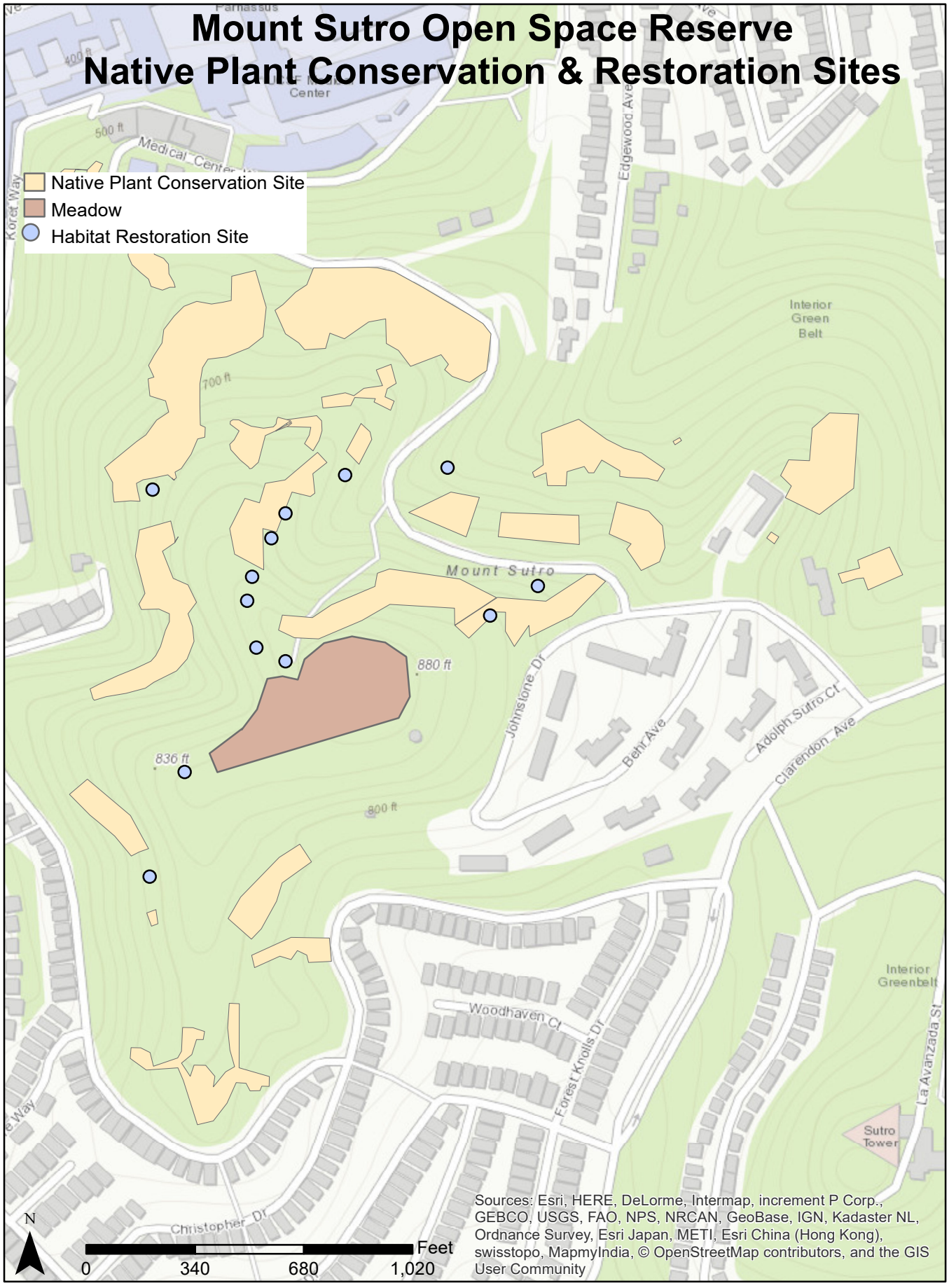
Another area that needs further study is impacts of wood chips or large amounts of tree debris that may be left with in the reserve after tree removal. Possible impacts to locally rare plants form leaving chips on site, from eucalyptus or other trees, need further study. Many of the local plant communities prefer the native soils, and do poorly when heavily mulched. This is something we have observed within our restoration sites.

Thank you for considering our comments.

Liza Kachko
Sutro Stewards Nursery Program Manager

Amy Kaeser
Sutro Stewards Conservation Program Manager

Mount Sutro Open Space Reserve
Native Plant Conservation & Restoration Sites



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

APPENDIX 4.2

Air Quality, Greenhouse Gases, and Carbon Sequestration Support Information

APPENDIX 4.2

Air Quality, Greenhouse Gases, and Carbon Sequestration Support Information

Criteria Air Pollutant and Greenhouse Gas Emission Assumptions and CalEEMod Outputs

Unmitigated Emissions Average Pounds Per Day (Grading and Forest Management Equipment Use)

Activity	ROG	NOx	CO	SO2	PM10	PM2.5
Grading	0.74	9.03	4.77	0.01	1.22	0.42
Forest Management	1.35	12.90	9.03	0.02	1.51	0.71
TOTAL	**2.09**	**21.93**	**13.80**	**0.03**	**2.73**	**1.13**

GHG Emissions

	Year 1	Year 1/2	Year 2/3	Year 3/4	Year 4/5	Year 5/6	Year 19/20	Year 20
	Phase I	Phase I	Phase I	Phase I	Phase I	Phase I/II	Phase III	Phase III
	2017	2018	2019	2020	2021	2022	2036	2037
	CO2e tons/year	**CO2e tons/year**	**CO2e tons/year**	**CO2e tons/year**	**CO2e tons/year**	**CO2e tons/year**	**CO2e tons/year**	**CO2e tons/year**
	22.17	11.66	0.00	0.00	0.00	0.00	0.00	0.00
	44.09	109.18	97.52	95.84	93.11	91.06	79.90	24.76
	66.26	**120.84**	**97.52**	**95.84**	**93.11**	**91.06**	**79.90**	**24.76**
Carbon Sequestration	0.00	-745.00	-765.00	-785.00	-806.00	-827.00	-1,156.00	-1,188.00
Carbon Stock/Update Removal	519.87	779.80	779.80	779.80	779.80	315.44	83.27	27.76
Chip Decomposition (On-Site)	103.97	155.96	155.96	155.96	155.96	63.09	16.65	5.55
Subtotal	*690.10*	*311.60*	*268.28*	*246.60*	*222.87*	*-357.41*	*-976.18*	*-1,129.94*
Chip Decomposition (Off-Site)	311.92	467.88	467.88	467.88	467.88	189.27	49.96	16.65
TOTAL	**1,002.02**	**779.48**	**736.16**	**714.48**	**690.75**	**-168.14**	**-926.22**	**-1,113.28**

Phase 1, Year 1 of 5

Forest Type	Acres
1	4.80
2	1.80
3	1.60
4	3.60
TOTAL	**11.80**

Assumptions
1/5 of total acreage for all Phase 1 activities

Grading

Area	acres
Expanded Trails	0.25
Landing Areas	1.00
TOTAL	**1.25**

Assumptions
5 crew members

Grader, excavator, and water truck, calculated in CalEEMod

Nov 1 2017 to Feb 1 2018
66 Days of Construction
3 landing areas need grading, 0.25 acre each

Tree Removal Phase I, Year 1

Parameter	Value	Units	Assumptions	Avg. hours per day
Size of Phase I activities	11.80	Acres	Year 1, assumed as area disturbed during tree removal	
Height	100.00	feet	Biology Report	
DBH	18.00	inches	conservative based on weighted averages provided by Matt Greene	
Tree Removal Volume	3568.40	cubic yard	Year 1	
Number of Trees	1622.00		Year 1	
Board feet International 1/4	1295978.00	bd ft	Up to 8" top	
Equipment Hours (Felling)	54.22	hours	Hours for 1 feller buncher	0.63
Equipment hours (chipping)	43.82	hours	Hours for 1 chipper	0.51
Equipment Hours (Skidding)	130.13	hours	Hours for 1 skidder	1.51
Days (Felling)	5.42	days	10 hour days	
Days (Skidding)	13.01	days	10 hour days	
Total working days	86.00	days	November 1 to February 28/ CalEEMod	
Total working hours	860.00	hours	10 hour days	
Chips Removed	2880.00	cubic yards	120 cubic yards removed per week for 24 weeks	
Total Removed	6448.40	cubic yards	chips and trees	

References
LSA 2011

Matt Greene 2017
Germain 2016

Not Used =

Tree Removal Equipment Phase I, Year 1

Equipment	Value	Units	Assumptions	CalEEMod Input
log truck	72	total one way trips		Haul Trips
Water truck	2	one way trips/day	1 water truck per day	Vendor Trips
Light Duty Automobile	70	one way trips/day	35 crew members	Worker Trips
Crane	1.51	hours/day	Skidding	Crane
D6 Tractor	1.51	hours/day	Skidding	Crawler Tractor
Feller Buncher	0.63	hours/day	Felling	Crawler Tractor
Masticator	0.63	hours/day	Felling	Excavator
Skidder	1.51	hours/day	Skidding	Off-Highway Tractor
Forwarder	1.51	hours/day	Skidding	Off-Highway Tractor
Backhoe	2.14	hours/day	Felling and Skidding	Tractors/Loaders/Backhoes
Excavator	2.14	hours/day	Felling and Skidding	Excavator
Chainsaw	2.14	hours/day	Felling and Pruning	10 hp Concrete/Industrial Saw
Stump Grinder	0.63	hours/day	Felling	20 hp Other General Industrial Equipment
Chipper	0.25	hours/day	Chipping	20 hp Other General Industrial Equipment
Tub grinder	0.25	hours/day	Chipping	700 hp Crawler Tractor
Medium Truck	3.00	hours/day	All Activities	Off-Highway Truck
Loader	2.14	hours/day	Felling and Skidding	Tractors/Loaders/Backhoes
Auger	0.25	hours/day	Planting	20 hp Other General Industrial Equipment

References
CalEEMod 2016.3.1

Phase 1, Year 2 of 5

Forest Type	Acres
1	4.80
2	1.80
3	1.60
4	3.60
TOTAL	**11.80**

Assumptions
1/5 of total acreage for all Phase 1 activities

Tree Removal Phase I, Year 2 (same as Years 3 - 10)

Parameter	Value	Units	Assumptions	Avg. hours per day
Size of Phase I activities	11.80	Acres	Year 2, assumed as area disturbed during tree removal	
Height	100.00	feet	Biology Report	
DBH	18.00	inches	conservative based on weighted averages provided by Matt Greene	
Tree Removal Volume	2427.92	cubic yard	Year 2	
Number of Trees	1103.60		Year 2	
Equipment Hours (Felling)	36.89	hours	Hours for 1 feller buncher	0.29
Equipment hours (chipping)	43.82	hours	Hours for 1 chipper	0.34
Equipment Hours (Skidding)	88.54	hours	Hours for 1 skidder	0.69
Days (Felling)	3.69	days	10 hour days	
Days (Skidding)	8.85	days	10 hour days	
Total working days	129.00	days	September 1 to February 28/ CalEEMod	
Total working hours	1290.00	hours	10 hour days	
Chips Removed	2880.00	cubic yards	120 cubic yards removed per week for 24 weeks	
Total Removed	5307.92	cubic yards	chips and trees	

References
LSA 2011
Matt Greene 2017

Germain 2016

Tree Removal Equipment Phase I, Year 2 (same as Years 3 - 10)

Equipment	Value	Units	Assumptions	CalEEMod Input
log truck	72	total one way trips		Haul Trips
Water truck	2	one way trips/day	1 water truck per day	Vendor Trips
Light Duty Automobile	70	one way trips/day	35 crew members	Worker Trips
Crane	0.69	hours/day	Skidding	Crane
D6 Tractor	0.69	hours/day	Skidding	Crawler Tractor
Feller Buncher	0.29	hours/day	Felling	Crawler Tractor
Masticator	0.29	hours/day	Felling	Excavator
Skidder	0.69	hours/day	Skidding	Off-Highway Tractor
Forwarder	0.69	hours/day	Skidding	Off-Highway Tractor
Backhoe	0.97	hours/day	Felling and Skidding	Tractors/Loaders/Backhoes
Excavator	0.97	hours/day	Felling and Skidding	Excavator
Chainsaw	0.97	hours/day	Felling and Pruning	10 hp Concrete/Industrial Saw
Stump Grinder	0.29	hours/day	Felling	20 hp Other General Industrial Equipment
Chipper	0.17	hours/day	Chipping	20 hp Other General Industrial Equipment
Tub grinder	0.17	hours/day	Chipping	700 hp Crawler Tractor
Medium Truck	3.00	hours/day	All Activities	Off-Highway Truck
Loader	0.97	hours/day	Felling and Skidding	Tractors/Loaders/Backhoes
Auger	0.17	hours/day	Planting	20 hp Other General Industrial Equipment

References
CalEEMod 2016.3.1

Phase 1, Year 2 of 5

Forest Type	Acres
1	2.40
2	0.90
3	0.80
4	1.80
TOTAL	**5.90**

Assumptions
1/5 of total acreage for all Phase 1 activities

Tree Removal Phase III, Year 11 (same as Years 12 - 20)

Parameter	Value	Units	Assumptions	Avg. hours per day
Size of Phase I activities	5.90	Acres	Year 11, assumed as area disturbed during tree removal	
Height	100.00	feet	Biology Report	
DBH	18.00	inches	conservative based on weighted averages provided by Matt Greene	
Tree Removal Volume	1213.96	cubic yard	Year 11	
Number of Trees	551.80		Year 11	
Equipment Hours (Felling)	18.45	hours	Hours for 1 feller buncher	0.14
Equipment hours (chipping)	43.82	hours	Hours for 1 chipper	0.34
Equipment Hours (Skidding)	44.27	hours	Hours for 1 skidder	0.34
Days (Felling)	1.84	days	10 hour days	
Days (Skidding)	4.43	days	10 hour days	
Total working days	129.00	days	September 1 to February 28/ CalEEMod	
Total working hours	1290.00	hours	10 hour days	
Chips Removed	2880.00	cubic yards	120 cubic yards removed per week for 24 weeks	
Total Removed	4093.96	cubic yards	chips and trees	

References
LSA 2011
Matt Greene 2017

Germain 2016

Tree Removal Equipment Phase I, Year 2 (same as Year 11)

Equipment	Value	Units	Assumptions	CalEEMod Input
log truck	72	total one way trips		Haul Trips
Water truck	2	one way trips/day	1 water truck per day	Vendor Trips
Light Duty Automobile	70	one way trips/day	35 crew members	Worker Trips
Crane	0.34	hours/day	Skidding	Crane
D6 Tractor	0.34	hours/day	Skidding	Crawler Tractor
Feller Buncher	0.14	hours/day	Felling	Crawler Tractor
Masticator	0.14	hours/day	Felling	Excavator
Skidder	0.34	hours/day	Skidding	Off-Highway Tractor
Forwarder	0.34	hours/day	Skidding	Off-Highway Tractor
Backhoe	0.49	hours/day	Felling and Skidding	Tractors/Loaders/Backhoes
Excavator	0.49	hours/day	Felling and Skidding	Excavator
Chainsaw	0.49	hours/day	Felling and Pruning	10 hp Concrete/Industrial Saw
Stump Grinder	0.14	hours/day	Felling	20 hp Other General Industrial Equipment
Chipper	0.17	hours/day	Chipping	20 hp Other General Industrial Equipment
Tub grinder	0.17	hours/day	Chipping	700 hp Crawler Tractor
Medium Truck	3.00	hours/day	All Activities	Off-Highway Truck
Loader	0.49	hours/day	Felling and Skidding	Tractors/Loaders/Backhoes
Auger	0.17	hours/day	Planting	20 hp Other General Industrial Equipment

References
CalEEMod 2016.3.1

Germain (Harvest 2)	Original Metric	Cubic yards		Chips
sawlogs (board feet)	3,000	9.26		
Pulpwood (tons)	100	164.32	Assumes wood density of 49.69 lb/ft3	
Chips (tons)	60	98.59	Assumes wood density of 49.69 lb/ft3	
Firewood (cords)	12	56.89		
		329.06	per day	
		7897.44	total (24 days)	2366.16
Sutro				
Cubic yard per tree		2.2	Assumes 18" trees up to 4" top	
Total removed Year 1		3568		2880.00
Total removed Year 2-10		2427.92		
Total removed Year 11-20		1213.96		
Ratio of Germain harvest Year 1		0.4518		1.2172

Mount Sutro Project Grading

San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	1.00	Acre	1.25	43,560.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	4.6	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2019
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 - Nov 1 2017 start

Land Use - 1.25 acres grading

Construction Phase - Sept 1 to Dec 1 2017

Off-road Equipment - 1 grader, 10 hours a day

Off-road Equipment - grader (1) 6 hours a day, excavator (1) 7 hours a day

Trips and VMT - 5 crew members: 10 one way trips a day, 1 water truck: 2 one way trips a day

Grading - defaulted 1.5 acre graded, no cut/fill

Road Dust -

Energy Use -

Construction Off-road Equipment Mitigation - water 2x per day

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblLandUse	LotAcreage	1.00	1.25
tblOffRoadEquipment	HorsePower	247.00	0.00
tblOffRoadEquipment	HorsePower	97.00	0.00
tblOffRoadEquipment	LoadFactor	0.40	0.00
tblOffRoadEquipment	LoadFactor	0.37	0.00
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblProjectCharacteristics	OperationalYear	2018	2019
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	5.00	10.00

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					
2017	0.0164	0.2017	0.1035	2.4000e-004	0.0151	7.6400e-003	0.0227	1.9500e-003	7.0300e-003	8.9800e-003	0.0000	22.0188	22.0188	6.0400e-003	0.0000	22.1699
2018	7.9300e-003	0.0964	0.0538	1.3000e-004	0.0142	3.5500e-003	0.0177	1.7000e-003	3.2600e-003	4.9700e-003	0.0000	11.5800	11.5800	3.2300e-003	0.0000	11.6607
Maximum	**0.0164**	**0.2017**	**0.1035**	**2.4000e-004**	**0.0151**	**7.6400e-003**	**0.0227**	**1.9500e-003**	**7.0300e-003**	**8.9800e-003**	**0.0000**	**22.0188**	**22.0188**	**6.0400e-003**	**0.0000**	**22.1699**

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					
2017	0.0164	0.2017	0.1035	2.4000e-004	7.8900e-003	7.6400e-003	0.0155	1.1700e-003	7.0300e-003	8.2000e-003	0.0000	22.0188	22.0188	6.0400e-003	0.0000	22.1698
2018	7.9300e-003	0.0964	0.0538	1.3000e-004	6.9600e-003	3.5500e-003	0.0105	9.2000e-004	3.2600e-003	4.1900e-003	0.0000	11.5799	11.5799	3.2300e-003	0.0000	11.6606
Maximum	**0.0164**	**0.2017**	**0.1035**	**2.4000e-004**	**7.8900e-003**	**7.6400e-003**	**0.0155**	**1.1700e-003**	**7.0300e-003**	**8.2000e-003**	**0.0000**	**22.0188**	**22.0188**	**6.0400e-003**	**0.0000**	**22.1698**

	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**	**49.28**	**0.00**	**35.66**	**42.74**	**0.00**	**11.18**	**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	11-1-2017	1-31-2018	0.3217	0.3217
		Highest	0.3217	0.3217

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	3.7300e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.7300e-003**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

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	3.7300e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.7300e-003**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

	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	Grading	Grading	11/1/2017	1/31/2018	5	4	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 1.5

Acres of Paving: 1.25

Residential Indoor: 0; Residential Outdoor: 0; 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
Grading	Excavators	1	7.00	158	0.38
Grading	Graders	1	6.00	187	0.41
Grading	Rubber Tired Dozers	0	0.00	0	0.00
Grading	Tractors/Loaders/Backhoes	0	0.00	0	0.00

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
Grading	2	10.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Clean Paved Roads

3.2 Grading - 2017

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					0.0131	0.0000	0.0131	1.4200e-003	0.0000	1.4200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0153	0.1945	0.0947	2.1000e-004		7.5700e-003	7.5700e-003		6.9700e-003	6.9700e-003	0.0000	19.0200	19.0200	5.8300e-003	0.0000	19.1657
Total	**0.0153**	**0.1945**	**0.0947**	**2.1000e-004**	**0.0131**	**7.5700e-003**	**0.0207**	**1.4200e-003**	**6.9700e-003**	**8.3900e-003**	**0.0000**	**19.0200**	**19.0200**	**5.8300e-003**	**0.0000**	**19.1657**

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	2.6000e-004	6.5800e-003	2.2100e-003	1.0000e-005	2.8000e-004	5.0000e-005	3.4000e-004	8.0000e-005	5.0000e-005	1.3000e-004	0.0000	1.2261	1.2261	1.6000e-004	0.0000	1.2302
Worker	8.5000e-004	6.3000e-004	6.5600e-003	2.0000e-005	1.7000e-003	1.0000e-005	1.7100e-003	4.5000e-004	1.0000e-005	4.6000e-004	0.0000	1.7728	1.7728	5.0000e-005	0.0000	1.7740
Total	**1.1100e-003**	**7.2100e-003**	**8.7700e-003**	**3.0000e-005**	**1.9800e-003**	**6.0000e-005**	**2.0500e-003**	**5.3000e-004**	**6.0000e-005**	**5.9000e-004**	**0.0000**	**2.9988**	**2.9988**	**2.1000e-004**	**0.0000**	**3.0042**

3.2 Grading - 2017

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					5.9100e-003	0.0000	5.9100e-003	6.4000e-004	0.0000	6.4000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0153	0.1945	0.0947	2.1000e-004		7.5700e-003	7.5700e-003		6.9700e-003	6.9700e-003	0.0000	19.0200	19.0200	5.8300e-003	0.0000	19.1657
Total	**0.0153**	**0.1945**	**0.0947**	**2.1000e-004**	**5.9100e-003**	**7.5700e-003**	**0.0135**	**6.4000e-004**	**6.9700e-003**	**7.6100e-003**	**0.0000**	**19.0200**	**19.0200**	**5.8300e-003**	**0.0000**	**19.1657**

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	2.6000e-004	6.5800e-003	2.2100e-003	1.0000e-005	2.8000e-004	5.0000e-005	3.4000e-004	8.0000e-005	5.0000e-005	1.3000e-004	0.0000	1.2261	1.2261	1.6000e-004	0.0000	1.2302
Worker	8.5000e-004	6.3000e-004	6.5600e-003	2.0000e-005	1.7000e-003	1.0000e-005	1.7100e-003	4.5000e-004	1.0000e-005	4.6000e-004	0.0000	1.7728	1.7728	5.0000e-005	0.0000	1.7740
Total	**1.1100e-003**	**7.2100e-003**	**8.7700e-003**	**3.0000e-005**	**1.9800e-003**	**6.0000e-005**	**2.0500e-003**	**5.3000e-004**	**6.0000e-005**	**5.9000e-004**	**0.0000**	**2.9988**	**2.9988**	**2.1000e-004**	**0.0000**	**3.0042**

3.2 Grading - 2018

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					0.0131	0.0000	0.0131	1.4200e-003	0.0000	1.4200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.4100e-003	0.0928	0.0496	1.1000e-004		3.5200e-003	3.5200e-003		3.2400e-003	3.2400e-003	0.0000	10.0087	10.0087	3.1200e-003	0.0000	10.0866
Total	**7.4100e-003**	**0.0928**	**0.0496**	**1.1000e-004**	**0.0131**	**3.5200e-003**	**0.0166**	**1.4200e-003**	**3.2400e-003**	**4.6600e-003**	**0.0000**	**10.0087**	**10.0087**	**3.1200e-003**	**0.0000**	**10.0866**

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	1.1000e-004	3.3100e-003	9.8000e-004	1.0000e-005	1.5000e-004	2.0000e-005	1.7000e-004	4.0000e-005	2.0000e-005	7.0000e-005	0.0000	0.6507	0.6507	9.0000e-005	0.0000	0.6529
Worker	4.1000e-004	2.9000e-004	3.1400e-003	1.0000e-005	9.1000e-004	1.0000e-005	9.2000e-004	2.4000e-004	1.0000e-005	2.5000e-004	0.0000	0.9206	0.9206	2.0000e-005	0.0000	0.9212
Total	**5.2000e-004**	**3.6000e-003**	**4.1200e-003**	**2.0000e-005**	**1.0600e-003**	**3.0000e-005**	**1.0900e-003**	**2.8000e-004**	**3.0000e-005**	**3.2000e-004**	**0.0000**	**1.5713**	**1.5713**	**1.1000e-004**	**0.0000**	**1.5741**

3.2 Grading - 2018

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					5.9100e-003	0.0000	5.9100e-003	6.4000e-004	0.0000	6.4000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.4100e-003	0.0928	0.0496	1.1000e-004		3.5200e-003	3.5200e-003		3.2400e-003	3.2400e-003	0.0000	10.0087	10.0087	3.1200e-003	0.0000	10.0865
Total	**7.4100e-003**	**0.0928**	**0.0496**	**1.1000e-004**	**5.9100e-003**	**3.5200e-003**	**9.4300e-003**	**6.4000e-004**	**3.2400e-003**	**3.8800e-003**	**0.0000**	**10.0087**	**10.0087**	**3.1200e-003**	**0.0000**	**10.0865**

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	1.1000e-004	3.3100e-003	9.8000e-004	1.0000e-005	1.5000e-004	2.0000e-005	1.7000e-004	4.0000e-005	2.0000e-005	7.0000e-005	0.0000	0.6507	0.6507	9.0000e-005	0.0000	0.6529
Worker	4.1000e-004	2.9000e-004	3.1400e-003	1.0000e-005	9.1000e-004	1.0000e-005	9.2000e-004	2.4000e-004	1.0000e-005	2.5000e-004	0.0000	0.9206	0.9206	2.0000e-005	0.0000	0.9212
Total	**5.2000e-004**	**3.6000e-003**	**4.1200e-003**	**2.0000e-005**	**1.0600e-003**	**3.0000e-005**	**1.0900e-003**	**2.8000e-004**	**3.0000e-005**	**3.2000e-004**	**0.0000**	**1.5713**	**1.5713**	**1.1000e-004**	**0.0000**	**1.5741**

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	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
Unmitigated	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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.607141	0.042057	0.190386	0.086590	0.015934	0.004793	0.026379	0.008601	0.004262	0.005315	0.007178	0.000921	0.000443

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	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	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
NaturalGas Unmitigated	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

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					
Other Non-Asphalt Surfaces	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
Total		**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**

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	3.7300e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	3.7300e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

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	9.1000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.8200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**3.7300e-003**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

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	9.1000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.8200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**3.7300e-003**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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

Mount Sutro Forest Management

San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	11.80	Acre	11.80	514,008.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	4.6	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2019
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 - Start Nov 1 2017

Land Use - 11.8 acres

Construction Phase - Nov 1 2017 to Feb 28 2018, 86 days grading

Off-road Equipment - See spreadsheet

Off-road Equipment - See spreadsheet

Trips and VMT - 35 workers: 70 one way trips a day, 1 water truck a day (vendor): 2 one way trips a day, 72 one-way haul trucks total

Grading - 6,448 cubic yards export, see spreadsheet, default acres of disturbance (i.e., tree removal activites)

Energy Use -

Construction Off-road Equipment Mitigation - water 2x

Mount Sutro Forest Management - San Francisco County, Annual

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstructionPhase	NumDays	30.00	86.00
tblGrading	MaterialExported	0.00	6,448.00
tblOffRoadEquipment	HorsePower	187.00	0.00
tblOffRoadEquipment	HorsePower	247.00	0.00
tblOffRoadEquipment	HorsePower	367.00	0.00
tblOffRoadEquipment	HorsePower	81.00	10.00
tblOffRoadEquipment	HorsePower	212.00	700.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	LoadFactor	0.41	0.00
tblOffRoadEquipment	LoadFactor	0.40	0.00
tblOffRoadEquipment	LoadFactor	0.48	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.60
tblOffRoadEquipment	UsageHours	8.00	2.10
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	2.10
tblProjectCharacteristics	OperationalYear	2018	2019
tblTripsAndVMT	HaulingTripNumber	806.00	72.00

tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	38.00	70.00

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					
2017	0.0308	0.2971	0.2009	4.7000e-004	0.0205	0.0130	0.0335	4.2700e-003	0.0120	0.0162	0.0000	43.8540	43.8540	9.5400e-003	0.0000	44.0924
2018	0.0272	0.2575	0.1874	4.7000e-004	0.0205	0.0109	0.0314	4.2700e-003	0.0101	0.0143	0.0000	43.0009	43.0009	9.5000e-003	0.0000	43.2384
Maximum	**0.0308**	**0.2971**	**0.2009**	**4.7000e-004**	**0.0205**	**0.0130**	**0.0335**	**4.2700e-003**	**0.0120**	**0.0162**	**0.0000**	**43.8540**	**43.8540**	**9.5400e-003**	**0.0000**	**44.0924**

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					
2017	0.0308	0.2971	0.2009	4.7000e-004	0.0162	0.0130	0.0292	3.7800e-003	0.0120	0.0157	0.0000	43.8540	43.8540	9.5400e-003	0.0000	44.0924
2018	0.0272	0.2575	0.1874	4.7000e-004	0.0162	0.0109	0.0272	3.7800e-003	0.0101	0.0139	0.0000	43.0009	43.0009	9.5000e-003	0.0000	43.2384
Maximum	**0.0308**	**0.2971**	**0.2009**	**4.7000e-004**	**0.0162**	**0.0130**	**0.0292**	**3.7800e-003**	**0.0120**	**0.0157**	**0.0000**	**43.8540**	**43.8540**	**9.5400e-003**	**0.0000**	**44.0924**

	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**	**20.89**	**0.00**	**13.20**	**11.48**	**0.00**	**3.17**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Mount Sutro Forest Management - San Francisco County, Annual

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	11-1-2017	1-31-2018	0.4805	0.4805
2	2-1-2018	4-30-2018	0.1328	0.1328
		Highest	0.4805	0.4805

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

	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	Grading	Grading	11/1/2017	2/28/2018	5	86	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 12.9

Acres of Paving: 11.8

Residential Indoor: 0; Residential Outdoor: 0; 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
Grading	Concrete/Industrial Saws	1	2.10	10	0.73
Grading	Cranes	1	1.50	231	0.29
Grading	Crawler Tractors	1	1.50	212	0.43
Grading	Crawler Tractors	1	0.60	212	0.43
Grading	Crawler Tractors	1	0.30	700	0.43
Grading	Excavators	1	0.60	158	0.38
Grading	Excavators	1	2.10	158	0.38
Grading	Graders	0	0.00	0	0.00
Grading	Off-Highway Tractors	2	1.50	124	0.44
Grading	Off-Highway Trucks	1	3.00	402	0.38
Grading	Other General Industrial Equipment	1	0.60	20	0.34
Grading	Other General Industrial Equipment	2	0.30	20	0.34
Grading	Rubber Tired Dozers	0	0.00	0	0.00
Grading	Scrapers	0	0.00	0	0.00
Grading	Tractors/Loaders/Backhoes	2	2.10	97	0.37

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
Grading	15	70.00	2.00	72.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2017

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					7.7900e-003	0.0000	7.7900e-003	8.8000e-004	0.0000	8.8000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0244	0.2784	0.1506	3.1000e-004		0.0128	0.0128		0.0118	0.0118	0.0000	28.5342	28.5342	8.7400e-003	0.0000	28.7528
Total	**0.0244**	**0.2784**	**0.1506**	**3.1000e-004**	**7.7900e-003**	**0.0128**	**0.0206**	**8.8000e-004**	**0.0118**	**0.0127**	**0.0000**	**28.5342**	**28.5342**	**8.7400e-003**	**0.0000**	**28.7528**

3.2 Grading - 2017

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	2.2000e-004	7.7900e-003	2.1900e-003	2.0000e-005	5.3000e-004	4.0000e-005	5.7000e-004	1.4000e-004	4.0000e-005	1.8000e-004	0.0000	1.6844	1.6844	2.8000e-004	0.0000	1.6913
Vendor	2.6000e-004	6.5800e-003	2.2100e-003	1.0000e-005	2.8000e-004	5.0000e-005	3.4000e-004	8.0000e-005	5.0000e-005	1.3000e-004	0.0000	1.2261	1.2261	1.6000e-004	0.0000	1.2302
Worker	5.9200e-003	4.3800e-003	0.0460	1.4000e-004	0.0119	9.0000e-005	0.0120	3.1600e-003	8.0000e-005	3.2500e-003	0.0000	12.4093	12.4093	3.5000e-004	0.0000	12.4182
Total	**6.4000e-003**	**0.0188**	**0.0504**	**1.7000e-004**	**0.0127**	**1.8000e-004**	**0.0129**	**3.3800e-003**	**1.7000e-004**	**3.5600e-003**	**0.0000**	**15.3198**	**15.3198**	**7.9000e-004**	**0.0000**	**15.3396**

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					3.5100e-003	0.0000	3.5100e-003	4.0000e-004	0.0000	4.0000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0244	0.2784	0.1506	3.1000e-004		0.0128	0.0128		0.0118	0.0118	0.0000	28.5342	28.5342	8.7400e-003	0.0000	28.7527
Total	**0.0244**	**0.2784**	**0.1506**	**3.1000e-004**	**3.5100e-003**	**0.0128**	**0.0163**	**4.0000e-004**	**0.0118**	**0.0122**	**0.0000**	**28.5342**	**28.5342**	**8.7400e-003**	**0.0000**	**28.7527**

3.2 Grading - 2017

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	2.2000e-004	7.7900e-003	2.1900e-003	2.0000e-005	5.3000e-004	4.0000e-005	5.7000e-004	1.4000e-004	4.0000e-005	1.8000e-004	0.0000	1.6844	1.6844	2.8000e-004	0.0000	1.6913
Vendor	2.6000e-004	6.5800e-003	2.2100e-003	1.0000e-005	2.8000e-004	5.0000e-005	3.4000e-004	8.0000e-005	5.0000e-005	1.3000e-004	0.0000	1.2261	1.2261	1.6000e-004	0.0000	1.2302
Worker	5.9200e-003	4.3800e-003	0.0460	1.4000e-004	0.0119	9.0000e-005	0.0120	3.1600e-003	8.0000e-005	3.2500e-003	0.0000	12.4093	12.4093	3.5000e-004	0.0000	12.4182
Total	**6.4000e-003**	**0.0188**	**0.0504**	**1.7000e-004**	**0.0127**	**1.8000e-004**	**0.0129**	**3.3800e-003**	**1.7000e-004**	**3.5600e-003**	**0.0000**	**15.3198**	**15.3198**	**7.9000e-004**	**0.0000**	**15.3396**

3.2 Grading - 2018

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					7.7900e-003	0.0000	7.7900e-003	8.8000e-004	0.0000	8.8000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0214	0.2402	0.1426	3.1000e-004		0.0108	0.0108		9.9100e-003	9.9100e-003	0.0000	28.0755	28.0755	8.7400e-003	0.0000	28.2940
Total	**0.0214**	**0.2402**	**0.1426**	**3.1000e-004**	**7.7900e-003**	**0.0108**	**0.0186**	**8.8000e-004**	**9.9100e-003**	**0.0108**	**0.0000**	**28.0755**	**28.0755**	**8.7400e-003**	**0.0000**	**28.2940**

3.2 Grading - 2018

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	1.7000e-004	7.1900e-003	1.8500e-003	2.0000e-005	5.3000e-004	3.0000e-005	5.6000e-004	1.4000e-004	3.0000e-005	1.7000e-004	0.0000	1.6606	1.6606	2.8000e-004	0.0000	1.6677
Vendor	2.1000e-004	6.2000e-003	1.8200e-003	1.0000e-005	2.8000e-004	4.0000e-005	3.2000e-004	8.0000e-005	4.0000e-005	1.2000e-004	0.0000	1.2165	1.2165	1.6000e-004	0.0000	1.2206
Worker	5.3800e-003	3.8600e-003	0.0411	1.3000e-004	0.0119	9.0000e-005	0.0120	3.1600e-003	8.0000e-005	3.2500e-003	0.0000	12.0483	12.0483	3.1000e-004	0.0000	12.0562
Total	**5.7600e-003**	**0.0173**	**0.0448**	**1.6000e-004**	**0.0127**	**1.6000e-004**	**0.0129**	**3.3800e-003**	**1.5000e-004**	**3.5400e-003**	**0.0000**	**14.9254**	**14.9254**	**7.5000e-004**	**0.0000**	**14.9444**

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					3.5100e-003	0.0000	3.5100e-003	4.0000e-004	0.0000	4.0000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0214	0.2402	0.1426	3.1000e-004		0.0108	0.0108		9.9100e-003	9.9100e-003	0.0000	28.0755	28.0755	8.7400e-003	0.0000	28.2940
Total	**0.0214**	**0.2402**	**0.1426**	**3.1000e-004**	**3.5100e-003**	**0.0108**	**0.0143**	**4.0000e-004**	**9.9100e-003**	**0.0103**	**0.0000**	**28.0755**	**28.0755**	**8.7400e-003**	**0.0000**	**28.2940**

3.2 Grading - 2018

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	1.7000e-004	7.1900e-003	1.8500e-003	2.0000e-005	5.3000e-004	3.0000e-005	5.6000e-004	1.4000e-004	3.0000e-005	1.7000e-004	0.0000	1.6606	1.6606	2.8000e-004	0.0000	1.6677
Vendor	2.1000e-004	6.2000e-003	1.8200e-003	1.0000e-005	2.8000e-004	4.0000e-005	3.2000e-004	8.0000e-005	4.0000e-005	1.2000e-004	0.0000	1.2165	1.2165	1.6000e-004	0.0000	1.2206
Worker	5.3800e-003	3.8600e-003	0.0411	1.3000e-004	0.0119	9.0000e-005	0.0120	3.1600e-003	8.0000e-005	3.2500e-003	0.0000	12.0483	12.0483	3.1000e-004	0.0000	12.0562
Total	**5.7600e-003**	**0.0173**	**0.0448**	**1.6000e-004**	**0.0127**	**1.6000e-004**	**0.0129**	**3.3800e-003**	**1.5000e-004**	**3.5400e-003**	**0.0000**	**14.9254**	**14.9254**	**7.5000e-004**	**0.0000**	**14.9444**

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	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
Unmitigated	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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.607141	0.042057	0.190386	0.086590	0.015934	0.004793	0.026379	0.008601	0.004262	0.005315	0.007178	0.000921	0.000443

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	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	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
NaturalGas Unmitigated	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

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.2 Energy by Land Use - NaturalGas

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004
Unmitigated	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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

Mount Sutro Forest Management

San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	11.80	Acre	11.80	514,008.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	4.6	**Precipitation Freq (Days)**	64
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 - Start Sept 3 2018

Land Use - 11.8 acres

Construction Phase - Sept 3 2018 to Feb 28 2019, 129 days grading

Off-road Equipment - See spreadsheet

Off-road Equipment - See spreadsheet

Trips and VMT - 35 workers: 70 one way trips a day, 1 water truck a day (vendor): 2 one way trips a day, 72 one-way haul trucks total

Grading - 2,428 cubic yards export, see spreadsheet, default acres of disturbance (i.e., tree removal activites)

Energy Use -

Construction Off-road Equipment Mitigation - water 2x

Mount Sutro Forest Management - San Francisco County, Annual

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstructionPhase	NumDays	30.00	129.00
tblGrading	AcresOfGrading	9.27	12.90
tblGrading	MaterialExported	0.00	2,427.92
tblOffRoadEquipment	HorsePower	187.00	0.00
tblOffRoadEquipment	HorsePower	247.00	0.00
tblOffRoadEquipment	HorsePower	367.00	0.00
tblOffRoadEquipment	HorsePower	81.00	10.00
tblOffRoadEquipment	HorsePower	212.00	700.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	LoadFactor	0.41	0.00
tblOffRoadEquipment	LoadFactor	0.40	0.00
tblOffRoadEquipment	LoadFactor	0.48	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.29
tblOffRoadEquipment	UsageHours	8.00	0.97
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.97
tblProjectCharacteristics	OperationalYear	2018	2020

tblTripsAndVMT	HaulingTripNumber	303.00	72.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	38.00	70.00

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					
2018	0.0383	0.3280	0.2583	7.2000e-004	0.0321	0.0131	0.0452	7.4300e-003	0.0120	0.0195	0.0000	65.6199	65.6199	0.0128	0.0000	65.9402
2019	0.0175	0.1458	0.1223	3.5000e-004	0.0199	5.7100e-003	0.0256	4.1700e-003	5.2600e-003	9.4200e-003	0.0000	32.1036	32.1036	6.3700e-003	0.0000	32.2628
Maximum	**0.0383**	**0.3280**	**0.2583**	**7.2000e-004**	**0.0321**	**0.0131**	**0.0452**	**7.4300e-003**	**0.0120**	**0.0195**	**0.0000**	**65.6199**	**65.6199**	**0.0128**	**0.0000**	**65.9402**

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					
2018	0.0383	0.3280	0.2583	7.2000e-004	0.0281	0.0131	0.0412	6.9900e-003	0.0120	0.0190	0.0000	65.6198	65.6198	0.0128	0.0000	65.9401
2019	0.0175	0.1458	0.1223	3.5000e-004	0.0159	5.7100e-003	0.0216	3.7300e-003	5.2600e-003	8.9900e-003	0.0000	32.1036	32.1036	6.3700e-003	0.0000	32.2628
Maximum	**0.0383**	**0.3280**	**0.2583**	**7.2000e-004**	**0.0281**	**0.0131**	**0.0412**	**6.9900e-003**	**0.0120**	**0.0190**	**0.0000**	**65.6198**	**65.6198**	**0.0128**	**0.0000**	**65.9401**

	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**	**15.24**	**0.00**	**11.19**	**7.59**	**0.00**	**2.98**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Mount Sutro Forest Management - San Francisco County, Annual

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	9-3-2018	12-2-2018	0.2775	0.2775
2	12-3-2018	3-2-2019	0.2496	0.2496
		Highest	0.2775	0.2775

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

	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	Grading	Grading	9/3/2018	2/28/2019	5	129	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 12.9

Acres of Paving: 11.8

Residential Indoor: 0; Residential Outdoor: 0; 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
Grading	Concrete/Industrial Saws	1	0.97	10	0.73
Grading	Cranes	1	0.69	231	0.29
Grading	Crawler Tractors	1	0.69	212	0.43
Grading	Crawler Tractors	1	0.29	212	0.43
Grading	Crawler Tractors	1	0.17	700	0.43
Grading	Excavators	1	0.29	158	0.38
Grading	Excavators	1	0.97	158	0.38
Grading	Graders	0	0.00	0	0.00
Grading	Off-Highway Tractors	2	0.69	124	0.44
Grading	Off-Highway Trucks	1	3.00	402	0.38
Grading	Other General Industrial Equipment	1	0.29	20	0.34
Grading	Other General Industrial Equipment	2	0.17	20	0.34
Grading	Rubber Tired Dozers	0	0.00	0	0.00
Grading	Scrapers	0	0.00	0	0.00
Grading	Tractors/Loaders/Backhoes	2	0.97	97	0.37

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
Grading	15	70.00	2.00	72.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2018

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					7.2000e-003	0.0000	7.2000e-003	7.9000e-004	0.0000	7.9000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0268	0.2983	0.1700	4.0000e-004		0.0128	0.0128		0.0117	0.0117	0.0000	36.8762	36.8762	0.0115	0.0000	37.1632
Total	**0.0268**	**0.2983**	**0.1700**	**4.0000e-004**	**7.2000e-003**	**0.0128**	**0.0200**	**7.9000e-004**	**0.0117**	**0.0125**	**0.0000**	**36.8762**	**36.8762**	**0.0115**	**0.0000**	**37.1632**

3.2 Grading - 2018

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	2.3000e-004	9.5900e-003	2.4600e-003	2.0000e-005	5.5000e-004	4.0000e-005	5.9000e-004	1.5000e-004	4.0000e-005	1.8000e-004	0.0000	2.2141	2.2141	3.8000e-004	0.0000	2.2235
Vendor	4.3000e-004	0.0124	3.6500e-003	2.0000e-005	5.6000e-004	8.0000e-005	6.5000e-004	1.6000e-004	8.0000e-005	2.4000e-004	0.0000	2.4329	2.4329	3.3000e-004	0.0000	2.4411
Worker	0.0108	7.7100e-003	0.0822	2.7000e-004	0.0238	1.8000e-004	0.0240	6.3300e-003	1.7000e-004	6.5000e-003	0.0000	24.0967	24.0967	6.3000e-004	0.0000	24.1123
Total	**0.0114**	**0.0297**	**0.0883**	**3.1000e-004**	**0.0249**	**3.0000e-004**	**0.0252**	**6.6400e-003**	**2.9000e-004**	**6.9200e-003**	**0.0000**	**28.7437**	**28.7437**	**1.3400e-003**	**0.0000**	**28.7770**

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					3.2400e-003	0.0000	3.2400e-003	3.6000e-004	0.0000	3.6000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0268	0.2983	0.1700	4.0000e-004		0.0128	0.0128		0.0117	0.0117	0.0000	36.8761	36.8761	0.0115	0.0000	37.1631
Total	**0.0268**	**0.2983**	**0.1700**	**4.0000e-004**	**3.2400e-003**	**0.0128**	**0.0160**	**3.6000e-004**	**0.0117**	**0.0121**	**0.0000**	**36.8761**	**36.8761**	**0.0115**	**0.0000**	**37.1631**

3.2 Grading - 2018

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	2.3000e-004	9.5900e-003	2.4600e-003	2.0000e-005	5.5000e-004	4.0000e-005	5.9000e-004	1.5000e-004	4.0000e-005	1.8000e-004	0.0000	2.2141	2.2141	3.8000e-004	0.0000	2.2235
Vendor	4.3000e-004	0.0124	3.6500e-003	2.0000e-005	5.6000e-004	8.0000e-005	6.5000e-004	1.6000e-004	8.0000e-005	2.4000e-004	0.0000	2.4329	2.4329	3.3000e-004	0.0000	2.4411
Worker	0.0108	7.7100e-003	0.0822	2.7000e-004	0.0238	1.8000e-004	0.0240	6.3300e-003	1.7000e-004	6.5000e-003	0.0000	24.0967	24.0967	6.3000e-004	0.0000	24.1123
Total	**0.0114**	**0.0297**	**0.0883**	**3.1000e-004**	**0.0249**	**3.0000e-004**	**0.0252**	**6.6400e-003**	**2.9000e-004**	**6.9200e-003**	**0.0000**	**28.7437**	**28.7437**	**1.3400e-003**	**0.0000**	**28.7770**

3.2 Grading - 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					7.2000e-003	0.0000	7.2000e-003	7.9000e-004	0.0000	7.9000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0123	0.1320	0.0823	2.0000e-004		5.5700e-003	5.5700e-003		5.1200e-003	5.1200e-003	0.0000	18.1357	18.1357	5.7400e-003	0.0000	18.2791
Total	**0.0123**	**0.1320**	**0.0823**	**2.0000e-004**	**7.2000e-003**	**5.5700e-003**	**0.0128**	**7.9000e-004**	**5.1200e-003**	**5.9100e-003**	**0.0000**	**18.1357**	**18.1357**	**5.7400e-003**	**0.0000**	**18.2791**

3.2 Grading - 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	1.1000e-004	4.5200e-003	1.2600e-003	1.0000e-005	5.0000e-004	2.0000e-005	5.2000e-004	1.3000e-004	2.0000e-005	1.5000e-004	0.0000	1.0888	1.0888	1.9000e-004	0.0000	1.0936
Vendor	1.9000e-004	5.8700e-003	1.7400e-003	1.0000e-005	2.8000e-004	4.0000e-005	3.2000e-004	8.0000e-005	3.0000e-005	1.2000e-004	0.0000	1.2022	1.2022	1.6000e-004	0.0000	1.2063
Worker	4.9300e-003	3.4100e-003	0.0371	1.3000e-004	0.0119	9.0000e-005	0.0120	3.1600e-003	8.0000e-005	3.2500e-003	0.0000	11.6769	11.6769	2.8000e-004	0.0000	11.6838
Total	**5.2300e-003**	**0.0138**	**0.0401**	**1.5000e-004**	**0.0127**	**1.5000e-004**	**0.0128**	**3.3700e-003**	**1.3000e-004**	**3.5200e-003**	**0.0000**	**13.9679**	**13.9679**	**6.3000e-004**	**0.0000**	**13.9837**

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					3.2400e-003	0.0000	3.2400e-003	3.6000e-004	0.0000	3.6000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0123	0.1320	0.0823	2.0000e-004		5.5700e-003	5.5700e-003		5.1200e-003	5.1200e-003	0.0000	18.1357	18.1357	5.7400e-003	0.0000	18.2791
Total	**0.0123**	**0.1320**	**0.0823**	**2.0000e-004**	**3.2400e-003**	**5.5700e-003**	**8.8100e-003**	**3.6000e-004**	**5.1200e-003**	**5.4800e-003**	**0.0000**	**18.1357**	**18.1357**	**5.7400e-003**	**0.0000**	**18.2791**

3.2 Grading - 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	1.1000e-004	4.5200e-003	1.2600e-003	1.0000e-005	5.0000e-004	2.0000e-005	5.2000e-004	1.3000e-004	2.0000e-005	1.5000e-004	0.0000	1.0888	1.0888	1.9000e-004	0.0000	1.0936
Vendor	1.9000e-004	5.8700e-003	1.7400e-003	1.0000e-005	2.8000e-004	4.0000e-005	3.2000e-004	8.0000e-005	3.0000e-005	1.2000e-004	0.0000	1.2022	1.2022	1.6000e-004	0.0000	1.2063
Worker	4.9300e-003	3.4100e-003	0.0371	1.3000e-004	0.0119	9.0000e-005	0.0120	3.1600e-003	8.0000e-005	3.2500e-003	0.0000	11.6769	11.6769	2.8000e-004	0.0000	11.6838
Total	**5.2300e-003**	**0.0138**	**0.0401**	**1.5000e-004**	**0.0127**	**1.5000e-004**	**0.0128**	**3.3700e-003**	**1.3000e-004**	**3.5200e-003**	**0.0000**	**13.9679**	**13.9679**	**6.3000e-004**	**0.0000**	**13.9837**

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	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
Unmitigated	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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.607015	0.041018	0.191033	0.087570	0.015386	0.004865	0.027149	0.008727	0.004280	0.004624	0.006947	0.000926	0.000460

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	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	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
NaturalGas Unmitigated	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

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.2 Energy by Land Use - NaturalGas

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Unmitigated	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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

Mount Sutro Forest Management

San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	11.80	Acre	11.80	514,008.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	4.6	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2021
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 - Start Sept 2 2019

Land Use - 11.8 acres

Construction Phase - Sept 2 2018 to Feb 28 2020, 130 days grading

Off-road Equipment - See spreadsheet

Off-road Equipment - See spreadsheet

Trips and VMT - 35 workers: 70 one way trips a day, 1 water truck a day (vendor): 2 one way trips a day, 72 one-way haul trucks total

Grading - 2,427.92 cubic yards export, see spreadsheet, default acres of disturbance (i.e., tree removal activites)

Energy Use -

Construction Off-road Equipment Mitigation - water 2x

Mount Sutro Forest Management - San Francisco County, Annual

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstructionPhase	NumDays	30.00	130.00
tblGrading	AcresOfGrading	9.34	13.00
tblGrading	MaterialExported	0.00	2,427.92
tblOffRoadEquipment	HorsePower	187.00	0.00
tblOffRoadEquipment	HorsePower	247.00	0.00
tblOffRoadEquipment	HorsePower	367.00	0.00
tblOffRoadEquipment	HorsePower	81.00	10.00
tblOffRoadEquipment	HorsePower	212.00	700.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	LoadFactor	0.41	0.00
tblOffRoadEquipment	LoadFactor	0.40	0.00
tblOffRoadEquipment	LoadFactor	0.48	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.29
tblOffRoadEquipment	UsageHours	8.00	0.97
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.97

tblProjectCharacteristics	OperationalYear	2018	2021
tblTripsAndVMT	HaulingTripNumber	303.00	72.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	38.00	70.00

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	0.0354	0.2948	0.2475	7.1000e-004	0.0324	0.0116	0.0440	7.5100e-003	0.0106	0.0182	0.0000	64.9368	64.9368	0.0129	0.0000	65.2589
2020	0.0162	0.1312	0.1166	3.5000e-004	0.0199	5.0700e-003	0.0250	4.1700e-003	4.6700e-003	8.8400e-003	0.0000	31.2938	31.2938	6.3300e-003	0.0000	31.4522
Maximum	**0.0354**	**0.2948**	**0.2475**	**7.1000e-004**	**0.0324**	**0.0116**	**0.0440**	**7.5100e-003**	**0.0106**	**0.0182**	**0.0000**	**64.9368**	**64.9368**	**0.0129**	**0.0000**	**65.2589**

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	0.0354	0.2948	0.2475	7.1000e-004	0.0285	0.0116	0.0400	7.0700e-003	0.0106	0.0177	0.0000	64.9368	64.9368	0.0129	0.0000	65.2588
2020	0.0162	0.1312	0.1166	3.5000e-004	0.0159	5.0700e-003	0.0210	3.7300e-003	4.6700e-003	8.4000e-003	0.0000	31.2938	31.2938	6.3300e-003	0.0000	31.4521
Maximum	**0.0354**	**0.2948**	**0.2475**	**7.1000e-004**	**0.0285**	**0.0116**	**0.0400**	**7.0700e-003**	**0.0106**	**0.0177**	**0.0000**	**64.9368**	**64.9368**	**0.0129**	**0.0000**	**65.2588**

	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**	**15.24**	**0.06**	**11.57**	**7.53**	**0.00**	**3.26**	**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	9-2-2019	12-1-2019	0.2473	0.2473
2	12-2-2019	3-1-2020	0.2270	0.2270
		Highest	0.2473	0.2473

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

	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	Grading	Grading	9/2/2019	2/28/2020	5	130	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 13

Acres of Paving: 11.8

Residential Indoor: 0; Residential Outdoor: 0; 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
Grading	Concrete/Industrial Saws	1	0.97	10	0.73
Grading	Cranes	1	0.69	231	0.29
Grading	Crawler Tractors	1	0.69	212	0.43
Grading	Crawler Tractors	1	0.29	212	0.43
Grading	Crawler Tractors	1	0.17	700	0.43
Grading	Excavators	1	0.29	158	0.38
Grading	Excavators	1	0.97	158	0.38
Grading	Graders	0	0.00	0	0.00
Grading	Off-Highway Tractors	2	0.69	124	0.44
Grading	Off-Highway Trucks	1	3.00	402	0.38
Grading	Other General Industrial Equipment	1	0.29	20	0.34
Grading	Other General Industrial Equipment	1	0.17	20	0.34
Grading	Other General Industrial Equipment	1	0.17	20	0.34
Grading	Rubber Tired Dozers	0	0.00	0	0.00
Grading	Scrapers	0	0.00	0	0.00
Grading	Tractors/Loaders/Backhoes	2	0.97	97	0.37

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
Grading	15	70.00	2.00	72.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 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					7.2500e-003	0.0000	7.2500e-003	8.0000e-004	0.0000	8.0000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0248	0.2670	0.1664	4.1000e-004		0.0113	0.0113		0.0104	0.0104	0.0000	36.6931	36.6931	0.0116	0.0000	36.9834
Total	**0.0248**	**0.2670**	**0.1664**	**4.1000e-004**	**7.2500e-003**	**0.0113**	**0.0185**	**8.0000e-004**	**0.0104**	**0.0112**	**0.0000**	**36.6931**	**36.6931**	**0.0116**	**0.0000**	**36.9834**

3.2 Grading - 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	2.2000e-004	9.0800e-003	2.5300e-003	2.0000e-005	5.5000e-004	3.0000e-005	5.9000e-004	1.5000e-004	3.0000e-005	1.8000e-004	0.0000	2.1860	2.1860	3.8000e-004	0.0000	2.1955
Vendor	3.9000e-004	0.0119	3.5200e-003	2.0000e-005	5.7000e-004	7.0000e-005	6.4000e-004	1.6000e-004	7.0000e-005	2.3000e-004	0.0000	2.4324	2.4324	3.3000e-004	0.0000	2.4406
Worker	9.9800e-003	6.9000e-003	0.0750	2.6000e-004	0.0241	1.9000e-004	0.0243	6.4000e-003	1.7000e-004	6.5700e-003	0.0000	23.6253	23.6253	5.6000e-004	0.0000	23.6394
Total	**0.0106**	**0.0279**	**0.0811**	**3.0000e-004**	**0.0252**	**2.9000e-004**	**0.0255**	**6.7100e-003**	**2.7000e-004**	**6.9800e-003**	**0.0000**	**28.2437**	**28.2437**	**1.2700e-003**	**0.0000**	**28.2755**

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					3.2600e-003	0.0000	3.2600e-003	3.6000e-004	0.0000	3.6000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0248	0.2670	0.1664	4.1000e-004		0.0113	0.0113		0.0104	0.0104	0.0000	36.6931	36.6931	0.0116	0.0000	36.9833
Total	**0.0248**	**0.2670**	**0.1664**	**4.1000e-004**	**3.2600e-003**	**0.0113**	**0.0145**	**3.6000e-004**	**0.0104**	**0.0107**	**0.0000**	**36.6931**	**36.6931**	**0.0116**	**0.0000**	**36.9833**

3.2 Grading - 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	2.2000e-004	9.0800e-003	2.5300e-003	2.0000e-005	5.5000e-004	3.0000e-005	5.9000e-004	1.5000e-004	3.0000e-005	1.8000e-004	0.0000	2.1860	2.1860	3.8000e-004	0.0000	2.1955
Vendor	3.9000e-004	0.0119	3.5200e-003	2.0000e-005	5.7000e-004	7.0000e-005	6.4000e-004	1.6000e-004	7.0000e-005	2.3000e-004	0.0000	2.4324	2.4324	3.3000e-004	0.0000	2.4406
Worker	9.9800e-003	6.9000e-003	0.0750	2.6000e-004	0.0241	1.9000e-004	0.0243	6.4000e-003	1.7000e-004	6.5700e-003	0.0000	23.6253	23.6253	5.6000e-004	0.0000	23.6394
Total	**0.0106**	**0.0279**	**0.0811**	**3.0000e-004**	**0.0252**	**2.9000e-004**	**0.0255**	**6.7100e-003**	**2.7000e-004**	**6.9800e-003**	**0.0000**	**28.2437**	**28.2437**	**1.2700e-003**	**0.0000**	**28.2755**

3.2 Grading - 2020

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					7.2500e-003	0.0000	7.2500e-003	8.0000e-004	0.0000	8.0000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0114	0.1186	0.0800	2.0000e-004		4.9500e-003	4.9500e-003		4.5500e-003	4.5500e-003	0.0000	17.7373	17.7373	5.7400e-003	0.0000	17.8807
Total	**0.0114**	**0.1186**	**0.0800**	**2.0000e-004**	**7.2500e-003**	**4.9500e-003**	**0.0122**	**8.0000e-004**	**4.5500e-003**	**5.3500e-003**	**0.0000**	**17.7373**	**17.7373**	**5.7400e-003**	**0.0000**	**17.8807**

3.2 Grading - 2020

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-004	4.1500e-003	1.2300e-003	1.0000e-005	5.0000e-004	1.0000e-005	5.2000e-004	1.3000e-004	1.0000e-005	1.4000e-004	0.0000	1.0638	1.0638	1.9000e-004	0.0000	1.0685
Vendor	1.6000e-004	5.3800e-003	1.5900e-003	1.0000e-005	2.8000e-004	2.0000e-005	3.0000e-004	8.0000e-005	2.0000e-005	1.0000e-004	0.0000	1.1903	1.1903	1.6000e-004	0.0000	1.1943
Worker	4.5700e-003	3.0400e-003	0.0338	1.2000e-004	0.0119	9.0000e-005	0.0120	3.1600e-003	8.0000e-005	3.2500e-003	0.0000	11.3025	11.3025	2.5000e-004	0.0000	11.3087
Total	**4.8300e-003**	**0.0126**	**0.0366**	**1.4000e-004**	**0.0127**	**1.2000e-004**	**0.0128**	**3.3700e-003**	**1.1000e-004**	**3.4900e-003**	**0.0000**	**13.5565**	**13.5565**	**6.0000e-004**	**0.0000**	**13.5715**

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					3.2600e-003	0.0000	3.2600e-003	3.6000e-004	0.0000	3.6000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0114	0.1186	0.0800	2.0000e-004		4.9500e-003	4.9500e-003		4.5500e-003	4.5500e-003	0.0000	17.7373	17.7373	5.7400e-003	0.0000	17.8807
Total	**0.0114**	**0.1186**	**0.0800**	**2.0000e-004**	**3.2600e-003**	**4.9500e-003**	**8.2100e-003**	**3.6000e-004**	**4.5500e-003**	**4.9100e-003**	**0.0000**	**17.7373**	**17.7373**	**5.7400e-003**	**0.0000**	**17.8807**

3.2 Grading - 2020

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-004	4.1500e-003	1.2300e-003	1.0000e-005	5.0000e-004	1.0000e-005	5.2000e-004	1.3000e-004	1.0000e-005	1.4000e-004	0.0000	1.0638	1.0638	1.9000e-004	0.0000	1.0685
Vendor	1.6000e-004	5.3800e-003	1.5900e-003	1.0000e-005	2.8000e-004	2.0000e-005	3.0000e-004	8.0000e-005	2.0000e-005	1.0000e-004	0.0000	1.1903	1.1903	1.6000e-004	0.0000	1.1943
Worker	4.5700e-003	3.0400e-003	0.0338	1.2000e-004	0.0119	9.0000e-005	0.0120	3.1600e-003	8.0000e-005	3.2500e-003	0.0000	11.3025	11.3025	2.5000e-004	0.0000	11.3087
Total	**4.8300e-003**	**0.0126**	**0.0366**	**1.4000e-004**	**0.0127**	**1.2000e-004**	**0.0128**	**3.3700e-003**	**1.1000e-004**	**3.4900e-003**	**0.0000**	**13.5565**	**13.5565**	**6.0000e-004**	**0.0000**	**13.5715**

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	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
Unmitigated	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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.606408	0.040118	0.191445	0.088323	0.014900	0.004926	0.028280	0.008891	0.004289	0.004272	0.006741	0.000931	0.000477

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	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	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
NaturalGas Unmitigated	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

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.2 Energy by Land Use - NaturalGas

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Unmitigated	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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

Mount Sutro Forest Management

San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	11.80	Acre	11.80	514,008.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	4.6	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2022
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 - Start Sept 1 2020

Land Use - 11.8 acres

Construction Phase - Sept 1 2018 to Feb 26 2020, 129 days grading

Off-road Equipment - See spreadsheet

Off-road Equipment - See spreadsheet

Trips and VMT - 35 workers: 70 one way trips a day, 1 water truck a day (vendor): 2 one way trips a day, 72 one-way haul trucks total

Grading - 2,427.92 cubic yards export, see spreadsheet, default acres of disturbance (i.e., tree removal activites)

Energy Use -

Construction Off-road Equipment Mitigation - water 2x

Mount Sutro Forest Management - San Francisco County, Annual

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstructionPhase	NumDays	30.00	129.00
tblGrading	AcresOfGrading	9.27	12.90
tblGrading	MaterialExported	0.00	2,427.92
tblOffRoadEquipment	HorsePower	187.00	0.00
tblOffRoadEquipment	HorsePower	247.00	0.00
tblOffRoadEquipment	HorsePower	367.00	0.00
tblOffRoadEquipment	HorsePower	81.00	10.00
tblOffRoadEquipment	HorsePower	212.00	700.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	LoadFactor	0.41	0.00
tblOffRoadEquipment	LoadFactor	0.40	0.00
tblOffRoadEquipment	LoadFactor	0.48	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.97
tblOffRoadEquipment	UsageHours	8.00	0.29
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.97
tblProjectCharacteristics	OperationalYear	2018	2022

tblTripsAndVMT	HaulingTripNumber	303.00	72.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	38.00	70.00

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					
2020	0.0332	0.2685	0.2386	7.1000e-004	0.0327	0.0104	0.0431	7.5800e-003	9.5600e-003	0.0171	0.0000	64.0600	64.0600	0.0130	0.0000	64.3842
2021	0.0143	0.1104	0.1065	3.3000e-004	0.0193	4.2200e-003	0.0235	4.0200e-003	3.8900e-003	7.9000e-003	0.0000	29.4282	29.4282	6.0200e-003	0.0000	29.5786
Maximum	**0.0332**	**0.2685**	**0.2386**	**7.1000e-004**	**0.0327**	**0.0104**	**0.0431**	**7.5800e-003**	**9.5600e-003**	**0.0171**	**0.0000**	**64.0600**	**64.0600**	**0.0130**	**0.0000**	**64.3842**

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					
2020	0.0332	0.2685	0.2386	7.1000e-004	0.0287	0.0104	0.0391	7.1500e-003	9.5500e-003	0.0167	0.0000	64.0600	64.0600	0.0130	0.0000	64.3841
2021	0.0143	0.1104	0.1065	3.3000e-004	0.0154	4.2200e-003	0.0196	3.5800e-003	3.8900e-003	7.4700e-003	0.0000	29.4282	29.4282	6.0200e-003	0.0000	29.5786
Maximum	**0.0332**	**0.2685**	**0.2386**	**7.1000e-004**	**0.0287**	**0.0104**	**0.0391**	**7.1500e-003**	**9.5500e-003**	**0.0167**	**0.0000**	**64.0600**	**64.0600**	**0.0130**	**0.0000**	**64.3841**

	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**	**15.24**	**0.00**	**11.90**	**7.50**	**0.07**	**3.47**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Mount Sutro Forest Management - San Francisco County, Annual

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	9-1-2020	11-30-2020	0.2234	0.2234
2	12-1-2020	2-28-2021	0.2009	0.2009
		Highest	0.2234	0.2234

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

	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	Grading	Grading	9/1/2020	2/26/2021	5	129	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 12.9

Acres of Paving: 11.8

Residential Indoor: 0; Residential Outdoor: 0; 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
Grading	Concrete/Industrial Saws	1	0.97	10	0.73
Grading	Cranes	1	0.69	231	0.29
Grading	Crawler Tractors	1	0.69	212	0.43
Grading	Crawler Tractors	1	0.29	212	0.43
Grading	Crawler Tractors	1	0.17	700	0.43
Grading	Excavators	1	0.97	158	0.38
Grading	Excavators	1	0.29	158	0.38
Grading	Graders	0	0.00	0	0.00
Grading	Off-Highway Tractors	2	0.69	124	0.44
Grading	Off-Highway Trucks	1	3.00	402	0.38
Grading	Other General Industrial Equipment	1	0.29	20	0.34
Grading	Other General Industrial Equipment	2	0.17	20	0.34
Grading	Rubber Tired Dozers	0	0.00	0	0.00
Grading	Scrapers	0	0.00	0	0.00
Grading	Tractors/Loaders/Backhoes	2	0.97	97	0.37

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
Grading	15	70.00	2.00	72.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2020

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					7.2000e-003	0.0000	7.2000e-003	7.9000e-004	0.0000	7.9000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0234	0.2427	0.1636	4.1000e-004		0.0101	0.0101		9.3100e-003	9.3100e-003	0.0000	36.2996	36.2996	0.0117	0.0000	36.5931
Total	**0.0234**	**0.2427**	**0.1636**	**4.1000e-004**	**7.2000e-003**	**0.0101**	**0.0173**	**7.9000e-004**	**9.3100e-003**	**0.0101**	**0.0000**	**36.2996**	**36.2996**	**0.0117**	**0.0000**	**36.5931**

3.2 Grading - 2020

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	2.0000e-004	8.5500e-003	2.5300e-003	2.0000e-005	5.6000e-004	3.0000e-005	5.8000e-004	1.5000e-004	2.0000e-005	1.7000e-004	0.0000	2.1939	2.1939	3.9000e-004	0.0000	2.2037
Vendor	3.2000e-004	0.0110	3.2500e-003	2.0000e-005	5.8000e-004	5.0000e-005	6.2000e-004	1.7000e-004	5.0000e-005	2.1000e-004	0.0000	2.4359	2.4359	3.3000e-004	0.0000	2.4441
Worker	9.3600e-003	6.2300e-003	0.0692	2.6000e-004	0.0243	1.9000e-004	0.0245	6.4700e-003	1.7000e-004	6.6500e-003	0.0000	23.1306	23.1306	5.1000e-004	0.0000	23.1433
Total	**9.8800e-003**	**0.0258**	**0.0750**	**3.0000e-004**	**0.0255**	**2.7000e-004**	**0.0257**	**6.7900e-003**	**2.4000e-004**	**7.0300e-003**	**0.0000**	**27.7605**	**27.7605**	**1.2300e-003**	**0.0000**	**27.7911**

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					3.2400e-003	0.0000	3.2400e-003	3.6000e-004	0.0000	3.6000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0234	0.2427	0.1636	4.1000e-004		0.0101	0.0101		9.3100e-003	9.3100e-003	0.0000	36.2995	36.2995	0.0117	0.0000	36.5930
Total	**0.0234**	**0.2427**	**0.1636**	**4.1000e-004**	**3.2400e-003**	**0.0101**	**0.0134**	**3.6000e-004**	**9.3100e-003**	**9.6700e-003**	**0.0000**	**36.2995**	**36.2995**	**0.0117**	**0.0000**	**36.5930**

3.2 Grading - 2020

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	2.0000e-004	8.5500e-003	2.5300e-003	2.0000e-005	5.6000e-004	3.0000e-005	5.8000e-004	1.5000e-004	2.0000e-005	1.7000e-004	0.0000	2.1939	2.1939	3.9000e-004	0.0000	2.2037
Vendor	3.2000e-004	0.0110	3.2500e-003	2.0000e-005	5.8000e-004	5.0000e-005	6.2000e-004	1.7000e-004	5.0000e-005	2.1000e-004	0.0000	2.4359	2.4359	3.3000e-004	0.0000	2.4441
Worker	9.3600e-003	6.2300e-003	0.0692	2.6000e-004	0.0243	1.9000e-004	0.0245	6.4700e-003	1.7000e-004	6.6500e-003	0.0000	23.1306	23.1306	5.1000e-004	0.0000	23.1433
Total	**9.8800e-003**	**0.0258**	**0.0750**	**3.0000e-004**	**0.0255**	**2.7000e-004**	**0.0257**	**6.7900e-003**	**2.4000e-004**	**7.0300e-003**	**0.0000**	**27.7605**	**27.7605**	**1.2300e-003**	**0.0000**	**27.7911**

3.2 Grading - 2021

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					7.2000e-003	0.0000	7.2000e-003	7.9000e-004	0.0000	7.9000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0100	0.0994	0.0741	1.9000e-004		4.1200e-003	4.1200e-003		3.7900e-003	3.7900e-003	0.0000	16.9118	16.9118	5.4700e-003	0.0000	17.0486
Total	**0.0100**	**0.0994**	**0.0741**	**1.9000e-004**	**7.2000e-003**	**4.1200e-003**	**0.0113**	**7.9000e-004**	**3.7900e-003**	**4.5800e-003**	**0.0000**	**16.9118**	**16.9118**	**5.4700e-003**	**0.0000**	**17.0486**

3.2 Grading - 2021

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	9.0000e-005	3.6900e-003	1.2100e-003	1.0000e-005	5.0000e-004	1.0000e-005	5.1000e-004	1.3000e-004	1.0000e-005	1.4000e-004	0.0000	1.0040	1.0040	1.8000e-004	0.0000	1.0086
Vendor	1.3000e-004	4.7000e-003	1.4300e-003	1.0000e-005	2.7000e-004	1.0000e-005	2.8000e-004	8.0000e-005	1.0000e-005	9.0000e-005	0.0000	1.1205	1.1205	1.5000e-004	0.0000	1.1242
Worker	4.0800e-003	2.6100e-003	0.0298	1.1000e-004	0.0113	9.0000e-005	0.0114	3.0200e-003	8.0000e-005	3.1000e-003	0.0000	10.3919	10.3919	2.1000e-004	0.0000	10.3972
Total	**4.3000e-003**	**0.0110**	**0.0325**	**1.3000e-004**	**0.0121**	**1.1000e-004**	**0.0122**	**3.2300e-003**	**1.0000e-004**	**3.3300e-003**	**0.0000**	**12.5164**	**12.5164**	**5.4000e-004**	**0.0000**	**12.5300**

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					3.2400e-003	0.0000	3.2400e-003	3.6000e-004	0.0000	3.6000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0100	0.0994	0.0741	1.9000e-004		4.1200e-003	4.1200e-003		3.7900e-003	3.7900e-003	0.0000	16.9118	16.9118	5.4700e-003	0.0000	17.0486
Total	**0.0100**	**0.0994**	**0.0741**	**1.9000e-004**	**3.2400e-003**	**4.1200e-003**	**7.3600e-003**	**3.6000e-004**	**3.7900e-003**	**4.1500e-003**	**0.0000**	**16.9118**	**16.9118**	**5.4700e-003**	**0.0000**	**17.0486**

3.2 Grading - 2021

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	9.0000e-005	3.6900e-003	1.2100e-003	1.0000e-005	5.0000e-004	1.0000e-005	5.1000e-004	1.3000e-004	1.0000e-005	1.4000e-004	0.0000	1.0040	1.0040	1.8000e-004	0.0000	1.0086
Vendor	1.3000e-004	4.7000e-003	1.4300e-003	1.0000e-005	2.7000e-004	1.0000e-005	2.8000e-004	8.0000e-005	1.0000e-005	9.0000e-005	0.0000	1.1205	1.1205	1.5000e-004	0.0000	1.1242
Worker	4.0800e-003	2.6100e-003	0.0298	1.1000e-004	0.0113	9.0000e-005	0.0114	3.0200e-003	8.0000e-005	3.1000e-003	0.0000	10.3919	10.3919	2.1000e-004	0.0000	10.3972
Total	**4.3000e-003**	**0.0110**	**0.0325**	**1.3000e-004**	**0.0121**	**1.1000e-004**	**0.0122**	**3.2300e-003**	**1.0000e-004**	**3.3300e-003**	**0.0000**	**12.5164**	**12.5164**	**5.4000e-004**	**0.0000**	**12.5300**

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	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
Unmitigated	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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.605720	0.039347	0.191789	0.088945	0.014469	0.004989	0.029396	0.009044	0.004299	0.004006	0.006568	0.000937	0.000492

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	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	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
NaturalGas Unmitigated	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

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.2 Energy by Land Use - NaturalGas

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Unmitigated	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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

Mount Sutro Forest Management

San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	11.80	Acre	11.80	514,008.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	4.6	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2023
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 - Start Sept 1 2021

Land Use - 11.8 acres

Construction Phase - Sept 1 2021 to Feb 28 2022, 129 days grading

Off-road Equipment - See spreadsheet

Off-road Equipment - See spreadsheet

Trips and VMT - 35 workers: 70 one way trips a day, 1 water truck a day (vendor): 2 one way trips a day, 72 one-way haul trucks total

Grading - 2,427.92cubic yards export, see spreadsheet, default acres of disturbance (i.e., tree removal activites)

Energy Use -

Construction Off-road Equipment Mitigation - water 2x

Mount Sutro Forest Management - San Francisco County, Annual

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstructionPhase	NumDays	30.00	129.00
tblGrading	AcresOfGrading	9.27	12.90
tblGrading	MaterialExported	0.00	2,427.92
tblOffRoadEquipment	HorsePower	187.00	0.00
tblOffRoadEquipment	HorsePower	247.00	0.00
tblOffRoadEquipment	HorsePower	367.00	0.00
tblOffRoadEquipment	HorsePower	81.00	10.00
tblOffRoadEquipment	HorsePower	212.00	700.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	LoadFactor	0.41	0.00
tblOffRoadEquipment	LoadFactor	0.40	0.00
tblOffRoadEquipment	LoadFactor	0.48	0.00
tblOffRoadEquipment	LoadFactor	0.43	0.44
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.29
tblOffRoadEquipment	UsageHours	8.00	0.97
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.97

tblProjectCharacteristics	OperationalYear	2018	2023
tblTripsAndVMT	HaulingTripNumber	303.00	72.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	38.00	70.00

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					
2021	0.0308	0.2372	0.2288	7.0000e-004	0.0327	9.0800e-003	0.0418	7.5800e-003	8.3500e-003	0.0159	0.0000	63.2125	63.2125	0.0129	0.0000	63.5357
2022	0.0129	0.0911	0.1017	3.2000e-004	0.0193	3.4300e-003	0.0227	4.0200e-003	3.1500e-003	7.1700e-003	0.0000	29.0327	29.0327	6.0000e-003	0.0000	29.1827
Maximum	**0.0308**	**0.2372**	**0.2288**	**7.0000e-004**	**0.0327**	**9.0800e-003**	**0.0418**	**7.5800e-003**	**8.3500e-003**	**0.0159**	**0.0000**	**63.2125**	**63.2125**	**0.0129**	**0.0000**	**63.5357**

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					
2021	0.0308	0.2372	0.2288	7.0000e-004	0.0287	9.0800e-003	0.0378	7.1500e-003	8.3500e-003	0.0155	0.0000	63.2125	63.2125	0.0129	0.0000	63.5357
2022	0.0129	0.0911	0.1017	3.2000e-004	0.0154	3.4300e-003	0.0188	3.5800e-003	3.1500e-003	6.7300e-003	0.0000	29.0326	29.0326	6.0000e-003	0.0000	29.1827
Maximum	**0.0308**	**0.2372**	**0.2288**	**7.0000e-004**	**0.0287**	**9.0800e-003**	**0.0378**	**7.1500e-003**	**8.3500e-003**	**0.0155**	**0.0000**	**63.2125**	**63.2125**	**0.0129**	**0.0000**	**63.5357**

	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**	**15.24**	**0.00**	**12.28**	**7.50**	**0.00**	**3.81**	**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	9-1-2021	11-30-2021	0.1984	0.1984
2	12-1-2021	2-28-2022	0.1753	0.1753
		Highest	0.1984	0.1984

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

	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	Grading	Grading	9/1/2021	2/28/2022	5	129	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 12.9

Acres of Paving: 11.8

Residential Indoor: 0; Residential Outdoor: 0; 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
Grading	Concrete/Industrial Saws	1	0.97	10	0.73
Grading	Cranes	1	0.69	231	0.29
Grading	Crawler Tractors	1	0.69	212	0.43
Grading	Crawler Tractors	1	0.29	212	0.43
Grading	Crawler Tractors	1	0.17	700	0.44
Grading	Excavators	1	0.29	158	0.38
Grading	Excavators	1	0.97	158	0.38
Grading	Graders	0	0.00	0	0.00
Grading	Off-Highway Tractors	2	0.69	124	0.44
Grading	Off-Highway Trucks	1	3.00	402	0.38
Grading	Other General Industrial Equipment	1	0.29	20	0.34
Grading	Other General Industrial Equipment	2	0.17	20	0.34
Grading	Rubber Tired Dozers	0	0.00	0	0.00
Grading	Scrapers	0	0.00	0	0.00
Grading	Tractors/Loaders/Backhoes	2	0.97	97	0.37

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
Grading	15	70.00	2.00	72.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2021

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					7.2000e-003	0.0000	7.2000e-003	7.9000e-004	0.0000	7.9000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0216	0.2136	0.1591	4.1000e-004		8.8500e-003	8.8500e-003		8.1400e-003	8.1400e-003	0.0000	36.3481	36.3481	0.0118	0.0000	36.6420
Total	**0.0216**	**0.2136**	**0.1591**	**4.1000e-004**	**7.2000e-003**	**8.8500e-003**	**0.0161**	**7.9000e-004**	**8.1400e-003**	**8.9300e-003**	**0.0000**	**36.3481**	**36.3481**	**0.0118**	**0.0000**	**36.6420**

3.2 Grading - 2021

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	1.9000e-004	7.9300e-003	2.5900e-003	2.0000e-005	5.6000e-004	2.0000e-005	5.8000e-004	1.5000e-004	2.0000e-005	1.7000e-004	0.0000	2.1549	2.1549	4.0000e-004	0.0000	2.1648
Vendor	2.7000e-004	0.0101	3.0800e-003	2.0000e-005	5.8000e-004	2.0000e-005	6.0000e-004	1.7000e-004	2.0000e-005	1.9000e-004	0.0000	2.4050	2.4050	3.2000e-004	0.0000	2.4129
Worker	8.7700e-003	5.6000e-003	0.0640	2.5000e-004	0.0243	1.8000e-004	0.0245	6.4700e-003	1.7000e-004	6.6400e-003	0.0000	22.3045	22.3045	4.6000e-004	0.0000	22.3160
Total	**9.2300e-003**	**0.0236**	**0.0697**	**2.9000e-004**	**0.0255**	**2.2000e-004**	**0.0257**	**6.7900e-003**	**2.1000e-004**	**7.0000e-003**	**0.0000**	**26.8644**	**26.8644**	**1.1800e-003**	**0.0000**	**26.8937**

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					3.2400e-003	0.0000	3.2400e-003	3.6000e-004	0.0000	3.6000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0216	0.2136	0.1591	4.1000e-004		8.8500e-003	8.8500e-003		8.1400e-003	8.1400e-003	0.0000	36.3481	36.3481	0.0118	0.0000	36.6420
Total	**0.0216**	**0.2136**	**0.1591**	**4.1000e-004**	**3.2400e-003**	**8.8500e-003**	**0.0121**	**3.6000e-004**	**8.1400e-003**	**8.5000e-003**	**0.0000**	**36.3481**	**36.3481**	**0.0118**	**0.0000**	**36.6420**

3.2 Grading - 2021

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	1.9000e-004	7.9300e-003	2.5900e-003	2.0000e-005	5.6000e-004	2.0000e-005	5.8000e-004	1.5000e-004	2.0000e-005	1.7000e-004	0.0000	2.1549	2.1549	4.0000e-004	0.0000	2.1648
Vendor	2.7000e-004	0.0101	3.0800e-003	2.0000e-005	5.8000e-004	2.0000e-005	6.0000e-004	1.7000e-004	2.0000e-005	1.9000e-004	0.0000	2.4050	2.4050	3.2000e-004	0.0000	2.4129
Worker	8.7700e-003	5.6000e-003	0.0640	2.5000e-004	0.0243	1.8000e-004	0.0245	6.4700e-003	1.7000e-004	6.6400e-003	0.0000	22.3045	22.3045	4.6000e-004	0.0000	22.3160
Total	**9.2300e-003**	**0.0236**	**0.0697**	**2.9000e-004**	**0.0255**	**2.2000e-004**	**0.0257**	**6.7900e-003**	**2.1000e-004**	**7.0000e-003**	**0.0000**	**26.8644**	**26.8644**	**1.1800e-003**	**0.0000**	**26.8937**

3.2 Grading - 2022

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					7.2000e-003	0.0000	7.2000e-003	7.9000e-004	0.0000	7.9000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	8.8200e-003	0.0809	0.0713	1.9000e-004		3.3200e-003	3.3200e-003		3.0600e-003	3.0600e-003	0.0000	16.9355	16.9355	5.4800e-003	0.0000	17.0724
Total	**8.8200e-003**	**0.0809**	**0.0713**	**1.9000e-004**	**7.2000e-003**	**3.3200e-003**	**0.0105**	**7.9000e-004**	**3.0600e-003**	**3.8500e-003**	**0.0000**	**16.9355**	**16.9355**	**5.4800e-003**	**0.0000**	**17.0724**

3.2 Grading - 2022

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	8.0000e-005	3.4000e-003	1.2400e-003	1.0000e-005	5.0000e-004	1.0000e-005	5.1000e-004	1.3000e-004	1.0000e-005	1.4000e-004	0.0000	0.9855	0.9855	1.9000e-004	0.0000	0.9901
Vendor	1.2000e-004	4.4500e-003	1.4100e-003	1.0000e-005	2.7000e-004	1.0000e-005	2.8000e-004	8.0000e-005	1.0000e-005	9.0000e-005	0.0000	1.1057	1.1057	1.5000e-004	0.0000	1.1094
Worker	3.8500e-003	2.3600e-003	0.0278	1.1000e-004	0.0113	8.0000e-005	0.0114	3.0200e-003	8.0000e-005	3.0900e-003	0.0000	10.0060	10.0060	1.9000e-004	0.0000	10.0109
Total	**4.0500e-003**	**0.0102**	**0.0305**	**1.3000e-004**	**0.0121**	**1.0000e-004**	**0.0122**	**3.2300e-003**	**1.0000e-004**	**3.3200e-003**	**0.0000**	**12.0972**	**12.0972**	**5.3000e-004**	**0.0000**	**12.1103**

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					3.2400e-003	0.0000	3.2400e-003	3.6000e-004	0.0000	3.6000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	8.8200e-003	0.0809	0.0713	1.9000e-004		3.3200e-003	3.3200e-003		3.0600e-003	3.0600e-003	0.0000	16.9354	16.9354	5.4800e-003	0.0000	17.0724
Total	**8.8200e-003**	**0.0809**	**0.0713**	**1.9000e-004**	**3.2400e-003**	**3.3200e-003**	**6.5600e-003**	**3.6000e-004**	**3.0600e-003**	**3.4200e-003**	**0.0000**	**16.9354**	**16.9354**	**5.4800e-003**	**0.0000**	**17.0724**

3.2 Grading - 2022

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	8.0000e-005	3.4000e-003	1.2400e-003	1.0000e-005	5.0000e-004	1.0000e-005	5.1000e-004	1.3000e-004	1.0000e-005	1.4000e-004	0.0000	0.9855	0.9855	1.9000e-004	0.0000	0.9901
Vendor	1.2000e-004	4.4500e-003	1.4100e-003	1.0000e-005	2.7000e-004	1.0000e-005	2.8000e-004	8.0000e-005	1.0000e-005	9.0000e-005	0.0000	1.1057	1.1057	1.5000e-004	0.0000	1.1094
Worker	3.8500e-003	2.3600e-003	0.0278	1.1000e-004	0.0113	8.0000e-005	0.0114	3.0200e-003	8.0000e-005	3.0900e-003	0.0000	10.0060	10.0060	1.9000e-004	0.0000	10.0109
Total	**4.0500e-003**	**0.0102**	**0.0305**	**1.3000e-004**	**0.0121**	**1.0000e-004**	**0.0122**	**3.2300e-003**	**1.0000e-004**	**3.3200e-003**	**0.0000**	**12.0972**	**12.0972**	**5.3000e-004**	**0.0000**	**12.1103**

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	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
Unmitigated	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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.605107	0.038687	0.192108	0.089453	0.014064	0.005036	0.030434	0.009181	0.004309	0.003768	0.006404	0.000941	0.000505

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	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	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
NaturalGas Unmitigated	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

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.2 Energy by Land Use - NaturalGas

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Unmitigated	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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

Mount Sutro Forest Management

San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	11.80	Acre	11.80	514,008.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	4.6	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2024
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 - Start Sept 1 2022

Land Use - 11.8 acres

Construction Phase - Sept 1 2022 to Feb 28 2023, 129 days grading

Off-road Equipment - See spreadsheet

Off-road Equipment - See spreadsheet

Trips and VMT - 35 workers: 70 one way trips a day, 1 water truck a day (vendor): 2 one way trips a day, 72 one-way haul trucks total

Grading - 2,427.92 cubic yards export, see spreadsheet, default acres of disturbance (i.e., tree removal activites)

Energy Use -

Construction Off-road Equipment Mitigation - water 2x

Mount Sutro Forest Management - San Francisco County, Annual

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstructionPhase	NumDays	30.00	129.00
tblGrading	AcresOfGrading	9.27	12.90
tblGrading	MaterialExported	0.00	2,427.92
tblOffRoadEquipment	HorsePower	187.00	0.00
tblOffRoadEquipment	HorsePower	247.00	0.00
tblOffRoadEquipment	HorsePower	367.00	0.00
tblOffRoadEquipment	HorsePower	81.00	10.00
tblOffRoadEquipment	HorsePower	212.00	700.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	LoadFactor	0.41	0.00
tblOffRoadEquipment	LoadFactor	0.40	0.00
tblOffRoadEquipment	LoadFactor	0.48	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.29
tblOffRoadEquipment	UsageHours	8.00	0.97
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.97
tblProjectCharacteristics	OperationalYear	2018	2024

tblTripsAndVMT	HaulingTripNumber	303.00	72.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	38.00	70.00

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					
2022	0.0273	0.1930	0.2157	6.9000e-004	0.0324	7.2600e-003	0.0396	7.5100e-003	6.6800e-003	0.0142	0.0000	61.5569	61.5569	0.0127	0.0000	61.8749
2023	0.0123	0.0812	0.1011	3.3000e-004	0.0196	3.0500e-003	0.0226	4.0900e-003	2.8100e-003	6.9000e-003	0.0000	29.2653	29.2653	6.1200e-003	0.0000	29.4183
Maximum	**0.0273**	**0.1930**	**0.2157**	**6.9000e-004**	**0.0324**	**7.2600e-003**	**0.0396**	**7.5100e-003**	**6.6800e-003**	**0.0142**	**0.0000**	**61.5569**	**61.5569**	**0.0127**	**0.0000**	**61.8749**

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					
2022	0.0273	0.1930	0.2157	6.9000e-004	0.0284	7.2600e-003	0.0357	7.0700e-003	6.6800e-003	0.0138	0.0000	61.5569	61.5569	0.0127	0.0000	61.8749
2023	0.0123	0.0812	0.1011	3.3000e-004	0.0156	3.0500e-003	0.0187	3.6600e-003	2.8100e-003	6.4600e-003	0.0000	29.2653	29.2653	6.1200e-003	0.0000	29.4183
Maximum	**0.0273**	**0.1930**	**0.2157**	**6.9000e-004**	**0.0284**	**7.2600e-003**	**0.0357**	**7.0700e-003**	**6.6800e-003**	**0.0138**	**0.0000**	**61.5569**	**61.5569**	**0.0127**	**0.0000**	**61.8749**

	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**	**15.24**	**0.00**	**12.72**	**7.50**	**0.00**	**4.17**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Mount Sutro Forest Management - San Francisco County, Annual

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	9-1-2022	11-30-2022	0.1651	0.1651
2	12-1-2022	2-28-2023	0.1509	0.1509
		Highest	0.1651	0.1651

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

	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	Grading	Grading	9/1/2022	2/28/2023	5	129	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 12.9

Acres of Paving: 11.8

Residential Indoor: 0; Residential Outdoor: 0; 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
Grading	Concrete/Industrial Saws	1	0.97	10	0.73
Grading	Cranes	1	0.69	231	0.29
Grading	Crawler Tractors	1	0.69	212	0.43
Grading	Crawler Tractors	1	0.29	212	0.43
Grading	Crawler Tractors	1	0.17	700	0.43
Grading	Excavators	1	0.29	158	0.38
Grading	Excavators	1	0.97	158	0.38
Grading	Graders	0	0.00	0	0.00
Grading	Off-Highway Tractors	2	0.69	124	0.44
Grading	Off-Highway Trucks	1	3.00	402	0.38
Grading	Other General Industrial Equipment	2	0.17	20	0.34
Grading	Other General Industrial Equipment	1	0.29	20	0.34
Grading	Rubber Tired Dozers	0	0.00	0	0.00
Grading	Scrapers	0	0.00	0	0.00
Grading	Tractors/Loaders/Backhoes	2	0.97	97	0.37

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
Grading	15	70.00	2.00	72.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2022

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					7.2000e-003	0.0000	7.2000e-003	7.9000e-004	0.0000	7.9000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0187	0.1714	0.1510	4.1000e-004		7.0400e-003	7.0400e-003		6.4800e-003	6.4800e-003	0.0000	35.8873	35.8873	0.0116	0.0000	36.1774
Total	**0.0187**	**0.1714**	**0.1510**	**4.1000e-004**	**7.2000e-003**	**7.0400e-003**	**0.0142**	**7.9000e-004**	**6.4800e-003**	**7.2700e-003**	**0.0000**	**35.8873**	**35.8873**	**0.0116**	**0.0000**	**36.1774**

3.2 Grading - 2022

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	1.8000e-004	7.2100e-003	2.6400e-003	2.0000e-005	5.6000e-004	2.0000e-005	5.8000e-004	1.5000e-004	2.0000e-005	1.7000e-004	0.0000	2.0911	2.0911	3.9000e-004	0.0000	2.1009
Vendor	2.5000e-004	9.4400e-003	2.9900e-003	2.0000e-005	5.7000e-004	2.0000e-005	5.9000e-004	1.6000e-004	2.0000e-005	1.8000e-004	0.0000	2.3462	2.3462	3.1000e-004	0.0000	2.3540
Worker	8.1800e-003	5.0000e-003	0.0590	2.3000e-004	0.0241	1.8000e-004	0.0242	6.4000e-003	1.6000e-004	6.5700e-003	0.0000	21.2323	21.2323	4.1000e-004	0.0000	21.2426
Total	**8.6100e-003**	**0.0217**	**0.0646**	**2.7000e-004**	**0.0252**	**2.2000e-004**	**0.0254**	**6.7100e-003**	**2.0000e-004**	**6.9200e-003**	**0.0000**	**25.6697**	**25.6697**	**1.1100e-003**	**0.0000**	**25.6975**

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					3.2400e-003	0.0000	3.2400e-003	3.6000e-004	0.0000	3.6000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0187	0.1714	0.1510	4.1000e-004		7.0400e-003	7.0400e-003		6.4800e-003	6.4800e-003	0.0000	35.8872	35.8872	0.0116	0.0000	36.1774
Total	**0.0187**	**0.1714**	**0.1510**	**4.1000e-004**	**3.2400e-003**	**7.0400e-003**	**0.0103**	**3.6000e-004**	**6.4800e-003**	**6.8400e-003**	**0.0000**	**35.8872**	**35.8872**	**0.0116**	**0.0000**	**36.1774**

3.2 Grading - 2022

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	1.8000e-004	7.2100e-003	2.6400e-003	2.0000e-005	5.6000e-004	2.0000e-005	5.8000e-004	1.5000e-004	2.0000e-005	1.7000e-004	0.0000	2.0911	2.0911	3.9000e-004	0.0000	2.1009
Vendor	2.5000e-004	9.4400e-003	2.9900e-003	2.0000e-005	5.7000e-004	2.0000e-005	5.9000e-004	1.6000e-004	2.0000e-005	1.8000e-004	0.0000	2.3462	2.3462	3.1000e-004	0.0000	2.3540
Worker	8.1800e-003	5.0000e-003	0.0590	2.3000e-004	0.0241	1.8000e-004	0.0242	6.4000e-003	1.6000e-004	6.5700e-003	0.0000	21.2323	21.2323	4.1000e-004	0.0000	21.2426
Total	**8.6100e-003**	**0.0217**	**0.0646**	**2.7000e-004**	**0.0252**	**2.2000e-004**	**0.0254**	**6.7100e-003**	**2.0000e-004**	**6.9200e-003**	**0.0000**	**25.6697**	**25.6697**	**1.1100e-003**	**0.0000**	**25.6975**

3.2 Grading - 2023

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					7.2000e-003	0.0000	7.2000e-003	7.9000e-004	0.0000	7.9000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	8.4000e-003	0.0726	0.0718	2.0000e-004		2.9500e-003	2.9500e-003		2.7200e-003	2.7200e-003	0.0000	17.3312	17.3312	5.6100e-003	0.0000	17.4714
Total	**8.4000e-003**	**0.0726**	**0.0718**	**2.0000e-004**	**7.2000e-003**	**2.9500e-003**	**0.0102**	**7.9000e-004**	**2.7200e-003**	**3.5100e-003**	**0.0000**	**17.3312**	**17.3312**	**5.6100e-003**	**0.0000**	**17.4714**

3.2 Grading - 2023

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	6.0000e-005	2.6300e-003	1.2700e-003	1.0000e-005	5.0000e-004	1.0000e-005	5.1000e-004	1.3000e-004	1.0000e-005	1.3000e-004	0.0000	0.9754	0.9754	1.9000e-004	0.0000	0.9801
Vendor	1.0000e-004	3.7800e-003	1.3900e-003	1.0000e-005	2.7000e-004	1.0000e-005	2.8000e-004	8.0000e-005	1.0000e-005	8.0000e-005	0.0000	1.1045	1.1045	1.5000e-004	0.0000	1.1082
Worker	3.7400e-003	2.1900e-003	0.0266	1.1000e-004	0.0116	9.0000e-005	0.0117	3.0900e-003	8.0000e-005	3.1700e-003	0.0000	9.8542	9.8542	1.8000e-004	0.0000	9.8587
Total	**3.9000e-003**	**8.6000e-003**	**0.0293**	**1.3000e-004**	**0.0124**	**1.1000e-004**	**0.0125**	**3.3000e-003**	**1.0000e-004**	**3.3800e-003**	**0.0000**	**11.9341**	**11.9341**	**5.2000e-004**	**0.0000**	**11.9470**

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					3.2400e-003	0.0000	3.2400e-003	3.6000e-004	0.0000	3.6000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	8.4000e-003	0.0726	0.0718	2.0000e-004		2.9500e-003	2.9500e-003		2.7200e-003	2.7200e-003	0.0000	17.3312	17.3312	5.6100e-003	0.0000	17.4713
Total	**8.4000e-003**	**0.0726**	**0.0718**	**2.0000e-004**	**3.2400e-003**	**2.9500e-003**	**6.1900e-003**	**3.6000e-004**	**2.7200e-003**	**3.0800e-003**	**0.0000**	**17.3312**	**17.3312**	**5.6100e-003**	**0.0000**	**17.4713**

3.2 Grading - 2023

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	6.0000e-005	2.6300e-003	1.2700e-003	1.0000e-005	5.0000e-004	1.0000e-005	5.1000e-004	1.3000e-004	1.0000e-005	1.3000e-004	0.0000	0.9754	0.9754	1.9000e-004	0.0000	0.9801
Vendor	1.0000e-004	3.7800e-003	1.3900e-003	1.0000e-005	2.7000e-004	1.0000e-005	2.8000e-004	8.0000e-005	1.0000e-005	8.0000e-005	0.0000	1.1045	1.1045	1.5000e-004	0.0000	1.1082
Worker	3.7400e-003	2.1900e-003	0.0266	1.1000e-004	0.0116	9.0000e-005	0.0117	3.0900e-003	8.0000e-005	3.1700e-003	0.0000	9.8542	9.8542	1.8000e-004	0.0000	9.8587
Total	**3.9000e-003**	**8.6000e-003**	**0.0293**	**1.3000e-004**	**0.0124**	**1.1000e-004**	**0.0125**	**3.3000e-003**	**1.0000e-004**	**3.3800e-003**	**0.0000**	**11.9341**	**11.9341**	**5.2000e-004**	**0.0000**	**11.9470**

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	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
Unmitigated	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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.604697	0.038136	0.192426	0.089922	0.013708	0.005077	0.031210	0.009257	0.004288	0.003553	0.006262	0.000945	0.000519

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	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	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
NaturalGas Unmitigated	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

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.2 Energy by Land Use - NaturalGas

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Unmitigated	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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

Mount Sutro Forest Management

San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	5.90	Acre	5.90	257,004.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	4.6	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2040
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 - Start Sept 1 2035

Land Use - 5.9 acres

Construction Phase - Sept 3 2035 to Feb 29 2036, 130 days grading

Off-road Equipment - See spreadsheet

Off-road Equipment - See spreadsheet

Trips and VMT - 35 workers: 70 one way trips a day, 1 water truck a day (vendor): 2 one way trips a day, 72 one-way haul trucks total

Grading - 1,213.96 cubic yards export, see spreadsheet, default acres of disturbance (i.e., tree removal activites)

Energy Use -

Construction Off-road Equipment Mitigation - water 2x

Mount Sutro Forest Management - San Francisco County, Annual

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstructionPhase	NumDays	20.00	130.00
tblConstructionPhase	PhaseEndDate	10/12/2035	2/29/2036
tblGrading	MaterialExported	0.00	1,213.96
tblOffRoadEquipment	HorsePower	187.00	0.00
tblOffRoadEquipment	HorsePower	247.00	0.00
tblOffRoadEquipment	HorsePower	81.00	10.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	HorsePower	212.00	700.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	LoadFactor	0.41	0.00
tblOffRoadEquipment	LoadFactor	0.40	0.00
tblOffRoadEquipment	LoadFactor	0.29	0.29
tblOffRoadEquipment	LoadFactor	0.43	0.43
tblOffRoadEquipment	LoadFactor	0.43	0.43
tblOffRoadEquipment	LoadFactor	0.44	0.44
tblOffRoadEquipment	LoadFactor	0.34	0.34
tblOffRoadEquipment	LoadFactor	0.43	0.43
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.34	0.34
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Crawler Tractors
tblOffRoadEquipment	OffRoadEquipmentType		Crawler Tractors
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Tractors
tblOffRoadEquipment	OffRoadEquipmentType		Concrete/Industrial Saws
tblOffRoadEquipment	OffRoadEquipmentType		Other General Industrial Equipment

tblOffRoadEquipment	OffRoadEquipmentType		Crawler Tractors
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Other General Industrial Equipment
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	UsageHours	8.00	0.14
tblOffRoadEquipment	UsageHours	8.00	0.49
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.49
tblProjectCharacteristics	OperationalYear	2018	2040
tblTripsAndVMT	HaulingTripNumber	152.00	72.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	38.00	70.00

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					
2035	0.0188	0.0458	0.1333	5.4000e-004	0.0279	1.3300e-003	0.0292	6.9700e-003	1.3200e-003	8.2900e-003	0.0000	52.2467	52.2467	2.0200e-003	0.0000	52.2971
2036	9.6300e-003	0.0235	0.0682	2.8000e-004	0.0159	6.8000e-004	0.0166	3.7800e-003	6.8000e-004	4.4600e-003	0.0000	26.7309	26.7309	1.0300e-003	0.0000	26.7566
Maximum	**0.0188**	**0.0458**	**0.1333**	**5.4000e-004**	**0.0279**	**1.3300e-003**	**0.0292**	**6.9700e-003**	**1.3200e-003**	**8.2900e-003**	**0.0000**	**52.2467**	**52.2467**	**2.0200e-003**	**0.0000**	**52.2971**

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					
2035	0.0188	0.0458	0.1333	5.4000e-004	0.0262	1.3300e-003	0.0276	6.7900e-003	1.3200e-003	8.1100e-003	0.0000	52.2466	52.2466	2.0200e-003	0.0000	52.2970
2036	9.6300e-003	0.0235	0.0682	2.8000e-004	0.0143	6.8000e-004	0.0150	3.6000e-003	6.8000e-004	4.2800e-003	0.0000	26.7308	26.7308	1.0300e-003	0.0000	26.7566
Maximum	**0.0188**	**0.0458**	**0.1333**	**5.4000e-004**	**0.0262**	**1.3300e-003**	**0.0276**	**6.7900e-003**	**1.3200e-003**	**8.1100e-003**	**0.0000**	**52.2466**	**52.2466**	**2.0200e-003**	**0.0000**	**52.2970**

	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**	**7.49**	**0.00**	**7.16**	**3.35**	**0.00**	**2.82**	**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	9-3-2035	12-2-2035	0.0492	0.0492
2	12-3-2035	3-2-2036	0.0484	0.0484
		Highest	0.0492	0.0492

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	0.0220	0.0000	5.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.1000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0220**	**0.0000**	**5.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.1000e-004**	**1.1000e-004**	**0.0000**	**0.0000**	**1.1000e-004**

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	0.0220	0.0000	5.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.1000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0220**	**0.0000**	**5.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.1000e-004**	**1.1000e-004**	**0.0000**	**0.0000**	**1.1000e-004**

	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	Grading	Grading	9/3/2035	2/29/2036	5	130	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 5.28

Acres of Paving: 5.9

Residential Indoor: 0; Residential Outdoor: 0; 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
Grading	Excavators	1	0.14	158	0.38
Grading	Excavators	1	0.49	158	0.38
Grading	Graders	0	0.00	0	0.00
Grading	Rubber Tired Dozers	0	0.00	0	0.00
Grading	Cranes	1	0.34	231	0.29
Grading	Tractors/Loaders/Backhoes	2	0.49	97	0.37
Grading	Crawler Tractors	1	0.34	212	0.43
Grading	Crawler Tractors	1	0.14	212	0.43
Grading	Off-Highway Tractors	2	0.34	124	0.44
Grading	Concrete/Industrial Saws	1	0.49	10	0.73
Grading	Other General Industrial Equipment	2	0.17	20	0.34
Grading	Crawler Tractors	1	0.17	700	0.43
Grading	Off-Highway Trucks	1	3.00	402	0.38
Grading	Other General Industrial Equipment	1	0.14	20	0.34

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
Grading	15	70.00	2.00	72.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Clean Paved Roads

3.2 Grading - 2035

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					2.9800e-003	0.0000	2.9800e-003	3.3000e-004	0.0000	3.3000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0144	0.0344	0.0982	3.4000e-004		1.2300e-003	1.2300e-003		1.2300e-003	1.2300e-003	0.0000	33.7649	33.7649	1.1400e-003	0.0000	33.7933
Total	**0.0144**	**0.0344**	**0.0982**	**3.4000e-004**	**2.9800e-003**	**1.2300e-003**	**4.2100e-003**	**3.3000e-004**	**1.2300e-003**	**1.5600e-003**	**0.0000**	**33.7649**	**33.7649**	**1.1400e-003**	**0.0000**	**33.7933**

3.2 Grading - 2035

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	1.1000e-004	3.4200e-003	3.2200e-003	2.0000e-005	5.5000e-004	1.0000e-005	5.6000e-004	1.5000e-004	1.0000e-005	1.5000e-004	0.0000	1.7748	1.7748	4.2000e-004	0.0000	1.7854
Vendor	1.5000e-004	6.0800e-003	3.0000e-003	2.0000e-005	5.6000e-004	1.0000e-005	5.7000e-004	1.6000e-004	1.0000e-005	1.7000e-004	0.0000	2.0855	2.0855	3.1000e-004	0.0000	2.0932
Worker	4.1600e-003	1.9800e-003	0.0289	1.6000e-004	0.0238	9.0000e-005	0.0239	6.3300e-003	8.0000e-005	6.4100e-003	0.0000	14.6215	14.6215	1.5000e-004	0.0000	14.6252
Total	**4.4200e-003**	**0.0115**	**0.0351**	**2.0000e-004**	**0.0249**	**1.1000e-004**	**0.0250**	**6.6400e-003**	**1.0000e-004**	**6.7300e-003**	**0.0000**	**18.4818**	**18.4818**	**8.8000e-004**	**0.0000**	**18.5037**

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					1.3400e-003	0.0000	1.3400e-003	1.5000e-004	0.0000	1.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0144	0.0344	0.0982	3.4000e-004		1.2300e-003	1.2300e-003		1.2300e-003	1.2300e-003	0.0000	33.7648	33.7648	1.1400e-003	0.0000	33.7933
Total	**0.0144**	**0.0344**	**0.0982**	**3.4000e-004**	**1.3400e-003**	**1.2300e-003**	**2.5700e-003**	**1.5000e-004**	**1.2300e-003**	**1.3800e-003**	**0.0000**	**33.7648**	**33.7648**	**1.1400e-003**	**0.0000**	**33.7933**

3.2 Grading - 2035

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	1.1000e-004	3.4200e-003	3.2200e-003	2.0000e-005	5.5000e-004	1.0000e-005	5.6000e-004	1.5000e-004	1.0000e-005	1.5000e-004	0.0000	1.7748	1.7748	4.2000e-004	0.0000	1.7854
Vendor	1.5000e-004	6.0800e-003	3.0000e-003	2.0000e-005	5.6000e-004	1.0000e-005	5.7000e-004	1.6000e-004	1.0000e-005	1.7000e-004	0.0000	2.0855	2.0855	3.1000e-004	0.0000	2.0932
Worker	4.1600e-003	1.9800e-003	0.0289	1.6000e-004	0.0238	9.0000e-005	0.0239	6.3300e-003	8.0000e-005	6.4100e-003	0.0000	14.6215	14.6215	1.5000e-004	0.0000	14.6252
Total	**4.4200e-003**	**0.0115**	**0.0351**	**2.0000e-004**	**0.0249**	**1.1000e-004**	**0.0250**	**6.6400e-003**	**1.0000e-004**	**6.7300e-003**	**0.0000**	**18.4818**	**18.4818**	**8.8000e-004**	**0.0000**	**18.5037**

3.2 Grading - 2036

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					2.9800e-003	0.0000	2.9800e-003	3.3000e-004	0.0000	3.3000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.3600e-003	0.0176	0.0502	1.8000e-004		6.3000e-004	6.3000e-004		6.3000e-004	6.3000e-004	0.0000	17.2751	17.2751	5.8000e-004	0.0000	17.2896
Total	**7.3600e-003**	**0.0176**	**0.0502**	**1.8000e-004**	**2.9800e-003**	**6.3000e-004**	**3.6100e-003**	**3.3000e-004**	**6.3000e-004**	**9.6000e-004**	**0.0000**	**17.2751**	**17.2751**	**5.8000e-004**	**0.0000**	**17.2896**

3.2 Grading - 2036

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	6.0000e-005	1.7500e-003	1.6500e-003	1.0000e-005	5.1000e-004	0.0000	5.1000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.9081	0.9081	2.2000e-004	0.0000	0.9135
Vendor	8.0000e-005	3.1100e-003	1.5300e-003	1.0000e-005	2.9000e-004	0.0000	2.9000e-004	8.0000e-005	0.0000	9.0000e-005	0.0000	1.0670	1.0670	1.6000e-004	0.0000	1.0709
Worker	2.1300e-003	1.0100e-003	0.0148	8.0000e-005	0.0122	5.0000e-005	0.0122	3.2400e-003	4.0000e-005	3.2800e-003	0.0000	7.4807	7.4807	8.0000e-005	0.0000	7.4827
Total	**2.2700e-003**	**5.8700e-003**	**0.0180**	**1.0000e-004**	**0.0130**	**5.0000e-005**	**0.0130**	**3.4500e-003**	**4.0000e-005**	**3.5000e-003**	**0.0000**	**9.4558**	**9.4558**	**4.6000e-004**	**0.0000**	**9.4670**

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					1.3400e-003	0.0000	1.3400e-003	1.5000e-004	0.0000	1.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.3600e-003	0.0176	0.0502	1.8000e-004		6.3000e-004	6.3000e-004		6.3000e-004	6.3000e-004	0.0000	17.2750	17.2750	5.8000e-004	0.0000	17.2896
Total	**7.3600e-003**	**0.0176**	**0.0502**	**1.8000e-004**	**1.3400e-003**	**6.3000e-004**	**1.9700e-003**	**1.5000e-004**	**6.3000e-004**	**7.8000e-004**	**0.0000**	**17.2750**	**17.2750**	**5.8000e-004**	**0.0000**	**17.2896**

3.2 Grading - 2036

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	6.0000e-005	1.7500e-003	1.6500e-003	1.0000e-005	5.1000e-004	0.0000	5.1000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.9081	0.9081	2.2000e-004	0.0000	0.9135
Vendor	8.0000e-005	3.1100e-003	1.5300e-003	1.0000e-005	2.9000e-004	0.0000	2.9000e-004	8.0000e-005	0.0000	9.0000e-005	0.0000	1.0670	1.0670	1.6000e-004	0.0000	1.0709
Worker	2.1300e-003	1.0100e-003	0.0148	8.0000e-005	0.0122	5.0000e-005	0.0122	3.2400e-003	4.0000e-005	3.2800e-003	0.0000	7.4807	7.4807	8.0000e-005	0.0000	7.4827
Total	**2.2700e-003**	**5.8700e-003**	**0.0180**	**1.0000e-004**	**0.0130**	**5.0000e-005**	**0.0130**	**3.4500e-003**	**4.0000e-005**	**3.5000e-003**	**0.0000**	**9.4558**	**9.4558**	**4.6000e-004**	**0.0000**	**9.4670**

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	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
Unmitigated	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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.598130	0.035642	0.192395	0.093881	0.011711	0.005394	0.038948	0.010487	0.004523	0.001760	0.005537	0.000928	0.000663

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	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	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
NaturalGas Unmitigated	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

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.2 Energy by Land Use - NaturalGas

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0220	0.0000	5.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.1000e-004
Unmitigated	0.0220	0.0000	5.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.1000e-004

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	5.3600e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0166					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	5.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.1000e-004
Total	**0.0220**	**0.0000**	**5.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.1000e-004**	**1.1000e-004**	**0.0000**	**0.0000**	**1.1000e-004**

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	5.3600e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0166					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	5.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.1000e-004
Total	**0.0220**	**0.0000**	**5.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.1000e-004**	**1.1000e-004**	**0.0000**	**0.0000**	**1.1000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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

Mount Sutro Forest Management

San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	5.90	Acre	5.90	257,004.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	4.6	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2040
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 - Start Sept 1 2036

Land Use - 5.9 acres

Construction Phase - Sept 1 2036 to Feb 26 2037, 129 days grading

Off-road Equipment - See spreadsheet

Off-road Equipment - See spreadsheet

Trips and VMT - 35 workers: 70 one way trips a day, 1 water truck a day (vendor): 2 one way trips a day, 72 one-way haul trucks total

Grading - 1,213.96 cubic yards export, see spreadsheet, default acres of disturbance (i.e., tree removal activites)

Energy Use -

Construction Off-road Equipment Mitigation - water 2x

Mount Sutro Forest Management - San Francisco County, Annual

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstructionPhase	NumDays	20.00	129.00
tblGrading	MaterialExported	0.00	1,213.96
tblOffRoadEquipment	HorsePower	187.00	0.00
tblOffRoadEquipment	HorsePower	247.00	0.00
tblOffRoadEquipment	HorsePower	81.00	10.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	HorsePower	212.00	700.00
tblOffRoadEquipment	LoadFactor	0.41	0.00
tblOffRoadEquipment	LoadFactor	0.40	0.00
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Crawler Tractors
tblOffRoadEquipment	OffRoadEquipmentType		Crawler Tractors
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Tractors
tblOffRoadEquipment	OffRoadEquipmentType		Concrete/Industrial Saws
tblOffRoadEquipment	OffRoadEquipmentType		Other General Industrial Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Other General Industrial Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Crawler Tractors
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	UsageHours	8.00	0.10
tblOffRoadEquipment	UsageHours	8.00	0.50
tblOffRoadEquipment	UsageHours	8.00	0.00

tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.50
tblProjectCharacteristics	OperationalYear	2018	2040
tblTripsAndVMT	HaulingTripNumber	152.00	72.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripNumber	38.00	70.00

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					
2036	0.0191	0.0465	0.1345	5.5000e-004	0.0282	1.3400e-003	0.0296	7.0900e-003	1.3300e-003	8.4200e-003	0.0000	53.0873	53.0873	2.0500e-003	0.0000	53.1386
2037	8.8900e-003	0.0216	0.0627	2.6000e-004	0.0149	6.2000e-004	0.0155	3.5300e-003	6.2000e-004	4.1500e-003	0.0000	24.7338	24.7338	9.6000e-004	0.0000	24.7578
Maximum	**0.0191**	**0.0465**	**0.1345**	**5.5000e-004**	**0.0282**	**1.3400e-003**	**0.0296**	**7.0900e-003**	**1.3300e-003**	**8.4200e-003**	**0.0000**	**53.0873**	**53.0873**	**2.0500e-003**	**0.0000**	**53.1386**

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					
2036	0.0191	0.0465	0.1345	5.5000e-004	0.0267	1.3400e-003	0.0280	6.9300e-003	1.3300e-003	8.2500e-003	0.0000	53.0872	53.0872	2.0500e-003	0.0000	53.1385
2037	8.8900e-003	0.0216	0.0627	2.6000e-004	0.0134	6.2000e-004	0.0140	3.3600e-003	6.2000e-004	3.9800e-003	0.0000	24.7338	24.7338	9.6000e-004	0.0000	24.7577
Maximum	**0.0191**	**0.0465**	**0.1345**	**5.5000e-004**	**0.0267**	**1.3400e-003**	**0.0280**	**6.9300e-003**	**1.3300e-003**	**8.2500e-003**	**0.0000**	**53.0872**	**53.0872**	**2.0500e-003**	**0.0000**	**53.1385**

	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**	**7.01**	**0.00**	**6.71**	**3.11**	**0.00**	**2.70**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Mount Sutro Forest Management - San Francisco County, Annual

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	9-1-2036	11-30-2036	0.0487	0.0487
2	12-1-2036	2-28-2037	0.0474	0.0474
		Highest	0.0487	0.0487

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	0.0220	0.0000	5.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.1000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0220**	**0.0000**	**5.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.1000e-004**	**1.1000e-004**	**0.0000**	**0.0000**	**1.1000e-004**

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	0.0220	0.0000	5.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.1000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0220**	**0.0000**	**5.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.1000e-004**	**1.1000e-004**	**0.0000**	**0.0000**	**1.1000e-004**

	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	Grading	Grading	9/1/2036	2/26/2037	5	129	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4.84

Acres of Paving: 5.9

Residential Indoor: 0; Residential Outdoor: 0; 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
Grading	Cranes	1	0.30	231	0.29
Grading	Crawler Tractors	1	0.30	212	0.43
Grading	Crawler Tractors	1	0.10	212	0.43
Grading	Off-Highway Tractors	2	0.30	124	0.44
Grading	Concrete/Industrial Saws	1	0.50	10	0.73
Grading	Excavators	1	0.10	158	0.38
Grading	Excavators	1	0.50	158	0.38
Grading	Graders	0	0.00	0	0.00
Grading	Other General Industrial Equipment	2	0.20	20	0.34
Grading	Other General Industrial Equipment	1	0.10	20	0.34
Grading	Off-Highway Trucks	1	3.00	402	0.38
Grading	Crawler Tractors	1	0.20	700	0.43
Grading	Rubber Tired Dozers	0	0.00	0	0.00
Grading	Tractors/Loaders/Backhoes	2	0.50	97	0.37

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
Grading	15	70.00	2.00	72.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2036

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					2.7500e-003	0.0000	2.7500e-003	3.0000e-004	0.0000	3.0000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0146	0.0347	0.0985	3.5000e-004		1.2300e-003	1.2300e-003		1.2300e-003	1.2300e-003	0.0000	34.1616	34.1616	1.1500e-003	0.0000	34.1904
Total	**0.0146**	**0.0347**	**0.0985**	**3.5000e-004**	**2.7500e-003**	**1.2300e-003**	**3.9800e-003**	**3.0000e-004**	**1.2300e-003**	**1.5300e-003**	**0.0000**	**34.1616**	**34.1616**	**1.1500e-003**	**0.0000**	**34.1904**

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	1.2000e-004	3.5300e-003	3.3200e-003	2.0000e-005	5.6000e-004	1.0000e-005	5.6000e-004	1.5000e-004	1.0000e-005	1.5000e-004	0.0000	1.8302	1.8302	4.4000e-004	0.0000	1.8411
Vendor	1.5000e-004	6.2200e-003	3.0700e-003	2.0000e-005	5.8000e-004	1.0000e-005	5.8000e-004	1.7000e-004	1.0000e-005	1.7000e-004	0.0000	2.1340	2.1340	3.1000e-004	0.0000	2.1419
Worker	4.2600e-003	2.0200e-003	0.0296	1.7000e-004	0.0243	9.0000e-005	0.0244	6.4700e-003	9.0000e-005	6.5600e-003	0.0000	14.9615	14.9615	1.5000e-004	0.0000	14.9653
Total	**4.5300e-003**	**0.0118**	**0.0360**	**2.1000e-004**	**0.0255**	**1.1000e-004**	**0.0256**	**6.7900e-003**	**1.1000e-004**	**6.8800e-003**	**0.0000**	**18.9257**	**18.9257**	**9.0000e-004**	**0.0000**	**18.9482**

3.2 Grading - 2036

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					1.2400e-003	0.0000	1.2400e-003	1.4000e-004	0.0000	1.4000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0146	0.0347	0.0985	3.5000e-004		1.2300e-003	1.2300e-003		1.2300e-003	1.2300e-003	0.0000	34.1616	34.1616	1.1500e-003	0.0000	34.1903
Total	**0.0146**	**0.0347**	**0.0985**	**3.5000e-004**	**1.2400e-003**	**1.2300e-003**	**2.4700e-003**	**1.4000e-004**	**1.2300e-003**	**1.3700e-003**	**0.0000**	**34.1616**	**34.1616**	**1.1500e-003**	**0.0000**	**34.1903**

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	1.2000e-004	3.5300e-003	3.3200e-003	2.0000e-005	5.6000e-004	1.0000e-005	5.6000e-004	1.5000e-004	1.0000e-005	1.5000e-004	0.0000	1.8302	1.8302	4.4000e-004	0.0000	1.8411
Vendor	1.5000e-004	6.2200e-003	3.0700e-003	2.0000e-005	5.8000e-004	1.0000e-005	5.8000e-004	1.7000e-004	1.0000e-005	1.7000e-004	0.0000	2.1340	2.1340	3.1000e-004	0.0000	2.1419
Worker	4.2600e-003	2.0200e-003	0.0296	1.7000e-004	0.0243	9.0000e-005	0.0244	6.4700e-003	9.0000e-005	6.5600e-003	0.0000	14.9615	14.9615	1.5000e-004	0.0000	14.9653
Total	**4.5300e-003**	**0.0118**	**0.0360**	**2.1000e-004**	**0.0255**	**1.1000e-004**	**0.0256**	**6.7900e-003**	**1.1000e-004**	**6.8800e-003**	**0.0000**	**18.9257**	**18.9257**	**9.0000e-004**	**0.0000**	**18.9482**

3.2 Grading - 2037

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					2.7500e-003	0.0000	2.7500e-003	3.0000e-004	0.0000	3.0000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.7800e-003	0.0162	0.0459	1.6000e-004		5.7000e-004	5.7000e-004		5.7000e-004	5.7000e-004	0.0000	15.9162	15.9162	5.4000e-004	0.0000	15.9296
Total	**6.7800e-003**	**0.0162**	**0.0459**	**1.6000e-004**	**2.7500e-003**	**5.7000e-004**	**3.3200e-003**	**3.0000e-004**	**5.7000e-004**	**8.7000e-004**	**0.0000**	**15.9162**	**15.9162**	**5.4000e-004**	**0.0000**	**15.9296**

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	5.0000e-005	1.6400e-003	1.5400e-003	1.0000e-005	5.0000e-004	0.0000	5.1000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.8527	0.8527	2.0000e-004	0.0000	0.8578
Vendor	7.0000e-005	2.9000e-003	1.4300e-003	1.0000e-005	2.7000e-004	0.0000	2.7000e-004	8.0000e-005	0.0000	8.0000e-005	0.0000	0.9943	0.9943	1.5000e-004	0.0000	0.9979
Worker	1.9900e-003	9.4000e-004	0.0138	8.0000e-005	0.0113	4.0000e-005	0.0114	3.0200e-003	4.0000e-005	3.0600e-003	0.0000	6.9707	6.9707	7.0000e-005	0.0000	6.9725
Total	**2.1100e-003**	**5.4800e-003**	**0.0168**	**1.0000e-004**	**0.0121**	**4.0000e-005**	**0.0122**	**3.2300e-003**	**4.0000e-005**	**3.2700e-003**	**0.0000**	**8.8176**	**8.8176**	**4.2000e-004**	**0.0000**	**8.8282**

3.2 Grading - 2037

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					1.2400e-003	0.0000	1.2400e-003	1.4000e-004	0.0000	1.4000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.7800e-003	0.0162	0.0459	1.6000e-004		5.7000e-004	5.7000e-004		5.7000e-004	5.7000e-004	0.0000	15.9162	15.9162	5.4000e-004	0.0000	15.9296
Total	**6.7800e-003**	**0.0162**	**0.0459**	**1.6000e-004**	**1.2400e-003**	**5.7000e-004**	**1.8100e-003**	**1.4000e-004**	**5.7000e-004**	**7.1000e-004**	**0.0000**	**15.9162**	**15.9162**	**5.4000e-004**	**0.0000**	**15.9296**

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	5.0000e-005	1.6400e-003	1.5400e-003	1.0000e-005	5.0000e-004	0.0000	5.1000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.8527	0.8527	2.0000e-004	0.0000	0.8578
Vendor	7.0000e-005	2.9000e-003	1.4300e-003	1.0000e-005	2.7000e-004	0.0000	2.7000e-004	8.0000e-005	0.0000	8.0000e-005	0.0000	0.9943	0.9943	1.5000e-004	0.0000	0.9979
Worker	1.9900e-003	9.4000e-004	0.0138	8.0000e-005	0.0113	4.0000e-005	0.0114	3.0200e-003	4.0000e-005	3.0600e-003	0.0000	6.9707	6.9707	7.0000e-005	0.0000	6.9725
Total	**2.1100e-003**	**5.4800e-003**	**0.0168**	**1.0000e-004**	**0.0121**	**4.0000e-005**	**0.0122**	**3.2300e-003**	**4.0000e-005**	**3.2700e-003**	**0.0000**	**8.8176**	**8.8176**	**4.2000e-004**	**0.0000**	**8.8282**

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	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
Unmitigated	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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.598130	0.035642	0.192395	0.093881	0.011711	0.005394	0.038948	0.010487	0.004523	0.001760	0.005537	0.000928	0.000663

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	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	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
NaturalGas Unmitigated	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

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					
Other Non-Asphalt Surfaces	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
Total		**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**

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0220	0.0000	5.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.1000e-004
Unmitigated	0.0220	0.0000	5.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.1000e-004

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	5.3600e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0166					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	5.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.1000e-004
Total	**0.0220**	**0.0000**	**5.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.1000e-004**	**1.1000e-004**	**0.0000**	**0.0000**	**1.1000e-004**

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	5.3600e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0166					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	5.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.1000e-004	1.1000e-004	0.0000	0.0000	1.1000e-004
Total	**0.0220**	**0.0000**	**5.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.1000e-004**	**1.1000e-004**	**0.0000**	**0.0000**	**1.1000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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 4.2

Air Quality, Greenhouse Gases, and Carbon Sequestration Support Information

Carbon Sequestration Report

UCSF-VMP DEIR
Standing Forest Carbon Estimation
Mount Sutro Open Space Reserve
February 2017

Joseph McGuire, RPF
Buena Vista Services, LLC

Methods

The standing forest carbon on the Reserve was initially estimated in 2015 by HortScience. Plot data was analyzed and additional plots were determined to be necessary to help lower the Standard Error (SE) sufficiently to support a robust estimate of standing carbon. HortScience had measured 11, 1/5-acre fixed radius plots. An additional 8 randomly assigned plots were measured in 2017 by RPF Joe McGuire from Buena Vista Services (BVS). The SE was lowered to 5% (Table 1) and the additional plots also provided a larger distribution of samples to account for variability within forest types. Conditions were still similar enough that it was deemed appropriate to combine data sets. A four-class map of the 64-acre forest was developed by HortScience using existing aerial photography and ground verification. This type map was deemed sufficient for use in the additional measurement effort. Refer to Sutro Reserve Carbon Plot Map.

Sampling was treated as a stratified inventory. The project area was stratified into four cover classes:

- Type 1. 24 ac. Dense stands dominated by blue gum with some blackwood acacia
- Type 2. 9 ac. Sparse stands dominated by blue gum with some Monterey pine
- Type 3. 8 ac. Moderate stands dominated by blue gum with blackwood acacia
- Type 4. 18 ac. Moderate stands dominated by blue gum
- Summit Area. 5 ac. Not sampled

All trees 2" DBH and larger were recorded by species, condition and live crown ration. Diameters at breast height (DBH) were measured within slope-corrected circular 1/5 acre plots (37.2' in diameter). Cubic foot volume equations requiring DBH were sufficient for all species except coastal redwood. Although rare on the Reserve, tree heights for redwoods were estimating using regressions of diameter on total height measured on 20 trees opportunistically encountered on the Reserve. Plot centers were randomly positioned within mapped polygons in ArcGis. Plot waypoints were then uploaded to a GPS unit and plot centers were navigated to in the field, flagged in pink, labeled and measured. These plot locations can be navigated to by GPS when future re-measurements are desired.

Data Work-Up

Standing cubic foot wood volume was calculated using the following equations from USDA Forest Service Gen. Tech. Rep. PSW-GTR-160. 1997.

Blue Gum	Vol = 0.055113 (DBH^2.436870)
Acacia	Vol = 0.048490 (DBH^2.347250)
Monterey cypress	Vol = 0.035598 (DBH^2.495263)
Monterey pine	Vol = 0.019874 (DBH^2.666079)
Western plum & cherry	Vol = 0.030684 (DBH^2.560469)
Coastal redwood	Vol = exp(-6.2597+1.9976 x ln (DBH)+0.9642 x ln (HT)

(Krumland and Wensel 1975)

Biomass was calculated by applying the regional species-appropriate USFS 2009 wood densities and specific gravity values as follows:

Wood Density = specific gravity x weight of water (62.4 lbs/ft^3)
Biomass (tons) = (wood volume (ft^3) x Wood Density)/2,000
Per acre Carbon Content (C) was calculated by dividing the biomass in tons/ac by half
Total metric tons (CO_2e) were calculated by multiplying C by 3.67 (the molecular weight ratio of CO_2 to C)

Mortality
Significant eucalyptus tree mortality has been occurring for several years due to a combination of drought, insects and fungal agents. As an indication of the severity, out of 775 sampled trees, approximately 260 were either "dead" or "dying". Mortality was observed across all diameter classes in this species. By volume, this represents approximately 33% of all standing trees. Trees with 25% or less LCR were categorized as "dying" and included with the standing dead trees.

CO_2eT Estimates
When aggregating all species the following CO_2e estimates are made for the Reserve. Nearly 95% of this is eucalyptus.

Gross Forest Carbon Sequestration Estimate Methods

The CUFR Tree Carbon Calculator (CTCC) developed by the USDA provides a tool to calculate CO_2 in lbs/tree/yr by DBH class of many tree species found in the California Central Coast Region.

https://www.fs.usda.gov/ccrc/tools/tree-carbon-calculator-ctcc

Plot data was run through this model and converted to CO_2et/tree/yr and then expanded to CO_2et/ac/yr. Using only live trees (which continue growing) this provides a reasonable estimate for the annual additionality statistic which was then worked-up by stand type. Stand growth estimates are projected to year 20, and discounted (deductions made) for silvicultural prescriptions proposed in the EIR.

Proposed treatments include:
Year 1:
1.75 acres of Group Selection (GS),
14 acres of Single Tree selection (SS),
1.0 acres of Seed Tree (ST).
Year 6:
1.35 acres GS
1.35 acres ST

Refer to Sutro Reserve Carbon Plot Map and Table 2. for a presentation of the growth and treatment effects. For this analysis, biomass removals by prescription were assumed to be:
GS = 100% of stems
ST = leave 5-10 healthy dominant or co-dominant trees per acre (if present) which also equals approximately 60% of the standing biomass,
SS = targets dead and dying trees which are around 33%.

Acre-weighting by area and removal percentage were derived and used to reduce the initial stocking. Subsequent years were then grown from the post-treatment condition using the net growth data derived from the inventory.

The model estimates that prior to treatments, there were 34,070 Gross/22920 Net CO_2et present on the Reserve.

Year 1 treatments impact 3,900 CO_2et of standing forest carbon. If 40% of the cut material remains as slash and chips, the Year 1 removal/reduction from the Reserve will be approximately 2,340 CO_2et. Significantly, this represents only ~6% of the current carbon stocks which would be surpassed by growth of live trees by Year 4.

Year 6 treatments impact 1250 CO_2et of standing forest carbon, with the reductions totaling around 750 CO_2et. This reduction would be replaced in a single year of forest growth.

Planted seedlings will provide very little carbon additionality at first (~ 0.6 CO_2et), but annual growth at ~3% will eventually provide measurable carbon stocks over time.

Significantly, continued high tree mortality will be the most significant source of biomass flux over the 20-year planning horizon, and a wildfire would be the most extreme case of carbon loss.

No estimations of grass and shrub were made, but would be a minor component of the carbon totals and would likely remain fairly constant over time.

Over the 20-year planning horizon, the Reserve is expected to accrue 13,665 CO2eT (+/- 680 CO2eT/yr including treatment reductions totaling 2,990 CO2eT) and reach 47,735 CO2eT in the year 2038. Additional treatments, chip decay and planting will

alter this estimation, but if living trees continuously replace dying ones, the trend will remain positive absent a stand-destroying wildfire or other sudden effect.

Limitations

This was not a sampling scheme designed to achieve a particular desired standard error term, but the goal was to drop it to 5% with supplemental plots – and this was successful. A general rule in sampling is that at least 30 sample points should be collected to allow for robust error calculations and population estimates. In this case, variability was low enough to justify fewer plots that yielded a low overall SE term and provided a sufficient estimate for the study.

GHG emissions associated with equipment and chip decay over the next twenty years was not estimated due to the low intensity of the planned treatments. The standing and sequestering forest carbon on the Reserve can be adjusted following re-measurements of the plots that are stored as GPS coordinates and easily navigated to in the field.

Table 1: Sutro Reserve, Gross CO2eT Estimate error term

POST- STRATIFICATION TEST, USING FREESE DATA SET
based on CO2eT

stratum	#plots	acres	se%	meanCO2eT/ac		
1	5	24	16%	500		
2	3	9	10%	493		
3	3	8	15%	841		
4	8	18	10%	606		
Total	19	59	**5%**	577		
AT 95% CI, MEAN VOL PER ACRE =				514	to	641
			SE=	31.95		
	TOTAL POPULATION=			34,069	eT	

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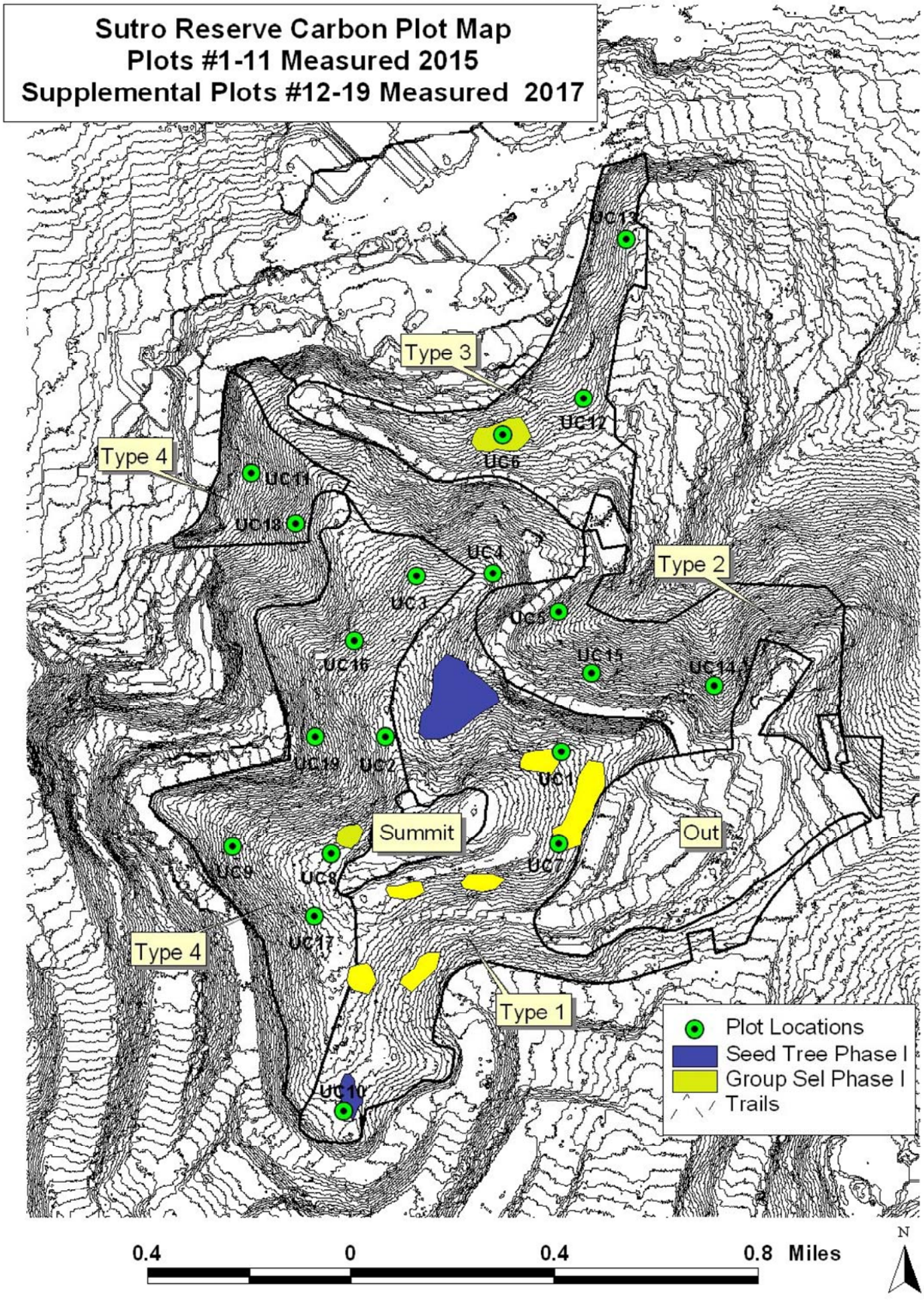

Sutro Reserve Carbon Plot Map
Plots #1-11 Measured 2015
Supplemental Plots #12-19 Measured 2017
Type 3
Type 4
Type 2
Type 4
Summit
Out
Type 1
UC13
UC12
UC6
UC11
UC18
UC4
UC3
UC5
UC16
UC15
UC14
UC19
UC2
UC1
UC9
UC8
UC7
UC17
UC10
Plot Locations
Seed Tree Phase I
Group Sel Phase I
Trails
0.4
0
0.4
0.8 Miles
N

Table 2: Sutro Reserve 20-Year Forest Carbon Estimates

Sutro Reserve 20-Year Gross Forest Carbon Estimates																															
			Gross	Net	Net	Net	*Treatment	Post-treat	year	year	year	year	year	*Treat	Post-treat	year	year	year	year	year	year	year	year	year	year	year	year	year	year	year	year
Plot#	Stratum	acres	CO2et/ac	CO2et/ac	CO2et/ac/yr	%grth	Acres	CO2et/ac	1	2	3	4	5	Acres	CO2et/ac	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1		429	318	16	3.73%		363	376	390	405	420	435		415	430	447	463	480	498	517	536	556	577	598	621	644	668	693	719	
2	1		337	128	6	1.78%		285	290	295	300	306	311		296	302	307	313	318	324	330	335	341	348	354	360	366	373	380	386	
4	1		627	420	14	2.23%		530	542	554	566	579	592		564	577	589	603	616	630	644	658	673	688	703	719	735	752	768	785	
7	1		369	170	10	2.71%		312	320	329	338	347	356		340	349	358	368	378	388	399	410	421	432	444	456	468	481	494	507	
10	1		738	478	20	2.71%		624	641	658	676	694	713		679	698	717	736	756	777	798	819	842	864	888	912	937	962	988	1015	
avg	**1**		**500**	**303**	**13**	**2.63%**	**ST:1.0, SS:5.5**	**423**	**434**	**445**	**457**	**469**	**482**	**ST:0.7**	**459**	**471**	**484**	**497**	**510**	**523**	**537**	**552**	**567**	**582**	**597**	**614**	**630**	**647**	**665**	**683**	
exp	**1**	**24**	**12000**	**7267**	**317**		**GS:1.3, pl 250**	**10142**	**10410**	**10685**	**10968**	**11259**	**11558**	**GS:0.7**	**11014**	**11307**	**11608**	**11917**	**12235**	**12562**	**12898**	**13243**	**13598**	**13963**	**14339**	**14725**	**15121**	**15530**	**15949**	**16381**	
5	2		576	375	10	1.74%		532	541	550	560	570	579		556	566	576	586	596	606	617	627	638	649	661	672	684	696	708	720	
14	2		404	128	4	0.99%		373	377	380	384	388	392		376	380	384	387	391	395	399	403	407	411	415	419	423	427	432	436	
15	2		499	280	12	2.40%		461	472	483	495	507	519		498	510	522	535	548	561	574	588	602	617	632	647	662	678	694	711	
avg	**2**		**493**	**261**	**9**	**1.71%**	**ST:0, SS:2.1**	**455**	**463**	**471**	**480**	**488**	**497**	**ST:0.23**	**477**	**485**	**494**	**503**	**512**	**521**	**530**	**539**	**549**	**559**	**569**	**579**	**590**	**600**	**611**	**622**	
exp	**2**	**9**	**4437**	**2349**	**78**		**GS: 0**	**4095**	**4167**	**4241**	**4316**	**4392**	**4470**	**GS:0.23**	**4291**	**4367**	**4444**	**4523**	**4604**	**4686**	**4770**	**4855**	**4942**	**5031**	**5122**	**5214**	**5308**	**5404**	**5502**	**5602**	
6	3		700	631	18	2.57%		619	635	651	668	685	703		671	688	706	724	743	762	781	802	822	843	865	887	910	933	957	982	
12	3		1096	812	18	1.64%		969	985	1001	1018	1034	1051		1004	1020	1037	1054	1071	1089	1107	1125	1144	1162	1182	1201	1221	1241	1261	1282	
13	3		728	636	18	2.47%		644	660	676	693	710	727		695	712	729	747	766	785	804	824	844	865	887	909	931	954	978	1002	
avg	**3**		**841**	**693**	**18**	**2.23%**	**ST:0, SS:1.9**	**744**	**760**	**776**	**793**	**810**	**827**	**ST:0.23**	**790**	**807**	**824**	**842**	**860**	**879**	**898**	**917**	**937**	**957**	**978**	**999**	**1021**	**1043**	**1065**	**1089**	
exp	**3**	**8**	**6731**	**5544**	**144**		**GS: 0.3, pl 35**	**5951**	**6078**	**6208**	**6341**	**6477**	**6616**	**GS:0.23**	**6318**	**6454**	**6593**	**6735**	**6880**	**7028**	**7180**	**7335**	**7494**	**7656**	**7822**	**7991**	**8164**	**8342**	**8523**	**8708**	
3	4		460	398	16	3.48%		421	436	451	467	483	500		490	507	524	543	561	581	601	622	644	666	689	713	738	764	790	818	
8	4		771	547	26	3.37%		706	730	754	780	806	833		817	844	873	902	932	964	996	1030	1065	1101	1138	1176	1216	1257	1299	1343	
9	4		656	595	21	3.20%		601	620	640	660	681	703		689	711	734	757	782	807	832	859	887	915	944	975	1006	1038	1071	1105	
11	4		479	205	10	2.09%		439	448	457	467	476	486		477	487	497	507	518	528	539	551	562	574	586	598	611	623	636	650	
16	4		567	363	12	2.12%		519	530	541	553	565	576		565	577	589	602	614	627	641	654	668	682	697	711	726	742	757	773	
17	4		908	553	21	2.31%		831	851	870	890	911	932		913	935	956	978	1001	1024	1048	1072	1097	1122	1148	1175	1202	1230	1258	1287	
18	4		372	319	13	3.49%		341	353	365	378	391	404		396	410	425	439	455	471	487	504	522	540	559	578	599	619	641	663	
19	4		633	468	16	2.53%		580	594	609	625	640	657		643	660	676	694	711	729	747	766	786	806	826	847	868	890	913	936	
avg	**4**		**606**	**431**	**17**	**2.82%**	**ST:0,SS:4.3**	**555**	**570**	**586**	**602**	**619**	**636**	**ST:0.23**	**624**	**641**	**659**	**678**	**697**	**716**	**737**	**757**	**779**	**801**	**823**	**847**	**871**	**895**	**921**	**947**	
exp	**4**	**18**	**10904**	**7758**	**304**		**GS: 0.1, pl 15**	**9983**	**10261**	**10548**	**10842**	**11145**	**11457**	**GS:0.23**	**11228**	**11542**	**11866**	**12199**	**12542**	**12895**	**13258**	**13632**	**14016**	**14412**	**14820**	**15240**	**15672**	**16116**	**16574**	**17045**	
avg			**577**	**388**	**14**	**2.35%**	**ST:1.0, SS:14**	**511**	**524**	**537**	**550**	**564**	**578**	**ST:1.35**	**557**	**571**	**585**	**600**	**615**	**630**	**646**	**662**	**679**	**696**	**714**	**732**	**750**	**769**	**789**	**809**	
exp		**59**	**34071**	**22918**	**843**		**GS: 1.7, pl 300**	**30172**	**30917**	**31682**	**32467**	**33273**	**34100**	**GS:1.35**	**32851**	**33670**	**34511**	**35374**	**36261**	**37171**	**38105**	**39065**	**40051**	**41063**	**42102**	**43169**	**44266**	**45392**	**46548**	**47736**	

* Year 1 Seed Tree (ST), Group Selection (GS), Single Tree Selection (SS) treatments. assumed to be performed in Year 1

Year 6 ST and GS treatments only

GS to remove ~100% of stems

ST to leave ~10 stems/ac

GS and ST to be planted in Year 1 at 110/ac

SS to target dead/dying trees

dead/dying = 32.73% by volume

pl = tree planting @110 TPA = ~585 seedlings. @2.2 lbs CO2/seedling = 0.6 CO2eT

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APPENDIX 4.2

Air Quality and Greenhouse Gases Support Information

Health Risk Assessment

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M E M O

Date: April 28, 2017

To: **Caitlin Gilleran**
Panorama Environmental, Inc.
One Embarcadero Center, Suite 740
San Francisco, CA 94111

From: James Reyff

SUBJECT: **UCSF Mount Sutro Open Space Reserve Vegetation Management Plan - Construction Health Risk Assessment**
Job#17-019

Illingworth & Rodkin, Inc. conducted a health risk assessment of construction activities associated with UCSF's forest vegetation management plan. The plan would include the removal of trees using chainsaws and hauled to landing areas using heavy equipment where they would either be chipped or loaded onto trucks and hauled off-site. Some of the chipped materials would be spread across the Reserve on areas of bare ground. After trees are felled, stumps would be ground using a stump grinder to below ground surface and covered with mulch.

The forest reserve is about 61 acres in total, with several different areas. The terrain across the reserve is complex, ranging in elevation by several hundred feet. Much of the reserve is surrounded by sensitive receptors that are mostly comprised of single-family residences. There is the hospital, an elementary school and multi-family residences.

Community Risk Impact Thresholds

The University uses the BAAQMD California Environmental Quality Act (CEQA) Air Quality Guidelines to consider exposure of sensitive receptors to air pollutant levels that result in an unacceptable cancer risk or hazard, to be significant. For cancer risk, which is a concern with diesel particulate matter (DPM) and other mobile-source TACs, the BAAQMD considers an increased risk of contracting cancer that is 10.0 in one million chances or greater, to be significant risk for a single source. The BAAQMD CEQA Guidelines also consider single-source TAC exposure to be significant if annual fine particulate matter ($PM_{2.5}$) concentrations exceed 0.3 micrograms per cubic meter ($\mu g/m^3$) or if the computed hazard index (HI) is greater than 1.0 for non-cancer risk hazards. These thresholds were used to address impacts from project TAC sources that could affect nearby sensitive receptors (e.g., residents). Receptors that are located within 1,000 feet of the project site

were considered inn this assessment. The methodology for computing cancer risk, annual $PM_{2.5}$ concentrations, and non-cancer hazards is contained in *Attachment 1*. Note that this methodology describes new guidance to computed cancer risk that was recently finalized by the State Office of Environmental Heal Hazards Assessment (OEHHA) and provides greater protections for infants and children.

Emissions Estimation

The CalEEMod modeling used to predict air pollutant emissions from forest management activities was used as the basis for the emissions used in this health risk assessment. Since the health risk assessment addresses pollutant emissions on-site or near the site, emissions from truck and worker travel within for a travel distance of one mile per trip were included. The exhaust PM10 emissions were assumed to be diesel particulate matter, which is the primary TAC of concern. Exhaust $PM_{2.5}$ and fugitive $PM_{2.5}$ emissions were used to assess annual $PM_{2.5}$ concentrations. Emissions were input to the dispersion modeling to predict annual concentrations for each year of activity (i.e., assumed to be 2017 through 2036).

The CalEEMod modeling included three different emission scenarios. The modeling outputs are included as Attachment 2. Each run includes two sets of emissions: unmitigated and mitigated. The unmitigated emissions include an inventory of construction equipment that is based on statewide characteristics, in terms of emission factors. An unmitigated run includes the effects of mitigation measures included in the LRDP and also the use of gasoline powered chainsaws. Note that CalEEMod does not have an option for modeling gasoline off-road equipment under "Unmitigated" conditions).

> Phase I, Year 1 Activities. For the purposes of this analysis, Year I, is actually one season (September to February) of activities. During Year 1, some initial, one time, grading would occur. Additionally, several management activities will occur. One of the only emission generating activities would be from tree removal under the "Forest Treatments" and "Management of Tree Risk and Defensible Space" activities. A grading scenario was also modeled for this scenario. Grading would occur at two landing areas, a new trail, and along some trails. These emissions were modeled to occur in 2017 and into 2018.
>
> Year 2 through 10 Activities. This phase assumes seasonal activities that continue from Phase 1, Year 1. These emissions were modeled to occur from 2018 through 2027.
>
> Year 11 through 20 Activities. This phase assumes seasonal activities that continue management of the forest. These emissions were modeled to occur from 2028 through 2036.

The total emissions for each phase were assumed to occur in one year, so if the model indicated two years (based on the calendar), they were added together to represent annual emissions.

Dispersion Modeling

The U.S. EPA AERMOD dispersion model was used to predict concentrations of DPM and $PM_{2.5}$ concentrations at sensitive receptors (residences, hospital and school) in the vicinity of the project construction area. The AERMOD dispersion model is a BAAQMD-recommended model for use in

modeling of these types of emission activities for CEQA projects.[1] For each phase of construction activity (or forest vegetation management), the AERMOD modeling utilized fourteen sources to represent the on-site construction emissions, seven for exhaust emissions and seven for fugitive dust emissions.

Since activities could occur throughout the forest reserve, emissions were distributed uniformly across each area source. To account for the complex terrain of the project site and surrounding area, terrain elevation data were applied to the sources and receptors. To represent the construction equipment exhaust emissions, an emission release height of 6 meters (19.7 feet) was used for the area source. The elevated source height reflects the height of the equipment exhaust pipes plus an additional distance for the height of the exhaust plume above the exhaust pipes to account for plume rise of the exhaust gases. For modeling fugitive $PM_{2.5}$ emissions, a near-ground level release height of 2 meters (6.6 feet) was used for the area source.

The emissions were based on the CalEEMod modeling with the annual tons per year emissions adjusted to grams per second per square meter. Emissions from the construction equipment and on-road vehicle travel were distributed throughout the modeled area sources. Construction emissions were modeled as occurring daily between 8 a.m. to 5 p.m., when the majority of construction activity would occur.

The modeling used a 2-year meteorological data set (2007-2008) from Mission Bay prepared for use with the AERMOD model by the California Air Resources Board (CARB). Annual DPM and $PM_{2.5}$ concentrations from construction activities during the 2017-2036 period were modeled. DPM and $PM_{2.5}$ concentrations were calculated at nearby sensitive receptors. The model incorporated terrain elevation based on USGS DEM data (7.5-minute format) referenced to NAD27. A receptor height of 1.5 meters (4.9 feet) was used to represent the breathing height of residents at the nearby single family home and patients in the hospital. A receptor height of 1 meter (3.3 feet) was used to represent the breathing height of the elementary school students.

Residential, hospital and school receptors exposed to maximum cancer risk have been identified and shown in Figure 1. The maximum modeled DPM concentrations were used to assess cancer risks. Community/Health risks also include non-cancer hazards, expressed as a Hazard Index (HI) and annual $PM_{2.5}$ concentrations. The maximum impacts for each receptor type are reported in Table 1.

Cancer Risks

Results of this assessment indicate that the maximum excess residential cancer risks would be less than 4 in a million, assuming 3rd trimester, infant and child exposure at the beginning of these activities. Note that 3rd trimester fetuses and infants are far more sensitive to cancer causing TACs. At the location of maximum impact for the hospital, maximum cancer risk was computed as 0.7 per million, assuming infant exposure. At the school, maximum cancer risk was computed as 0.1 per million, assuming child exposure over 9 years.

1 Bay Area Air Quality Management District (BAAQMD), *Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 3.0.* May. 2012

Table 1. Maximum Health/Community Risk Impacts

Receptor Type	Cancer Risk (per million)	Annual $PM_{2.5}$ ($\mu g/m^3$)	Hazard Index
Residential (infant/child, 30-year maximum exposure)	3.95	<0.01	<0.01
With LRDP mitigation	2.56	<0.01	<0.01
Hospital (infant, 1-year maximum exposure)	0.67	<0.01	<0.01
With LRDP mitigation	0.38	<0.01	<0.01
School (child 9-year maximum exposure)	0.1	<0.01	<0.01
With LRDP mitigation	<0.1	<0.01	<0.01

Predicted Annual $PM_{2.5}$ Concentration and Non-Cancer Hazards

The maximum-modeled annual $PM_{2.5}$ concentration, which is based on combined exhaust and fugitive dust emissions, was 0.006 $\mu g/m^3$ at the residential receptor with maximum exposure. This was the receptor that had the highest modeled concentration, regardless of receptor type.

The maximum computed HI based on DPM concentration would be much lower than the BAAQMD significance thresholds. The HI was found to be less than 0.01 at all the receptors.

Figure 1: Project Construction Site and Maximum TAC and $PM_{2.5}$ Impacts



Attachment 1: Health Risk Calculation Methodology

A health risk assessment (HRA) for exposure to Toxic Air Contaminates (TACs) requires the application of a risk characterization model to the results from the air dispersion model to estimate potential health risk at each sensitive receptor location. The State of California Office of Environmental Health Hazard Assessment (OEHHA) and California Air Resources Board (CARB) develop recommended methods for conducting health risk assessments. The most recent OEHHA risk assessment guidelines were published in February of 2015.[1] These guidelines incorporate substantial changes designed to provide for enhanced protection of children, as required by State law, compared to previous published risk assessment guidelines. CARB has provided additional guidance on implementing OEHHA's recommended methods.[2] This HRA used the recent 2015 OEHHA risk assessment guidelines and CARB guidance. The BAAQMD has adopted recommended procedures for applying the newest OEHHA guidelines as part of Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants.[3] Exposure parameters from the OEHHA guidelines and the recent BAAQMD HRA Guidelines were used in this evaluation.

Cancer Risk

Potential increased cancer risk from inhalation of TACs are calculated based on the TAC concentration over the period of exposure, inhalation dose, the TAC cancer potency factor, and an age sensitivity factor to reflect the greater sensitivity of infants and children to cancer causing TACs. The inhalation dose depends on a person's breathing rate, exposure time and frequency of exposure, and the exposure duration. These parameters vary depending on the age, or age range, of the persons being exposed and whether the exposure is considered to occur at a residential location or other sensitive receptor location.

The current OEHHA guidance recommends that cancer risk be calculated by age groups to account for different breathing rates and sensitivity to TACs. Specifically, they recommend evaluating risks for the third trimester of pregnancy to age zero, ages zero to less than two (infant exposure), ages two to less than 16 (child exposure), and ages 16 to 70 (adult exposure). Age sensitivity factors (ASFs) associated with the different types of exposure are an ASF of 10 for the third trimester and infant exposures, an ASF of 3 for a child exposure, and an ASF of 1 for an adult exposure. Also associated with each exposure type are different breathing rates, expressed as liters per kilogram of body weight per day (L/kg-day). As recommended by the BAAQMD, 95th percentile breathing rates are used for the third trimester and infant exposures, and 80th percentile breathing rates for child and adult exposures. Additionally, CARB and the BAAQMD recommend the use of a residential exposure duration of 30 years for sources with long-term emissions (e.g., roadways).

Under previous OEHHA and BAAQMD HRA guidance, residential receptors are assumed to be at their home 24 hours a day, or 100 percent of the time. In the 2015 Risk Assessment Guidance, OEHHA includes adjustments to exposure duration to account for the fraction of time at home (FAH), which can be less than 100 percent of the time, based on updated population and activity statistics. The FAH factors are age-specific and are: 0.85 for third trimester of pregnancy to less than 2 years old, 0.72 for ages 2 to less than 16 years, and 0.73 for ages 16 to 70 years. Use of the FAH factors is allowed by the BAAQMD if there are no schools in the project vicinity that would have a cancer risk of one in a million or greater assuming 100 percent exposure (FAH = 1.0).

---

[1] OEHHA, 2015. *Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*. Office of Environmental Health Hazard Assessment. February.

[2] CARB, 2015. *Risk Management Guidance for Stationary Sources of Air Toxics*. July 23.

[3] BAAQMD, 2016. *BAAQMD Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines*. January 2016.

Functionally, cancer risk is calculated using the following parameters and formulas:

Cancer Risk (per million) = $CPF \times Inhalation\ Dose \times ASF \times ED/AT \times FAH \times 10^{6}$

Where:

CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = $C_{air} \times DBR \times A \times (EF/365) \times 10^{-6}$

Where:

C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

The health risk parameters used in this evaluation are summarized as follows:

Parameter	*Exposure Type* →	Infant		Child		Adult
	Age Range →	3rd Trimester	0<2	2 < 9	9 < 16	16 - 30
DPM Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$		1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
Daily Breathing Rate (L/kg-day)*		361	1,090	631	572	261
Inhalation Absorption Factor		1	1	1	1	1
Averaging Time (years)		70	70	70	70	70
Residential Exposure Duration (years)		0.25	2	14	14	14
Hospital Maximum Exposure (years)		0	1	0	0	0
Elementary School Exposure (years)		0	0	9	0	0
Exposure Frequency (days/year)		350	350	350	350	350
Age Sensitivity Factor		10	10	3	3	1
Fraction of Time at Home		0.85-1.0	0.85-1.0	0.72-1.0	0.72-1.0	0.73

* 95th percentile breathing rates for 3rd trimester and infants and 80th percentile for children and adults

Non-Cancer Hazards

Potential non-cancer health hazards from TAC exposure are expressed in terms of a hazard index (HI), which is the ratio of the TAC concentration to a reference exposure level (REL). OEHHA has defined acceptable concentration levels for contaminants that pose non-cancer health hazards. TAC concentrations below the REL are not expected to cause adverse health impacts, even for sensitive individuals. The total HI is calculated as the sum of the HIs for each TAC evaluated and the total HI is compared to the BAAQMD significance thresholds to determine whether a significant non-cancer health impact from a project would occur.

Typically, for residential projects located near roadways with substantial TAC emissions, the primary TAC of concern with non-cancer health effects is diesel particulate matter (DPM). For DPM, the chronic inhalation REL is 5 micrograms per cubic meter ($\mu g/m^3$).

Annual $PM_{2.5}$ Concentrations

While not a TAC, fine particulate matter ($PM_{2.5}$) has been identified by the BAAQMD as a pollutant with potential non-cancer health effects that should be included when evaluating potential community health impacts under the California Environmental Quality Act (CEQA). The thresholds of significance for $PM_{2.5}$ (project level and cumulative) are in terms of an increase in the annual average concentration. When considering $PM_{2.5}$ impacts, the contribution from all sources of $PM_{2.5}$ emissions should be included. For projects with potential impacts from nearby local roadways, the $PM_{2.5}$ impacts should include those from vehicle exhaust emissions, $PM_{2.5}$ generated from vehicle tire and brake wear, and fugitive emissions from re-suspended dust on the roads.

Mount Sutro Project Grading

San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	1.00	Acre	1.25	43,560.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	4.6	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2019
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 - Nov 1 2017 start

Land Use - 1.25 acres grading

Construction Phase - Sept 1 to Dec 1 2017

Off-road Equipment - 1 grader, 10 hours a day

Off-road Equipment - grader (1) 6 hours a day, excavator (1) 7 hours a day

Trips and VMT - 5 crew members: 10 one way trips a day, 1 water truck: 2 one way trips a day, 2 mile lengths

Grading - defaulted 1.5 acre graded, no cut/fill

Road Dust -

Energy Use -

Construction Off-road Equipment Mitigation - water 2x per day, 15 mph, Tier 3

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblLandUse	LotAcreage	1.00	1.25
tblOffRoadEquipment	HorsePower	247.00	0.00
tblOffRoadEquipment	HorsePower	97.00	0.00
tblOffRoadEquipment	LoadFactor	0.40	0.00
tblOffRoadEquipment	LoadFactor	0.37	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblProjectCharacteristics	OperationalYear	2018	2019
tblTripsAndVMT	HaulingTripLength	20.00	2.00
tblTripsAndVMT	VendorTripLength	7.30	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripLength	10.80	2.00
tblTripsAndVMT	WorkerTripNumber	5.00	10.00

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					
2017	0.0158	0.1982	0.0981	2.1000e-004	0.0135	7.5800e-003	0.0211	1.5200e-003	6.9700e-003	8.4900e-003	0.0000	19.7960	19.7960	5.9100e-003	0.0000	19.9439
2018	7.6200e-003	0.0947	0.0512	1.1000e-004	0.0133	3.5200e-003	0.0169	1.4700e-003	3.2400e-003	4.7100e-003	0.0000	10.4186	10.4186	3.1600e-003	0.0000	10.4976
Maximum	**0.0158**	**0.1982**	**0.0981**	**2.1000e-004**	**0.0135**	**7.5800e-003**	**0.0211**	**1.5200e-003**	**6.9700e-003**	**8.4900e-003**	**0.0000**	**19.7960**	**19.7960**	**5.9100e-003**	**0.0000**	**19.9439**

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					
2017	5.4900e-003	0.1009	0.1341	2.1000e-004	6.3000e-003	4.1700e-003	0.0105	7.4000e-004	4.1700e-003	4.9200e-003	0.0000	19.7960	19.7960	5.9100e-003	0.0000	19.9438
2018	2.9000e-003	0.0539	0.0714	1.1000e-004	6.1200e-003	2.2300e-003	8.3500e-003	6.9000e-004	2.2300e-003	2.9200e-003	0.0000	10.4186	10.4186	3.1600e-003	0.0000	10.4976
Maximum	**5.4900e-003**	**0.1009**	**0.1341**	**2.1000e-004**	**6.3000e-003**	**4.1700e-003**	**0.0105**	**7.4000e-004**	**4.1700e-003**	**4.9200e-003**	**0.0000**	**19.7960**	**19.7960**	**5.9100e-003**	**0.0000**	**19.9438**

	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	**64.11**	**47.18**	**-37.74**	**0.00**	**53.74**	**42.34**	**50.40**	**52.17**	**37.32**	**40.61**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Mount Sutro Project Grading - San Francisco County, Annual

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	11-1-2017	1-31-2018	0.3153	0.1624
		Highest	0.3153	0.1624

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	3.7300e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.7300e-003**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

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	3.7300e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.7300e-003**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

	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	Grading	Grading	11/1/2017	1/31/2018	5	4	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 1.5

Acres of Paving: 1.25

Residential Indoor: 0; Residential Outdoor: 0; 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
Grading	Excavators	1	7.00	158	0.38
Grading	Graders	1	6.00	187	0.41
Grading	Rubber Tired Dozers	0	0.00	0	0.00
Grading	Tractors/Loaders/Backhoes	0	0.00	0	0.00

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
Grading	2	10.00	2.00	0.00	2.00	2.00	2.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Grading - 2017

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					0.0131	0.0000	0.0131	1.4200e-003	0.0000	1.4200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0153	0.1942	0.0944	2.0000e-004		7.5500e-003	7.5500e-003		6.9500e-003	6.9500e-003	0.0000	18.9750	18.9750	5.8100e-003	0.0000	19.1203
Total	**0.0153**	**0.1942**	**0.0944**	**2.0000e-004**	**0.0131**	**7.5500e-003**	**0.0207**	**1.4200e-003**	**6.9500e-003**	**8.3700e-003**	**0.0000**	**18.9750**	**18.9750**	**5.8100e-003**	**0.0000**	**19.1203**

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	3.8600e-003	1.4000e-003	0.0000	8.0000e-005	2.0000e-005	1.0000e-004	2.0000e-005	2.0000e-005	4.0000e-005	0.0000	0.4533	0.4533	9.0000e-005	0.0000	0.4554
Worker	3.4000e-004	1.9000e-004	2.3000e-003	0.0000	3.2000e-004	0.0000	3.2000e-004	8.0000e-005	0.0000	9.0000e-005	0.0000	0.3678	0.3678	1.0000e-005	0.0000	0.3681
Total	**4.8000e-004**	**4.0500e-003**	**3.7000e-003**	**0.0000**	**4.0000e-004**	**2.0000e-005**	**4.2000e-004**	**1.0000e-004**	**2.0000e-005**	**1.3000e-004**	**0.0000**	**0.8211**	**0.8211**	**1.0000e-004**	**0.0000**	**0.8236**

3.2 Grading - 2017

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					5.9100e-003	0.0000	5.9100e-003	6.4000e-004	0.0000	6.4000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.0100e-003	0.0968	0.1304	2.0000e-004		4.1500e-003	4.1500e-003		4.1500e-003	4.1500e-003	0.0000	18.9749	18.9749	5.8100e-003	0.0000	19.1203
Total	**5.0100e-003**	**0.0968**	**0.1304**	**2.0000e-004**	**5.9100e-003**	**4.1500e-003**	**0.0101**	**6.4000e-004**	**4.1500e-003**	**4.7900e-003**	**0.0000**	**18.9749**	**18.9749**	**5.8100e-003**	**0.0000**	**19.1203**

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	3.8600e-003	1.4000e-003	0.0000	8.0000e-005	2.0000e-005	1.0000e-004	2.0000e-005	2.0000e-005	4.0000e-005	0.0000	0.4533	0.4533	9.0000e-005	0.0000	0.4554
Worker	3.4000e-004	1.9000e-004	2.3000e-003	0.0000	3.2000e-004	0.0000	3.2000e-004	8.0000e-005	0.0000	9.0000e-005	0.0000	0.3678	0.3678	1.0000e-005	0.0000	0.3681
Total	**4.8000e-004**	**4.0500e-003**	**3.7000e-003**	**0.0000**	**4.0000e-004**	**2.0000e-005**	**4.2000e-004**	**1.0000e-004**	**2.0000e-005**	**1.3000e-004**	**0.0000**	**0.8211**	**0.8211**	**1.0000e-004**	**0.0000**	**0.8236**

3.2 Grading - 2018

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					0.0131	0.0000	0.0131	1.4200e-003	0.0000	1.4200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.3900e-003	0.0926	0.0495	1.1000e-004		3.5100e-003	3.5100e-003		3.2300e-003	3.2300e-003	0.0000	9.9849	9.9849	3.1100e-003	0.0000	10.0627
Total	**7.3900e-003**	**0.0926**	**0.0495**	**1.1000e-004**	**0.0131**	**3.5100e-003**	**0.0166**	**1.4200e-003**	**3.2300e-003**	**4.6500e-003**	**0.0000**	**9.9849**	**9.9849**	**3.1100e-003**	**0.0000**	**10.0627**

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	6.0000e-005	2.0000e-003	6.0000e-004	0.0000	4.0000e-005	1.0000e-005	5.0000e-005	1.0000e-005	1.0000e-005	2.0000e-005	0.0000	0.2426	0.2426	5.0000e-005	0.0000	0.2437
Worker	1.7000e-004	9.0000e-005	1.0900e-003	0.0000	1.7000e-004	0.0000	1.7000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.1911	0.1911	1.0000e-005	0.0000	0.1912
Total	**2.3000e-004**	**2.0900e-003**	**1.6900e-003**	**0.0000**	**2.1000e-004**	**1.0000e-005**	**2.2000e-004**	**6.0000e-005**	**1.0000e-005**	**7.0000e-005**	**0.0000**	**0.4337**	**0.4337**	**6.0000e-005**	**0.0000**	**0.4350**

3.2 Grading - 2018

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					5.9100e-003	0.0000	5.9100e-003	6.4000e-004	0.0000	6.4000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.6800e-003	0.0518	0.0698	1.1000e-004		2.2200e-003	2.2200e-003		2.2200e-003	2.2200e-003	0.0000	9.9849	9.9849	3.1100e-003	0.0000	10.0626
Total	**2.6800e-003**	**0.0518**	**0.0698**	**1.1000e-004**	**5.9100e-003**	**2.2200e-003**	**8.1300e-003**	**6.4000e-004**	**2.2200e-003**	**2.8600e-003**	**0.0000**	**9.9849**	**9.9849**	**3.1100e-003**	**0.0000**	**10.0626**

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	6.0000e-005	2.0000e-003	6.0000e-004	0.0000	4.0000e-005	1.0000e-005	5.0000e-005	1.0000e-005	1.0000e-005	2.0000e-005	0.0000	0.2426	0.2426	5.0000e-005	0.0000	0.2437
Worker	1.7000e-004	9.0000e-005	1.0900e-003	0.0000	1.7000e-004	0.0000	1.7000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.1911	0.1911	1.0000e-005	0.0000	0.1912
Total	**2.3000e-004**	**2.0900e-003**	**1.6900e-003**	**0.0000**	**2.1000e-004**	**1.0000e-005**	**2.2000e-004**	**6.0000e-005**	**1.0000e-005**	**7.0000e-005**	**0.0000**	**0.4337**	**0.4337**	**6.0000e-005**	**0.0000**	**0.4350**

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	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
Unmitigated	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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.607141	0.042057	0.190386	0.086590	0.015934	0.004793	0.026379	0.008601	0.004262	0.005315	0.007178	0.000921	0.000443

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	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	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
NaturalGas Unmitigated	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

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					
Other Non-Asphalt Surfaces	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
Total		**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**

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	3.7300e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	3.7300e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

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	9.1000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.8200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**3.7300e-003**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

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	9.1000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.8200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**3.7300e-003**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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

Mount Sutro Forest Management

San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	11.80	Acre	11.80	514,008.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	4.6	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2019
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 - Start Nov 1 2017

Land Use - 11.8 acres

Construction Phase - Nov 1 2017 to Feb 28 2018, 86 days grading

Off-road Equipment - See spreadsheet

Off-road Equipment - See spreadsheet

Trips and VMT - 35 workers: 70 one way trips a day, 1 water truck a day (vendor): 2 one way trips a day, 72 one-way haul trucks total, 2 mile trip lengths

Grading - 6,448 cubic yards export, see spreadsheet, default acres of disturbance (i.e., tree removal activites)

Energy Use -

Construction Off-road Equipment Mitigation - water 2x, 15 mph, Tier 3 engines

Mount Sutro Forest Management - San Francisco County, Annual

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstructionPhase	NumDays	30.00	86.00
tblGrading	MaterialExported	0.00	6,448.00
tblOffRoadEquipment	HorsePower	187.00	0.00
tblOffRoadEquipment	HorsePower	247.00	0.00
tblOffRoadEquipment	HorsePower	367.00	0.00
tblOffRoadEquipment	HorsePower	81.00	10.00

tblOffRoadEquipment	HorsePower	212.00	700.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	LoadFactor	0.41	0.00
tblOffRoadEquipment	LoadFactor	0.40	0.00
tblOffRoadEquipment	LoadFactor	0.48	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.60
tblOffRoadEquipment	UsageHours	8.00	2.10
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	2.10
tblProjectCharacteristics	OperationalYear	2018	2019
tblTripsAndVMT	HaulingTripLength	20.00	2.00
tblTripsAndVMT	HaulingTripNumber	806.00	72.00
tblTripsAndVMT	VendorTripLength	7.30	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripLength	10.80	2.00
tblTripsAndVMT	WorkerTripNumber	38.00	70.00

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					
2017	0.0270	0.2861	0.1687	3.4000e-004	0.0101	0.0129	0.0230	1.5100e-003	0.0118	0.0133	0.0000	31.8415	31.8415	9.0000e-003	0.0000	32.0664
2018	0.0237	0.2476	0.1585	3.4000e-004	0.0101	0.0108	0.0210	1.5100e-003	9.9600e-003	0.0115	0.0000	31.3099	31.3099	8.9800e-003	0.0000	31.5344
Maximum	**0.0270**	**0.2861**	**0.1687**	**3.4000e-004**	**0.0101**	**0.0129**	**0.0230**	**1.5100e-003**	**0.0118**	**0.0133**	**0.0000**	**31.8415**	**31.8415**	**9.0000e-003**	**0.0000**	**32.0664**

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					
2017	0.0101	0.1555	0.2053	3.4000e-004	5.8500e-003	6.6600e-003	0.0125	1.0200e-003	6.6500e-003	7.6800e-003	0.0000	31.8414	31.8414	9.0000e-003	0.0000	32.0664
2018	9.8200e-003	0.1552	0.2031	3.4000e-004	5.8500e-003	6.6500e-003	0.0125	1.0200e-003	6.6500e-003	7.6700e-003	0.0000	31.3098	31.3098	8.9800e-003	0.0000	31.5344
Maximum	**0.0101**	**0.1555**	**0.2053**	**3.4000e-004**	**5.8500e-003**	**6.6600e-003**	**0.0125**	**1.0200e-003**	**6.6500e-003**	**7.6800e-003**	**0.0000**	**31.8414**	**31.8414**	**9.0000e-003**	**0.0000**	**32.0664**

	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	**60.78**	**41.78**	**-24.80**	**0.00**	**42.31**	**43.79**	**43.09**	**32.45**	**38.96**	**38.13**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Mount Sutro Forest Management - San Francisco County, Annual

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	11-1-2017	1-31-2018	0.4572	0.2530
2	2-1-2018	4-30-2018	0.1262	0.0768
		Highest	0.4572	0.2530

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

	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	Grading	Grading	11/1/2017	2/28/2018	5	86	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 12.9

Acres of Paving: 11.8

Residential Indoor: 0; Residential Outdoor: 0; 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
Grading	Concrete/Industrial Saws	1	2.10	10	0.73
Grading	Cranes	1	1.50	231	0.29
Grading	Crawler Tractors	1	1.50	212	0.43
Grading	Crawler Tractors	1	0.60	212	0.43
Grading	Crawler Tractors	1	0.30	700	0.43
Grading	Excavators	1	0.60	158	0.38
Grading	Excavators	1	2.10	158	0.38
Grading	Graders	0	0.00	0	0.00
Grading	Off-Highway Tractors	2	1.50	124	0.44
Grading	Off-Highway Trucks	1	3.00	402	0.38
Grading	Other General Industrial Equipment	1	0.60	20	0.34
Grading	Other General Industrial Equipment	2	0.30	20	0.34
Grading	Rubber Tired Dozers	0	0.00	0	0.00
Grading	Scrapers	0	0.00	0	0.00
Grading	Tractors/Loaders/Backhoes	2	2.10	97	0.37

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
Grading	15	70.00	2.00	72.00	2.00	2.00	2.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Grading - 2017

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					7.7900e-003	0.0000	7.7900e-003	8.8000e-004	0.0000	8.8000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0244	0.2784	0.1506	3.1000e-004		0.0128	0.0128		0.0118	0.0118	0.0000	28.5342	28.5342	8.7400e-003	0.0000	28.7528
Total	**0.0244**	**0.2784**	**0.1506**	**3.1000e-004**	**7.7900e-003**	**0.0128**	**0.0206**	**8.8000e-004**	**0.0118**	**0.0127**	**0.0000**	**28.5342**	**28.5342**	**8.7400e-003**	**0.0000**	**28.7528**

3.2 Grading - 2017

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	7.0000e-005	2.4900e-003	6.7000e-004	0.0000	5.0000e-005	1.0000e-005	6.0000e-005	1.0000e-005	1.0000e-005	2.0000e-005	0.0000	0.2797	0.2797	7.0000e-005	0.0000	0.2814
Vendor	1.4000e-004	3.8600e-003	1.4000e-003	0.0000	8.0000e-005	2.0000e-005	1.0000e-004	2.0000e-005	2.0000e-005	4.0000e-005	0.0000	0.4533	0.4533	9.0000e-005	0.0000	0.4554
Worker	2.3900e-003	1.3500e-003	0.0161	3.0000e-005	2.2100e-003	2.0000e-005	2.2400e-003	5.9000e-004	2.0000e-005	6.1000e-004	0.0000	2.5742	2.5742	1.0000e-004	0.0000	2.5768
Total	**2.6000e-003**	**7.7000e-003**	**0.0182**	**3.0000e-005**	**2.3400e-003**	**5.0000e-005**	**2.4000e-003**	**6.2000e-004**	**5.0000e-005**	**6.7000e-004**	**0.0000**	**3.3073**	**3.3073**	**2.6000e-004**	**0.0000**	**3.3136**

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					3.5100e-003	0.0000	3.5100e-003	4.0000e-004	0.0000	4.0000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.4900e-003	0.1478	0.1872	3.1000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003	0.0000	28.5342	28.5342	8.7400e-003	0.0000	28.7527
Total	**7.4900e-003**	**0.1478**	**0.1872**	**3.1000e-004**	**3.5100e-003**	**6.6100e-003**	**0.0101**	**4.0000e-004**	**6.6100e-003**	**7.0100e-003**	**0.0000**	**28.5342**	**28.5342**	**8.7400e-003**	**0.0000**	**28.7527**

3.2 Grading - 2017

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	7.0000e-005	2.4900e-003	6.7000e-004	0.0000	5.0000e-005	1.0000e-005	6.0000e-005	1.0000e-005	1.0000e-005	2.0000e-005	0.0000	0.2797	0.2797	7.0000e-005	0.0000	0.2814
Vendor	1.4000e-004	3.8600e-003	1.4000e-003	0.0000	8.0000e-005	2.0000e-005	1.0000e-004	2.0000e-005	2.0000e-005	4.0000e-005	0.0000	0.4533	0.4533	9.0000e-005	0.0000	0.4554
Worker	2.3900e-003	1.3500e-003	0.0161	3.0000e-005	2.2100e-003	2.0000e-005	2.2400e-003	5.9000e-004	2.0000e-005	6.1000e-004	0.0000	2.5742	2.5742	1.0000e-004	0.0000	2.5768
Total	**2.6000e-003**	**7.7000e-003**	**0.0182**	**3.0000e-005**	**2.3400e-003**	**5.0000e-005**	**2.4000e-003**	**6.2000e-004**	**5.0000e-005**	**6.7000e-004**	**0.0000**	**3.3073**	**3.3073**	**2.6000e-004**	**0.0000**	**3.3136**

3.2 Grading - 2018

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					7.7900e-003	0.0000	7.7900e-003	8.8000e-004	0.0000	8.8000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0214	0.2402	0.1426	3.1000e-004		0.0108	0.0108		9.9100e-003	9.9100e-003	0.0000	28.0755	28.0755	8.7400e-003	0.0000	28.2940
Total	**0.0214**	**0.2402**	**0.1426**	**3.1000e-004**	**7.7900e-003**	**0.0108**	**0.0186**	**8.8000e-004**	**9.9100e-003**	**0.0108**	**0.0000**	**28.0755**	**28.0755**	**8.7400e-003**	**0.0000**	**28.2940**

3.2 Grading - 2018

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	5.0000e-005	2.4200e-003	4.9000e-004	0.0000	5.0000e-005	1.0000e-005	6.0000e-005	1.0000e-005	0.0000	2.0000e-005	0.0000	0.2803	0.2803	7.0000e-005	0.0000	0.2820
Vendor	1.1000e-004	3.7500e-003	1.1100e-003	0.0000	8.0000e-005	1.0000e-005	9.0000e-005	2.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.4535	0.4535	8.0000e-005	0.0000	0.4557
Worker	2.1600e-003	1.1800e-003	0.0143	3.0000e-005	2.2100e-003	2.0000e-005	2.2400e-003	5.9000e-004	2.0000e-005	6.1000e-004	0.0000	2.5005	2.5005	9.0000e-005	0.0000	2.5028
Total	**2.3200e-003**	**7.3500e-003**	**0.0159**	**3.0000e-005**	**2.3400e-003**	**4.0000e-005**	**2.3900e-003**	**6.2000e-004**	**3.0000e-005**	**6.7000e-004**	**0.0000**	**3.2343**	**3.2343**	**2.4000e-004**	**0.0000**	**3.2404**

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					3.5100e-003	0.0000	3.5100e-003	4.0000e-004	0.0000	4.0000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.4900e-003	0.1478	0.1872	3.1000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003	0.0000	28.0755	28.0755	8.7400e-003	0.0000	28.2940
Total	**7.4900e-003**	**0.1478**	**0.1872**	**3.1000e-004**	**3.5100e-003**	**6.6100e-003**	**0.0101**	**4.0000e-004**	**6.6100e-003**	**7.0100e-003**	**0.0000**	**28.0755**	**28.0755**	**8.7400e-003**	**0.0000**	**28.2940**

3.2 Grading - 2018

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	5.0000e-005	2.4200e-003	4.9000e-004	0.0000	5.0000e-005	1.0000e-005	6.0000e-005	1.0000e-005	0.0000	2.0000e-005	0.0000	0.2803	0.2803	7.0000e-005	0.0000	0.2820
Vendor	1.1000e-004	3.7500e-003	1.1100e-003	0.0000	8.0000e-005	1.0000e-005	9.0000e-005	2.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.4535	0.4535	8.0000e-005	0.0000	0.4557
Worker	2.1600e-003	1.1800e-003	0.0143	3.0000e-005	2.2100e-003	2.0000e-005	2.2400e-003	5.9000e-004	2.0000e-005	6.1000e-004	0.0000	2.5005	2.5005	9.0000e-005	0.0000	2.5028
Total	**2.3200e-003**	**7.3500e-003**	**0.0159**	**3.0000e-005**	**2.3400e-003**	**4.0000e-005**	**2.3900e-003**	**6.2000e-004**	**3.0000e-005**	**6.7000e-004**	**0.0000**	**3.2343**	**3.2343**	**2.4000e-004**	**0.0000**	**3.2404**

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	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
Unmitigated	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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.607141	0.042057	0.190386	0.086590	0.015934	0.004793	0.026379	0.008601	0.004262	0.005315	0.007178	0.000921	0.000443

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	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	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
NaturalGas Unmitigated	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

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.2 Energy by Land Use - NaturalGas

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004
Unmitigated	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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

Mount Sutro Forest Management

San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	11.80	Acre	11.80	514,008.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	4.6	**Precipitation Freq (Days)**	64
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 - Start Sept 3 2018

Land Use - 11.8 acres

Construction Phase - Sept 3 2018 to Feb 28 2019, 129 days grading

Off-road Equipment - See spreadsheet

Off-road Equipment - See spreadsheet

Trips and VMT - 35 workers: 70 one way trips a day, 1 water truck a day (vendor): 2 one way trips a day, 72 one-way haul trucks total, 2 mile trip lengths

Grading - 3,985 cubic yards export, see spreadsheet, default acres of disturbance (i.e., tree removal activites)

Energy Use -

Construction Off-road Equipment Mitigation - water 2x, 15 mph, Tier 3 engines

Mount Sutro Forest Management - San Francisco County, Annual

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstructionPhase	NumDays	30.00	129.00
tblGrading	MaterialExported	0.00	3,985.00
tblOffRoadEquipment	HorsePower	187.00	0.00
tblOffRoadEquipment	HorsePower	247.00	0.00
tblOffRoadEquipment	HorsePower	367.00	0.00
tblOffRoadEquipment	HorsePower	81.00	10.00
tblOffRoadEquipment	HorsePower	212.00	700.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	HorsePower	88.00	20.00

tblOffRoadEquipment	LoadFactor	0.41	0.00
tblOffRoadEquipment	LoadFactor	0.40	0.00
tblOffRoadEquipment	LoadFactor	0.48	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.40
tblOffRoadEquipment	UsageHours	8.00	1.40
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	1.40
tblProjectCharacteristics	OperationalYear	2018	2020
tblTripsAndVMT	HaulingTripLength	20.00	2.00
tblTripsAndVMT	HaulingTripNumber	498.00	72.00
tblTripsAndVMT	VendorTripLength	7.30	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripLength	10.80	2.00
tblTripsAndVMT	WorkerTripNumber	38.00	70.00

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					
2018	0.0373	0.3782	0.2442	5.5000e-004	0.0121	0.0161	0.0282	2.0700e-003	0.0148	0.0169	0.0000	50.1992	50.1992	0.0141	0.0000	50.5520
2019	0.0170	0.1683	0.1173	2.7000e-004	9.7700e-003	7.0300e-003	0.0168	1.4500e-003	6.4700e-003	7.9300e-003	0.0000	24.6572	24.6572	7.0400e-003	0.0000	24.8331
Maximum	**0.0373**	**0.3782**	**0.2442**	**5.5000e-004**	**0.0121**	**0.0161**	**0.0282**	**2.0700e-003**	**0.0148**	**0.0169**	**0.0000**	**50.1992**	**50.1992**	**0.0141**	**0.0000**	**50.5520**

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					
2018	0.0163	0.2438	0.3187	5.5000e-004	7.9800e-003	0.0102	0.0182	1.6100e-003	0.0102	0.0118	0.0000	50.1991	50.1991	0.0141	0.0000	50.5519
2019	7.9600e-003	0.1216	0.1578	2.7000e-004	5.6900e-003	5.0800e-003	0.0108	1.0000e-003	5.0800e-003	6.0800e-003	0.0000	24.6572	24.6572	7.0400e-003	0.0000	24.8331
Maximum	**0.0163**	**0.2438**	**0.3187**	**5.5000e-004**	**7.9800e-003**	**0.0102**	**0.0182**	**1.6100e-003**	**0.0102**	**0.0118**	**0.0000**	**50.1991**	**50.1991**	**0.0141**	**0.0000**	**50.5519**

	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	**55.28**	**33.14**	**-31.78**	**0.00**	**37.41**	**34.04**	**35.66**	**25.85**	**28.35**	**27.98**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Mount Sutro Forest Management - San Francisco County, Annual

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	9-3-2018	12-2-2018	0.3142	0.1968
2	12-3-2018	3-2-2019	0.2819	0.1897
		Highest	0.3142	0.1968

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

	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	Grading	Grading	9/3/2018	2/28/2019	5	129	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 12.9

Acres of Paving: 11.8

Residential Indoor: 0; Residential Outdoor: 0; 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
Grading	Concrete/Industrial Saws	1	1.40	10	0.73
Grading	Cranes	1	1.00	231	0.29
Grading	Crawler Tractors	1	1.00	212	0.43
Grading	Crawler Tractors	1	0.40	212	0.43
Grading	Crawler Tractors	1	0.20	700	0.43
Grading	Excavators	1	0.40	158	0.38
Grading	Excavators	1	1.40	158	0.38
Grading	Graders	0	0.00	0	0.00
Grading	Off-Highway Tractors	2	1.00	124	0.44
Grading	Off-Highway Trucks	1	3.00	402	0.38
Grading	Other General Industrial Equipment	1	0.40	20	0.34
Grading	Other General Industrial Equipment	2	0.20	20	0.34
Grading	Rubber Tired Dozers	0	0.00	0	0.00
Grading	Scrapers	0	0.00	0	0.00
Grading	Tractors/Loaders/Backhoes	2	1.40	97	0.37

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
Grading	15	70.00	2.00	72.00	2.00	2.00	2.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Grading - 2018

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					7.4300e-003	0.0000	7.4300e-003	8.3000e-004	0.0000	8.3000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0327	0.3651	0.2127	4.8000e-004		0.0160	0.0160		0.0147	0.0147	0.0000	43.9174	43.9174	0.0137	0.0000	44.2592
Total	**0.0327**	**0.3651**	**0.2127**	**4.8000e-004**	**7.4300e-003**	**0.0160**	**0.0234**	**8.3000e-004**	**0.0147**	**0.0156**	**0.0000**	**43.9174**	**43.9174**	**0.0137**	**0.0000**	**44.2592**

3.2 Grading - 2018

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	7.0000e-005	3.2300e-003	6.5000e-004	0.0000	6.0000e-005	1.0000e-005	6.0000e-005	1.0000e-005	1.0000e-005	2.0000e-005	0.0000	0.3737	0.3737	9.0000e-005	0.0000	0.3759
Vendor	2.3000e-004	7.5000e-003	2.2300e-003	1.0000e-005	1.6000e-004	3.0000e-005	1.8000e-004	5.0000e-005	3.0000e-005	7.0000e-005	0.0000	0.9071	0.9071	1.7000e-004	0.0000	0.9113
Worker	4.3200e-003	2.3700e-003	0.0286	6.0000e-005	4.4300e-003	5.0000e-005	4.4800e-003	1.1800e-003	4.0000e-005	1.2300e-003	0.0000	5.0010	5.0010	1.8000e-004	0.0000	5.0055
Total	**4.6200e-003**	**0.0131**	**0.0315**	**7.0000e-005**	**4.6500e-003**	**9.0000e-005**	**4.7200e-003**	**1.2400e-003**	**8.0000e-005**	**1.3200e-003**	**0.0000**	**6.2818**	**6.2818**	**4.4000e-004**	**0.0000**	**6.2928**

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					3.3400e-003	0.0000	3.3400e-003	3.7000e-004	0.0000	3.7000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0117	0.2307	0.2872	4.8000e-004		0.0101	0.0101		0.0101	0.0101	0.0000	43.9173	43.9173	0.0137	0.0000	44.2591
Total	**0.0117**	**0.2307**	**0.2872**	**4.8000e-004**	**3.3400e-003**	**0.0101**	**0.0134**	**3.7000e-004**	**0.0101**	**0.0105**	**0.0000**	**43.9173**	**43.9173**	**0.0137**	**0.0000**	**44.2591**

3.2 Grading - 2018

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	7.0000e-005	3.2300e-003	6.5000e-004	0.0000	6.0000e-005	1.0000e-005	6.0000e-005	1.0000e-005	1.0000e-005	2.0000e-005	0.0000	0.3737	0.3737	9.0000e-005	0.0000	0.3759
Vendor	2.3000e-004	7.5000e-003	2.2300e-003	1.0000e-005	1.6000e-004	3.0000e-005	1.8000e-004	5.0000e-005	3.0000e-005	7.0000e-005	0.0000	0.9071	0.9071	1.7000e-004	0.0000	0.9113
Worker	4.3200e-003	2.3700e-003	0.0286	6.0000e-005	4.4300e-003	5.0000e-005	4.4800e-003	1.1800e-003	4.0000e-005	1.2300e-003	0.0000	5.0010	5.0010	1.8000e-004	0.0000	5.0055
Total	**4.6200e-003**	**0.0131**	**0.0315**	**7.0000e-005**	**4.6500e-003**	**9.0000e-005**	**4.7200e-003**	**1.2400e-003**	**8.0000e-005**	**1.3200e-003**	**0.0000**	**6.2818**	**6.2818**	**4.4000e-004**	**0.0000**	**6.2928**

3.2 Grading - 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					7.4300e-003	0.0000	7.4300e-003	8.3000e-004	0.0000	8.3000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0149	0.1621	0.1032	2.4000e-004		6.9900e-003	6.9900e-003		6.4300e-003	6.4300e-003	0.0000	21.5987	21.5987	6.8300e-003	0.0000	21.7695
Total	**0.0149**	**0.1621**	**0.1032**	**2.4000e-004**	**7.4300e-003**	**6.9900e-003**	**0.0144**	**8.3000e-004**	**6.4300e-003**	**7.2600e-003**	**0.0000**	**21.5987**	**21.5987**	**6.8300e-003**	**0.0000**	**21.7695**

3.2 Grading - 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	1.5500e-003	3.2000e-004	0.0000	5.0000e-005	0.0000	5.0000e-005	1.0000e-005	0.0000	2.0000e-005	0.0000	0.1848	0.1848	4.0000e-005	0.0000	0.1859
Vendor	1.0000e-004	3.6100e-003	1.0500e-003	0.0000	8.0000e-005	1.0000e-005	9.0000e-005	2.0000e-005	1.0000e-005	3.0000e-005	0.0000	0.4493	0.4493	8.0000e-005	0.0000	0.4513
Worker	1.9600e-003	1.0400e-003	0.0128	3.0000e-005	2.2100e-003	2.0000e-005	2.2400e-003	5.9000e-004	2.0000e-005	6.1000e-004	0.0000	2.4244	2.4244	8.0000e-005	0.0000	2.4264
Total	**2.0900e-003**	**6.2000e-003**	**0.0142**	**3.0000e-005**	**2.3400e-003**	**3.0000e-005**	**2.3800e-003**	**6.2000e-004**	**3.0000e-005**	**6.6000e-004**	**0.0000**	**3.0585**	**3.0585**	**2.0000e-004**	**0.0000**	**3.0636**

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					3.3400e-003	0.0000	3.3400e-003	3.7000e-004	0.0000	3.7000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.8600e-003	0.1154	0.1436	2.4000e-004		5.0400e-003	5.0400e-003		5.0400e-003	5.0400e-003	0.0000	21.5987	21.5987	6.8300e-003	0.0000	21.7695
Total	**5.8600e-003**	**0.1154**	**0.1436**	**2.4000e-004**	**3.3400e-003**	**5.0400e-003**	**8.3800e-003**	**3.7000e-004**	**5.0400e-003**	**5.4100e-003**	**0.0000**	**21.5987**	**21.5987**	**6.8300e-003**	**0.0000**	**21.7695**

3.2 Grading - 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	1.5500e-003	3.2000e-004	0.0000	5.0000e-005	0.0000	5.0000e-005	1.0000e-005	0.0000	2.0000e-005	0.0000	0.1848	0.1848	4.0000e-005	0.0000	0.1859
Vendor	1.0000e-004	3.6100e-003	1.0500e-003	0.0000	8.0000e-005	1.0000e-005	9.0000e-005	2.0000e-005	1.0000e-005	3.0000e-005	0.0000	0.4493	0.4493	8.0000e-005	0.0000	0.4513
Worker	1.9600e-003	1.0400e-003	0.0128	3.0000e-005	2.2100e-003	2.0000e-005	2.2400e-003	5.9000e-004	2.0000e-005	6.1000e-004	0.0000	2.4244	2.4244	8.0000e-005	0.0000	2.4264
Total	**2.0900e-003**	**6.2000e-003**	**0.0142**	**3.0000e-005**	**2.3400e-003**	**3.0000e-005**	**2.3800e-003**	**6.2000e-004**	**3.0000e-005**	**6.6000e-004**	**0.0000**	**3.0585**	**3.0585**	**2.0000e-004**	**0.0000**	**3.0636**

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	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
Unmitigated	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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.607015	0.041018	0.191033	0.087570	0.015386	0.004865	0.027149	0.008727	0.004280	0.004624	0.006947	0.000926	0.000460

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	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	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
NaturalGas Unmitigated	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

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.2 Energy by Land Use - NaturalGas

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Unmitigated	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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

Mount Sutro Forest Management

San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	11.80	Acre	11.80	514,008.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	4.6	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2030
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 - Start Sept 1 2028

Land Use - 11.8 acres

Construction Phase - Sept 3 2028 to Feb 28 2029, 129 days grading

Off-road Equipment - See spreadsheet

Off-road Equipment - See spreadsheet

Trips and VMT - 35 workers: 70 one way trips a day, 1 water truck a day (vendor): 2 one way trips a day, 72 one-way haul trucks total, 2 mile trip lengths

Grading - 3,985 cubic yards export, see spreadsheet, default acres of disturbance (i.e., tree removal activites)

Energy Use -

Construction Off-road Equipment Mitigation - water 2x, 15 mph, Tier 3 engines

Mount Sutro Forest Management - San Francisco County, Annual

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstructionPhase	NumDays	30.00	129.00
tblGrading	MaterialExported	0.00	3,985.00
tblOffRoadEquipment	HorsePower	187.00	0.00
tblOffRoadEquipment	HorsePower	247.00	0.00
tblOffRoadEquipment	HorsePower	367.00	0.00
tblOffRoadEquipment	HorsePower	81.00	10.00
tblOffRoadEquipment	HorsePower	212.00	700.00
tblOffRoadEquipment	HorsePower	88.00	20.00
tblOffRoadEquipment	HorsePower	88.00	20.00

tblOffRoadEquipment	LoadFactor	0.41	0.00
tblOffRoadEquipment	LoadFactor	0.40	0.00
tblOffRoadEquipment	LoadFactor	0.48	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.40
tblOffRoadEquipment	UsageHours	8.00	1.40
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	1.40
tblProjectCharacteristics	OperationalYear	2018	2030
tblTripsAndVMT	HaulingTripLength	20.00	2.00
tblTripsAndVMT	HaulingTripNumber	498.00	72.00
tblTripsAndVMT	VendorTripLength	7.30	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	WorkerTripLength	10.80	2.00
tblTripsAndVMT	WorkerTripNumber	38.00	70.00

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					
2028	0.0211	0.1576	0.1978	5.3000e-004	0.0121	6.0400e-003	0.0181	2.0700e-003	5.5600e-003	7.6300e-003	0.0000	46.8956	46.8956	0.0139	0.0000	47.2435
2029	0.0105	0.0787	0.0985	2.6000e-004	9.7700e-003	3.0200e-003	0.0128	1.4500e-003	2.7800e-003	4.2300e-003	0.0000	23.3947	23.3947	6.9500e-003	0.0000	23.5686
Maximum	**0.0211**	**0.1576**	**0.1978**	**5.3000e-004**	**0.0121**	**6.0400e-003**	**0.0181**	**2.0700e-003**	**5.5600e-003**	**7.6300e-003**	**0.0000**	**46.8956**	**46.8956**	**0.0139**	**0.0000**	**47.2435**

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					
2028	0.0140	0.2387	0.3020	5.3000e-004	7.9800e-003	0.0101	0.0181	1.6100e-003	0.0101	0.0117	0.0000	46.8956	46.8956	0.0139	0.0000	47.2434
2029	6.9300e-003	0.1192	0.1507	2.6000e-004	5.6900e-003	5.0600e-003	0.0108	1.0000e-003	5.0600e-003	6.0600e-003	0.0000	23.3947	23.3947	6.9500e-003	0.0000	23.5685
Maximum	**0.0140**	**0.2387**	**0.3020**	**5.3000e-004**	**7.9800e-003**	**0.0101**	**0.0181**	**1.6100e-003**	**0.0101**	**0.0117**	**0.0000**	**46.8956**	**46.8956**	**0.0139**	**0.0000**	**47.2434**

	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	**33.71**	**-51.48**	**-52.77**	**0.00**	**37.41**	**-67.66**	**6.60**	**25.85**	**-82.13**	**-50.08**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Mount Sutro Forest Management - San Francisco County, Annual

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	9-1-2028	11-30-2028	0.1351	0.1910
2	12-1-2028	2-28-2029	0.1334	0.1888
		Highest	0.1351	0.1910

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

	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	Grading	Grading	9/1/2028	2/28/2029	5	129	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 12.9

Acres of Paving: 11.8

Residential Indoor: 0; Residential Outdoor: 0; 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
Grading	Concrete/Industrial Saws	1	1.40	10	0.73
Grading	Cranes	1	1.00	231	0.29
Grading	Crawler Tractors	1	1.00	212	0.43
Grading	Crawler Tractors	1	0.40	212	0.43
Grading	Crawler Tractors	1	0.20	700	0.43
Grading	Excavators	1	0.40	158	0.38
Grading	Excavators	1	1.40	158	0.38
Grading	Graders	0	0.00	0	0.00
Grading	Off-Highway Tractors	2	1.00	124	0.44
Grading	Off-Highway Trucks	1	3.00	402	0.38
Grading	Other General Industrial Equipment	2	0.20	20	0.34
Grading	Other General Industrial Equipment	1	0.40	20	0.34
Grading	Rubber Tired Dozers	0	0.00	0	0.00
Grading	Scrapers	0	0.00	0	0.00
Grading	Tractors/Loaders/Backhoes	2	1.40	97	0.37

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
Grading	15	70.00	2.00	72.00	2.00	2.00	2.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Grading - 2028

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					7.4300e-003	0.0000	7.4300e-003	8.3000e-004	0.0000	8.3000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0188	0.1496	0.1829	4.8000e-004		5.9900e-003	5.9900e-003		5.5100e-003	5.5100e-003	0.0000	42.2698	42.2698	0.0137	0.0000	42.6116
Total	**0.0188**	**0.1496**	**0.1829**	**4.8000e-004**	**7.4300e-003**	**5.9900e-003**	**0.0134**	**8.3000e-004**	**5.5100e-003**	**6.3400e-003**	**0.0000**	**42.2698**	**42.2698**	**0.0137**	**0.0000**	**42.6116**

3.2 Grading - 2028

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	2.0100e-003	6.4000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	1.0000e-005	0.0000	2.0000e-005	0.0000	0.3251	0.3251	6.0000e-005	0.0000	0.3267
Vendor	9.0000e-005	5.1000e-003	1.5400e-003	1.0000e-005	1.6000e-004	0.0000	1.6000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.8111	0.8111	1.2000e-004	0.0000	0.8140
Worker	2.1400e-003	8.3000e-004	0.0127	4.0000e-005	4.4300e-003	4.0000e-005	4.4700e-003	1.1800e-003	4.0000e-005	1.2200e-003	0.0000	3.4896	3.4896	6.0000e-005	0.0000	3.4911
Total	**2.2600e-003**	**7.9400e-003**	**0.0148**	**5.0000e-005**	**4.6500e-003**	**4.0000e-005**	**4.6900e-003**	**1.2400e-003**	**4.0000e-005**	**1.2900e-003**	**0.0000**	**4.6258**	**4.6258**	**2.4000e-004**	**0.0000**	**4.6319**

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					3.3400e-003	0.0000	3.3400e-003	3.7000e-004	0.0000	3.7000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0117	0.2307	0.2872	4.8000e-004		0.0101	0.0101		0.0101	0.0101	0.0000	42.2698	42.2698	0.0137	0.0000	42.6116
Total	**0.0117**	**0.2307**	**0.2872**	**4.8000e-004**	**3.3400e-003**	**0.0101**	**0.0134**	**3.7000e-004**	**0.0101**	**0.0105**	**0.0000**	**42.2698**	**42.2698**	**0.0137**	**0.0000**	**42.6116**

3.2 Grading - 2028

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	2.0100e-003	6.4000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	1.0000e-005	0.0000	2.0000e-005	0.0000	0.3251	0.3251	6.0000e-005	0.0000	0.3267
Vendor	9.0000e-005	5.1000e-003	1.5400e-003	1.0000e-005	1.6000e-004	0.0000	1.6000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.8111	0.8111	1.2000e-004	0.0000	0.8140
Worker	2.1400e-003	8.3000e-004	0.0127	4.0000e-005	4.4300e-003	4.0000e-005	4.4700e-003	1.1800e-003	4.0000e-005	1.2200e-003	0.0000	3.4896	3.4896	6.0000e-005	0.0000	3.4911
Total	**2.2600e-003**	**7.9400e-003**	**0.0148**	**5.0000e-005**	**4.6500e-003**	**4.0000e-005**	**4.6900e-003**	**1.2400e-003**	**4.0000e-005**	**1.2900e-003**	**0.0000**	**4.6258**	**4.6258**	**2.4000e-004**	**0.0000**	**4.6319**

3.2 Grading - 2029

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					7.4300e-003	0.0000	7.4300e-003	8.3000e-004	0.0000	8.3000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.4100e-003	0.0748	0.0915	2.4000e-004		3.0000e-003	3.0000e-003		2.7600e-003	2.7600e-003	0.0000	21.1349	21.1349	6.8400e-003	0.0000	21.3058
Total	**9.4100e-003**	**0.0748**	**0.0915**	**2.4000e-004**	**7.4300e-003**	**3.0000e-003**	**0.0104**	**8.3000e-004**	**2.7600e-003**	**3.5900e-003**	**0.0000**	**21.1349**	**21.1349**	**6.8400e-003**	**0.0000**	**21.3058**

3.2 Grading - 2029

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	2.0000e-005	9.8000e-004	3.3000e-004	0.0000	5.0000e-005	0.0000	5.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1608	0.1608	3.0000e-005	0.0000	0.1616
Vendor	5.0000e-005	2.5100e-003	7.7000e-004	0.0000	8.0000e-005	0.0000	8.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.4022	0.4022	6.0000e-005	0.0000	0.4037
Worker	1.0000e-003	3.8000e-004	5.9600e-003	2.0000e-005	2.2100e-003	2.0000e-005	2.2300e-003	5.9000e-004	2.0000e-005	6.1000e-004	0.0000	1.6968	1.6968	3.0000e-005	0.0000	1.6975
Total	**1.0700e-003**	**3.8700e-003**	**7.0600e-003**	**2.0000e-005**	**2.3400e-003**	**2.0000e-005**	**2.3600e-003**	**6.2000e-004**	**2.0000e-005**	**6.4000e-004**	**0.0000**	**2.2598**	**2.2598**	**1.2000e-004**	**0.0000**	**2.2628**

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					3.3400e-003	0.0000	3.3400e-003	3.7000e-004	0.0000	3.7000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.8600e-003	0.1154	0.1436	2.4000e-004		5.0400e-003	5.0400e-003		5.0400e-003	5.0400e-003	0.0000	21.1349	21.1349	6.8400e-003	0.0000	21.3058
Total	**5.8600e-003**	**0.1154**	**0.1436**	**2.4000e-004**	**3.3400e-003**	**5.0400e-003**	**8.3800e-003**	**3.7000e-004**	**5.0400e-003**	**5.4100e-003**	**0.0000**	**21.1349**	**21.1349**	**6.8400e-003**	**0.0000**	**21.3058**

3.2 Grading - 2029

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	2.0000e-005	9.8000e-004	3.3000e-004	0.0000	5.0000e-005	0.0000	5.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1608	0.1608	3.0000e-005	0.0000	0.1616
Vendor	5.0000e-005	2.5100e-003	7.7000e-004	0.0000	8.0000e-005	0.0000	8.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.4022	0.4022	6.0000e-005	0.0000	0.4037
Worker	1.0000e-003	3.8000e-004	5.9600e-003	2.0000e-005	2.2100e-003	2.0000e-005	2.2300e-003	5.9000e-004	2.0000e-005	6.1000e-004	0.0000	1.6968	1.6968	3.0000e-005	0.0000	1.6975
Total	**1.0700e-003**	**3.8700e-003**	**7.0600e-003**	**2.0000e-005**	**2.3400e-003**	**2.0000e-005**	**2.3600e-003**	**6.2000e-004**	**2.0000e-005**	**6.4000e-004**	**0.0000**	**2.2598**	**2.2598**	**1.2000e-004**	**0.0000**	**2.2628**

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	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
Unmitigated	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

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

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
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.602408	0.036316	0.193185	0.092029	0.012351	0.005268	0.034818	0.009679	0.004284	0.002352	0.005755	0.000958	0.000595

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	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	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
NaturalGas Unmitigated	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

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.2 Energy by Land Use - NaturalGas

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					
Other Non-Asphalt Surfaces	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
Total		**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**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Unmitigated	0.0440	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

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	0.0107					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0332					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.2000e-004
Total	**0.0440**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.2000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

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

Attachment 3 Health Risk Calculations

Emission Summary

Unmitigated

Mount Sutro, San Francisco, California

DPM Emissions and Modeling Emission Rates

Emissions Model Year	Activity	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	DPM Emissions (lb/hr)	DPM Emissions (g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2017	AreaA	0.0348	DPM	69.6	0.02119	2.67E-03	5,656	1.17E-08
	AreaB		DPM				115,449	1.17E-08
	AreaC		DPM				55,672	1.17E-08
	AreaD		DPM				12,368	1.17E-08
	AreaE		DPM				7,300	1.17E-08
	AreaF		DPM				21,465	1.17E-08
	AreaG		DPM				10,679	1.17E-08
2018-2027	AreaA	0.0231	DPM	46.3	0.01408	1.77E-03	5,656	7.76E-09
	AreaB		DPM				115,449	7.76E-09
	AreaC		DPM				55,672	7.76E-09
	AreaD		DPM				12,368	7.76E-09
	AreaE		DPM				7,300	7.76E-09
	AreaF		DPM				21,465	7.76E-09
	AreaG		DPM				10,679	7.76E-09
2028-2036	AreaA	0.0091	DPM	18.1	0.00552	6.95E-04	5,656	3.04E-09
	AreaB		DPM				115,449	3.04E-09
	AreaC		DPM				55,672	3.04E-09
	AreaD		DPM				12,368	3.04E-09
	AreaE		DPM				7,300	3.04E-09
	AreaF		DPM				21,465	3.04E-09
	AreaG		DPM				10,679	**3.04E-09**
Total		***0.0670***		***18.1***	***0.0055***	***0.0007***		

Operation Hours

hr/day =	9	(8am - 5pm)
days/yr =	365	
hours/year =	3285	

Mount Sutro, San Francisco, California

PM2.5 Fugitive Dust Emissions for Modeling

Construction Year	Activity	Area Source	PM2.5 Emissions (ton/year)	PM2.5 Emissions (lb/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (g/s)	Modeled Area (m^2)	PM2.5 Emission Rate $g/s/m^2$
2017	AreaA	FUG	0.0060	12.0	0.00367	4.62E-04	5,656	2.02E-09
	AreaB	FUG					115,449	2.02E-09
	AreaC	FUG					55,672	2.02E-09
	AreaD	FUG					12,368	2.02E-09
	AreaE	FUG					7,300	2.02E-09
	AreaF	FUG					21,465	2.02E-09
	AreaG	FUG					10,679	2.02E-09
2018-2027	AreaA	FUG	0.0035	7.0	0.00214	2.70E-04	5,656	1.18E-09
	AreaB	FUG					115,449	1.18E-09
	AreaC	FUG					55,672	1.18E-09
	AreaD	FUG					12,368	1.18E-09
	AreaE	FUG					7,300	1.18E-09
	AreaF	FUG					21,465	1.18E-09
	AreaG	FUG					10,679	1.18E-09
2028-2036	AreaA	FUG	0.0035	7.0	0.00214	2.70E-04	5,656	1.18E-09
	AreaB	FUG					115,449	1.18E-09
	AreaC	FUG					55,672	1.18E-09
	AreaD	FUG					12,368	1.18E-09
	AreaE	FUG					7,300	1.18E-09
	AreaF	FUG					21,465	1.18E-09
	AreaG	FUG					10,679	**1.18E-09**
Total			***0.0131***	***7.0***	***0.0021***	***0.0003***		

Operation Hours

hr/day =	9	(8am - 5pm)
days/yr =	365	
hours/year =	3285	

Mitigated

Mount Sutro, San Francisco, California

DPM Emissions and Modeling Emission Rates

Emissions Model Year	Activity	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	DPM Emissions (lb/hr)	DPM Emissions (g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2017	AreaA	0.0197	DPM	39.4	0.01199	1.51E-03	5,656	6.61E-09
	AreaB		DPM	0.0	0.00000	0.00E+00	115,449	6.61E-09
	AreaC		DPM	0.0	0.00000	0.00E+00	55,672	6.61E-09
	AreaD		DPM	0.0	0.00000	0.00E+00	12,368	6.61E-09
	AreaE		DPM	0.0	0.00000	0.00E+00	7,300	6.61E-09
	AreaF		DPM	0.0	0.00000	0.00E+00	21,465	6.61E-09
	AreaG		DPM	0.0	0.00000	0.00E+00	10,679	6.61E-09
2018-2027	AreaA	0.0153	DPM	30.6	0.00932	1.17E-03	5,656	5.13E-09
	AreaB		DPM	0.0	0.00000	0.00E+00	115,449	5.13E-09
	AreaC		DPM	0.0	0.00000	0.00E+00	55,672	5.13E-09
	AreaD		DPM	0.0	0.00000	0.00E+00	12,368	5.13E-09
	AreaE		DPM	0.0	0.00000	0.00E+00	7,300	5.13E-09
	AreaF		DPM	0.0	0.00000	0.00E+00	21,465	5.13E-09
	AreaG		DPM	0.0	0.00000	0.00E+00	10,679	5.13E-09
2028-2036	AreaA	0.0091	DPM	18.1	0.00552	6.95E-04	5,656	3.04E-09
	AreaB		DPM	0.0	0.00000	0.00E+00	115,449	3.04E-09
	AreaC		DPM	0.0	0.00000	0.00E+00	55,672	3.04E-09
	AreaD		DPM	0.0	0.00000	0.00E+00	12,368	3.04E-09
	AreaE		DPM	0.0	0.00000	0.00E+00	7,300	3.04E-09
	AreaF		DPM	0.0	0.00000	0.00E+00	21,465	3.04E-09
	AreaG		DPM	0.0	0.00000	0.00E+00	10,679	**3.04E-09**
Total		***0.0441***		***18.1***	***0.0055***	***0.0007***		

Operation Hours

hr/day =	9	(8am - 5pm)
days/yr =	365	
hours/year =	3285	

Mount Sutro, San Francisco, California

PM2.5 Fugitive Dust Emissions for Modeling

Construction Year	Activity	Area Source	PM2.5 Emissions (ton/year)	PM2.5 Emissions (lb/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (g/s)	Modeled Area (m^2)	PM2.5 Emission Rate $g/s/m^2$
2017	AreaA	FUG	0.00347	6.9	0.00211	2.66E-04	5,656	1.16E-09
	AreaB	FUG					115,449	1.16E-09
	AreaC	FUG					55,672	1.16E-09
	AreaD	FUG					12,368	1.16E-09
	AreaE	FUG					7,300	1.16E-09
	AreaF	FUG					21,465	1.16E-09
	AreaG	FUG					10,679	1.16E-09
2018-2027	AreaA	FUG	0.0026	5.2	0.00159	2.00E-04	5,656	8.76E-10
	AreaB	FUG					115,449	8.76E-10
	AreaC	FUG					55,672	8.76E-10
	AreaD	FUG					12,368	8.76E-10
	AreaE	FUG					7,300	8.76E-10
	AreaF	FUG					21,465	8.76E-10
	AreaG	FUG					10,679	8.76E-10
2028-2036	AreaA	FUG	0.00352	7.0	0.00214	2.70E-04	5,656	1.18E-09
	AreaB	FUG					115,449	1.18E-09
	AreaC	FUG					55,672	1.18E-09
	AreaD	FUG					12,368	1.18E-09
	AreaE	FUG					7,300	1.18E-09
	AreaF	FUG					21,465	1.18E-09
	AreaG	FUG					10,679	**1.18E-09**
Total			***0.0096***	***7.0***	***0.0021***	***0.0003***		

Operation Hours

hr/day =	9	(8am - 5pm)
days/yr =	365	
hours/year =	3285	

Health Risk Calculations

Residential- Unmitigated and Mitigated

Mount Sutro, San Francisco, California
Maximum DPM Cancer Risk Calculations From Construction
Impacts at Off-Site Receptors-1.5 meter

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

	Infant/Child				Adult
Age -->	**3rd Trimester**	**0 - 2**	**2 - 9**	**2 - 16**	**16 - 30**
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Construction Cancer Risk by Year - Maximum Impact Receptor Location

			Infant/Child - Exposure Information				Adult - Exposure Information					
				DPM Conc (ug/m3)	Age	Infant/Child		Modeled DPM Conc (ug/m3)	Age	Adult		
Exposure Year	**Exposure Duration (years)**	**Age**	**Year**	**Annual**	**Sensitivity Factor**	**Cancer Risk (per million)**	**Year**	**Annual**	**Sensitivity Factor**	**Cancer Risk (per million)**	**Fugitive PM2.5**	**Total PM2.5**
0	0.25	-0.25 - 0*	2017	0.0082	10	0.11	2017	-	-	-		
1	1	0 - 1	2017	0.0082	10	1.35	2017	0.0082	1	0.02	0.0016	0.010
2	1	1 - 2	2018	0.0055	10	0.90	2018	0.0055	1	0.02	0.0009	0.006
3	1	2 - 3	2019	0.0055	3	0.16	2019	0.0055	1	0.02	0.0009	0.006
4	1	3 - 4	2020	0.0055	3	0.14	2020	0.0055	1	0.02	0.0009	0.006
5	1	4 - 5	2021	0.0055	3	0.14	2021	0.0055	1	0.02	0.0009	0.006
6	1	5 - 6	2022	0.0055	3	0.14	2022	0.0055	1	0.02	0.0009	0.006
7	1	6 - 7	2023	0.0055	3	0.14	2023	0.0055	1	0.02	0.0009	0.006
8	1	7 - 8	2024	0.0055	3	0.14	2024	0.0055	1	0.02	0.0009	0.006
9	1	8 - 9	2025	0.0055	3	0.14	2025	0.0055	1	0.02	0.0009	0.006
10	1	9 - 10	2026	0.0055	3	0.14	2026	0.0055	1	0.02	0.0009	0.006
11	1	10 - 11	2027	0.0055	3	0.14	2027	0.0055	1	0.02	0.0009	0.0064
12	1	11 - 12	2028	0.0021	3	0.05	2028	0.0021	1	0.01	0.00093	0.0030
13	1	12 - 13	2029	0.0021	3	0.05	2029	0.0021	1	0.01	0.00093	0.0030
14	1	13 - 14	2030	0.0021	3	0.05	2030	0.0021	1	0.01	0.00093	0.0030
15	1	14 - 15	2031	0.0021	3	0.05	2031	0.0021	1	0.01	0.00093	0.0030
16	1	15 - 16	2032	0.0021	3	0.05	2032	0.0021	1	0.01	0.00093	0.0030
17	1	16-17	2033	0.0021	1	0.01	2033	0.0021	1	0.01	0.00093	0.0030
18	1	17-18	2034	0.0021	1	0.01	2034	0.0021	1	0.01	0.00093	0.0030
19	1	18-19	2035	0.0021	1	0.01	2035	0.0021	1	0.01	0.00093	0.0030
20	1	19-20	2036	0.0021	1	0.01	2036	0.0021	1	0.01	0.00093	0.0030
21	1	20-21		0.0000	1	0.00		0.0000	1	0.00		
22	1	21-22		0.0000	1	0.00		0.0000	1	0.00		
23	1	22-23		0.0000	1	0.00		0.0000	1	0.00		
24	1	23-24		0.0000	1	0.00		0.0000	1	0.00		
25	1	24-25		0.0000	1	0.00		0.0000	1	0.00		
26	1	25-26		0.0000	1	0.00		0.0000	1	0.00		
27	1	26-27		0.0000	1	0.00		0.0000	1	0.00		
28	1	27-28		0.0000	1	0.00		0.0000	1	0.00		
29	1	28-29		0.0000	1	0.00		0.0000	1	0.00		
30	1	29-30		0.0000	1	0.00		0.0000	1	0.00		
Total Increased Cancer Risk						**3.95**				**0.24**		

* Third trimester of pregnancy

Mount Sutro, San Francisco, California
Maximum DPM Cancer Risk Calculations From Construction
Impacts at Off-Site Receptors-1.5 meter

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

	Infant/Child				Adult
Age -->	**3rd Trimester**	**0 - 2**	**2 - 9**	**2 - 16**	**16 - 30**
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Construction Cancer Risk by Year - Maximum Impact Receptor Location

			Infant/Child - Exposure Information				Adult - Exposure Information					
				DPM Conc (ug/m3)	Age	Infant/Child		Modeled DPM Conc (ug/m3)	Age	Adult		
Exposure Year	**Exposure Duration (years)**	**Age**	**Year**	**Annual**	**Sensitivity Factor**	**Cancer Risk (per million)**	**Year**	**Annual**	**Sensitivity Factor**	**Cancer Risk (per million)**	**Fugitive PM2.5**	**Total PM2.5**
0	0.25	-0.25 - 0*	2017	0.0047	10	0.06	2017	-	-	-		
1	1	0 - 1	2017	0.0047	10	0.76	2017	0.0047	1	0.01	0.0016	0.006
2	1	1 - 2	2018	0.0036	10	0.59	2018	0.0036	1	0.01	0.0007	0.004
3	1	2 - 3	2019	0.0036	3	0.10	2019	0.0036	1	0.01	0.0007	0.004
4	1	3 - 4	2020	0.0036	3	0.09	2020	0.0036	1	0.01	0.0007	0.004
5	1	4 - 5	2021	0.0036	3	0.09	2021	0.0036	1	0.01	0.0007	0.004
6	1	5 - 6	2022	0.0036	3	0.09	2022	0.0036	1	0.01	0.0007	0.004
7	1	6 - 7	2023	0.0036	3	0.09	2023	0.0036	1	0.01	0.0007	0.004
8	1	7 - 8	2024	0.0036	3	0.09	2024	0.0036	1	0.01	0.0007	0.004
9	1	8 - 9	2025	0.0036	3	0.09	2025	0.0036	1	0.01	0.0007	0.004
10	1	9 - 10	2026	0.0036	3	0.09	2026	0.0036	1	0.01	0.0007	0.004
11	1	10 - 11	2027	0.0036	3	0.09	2027	0.0036	1	0.01	0.0007	0.0043
12	1	11 - 12	2028	0.0021	3	0.05	2028	0.0021	1	0.01	0.00093	0.0030
13	1	12 - 13	2029	0.0021	3	0.05	2029	0.0021	1	0.01	0.00093	0.0030
14	1	13 - 14	2030	0.0021	3	0.05	2030	0.0021	1	0.01	0.00093	0.0030
15	1	14 - 15	2031	0.0021	3	0.05	2031	0.0021	1	0.01	0.00093	0.0030
16	1	15 - 16	2032	0.0021	3	0.05	2032	0.0021	1	0.01	0.00093	0.0030
17	1	16-17	2033	0.0021	1	0.01	2033	0.0021	1	0.01	0.00093	0.0030
18	1	17-18	2034	0.0021	1	0.01	2034	0.0021	1	0.01	0.00093	0.0030
19	1	18-19	2035	0.0021	1	0.01	2035	0.0021	1	0.01	0.00093	0.0030
20	1	19-20	2036	0.0021	1	0.01	2036	0.0021	1	0.01	0.00093	0.0030
21	1	20-21		0.0000	1	0.00		0.0000	1	0.00		
22	1	21-22		0.0000	1	0.00		0.0000	1	0.00		
23	1	22-23		0.0000	1	0.00		0.0000	1	0.00		
24	1	23-24		0.0000	1	0.00		0.0000	1	0.00		
25	1	24-25		0.0000	1	0.00		0.0000	1	0.00		
26	1	25-26		0.0000	1	0.00		0.0000	1	0.00		
27	1	26-27		0.0000	1	0.00		0.0000	1	0.00		
28	1	27-28		0.0000	1	0.00		0.0000	1	0.00		
29	1	28-29		0.0000	1	0.00		0.0000	1	0.00		
30	1	29-30		0.0000	1	0.00		0.0000	1	0.00		
Total Increased Cancer Risk						**2.56**				**0.17**		

* Third trimester of pregnancy

Hospital- Mitigated and Unmitigated

Mount Sutro, San Francisco, California
Maximum DPM Cancer Risk Calculations From Construction
Impacts at Off-Site Receptors-1.5 meter

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

	Infant/Child				Adult
Age -->	**3rd Trimester**	**0 to 2**	**2 to 9**	**9 to 16**	**16 to 30**
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Construction Cancer Risk by Year - Maximum Impact Receptor Location

			Infant/Child - Exposure Information			Infant/Child		
Exposure Year	**Exposure Duration (years)**	**Age**	**DPM Conc (ug/m3) Year**	**Annual**	**Age Sensitivity Factor**	**Cancer Risk (per million)**	**Fugitive PM2.5**	**Total PM2.5**
0	1	0 - 1	2017	0.0023	10	0.38	0.0005	0.003
1	1	0 - 1	2018	0.0018	10	0.30	0.0004	0.002
2	1	0 - 1	2019	0.0018	10	0.30	0.0004	0.002
3	1	0 - 1	2020	0.0018	10	0.30	0.0004	0.002
4	1	0 - 1	2021	0.0018	10	0.30	0.0004	0.002
5	1	0 - 1	2022	0.0018	10	0.30	0.0004	0.002
6	1	0 - 1	2023	0.0018	10	0.30	0.0004	0.002
7	1	0 - 1	2024	0.0018	10	0.30	0.0004	0.002
8	1	0 - 1	2025	0.0018	10	0.30	0.0004	0.002
9	1	0 - 1	2026	0.0018	10	0.30	0.0004	0.002
10	1	0 - 1	2027	0.0018	10	0.30	0.0004	0.002
11	1	0 - 1	2028	0.0010	10	0.16	0.0005	0.002
12	1	0 - 1	2029	0.0010	10	0.16	0.0005	0.002
13	1	0 - 1	2030	0.0010	10	0.16	0.0005	0.002
14	1	0 - 1	2031	0.0010	10	0.16	0.0005	0.002
15	1	0 - 1	2032	0.0010	10	0.16	0.0005	0.002
16	1	0 - 1	2033	0.0010	10	0.16	0.0005	0.002
17	1	0 - 1	2034	0.0010	10	0.16	0.0005	0.002
18	1	0 - 1	2035	0.0010	10	0.16	0.0005	0.002
19	1	0 - 1	2036	0.0010	10	0.16	0.0005	0.002
20	1	0 - 1		0.0000	1	0.00		
21	1	0 - 1		0.0000	1	0.00		
22	1	0 - 1		0.0000	1	0.00		
23	1	0 - 1		0.0000	1	0.00		
24	1	0 - 1		0.0000	1	0.00		
25	1	0 - 1		0.0000	1	0.00		
26	1	0 - 1		0.0000	1	0.00		
27	1	0 - 1		0.0000	1	0.00		
28	1	0 - 1		0.0000	1	0.00		
29	1	0 - 1		0.0000	1	0.00		
30	1	0 - 1		0.0000	1	0.00		
Total Increased Cancer Risk						0.38		

* Third trimester of pregnancy

Mount Sutro, San Francisco, California
Maximum DPM Cancer Risk Calculations From Construction
Impacts at Hospital (Assuming 1 -year exposure for Infants)-1.5 meter

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

	Infant/Child				Adult
Age -->	**3rd Trimester**	**0 to 2**	**2 to 9**	**9 to 16**	**16 to 30**
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Construction Cancer Risk by Year - Maximum Impact Receptor Location

			Infant/Child - Exposure Information			Infant/Child		
Exposure Year	**Exposure Duration (years)**	**Age**	**DPM Conc (ug/m3) Year**	**Annual**	**Age Sensitivity Factor**	**Cancer Risk (per million)**	**Fugitive PM2.5**	**Total PM2.5**
0	1	0 - 1	2017	0.0041	10	0.67	0.0008	0.005
1	1	0 - 1	2018	0.0027	10	0.44	0.0005	0.003
2	1	0 - 1	2019	0.0027	10	0.44	0.0005	0.003
3	1	0 - 1	2020	0.0027	10	0.44	0.0005	0.003
4	1	0 - 1	2021	0.0027	10	0.44	0.0005	0.003
5	1	0 - 1	2022	0.0027	10	0.44	0.0005	0.003
6	1	0 - 1	2023	0.0027	10	0.44	0.0005	0.003
7	1	0 - 1	2024	0.0027	10	0.44	0.0005	0.003
8	1	0 - 1	2025	0.0027	10	0.44	0.0005	0.003
9	1	0 - 1	2026	0.0027	10	0.44	0.0005	0.003
10	1	0 - 1	2027	0.0027	10	0.44	0.0005	0.003
11	1	0 - 1	2028	0.0010	10	0.16	0.0005	0.002
12	1	0 - 1	2029	0.0010	10	0.16	0.0005	0.002
13	1	0 - 1	2030	0.0010	10	0.16	0.0005	0.002
14	1	0 - 1	2031	0.0010	10	0.16	0.0005	0.002
15	1	0 - 1	2032	0.0010	10	0.16	0.0005	0.002
16	1	0 - 1	2033	0.0010	10	0.16	0.0005	0.002
17	1	0 - 1	2034	0.0010	10	0.16	0.0005	0.002
18	1	0 - 1	2035	0.0010	10	0.16	0.0005	0.002
19	1	0 - 1	2036	0.0010	10	0.16	0.0005	0.002
20	1	0 - 1		0.0000	1	0.00	0.0005	0.001
21	1	0 - 1		0.0000	1	0.00		
22	1	0 - 1		0.0000	1	0.00		
23	1	0 - 1		0.0000	1	0.00		
24	1	0 - 1		0.0000	1	0.00		
25	1	0 - 1		0.0000	1	0.00		
26	1	0 - 1		0.0000	1	0.00		
27	1	0 - 1		0.0000	1	0.00		
28	1	0 - 1		0.0000	1	0.00		
29	1	0 - 1		0.0000	1	0.00		
30	1	0 - 1		0.0000	1	0.00		
Total Increased Cancer Risk						0.67		

* Third trimester of pregnancy

School

Mt Sutro, San francisco, CA - Construction Impacts - Unmitigated Emissions
Maximum DPM Cancer Risk Calculations From Construction
Clarendon Elementary School- 1 meter - Child Exposures

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air $(\mu g/m^3)$
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

	Infant/Child				Adult
Age -->	**3rd Trimester**	**0 to 2**	**2 to 9**	**9 to 16**	**16 to 30**
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

First year of exposure	Risk
2017	0.12
2018	0.09
2027	0.02

Construction Cancer Risk by Year - Maximum Impact Receptor Location

		Student - Exposure Information					
Exposure Year	**Exposure Duration (years)**	**DPM Conc (ug/m3) Year**	**Annual**	**Age* Sensitivity**	**Student Cancer Risk (per million)**	**Fugitive PM2.5**	**Total PM2.5**
1	1	2017	0.0006	3	0.02	0.0001	0.001
2	10	2018-2027	0.0004	3	0.10	0.0001	0.000
3	9	2028-2036	0.0001	3	0.02	0.0001	0.001
Total Increased Cancer Risk					**0.1**		

* Students assumed to be less than 16 years of age

Mt Sutro, San francisco, CA - Construction Impacts - Unmitigated Emissions
Maximum DPM Cancer Risk Calculations From Construction
Clarendon Elementary School- 1 meter - Assuming 9 years of Child exposure

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air $(\mu g/m^3)$
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

	Infant/Child				Adult
Age -->	**3rd Trimester**	**0 to 2**	**2 to 9**	**9 to 16**	**16 to 30**
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

First year of exposure	Risk
2017	0.07
2018	0.07
2028	0.02

Construction Cancer Risk by Year - Maximum Impact Receptor Location

		Student - Exposure Information			Student		
Exposure Year	**Exposure Duration (years)**	**DPM Conc (ug/m3) Year**	**Annual**	**Age* Sensitivity**	**Cancer Risk (per million)**	**Fugitive PM2.5**	**Total PM2.5**
1	1	2017	0.0003	3	0.01	0.0001	0.001
2	10	2018-2027	0.0003	3	0.08	0.0001	0.000
3	9	2028-2036	0.0001	3	0.02	0.0001	0.000
Total Increased Cancer Risk					**0.1**		

* Students assumed to be less than 16 years of age

Results Summary- Mitigated Risks

Mount Sutro, San Francisco, California

Maximum Impacts at Construction MEI Location

Emissions Year	Maximum Concentrations: Exhaust PM10/DPM ($\mu g/m^3$)	Maximum Concentrations: Fugitive PM2.5 ($\mu g/m^3$)	Cancer Risk (per million): Child	Cancer Risk (per million): Adult	Hazard Index (-)	Maximum Annual PM2.5 Concentration ($\mu g/m^3$)
2017	0.0047	0.0016	0.83	0.01	0.00094	0.00564
2018-2027	0.0036	0.0007	1.45	0.1	0.00072	0.00432
2028-2036	0.0021	0.0009	0.3	0.1	0.000	0.00252
Maximum	0.0021	0.0009	2.6	0.2	0.000	0.0056

Maximum Impacts at School MEI Location-9 years of exposure

Emissions Year	Maximum Concentrations: Exhaust PM10/DPM ($\mu g/m^3$)	Maximum Concentrations: Fugitive PM2.5 ($\mu g/m^3$)	Cancer Risk (per million): Child	Hazard Index (-)	Maximum Annual PM2.5 Concentration ($\mu g/m^3$)
-	0.0003	0.0001	0.07	0.000	0.0004

Maximum Impacts at Hospital MEI Location-1 year of exposure

Emissions Year	Maximum Concentrations: Exhaust PM10/DPM ($\mu g/m^3$)	Maximum Concentrations: Fugitive PM2.5 ($\mu g/m^3$)	Cancer Risk (per million): Infant	Hazard Index (-)	Maximum Annual PM2.5 Concentration ($\mu g/m^3$)
-	0.0023	0.0005	0.4	0.000	0.0028

APPENDIX 4.3

Biological Habitat Evaluation Report

PACIFIC BIOLOGY
635 Carmel Avenue, Albany, CA 94706

Mount Sutro Open Space Reserve Project
San Francisco, California

BIOLOGICAL HABITAT EVALUATION REPORT

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EXECUTIVE SUMMARY

The Mount Sutro Open Space Vegetation Management Plan (Plan) provides a management framework for protecting, enhancing, and restoring vegetation in the 61-acre Reserve. The forest is in declining health and the Mount Sutro Open Space Reserve (Reserve) contains approximately 10,000 live and 3,400 dead trees (VMP 2017). Generally described, vegetation in the Reserve is dominated by a canopy of non-native blue gum eucalyptus (*Eucalyptus globulus*) and the understory is dominated by invasive, highly competitive herbaceous and woody vegetation. The implementation of the Plan is intended to increase the health of the forest by removing and replacing dying trees, increasing biodiversity, improving regeneration and recruitment of trees, managing insect and disease pressure, and improving structural diversity. However, the implementation of the Plan and associated management activities could result in short-term impacts to sensitive biological resources, primarily through the removal of dead, dying, unhealthy and structurally unsound trees, and through the removal of competing vegetation species that are non-native and invasive, including trees and understory vegetation.

The following special-status wildlife species have some potential to occur in the Reserve and to be adversely affected by tree and vegetation removal and other activities that will occur as part of the Plan: Monarch butterfly (*Danaus plexippus*) (winter roosts), Cooper's hawk (*Accipiter cooperii*), olive-sided flycatcher (*Contopus cooperi*), Allen's hummingbird (*Selasphorus sasin*), western red bat (*Lasiurus blossevillii*), hoary bat **(***Lasiurus cinereus*), and San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*). Additionally, numerous common bird species, including raptors, could nest in the Reserve. The avoidance measures recommended in this report address potential impacts to these species. One special-status plant, a moss (coast triquetrella [*Triquetrella californica*]), has been identified as having potential to occur in the Reserve. The implementation of the recommended avoidance measures would also address potential impacts to this species.

There are no sensitive plant communities or wetlands in the Reserve. One potentially jurisdictional feature has been identified and this drainage is located in the eastern portion of the Reserve. This feature may be under the jurisdiction of the Army Corps of Engineers (Corps), California Department of Fish and Wildlife (CDFW), and Regional Water Quality Control Board (RWQCB). The proposed activities would improve the habitat condition of the drainage, and because BMP's incorporated into the project description would avoid sedimentation and other adverse effects to the feature, related impacts under CEQA would be less than significant.

1.0 INTRODUCTION

The University of California, San Francisco (UCSF) owns and manages the Mount Sutro Open Space Reserve ("Reserve"), located south of its Parnassus Heights campus. The last several years of drought, forest pathogens infestation, and the age of the stand have led to a decline in the overall health of the forest in the Reserve (VMP 2017). In response to the declining condition of the forest, UCSF commissioned the development of the *Mount Sutro Open Space Vegetation Management Plan* (the Plan), which provides a management framework for protecting, enhancing, and restoring vegetation in the 61-acre Reserve.

This Biological Resources Habitat Evaluation Report describes the biological resources occurring within the Reserve, evaluates potential impacts to sensitive biological resources from the implementation of the Plan, and identifies feasible avoidance measures that can be implemented to protect sensitive biological resources. Biological surveys have previously been conducted on the Reserve by several organizations, including HortSciences, Inc. and Matt Greene Forestry & Biological Consulting (2017), who prepared the *Vegetation Management Plan, Mount Sutro Open Space Reserve*, and LSA Associates (2011), who prepared the *Biological Resources Report, Mount Sutro Open Space Reserve, San Francisco California*. Both of those reports document the existing biological conditions in the Reserve, while the LSA Associates report also assessed the potential for onsite habitats to support sensitive and special-status biological resources, and recommended avoided avoidance measures to protect sensitive biological resources.

This current Biological Resources Habitat Evaluation Report (Pacific Biology 2017) incorporates the findings of the existing biological documentation, and provides additional habitat information and findings as appropriate. While there is general agreement on the biological condition of the Reserve, the findings presented in this current report are more recent and should supersede the findings of the LSA Associates (2011) report.

2.0 PROJECT LOCATION

The Reserve encompasses 61 acres of open space that occupies most of Mount Sutro, an approximately 500-foot tall hill. The Reserve is owned and managed by UCSF, and is located just south of the UCSF Parnassus campus, near the center of the City and County of San Francisco (**Figure 1**). The Reserve is surrounded by developed lands, including urban neighborhoods and the UCSF Parnassus Campus (**Figure 2**). The Reserve is bounded to the north by the UCSF's hospital, research, educational and support structures, and to the east by the City of San Francisco's Interior Greenbelt. The University's Aldea Housing and Clarendon

Avenue, Christopher Drive and Crestmont Drive form the Reserve's southern and western boundaries. The project site is mapped on the San Francisco North USGS 7.5-minute quadrangle.

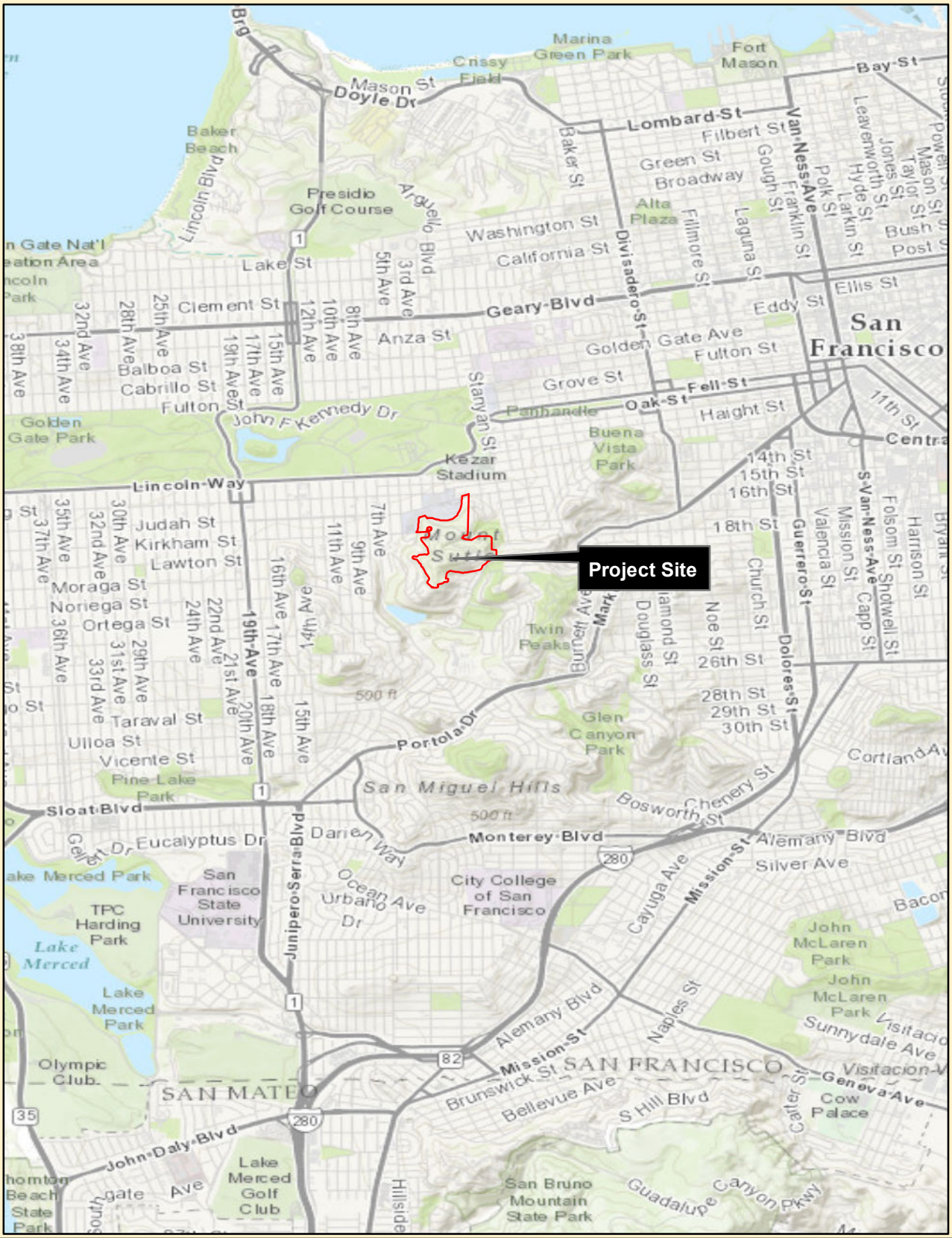
3.0 PROJECT DESCRIPTION

The purpose of the Plan is to provide a management framework for protecting, enhancing, and restoring vegetation in the 61-acre Reserve. The plan is needed to address the potential threats that exist in the Reserve, including threats to human safety, ecosystem health, and the aesthetic experience of the Reserve (VMP 2017). The number of dead trees within the Reserve pose a potential threat to human safety and the composition of the forest pose a threat to the health of the forest and the aesthetic experience of people that use the Reserve (VMP 2017). The Plan identifies four goals to guide short-term and long-term management of the Reserve:

- Protect the safety of Reserve users and adjacent campus and residential properties
- Improve and enhance the health and stability of the ecosystem
- Enhance the visual design and aesthetic experience
- Maintain and ensure public access to the Reserve

The key actions proposed by the Plan that would affect biological resources include:

1. Removal of dead, dying, unhealthy and structurally unsound trees. This would include removing individual trees or groups of trees. As discussed in the Plan, tree removal would serve to promote growth of remaining trees, reduce the number of dead trees, provide space for new regeneration, to provide defensible space, reduce fuel loads, enhance or establish views, reduce risk of tree failure and injury or damage. Various pieces of equipment may be utilized in the process of removing trees and include the following and likely more: hand saws, chainsaw, harvesters, masticators, chippers, grinders, skidding equipment, loaders, and other commonly employed equipment (VMP 2017).
2. Removal of competing vegetation species that are non-native and invasive, including but not limited to acacia, ehrharta, blackberry, ivy, and other vine species. This treatment will permit natural and planted trees to become established (VMP 2017). As discussed in the Plan, understory removal will occur by hand or by equipment and no herbicides would be used.
3. Planting of trees and understory vegetation, and ongoing monitoring and maintenance.



Reserve Boundary

FIGURE 1
REGIONAL LOCATION
Mt. Sutro Open Space Reserve Project

Miles
0 0.75 1.5

N

Scale: 1:60,000
Data: ESRI Basemap
Pacific Biology January 2017



Reserve Boundary
Trails
Woodland Creek/Swale

FIGURE 2
PROJECT SITE
Mt. Sutro Open Space Reserve Project

Feet
0 250 500

N

Scale: 1:6,000
Data: ESRI Basemap
Data: BAARI 2015
Pacific Biology January 2017

4.0 METHODOLOGY

Database and Information Review

The latest version of the California Natural Diversity Database (CNDDB) was reviewed for the project area. The intent of the database review was to document all occurrences of special-status species in the project area and to determine their location relative to the Reserve. The U.S. Fish and Wildlife Service (IPaC) database was also reviewed for the project vicinity. Existing spatial information depicting the project area was also compiled and reviewed. This information included publicly available digital ortho-rectified aerial photography, topographical quadrangle maps, and stream maps.

The following reports prepared for the Reserve were also reviewed:

- Draft Vegetation Management Plan (TAC Draft), Mount Sutro Open Space Reserve (HorScience and Matt Green Forestry and Biological Consulting, August 12, 2016, revised January 20, 2017)
- Biological Resources Report, Mount Sutro Open Space Reserve, San Francisco, California (LSA Associates, Revised September 2011)
- Draft UCSF Mounty Sutro Management EIR, Section 4.3 Biological Resources Section (UCSF 2013)

Field Surveys

Josh Phillips (Principal Biologist of Pacific Biology) and Jake Schweitzer (Senior Ecologist of Vollmar Natural Lands Consulting) attended a site walk with the project team on November 21, 2016. An overview of the Plan was presented by Matt Green Forestry and representative habitats in the Reserve were visited.

Wildlife specialist Daniel Edelstein conducted a general wildlife survey on December 19, 2016 to identify bird, mammal, reptile, and amphibian species observable at the time of the survey. This survey included walking along all Reserve trails and adjacent areas, noting habitat conditions, searching under leaf litter and vegetation, and recording all wildlife observed.

Mr. Schweitzer conducted a reconnaissance-level botanical survey on January 6, 2017. The survey involved walking along all Reserve trails and adjacent areas and recording dominant plant species from each stratum (tree, shrub/vine/sapling, and herbaceous strata) within each of the four forest types in the Reserved described in the Plan. Additional habitat parameters recorded include general habitat conditions such as soils information, the presence of rock outcroppings,

and level of disturbance. Drainages were investigated as potentially jurisdictional waters of the United States or of the state. Representative digital photographs were taken of habitat conditions and features of interest. The observed habitat conditions were compared with existing mapped habitats and the Reserve plant inventory, in order to assess the accuracy and completeness of the existing documentation. Finally, each habitat was assessed as potentially sensitive habitat and for its potential to support special-status plant taxa. As noted above, the survey was conducted during winter and was reconnaissance in nature. The focus of the survey was to document habitat conditions and the potential for special-status plants to occur on the Reserve and to compare with existing documentation, rather than to identify specific plant taxa (many of which would not have been identifiable during the surveys).

5.0 EXISTING BIOLOGICAL CONDITIONS

(i) Historic Site Conditions and Management

The dominant vegetation on the Reserve today is the result of past land management and planting activities. As described in the Plan (2017), in the 1800s Mount Panassus (which includes the current day Reserve) was covered predominantly with coastal scrub chaparral, likely consisting of native grasses, wildflowers, and shrubs. Trees occurring at that time likely included willow (*Salix* sp.) and California bay laurel (*Umbellularia californica*) along streams, and it is possible that coast live oak (*Quercus agrifolia*) and redwood (*Sequoia sempervirens*) were also present. In 1886, the area was planted with blue gum eucalyptus (*Eucalyptus globulus*), Monterey pine (*Pinus radicata*), Monterey cypress (*Hesperocyparis macrocarpa*), and possibly fruit trees and other tree species. The eucalyptus trees were the most successful trees in adapting to the site conditions and they soon shaded out smaller trees of other species. Over time, blue gum became the dominant tree species. Vine and shrubs species arose naturally or were planted and eventually the native vegetation all but disappeared. By the turn of the 20th century, the entire mountain was covered with trees, and it became commonly known as Sutro Forest.

(ii) Existing Plant Communities

Plant communities on the Reserve are accurately described in the Plan (2017) and by LSA Associates (2011). Generally described, vegetation in the Reserve is dominated by a canopy of blue gum eucalyptus. Other tree species, whether large, medium or small in size, are present in smaller numbers. Such trees include blackwood acacia (*Acacia melanoxylon*), Monterey pine, Monterey cypress, redwood, plum (*Prunus domestica*), cherry (*Prunus* sp.), Bailey's acacia (*Acacia baileyana*), willows (*Salix sp*.), California bay laurel, and coast live oak (*Quercus agrifolia*). The ground plane is dominated by invasive, highly competitive herbaceous and

woody vegetation including Himalayan blackberry (*Rubus armeniacus*), poison oak (*Toxicodendron diversilobum*), English ivy (*Hedera helix*), German ivy (*Senecio mikanioides*), Cape ivy (*Delairea odorata*), wild geranium (*Geranium maculatum*), and nightshade (*Solanum* sp.).

The following discussion serves to review and provide additional detail on the Reserve's constituent plant species composition and general conditions. The tree canopy throughout the Reserve is dominated by Tasmanian bluegum, which were originally planted on the site in the late 1880s (VMP 2017). Mr. Sutro also planted most of the other tree species that are still present on the site, including Monterey pine, Monterey cypress, coast redwood, and possibly the variety of fruit trees (primarily Prunus species). All of these trees are introduced species (including Monterey pine, Monterey cypress, and coast redwood, which are native to California, but not to San Francisco), and they have since become far more common than any of the native trees on the Reserve (which are mostly limited to relatively few scattered coast live oak and California bay trees). The large number of Acacia trees (especially *melanoxylon* and *dealbata*) may have been planted, or may have colonized the site without being planted. The same applies to Victorian box trees (*Pittosporum undulatum*). The presence and abundance of these other lower stature tree species, as well as the composition of the shrub/vine and herb plant strata, is largely dictated by the relative dominance by the Tasmanian bluegum in the upper canopy. The bluegum grow rapidly and reach towering heights, and probably established their dominance soon after being planted. However, many of the bluegum trees on the Reserve are dead or dying and are not reproducing, and their reduced canopy cover is allowing other tree species to take advantage of the increased available sunlight. Among these other tree species, blackwood acacia is most conspicuous in areas opened up by the bluegum mortality.

LSA Associates (2011) notes that most Reserve habitats most closely match the Eucalyptus Groves (Eucalyptus Semi-Natural Woodland Stands), as treated in the Manual of California Vegetation (MCV) system (Sawyer et al. 2009). Data collected by HortSciences and Matt Greene Forestry & Biological Consulting indicate that some areas lack the requisite 80% or more cover of bluegum to be classified as Eucalyptus Groves, especially within areas where blackwood acacia is sub-dominant. However, as is often the case with such disturbed habitats, there is no more appropriate named plant community. There is no designated class for blackwood acacia and no other tree is dominant or sub-dominant. In any case, the tree canopy is sufficiently homogeneous that the habitat mapping provided in the VMP (2017) distinguishes habitats according to stand characteristics more than dominant species.

Based on the remnant native plant species occurring within understory habitats on the Reserve, the introduced Eucalyptus Groves and associated non-native plants have most likely displaced various incarnations of coastal scrub. A number of native shrubs, vines, and herbs that are most commonly associated with coastal scrub habitat are scattered throughout the Reserve. The more common native plants are generally those that are well adapted to the shaded conditions bequeathed by the introduced tree canopy. The most prevalent native plant species among the shrub and vine stratum include red elderberry (*Sambucus racemosa*), California blackberry (*Rubus ursinus*), thimbleberry (*R. parviflorus*), poison oak, snowberry (*Symphoricarpos albus var. laevigatus*), and pink honeysuckle (*Lonicera hispidulus*). In a few areas, especially along western portions of the site, these species are sub-dominant or even dominant. However, in most portions of the Reserve they have been displaced by introduced and generally invasive shrubs and vines, many of which have likely escaped from landscaped yards and gardens in the vicinity of the Reserve. These include Himalayan blackberry, English ivy, cotoneaster (*Cotoneaster* spp.), garden nasturtium (*Tropaeolum majus*), slender firethorn (*Pyracantha angustifolia*), and New Zealand nightshade (*Solanum aviculare*). In more open, sunny areas where bluegum mortality is high, the highly invasive Cape-ivy forms a dense, tangled mat of vegetation. Among the shrub/vine stratum, the only species that form extensive stands that would qualify as named classes in the MCV are Himalayan blackberry and California blackberry. These areas would qualify and be treated in the MCV as Himalayan Blackberry Brambles (*Rubus armeniacus* Semi-Natural Stands) and *Rubus parviflorus, spectabilis, ursinus* Shrubland Alliance, respectively. The other most common shrub/vine species on the preserve, red elderberry, English ivy, and Cape-ivy, are not treated as classes in the MCV.

Like the shrub/vine stratum, the herbaceous stratum throughout the Reserve consists of a mix of introduced plant species and species typically associated with coastal scrub, most of which are adapted to the site's shady conditions. Because the stands of blackberry and ivy vines are so dense and widespread, most of the herb species occur primarily along the edges of trails and surrounding rock outcrops (where the vines are less dense). The most common and widespread introduced herbs include common chickweed (*Stellaria media*), panic veldt grass (*Ehrharta erecta*), Bermuda buttercup (*Oxalis pes-caprae*), English plantain (*Plantago lanceolata*), and forget-me-not (*Myosotis* spp.). Native herb species consist primarily of broad-leaved forbs and ferns. Common forbs include California figwort (*Scrophularia californica*), ridge hedge nettle (*Stachys ajugoides*), Pacific blacksnakeroot (*Sanicula crassicaulis*), creeping snowberry (*Symphoricarpos mollis*), and miner's lettuce (*Claytonia perfoliata*). Ferns include leather-leaf

fern (*Polypodium scouleri*), western sword fern (*Polystichum munitum*), coastal woodfern (*Dryopteris arguta*), and goldback fern (*Pentagramma triangularis*).

Aside from open habitats where the tree canopy is relatively sparse, microhabitats on the Reserve are limited to rock outcroppings. Large outcroppings throughout the site support a predominance of native plants on their surfaces and within their crevices, in particular leather-leaf fern and goldback fern, as well as California Dutchman's pipe (*Aristolochia californica*) and a variety of native mosses. The thinner soils surrounding the outcrops also generally support a higher percentage of native plant species.

During the January reconnaissance botanical survey, 26 plant taxa were found that were not documented during previous botanical surveys. Of the 195 plant taxa that have been documented on the Reserve, 83 (43%) are non-native, and of these, 41 (49%, 21% of all plants) are considered to be invasive by the California Invasive Plant Council (Cal-IPC 2017). The area covered by introduced and invasive species is considerably larger than the percent of species suggests—a majority of the site is dominated by such species. Representative photographs of the Reserve are included in **Appendix A** and a list of all plant taxa observed on the Reserve is included in **Appendix B**.

(iii) Common Wildlife

Insects

The blue gum eucalyptus in the Reserve have been attacked by pests such as the longhorned borer (*Phoracantha* spp.), snout beetle (*Gonipterus scutellatus*), and tortoise beetle (*Trachymela sloanei*) (VMP 2017). Based on information provided by the U.C. Integrated Pest Management (IPM) project[1], longhorned borers are attracted to freshly cut wood, dying limbs, and trees suffering from stress, especially drought stress. The problem is exacerbated in California because many eucalyptus trees are growing in unmanaged or minimally managed environments with no supplemental irrigation. Both the beetles and eucalyptus trees are native to Australia. Eucalyptus species that naturally grow in wetter areas of Australia have been planted in California where they experience prolonged dry periods, which makes them susceptible to attack by these beetles. Such is apparently the case in the Reserve, where drought conditions have compromised the health of the eucalyptus and made them vulnerable to the beetles.

[1] http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7425.html

Native insect diversity within the Reserve is expected to be low because of the dominance of nonnative eucalyptus (LSA 2011). Eucalyptus covers the majority of the Reserve except the Rotary Native Plant Garden at the summit, which has been restored with native plant species. Due to increased sunlight exposure, the insect fauna of the Rotary Native Plant Garden would differ from that of the shaded understory of the eucalyptus forest, but is expected to be low in diversity because of the garden's small size and isolation (LSA 2011).

Amphibians and Reptiles

During the reconnaissance wildlife survey conducted in December 2016, only one amphibian, California slender salamander (*Batrachoseps attenuatus*), was observed. This common species was found within leaf litter and underneath logs in several locations in the Reserve. It is also likely that arboreal salamander (*Aneides lugubris*) occurs. No reptiles were observed during the site survey, but common species such as southern alligator lizard (*Elgaria multicarinatus*), western fence lizard (*Sceloporus occidentalis*) and common garter snake (*Thamnophis sirtalis*) likely occur.

Mammals

No mammals were observed during the recent reconnaissance wildlife survey, and Eastern fox squirrel (*Sciurus niger*) was the only mammal species observed during LSA's site visits in 2011. As discussed in the LSA Associates (2011) report, urban-adapted species such as Virginia opossum (*Didelphis virginiana*), deer mouse (*Peromyscus maniculatus*), house mouse (*Mus musculus*), northern raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and black-tailed deer (*Odocoileus hemionus*) are also expected to occur. Given the dense growth of ivy, it is also likely that Norway rat (*Rattus norvegicus*) is present.

Eucalyptus trees seldom contain cavities, crevices or other features that could support colonial roosting bat species, and no such roosting features have been observed during field surveys. Colonial bat species are most likely to use eucalyptus as night roosts, rather than day roosts, although individual males or non-reproductive females, or potentially, dispersing juveniles could use them opportunistically. Therefore, bat species common to the Bay Area such as big brown bat (*Eptesicus fuscus*) and Brazilian free-tailed bat (*Tadarida brasiliensis*) could forage or otherwise temporarily occur, but day roost, hibernation roosts, or maternity roosts of colonial bat species are unlikely.

Birds

The Reserve provides an "island" of habitat within an urban area and is used by numerous bird species as nesting, foraging, wintering, and/or stop-over habitat. Bird observations in the Reserve are tracked by bird watchers/enthusiasts and recorded in Ebird[2]; the 80 species of birds documented in the Reserve are listed in **Appendix C**.

Urban-adapted raptors such as great horned owl (*Bubo virginianus*), red-shouldered hawk (*Buteo lineatus*), and Cooper's hawk (*Accipiter cooperi*) have been observed in the Reserve. Of note and as discussed in the LSA Associates (2011) report, "the Reserve is also one of the few sites in the City that support breeding Pacific-slope flycatchers (*Empidonax difficilis*), Swainson's thrushes (*Catharus ustulatus*), and Wilson's warblers (*Wilsonia pusillula*), all of which occur in moist drainages with scattered canopy openings that allow sunlight to penetrate to the forest floor such as the East Bowl Corridor (J. Clark, pers. comm.). Olive-sided flycatcher (*Contopus cooperi*), a California Species of Special Concern and uncommon summer resident, was detected in the lower portion of the East Bowl Corridor during LSA's surveys and occurs on the Reserve every year, although its breeding success is constrained by common raven (*Corvus corax*) predation (J. Clark, pers. comm.)".

Also of note and as discussed in the LSA Associates (2011) report, "the diverse native shrubs and open character of the Rotary Native Plant Garden at the summit clearing provides optimal habitat for Anna's (*Calypte anna*) and Allen's (*Selasphorus sasin*) hummingbird, both of which were abundant in the area during LSA's site visits. The summit clearing was also the only place on the Reserve where Allen's hummingbird and orange-crowned warbler (*Oreothlypis celata*) were observed, likely due to its open habitat structure. Both of these species are known to breed on the Reserve (J. Clark, pers. comm.)".

Allen's hummingbird, great horned owl, and other bird species that occur in the Reserve can be early nesters, with nesting commencing in early February. Therefore, the nesting period in the Reserve may extend from February 1 through August 31.

[2] http://ebird.org/ebird/hotspot/L1011743?yr=all&m=&rank=mrec&hs_sortBy=taxon_order&hs_o=desc

(iv) Special-Status Plant Species

For the purposes of this report, special-status plants include those species that are state or federally listed as Rare, Threatened or Endangered; federal candidates for listing; proposed for state or federal listing; or identified by the CNPS Inventory of Rare and Endangered Plants of California (CNPS Inventory) as Rank 1, 2, 3, or 4 species. **Figure 3** shows the location of special-status plant species documented by the CNDDB in the project area (i.e., within approximately 3 miles of the project site).

Aside from a single mapped CNDDB rare plant occurrence, no special-status botanical resources have been identified on the Reserve. The plant species mapped in the Reserve by the CNDDB is San Francisco gumplant (*Grindelia hirsutula* var. *maritima*), a CNPS Rank 1B species. The precision of this occurrence is listed as one-fifth of a mile, and is noted in the LSA Associates (2011) report as occurring outside the Reserve on the west slope of Mount Sutro on San Francisco Public Utilities Commission Land. This species was observed during the January 2017 survey as a planted species within the restored Rotary Native Plant Garden (which is outside of the Plan area), but not elsewhere in the Reserve. Given the highly disturbed botanical condition of the Reserve, San Francisco gumplant is not expected to occur in portions of the Reserve covered by the Plan.

In the biological resources report prepared by LSA Associates (2011), only one plant was listed as having potential to occur in the Plan area, and this is a moss (coast triquetrella [*Triquetrella californica*]), a CNPS Rank 1B species. This moss primarily occurs within more coastal habitats and at elevations lower than the base of the Reserve/Mount Sutro. The closest extant record (CNDDB Occurrence #4) is located less than 0.1 mile from the site on Tank Hill. Although this moss has not been documented on the site, it may be present in the Plan area on soil, gravels and rocks along trail sides, and within grassy areas with rocks (LSA 2011).

LSA Associates (2011) identified 13 special-status plant species known from the vicinity of the Reserve that are associated with coastal scrub (including all microhabitats), which is a remnant habitat type on the Reserve. Two special-status plant species associated with cismontane woodland (which to a lesser degree is also a remnant habitat type on the Reserve) were also identified as occurring in the vicinity. However, we concur with LSA Associates' assessment that, with the exception of coast triquetrella, no other special-status plants known from the vicinity of the site are expected to occur due to the disturbed nature of the onsite habitats. The special-status plant species table compiled by LSA Associates (2011) is included as **Appendix D**.



Special-Status Species

Mt Sutro Reserve

FIGURE 3

DOCUMENTED SPECIAL-STATUS SPECIES

Mt. Sutro Open Space Reserve Project

Miles

0 0.75 1.5

N

Scale: 1:60,000

Data: CNDDB 2017

Data: ESRI Basemap

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(v) Special-Status Wildlife Species

For the purposes of this report, special-status wildlife species include those that are state or federally listed as Threatened or Endangered, proposed for listing as Threatened or Endangered, designated as state or federal candidates for listing, a federal Bird of Conservation Concern, a state Species of Special Concern, a state Fully Protected Animal, or included on the CDFW Special Animals List.

Figure 3 shows the location of special-status wildlife species documented by the CNDDB in the project area (i.e., within approximately 3 miles of the project site). The potential of these species and other special-status wildlife species to in the Reserve is evaluated below in **Table 1**.

Table 1: Special-Status Wildlife Species

Common Name ***Scientific Name***	**Federal/State Status[1]**	**Habitat**	**Potential to Occur in Reserve**
INVERTEBRATES			
San Bruno elfin butterfly *Callophrys mossii bayensis*	FE	Steep, north-facing slopes within the fog belt. Larval host plant is stonecrop (*Sedum spathulifolium*). Mainly in the vicinity of San Bruno Mountain.	**Not Expected**: The larval food plant does not occur on the project site. Species distribution is generally limited to San Bruno Mountain, and the species has not been documented within 4 miles of the project site (CNDDB).
Mission blue butterfly *Plebejus icarioides missionensis*	FE	Grasslands of the San Francisco peninsula; three larval host plants: *Lupinus albifrons, L. variicolor, and L. formosus.*	**Not Expected**: The species has been documented in nearby areas outside of the Reserve, but suitable habitat and the larval food plants do not occur on the project site.
Callippe silverspot butterflu *Pomatiopsis binneyi*	FE	Coastal scrub of the San Francisco peninsula; host plant is Viola pendunculata; most adults found on east-facing slopes.	**Not Expected**: The species has been documented in nearby areas outside of the Reserve, but suitable habitat and the larval food plants do not occur on the project site.
Monarch butterfly (wintering roosts) *Danaus plexippus*	SA	Protected areas in groves of trees with dense canopy cover and nearby water sources.	**Potential**: Dense eucalyptus trees in sheltered portions of the Reserve provide suitable winter roost habitat. However, winter roosts have not been documented in the Reserve.

Table 1: Special-Status Wildlife Species			
Common Name ***Scientific Name***	**Federal/State Status[1]**	**Habitat**	**Potential to Occur in Reserve**
AMPHIBIANS			
California red-legged frog *Rana draytonii*	FT/CSC	Marshes, stream pools, reservoirs, ponds. Uses both riparian and upland habitats for foraging, shelter, cover, and non-dispersal movement (Recovery Plan 2010)	**Not Expected**: Aquatic habitat does not occur in the Reserve, and dense understory vegetation would make dispersal through Reserve difficult. Known to occur in Golden Gate Park (approximately 1 mile from Reserve) but there is dense urban development separating the Reserve from documented populations and suitable habitat.
REPTILES			
Western pond turtle *Actinemys marmorata*	FS/CSC	Perennial ponds, deep slow moving streams, marshes and lakes are habitat for this species at 6,000 ft. and below in elevation. However, eggs are laid in loose soil on land in oak woodlands, mixed coniferous forests, broadleaf forests and grasslands, usually within 400 ft. of ponds, lakes, slow streams and marshes with vegetated borders, rocks, or logs. Logs, rocks, cattail mats, and exposed banks are required for basking.	**Not Expected**: Aquatic habitat does not occur in the Reserve or in areas accessible to the Reserve.
San Francisco garter snake Thamnophis sirtalis tetrataenia	FE/SE	Freshwater marshes, ponds, and slowmoving streams in San Mateo County and extreme northern Santa Cruz County; prefers dense cover and water depths of at least 1 foot.	**Not Expected**: Suitable aquatic habitat does not occur in the Reserve or in areas accessible to the Reserve. Reserve is outside of known range of species and the species is not known to occur within 9 miles of the Reserve (CNDDB).
BIRDS			
Cooper's hawk *Accipiter cooperi*	-/WL	Mature forests, open woodland, riparian forest. Nests in coast live oak and other forest habitats.	**Potential:** Suitable nesting habitat present and species has been observed in Reserve.

Table 1: Special-Status Wildlife Species			
Common Name ***Scientific Name***	**Federal/State Status[1]**	**Habitat**	**Potential to Occur in Reserve**
Sharp-shinned hawk *Accipiter striatus*	-/WL	Mixed woodlands and forests. Nests in conifers or deciduous trees in dense woodlands or mountain forests.	**Not Expected** (nesting)**:** Non-nesting individuals have been observed in the Reserve.
Olive-sided flycatcher *Contopus cooperi*	FCC	Nests in trees, with preference for conifers, but also eucalyptus.	**Potential:** Suitable nesting habitat present and species has been observed in Reserve.
San Francisco Common Yellowthroat *Geothlypis trichas sinuosa*	FCC/CSC	Freshwater marsh, swale, etc.	**Not Expected**: Suitable marsh habitat not present. Species has not been documented in the Reserve according to eBird.
California black rail *Laterallus jamaicensis*	ST	Salt marshes bordering larger bays, also found in brackish and freshwater marshes.	**Not Expected:** Suitable marsh habitat not present in the Reserve or in nearby areas. Species has not been documented in the Reserve according to eBird.
Bank swallow *Riparia riparia*	SE	Vertical banks or cliffs with fine textured or sandy soils.	**Not Expected:** Suitable nesting habitat not present. Species has not been documented in the Reserve according to eBird.
Allen's hummingbird *Selasphorus sasin*	FCC/-	Semi-open habitats including open oak woods, streamside groves, and parks. Nests in trees and shrubs.	**Potential:** Suitable nesting habitat present and species has been observed in Reserve.
MAMMALS			
Pallid bat *Antrozous pallidus*	BLM, FS/CSC	Variety of habitats, but most common in open dry lands with rocky areas for roosting. Prefers rocky outcrops, cliffs, and crevices with access to open habitat for foraging.	**Not Expected**: Eucalyptus trees seldom contain cavities, crevices or other features that could support colonial roosting bat species, and no such roosting features have been observed during field surveys; marginal habitat also due to scarcity of open habitat.
Townsend's big-eared bat *Corynorhinus townsendii*	(Proposed) SE	Variety of woodland and forest habitats, but prefers conifers. Roosts primarily in caves, mines, tunnels,	**Not Expected:** Suitable roosting habitat (e.g., caves, mines, tunnels, buildings, bridges) not present.

Table 1: Special-Status Wildlife Species			
Common Name ***Scientific Name***	**Federal/State Status[1]**	**Habitat**	**Potential to Occur in Reserve**
		and sometimes in buildings, bridges, or other human made structures.	
Western red bat *Lasiurus blossevillii*	FS/CSC	Roosts in moderately dense foliage. Roost primarily in trees, less often in shrubs. Roost sites often are in edge habitats adjacent to streams, fields, or urban areas.	**Potential**: Suitable roosting habitat is present for this foliage roosting species.
Hoary bat *Lasiurus cinereus*	SA	Generally roosts in dense foliage of medium to large trees. Solitary species and does not form large roosts.	**Potential**: Suitable roosting habitat is present for this foliage roosting species.
San Francisco dusky-footed woodrat	CSC	Woodland and chaparral habitats. Woodrats build nests (i.e., stickhouses), which are often the result of work by several generations of woodrats, by piling up sticks, rocks, and other available material.	**Potential:** Evidence (i.e., stick houses/nests) of woodrats have been observed in the Reserve. Individuals of this species have not been documented within 12 miles of the Reserve. However, the Reserve is within the range of the species, and due to dense vegetation, all portions of the Reserve have not been searched for individuals.
American badger *Taxidea taxus*	-/CSC	Suitable habitat is characterized by herbaceous, shrub, and open stages of most habitats with dry, friable soils.	**Not Expected**: Suitable open habitat not present.
Notes: 1. FE = federally listed Endangered, FT = federally listed Threatened, FCC = Federal Bird of Conservation Concern, BLM = BLM sensitive species, FS = Forest Service sensitive species, SE = state listed Endangered, ST = state listed Threatened, CSC = California Species of Concern, CFP = Fully protected, SA = Included on CDFW Special Animals List			

For the reasons discussed in **Table 1**, the following special-status wildlife species have some potential to occur in the Reserve: Monarch butterfly (winter roosts), Cooper's hawk, olive-sided flycatcher, Allen's hummingbird, western red bat, hoary bat, and San Francisco dusky-footed woodrat. Potential impacts to these species from the implementation of the Plan are discussed in **Section 6.0, Project Impacts**.

(vi) Jurisdictional Resources

Wetlands, creeks, streams, and permanent and intermittent drainages are subject to the jurisdiction of the U.S. Army Corps of Engineers (Corps) under Section 404 of the Federal Clean Water Act (CWA). The California Department of Fish and Wildlife (CDFW) also generally has jurisdiction over these resources, together with other aquatic features that provide an existing fish and wildlife resource pursuant to Sections 1602-1603 of the California Fish and Game Code. The CDFW asserts jurisdiction to the outer edge of vegetation associated with a riparian corridor. Creeks and wetlands are also subject to regulation of the Regional Water Quality Control Board (RWQCB) under both the federal CWA and the State of California's Porter-Cologne Water Quality Control Act (California Water Code, Division 7).

A focus of the January 2017 field survey was to identify features potentially under the jurisdiction of the Corps, CDFW, and/or RWQCB. No potentially jurisdictional wetlands were identified during the recent surveys or during previous surveys conducted by LSA Associates. As noted by LSA Associates (2011), the steep topography over most of the site prevents the establishment of ponded depressions, seasonal wetlands, or other features that retain water long enough to support hydric soils and hydrophytic vegetation (e.g., cattails).

There are several drainages/swales on the Reserve that drain the slopes of Mount Sutro, including Woodland Creek, which is mapped as a blue line stream on the Reserve trails map and in the Bay Area Aquatic Resources Inventory (SFEI BAARI 2015). This drainage corresponds to the feature described by LSA Associates (2011) as occurring in the East Bowl Corridor. The feature is not mapped as a blue line on the San Francisco North USGS quadrangle. The "creek" and other drainage features were carefully investigated during the 2017 reconnaissance survey. Woodland Creek receives runoff from the street above the creek (Medica Center Way) via a storm drain and also collects runoff from the surrounding hill slopes. The lower reaches of Woodland Creek were observed to have bed and bank topography, but the upper reaches of Woodland Creek did not have a defined bed and bank. Woodland Creek and all other onsite drainages appear to be ephemeral, flowing only during and shortly after rain events (i.e., within a few days), none of the onsite drainages support a predominance of wetland vegetation, and with the exception of a portion of Woodland Creek, none of the other onsite drainages feature bed and bank topography (i.e., they are swales). Dominant plant species observed within Woodland Creek and other swales include Cape-ivy, English ivy, Himalayan blackberry, and black nightshade (*Solanum nigra*). As such, the results of the reconnaissance survey corroborate LSA Associates' determination that the swales/drainages are likely not potential jurisdictional

wetlands. However, it appears that Woodland Creek conveys storm flows to the City's storm water system during the rainy season. Since most, if not all, of the City's storm drains eventually lead to San Francisco Bay, the Corps could exert jurisdiction over the drainage since it could be considered a tributary to navigable waters of the U.S. This drainage feature may also be subject to CDFW and RWQCB jurisdiction. The general location of Woodland Creek is shown in **Figure 2**.

(vii) Sensitive Plant Communities

Sensitive plant communities are communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects. These communities may or may not contain special-status species or their habitat. The most current version of the CDFG's *List of California Terrestrial Natural Communities* indicates which natural communities are of special status given the current state of the California classification.

The Reserve is heavily dominated by non-native vegetation and the majority of vegetation within the Reserve consists of Eucalyptus Groves with a dense understory of English ivy, Himalayan blackberry, and other non-native species. None of the vegetation communities in the Reserve are identified as being sensitive plant communities. Therefore, sensitive plant communities are not further discussed in this report.

(viii) Wildlife Movement Corridors

Wildlife corridors are described as pathways or habitat linkages that connect discrete areas of natural open space otherwise separated or fragmented by topography, changes in vegetation, and other natural or manmade obstacles such as urbanization. The Reserve is surrounded by dense urban development, and therefore, does not physically connect discrete areas of open space. Additionally, there are no drainages that have flowing water for prolonged periods after storm events or that provide an above ground connection with other drainages. Therefore, the Reserve does not function as part of a wildlife movement corridor for terrestrial or aquatic species. However, the Reserve provides an "island" of habitat within an urban area and is used by bird species during migration.

6.0 POTENTIAL IMPACTS TO SENSITIVE BIOLOGICAL RESOURCES

The purpose of the Mount Sutro Open Space Vegetation Management Plan (the Plan) is to provide a management framework for protecting, enhancing, and restoring vegetation in the 61-acre Reserve (VMP 2017). The implementation of the Plan is intended to increase the health of the forest by removing and replacing dying trees, increasing biodiversity, improving regeneration

and recruitment of trees, managing insect and disease pressure, and improving structural diversity. However, the implementation of the Plan and associated management activities could result in short-term impacts to sensitive biological resources, primarily through the removal of dead, dying, unhealthy and structurally unsound trees, and through the removal of competing vegetation species that are non-native and invasive, including trees and understory vegetation. These impacts are discussed below, and as necessary, avoidance measures are provided to address the impacts.

(i) Potential Impacts to Special Status Plants

Only one special-status plant species, which is a moss (coast triquetrella), has potential to occur in the Plan area. Coast triquetrella is a CNPS Rank 1B species. According to the CNPS Online Inventory of Rare and Endangered Plants, this species occurs on soil in coastal bluff scrub and coastal scrub habitat. Remnants of these habitats occur in the Reserve and the species is reported by the CNDDB from a location less than 0.1 mile from the site on Tank Hill. Although this moss was not observed during the fieldwork, it may be present in the Plan area on soil, gravels and rocks along trail sides, and within grassy areas with rocks (LSA 2011).

Implementation of the Plan would require vegetation removal, access, staging or other activities in areas that provide potentially suitable habitat for coast triquetrella. Therefore, should coast triquetrella be present, activities associated with implementation of the Plan could result in the loss of coast triquetrella. The implementation of Avoidance Measure 1 would ensure that occurrences of coast triquetrella are not disturbed and would reduce related impacts to a less than significant level.

> **Avoidance Measure 1**: Prior to Plan-related activities occurring in potentially suitable habitat for coast triquetrella, a qualified biologist familiar with the identification of coast triquetrella shall conduct a clearance survey to determine if the species is present. The survey may be conducted at any time of year because this moss is identifiable from vegetative characteristics. For the purposes of this measure, potentially suitable habitat for the species includes areas without dense ground cover, including but not limited to exposed soil, gravels and rocks along trail sides, and within grassy areas with rocks. If coastal triquetrella is identified as occurring in areas that would be subject to ground disturbance, the occurrence(s) shall be clearly marked in the field and on project plans, and all occurrences will be avoided during Plan implementation.

(ii) Potential Impacts to Special Status Wildlife

As discussed in **Table 1**, the following special-status wildlife species have potential to occur in the Reserve: Monarch butterfly (winter roosts), Cooper's hawk, olive-sided flycatcher, Allen's hummingbird, western red bat, hoary bat, and San Francisco dusky-footed woodrat. These species are further discussed below.

Monarch Butterfly

Winter roosts of the monarch butterfly are considered sensitive and are included on the CDFW Special Animals List. The monarch butterfly follows a pattern of seasonal migration and the Rocky Mountains population migrates southwest to wintering grounds along the California coast. Wintering sites in California are associated with wind-protected groves of large trees (primarily eucalyptus or pines) with nectar and water sources nearby, generally near the coast. A few California sites (*e.g.*, Pacific Grove and Natural Bridges) support concentrated numbers of overwintering adults, but adults often winter as scattered individuals or in small clusters (Emmel *et al*. 1973). Sexually mature monarch butterflies mate along their northern migratory route (while returning to their summer grounds) and deposit eggs on milkweed plants. Adults die shortly after mating and laying eggs, leaving the completion of the northern migration to their offspring.

The Reserve's eucalyptus forest provides suitable roosting habitat for wintering monarch butterflies. While there are no records of monarchs forming winter roosts in the Reserve, it is possible that winter roosts occur or could occur in the future. The trees to be removed are of poor health and contain sparse foliage, which likely lowers their habitat value for monarch butterflies. However, should a monarch winter roost occur in the Reserve, tree removal and other management activities during the wintering season (October-February) could result in the disturbance of a winter roost. In the long term, implementation of the Plan would improve the health of the forest and make conditions more favorable for wintering monarchs. The implementation of Avoidance Measure 2 would ensure that a monarch butterfly winter roost is not disturbed and would reduce related impacts to a less than significant level.

> **Avoidance Measure 2**: Prior to tree removal and other management activities during the winter roosting season (October-February), a qualified biologist familiar with monarch butterfly roosting behavior will conduct a survey of the treatment areas in which work would occur and surrounding areas within 200 feet. If any winter roosts are found, the roosting trees will be clearly marked and tree removal and management activities within 200 feet of the tree(s) will be delayed until the aggregation has dispersed.

Nesting Birds

Several special-status bird species could nest in the Reserve, including Cooper's hawk, olive-sided flycatcher, and Allen's hummingbird.

- **Cooper's hawk** is included on the Special Animals List maintained by the CDFW and on this basis could be considered to be of special-status under CEQA. This species was previously a California Species of Special Concern, but its sensitivity status has been downgraded to being a "Watch List" species. Breeding pairs generally select nest sites within dense stands of live oak woodland, riparian habitats, or other wooded areas, but the species is known to occasionally nest in residential areas. This species has been observed in the Reserve and it could nest in the Reserve.

- **Olive-sided flycatcher** is a California Species of Special Concern and a Federal Bird of Conservation Concern. It is typically associated with late-successional forests with open canopies in mountainous portions of the state, but has expanded locally in lowlands of the San Francisco Bay region to occupy plantings of conifers and eucalyptus (Shuford 1993). Edges and openings within otherwise dense forests are its preferred habitat as such areas provide unobstructed airspace in which to forage for insects. Olive-sided flycatcher was confirmed as breeding during the San Francisco Breeding Bird Atlas effort in 1991 and 1992 (SFFO 2003). LSA detected a single singing individual during field work in 2011. This species is a regular summer resident on the Reserve but its breeding success is severely constrained by common raven predation (J. Clark, pers. comm., as cited in LSA 2011). This species is known to occur in the Reserve and could successfully breed in the Reserve.

- **Allen's hummingbird** (*Selasphorus sasin*) is a Federal Bird of Conservation Concern. While this species is locally common, it may still be considered to be special-status because of its federal (nation-wide) status. This species nests in moist coastal areas, scrub, chaparral, and forests. The diverse native shrubs and open character of the Rotary Native Plant Garden at the summit clearing provides optimal habitat for this species. The species was observed at this location by LSA in 2011 and this species is known to breed on the Reserve (J. Clark, pers. comm., as cited in LSA 2011).

Additionally, numerous common bird species and raptors (e.g., great horned owl, red-shouldered hawk) could nest in the reserve. The active nests of most native bird species are protected by the Migratory Bird Treaty Act (16 U.S.C. 704) and the California Fish and Game Code (Section 3503). The proposed tree and vegetation removal activities could result in the direct loss of a nest of a special-status bird species or of a species protected by the Migratory Bird Treaty Act

and/or California Fish and Game Code. Additionally, noise from operation of certain equipment that would be used (e.g., chainsaw, harvesters, masticators, chippers, grinders, skidding equipment, loaders, and other commonly employed equipment) could result in the noise-related abandonment of an active nest. As discussed in the VMP (2017), it is UCSF's policy to avoid unnecessary tree work during the bird-nesting season (March to August). However, while this policy may reduce potential impacts to nesting birds, it does not cover the entire nesting season (February through August), does not specify procedures should tree removal occur during the nesting season, does not address other vegetation removal, and does not account for noise related disturbances to nesting birds. The implementation of Avoidance Measure 3, below, would ensure that a special-status or otherwise protected bird nest is not disturbed during management activities.

> **Avoidance Measure 3**: All unnecessary tree removal will be avoided during the nesting season (February through August). If tree removal or heavy equipment use would occur anytime during the nesting/breeding season of native bird species potentially nesting near the site (typically February through August in the project region), a pre-construction survey for nesting birds would be conducted by a qualified biologist within one week of the commencement of management activities.
>
> If active nests are found in areas that could be directly affected or are within 300 feet of construction and would be subject to prolonged construction-related noise, a no-disturbance buffer zone will be created around active nests during the breeding season or until a qualified biologist determines that all young have fledged. The size of the buffer zones and types of construction activities restricted within them will be determined by a qualified biologist taking into account factors such as the following:
>
> - Noise and human disturbance levels at the site at the time of the survey and the noise and disturbance expected during the management activity;
> - Distance and amount of vegetation or other screening between the management site and the nest; and
> - Sensitivity of individual nesting species and behaviors of the nesting birds.

Special-Status Bats

Eucalyptus trees seldom contain cavities, crevices or other features that could support colonial roosting bat species, and no such roosting features have been observed during field surveys. Colonial bat species are most likely to use eucalyptus as night roosts, rather than day roosts,

although individual males or non-reproductive females, or potentially, dispersing juveniles could use them opportunistically. However, two foliage roosting bat species, hoary bat and western red bat, could use the onsite trees for day roosting or maternity roosting. These species are further discussed below:

Hoary bat is included on the CDFW Special Animal List but does not have any other state or federal listing status. The hoary bat is a solitary rooster (i.e., it does not communally roost) and it roosts exclusively in trees. The species generally roosts in dense foliage of medium to large trees, preferring sites that are hidden from above, with few branches below, and have ground cover of low reflectivity (CWHR M034). The Reserve's eucalyptus forest provides potential roosting habitat for the hoary bat. However, the trees to be removed are of poor health and contain sparse foliage, which lowers their habitat value for roosting hoary bats. As the species is a solitary rooster, and because the trees to be removed provide lower quality roosting habitat for the species (given their poor health and sparse foliage), in the unlikely event that the species is present, only a low number would be present. If the species was to occur on the site, it is likely that it would abandon its tree roost at the onset of tree removal or other nearby loud management activities and relocate to another tree in the area. Therefore, given its low sensitivity status and low potential to occur, that it is a solitary rooster (and thus would only occur in low numbers), that trees to be removed provide lower quality roosting habitat, and because tree roosting bats (including hoary bat) naturally tend to switch roost sites frequently, it is unlikely that impacts to hoary bats would be substantial. However, conservatively, Avoidance Measure 4, see below, is recommended to further reduce the potential for harm to individual hoary bats.

Western red bat is a California Species of Species Concern. The western red bat is a generally a solitary rooster, but occasionally nursery colonies are found (CWHR M033). The species roosts primarily in trees, and less often in shrubs. Roost sites are in edge habitats adjacent to streams, fields, or urban areas. Preferred roosting sites are protected from above, open below, and located above dark ground-cover (CWHR M033). The CNDDB contains one record of this species in San Francisco, where a single individual was seen roosting in Strybing Arboretum in Golden Gate Park in 2000 (CNDDB 2017). The Reserve's eucalyptus forest provides potential roosting habitat for the western red bat. However, the trees to be removed are of poor health and contain sparse foliage, which lowers their habitat value for roosting red bats. As the species is often a solitary rooster, and because the trees to be removed provide lower quality roosting habitat for the species (given their poor health and sparse foliage), in the unlikely event that the species is present, only a low number would likely be present. If the species was to occur on the site, it is likely that it would abandon its tree roost at the onset of tree removal or other nearby

loud management activities and relocate to another tree in the area. Therefore, given that the species is generally a solitary rooster (and thus would likely only occur in low numbers), that trees to be removed provide lower quality roosting habitat, and because tree roosting bats (including western red bat) naturally tend to switch roost sites frequently, it is it not expected that impacts to western red bats would be substantial. However, conservatively, Avoidance Measure 4, see below, is recommended to further reduce the potential for harm to individual western red bats.

> **Avoidance Measure 4**: Appropriate methods shall be used to minimize the potential of harm to bats during tree removal. The below methods, which should be implemented, are effective in creating noise, vibration, and visual disturbances that are effective in causing bats that emerge nightly to feed, to not return to the roost that night:
>
> - Whenever possible, tree removal will be preceded by removal of shrubs and very small trees, with tallest nearby or adjacent trees removed the following day.
> - Use a two-step tree removal process. This method is conducted over two consecutive days, and works by creating noise and vibration by cutting non-habitat branches and limbs from habitat trees using chainsaws only (no excavators or other heavy machinery) on Day 1. The remainder of the tree is removed on Day 2.
> - Cut vegetation and trees will be cut into smaller pieces and/or chipped on-site wherever possible.
>
> Additionally, prior to their removal, individual trees will be visually inspected with binoculars for any large cavities or openings that could be used by colonial bat species. As previously discussed, such features are not common in eucalyptus trees and no such features have been observed during site surveys. In the unlikely event that a large opening/cavity is observed that could support colonial bat species, then a bat specialist will be consulted and any recommended bat avoidance measures will be implemented prior to removal of the tree.

San Francisco dusky-footed woodrat

The San Francisco dusky-foot is a California Species of Special Concern. The dusky–footed woodrat (N. fuscipes) is fairly common and widespread throughout the Coast Range and the northern interior of California. The subspecies, the San Francisco dusky-footed woodrat, is believed to be restricted to the San Francisco Bay Area. Dusky-footed woodrats are highly

arboreal (Kelly 1990). Evergreen or live oaks and other thick-leaved trees and shrubs are important habitat components for this species (Kelly 1990, Williams et. al. 1992). Woodrats build nests (i.e., stickhouses), which are often the result of work by several generations of woodrats, by piling up sticks, rocks, and other available material. This woodrat is semi-colonial and often lives with others in the same area. The breeding period for the dusky-footed woodrat is generally in the spring, but potentially extends through July.

Based on the CNDDB, there are no documented occurrences of this species from the Reserve or from within approximately 12 miles of the Reserve (CNDDB); however, stick nests have been observed in the Reserve, indicating presence of at least one species of woodrat The fact that the species has not been documented in the project vicinity, and that Reserve is isolated from areas with known populations of the species, limits the possibility that this species occurs in the Reserve. However, given that the Reserve is within the range of the species, that suitable habitat is present, and that due to dense vegetation all portions of the Reserve have not been searched for stick houses, there is some potential for the species to occur. If the species was to occur, proposed vegetation management activities could result in the loss of a woodrat nest. The implementation of Avoidance Measure 5 would ensure that a San Francisco dusky-footed woodrat nest is not disturbed and would reduce related impacts to a less than significant level.

> **Avoidance Measure 5**: No earlier than 30 days prior to the commencement of management activities in a treatment area, a survey should be conducted to determine if active woodrat nests (stick houses) with young are present within the disturbance zone or within 50 feet of the disturbance zone. If active woodrat nests with young are identified, a fence should be erected around the nest site at a distance adequate to provide the woodrat sufficient foraging habitat at the discretion of a qualified biologist. Clearing and management activities within the fenced area would be postponed or halted until young have left the nest. A qualified biologist should serve as a construction monitor during those periods when disturbance activities will occur near active nest areas to ensure that no inadvertent impacts on these nests occur.
>
> To the degree feasible, any identified woodrat nests will be left undisturbed. If the relocation of a nest is required, then a woodrat nest relocation plan will be prepared and submitted to the CDFW for approval. The approved woodrat nest relocation plan may then be implemented under the direction of a qualified biologist and only when it is determined that young are not present in the nest.

(iii) Potential Impacts to Jurisdictional Resources

As previously discussed, the only potentially jurisdictional feature identified is the drainage in the eastern portion of the Reserve (**Figure 2**). This drainage, referred to as Woodland Creek, appears to be ephemeral, flowing only during and shortly after rain events (i.e., within a few days); only the lower reach of the feature contains bed and bank topography, and it does not support a predominance of wetland vegetation. While this feature would not be considered a wetland, the Corps could exert jurisdiction over the drainage since it appears to convey storm flows to the City's storm water system during the rainy season, and since most, if not all, of the City's storm drains eventually lead to San Francisco Bay. This drainage feature may also be subject to CDFW and RWQCB jurisdiction.

The proposed project does not include any fill or other alteration of the drainage. Activities below the top of bank would be limited to removal of non-native vegetation and planting of native vegetation. As these activities would improve the habitat condition of the drainage, and because BMP's incorporated into the project description would avoid sedimentation and other adverse effects to the drainage, related impacts under CEQA would be less than significant. However, UCSF should contact the Corps, CDFW, and RWQCB prior to activities within the creek/swale to determine if any agreements/permits/certifications are required.

(iv) Potential Impacts to Wildlife Movement Corridors

As previously discussed, the Reserve is surrounded by dense urban development, and therefore, does not physically connect discrete areas of open space. However, the Reserve does provide habitat for a variety of urban-adapted wildlife species, including habitat for migratory birds. The proposed project is intended to improve the health of the forest, which would serve to maintain and enhance the Reserve's function as wildlife habitat (including stopover habitat for migratory birds). Therefore, related impacts would be less than significant.

(v) Potential Conflict with Policies and Ordinances Protecting Biological Resources

Pursuant to the University of California's constitutional autonomy, development and uses on property owned or leased by the University that are in furtherance of the University's educational purposes are not subject to local land use regulation, including City of San Francisco General Plan policies regarding the protection of biological resources. Although UCSF is not subject to City policies and regulations, UCSF strives to be consistent with City standards, where feasible.

The City of San Francisco maintains an Urban Forestry Ordinance (DPW Code Article 16) that protects various types of trees on private land, including:

- **Landmark Trees.** UCSF has no landmark trees on its Parnassus Heights Campus, including the Reserve.
- **Significant Trees.** Defined as trees within 10 feet of a property line that are taller than 20 feet or with a canopy greater than 15 feet or with a trunk diameter greater than 12 inches at breast height. Individual trees meeting these criteria may be removed as part of the proposed plan.
- **Street Trees.** No street trees would be removed as part of this plan.

Removal of significant trees, per the ordinance, typically requires a permit and public review. The overall intention of the ordinance is to protect urban forests and important trees that provide shade, habitat, and aesthetic value to the City of San Francsico's residents, among other goals. The plan would not conflict with the Urban Forestry Ordinance's overall goals, even though its implementation would result in the removal of some trees that the City may define as "significant". The plan promotes the preservation and restoration of the Reserve as a healthy forest and removal of hazardous trees.

(v) Potential Conflict with the Provisions of an Adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan

There are no adopted Habitat Conservation Plans, Natural Community Conservation Plans, or other applicable habitat conservation plans that would be applicable to the Reserve. Therefore, the implementation of the Plan would not conflict with such a plan.

11.0 LITERATURE CITED

Mount Sutro Open Space Reserve References

U.C. San Francisco (UCSF). 2013. Environmental Impact Report, UCSF Mount Sutro Management.

HortScience, In.c and Matt Greene Forestry & Biological Consulting. 2017. Vegetation Management Plan, Mount Sutro Open Space Reserve. Prepared for University of California, San Francisco.

LSA Associate. 2011. Biological Resources Report. Mount Sutro Open Space Reserve, San Francisco California. Prepared for University of California, San Francisco.

General References

California Department of Fish and Wildlife (CDFW). 2017. California Natural Diversity Database (CNDDB) (January updates). California Department of Fish and Wildlife.

California Invasive Plant Council (Cal-IPC). 2017. Website available (as of 01/2017) at: http://www.cal-ipc.org/ip/inventory/index.php#inventory

California Native Plant Society (CNPS). 2017. CNPS's Electronic Inventory of Rare and Endangered Plants of California (seventh edition). Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. California Native Plant Society, Sacramento, CA. Website available (as of 01/2017) at: http://cnps.site.aplus.net/cgi-bin/inv/inventory.cgi

California Wildlife Habitat Relationship System (CWHRS). M033. Western Red Bat. https://nrm.**dfg**.ca.gov/FileHandler.ashx?DocumentID=2339

California Wildlife Habitat Relationship System (CWHRS). M034. Hoary Bat. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2341

Emmel, T.C. and J.F. Emmel. 1973. *The Butterflies of Southern California*. The Natural History Museum of Los Angeles County, Sciences Series 26.

Kelly 1990. Population Ecology and Social Organization of Dusky-footed Woodrats, Neotoma fuscipes. Ph.D. Dissertation, University of California, Berkeley 191 pp

Sawyer, John O., Todd Keeler-Wolf, and Julie M. Evans. 2009. A Manual of California Vegetation, Second Edition. California Native Plant Society Press.

San Francisco Estuary Institute (SFEI). 2015. Bay Area Aquatic Resources Inventory (BAARI) GIS data.

San Francisco Field Ornithologists (SFFO). 2003. Draft San Francisco Breeding Bird Atlas. (As cited by LSA Associates 2011)

Shuford, W.D. 1993. The Marin County breeding bird atlas: A distributional and natural history of coastal California birds. Bushtit Books, Bolinas, California.

U.S. Department of Agriculture Soil Conservation Service (USDA-NRCS). 2017. Web Soil Survey Website. Available (01/2017) at: http://websoilsurvey.sc.egov.usda.gov/app/WebSoilSurvey.aspx

U.S. Fish and Wildlife Service (USFWS). 2017. Critical Habitat Portal, website available (01/2017) at: https://fws.maps.arcgis.com/home/webmap/

U.S. Geological Survey (USGS). 2012. Geology of the Bay Area GIS Digital Database. Compiled from the following USGS publications and topographic mapping: Open-File Report (1997) OFR97-456, 1:48,000; Miscellaneous Field Study (2000) MF-2337, 1:75,000; portion of Miscellaneous Field Study (2005) MF-2402, 1:62,500 – portion of Scientific Investigations Map (2007) SIM-2956, 1:62,500.

Williams, D.F., J. Verner, H.F. Sakai, and J.R. Waters. 1992. General biology of major prey species of the California spotted owl. USDA Forest Service Gen. Tech. Rep., PSW-GTR-133:207-221

Appendix A – Representative Photograpsh

REPRESENTATIVE PHOTOGRAPHS OF THE STUDY AREA (from 11/21/2016 to 01/06/2017)

Representative Photographs of the Study Area



View of Tasmanian Bluegum with Cape-ivy Understory



View of View of Tasmanian Bluegum with
Garden Nasturtium Understory

Representative Photographs of the Study Area



View of Rock Outcropping and Bermuda Buttercup



View of Rock Outcropping and Native Polypody Ferns

Representative Photographs of the Study Area



View of Tasmanian Bluegum with English Ivy
and Himalayan Blackberry Understory



View of Remnant Native Coastal Scrub Habitat
(California blackberry, fern species, and golden yarrow)

Representative Photographs of the Study Area



View of Ephemeral Drainage (Woodland Creek)
Below Medical Center Way



View of Woodland Creek at Base of
Mt. Sutro and Entrance to City Storm Drain

Appendix B – Plant List

Vascular Plant Taxa Identified on the Mount Sutro Open Space Reserve, San Francisco, CA 2010-2017.

See notes at bottom of table

Family Name - Scientific (Common)	Scientific Name	Common Name	Nativity - Cal-IPC	Source*
Adoxaceae (Muskroot Family)	*Sambucus racemosa*	Red Elderberry	Native	1,3
Agavaceae (Century-plant Family)	*Chlorogalum pomeridianum* var. *pomeridianum*	Wavyleaf Soap Plant	Native	1,2,3
Alliaceae (Asparagus Family)	*Allium tribracteatum*	Three-Bracted Onion	Native	1
Anacardiaceae (Sumac Family)	*Toxicodendron diversilobum*	Western Poison Oak	Native	1,2,3
Apiaceae (Carrot Family)	*Angelica hendersonii*	Henderson's Angelica	Native	2,3
Apiaceae (Carrot Family)	*Apium graveolens*	Celery	Naturalized	1
Apiaceae (Carrot Family)	*Conium maculatum*	Poison-Hemlock	Naturalized	1,2,3
Apiaceae (Carrot Family)	*Heracleum maximum*	Cow Parsnip, Giant Hogweed	Native	1,2,3
Apiaceae (Carrot Family)	*Osmorhiza berteroi*	Sweetcicely	Native	2,3
Apiaceae (Carrot Family)	*Sanicula crassicaulis*	Pacific Blacksnakeroot	Native	1,2,3
Apiaceae (Carrot Family)	*Torilis arvensis*	Tall Sock-Destroyer	Naturalized	2,3
Apocynaceae (Dogbane Family)	*Vinca major*	Greater Periwinkle	Naturalized	1,2,3
Aquifoliaceae (Holly Family)	*Ilex aquifolium*	English Holly	Naturalized	2,3
Araceae (Arum Family)	*Arum italicum*	Italian Arum	Naturalized	2
Araliaceae (Ginseng Family)	*Aralia californica*	Elk Clover	Native	3
Araliaceae (Ginseng Family)	*Hedera canariensis*	Canary Islands Ivy	Naturalized	3
Araliaceae (Ginseng Family)	*Hedera helix*	English Ivy	Naturalized	1,2,3
Aristolochiaceae (Birthwort Family)	*Aristolochia californica*	California Dutchman's Pipe	Native	1,2,3
Asteraceae (Aster Family)	*Achillea millefolium*	Common Yarrow	Native	1,2,3
Asteraceae (Aster Family)	*Anaphalis margaritacea*	Western Pearly Everlasting	Native	2,3
Asteraceae (Aster Family)	*Artemisia californica*	California Sagebrush	Native	1,2,3
Asteraceae (Aster Family)	*Artemisia douglasiana*	Mugwort	Native	1,2,3
Asteraceae (Aster Family)	*Baccharis pilularis*	Coyote Brush	Native	1,2,3
Asteraceae (Aster Family)	*Bellis perennis*	English Daisy	Naturalized	2
Asteraceae (Aster Family)	*Carduus pycnocephalus* ssp. *pycnocephalus*	Italian Thistle	Naturalized	1,2,3
Asteraceae (Aster Family)	*Cirsium brevistylum*	Clustered Thistle	Native	2,3
Asteraceae (Aster Family)	*Delairea odorata*	Cape-Ivy, German Ivy	Naturalized	1,2,3
Asteraceae (Aster Family)	*Erigeron glaucus*	Seaside Daisy	Native	2,3

Family Name - Scientific (Common)	Scientific Name	Common Name	Nativity - Cal-IPC	Source*
Asteraceae (Aster Family)	*Eriophyllum confertiflorum* var. *confertiflorum*	Golden Yarrow	Native	1
Asteraceae (Aster Family)	*Eriophyllum staechadifolium*	Seaside Woolly Sunflower	Native	1,2,3
Asteraceae (Aster Family)	*Grindelia hirsutula* var. *maritima*	San Francisco Gumplant	Native	1,2,3
Asteraceae (Aster Family)	*Helminthotheca echioides*	Bristly Ox-Tongue	Naturalized	1,2
Asteraceae (Aster Family)	*Hieracium albiflorum*	White Hawkweed	Native	1,2,3
Asteraceae (Aster Family)	*Hypochaeris radicata*	Rough Cat's-Ear	Naturalized	1
Asteraceae (Aster Family)	*Pericallis x hybrida*	Common Ragwort	Not Native	2,3
Asteraceae (Aster Family)	*Pseudognaphalium luteoalbum*	Jersey Cudweed	Naturalized	1
Asteraceae (Aster Family)	*Senecio elegans*	Red-Purple Ragwort	Naturalized	2
Asteraceae (Aster Family)	*Senecio glomeratus*	Cutleaf Burnweed	Naturalized	2
Asteraceae (Aster Family)	*Senecio jacobaea*	Tansy Ragwort	Naturalized	2
Asteraceae (Aster Family)	*Sonchus asper* ssp. *asper*	Prickly Sow Thistle	Naturalized	2,3
Asteraceae (Aster Family)	*Sonchus oleraceus*	Common Sow Thistle	Naturalized	1,2,3
Asteraceae (Aster Family)	*Taraxacum officinale*	Common Dandelion	Naturalized	1,2
Berberidaceae (Barberry Family)	*Berberis pinnata*	California Barberry	Native	1,2,3
Boraginaceae (Borage Family)	*Myosotis latifolia*	Broadleaved Forget-Me-Not	Naturalized	1
Boraginaceae (Borage Family)	*Phacelia malvifolia*	Stinging Phacelia	Native	2,3
Boraginaceae (Forget-me-not Family)	*Myosotis sylvatica*	Woodland Forget-me-not	Not Native	2,3
Brassicaceae (Mustard Family)	*Barbarea orthoceras*	American Yellowrocket	Native	2
Brassicaceae (Mustard Family)	*Brassica nigra*	Black Mustard	Naturalized	2
Brassicaceae (Mustard Family)	*Cardamine californica*	Milkmaids	Native	2,3
Brassicaceae (Mustard Family)	*Cardamine oligosperma*	Little Western Bittercress	Native	1,2,3
Brassicaceae (Mustard Family)	*Nasturtium officinale*	Water Cress	Native	1
Caprifoliaceae (Honeysuckle Family)	*Lonicera hispidula*	Pink Honeysuckle	Native	1,2,3
Caprifoliaceae (Honeysuckle Family)	*Lonicera involucrata* var. *ledebourii*	Coast twinberry	Native	2,3
Caprifoliaceae (Honeysuckle Family)	*Symphoricarpos albus* var. *laevigatus*	Snowberry	Native	1,2,3
Caprifoliaceae (Honeysuckle Family)	*Symphoricarpos mollis*	Creeping Snowberry	Native	1
Caryophyllaceae (Pink Family)	*Stellaria media*	Common Chickweed	Naturalized	1,2,3
Casuarinaceae (She-oak Family)	*Casuarina cunninghamiana*	River She-oak	Naturalized	1
Casuarinaceae (She-oak Family)	*Casuarina stricta*	Coast Beefwood	Naturalized	2,3

Family Name - Scientific (Common)	Scientific Name	Common Name	Nativity - Cal-IPC	Source*
Commelinaceae (Spiderwort Family)	*Tradescantia fluminensis*	Small-Leaf Spiderwort	Naturalized	2
Convolvulaceae (Morning-glory Family)	*Calystegia purpurata* ssp. *purpurata*	Purple Western Morning Glory	Native	2,3
Cucurbitaceae (Cucumber Family)	*Marah fabacea*	California Man-Root	Native	1,2,3
Cupressaceae (Cypress Family)	*Hesperocyparis macrocarpa*	Monterey Cypress	Native**	1,2,3
Cupressaceae (Cypress Family)	*Sequoia sempervirens*	Redwood	Native**	1,2,3
Cyperaceae (Sedge Family)	*Carex barbarae*	Santa Barbara Sedge	Native	3
Cyperaceae (Sedge Family)	*Carex brevicaulis*	Short-Stemmed Sedge	Native	1,2,3
Cyperaceae (Sedge Family)	*Carex subbracteata*	Small-Bracted Sedge	Native	2
Cyperaceae (Sedge Family)	*Carex tumulicola*	Foothill Sedge	Native	1
Cyperaceae (Sedge Family)	*Cyperus* sp.	Sedge	Naturalized	3
Dennstaedtiaceae (Bracken Fern Family)	*Pteridium aquilinum* var. *pubescens*	Hairy Brackenfern	Native	1,2,3
Dryopteridaceae (Wood Fern Family)	*Dryopteris arguta*	Coastal Woodfern	Native	1,2,3
Dryopteridaceae (Wood Fern Family)	*Polystichum munitum*	Western Sword Fern	Native	1,2,3
Dryopteridaceae (Wood Fern Family)	*Polystichum* sp.	Fern	Naturalized	3
Ericaceae (Heath Family)	*Arbutus menziesii*	Pacific Madrone	Native	2,3
Ericaceae (Heath Family)	*Arctostaphylos* sp.	Manzanita	Native	2
Fabaceae (Pea Family)	*Acacia dealbata*	Silver Wattle	Naturalized	1,3
Fabaceae (Pea Family)	*Acacia decurrens*	Green Wattle	Waif	2,3
Fabaceae (Pea Family)	*Acacia melanoxylon*	Blackwood Acacia	Naturalized	1,2,3
Fabaceae (Pea Family)	*Cytisus scoparius*	Scotch Broom	Naturalized	3
Fabaceae (Pea Family)	*Cytisus striatus*	Portugese Broom	Naturalized	3
Fabaceae (Pea Family)	*Genista monspessulana*	French Broom	Naturalized	1,2,3
Fabaceae (Pea Family)	*Lathyrus vestitus* var. *vestitus*	Common Pacific Pea	Native	1,2,3
Fabaceae (Pea Family)	*Lupinus albifrons*	Silver Lupine	Native	1
Fabaceae (Pea Family)	*Lupinus arboreus*	Yellow Bush Lupine	Native	2
Fabaceae (Pea Family)	*Lupinus bicolor*	Miniature Lupine	Native	1
Fabaceae (Pea Family)	*Medicago polymorpha*	California Burclover	Naturalized	1
Fabaceae (Pea Family)	*Vicia americana* ssp. *americana*	American Vetch	Native	2
Fagaceae (Beech Family)	*Quercus agrifolia*	Coast Live Oak, Encina	Native	1,2,3
Garryaceae (Silk Tassel Family)	*Garrya elliptica*	Wavyleaf Silktassel	Native	1
Geraniaceae (Geranium Family)	*Geranium dissectum*	Cutleaf Geraniium	Naturalized	1

Family Name - Scientific (Common)	Scientific Name	Common Name	Nativity - Cal-IPC	Source*
Geraniaceae (Geranium Family)	*Geranium maculatum*	Wild Geranium	Naturalized	3
Geraniaceae (Geranium Family)	*Geranium molle*	Dovefoot Geranium	Naturalized	1
Geraniaceae (Geranium Family)	*Geranium pratense*	Meadow Cranesbill		2
Geraniaceae (Geranium Family)	*Geranium robertianum*	Robert Geranium	Naturalized	2,3
Grossulariaceae (Currant Family)	*Ribes sanguineum* var. *glutinosum*	Blood Currant	Native	1,2,3
Iridaceae (Iris Family)	*Iris douglasiana*	Douglas Iris	Native	1,2,3
Iridaceae (Iris Family)	*Sisyrinchium bellum*	Western Blue-Eyed-Grass	Native	2,3
Juncaceae (Rush Family)	*Juncus bufonius*	Toad Rush	Native	,2,3
Juncaceae (Rush Family)	*Juncus patens*	Spreading Rush	Native	1,2,3
Juncaceae (Rush Family)	*Luzula comosa*	Pacific Woodrush	Native	2,3
Lamiaceae (Mint Family)	*Clinopodium douglasii*	Yerba Buena	Native	1
Lamiaceae (Mint Family)	*Salvia spathacea*	California Hummingbird Sage	Native	1,2,3
Lamiaceae (Mint Family)	*Stachys ajugoides*	Ridge hedge nettle	Native	1,2,3
Lauraceae (Laurel Family)	*Umbellularia californica*	California Laurel	Native	2,3
Liliaceae (Lily Family)	*Allium triquetrum*	Three Cornered Leek	Naturalized	1,2,3
Liliaceae (Lily Family)	*Fritillaria affinis*	Checker Lily	Native	3
Liliaceae (Lily Family)	*Prosartes hookeri*	Drops-Of-Gold	Native	2,3
Malvaceae (Mallow Family)	*Lavatera assurgentiflora*	Island Mallow	Native	2
Malvaceae (Mallow Family)	*Malva nicaeensis*	Bull Mallow	Naturalized	1,2,
Malvaceae (Mallow Family)	*Sidalcea malviflora* ssp. *malviflora*	Checker Bloom	Native	1
Melanthiaceae (False-hellebore Family)	*Trillium chloropetalum*	Giant Trillium	Native	3
Montiaceae (Miner's Lettuce Family)	*Claytonia perfoliata*	Miner's Lettuce	Native	1,2,3
Myricaceae (Bayberry Family)	*Morella californica*	Wax Myrtle	Native	1,2
Myrtaceae (Myrtle Family)	*Eucalyptus globulus*	Blue Gum	Naturalized	1,2,3
Onagraceae (Evening Primrose Family)	*Epilobium brachycarpum*	Tall Annual Willowherb	Native	2,3
Onagraceae (Evening Primrose Family)	*Epilobium ciliatum*	Fringed Willowherb	Native	2,3
Onagraceae (Evening Primrose Family)	*Fuchia hybrida*	Hybrid Fuchia	Naturalized	2
Oxalidaceae (Wood-Sorrel Family)	*Oxalis corniculata*	Creeping Woodsorrel	Naturalized	1
Oxalidaceae (Wood-Sorrel Family)	*Oxalis incarnata*	Crimson Wood-Sorrel	Naturalized	2,3
Oxalidaceae (Wood-Sorrel Family)	*Oxalis pes-caprae*	Bermuda Buttercup	Naturalized	1,2,3
Oxalidaceae (Wood-Sorrel Family)	*Oxalis pilosa*	Hairy Wood Sorrel	Native	2
Papaveraceae (Poppy Family)	*Dicentra formosa*	Pacific Bleeding Heart	Native	1,2,3

Family Name - Scientific (Common)	Scientific Name	Common Name	Nativity - Cal-IPC	Source*
Papaveraceae (Poppy Family)	*Eschscholzia californica*	California Poppy	Native	1,2,3
Papaveraceae (Poppy Family)	*Fumaria officinalis*	Fumitory	Naturalized	2,3
Papaveraceae (Poppy Family)	*Fumaria parviflora*	Fineleaf Fumitory	Naturalized	1
Phrymaceae (Lopseed Family)	*Mimulus aurantiacus*	Island Monkeyflower	Native	1,2,3
Phrymaceae (Lopseed Family)	*Mimulus guttatus*	Seep Monkeyflower	Native	2
Pinaceae (Pine Family)	*Pinus radiata*	Monterey Pine	Native**	1,2,3
Pittosporaceae (Pittosporum Family)	*Pittosporum undulatum*	Victorian Box, Mock Orange	Naturalized	1,3
Plantaginaceae (Plantain Family)	*Plantago lanceolata*	English Plantain	Naturalized	1,2,3
Plantaginaceae (Plantain Family)	*Plantago major*	Common Plantain	Naturalized	1,2
Poaceae (Grass Family)	*Agrostis microphylla*	Small-Leaf Bent Grass	Native	1
Poaceae (Grass Family)	*Agrostis pallens*	Dune Bent Grass	Native	1
Poaceae (Grass Family)	*Avena barbata*	Slender Wild Oat	Naturalized	1,3
Poaceae (Grass Family)	*Briza maxima*	Rattlesnake Grass	Naturalized	2
Poaceae (Grass Family)	*Bromus carinatus* var. *carinatus*	California Brome	Native	1,2,3
Poaceae (Grass Family)	*Bromus catharticus* var. *elatus*	Chilean Brome	Naturalized	2,3
Poaceae (Grass Family)	*Bromus diandrus*	Ripgut Grass	Naturalized	1,2,3
Poaceae (Grass Family)	*Bromus laevipes*	Woodland Brome	Native	1
Poaceae (Grass Family)	*Calamagrostis nutkaensis*	Pacific Reed Grass	Native	1,2,3
Poaceae (Grass Family)	*Cynosurus echinatus*	Bristly Dogtail Grass	Naturalized	2
Poaceae (Grass Family)	*Dactylis glomerata*	Orchard Grass	Naturalized	2
Poaceae (Grass Family)	*Ehrharta erecta*	Panic Veldt Grass	Naturalized	1,2,3
Poaceae (Grass Family)	*Elymus glaucus*	Blue Or Western Wild-Rye	Native	2,3
Poaceae (Grass Family)	*Festuca perennis*	Rye Grass	Naturalized	1,3
Poaceae (Grass Family)	*Festuca rubra*	Red Fescue	Native	1,2,3
Poaceae (Grass Family)	*Holcus lanatus*	Common Velvet Grass	Naturalized	2
Poaceae (Grass Family)	*Hordeum murinum*	Wall Barley	Naturalized	1,2,3
Poaceae (Grass Family)	*Melica torreyana*	Torrey's Melic	Native	2,3
Poaceae (Grass Family)	*Poa annua*	Annual Blue Grass	Naturalized	2
Polygonaceae (Buckwheat Family)	*Rumex acetosella*	Sheep Sorrel	Naturalized	1,2
Polygonaceae (Buckwheat Family)	*Rumex conglomeratus*	Clustered Dock	Naturalized	2
Polygonaceae (Buckwheat Family)	*Rumex crispus*	Curly Dock	Naturalized	2
Polypodiaceae (Polypody Family)	*Polypodium californicum*	California Polypody	Native	1,2
Polypodiaceae (Polypody Family)	*Polypodium glycyrrhiza*	Licorice Fern	Native	3

Family Name - Scientific (Common)	Scientific Name	Common Name	Nativity - Cal-IPC	Source*
Polypodiaceae (Polypody Family)	*Polypodium scouleri*	Leather-Leaf Fern	Native	1,2,3
Pteridaceae (Maidenhair Fern Family)	*Pentagramma triangularis*	Goldback Fern	Native	2,3
Ranunculaceae (Buttercup Family)	*Aquilegia formosa*	Western Columbine	Native	2,3
Rhamnaceae (Buckthorn Family)	*Ceanothus thyrsiflorus* var. *griseus*	Carmel Ceanothus	Native	2,3
Rhamnaceae (Buckthorn Family)	*Ceanothus thyrsiflorus* var. *thyrsiiflorus*	Blue Blossom	Native	1,2,3
Rhamnaceae (Buckthorn Family)	*Frangula californica*	California Coffee Berry	Native	1,2,3
Rosaceae (Rose Family)	*Cotoneaster franchetii*	Franchet's Cotoneaster	Naturalized	1,3
Rosaceae (Rose Family)	*Cotoneaster lacteus*	Late Cotoneaster	Naturalized	2,3
Rosaceae (Rose Family)	*Cotoneaster pannosus*	Silverleaf Cotoneaster	Naturalized	1,2
Rosaceae (Rose Family)	*Drymocallis glandulosa* var. *glandulosa*	Sticky Cinquefoil	Native	1
Rosaceae (Rose Family)	*Duchesnea indica* var. *indica*	Mock-Strawberry	Naturalized	1
Rosaceae (Rose Family)	*Fragaria vesca*	Wood Strawberry	Native	1,2,3
Rosaceae (Rose Family)	*Heteromeles arbutifolia*	Toyon	Native	1,2,3
Rosaceae (Rose Family)	*Holodiscus discolor*	Oceanspray	Native	1,2,3
Rosaceae (Rose Family)	*Oemleria cerasiformis*	Indian Plum	Native	2,3
Rosaceae (Rose Family)	*Prunus cerasifera*	Cherry Plum	Naturalized	2,3
Rosaceae (Rose Family)	*Prunus cerasifera* var. *atropurpurea*	Purple Leaf Plum	Naturalized	2
Rosaceae (Rose Family)	*Prunus ilicifolia* ssp. *lyonii*	Catalina Cherry	Native	2
Rosaceae (Rose Family)	*Pyracantha angustifolia*	Slender Or Woolly Firethorn	Naturalized	2
Rosaceae (Rose Family)	*Rosa californica*	California Rose	Native	1,2
Rosaceae (Rose Family)	*Rosa gymnocarpa*	Wood Rose	Native	1,2,3
Rosaceae (Rose Family)	*Rubus armeniacus*	Himalayan Blackberry	Naturalized	1,2,3
Rosaceae (Rose Family)	*Rubus parviflorus*	Thimbleberry	Native	1,3
Rosaceae (Rose Family)	*Rubus ursinus*	California Blackberry	Native	1,2,3
Rubiaceae (Madder Family)	*Coprosma repens*	Mirror Bush	Waif	2,3
Rubiaceae (Madder Family)	*Galium aparine*	Goose Grass	Native	1,2,3
Ruscaceae (Butcher's-broom Family)	*Maianthemum racemosum*	False Lily Of The Valley	Native	3
Ruscaceae (Butcher's-broom Family)	*Maianthemum stellatum*	Starry False Lily Of The Valley	Native	1,2,3
Salicaceae (Willow Family)	*Salix* sp.	Willow	Naturalized	3

Family Name - Scientific (Common)	Scientific Name	Common Name	Nativity - Cal-IPC	Source*
Sapindaceae (Soapberry Family)	*Aesculus californica*	California Buckeye	Native	2,3
Saxifragaceae (Saxifrage Family)	*Tellima grandiflora*	Bigflower Tellima	Native	1,2,3
Scrophulariaceae (Figwort Family)	*Myoporum laetum*	Myoporum, Ngaio Tree	Naturalized	1,2,3
Scrophulariaceae (Figwort Family)	*Scrophularia californica*	California Figwort	Native	1,2,3
Solanaceae (Potato Family)	*Salpichroa origanifolia*	Lily Of The Valley Vine	Naturalized	2,3
Solanaceae (Potato Family)	*Solanum americanum*	American Black Nightshade	Native	1
Solanaceae (Potato Family)	*Solanum aviculare*	New Zealand Nightshade	Naturalized	1,3
Solanaceae (Potato Family)	*Solanum dulcamara*	Climbing Nightshade	Naturalized	3
Solanaceae (Potato Family)	*Solanum furcatum*	Forked Nightshade	Naturalized	2,3
Solanaceae (Potato Family)	*Solanum laciniatum*	New Zealand Nightshade	Naturalized	2,3
Solanaceae (Potato Family)	*Solanum nigrum*	Black Nightshade	Naturalized	1,3
Themidaceae (Brodiaea Family)	*Dichelostemma capitatum*	Blue Dicks	Native	3
Themidaceae (Brodiaea Family)	*Triteleia* sp.	Triplet Lilies	Native	3
Tropaeolaceae (Nasturtium Family)	*Tropaeolum majus*	Garden Nasturtium	Naturalized	1,2,3
Urticaceae (Nettle Family)	*Urtica dioica* ssp. *holosericea*	Hoary Nettle	Native	3
Valerianaceae (Valerian Family)	*Centranthus ruber*	Red Valerian	Naturalized	2,3

*Data Sources:

1 = Identified soley by VNLC during 2017 reconnaissance survey (Count: 26 taxa - see shaded rows)

2 = Identified by LSA Associates in Biological Resources Report (2011)

3 = Identified by Nature in the City and Sutro Stewards, Included in HortScience, Inc. and Matt Greene Forestry & Biological Consulting Vegetation Management Plan (2017)

** Native to California, but not to Reserve area

Note: Inventory includes species from restoration area, which is not part of Vegetation Management Plan project site

Appendix C - EBird List

< Hotspot Map

Mt. Sutro OSP

San Francisco County, California, US — Get Directions

All Months ▾ All Years ▾ Set

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Overview Recent Visits

80 Species | 201 Checklists

Updated 9 sec ago.

Last Seen First Seen High Counts Bar Charts Printable Checklist

Show All Details

	SPECIES NAME	COUNT	DATE	BY
1	**House Sparrow**	1	25 Nov 2015	John DeLuca
2	**American Goldfinch**	1	5 Jul 2014	Pat Greene
3	**Lesser Goldfinch**	4	9 Jul 2016	Linda Swanson
4	**Pine Siskin**	1	10 Apr 2015	Daniel Scali
5	**Purple Finch**	3	9 Sep 2016	Pat Greene
6	**House Finch**	1	17 Jan 2017	Pat Greene
	blackbird sp.	1	12 Jul 2013	Pat Greene
7	**Bullock's Oriole**	1	17 Mar 2016	Pat Greene
8	**Hooded Oriole**	1	10 Apr 2015	Daniel Scali
9	**Brown-headed Cowbird**	2	3 Jul 2016	Pat Greene
10	**Lazuli Bunting**	1	3 May 2013	Pat Greene
11	**Black-headed Grosbeak**	1	2 Sep 2016	Whitney Grover
12	**Rose-breasted Grosbeak**	1	9 Jul 2016	Linda Swanson
13	**Western Tanager**	1	2 Sep 2016	Whitney Grover



Recent Visits

Checklists submitted within the last hour are not shown.

OBSERVER	DATE	SPECIES
Whitney Grover	13 Feb 2017	16
Whitney Grover	10 Feb 2017	11
Pat Greene	19 Jan 2017	8
Pat Greene	17 Jan 2017	8
Pat Greene	15 Jan 2017	13
Pat Greene	5 Jan 2017	14
Whitney Grover	18 Dec 2016	9
Whitney Grover	24 Nov 2016	10
Whitney Grover	14 Nov 2016	11
Linda Swanson	12 Nov 2016	1

	SPECIES NAME	COUNT	DATE	BY
14	**Spotted Towhee**	1	25 Feb 2015	Michael Gertz
15	**California Towhee**	2	5 Jan 2017	Pat Greene
16	**Song Sparrow**	14	13 Feb 2017	Whitney Grover
17	**White-throated Sparrow**	1	17 Dec 2014	Pat Greene
18	**Golden-crowned Sparrow**	1	13 Feb 2017	Whitney Grover
19	**White-crowned Sparrow**	1	16 Jun 2016	Linda Swanson
20	**Dark-eyed Junco**	3	13 Feb 2017	Whitney Grover
21	**Fox Sparrow**	1	19 Jan 2017	Pat Greene
	Spizella sp.	1	9 Aug 2013	Pat Greene
22	**Wilson's Warbler**	1	16 Sep 2016	Whitney Grover
23	**Hermit Warbler**	1	6 May 2013	Eddie Bartley
24	**Townsend's Warbler**	1	10 Feb 2017	Whitney Grover
25	**Yellow-rumped Warbler**	10	15 Jan 2017	Pat Greene
26	**Yellow Warbler**	2	16 Sep 2016	Linda Swanson
27	**Nashville Warbler**	1	6 May 2013	Eddie Bartley
28	**Orange-crowned Warbler**	3	16 Sep 2016	Whitney Grover
29	**Cedar Waxwing**	1	16 Apr 2016	Linda Swanson
30	**European Starling**	1	12 Jun 2016	Bonnie Bompart
31	**Varied Thrush**	4	25 Feb 2015	Michael Gertz
32	**American Robin**	100	13 Feb 2017	Whitney Grover

More Recent Visits...

Top eBirders

BY SPECIES | BY CHECKLISTS

Updated 9 sec ago.

1	Pat Greene	69
2	Linda Swanson	46
3	Dominik Mosur	44
4	Daniel Scali	42
5	Whitney Grover	36
6	Richard Drechsler	35
7	RK Bose	31
7	Eddie Bartley	31
9	Jon Sieker	30
10	Michael Gertz	28

	SPECIES NAME	COUNT	DATE	BY
33	**Hermit Thrush**	1	15 Jan 2017	Pat Greene
34	**Swainson's Thrush**	1	6 Jul 2016	Linda Swanson
35	**Ruby-crowned Kinglet**	12	13 Feb 2017	Whitney Grover
36	**Pacific Wren**	8	13 Feb 2017	Whitney Grover
37	**House Wren**	1	8 Oct 2016	
38	**Brown Creeper**	1	10 Feb 2017	Whitney Grover
39	**Pygmy Nuthatch**	4	16 Sep 2016	Linda Swanson
40	**Red-breasted Nuthatch**	1	25 Nov 2015	John DeLuca
41	**Bushtit**	8	24 Nov 2016	Whitney Grover
42	**Chestnut-backed Chickadee**	3	13 Feb 2017	Whitney Grover
43	**Violet-green Swallow**	1	12 Jun 2016	Jon Sieker
44	**Common Raven**	1	13 Feb 2017	Whitney Grover
45	**American Crow**	4	13 Feb 2017	Whitney Grover
46	**California Scrub-Jay**	2	13 Feb 2017	Whitney Grover
47	**Steller's Jay**	2	13 Feb 2017	Whitney Grover
48	**Warbling Vireo**	1	30 May 2016	Linda Swanson
49	**Cassin's Vireo**	2	28 May 2016	Linda Swanson
50	**Hutton's Vireo**	1	15 Jun 2016	lee rudin
51	**Ash-throated Flycatcher**	1	11 Jun 2016	Pat Greene
52	**Black Phoebe**	1	31 May 2015	Pat Greene
	Empidonax sp.	1	9 Sep 2016	Pat Greene

	SPECIES NAME	COUNT	DATE	BY
	Pacific-slope/Cordilleran Flycatcher (Western Flycatcher)	2	2 Oct 2013	Pat Greene
53	**Pacific-slope Flycatcher**	2	16 Sep 2016	Linda Swanson
54	**Western Wood-Pewee**	1	29 May 2016	Linda Swanson
55	**Olive-sided Flycatcher**	1	6 Jun 2015	Linda Swanson
56	**Red-masked Parakeet**	2	3 Oct 2016	Linda Swanson
57	**Peregrine Falcon**	1	16 Jan 2014	Richard Drechsler
58	**Northern Flicker**	1	13 Feb 2017	Whitney Grover
	Downy/Hairy Woodpecker	1	10 Aug 2016	Linda Swanson
59	**Hairy Woodpecker**	1	13 Feb 2017	Whitney Grover
60	**Downy Woodpecker**	1	13 Feb 2017	Whitney Grover
61	**Nuttall's Woodpecker**	1	16 Sep 2016	Linda Swanson
62	**Red-breasted Sapsucker**	1	5 Jan 2017	Pat Greene
63	**Acorn Woodpecker**	1	27 Apr 2015	Pat Greene
	hummingbird sp.	2	27 Jun 2016	Linda Swanson
	Rufous/Allen's Hummingbird	2	2 Sep 2016	Whitney Grover
64	**Allen's Hummingbird**	1	13 Feb 2017	Whitney Grover
65	**Anna's Hummingbird**	9	13 Feb 2017	Whitney Grover
66	**White-throated Swift**	1	12 Jun 2016	Jon Sieker

	SPECIES NAME	COUNT	DATE	BY
67	**Great Horned Owl**	2	12 Nov 2016	Linda Swanson
	pigeon/dove sp.	1	1 May 2015	Pat Greene
68	**Mourning Dove**	2	16 Jun 2016	Linda Swanson
69	**Eurasian Collared-Dove**	1	8 Oct 2016	
70	**Band-tailed Pigeon**	2	11 Jun 2016	Daniel Scali
71	**Rock Pigeon**	1	8 Oct 2016	
72	**Caspian Tern**	1	12 Jun 2016	Jon Sieker
	gull sp.	1	25 Nov 2015	John DeLuca
73	**Western Gull**	1	28 Feb 2016	Robert Martin
	hawk sp.	1	13 Feb 2017	Whitney Grover
	Buteo sp.	1	8 Oct 2016	
74	**Red-tailed Hawk**	1	5 Jan 2017	Pat Greene
75	**Red-shouldered Hawk**	1	5 Jan 2017	Pat Greene
76	**Cooper's Hawk**	1	17 Mar 2016	Pat Greene
77	**Sharp-shinned Hawk**	1	1 May 2015	Pat Greene
78	**Osprey**	1	28 Feb 2016	Robert Martin
79	**Turkey Vulture**	1	29 May 2016	Linda Swanson
80	**Greater White-fronted Goose**	4	27 Sep 2015	Alex Smolyanskaya

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Appendix D – LSA Associates (2011) List of Special-Status Plant Species

Table A: Special-status Species Potentially Occurring in the Vicinity of the Mount Sutro Open Space Reserve, San Francisco, California

Species	Status	Habitat, Blooming Season, and Elevation	Potential for Occurrence in the Project Area
PLANTS			
Amsinckia lunaris Bent-flowered fiddleneck	1B	Annual grasslands. Blooms April to May. 3–500 meters.	Closest record (CNDDB occurrence #6) is located approximately 6.3 air miles to the south at San Bruno Mountain. The likelihood of this species occurring on the Reserve is low due to the density of and competition from exotic vegetation.
Arctostaphylos franciscana	1B	Serpentine outcrops in chaparral. 60-300 meters.	Considered extinct until one plant was discovered during a road construction project in the Presidio of San Francisco. Highly unlikely to occur on the Reserve due to lack of suitable serpentine habitat.
Arctostaphylos hookeri ssp. *ravenii* Presidio manzanita	FE, SE, 1B	Chaparral, coastal prairie, coastal scrub/serpentinite outcrop. Blooms February to March. 45–215 meters.	Closest extant record (CNDDB occurrence #4) is attributed to a reintroduction of the plant at Baker's Beach near the WWII Memorial, approximately 2.6 miles from the Reserve. Not expected to occur due to lack of suitable habitat.
Arctostaphylos imbricata San Bruno manzanita	SE, 1B	Chaparral or coastal scrub on San Bruno Mountain; mostly known from a few sandstone outcrops Blooms February to May. 275–370 meters.	Not expected to occur due to lack of suitable habitat; species distribution limited to San Bruno Mountain.
Arctostaphylos montaraensi Montara manzanita	1B	Coastal chaparral, coastal scrub. Blooms January to March. 150–500 meters.	Closest record (CNDDB occurrence #8) is located approximately 4.9 air miles to the south near the summit of San Bruno Mountain. The likelihood of this species occurring on site is low due to the density of competing non-native vegetation.
Arctostaphylos pacifica Pacific manzanita	SE, 1B	Coastal scrub associated with sandstone and other species of *Arctostaphylos*. Known only from San Bruno Mountain. Blooms February to April.	Closest record (CNDDB occurrence #1) is located approximately 5.3 air miles to the south near the summit of San Bruno Mountain. Not expected to occur; species distribution limited to San Bruno Mountain.
Cirsium andwersii Franciscan thistle	1B	Coastal bluff scrub, coastal prairie, broadleafed upland forest; sometimes occurs in serpentine seeps. Blooms March to July. 0-150 meters.	Closest presumed extant record (CNDDB occurrence #7) is approximately 1.9 miles to the north near Mountain Lake in the Presidio. Not expected to occur due to disturbance and lack of suitable habitat.
Cirsium occidentale var. compactum Compact cobwebby thistle	1B	Chaparral, coastal dunes, coastal prairie, coastal scrub. Blooms April to June. 5–150 meters.	Closest possibly extirpated record (CNDDB occurrence #15) approximately 2.7 miles to the south near Lake Merced. Not expected to occur due to prior disturbance and lack of suitable habitat
Clarkia franciscana Presidio clarkia	FE, SE, 1B	Coastal scrub, valley and foothill grassland, sometimes on serpentine. Blooms May to July. 25–335 meters.	Closest presumed extant record (CNDDB occurrence #2) is attributed to a reintroduction of the plant to serpentine grasslands at the Presidio approximately 1.9 miles to the north. Not expected to occur due to lack of suitable habitat.
Collinsia corymbosa Round-headed Chinese-houses	1B	Coastal dunes. Blooms April to June. 0–20 meters.	Closest presumed extant record (CNDDB occurrence #1) is attributed to a collection made in 1902 at the Presidio approximately 1.1 miles to the north. Not expected to occur due to lack of suitable habitat.

Species	Status	Habitat, Blooming Season, and Elevation	Potential for Occurrence in the Project Area
Collinsia multicolor San Francisco collinsia	1B	Closed-cone coniferous forest, coastal scrub and grassland on decomposed shale (mudstone) mixed with humus. Sometimes on serpentinite. Blooms March to May. 30–250 meters.	Closest presumed extant record (CNDDB occurrence #16) is attributed to a collection made in 1929 at Glen Canyon Park approximately 0.6 miles to the southeast. Not expected to occur due to prior disturbance and lack of suitable habitat.
Fritillaria liliacea Fragrant fritillary	1B	Grasslands in coastal scrub and coastal prairie, often on serpentine and usually in clay soils but various soil types are reported. Blooms February to April. 3–410 meters.	Closest presumed extant record (CNDDB occurrence #61) is attributed to an observation mentioned in an undated article by Mike Wood. The location is from the Twin Peaks area approximately 0.3 miles to the south. Not expected to occur due to prior disturbance and lack of suitable habitat.
Grindelia hirsutula var. *maritima* San Francisco gumplant	1B	Coastal scrub, grassland; sandy or serpentine slopes, sea bluffs, valley and foothill grassland. Blooms June to September. 15–400 meters.	Closest extant record (CNDDB occurrence #2) is attributed to a location on the west slope of Mount Sutro outside of the Reserve. Although this plant is on the Mount Sutro Stewards plant list, the known population is isolated from the Reserve habitat and it was not observed on the Reserve during LSA surveys.
Helianthella castanea Diablo helianthella	1B	Thin, rocky soils on grassy hillsides and in cismontane woodland, usually at the scrub/chaparral/oak woodland interface. Blooms April to May. 150–1,220 meters.	Closest presumed extant record (CNDDB occurrence #11) is attributed to a collection made in 1899 at Bay View Hill approximately 3.6 miles to the southeast. Not expected to occur due to prior disturbance and lack of suitable habitat.
Hesperolinon congestum Marin western flax	FT, ST, 1B	Chaparral, valley and foothill grassland/serpentinite. Blooms April to July. 5–370 meters.	Closest extant record (CNDDB occurrence #16) is attributed to an attempted reintroduction at Baker Beach, approximately 2.6 miles to the north. Not expected to occur due to lack of suitable habitat.
Pentachaeta bellidiflora White-rayed pentachaeta	FE, ST, 1B	Cismontane woodland valley and foothill grassland, often on open, dry rocky slopes. Blooms March to May. 35–620 meters.	The closest record (CNDDB #6) is from the east edge of San Bruno Mountain, approximately 6.5 air miles to the south-southeast. Not expected to occur due to lack of suitable habitat.
Plagiobothrys chorisianus var. chorisianus Choris' popcorn-flower	1B	Chaparral, coastal prairie, coastal scrub, mesic sites. Blooms March to June. 15–160 meters.	Closest presumed extant record (CNDDB occurrence #12) is approximately 0.2 miles to the north in Golden Gate Park as documented in the *Flora of San Francisco*. Not expected to occur due to prior disturbance and lack of suitable habitat
Plagiobothrys diffusus San Francisco popcorn flower	SE, 1B	Coastal prairie, valley and foothill grassland. Blooms March to June. 60–360 meters.	Closest presumed extant record (CNDDB occurrence #2) is approximately 1.7 miles to the north on clay flats near Mountain Lake in the Presidio. Not expected to occur due to prior disturbance and lack of suitable habitat.
Polemonium carneum Oregon polemonium	2	Coastal prairie, coastal scrub, lower montane coniferous forest. Blooms April to September. 0–1,830 meters.	Closest presumed extant record (CNDDB occurrence #5) is attributed to a 1939 collection from Point Bonita in Marin County, approximately 4.4 miles to the north. Not expected to occur due to prior disturbance and lack of suitable habitat.
Silene verecunda ssp. *verecunda* San Francisco campion	1B	Coastal bluff scrub, grassland, chaparral, coastal prairie, sandy areas in valley and foothill grassland. Blooms March to June. 30–645 meters.	Closest presumed extant record (CNDDB occurrence #8) is approximately 1 mile south of the Reserve at Mt. Davidson. This population is on rock slopes of Franciscan greywacke, threatened by blue gum eucalyptus and German ivy. Not expected to occur due to prior disturbance and lack of suitable habitat.

Species	Status	Habitat, Blooming Season, and Elevation	Potential for Occurrence in the Project Area
Stebbinsoseris decipiens Santa Cruz microseris	1B	Broadleafed upland forest, closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub, often in open areas and sometimes serpentinite in valley and foothill grassland. Blooms April to May. 10-500 meters.	Closest record (CNDDB occurrence #18) is approximately 7.3 air miles to the north on Angel Island. Not expected to occur due to lack of suitable habitat.
Triphysaria floribunda San Francisco owl's-clover	1B	Coastal prairie, coastal scrub, usually on serpentine in valley and foothill grassland. Blooms April to June. 10–160 meters.	Closest extant record (CNDDB occurrence #19) is attributed to a declining population at the Presidio, approximately 2.6 miles to the north. Not expected to occur due to lack of suitable habitat.
Triquetrella californica Coastal triquetrella	1B	Coastal bluff scrub, on soil in coastal scrub. 10–100 meters.	Closest extant record (CNDDB occurrence #4) is located less than 0.1 mile from the Reserve on Tank Hill. Like other mosses, coastal triquetrella grows over rocks, on soil, and within grassy areas with rocks. Although this moss was not observed during the fieldwork, it could have easily been overlooked and may be present on the project site.

Status
FE = federally listed as endangered
FT = federally listed as threatened
SE = State-listed as endangered
ST = State-listed as threatened
CSC = California Species of Special Concern
CFP = California Fully Protected Species
1B = California Rare Plant Rank 1B: species considered rare or endangered in California and elsewhere
2 = California Rare Plant Rank 2 – rare, threatened or endangered in California, but more common elsewhere.
CEQA = considered rare under Section 15380 of CEQA

APPENDIX 4.4

Correspondence with Native American Tribes

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
(916) 373-3710
(916) 373-5471 FAX

November 3, 2015

Deborah Wylie
Associate Vice President
University of California
1111 Franklin Street, 6th Bloor
Oakland, CA 94607-5200

Sent by Email: charlotte.strem@ucop.edu
Number of Pages: 16

RE: University of California CEQA process and consultation pursuant to Assembly Bill 52, University of California, Los Angeles

Dear Ms. Wylie:

Attached is a consultation list of tribes with traditional lands or cultural places located within the boundaries of the above referenced project. Government Code §65352.3 requires local governments to consult with California Native American tribes identified by the Native American Heritage Commission (NAHC) for the purpose of protecting, and/or mitigating impacts to tribal cultural resources in creating or amending general plans, including specific plans. As of July 1, 2015, Public Resources Code Sections 21080.1, 21080.3.1 and 21080.3.2 require public agencies to consult with California Native American tribes identified by the NAHC for the purpose mitigating impacts to tribal cultural resources under the California Environmental Quality Act (CEQA). In accordance with Public Resources Code Section 21080.1(d):

> Within 14 days of determining that an application for a project is complete or a decision by a public agency to undertake a project, the lead agency shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, which shall be accomplished by means of at least one written notification that includes a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation pursuant to this section.

The law does not preclude agencies from initiating consultation with the tribes that are culturally and traditionally affiliated with their jurisdictions. The NAHC believes that in fact that this is the best practice to ensure that tribes are consulted commensurate with the intent of the law.

In accordance with Public Resources Code Section 21080.1(d), formal notification must include a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation. The NAHC believes that agencies should also include with their notification letters information regarding any cultural resources assessment that has been completed on the APE, such as:

1. The results of any record search that may have been conducted at an Information Center of the California Historical Resources Information System (CHRIS), including, but not limited to:

   - A listing of any and all known cultural resources have already been recorded on or adjacent to the APE;
   - Copies of any and all cultural resource records and study reports that may have been provided by the Information Center as part of the records search response;
   - If the probability is low, moderate, or high that cultural resources are located in the APE.

- Whether the records search indicates a low, moderate or high probability that unrecorded cultural resources are located in the potential APE; and

- If a survey is recommended by the Information Center to determine whether previously unrecorded cultural resources are present.

2. The results of any archaeological inventory survey that was conducted, including:

   - Any report that may contain site forms, site significance, and suggested mitigation measurers.

     All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for pubic disclosure in accordance with Government Code Section 6254.10.

3. The results of any Sacred Lands File (SFL) check conducted through Native American Heritage Commission. The request form can be found at http://nahc.ca.gov/wp-content/uploads/2015/08/Local-Government-Tribal-Consultation-List-Request-Form-Update.pdf

4. Any ethnographic studies conducted for any area including all or part of the potential APE; and

5. Any geotechnical reports regarding all or part of the potential APE.

Lead agencies should be aware that records maintained by the NAHC and CHRIS is not exhaustive, and a negative response to these searches does not preclude the existence of a cultural place. A tribe may be the only source of information regarding the existence of a tribal cultural resource.

This information will aid tribes in determining whether to request formal consultation. In the case that they do, having the information beforehand well help to facilitate the consultation process.

If you receive notification of change of addresses and phone numbers from tribes, please notify me. With your assistance we are able to assure that our consultation list contains current information.

If you have any questions, please contact me at my email address: rw_nahc@pacbell.net.

Sincerely,

Rob Wood
Associate Governmental Program Analyst

Native American Heritage Commission
Tribal Consultation List
San Francisco County
November 1, 2015

Coastanoan Rumsen Carmel Tribe
Tony Cerda, Chairperson
240 E. 1st Street — Ohlone/Costanoan
Pomona , CA 91766
rumsen@aol.com
(909) 524-8041 Cell
(909) 629-6081

Amah MutsunTribal Band of Mission San Juan Bautista
Irenne Zwierlein, Chairperson
789 Canada Road — Ohlone/Costanoan
Woodside , CA 94062
amahmutsuntribal@gmail.com
(650) 400-4806 Cell

Muwekma Ohlone Indian Tribe of the SF Bay Area
Rosemary Cambra, Chairperson
P.O. Box 360791 — Ohlone / Costanoan
Milpitas , CA 95036
muwekma@muwekma.org
(408) 314-1898
(510) 581-5194

The Ohlone Indian Tribe
Andrew Galvan
P.O. Box 3152 — Ohlone/Costanoan
Fremont , CA 94539 — Bay Miwok
chochenyo@AOL.com — Plains Miwok
(510) 882-0527 Cell — Patwin

Indian Canyon Mutsun Band of Costanoan
Ann Marie Sayers, Chairperson
P.O. Box 28 — Ohlone/Costanoan
Hollister , CA 95024
ams@indiancanyon.org
(831) 637-4238

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

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.
This list applicable only for consultation with Native American tribes under Public Resources Code Sections 21080.3.1 for the proposed University of California CEQA process and consultation pursuant to Assembly Bill 52, University of California, San Francisco.

TORRES MARTINEZ DESERT CAHUILLA INDIANS
P.O. Box 1160
Thermal, CA 92274
(760) 397-0300 – FAX (760) 397-8146

May 2, 2016

University of California, San Francisco
3333 California Strreet, Suite 11 P.O. Box 0286
San Francisco, CA 94111

Re: California Environmental Quality Act Public Resources Code section 21080.3, subd. (b) ; California Assembly Bill 52, Request for Formal Notification of Proposed Projects within your jurisdiction that is traditionally and culturally affiliated with the Torres Martinez Desert Cahuilla Indians.

The purpose of this letter is to request formal notification of proposed projects within your jurisdiction that is traditionally and culturally affiliated with the Torres Martinez Desert Cahuilla Indians, in accordance with Public Resources Code Section 21080.3.1, subd. (b). As of the date of this letter, you have been formally notified that the boundaries of your local government's jurisdiction fall within the area that is traditionally and culturally affiliated with the Torres Martinez Desert Cahuilla Indians. Additionally, Torres Martinez Desert Cahuilla Indians has created specific requests and formal procedures in accordance with California Assembly Bill 52:

- Formal notice of and information on proposed projects for which your agency will serve as a lead agency under the California Environmental Quality Act (CEQA), Public Resources Code section 21000 et seq. Pursuant to Public Resources Code section 21080.3.1, subd. (b) shall be sent to Torres Martinez Desert Cahuilla Indians

- Within 14 days of determining that an application for a project is complete or of a decision by your agency to undertake a project, a lead agency must provide formal notification to Cultural Monitoring Coordinator, Michael Mirelez, who is the designated contact and tribal representative for the traditionally and culturally affiliated Torres Martinez Desert Cahuilla Indians regarding notifications pertaining to California Assembly Bill 52

  Contact Information:
  Michael Mirelez

Cultural Resource Coordinator
Torres Martinez Desert Cahuilla Indians
Address: P.O. Box 1160 Thermal, CA 92274

Office: 760-397-0300 ext:1213
Cell: 760-399-0022
Email: mmirelez@tmdci.org

This notice shall consist of a formal written letter that includes:

- A description of the proposed project
- The project's location
- The lead agency contact information
- A clear and definitive statement that the tribe has 30 day to request consultation
- An Aerial Photo of the project Area
- Copies of the CHRIS Archaeological Record Search

- Once the Torres Martinez Desert Cahuilla Indians has received the notification, we will respond within 30 days as to whether we wish to initiate consultation as prescribed by Public Resources Code section 21080.3.1, subd. (d), the Torres Martinez Desert Cahuilla Indians, may request consultation, as defined by Public Resources Code section 21080.3.1, subd. (b), pursuant to Public Resources Code section 21080.3.2 to mitigate any project impacts a specific project may cause to tribal cultural resources.

- The lead agency shall begin the consultation process within 30 days of receiving the Torres Martinez Desert Cahuilla Indians request for consultation and prior to the release of a negative declaration, mitigated negative declaration, or environmental impact statement.

- Once a review of inadvertent discoveries has been completed by the Cultural Resource Director, all information will then be transferred to the Torres Martinez Desert Cahuilla Indians Tribal Council for a final decision and directive.

Sincerely,

Michael Mirelez
Cultural Resource Coordinator
Torres Martinez Desert Cahuilla Indians

University of California
San Francisco

Campus Planning

Real Estate, Planning, & Capital Programs

UCSF Box 0286
654 Minnesota Street, 2nd Floor
San Francisco, CA 94143

tel: 415.476.2911

Lori Yamauchi
Associate Vice Chancellor

lori.yamauchi@ucsf.edu
www.ucsf.edu

February 6, 2017

Irenne Zwielein, Chairperson
Amah Mutsun Tribal Band of Mission San Juan Bautista
789 Canada Road
Woodside, California 94062

Subject: Formal Notification Pursuant to Public Resources Code §21080.3.1 (Assembly Bill 52) for the UCSF Mount Sutro Open Space Reserve Vegetation Management Plan Project, San Francisco County, California

Dear Ms. Zwielein:

Public Resources Code (PRC) §21080.3.1 (Assembly Bill 52) requires lead agencies to consult with California Native American Tribes that request consultation in writing prior to the agency's release of a Notice of Preparation (NOP) of an Environmental Impact Report (EIR), or notice of a Mitigated Negative Declaration (MND) or Negative Declaration (ND) on or after July 1, 2015.Pursuant to California Public Resources Code (PRC) §21080.3.1, the University of California, San Francisco (UCSF), as the California Environmental Quality Act (CEQA) Lead Agency, hereby provides formal notification of UCSF's proposal to undertake the Vegetation Management Plan (Plan) for the UCSF Mount Sutro Open Space Reserve (Reserve). UCSF intends to prepare an Environmental Impact Report for the project to fulfill the requirements of CEQA. The Amah Mutsun Tribal Band of Mission San Juan Bautista has 30 days from receipt of this formal notification to request consultation under PRC §21080.3.1.

The Plan would provide a management framework for protecting, enhancing, and restoring vegetation in the 61-acre Reserve. This Plan has been prepared to guide short-term and long-term management towards four goals:

1. Protect the safety of Reserve users and adjacent campus and residential properties
2. Improve and enhance the health and stability of the ecosystem
3. Enhance the visual design and aesthetic experience
4. Maintain and ensure public access to the Reserve

The Plan identifies a series of forest treatments over four forest types to meet its goals. Forest treatments would be implemented in three phases: initial 5 years, years 6 to 10, and years 11 to 20. Management activities include removing dead, dying, unhealthy, and structurally unstable trees; controlling low-growing vines and shrubs that would compete with desired vegetation; preventing sprouts from decayed stumps; and planting new trees. The Plan includes regenerating the eucalyptus canopy, planting native species, managing defensible space between surrounding buildings and the Reserve, and maintaining trails for recreational use.

A cultural resources report was prepared to determine whether the Reserve qualifies as a historic resource (i.e., meets the California Register of Historical Resource criteria) in October 2011; the report was later updated in January 2013. The report is available here:

https://ucsf.box.com/v/MtSutroCulturalReport2013Jan.

We understand that other cultural resources can be found in any project area. A Native American tribe or individual may be the only source for the presence of traditional cultural places or sites. Therefore, we request any additional information that you would like to provide related to any sacred or traditional cultural places, tribal cultural resources, or tribal landscapes with regard to the project area shown on the accompanying map, or regarding any other environmental concerns. Upon receipt of your request to consult, we would be happy to discuss with you or with other Tribal members the most respectful way to consider Tribal concerns while maintaining the confidentiality of these resources.

If you have any questions or concerns regarding the proposed project, please do not hesitate to contact me at (415) 502-5952 or diane.wong@ucsf.edu.

Sincerely,

Diane C. Wong

Diane Wong
Principal Planner/Environmental Coordinator
University of California, San Francisco

cc: Tania Treis, Panorama Environmental, Inc.
Kimi Worrell, Panorama Environmental, Inc.

Attachment: Project Location Map

Proposed Plan Location



University of California
San Francisco

Campus Planning

Real Estate, Planning, & Capital Programs

UCSF Box 0286
654 Minnesota Street, 2nd Floor
San Francisco, CA 94143

tel: 415.476.2911

Lori Yamauchi
Associate Vice Chancellor

lori.yamauchi@ucsf.edu
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February 6, 2017

Chairperson
Amah Mutsun Tribal Band of Mission San Juan Bautista
PO Box 5272
Galt, CA 95623

Subject: Formal Notification Pursuant to Public Resources Code §21080.3.1 (Assembly Bill 52) for the UCSF Mount Sutro Open Space Reserve Vegetation Management Plan Project, San Francisco County, California

Dear Chairperson:

Public Resources Code (PRC) §21080.3.1 (Assembly Bill 52) requires lead agencies to consult with California Native American Tribes that request consultation in writing prior to the agency's release of a Notice of Preparation (NOP) of an Environmental Impact Report (EIR), or notice of a Mitigated Negative Declaration (MND) or Negative Declaration (ND) on or after July 1, 2015.Pursuant to California Public Resources Code (PRC) §21080.3.1, the University of California, San Francisco (UCSF), as the California Environmental Quality Act (CEQA) Lead Agency, hereby provides formal notification of UCSF's proposal to undertake the Vegetation Management Plan (Plan) for the UCSF Mount Sutro Open Space Reserve (Reserve). UCSF intends to prepare an Environmental Impact Report for the project to fulfill the requirements of CEQA. The Amah Mutsun Tribal Band of Mission San Juan Bautista has 30 days from receipt of this formal notification to request consultation under PRC §21080.3.1.

The Plan would provide a management framework for protecting, enhancing, and restoring vegetation in the 61-acre Reserve. This Plan has been prepared to guide short-term and long-term management towards four goals:

1. Protect the safety of Reserve users and adjacent campus and residential properties
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A cultural resources report was prepared to determine whether the Reserve qualifies as a historic resource (i.e., meets the California Register of Historical Resource criteria) in October 2011; the report was later updated in January 2013. The report is available here:

https://ucsf.box.com/v/MtSutroCulturalReport2013Jan.

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If you have any questions or concerns regarding the proposed project, please do not hesitate to contact me at (415) 502-5952 or diane.wong@ucsf.edu.

Sincerely,

Diane C. Wong

Diane Wong
Principal Planner/Environmental Coordinator
University of California, San Francisco

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February 6, 2017

Tony Cerda, Chairperson
Coastanoan Rumsen Carmel Tribe
240 E. 1st Street
Pomona, California 91766

Subject: Formal Notification Pursuant to Public Resources Code §21080.3.1 (Assembly Bill 52) for the UCSF Mount Sutro Open Space Reserve Vegetation Management Plan Project, San Francisco County, California

Dear Mr. Cerda:

Public Resources Code (PRC) §21080.3.1 (Assembly Bill 52) requires lead agencies to consult with California Native American Tribes that request consultation in writing prior to the agency's release of a Notice of Preparation (NOP) of an Environmental Impact Report (EIR), or notice of a Mitigated Negative Declaration (MND) or Negative Declaration (ND) on or after July 1, 2015.Pursuant to California Public Resources Code (PRC) §21080.3.1, the University of California, San Francisco (UCSF), as the California Environmental Quality Act (CEQA) Lead Agency, hereby provides formal notification of UCSF's proposal to undertake the Vegetation Management Plan (Plan) for the UCSF Mount Sutro Open Space Reserve (Reserve). UCSF intends to prepare an Environmental Impact Report for the project to fulfill the requirements of CEQA. The Coastanoan Rumsen Carmel Tribe has 30 days from receipt of this formal notification to request consultation under PRC §21080.3.1.

The Plan would provide a management framework for protecting, enhancing, and restoring vegetation in the 61-acre Reserve. This Plan has been prepared to guide short-term and long-term management towards four goals:

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Sincerely,



Diane Wong
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University of California, San Francisco

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February 6, 2017

Ann Marie Sayers, Chairperson
Indian Canyon Mutsun Band of Costanoan
P.O. Box 28
Hollister, California 95024

Subject: Formal Notification Pursuant to Public Resources Code §21080.3.1 (Assembly Bill 52) for the UCSF Mount Sutro Open Space Reserve Vegetation Management Plan Project, San Francisco County, California

Dear Ms. Sayers:

Public Resources Code (PRC) §21080.3.1 (Assembly Bill 52) requires lead agencies to consult with California Native American Tribes that request consultation in writing prior to the agency's release of a Notice of Preparation (NOP) of an Environmental Impact Report (EIR), or notice of a Mitigated Negative Declaration (MND) or Negative Declaration (ND) on or after July 1, 2015. Pursuant to PRC §21080.3.1, the University of California, San Francisco (UCSF), as the California Environmental Quality Act (CEQA) Lead Agency, hereby provides formal notification of UCSF's proposal to undertake the Vegetation Management Plan (Plan) for the UCSF Mount Sutro Open Space Reserve (Reserve). UCSF intends to prepare an Environmental Impact Report for the project to fulfill the requirements of CEQA. The Indian Canyon Mutsun Band of Costanoan has 30 days from receipt of this formal notification to request consultation under PRC §21080.3.1.

The Plan would provide a management framework for protecting, enhancing, and restoring vegetation in the 61-acre Reserve. This Plan has been prepared to guide short-term and long-term management towards four goals:

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Sincerely,

Diane C. Wong

Diane Wong
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University of California, San Francisco

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Associate Vice Chancellor

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www.ucsf.edu

February 6, 2017

Rosemary Cambra, Chairperson
Muwekma Ohlone Indian Tribe of the SF Bay Area
P.O. Box 360791
Milpitas, California 95036

Subject: Formal Notification Pursuant to Public Resources Code §21080.3.1 (Assembly Bill 52) for the UCSF Mount Sutro Open Space Reserve Vegetation Management Plan Project, San Francisco County, California

Dear Ms. Cambra:

Public Resources Code (PRC) §21080.3.1 (Assembly Bill 52) requires lead agencies to consult with California Native American Tribes that request consultation in writing prior to the agency's release of a Notice of Preparation (NOP) of an Environmental Impact Report (EIR), or notice of a Mitigated Negative Declaration (MND) or Negative Declaration (ND) on or after July 1, 2015. Pursuant to PRC §21080.3.1, the University of California, San Francisco (UCSF), as the California Environmental Quality Act (CEQA) Lead Agency, hereby provides formal notification of UCSF's proposal to undertake the Vegetation Management Plan (Plan) for the UCSF Mount Sutro Open Space Reserve (Reserve). UCSF intends to prepare an Environmental Impact Report for the project to fulfill the requirements of CEQA. The Muwekma Ohlone Indian Tribe of the SF Bay Area has 30 days from receipt of this formal notification to request consultation under PRC §21080.3.1.

The Plan would provide a management framework for protecting, enhancing, and restoring vegetation in the 61-acre Reserve. This Plan has been prepared to guide short-term and long-term management towards four goals:

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February 6, 2017

Andrew Galvan
Ohlone Indian Tribe
P.O. Box 3152
Fremont, California 94539

Subject: Formal Notification Pursuant to Public Resources Code §21080.3.1 (Assembly Bill 52) for the UCSF Mount Sutro Open Space Reserve Vegetation Management Plan Project, San Francisco County, California

Dear Mr. Galvan:

Public Resources Code (PRC) §21080.3.1 (Assembly Bill 52) requires lead agencies to consult with California Native American Tribes that request consultation in writing prior to the agency's release of a Notice of Preparation (NOP) of an Environmental Impact Report (EIR), or notice of a Mitigated Negative Declaration (MND) or Negative Declaration (ND) on or after July 1, 2015. Pursuant to PRC §21080.3.1, the University of California, San Francisco (UCSF), as the California Environmental Quality Act (CEQA) Lead Agency, hereby provides formal notification of UCSF's proposal to undertake the Vegetation Management Plan (Plan) for the UCSF Mount Sutro Open Space Reserve (Reserve). UCSF intends to prepare an Environmental Impact Report for the project to fulfill the requirements of CEQA. The Ohlone Indian Tribe has 30 days from receipt of this formal notification to request consultation under PRC §21080.3.1.

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February 6, 2017

Michael Mirelez
Torres Martinez Desert Cahuilla Indians
P.O. Box 1160
Thermal, California 92274

Subject: Formal Notification Pursuant to Public Resources Code §21080.3.1 (Assembly Bill 52) for the UCSF Mount Sutro Open Space Reserve Vegetation Management Plan Project, San Francisco County, California

Dear Mr. Galvan:

Public Resources Code (PRC) §21080.3.1 (Assembly Bill 52) requires lead agencies to consult with California Native American Tribes that request consultation in writing prior to the agency's release of a Notice of Preparation (NOP) of an Environmental Impact Report (EIR), or notice of a Mitigated Negative Declaration (MND) or Negative Declaration (ND) on or after July 1, 2015. Pursuant to PRC §21080.3.1, the University of California, San Francisco (UCSF), as the California Environmental Quality Act (CEQA) Lead Agency, hereby provides formal notification of UCSF's proposal to undertake the Vegetation Management Plan (Plan) for the UCSF Mount Sutro Open Space Reserve (Reserve). UCSF intends to prepare an Environmental Impact Report for the project to fulfill the requirements of CEQA. The Torres Martinez Desert Cahuilla Indians Tribe has 30 days from receipt of this formal notification to request consultation under PRC §21080.3.1.

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APPENDIX 4.8

Fire Hazards Report

1 INTRODUCTION

1.1 SUMMARY OF PLAN AND PURPOSE OF STUDY

The purpose of this analysis is to determine whether the hazards posed by the forest to the campus and surrounding neighborhoods are increased or decreased by the project, and if the hazard is increased, whether that increase reaches the level of significance, and if so, what mitigating actions can be taken to minimize the negative impact.

1.2 HISTORY OF FIRE AND FIRE HAZARDS AT MOUNT SUTRO

1.2.1 Fire History

The recent fire history is meager. No fires of consequence have burned in the Reserve in recent history.

Previously, fires were commonplace. There was a "great" fire on October 8, 1899 and numerous smaller fires every summer. 23 The 1899 fire burned 60 acres and threatened the Affiliated Colleges (today's UCSF) and the Alms House (today's Laguna Honda Hospital) before it was extinguished by 70 firemen and hundreds of volunteers. The steep terrain hindered firefighting, and " .. .in one instance five horses were required [instead of the customary three] to pull the engine, and the animals were white with foam and apparently ready to drop in their tracks." 24, from Farms, Fire and Forest – Western Neighborhoods Project.

Because eucalyptus burns readily, the danger of fire was a constant worry. Trespassers who might light a fire for camping or cooking, were a recurring problem. According to the *San Francisco Chronicle,* "the [Sutro] woods are overrun-with picnickers, hunters and tramps."

One account states,

> "There have been no large fires at the San Miguel Ranch since the great fire of October 8, 1899, but there have been numerous small ones every summer. July 8, 1900 there was a fire on the hill back of the coursing track. November 21, 1900 there was a fire in the forest near Corbett road. July 1902 there was a fire on Ocean Avenue. In August 1902, there was a fire on a place adjoining the forest. On July 31, 1900 an inhabitant of the Alms House was caught trying to set fire to the forest. This was reported to the superintendent and he punished the man. One of the fires in 1900 did a great deal of damage; the others have not been so series in character.

> In consequence of the danger of fire we have not allowed any one to go to the ranch without a permit. We have also tried to limit the permits as much as possible, giving no general permits and usually for a single day only at a time."
>
> In the vicinity of the great fire of the fall of 1899, a great many eucalyptus trees have come up in the burned district and also a number of the pine and cypress trees …eventually the district burned at this time will again be covered with forest trees.
>
> In March, 1900 we sent an old horse "Gypsie", a buggy, a set of harness, etc. to the San Miguel Ranch for use of the superintendent. In June 1900, we sent a dump cart and another horse to the ranch for carrying shovels, sacks, etc. in case of fire."

The 2013 Mt Sutro EIR, pg. 4.4-13 noted that "The most dramatic impact to the cultural landscape was the logging which occurred in the early 1930s. This operation ended in 1934 after a fire burned 10 acres that required 400 firemen to extinguish."

1.3 FIRE MAPPING AND HAZARD CLASSIFICATION AT MOUNT SUTRO

The 2014 Hazard Mitigation Plan for the City and County of San Francisco reports, that the California Department of Forestry and Fire Protection (CAL FIRE) has no historical record of any wildfires occurring within the City and County of San Francisco, and concluded that the probability of a future wildfire event in the area appears to be low to moderate.

In 2007, pursuant to state law, CAL FIRE adopted Fire Hazard Severity Zone (FHSZ) maps in 2007 for SRA lands. CAL FIRE has also developed FHSZ maps for Local Responsibility Areas (LRAs) within California. LRAs include incorporated cities such as San Francisco, where fire protection is typically provided by a city fire department. The LRA fire hazard zone maps developed by CAL FIRE use an extension of the SRA FHSZ model, which reflects flame and ember intrusion from adjacent wildlands and from flammable vegetation in urban areas.[1]



Figure 1. Moderate Fire Hazard Severity Zone (Yellow Areas) as appears in Appendix C-13 of San Francisco Hazard Mitigation Plan.

The current CAL FIRE map of fire hazard severity zones indicates that San Francisco has no Very High Fire Hazard Severity Zones in its LRA. However, as shown in Figure 1, CAL FIRE has designated wooded areas of Sutro Heights as a Moderate fire hazard severity zone.

[1] City and County of San Francisco. 2014. Section 5 of the Hazard Mitigation Plan.

Appendix #4 of ABAG's Local Hazard Mitigation Plan noted that parts of San Francisco were included in the Communities at Risk designation. This designation was not intended to be site-specific. Rather is depicts the general risk within neighborhoods and the relative risk from community to community. The map is available at http://quake.abag.ca.gov. It depicts the entirety of the Reserve and many neighborhoods around it as a Community at Risk.

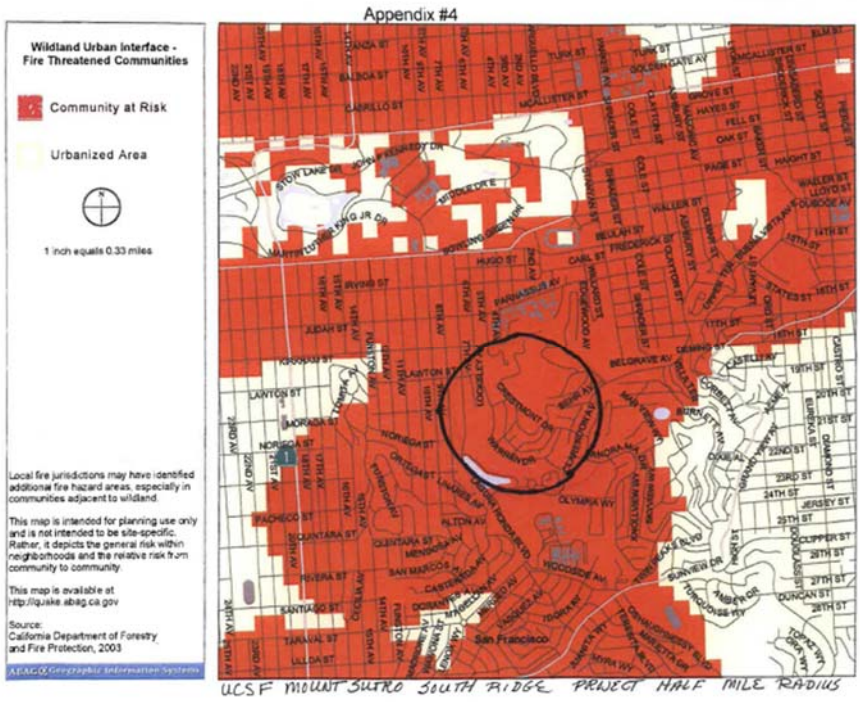


Figure 2. Designation of the area around Mt. Sutro Forest as a Community at Risk

1.4 EXISTING CONDITIONS

Situated in the center of San Francisco, the Mount Sutro Open Space Reserve (MSOSR) is a 79-acre reserve, supporting diverse and decadent vegetation on complicated topography.

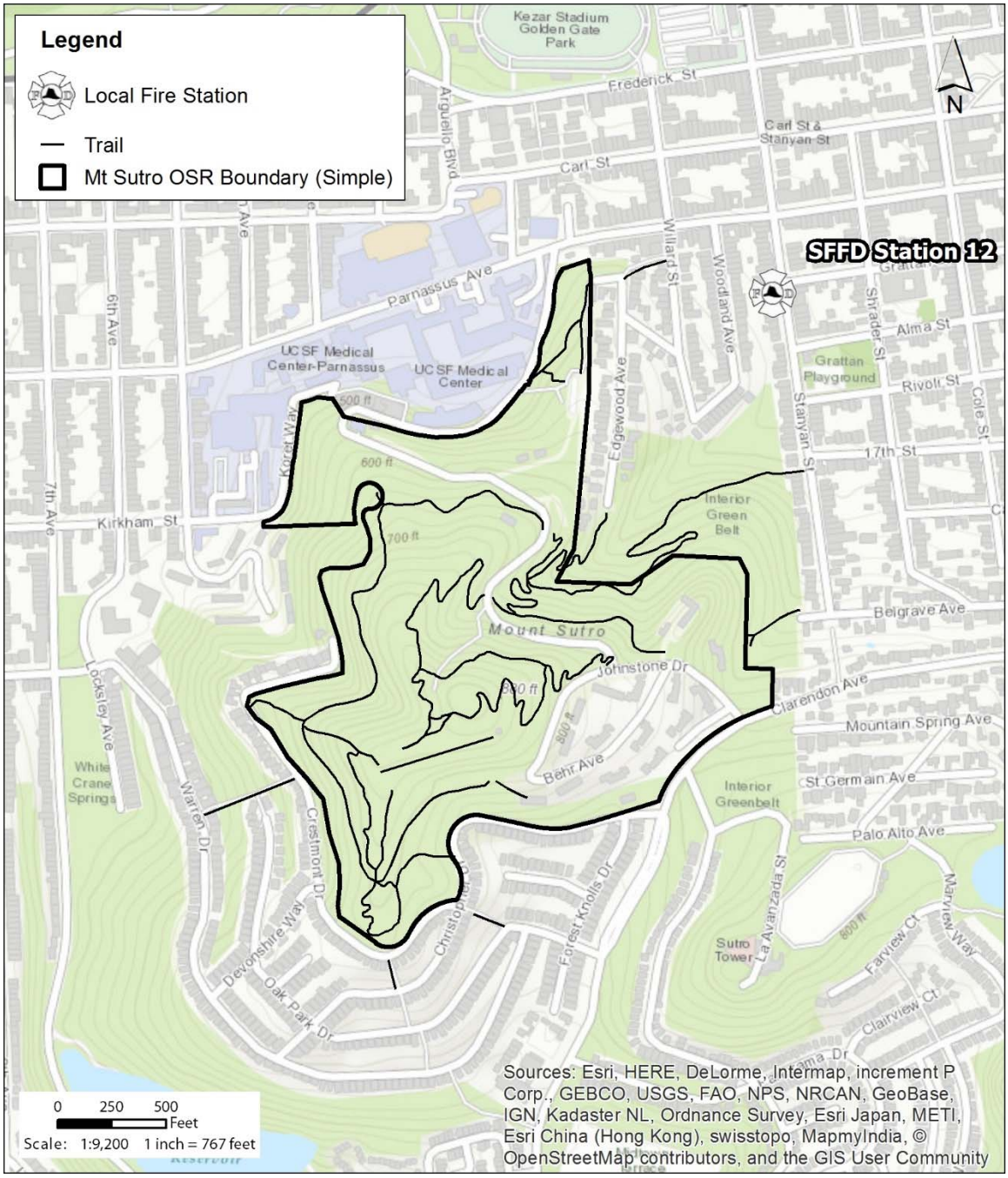


Figure 3. Project location

Elevation within the park varies from 423 feet (129 meters) to 909 feet (277 meters). Slope ranges from 4 degrees to 35 degrees, with 46% of the park over 20 degrees in slope. These steep slopes are primarily in the north and west side of the park. Slopes face **all** directions, but are predominately north-facing (Table 1).

Table 1 Aspect acres and percent cover.

Direction	Acres	Percent
North	9.8	18%
North East	12.9	16%
East	10.0	13%
South East	12.0	15%
South	6.9	9%
South West	1.3	2%
West	7.1	9%
North West	14.5	18%

1.4.1 Weather

Weather conditions significantly impact both the potential for fire ignition and the rate, intensity, and direction in which fires burn. The most important weather variables used to predict fire behavior are wind, temperature, and humidity. Temperature and humidity are used as a basis for fire danger warnings. Coupled with measurements of the moisture level in live plants, these weather conditions act as guidelines for predicting fire behavior.

Weather data was downloaded from the online weather data repository, MESOWEST, *mesowest.utah.edu/* to visually analyze and compare data from each September in the past five years, and to derive 90th and 97th percentile figures. MESOWEST data includes a citizen weather station just south of Diamond Heights and Mt Davidson at a slight higher elevation than the weather stations east of Mt Sutro. The weather station ID and name is CW9629 San Francisco. Several weather stations to the east of the reserve were disregarded because they were situated at a significantly lower elevation, meaning wind speeds would likely be under-represented at these lower-elevation sites. This station was chosen because it is situated at 393 feet in elevation, closer to the elevations found in MSOSR, and is just south of the reserve. The data from this weather station was used to determine the values to be used in the fire behavior analysis. Weather data downloaded was from 1/1/2012 to 12/31/2016 and passed MESOWEST's quality control tests.

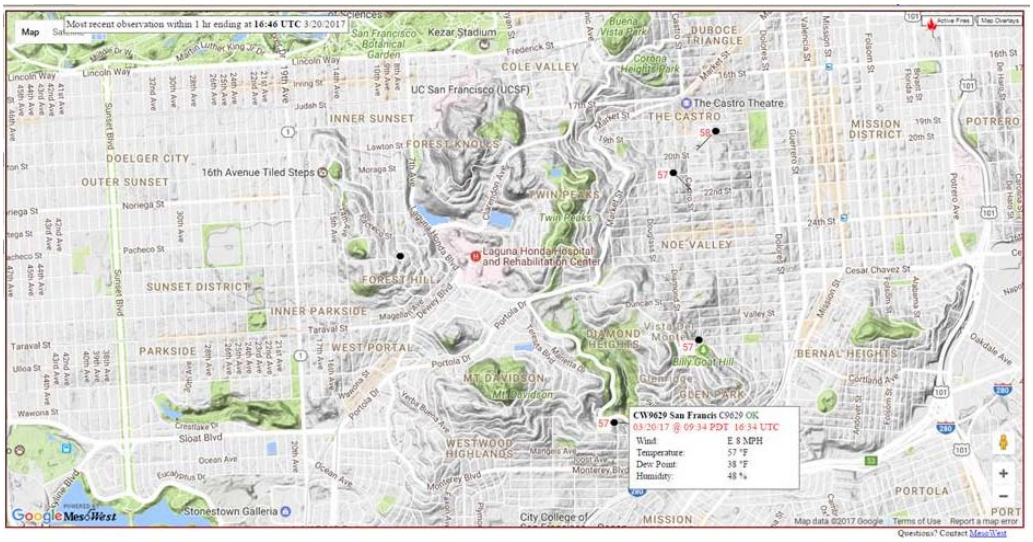


Figure 4. Location of the weather station that best represent conditions on the Reserve.

Weather is compared via percentiles. For hazard assessment, the hottest, driest, windiest observations are used. Typically, 90th percentile levels are used, representing the conditions that occur one fewer than 10 percent of the days in fire season, or roughly 15 days a year.

For purposes of comparing weather conditions throughout the state, the Sierra Nevada Ecosystem Project developed a standard set of weather conditions that defines an "average high fire danger", representing approximately 90th percentile weather conditions[2]. Sometimes these values are used to define fuel moistures in fire behavior modeling, to augment weather conditions.

The following graphs show maximum temperature, minimum relative humidity, wind speed, and wind azimuth data for September compiled and used in this analysis. Below is a series of graphs describing the 90th and 97th percentile weather parameters for the past five months of September.

The data highlights the 90th and 97th percentile values for temperature, relative humidity, and wind speed. Weather conditions in September were a focus because the VMP notes, "Occasionally, in September through early November, there are hot, dry, high-intensity winds that blow in from the northeast. This occurs when the semi-permanent low-pressure system of the southwestern United States weakens, and the Pacific high-pressure system shifts inland. These winds often occur in combination with high air temperatures and low humidity, and may serve to increase the vulnerability of the forest to wildfire during these periods."

[2] *Sierra Nevada Ecosystem Project: Final report to Congress*, vol. III, *Assessments and scientific basis for management options*. Davis: University of California, Centers for Water and Wildland Resources, 1996.

Though we analyzed 90th and 97th percentile weather, we chose to use the weather data from September 2015 (without precipitation) because the reserve experienced the highest temperatures in the last five years in that month, and it represents the worst-case scenario.

Below are a series of graphs describing the 90th and 97th percentile weather parameters for the past five months of September.

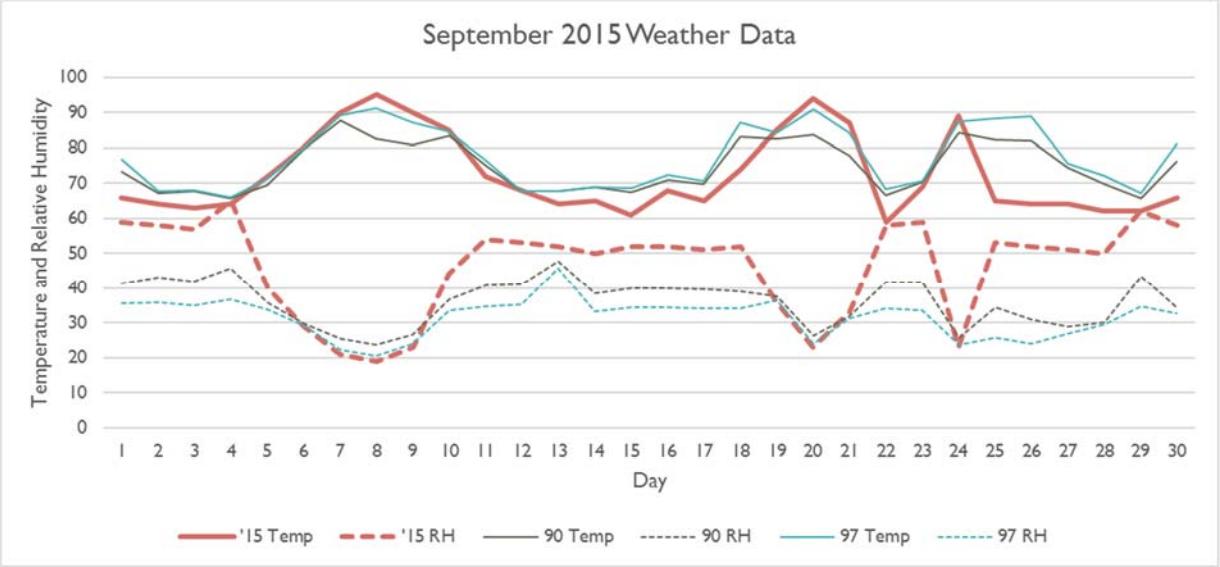


Figure 5. Graph of temperature and relative humidity from September 2015

Temperatures

During the summer, a low pressure system is formed by rising warm air in the Greater Central Valley. This low pressure system sometimes causes coastal fog to move inland up through the San Francisco Bay. The fog rises, becoming a layer of stratus clouds, burning off before noon, and followed by moderate winds. However, when days are sunny, humidity often drops to 30 percent in the summer. Summer days are usually comfortable - temperatures normally range from lows in the 40's and to highs in the 90's, with an occasional high reaching a maximum of 105 degrees Fahrenheit.

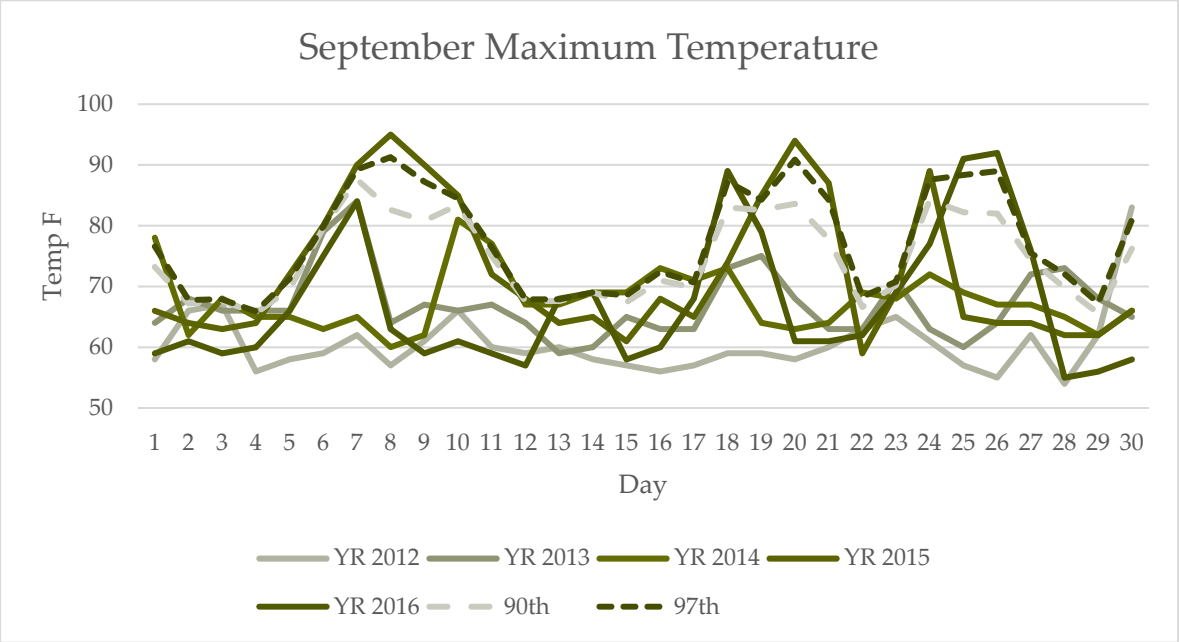


Figure 6. Maximum temperature for every day in September from 2012 to 2016, includes 90th and 97th percentile data for each day

Winds

The most important influence on fire behavior is wind. Wind can greatly affect the rate of spread and the increase in the heat output of a fire. Wind increases the flammability of fuels both by removing moisture through evaporation and by angling the flames so that they heat the fuels in the fire's path. The direction and velocity of surface winds can also control the direction and rate of the fire's spread. Aloft winds, defined as those that blow at least 20 feet above the ground, can carry embers and firebrands downwind. These burning fuels can ignite spot fires that precede the primary front. Gusty winds cause a fire to burn erratically and make it more difficult to contain.

During the spring, summer, and fall, winds are predominantly from the west to northwest at three to twelve miles per hour, however local topography influences microclimate conditions. Wind will tend to follow the pattern of least resistance and is therefore frequently deflected and divided by land forms such as Mt. Sutro or Mt. Davidson. Summer winds are influenced by air movement into the predominant inland low from the higher pressure area existing over the ocean. The slopes on the site produce pronounced diurnal up-canyon and down-slope winds caused by differential heating and cooling of air during the day.

The winds that create the most severe fire danger, known as the "Santa Ana" or "Diablo" winds, typically blow from the northeast, usually in October. Winds from the east and north bring low humidities and elevated fire danger and can wreak havoc in the East Bay Hills, causing fire to spread downhill and to the south with speeds that equal uphill spread under normal windy conditions. However, it is questionable as to whether the Reserve would experience this type of

wind because the air mass would necessarily flow over a body of water, and because the Reserve sits at the top of the slope, so wind could not subside over it.

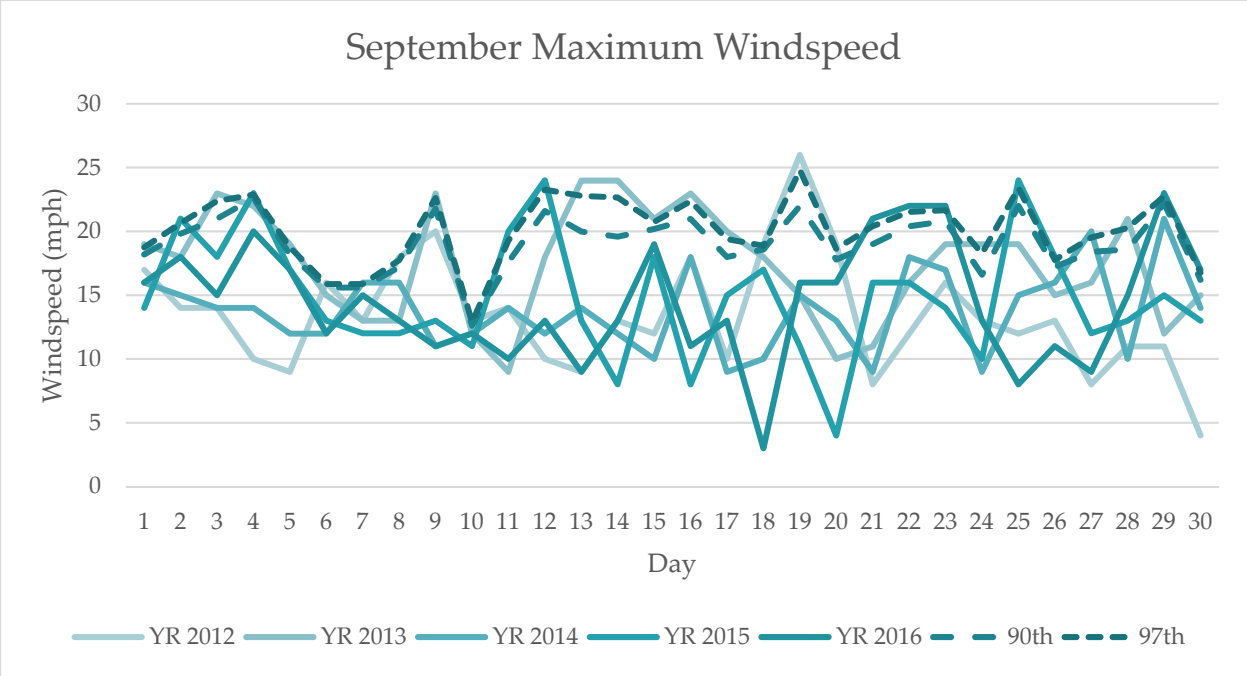


Figure 7. Maximum recorded wind speed for every day in September from 2012 to 2016, includes 90th and 97th percentile data for each day

The Reserve experiences occasional episodes of still, stagnant air formed by stationary highs during summer months. During these periods—characterized by continuous high temperatures and low relative humidities—fuels dry to a National Fire Danger Rating System rating of over 81 for the Burning Index, indicating extreme resistance to fire-control. This overall weather pattern creates extremely low humidities and enhances the possibilities of ignition and extreme fire behavior.

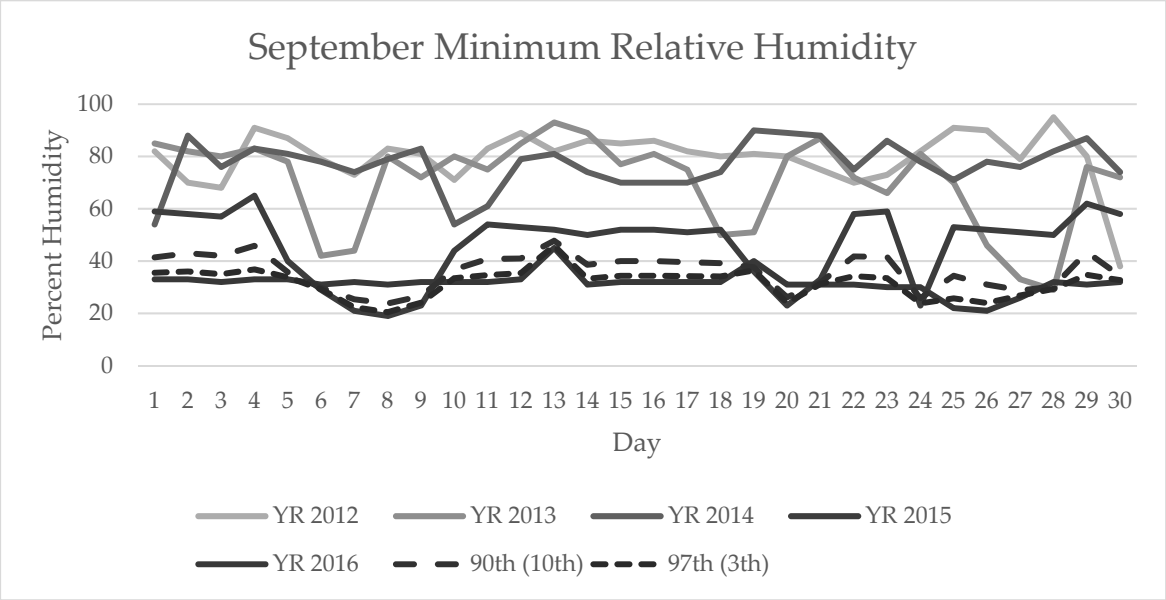


Figure 8. Minimum relative humidity for every day in September from 2012 to 2016, includes 90th and 97th percentile data for each day

1.4.2 Vegetation

Vegetation is described in the 2013 EIR, and further detailed in the Vegetation Management Plan. This section focuses on vegetative fuels, and described the biomass in relation to their role in fire behavior.

The Mt Sutro Vegetation Management Plan[3] presents a forest type classification for the entire reserve (Figure 5). This classification is based on forest inventory plots and describe four forest types within the reserve.

While the classification is sound, it does not lend itself to an easy translation to complicated fuel models from which fire behavior can be predicted. In addition, vegetation is only classed within the reserve and not outside along its borders.

Rather than attempt to cross-walk the inventory-based forest types to selected fuel models of Scott and

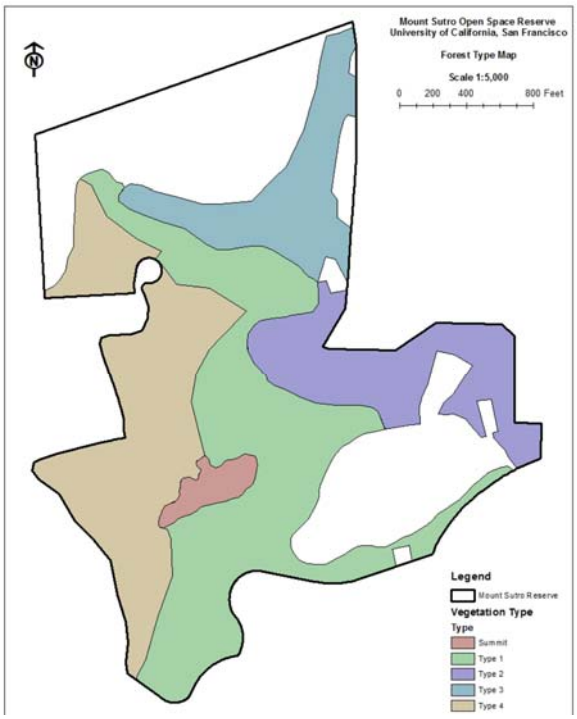


Figure 9. Forest type created from 2016 forest inventory, from the Mt Sutro Vegetation Management Plan, 2017.

[3] 2017, HortScience, Inc. Vegetation Management Plan, Mount Sutro Open Space Reserve, University of California, San Francisco, Revised 1/20/2017.

Burgan's classification[4], we opted to use data from the Landscape Fire and Resource Management Planning Tools Project (LANDFIRE), specifically their existing vegetation and fuel model layers with some modifications.

Details on the modifications used are provided in the following sections. On the next page is a map of LANDFIRE's existing vegetation layer (which is the foundation for their fuel model layer) and descriptions of those vegetation types to be altered based on management objectives presented in MSOSR's Vegetation Management Plan.

Close to 16% of the reserve is mapped as Developed. The remainder is classed predominately as Mixed Evergreen Woodland, which includes a variety of tree species typically found on the San Francisco Peninsula.

[4] 2005, Scott & Burgan: Scott, Joe H.; Burgan, Robert E. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel"s surface fire spread model. Gen. Tech. Rep. RMRS-GTR-153. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 72 p.

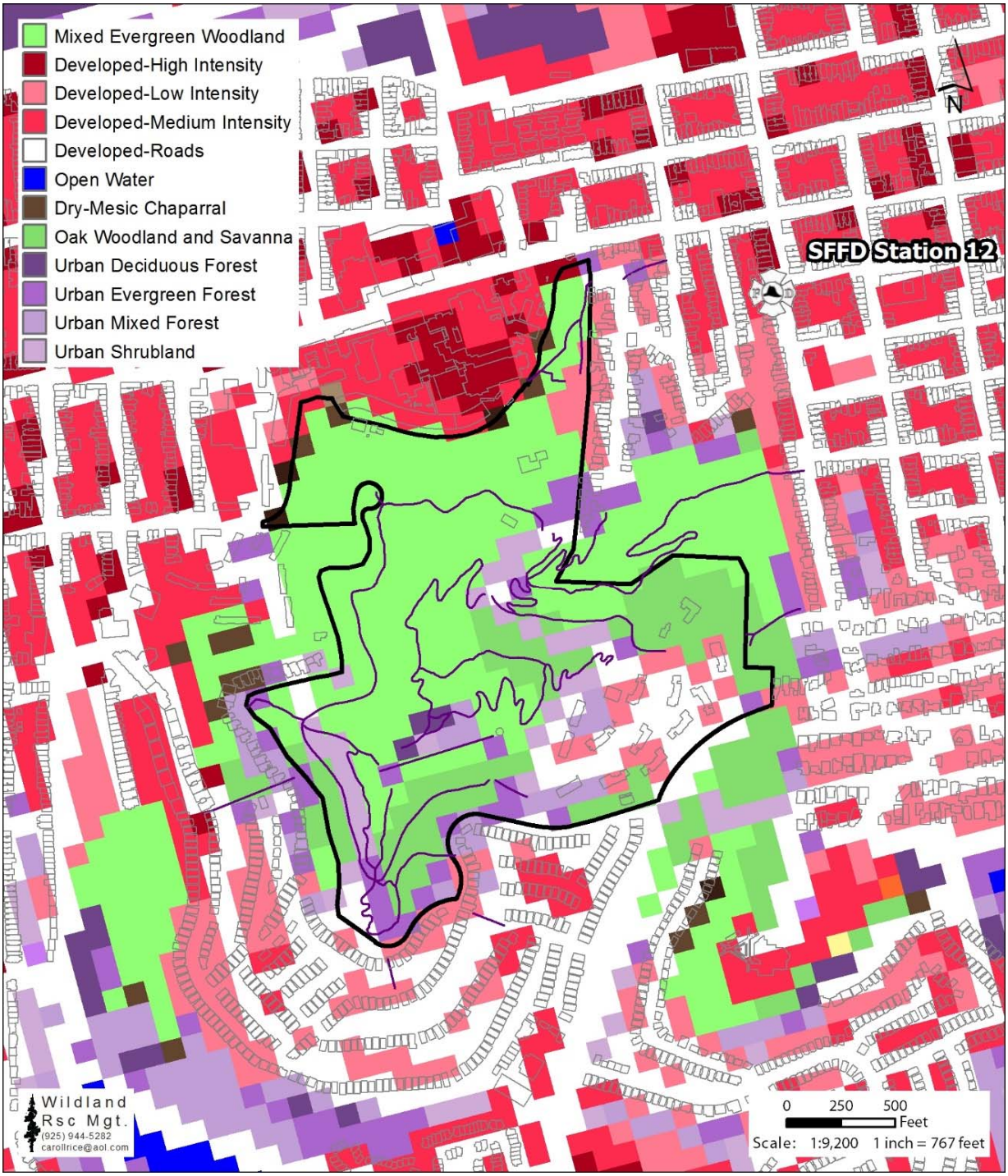


Figure 10. Existing vegetation, LandFire version 1.4 (downloaded March 2017).

Table 2 Existing vegetation classification for Mt Sutro (LANDFIRE version 1.40).

Classification (as mapped in LANDFIRE)	Acres	Percent
Central and Southern California Mixed Evergreen Woodland	36.47261	46%
Southern California Oak Woodland and Savanna	15.12279	19%
Developed-Roads	7.561395	10%
Western Warm Temperate Urban Shrubland	5.782243	7%
Western Warm Temperate Urban Evergreen Forest	4.670273	6%
Developed-Low Intensity	4.447879	6%
Western Warm Temperate Urban Mixed Forest	2.446334	3%
Southern California Dry-Mesic Chaparral	0.889576	1%
Western Warm Temperate Urban Deciduous Forest	0.667158	1%
California Mesic Chaparral	0.222394	0.3%
Developed-Medium Intensity	0.222394	0.3%
Developed-High Intensity	0.222394	0.3%

Central and Southern California Mixed Evergreen Woodland

Of the 79-acre park, 36.4 acres are classified as Central and Southern California Mixed Evergreen Woodland. This classification type should include tree species such as *Quercus chrysolepis* (canyon live oak), *Quercus agrifolia* (California live oak), *Quercus kelloggii* (California black oak), *Umbellularia californica* (bay laurel), *Acer macrophyllum* (big leaf maple), and *Arbutus menziesii* (Pacific madrone)[5].

Within the reserve, the forest inventory (Forest Type 3 and 4) found the following species (in order of dominance):

- *Eucalyptus sp*. (gum eucalyptus) – 45% of overstory
- *Acacia melanoxylon* (blackwood acacia) – 25% of overstory
- *Prunus domestica* (plum)
- *Prunus sp*. (cherry)
- *Umbellularia californica* (bay) (native)
- *Quercus agrifolia* (coast live oak) (native)

In parts, there is a heavy ground cover of cape ivy, German ivy, English ivy, and blackberry. In other parts, the understory is dominated by elderberry, blackberry, and poison oak with bracken ferns, and vetch. Elderberry is over 6 feet tall and is fairly significant (HortScience, 2017).

Southern California Oak Woodland and Savanna

Accounting for 19 percent of the reserve, this vegetation type is common along coastal plains, intermountain valleys, and low mountains. *Quercus agrifolia*, *Quercus kelloggii*, and/or *Juglans californica* dominate a mixed closed or open canopy. These woodlands may occur as remnant

[5] LANDFIRE, 2016. LANDFIRE/GAP Land Cover Map Unit Descriptions, Modified by GAP/USGS to incorporate descriptions of all LANDFIRE Map Units, and the 2015 NVC Hierarchy, Jan. 4, 2016.

patches on offshore islands. The California central coast region may have open stands of just *Juniperus californica*, with a grassy understory. These stands belong here due to proximity to other oak stands or chaparral, and due to the heavy native or non-native grass cover. Variable canopy densities in existing occurrences are likely due to variation in soil moisture regime, natural patch dynamics of fire, and land use (fire suppression, livestock grazing, herbivory, etc.). Most of these woodlands and savannas have been heavily altered through urban and agricultural development (LANDFIRE, 2016).

Within the reserve, the forest inventory (Forest Type 1) found the following species (in order of dominance):

- *Eucalyptus sp*. (gum eucalyptus)
- *Acacia melanoxylon* (blackwood acacia)
- *Hesperocyparia macrocarpa* (Monterey cypress) (native)
- *Sequoia sempervirens* (redwood) (native)
- *Prunus domestica* (plum)
- *Prunus sp*. (cherry)
- *Umbellularia californica* (bay) (native)
- *Quercus agrifolia* (coast live oak) (native)

The understory is dominated by Himalayan blackberry (*Rubus discolor*) and poison oak (*Toxicodendon diversilobum*). This is likely prohibiting new trees from becoming established. Also present are red elderberry (*Sambucus racemosa*), ivy, and other species (HortScience, 2017).

Developed Roads; Developed-Low Intensity; Developed-Medium Intensity; and Developed-High Intensity

Accounting for 16 percent of the park, or 12.5 acres, developed areas represent varying degrees of impervious (and "unburnable") cover.

Developed Roads

Roads in highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to100 percent of the total cover.

Low Intensity

Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49 percent of total cover. These areas most commonly include single-family housing units.

MED INTENSITY

Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-79 percent of the total cover. These areas most commonly include single-family housing units.

HIGH INTENSITY

Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to100 percent of the total cover.

These three classifications account for over 80% of the vegetation found in Mt Sutro.

1.4.2.1 Description of Fuel Models

In order to predict fire behavior, vegetation is categorized into Fuel Models, each of which burns in a slightly different manner. Fuel models describe such vegetation as tall and short chaparral, tall and short grass, forest with and without an understory, and oak woodlands with and without understory vegetation. The structure (or arrangement) of the vegetation is just as important as the kinds of plants that grow in the vegetation[6].

In determining the appropriate fuel model to apply to an area, it is critical to consider the fuel that will actually carry the fire. For example, a sparse stand of eucalyptus, or an individual trees with a grass understory may be characterized as a grassland fuel model because the eucalyptus leaves and branches may not contribute much to the fire behavior because of the minor amount of leaf drop, or because the height at which the branches start so high it is unlikely to burn.

The six properties of fuel complexes that determine the potential fire behavior include quantity (loading), sizes (distribution of fuel particle sizes), chemistry (volatile content, silica-free ash content), moisture (percent water content, proportion of dead material in the vegetation, etc.), continuity (vertical and horizontal), and compactness (depth). These properties change over time with treatments, vegetative growth, or disturbance.

In addition, the canopy fuels are also described for fire behavior prediction. The fuels in the tree canopy are described in three ways: tree height, canopy cover, and height of live branches.

On March 24th, 2017, seven data layers were downloaded from the LANDFIRE website. The following list details the version and attribute definitions for each layer:

1. Existing Vegetation –or EVT is a data layer representing the current distribution of the terrestrial ecological systems classification developed by NatureServe for the western

[6] Scott, Joe H and Robert E. Burgan, 20015. Standard Fire Behavior Fuel Models: A Comprehensive Set for use with Rothermel's Surface Fire Spread Model.

hemisphere. It is defined as a group of plant community types (associations) that tend to co-occur within landscapes with similar ecological processes, substrates, and/or environmental gradients. EVTs are mapped in LANDFIRE using decision tree models, field reference data, Landsat imagery, digital elevation model data, and biophysical gradient data.

2. Fuel Models – FBFM13 (LANDFIRE version 1.40). Thirteen typical surface fuel arrangements or "collections of fuel properties"[7] were described to serve as input for Rothermel's mathematical surface fire behavior and spread model[8].
3. Fuel Models – FBFM40 (LANDFIRE version 1.40). These represent a more refined version of the basic 13 fuel models described above. These models represent finer fuel characteristics (Scott & Burgan, 2005).
4. Canopy Cover – Described by percent cover of tree canopy in a stand.
5. Canopy Height – Described as the average height of the top of the canopy for a stand. Reported in meters * 10.
6. Canopy Base Height – Described by the lowest point in a stand where there is sufficient available fuel (0.25 in dia.) to propagate fire vertically through the canopy. Reported in meters * 10.
7. Canopy Base Density – Defined as the mass of available canopy fuel per unit canopy volume that would burn in a crown fire. Reported in kg/m^3*100.

The types of fuels found on the Reserve are categorized as:

Table 4 Fuel models within the MSOSR used in the existing conditions scenario.

Value	FBFM40	Description	Acres	Percent
91	NB1	URBAN	12.45	16%
121	GS1	LOW GRASS-SHRUB	5.78	7%
122	GS2	MODERATE GRASS-SHRUB	22.24	28%
147	SH7	VERY HIGH SHRUB	0.67	1%
165	TU5	TIMBER, VERY HIGH SHRUB	29.80	38%
182	TL2	TIMBER, LOW LOAD	0.67	1%
183	TL3	TIMBER, MODERATE LOAD	7.12	9%

[7] Anderson, 1982. Anderson, Hal. April 1982. Aids to Determining Fuel Models For Estimating Fire Behavior. USDA Forest Service, Intermountain Forest and Range Experiment Station, General Technical Report INTl-122.
[8] Rothermel, 1972. Rothermel, Richard C. 1972. A Mathematical Model for Predicting Fire Spread in Wildland Fuels. USDA Forest Service, Research Paper INT-115.

1.4.2.2. Distribution of Fuel Types

The predominate fuel type in TU5 (raster value 165), covering 38% of the reserve. TU5 is a timber fuel model where a shrub or herbaceous understory contribute to fire behavior. TU5 is described as a “very high (fuel) load, (with) dry climate shrub, heavy forest litter with shrub or small tree understory, (predicted) spread rate and flame (length) moderate”.

GS2 (raster value 122) accounts for 28% of the reserve. This fuel model is a grass-shrub fuel type where both grass and shrubs play an important role in determining fire behavior. GS2 is described as “low (fuel) load, dry climate grass and shrubs about 1 foot high, spread rate moderate and flame length low”.

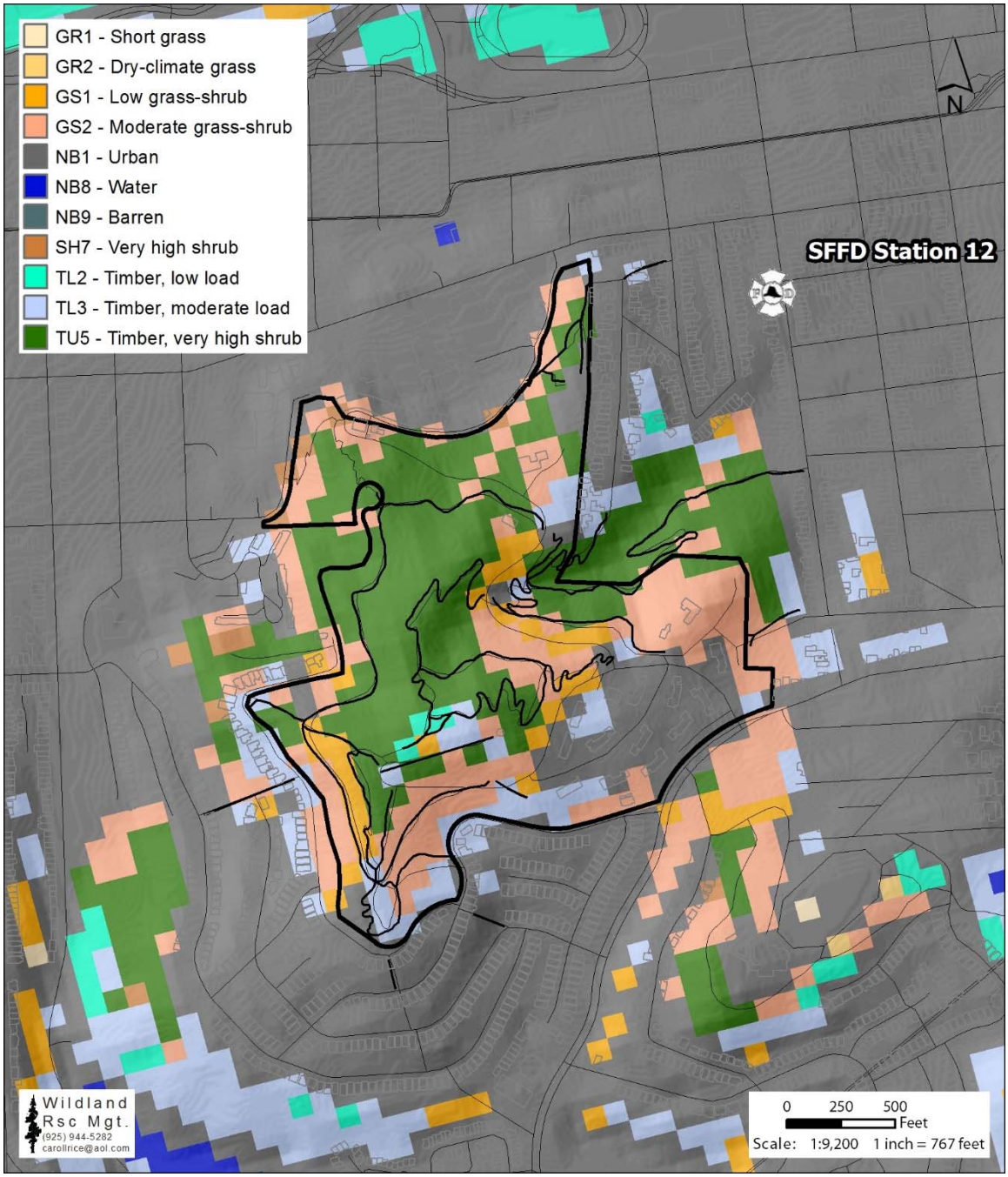


Figure 11. Fuel models within and surrounding the MSOSR

1.4.3 Surrounding Land Uses

The surrounding land uses are comprised of residential developments to the south, west, the University campus to the north, and a small continuation of the eucalyptus forest to the east.

Residences are largely single family dwellings to the south and west, however, the University maintains a large block of apartments near the southern entrance to the Reserve.

1. Fire Safe Regulations

A suite of codes, located in Title 14 Code of California Regulations: Division 1.5, Chapter 7, Subchapter 2, Articles 1-5 address fire safe regulations. These regulations have been prepared and adopted for the purpose of establishing minimum wildfire protection standards in conjunction with building, construction and development in State Responsibility Areas (SRA), and serves as a model code for incorporated areas in the state. . San Francisco adopted the 2013 California Fire Code through Ordinance 277-10, and updated through Ordinance 39-13, which includes these fire safe regulations. The code requires that the future design and construction of structures, subdivisions and developments in SRA shall provide for basic emergency access and perimeter wildfire protection measures as specified in the following articles. These measures shall provide for emergency access; signing and building numbering; private water supply reserves for emergency fire use; and vegetation modification.

Public Resources Code 4290

The Public Resources Code 4290 (PRC4290) contains requirements pertaining to new construction on SRA in California. Driveway widths, slopes, turn-around areas, and water storage requirements for firefighting forces are regulated in PRC4290. As a result of this code, future design and construction of structures, subdivisions, and developments in the SRA will provide for basic emergency access and perimeter wildfire protection measures. These measures also address emergency access; signing and building numbering; and vegetation modification.

The fire protection standards contained within PRC 4290 specify the minimums for such measures. These appear at http://www.fire.ca.gov/fire_prevention/downloads/Title_14.pdf

Public Resources Code 42901

A portion of the Public Resource Code 4291 (PRC4291) requires a minimum of 100' of fuel management for fire safety ("Defensible Space") surrounding all structures on SRA lands in California. The text of PRC 4291 appears as Appendix A of this report.

1.5 PUBLIC CONCERNS AND COMMENTS

Key Issues	Key methods for addressing those issues
The fire behavior is overstated	This analysis uses a nationally accepted fire behavior model, augmented by local expert experience. The analysis uses unbiased categorization of fuels using remote imaging, and this analysis was informed by on-site inspections to ensure categorization of fuels is accurate.

Thinning or removal will increase wind speed (and possibly fire spread rates)	Fire behavior modeling can predict the increase in winds, with resulting changes in fire spread. The FlamMap fire model has algorithms that take into account increased dryness due to greater sunlight hitting the forest floor, and less friction) thus greater wind speed from lower canopy cover, as a proxy for stand density.
Effect of dying tree canopy	See above about how FlamMap accounts for the effect of decreased canopy cover

2 METHODS

2.1 EXISTING MODELS AVAILABLE FOR FIRE BEHAVIOR AND APPROACH

Quantitative analysis employed a nationally-accepted industry standard regarding the assessment of wildland fire hazards and potential fire behavior. The potential for fire growth, high flame, and fast fire spread are similarly assessed. Local expert experience (in the form of the TAC and local fire officials) augments the quantitative analysis.

The analysis points to the value at risk from a specific type of hazard. For example, ember-production and distribution from wildfires threaten nearby houses and justify actions to reduce that particular threat. Fires with predicted long flame lengths are likely to damage the natural environment and prompt a different, or separate type of action to preserve the ecological features on the Reserve.

Comparison of Existing Models

We compared a variety of methods for determining existing fire behavior and hazard:

1. USDA Fire Behavior Prediction System (FBPS) – for wildland fuels
2. Vestra – Australia's Fire Behavior and Hazard Assessment Method for eucalypt forests
3. NFPA 1144 – Wildfire Risk and Hazard Severity Form for Wildland Urban Interface communities
4. USDA Photo Series for Quantifying Natural Fuels Volume XIII: Grasslands, Shrublands, Oak-Bay Woodlands and Eucalyptus Forests of the East Bay.

We settled on the FBPS method for assessing existing wildland fire hazard because this one allows a spatial distribution of hazard, which provides an opportunity for more specific, targeted mitigation measures. The NFPA 1144 is useful and will be used to determine existing hazards, however, it cannot capture the impacts of managing vegetation because much of the form addresses access and construction attributes. Vestra and the USDA Photo Series both are not spatially explicit. These models can provide stand-level fire behavior and hazard assessments but cannot describe the difference in fire behavior within the defined landscape.

Fire behavior prediction uses information on fuels, weather, and terrain. As detailed in the previous section, the analysis characterized the fuels in a three-D fashion, to include both the fuels closer to the forest floor (surface fuels) and the trees in the canopy, and its connectedness. The total volume, size class distribution, proportion of live-to dead material, and density of fuel are estimated. The dataset was based on a combination LandFire data, and the description of the four Forest Types in the Project Description. The data from these sources are augmented by on-site visits to measure and photograph fuels. Weather, in the form of temperatures, humidities, and wind speed (and direction) all are integrated into the model, particularly as it influences the moisture of the fuels (both live and dead). Terrain is obtained from public domain.

2.2 ASSUMPTIONS FOR THE PROPOSED PLAN

Treatments change the volume, spatial distribution, moisture content and sometimes chemical composition of fuels. For example, the San Francisco Fire Department requires defensible space areas have branches no lower than 10 feet off the ground, removal of shrubby fuels under trees, removal of all dead trees, (and later, trees smaller than 6 inches in diameter), "aggressive thinning" within 30-ft of structures, shortening grasses and shrubs throughout. These changes will be translated into a different fuel mode, height of live tree crown and amount of tree canopy cover. The ways the fuels are expected to change due to the treatments is an important assumption.

The locations of treatments were determined, and the changes to the fuels as a result of those treatments were described and quantified. For some treatments, the specific locations of treatments were assumed. Specifically, understory treatments were not assigned location, and so were assumed to be randomly located throughout the forest to cover 40 percent of the areas.

After fuel characteristics and treatment locations were assigned, FlamMap was run again using the same weather and terrain information to identify the change in fire behavior due to treatments.

The changes to fuels as a result of restoration activities, and seed tree and group selection treatments, and the locations of those activities are also incorporated into a new "landscape model" that spatially describes the post-treatment fuels.

Additional treatments to ensure line of sight along trails and public safety measures are mapped and post-treatment fuels characterized.

The two fire models – FlamMap and FARSITE - were run using the new fuel scenarios.

The process of describing future fuel characteristics was repeated assuming:

- Continuation of the treatments per the Vegetation Management Plan
- Growth of trees planted, and expansion of tree canopies
- Some mortality of existing trees
- Maintenance of defensible space, line of sight and other public safety measures.

The following table establishes the values used for post-treatment fuel characteristics after five and ten years:

Table 5: Fuel characteristics of existing condition, and 5 and 210 years after project initiation, sorted by treatment type

		Post Treatment Plus 5 Years				Post Treatment Plus 10 Years			
Treatment	Original FM	New FM	CH*	CBH**	CC***	New FM	CH*	CBH**	CC***
Understory Removal Phase I	91	91				91			
	121	121				121			
	122	122				122			
	147	182				144			
	165	182		30		144		30	
	182	182		30		144		30	
	183	182		30		144		30	
Understory Removal Phase II	91					91			
	121					121			
	122					122			
	147					182			
	165					182		30	
	182					182		30	
	183					182		30	
Defensible Space	91	91				91			
	121	121				121			
	122	122				122			
	147	143		30	50	143		30	50
	165	143		30	50	143		30	50
	183	143		30	50	143		30	50
Line of Sight	91	91				91			
	121	121				121			
	122	122				122			
	165	182		30		182		30	
	182	182		30		182		30	
	183	182		30		182		30	
Seed Tree	122	122				122			
	165	182	60	6	10	149	40	6	20
	183	182	60	6	10	149	40	6	20
Group Selection	121	121				121			
	122	121	60	6	10	149	40	6	20
	165	121	60	6	10	149	40	6	20
	183	121	60	6	10	149	40	6	20
Restoration	91	91				91			
	121	101	0	0	0	101	0	0	0
	122	101	0	0	0	101	0	0	0
	165	121	24	6	10	142	24	6	10
	183	121	24	6	10	142	24	6	10
Tree Planting	91	91				91			
	121	149		6	40	149		6	40
	122	149		6	40	149		6	40
	147	149		6	40	149		6	40
	165	149		6	40	149		6	40
	182	149		6	40	149		6	40
	183	149		6	40	149		6	40

Table 6. Fuel models as defined by LANDFIRE that would be the result of treatment within the Mount Sutro Open Space Reserve.

VALUE	ID	DESCRIPTION
91	NB1	Urban
101	GR1	Short, sparse dry climate grass is short, naturally or heavy grazing, predicted rate of fire spread and flame length low
121	GS1	Low load, dry climate grass-shrub shrub about 1 foot high, grass load low, spread rate moderate and flame length low
122	GS2	Moderate load, dry climate grass-shrub, shrubs are 1-3 feet high, grass load moderate, spread rate high, and flame length is moderate
141	SH1	Low load dry climate shrub, woody shrubs and shrub litter, fuelbed depth about 1 foot, may be some grass, spread rate and flame low
142	SH2	Moderate load dry climate shrub, woody shrubs and shrub litter, fuelbed depth about 1 foot, no grass, spread rate and flame low
147	SH7	Very high load, dry climate shrub, woody shrubs and shrub litter, very heavy shrub load, depth 4-6 feet, spread rate somewhat lower than SH6 and flame very high
165	TU5	Very high load, dry climate shrub, heavy forest litter with shrub or small tree understory, spread rate and flame moderate
182	TL2	Low load broadleaf litter, broadleaf, hardwood litter, spread rate and flame low
183	TL3	Moderate load conifer litter, moderate load conifer litter, light load of coarse fuels, spread rate and flame low

It is important to note that the reserve is surrounded by an urban landscape. While it is certain that the surrounding homes would burn, FlamMap is **not** designed to model structure fires, and erroneously assumes the structures are non-burnable spaces. Subsequently, please keep in mind that the model probably underestimates predicted fire behavior.

2.3 MODEL USED AND MODIFICATIONS/CALIBRATION

2.3.1. Site-specific Predicted Fire Behavior

The USDA Forest Service developed a series of computerized fire behavior prediction models that integrate factors such as topography, fuel models and weather parameters to derive fire behavior outputs based on heat transfer algorithms. The most well used are BEHAVE, FlamMap and FARSITE. All three prediction models use the same inputs and produce the same fire behavior characteristics.

The resulting prediction outputs include:

- flame length,
- rate of spread,
- crown fire potential.

Of these, two are especially pertinent for identifying areas of high fire hazard: flame length and crown fire potential. Flame length closely corresponds to fire intensity, and it is this factor that most influences probability of structure damage and ease of fire control. Crowning activity indicates locations where fire is expected to travel into and possibly consume the crowns of trees. A fire can burn exclusively along the forest floor (called a surface fire), or it can climb and consume the tree crown of an individual tree (torching), or it can reach into and spread through tree canopy to tree canopy (crown fire). When a fire burns through tree crowns, countless embers are produced and are distributed, sometimes at long distances. These embers can start new fires, which can each grow and confound the finest fire suppression forces. This assessment will focus on flame length and crown fire to describe wildfire hazard to the project area.

Fuels and terrain, as mapped by LandFire, were combined with extreme fire weather to predict the likely flame lengths, rates of spread, and crown fire potential. Flame length closely corresponds to fire intensity, and it is this factor that most influences probability of structure damage and ease of fire control. Crowning activity indicates locations where fire is expected to travel into and possibly consume the crowns of trees. When a fire burns tree crowns countless embers are produced and are distributed, sometimes at long distances. These embers can start new fires, which can each grow and confound the finest fire suppression forces. This assessment focuses on flame length and crown fire to describe wildfire hazard to the project area.

FlamMap is a geographic based software program used in the wildland fire protection community to predict fire behavior across the landscape. FlamMap5 (available from http://www.firemodels.org/index.php/national-systems/flammap).

FlamMap predicts fire behavior across an entire landscape all at once with static weather parameters as input. Thus FlamMap can compare fire outputs uniformly across a landscape. Farsite (not used in this analysis) indicates fire growth patterns based on a specified ignition location, and BEHAVE provides tabular outputs not linked to a particular location.

2.3.2. FlamMap Inputs

A FlamMap fire behavior prediction simulation involves the input of several spatial data layers as well as settings for specific weather parameters. The base input layers were compiled as part of the nation-wide Landscape Fire and Resource Management Planning Tools Project (LANDFIRE). The project consists of data describing vegetation, wildland fuel, and fire regimes across the United States (www.landfire.gov). This dataset was chosen for this assessment for its consistent, landscape-scale, cross-boundary strategic products for fire management planning. LANDFIRE data was chosen because it characterizes tree canopy characteristics and mid-story information that allows for the prediction of crown fire. These two Fuel Model layers, though describing the same phenomena, were derived from two very different processes and for varying purposes. The data layers describe existing vegetation composition and structure, wildland fuel (crown and surface). The consistent and comprehensive nature of LANDFIRE methods ensures that data will be nationally relevant, while the 30-meter grid resolution assures that data can be locally applicable. (LANDFIRE, 2008).

We assumed 1000-ft from the boundary of the property. A rectangle that encompasses the furthest point covers 551 acres. The study area was bounded by the following coordinates (GCS NAD83):

- North: 37.7686 degrees latitude
- South: 37.7500 degrees latitude
- West: -122.4667 degrees longitude
- East: -122.4467 degrees longitude

The first modification to the LANDFIRE data downloaded was to change the resolution from 30m to 3m. This was done to capture some of the (relatively) small restoration and treatments proposed in the Vegetation Management Plan.

For the elevation, aspect, and slope layers, the bilinear resampling method was used. For all other layers, the nearest resampling method was used.

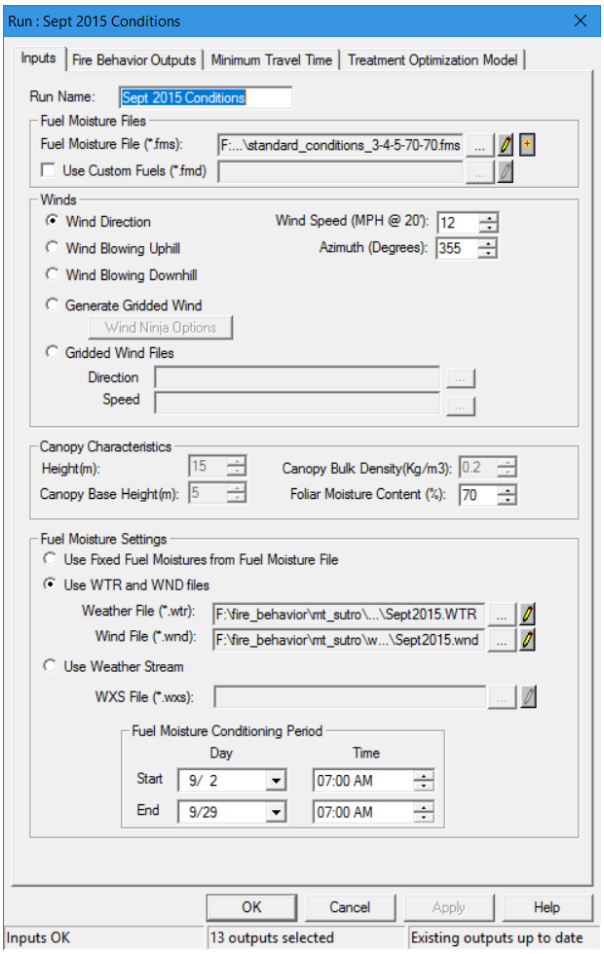
In addition, for the existing conditions scenario, all areas mapped as TL7 fuel model were converted to TU5 to better reflect existing conditions. The resulting LCP was called existing_conditions.LCP.

Modifications to the base fuel model layer (FBFM40), canopy base height, stand height, and crown bulk density were made for each prediction scenario:

1. Existing Conditions
2. Post Treatment (+5 Years)
3. Post Treatment (+10 Years)
4. For all fuel models, we set our fuel moistures (in percent) to the fuel moistures shown in Table 5 (below).

Table 7. Fuel moisture percentages used.

Class size	Percent
1hr fuels	3
10hr fuels	4
100hr fuels	5
Live herbaceous	70
Live woody	70



Though specific daily weather and wind data was used to condition the fuel moistures, for the FlamMap run, 20-ft wind speed was set to 12 mph (average speed for September across five years was xx, rounded up to 12 mph to account for ground level conditions on-site). Direction was set to 355, the average for the five-year period for the month of September. Foliar Moisture Content was set to 70% and weather and wind files derived from the data described above were used.

2.4 PREPARER'S QUALIFICATIONS

Carol Rice, Wildland Res Mgt

Carol Rice leads Wildland Res Mgt which for over 30 years has emphasized fire management, especially in the urban/wildland interface. Projects have included planning and overseeing implementation of regional fuel management plans in the San Francisco Bay Area, and conduct of various investigations and workshops regarding fire behavior, ecology, and economics. She wrote the fire portions of the SFWD resource management plan, the fire sections of the master plan for several preserves and parks in the MidPeninsula Regional Open Space District, Marin Municipal Water District, Marin County Open Space District, City of Palo Alto, and the San Mateo and Santa Clara County Parks Departments.

She is a frequent lecturer regarding vegetation-fuel-fire behavior interactions, and has written over 40 technical reports and publications. She holds a BS in Forestry and a MS in Fire Science and Management, both from the Department of Forestry and Resource Management University

of California, Berkeley. She is Past Chair of the California-Nevada-Hawaii Fire Council and is past Officer of the Board of Directors for the International Association of Wildland Fire.

Petronila Esther Mandeno, Digital Mapping Solutions

With over 15 years of experience in GIS data management map production, wildland fire behavior and natural resource management. Between 2002 -2010, and since 2013, Ms. Mandeno works as an independent consultant on a variety of porjets tht integrate natural resource expertise and skills to bring crucial information together. Ms. Mandeno brings a wide breadth of skills and knowledge to any project. During her time with California State Parks, she became a Burn Boss, using prescribed fire to manage forests before delving into the Sierra District's GIS where she developed and implemented a wide variety of data and map products for land managers. She has extensive on-the-ground experience using Global Positioning Systems (GPS) to capture field data. In addition to her general GIS and GPS experience, she has experience with data conversions between CAD (computer aided design) systems and ESRI data formats, aerial interpretation for vegetation and feature mapping as well as using remote sensing data (i.e. LANDSAT, IKONOS) for determining vegetation an forest fuel changes over times and LiDAR for stream restoration and re-surfacing work. Ms. Madeno continues to learn new skills (such as Python scripting language to automate tasks and ESRI's Story Maps for public outreach) to improve her performance.

She holds an MS in Natural Resource Management, Fire Ecology from the University of Nevada, Reno, and a BS in Resource Science, from the University of California, Davis.

3 RESULTS

We obtained shape files for the boundary and clipped the area for analysis and then extended it for 1000-ft outside the boundary. However, results are reported for the area within Reserve itself.

3.5 EXISTING CONDITIONS

3.5.1 Existing Conditions – Flame Length

Flame length (measured in feet) is the length of the flame at the head of the fire measured from the middle of the combustion zone to the average position of the flame tip[9].

Flame length is often correlated to the ability to control a fire. A flame length of eight feet is usually looked at as a cut-off point for strategic firefighting decisions on whether to attack the fire directly, or instead attempt control through indirect methods. Attacking the fire directly involves efforts to slow the flaming front at its head – where it is advancing fastest. Indirect attack involves fire control methods on the fire's flank or well ahead of the fire (using backfires or retardants).

The model predicted **no fire** over 60 percent of the reserve. Where fire did occur, flame lengths were often over 11 feet, occurring on the northern part of the reserve. The southern portion of the reserve shows low to moderate flame lengths and, in general, less fire activity.

Table 8. Predicated Flame length Acres.

Value	Acres	Percent
No Fire	48.98	62%
Less than 4 feet	1.53	2%
4.1 - 8	5.34	7%
8.1 - 11	5.54	7%
11.1 - 20	12.62	16%
Greater than 20 feet	4.88	6%

High flame lengths are well correlated to structural damage. Fire intensity (a.k.a. flame length) was determined to be the most important factor in many studies of structural damage from fire. Flame lengths are often used as a proxy for fire intensity because they are highly correlated to fire intensity.

[9] Andrews and Rothermel, 1982. Charts for Interpreting Wildland Fire Behavior Characteristics. USDA Forest Service, General Technical Report INT-131. September 1982.

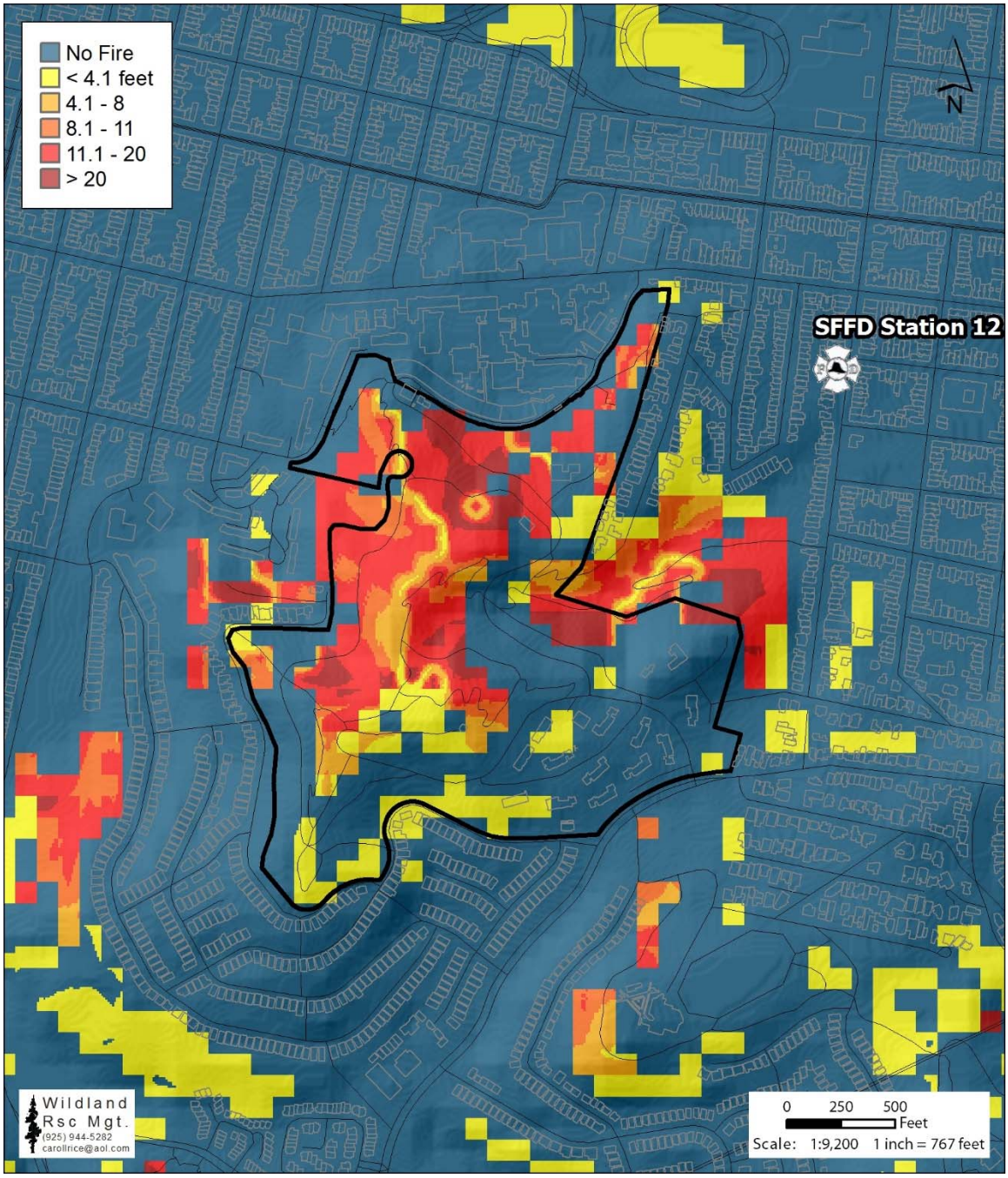


Figure 12. Map of flame length results for existing conditions scenario

3.5.2 Existing Conditions – Rate of Spread

Rate of spread (measured in chains per hour) is the forward rate of spread at the head of a surface fire.

Like the high predicted flame lengths, rate of spread is relatively high where the reserve does burn (Table 9). Fifteen percent of what is predicted to burn, experiences rate of spreads greater than 10 chains/hour (one chain equals 66 feet).

Table 9. Acres by rate of spread classification for the existing conditions scenario.

Value	Acres	Percent
No Fire	48.98	62%
Less than 1.1 ch/hr	0.50	1%
1.1 - 5	5.67	7%
5.1 - 10	11.11	14%
10.1 - 20	11.70	15%
Greater than 20 ch/hr	0.91	1%

This fast fire spread is predominately through fuel model TU5 – a timber fuel model with a very high shrub understory representing the eucalyptus-dominated forest with elderberry in the understory.

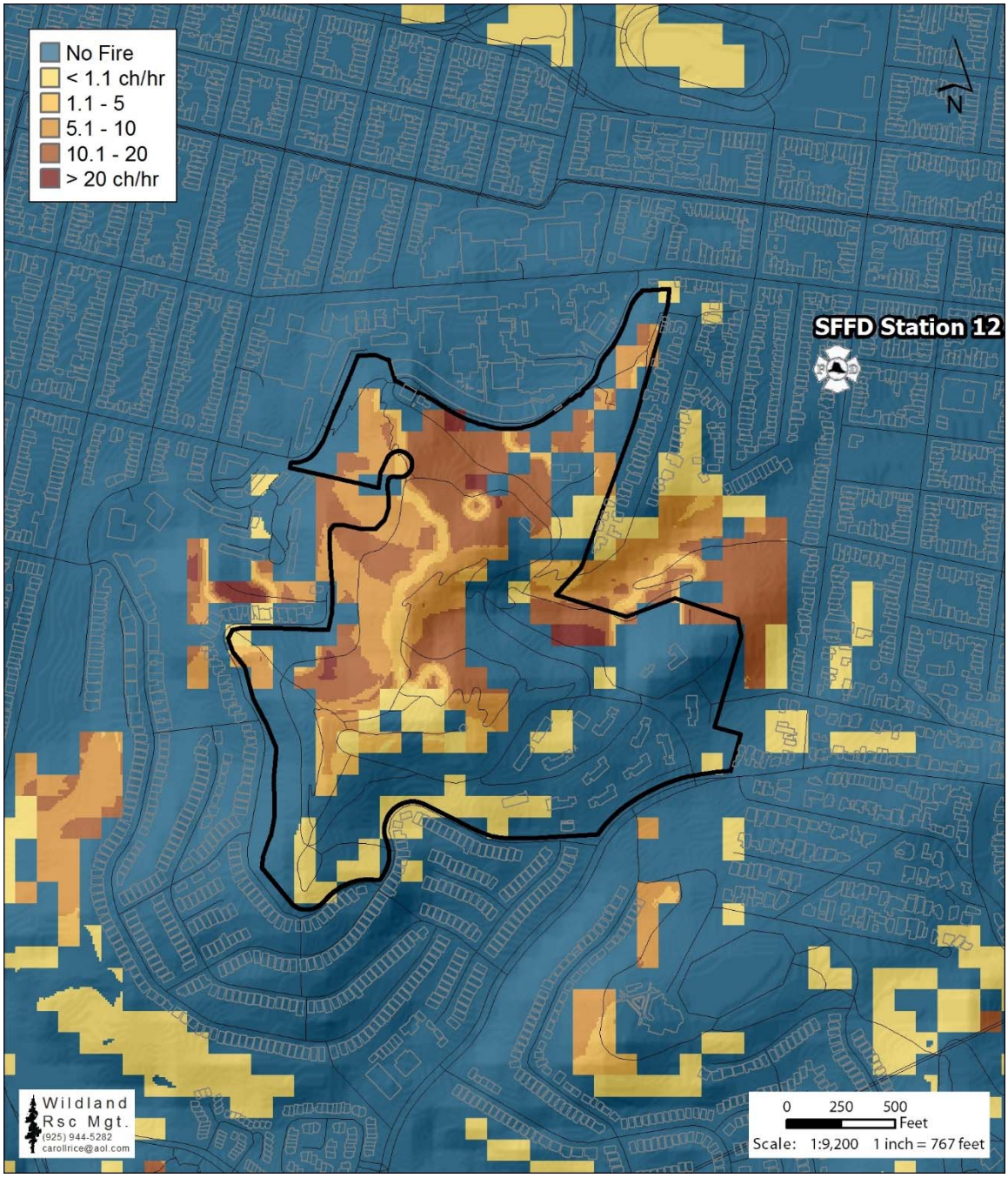


Figure 13. Predicted rate of spread for the existing conditions scenario

While a fast rate of spread does not necessarily mean a problematic fire, coupled with high flame lengths, a fast-moving fire cannot be suppressed with a hand-crew.

3.5.3 Existing Conditions – Crown Fire Activity

A surface fire that makes the transition to some form of crown fire is modeled from canopy base height, stand height, canopy bulk density, and foliar moisture content. It is important to keep in mind that crown fire activity only pertains to timber fuel model types. While shrub types may "crown", they are not modeled in FlamMap.

Crowning activity indicates locations where fire is expected to travel into and possibly consume the crowns. When a fire burns through tree crowns, countless embers are produced and are distributed, sometimes at long distances. These embers can start new fires, which can each grow and confound the finest fire suppression forces.

Hot fires create embers that loft ahead of the flaming front that ignite new fires called "spot fires". "Spotting potential" and "crowning potential" describe the propensity of vegetation to create and disburse embers that have the potential to start countless new fires well in advance of the main fire.

Since much of the reserve was mapped as TU5, a model prone to crown fire because of its high understory, this predictive model shows that for where fire occurred, it reached into the tree crowns (up to 38% of the reserve). Either the fire did not carry, or it burned into the tree canopy.

This will confound fire suppression efforts, and cast embers well into the neighboring residential areas where new ignitions are likely.

Table 10. Acres of Crown Fire Activity results from Flammap for the existing conditions scenario.

Value	Acres	Percent
No Fire	41.27	52%
Surface Fire	7.82	10%
Torching Fire	29.79	38%

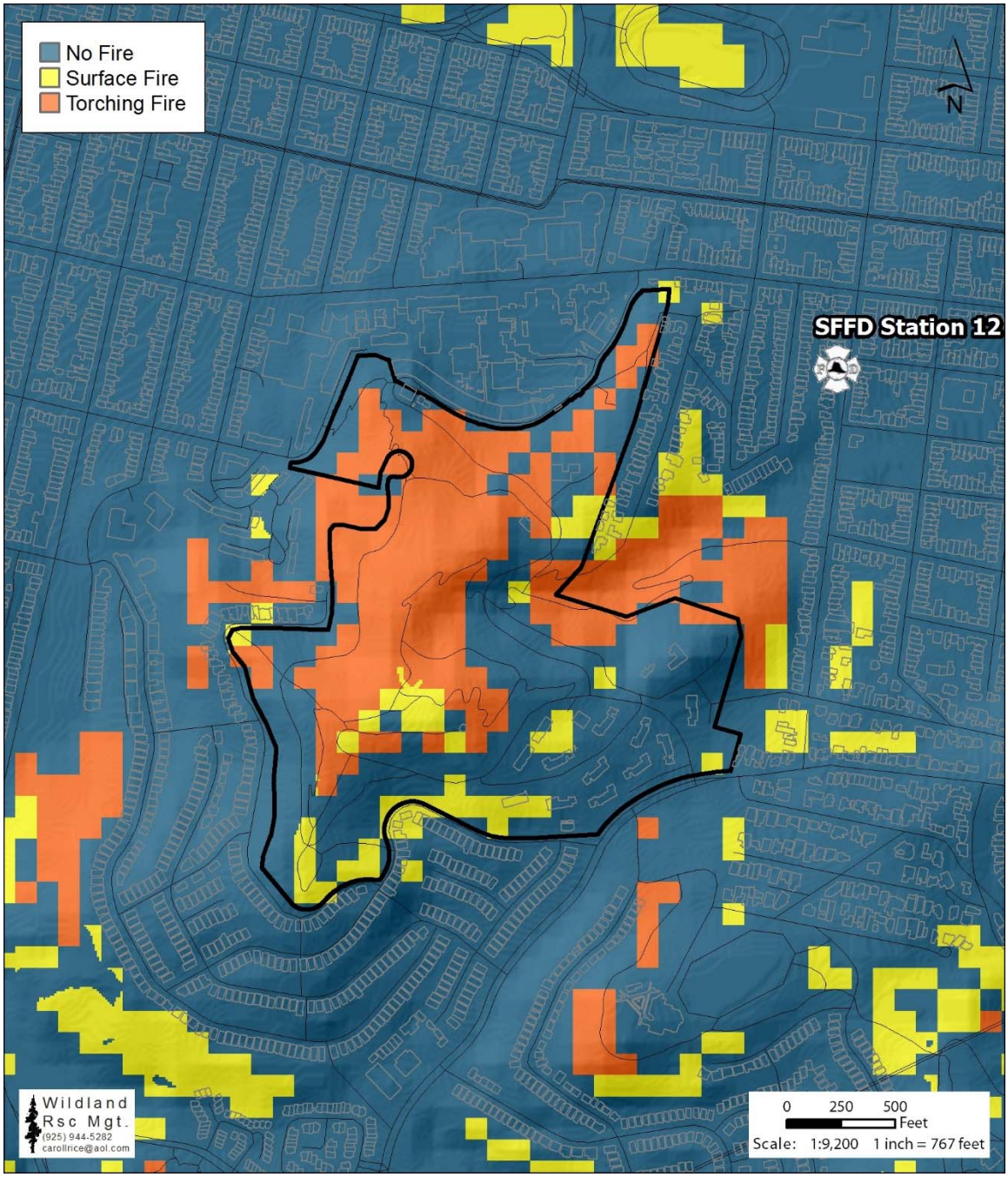


Figure 14. Predicted crown fire activity for the existing conditions scenario

The crown fire is predicted to occur on the northern slopes and ridgetops as shown in Figure 14.

3.2 CONDITIONS AFTER INITIAL 5 YEARS OF WORK

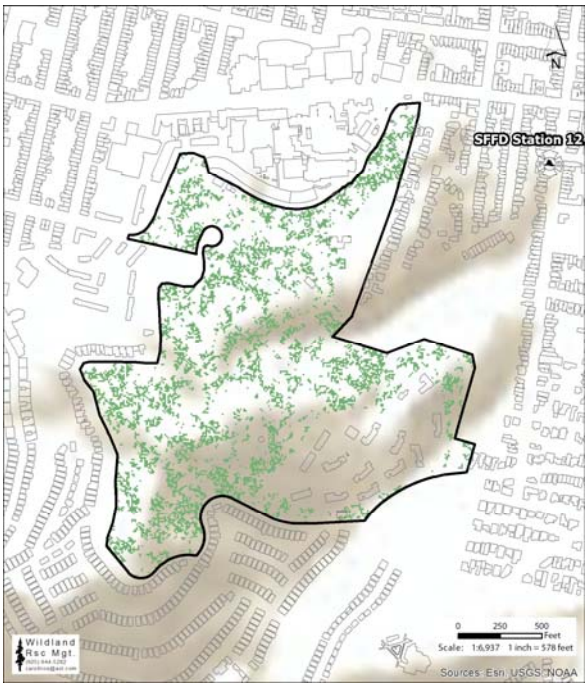
A series of complicated fuel treatments are proposed in the reserve's Vegetation Management Plan. For each proposed fuel treatment, their location on a map was determined and then changes to fuel characteristics were applied based on the likely resulting arrangement of fuels.

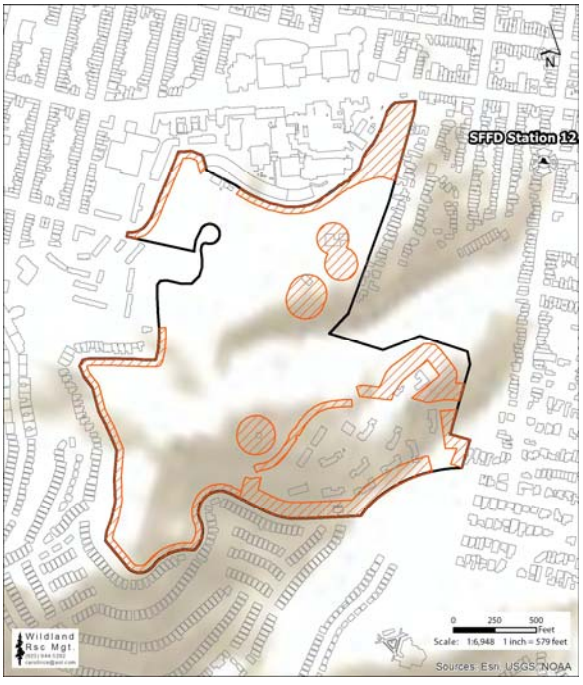
Table 11 summaries the fuel models found in each of the treatment areas and how they changed 5 years after initial treatment and 10 years after initial treatment.

Understory Removal

The exact locations where understory removal was assigned is not known. So, a randomized 3m by 3m surface was generated and clipped to the reserve's boundaries. A quarter of the randomized 3m by 3m raster cells were assigned the Understory Removal fuel treatment (shown as dark green pixels in image to the right).

These randomized locations account for 15 acres within the reserve.





Defensible Space

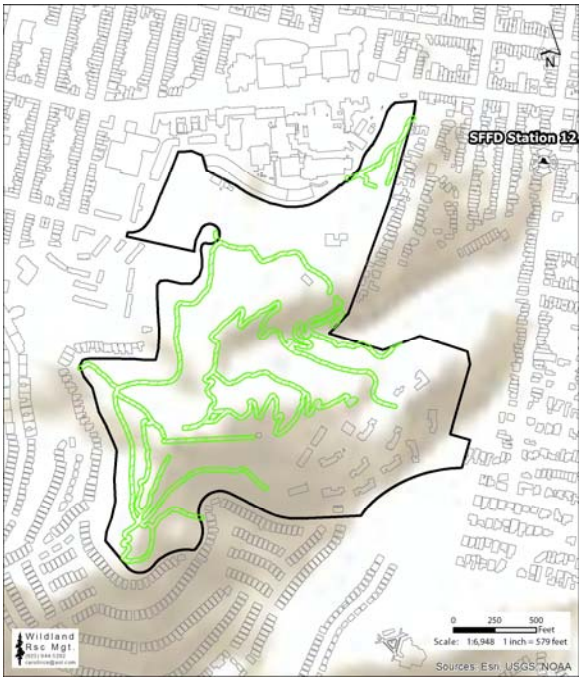
The San Francisco Fire Department surveyed the reserve and determined the locations where defensible space should be maintained. Their map was used to apply that fuel treatment to the existing conditions fuel models (shown with dark orange hash marks in image to the left).

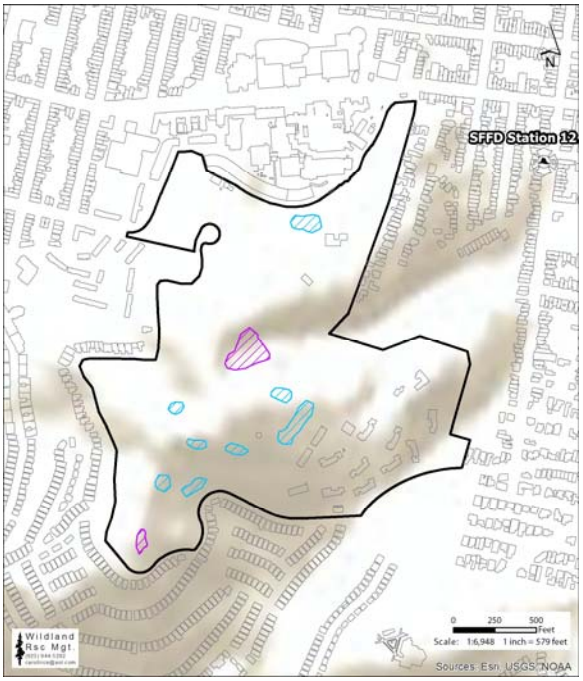
The defensible space treatment accounts for 16.5 acres of the reserve.

Line of Sight

For this fuel treatment, all trails within the reserve (provided by client were buffered by 12.5 feet (shown as buffered green hash marks in image to the right).

The line of sight treatment accounts for 9 acres of the reserve.





Seed Tree

Areas provided by client and cover 1 acre of the reserve (shown in magenta in image to left.

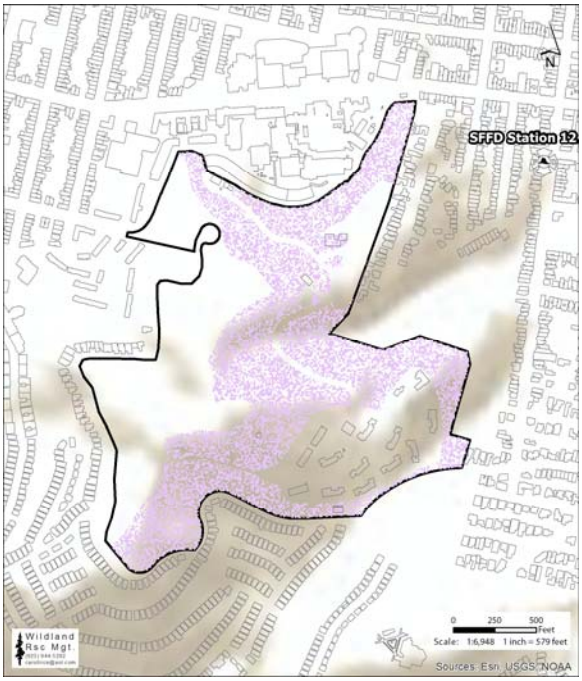
Group Selection

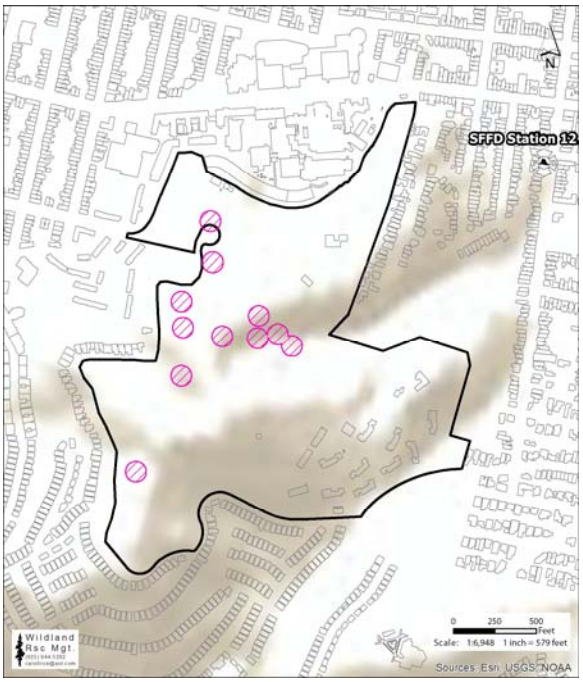
Areas provided by client and cover 1.8 acres of the reserve (shown in blue in image to the left).

Tree Planting

Again, the exact locations where tree planting will occur is not known. Like the Understory Removal treatment, a randomized 3m by 3m surface was generated and clipped to the three forest types (Types 1 – 3) planting will occur in. Half of the randomized 3m by 3m raster cells were assigned the Tree Planting fuel treatment (shown in pink in image to the right).

These randomized locations account for 20 acres within the reserve.





Restoration

Eleven restorations sites within the reserve were buffered to create a total of 3 acres of area (shown in bright pink in image to the left).

Table 11. Summary of changes to fuel characteristics based on treatments described in the MSOSR Vegetation Management plan.

		Post Treatment Plus 5 Years				Post Treatment Plus 10 Years			
Treatment	Original FM	New FM	CH*	CBH**	CC***	New FM	CH*	CBH**	CC***
Understory Removal Phase I	91	91				91			
	121	121				121			
	122	122				122			
	147	182				144			
	165	182		30		144		30	
	182	182		30		144		30	
	183	182		30		144		30	

Understory Removal Phase II	91					91			
	121					121			
	122					122			
	147					182			
	165					182		30	
	182					182		30	
	183					182		30	
Defensible Space	91	91				91			
	121	121				121			
	122	122				122			
	147	143		30	50	143		30	50
	165	143		30	50	143		30	50
	183	143		30	50	143		30	50
Line of Sight	91	91				91			
	121	121				121			
	122	122				122			
	165	182		30		182		30	
	182	182		30		182		30	
	183	182		30		182		30	
Seed Tree	122	122				122			
	165	182	60	6	10	149	40	6	20
	183	182	60	6	10	149	40	6	20
Group Selection	121	121				121			
	122	121	60	6	10	149	40	6	20
	165	121	60	6	10	149	40	6	20
	183	121	60	6	10	149	40	6	20
Restoration	91	91				91			
	121	101	0	0	0	101	0	0	0
	122	101	0	0	0	101	0	0	0
	165	121	24	6	10	142	24	6	10
	183	121	24	6	10	142	24	6	10
Tree Planting	91	91				91			
	121	149		6	40	149		6	40
	122	149		6	40	149		6	40
	147	149		6	40	149		6	40
	165	149		6	40	149		6	40
	182	149		6	40	149		6	40
	183	149		6	40	149		6	40

***Canopy Height (Meters * 10)**

****Canopy Base Height (meters * 10)**

*****Canopy Cover (percent)**

All treatments were combined with the existing fuel model. The resulting layer is shown in Figure 14. On the next page is a table of acres for each resulting fuel type.

Table 12. Acres by Fuel model for the 5-year post treatment scenario within the Mt Sutro Open Space Reserve.

Value	FBFM40	Description	Acres	Percent
91	NB1	URBAN	12.99	16%
101	GR1	SHORT GRASS	.47	1%
121	GS1	LOW GRASS-SHRUB	7.82	10%
122	GS2	MODERATE GRASS-SHRUB	17.04	22%
143	SH3	MODERATE SHRUB	5.33	7%
147	SH7	VERY HIGH SHRUB	0.17	0.2%
149	SH9	VERY HIGH LOAD SHRUB	10.15	13%
165	TU5	VERY HIGH LOAD, TIMBER	12.50	16%
182	TL2	TIMBER, LOW LOAD	9.72	12%
183	TL3	TIMBER, MODERATE LOAD	2.70	3%

Reviewing Table 12 reveals a more complex landscape after treatments are applied. Grass-shrub fuel types have been converted to grass fuel types while other areas have been converted to several, high fuel load shrub types.

The most dominate fuel model is now GS2 (22%) with TL5, TL2 and SH9 accounting for 16%, 12% and 13% of the reserve, respectively.

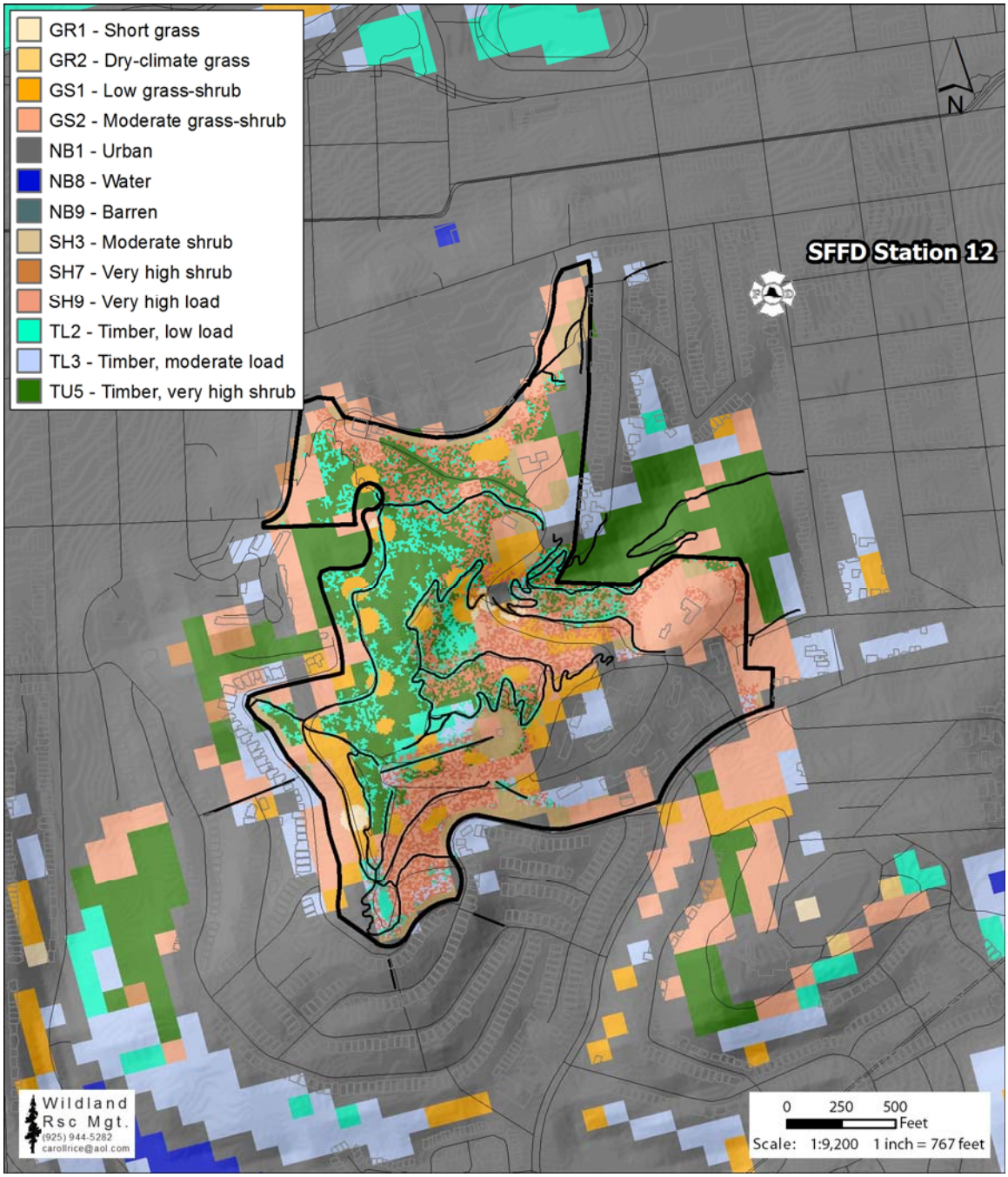


Figure 15. Modified fuels for the 5-Year post treatment scenario

Note the patch work distribution of fuel models. This is due to the randomized assignment of the Understory Removal and Tree Planting fuel treatments.

3.2.1 +5 Years Conditions – Flame Length

The main difference between the existing conditions scenario and the 5-years post treatment conditions is the increase in the high fuel load shrub fuel model. This model burns hotter and faster than others. So, while fire behavior is reduced in some areas of the reserve (particularly in the Defensible Space areas), it also increases throughout forest types 1 through 4 (in the randomized locations of the Understory Removal and Tree Planting treatments).

Table 13. Predicated Flame Length Acres for the 5-year post treatment scenario.

Value	Acres	Percent
No Fire	53.06	67%
Less than 4 feet	3.85	5%
4.1 - 8	2.77	4%
8.1 - 11	2.92	4%
11.1 - 20	9.03	11%
Greater than 20 feet	7.25	9%

Overall, fire behavior across the reserve is slightly lessened. Under the existing conditions scenario, 38% of the reserve burned. Five-years post treatment, 33% of the reserve is predicted to burn. In addition, the areas experiencing high flames is reduced. Flame lengths above 11 feet were predicted for 17.5 acres of the reserve under existing conditions. That was reduced to 16.28 acres 5-years post treatment.

However, though there was a slight reduction in overall fire behavior, areas that did not see fire under the existing conditions do experience fire post treatment due to the placement of the Tree Planting treatment in previous grass-based fuel models (converted to a shrub-based fuel model).

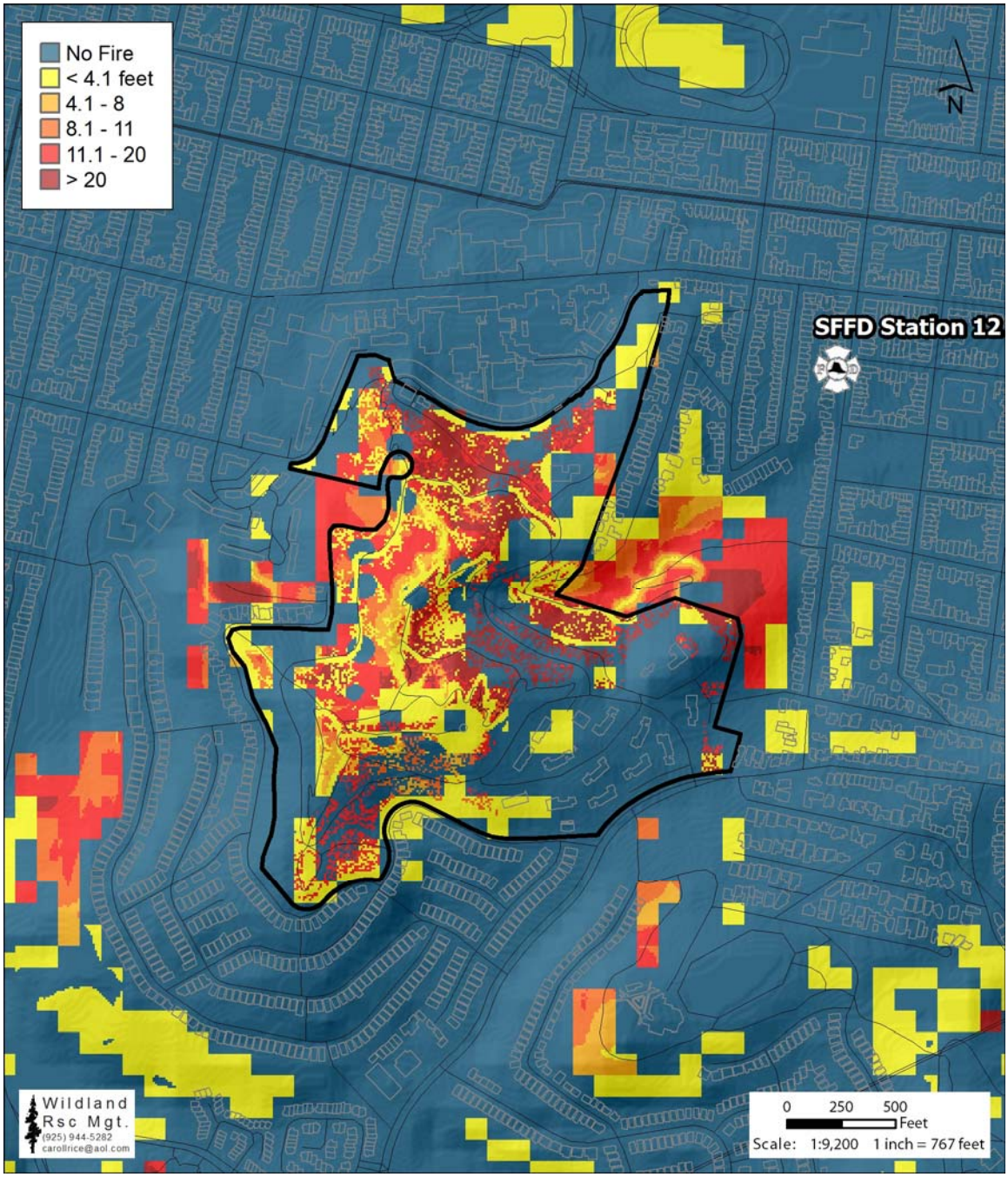


Figure 16. Predicted flame lengths for the 5-year post treatments scenario

3.2.2 +5 Years Conditions – Rate of Spread

Similar to the changes in flame length, rate of spread decreased overall, but increased where Tree Plantings and Understory Removal treatments were located.

Table 14. Predicated rate of spread Acres for the 5-year post treatment scenario.

Value	Acres	Percent
No Fire	53.56	68%
Less than 1.1 ch/hr	2.23	3%
1.1 - 5	3.74	5%
5.1 - 10	6.83	9%
10.1 - 20	7.48	9%
Greater than 20 ch/hr	5.03	6%

While the rate of spread increases in some limited locations, if the treatments are distributed throughout the reserve, fire-fighting would be aided by the broken up landscape rather than hindered by the increased fire behavior.

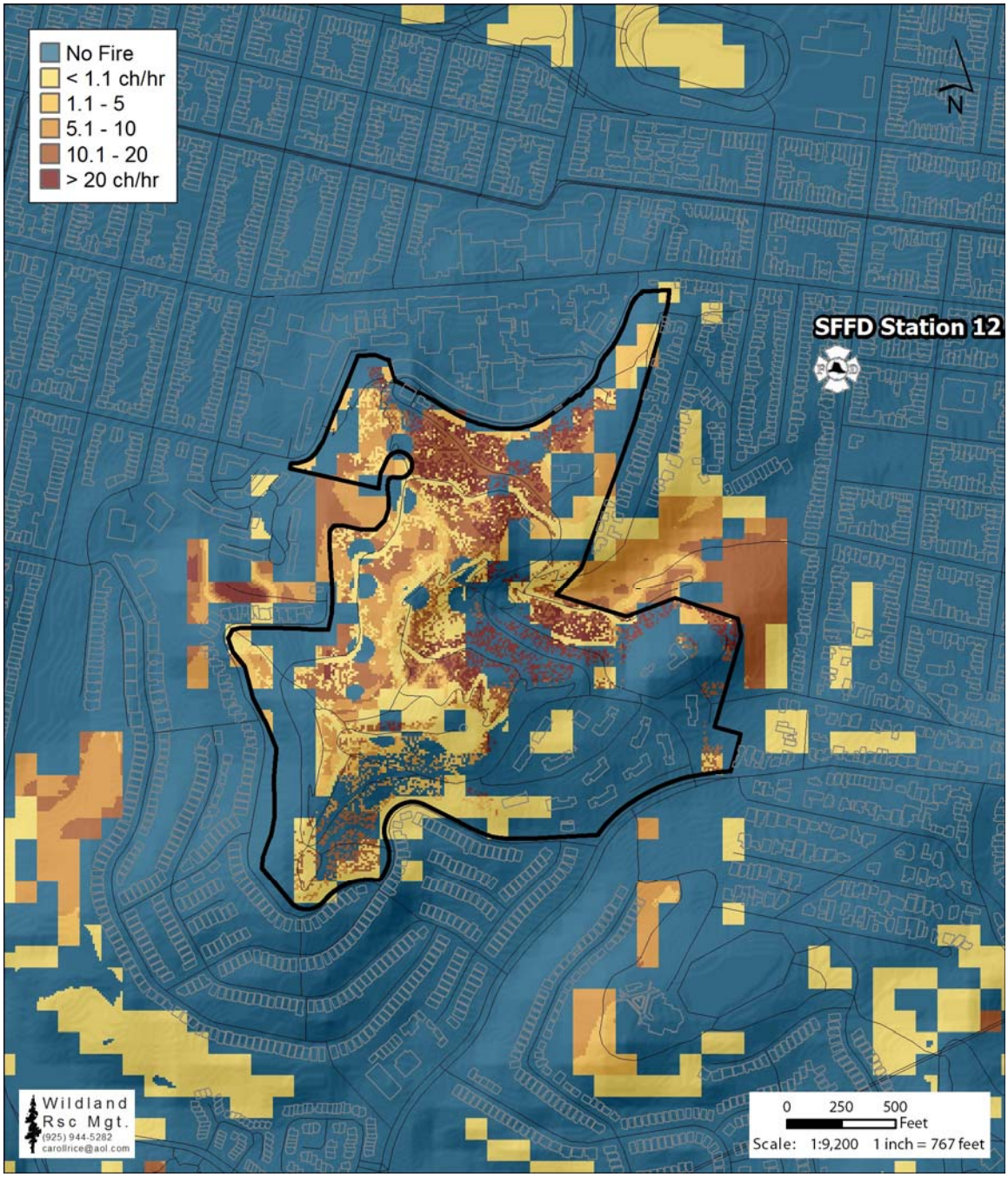


Figure 16. 1Predicted rate of spread for the 5-year post treatment scenario

3.2.3 +5 Years Conditions – Crown Fire Activity

Again, the complicated nature of the treatments resulted in a complicated array of potential crown fire activity. The amount of the reserve that might experience fire increases, but areas with potential torching trees diminishes to 28% (versus 38% under existing conditions).

Table 15. Predicated crown fire activity Acres for the 5-year post treatment scenario.

Value	Acres	Percent
No Fire	38.49	49%
Surface Fire	18.43	23%
Torching Fire	21.97	28%

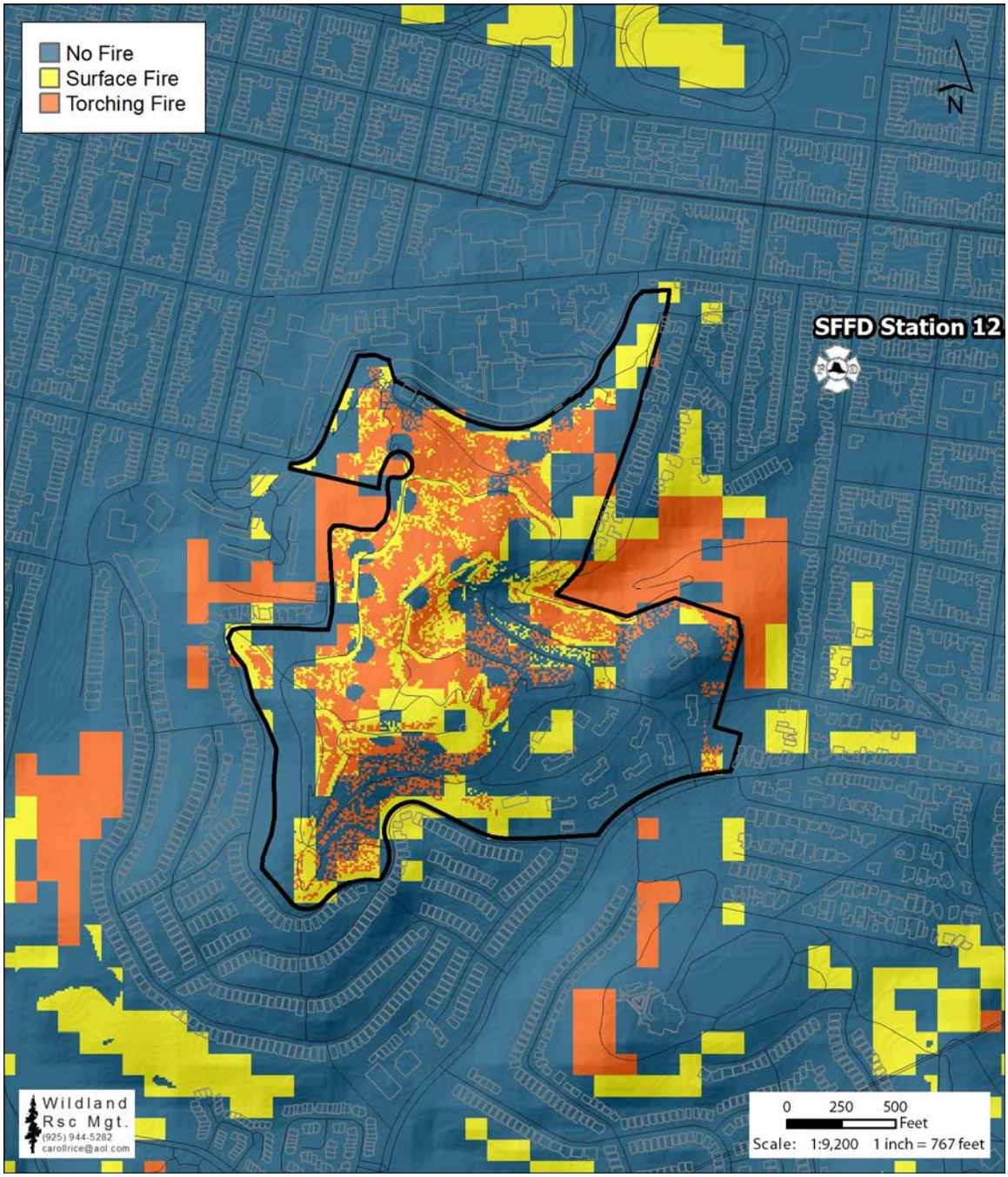


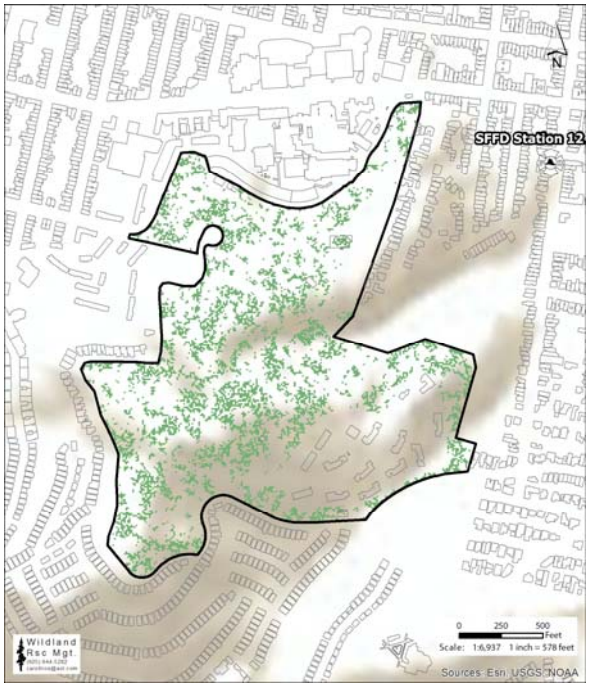
Figure 17. Predicted crown fire activity for the 5-year post treatment scenario

SECTION 3.3 – LONG-TERM CONDITIONS (AFTER FULL IMPLEMENTATION)

In Phase II of the project, which spans years 6-10 after Project initiation, many areas that were treated are simply being maintained. Understory Removal is assumed to be ongoing, affecting roughly 20% of the forest. Defensible Space Treatments and Line of Sight Treatments are assumed to be maintained. In the areas either not treated, or as part of the Restoration Treatment, very little changed from the 5-year post treatment scenario. Five years is not a significant amount of time to change forest characteristics dramatically except in areas of tree planting. In areas where eucalyptus trees were planted, trees are expected to be 20 feet tall, with 100% survival. This constitutes the most dramatic change in the forest.

Understory Removal

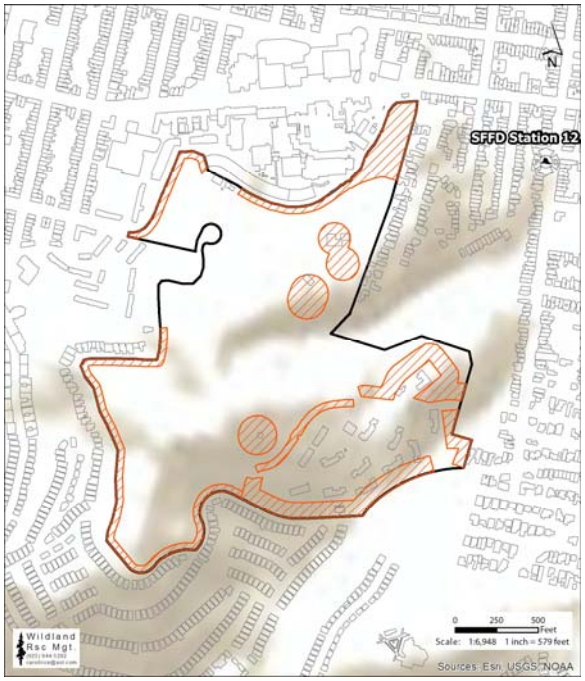
The exact locations where understory removal is expected to occur in Phase II of the project is not known. So, a randomized 3m by 3m surface was generated and clipped to the reserve's boundaries. An additional quarter of the randomized 3m by 3m raster cells were assigned the Understory Removal fuel treatment (shown as dark green pixels in image to the right).

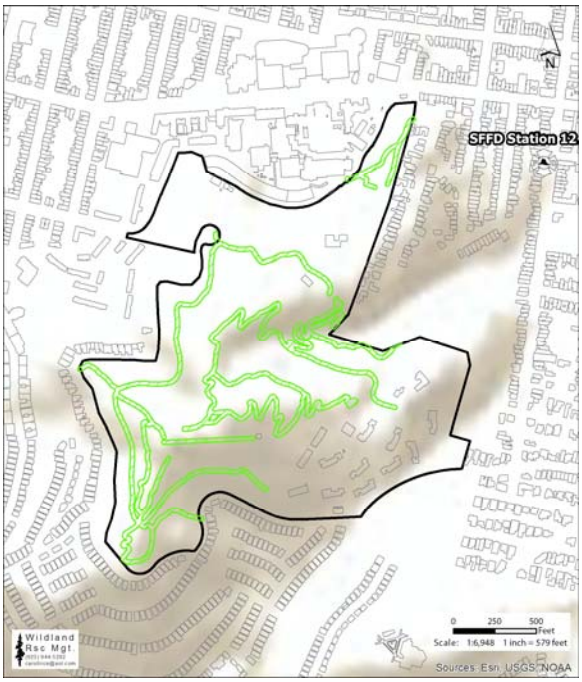


These randomized locations account for 15 acres within the reserve, which is in addition to the 15 acres treated in the first five years of the treatments.

Defensible Space

It was assumed that the defensible space treatments would be maintained annually, so the extent and condition of the treatments remained constant in Phase II of the project. As before, the defensible space treatment accounts for 16.5 acres of the reserve.





Line of Sight

Similar to the Defensible Space Treatments, the Line of Sight Treatments remained throughout Phase II. For this fuel treatment, all trails within the reserve (provided by client were buffered by 12.5 feet (shown as buffered green hash marks in image to the right).

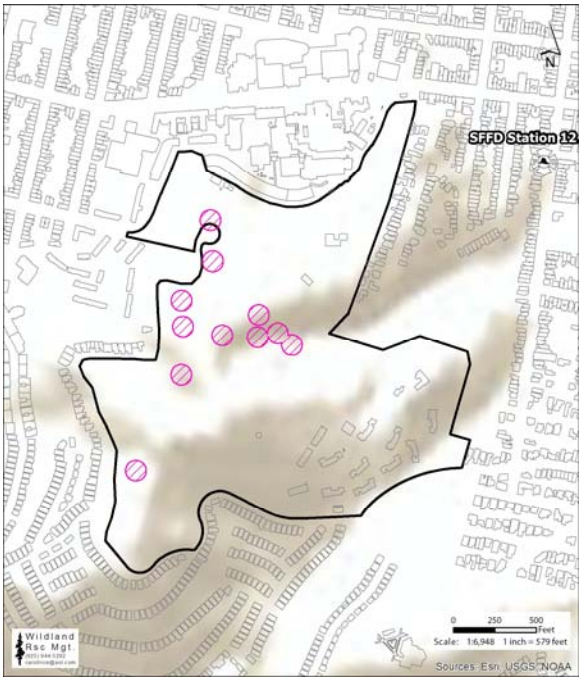
The line of sight treatment accounts for 9 acres of the reserve.

Seed Tree and Group Selection

During Phase II of the project, an additional 2.75 acres will be treated with the Seed Tree and Group Selection Treatments. It is assumed 50% of the area would occur in Forest Type 1, and the other 50% would be spread throughout the other Forest Types. The treatments will occur in sites that have the lowest tree density.

Tree Planting

Tree planting will take place in Phase II in the locations of the Seed Tree and Group Selection. Accordingly, 2.75 acres will be planted. Of these, 1.375 acres will be planted in Forest Type 1, and the remainder spread throughout Forest Types 2,3, and 4. For this analysis, areas were selected based on low canopy cover values.



Restoration

No additional restoration sites were to be established during Phase II. Thus, the locations of Restoration Sites are the same as in Phase I, as depicted in the image to the left.

Table 16. (Same as Table 11.) Summary of changes to fuel characteristics based on treatments described in the MSOSR Vegetation Management plan.

		Post Treatment Plus 5 Years				Post Treatment Plus 10 Years			
Treatment	Original FM	New FM	CH*	CBH**	CC***	New FM	CH*	CBH**	CC***
Understory Removal Phase I	91	91				91			
	121	121				121			

	122	122				122			
	147	182				144			
	165	182		30		144		30	
	182	182		30		144		30	
	183	182		30		144		30	
Understory Removal Phase II	91					91			
	121					121			
	122					122			
	147					182			
	165					182		30	
	182					182		30	
	183					182		30	
Defensible Space	91	91				91			
	121	121				121			
	122	122				122			
	147	143		30	50	143		30	50
	165	143		30	50	143		30	50
	183	143		30	50	143		30	50
Line of Sight	91	91				91			
	121	121				121			
	122	122				122			
	165	182		30		182		30	
	182	182		30		182		30	
	183	182		30		182		30	
Seed Tree	122	122				122			
	165	182	60	6	10	149	40	6	20
	183	182	60	6	10	149	40	6	20
Group Selection	121	121				121			
	122	121	60	6	10	149	40	6	20
	165	121	60	6	10	149	40	6	20
	183	121	60	6	10	149	40	6	20
Restoration	91	91				91			
	121	101	0	0	0	101	0	0	0
	122	101	0	0	0	101	0	0	0
	165	121	24	6	10	142	24	6	10
	183	121	24	6	10	142	24	6	10
Tree Planting	91	91				91			
	121	149		6	40	149		6	40
	122	149		6	40	149		6	40
	147	149		6	40	149		6	40
	165	149		6	40	149		6	40
	182	149		6	40	149		6	40
	183	149		6	40	149		6	40

***Canopy Height (Meters * 10)**

****Canopy Base Height (meters * 10)**

*****Canopy Cover (percent)**

The fuel model acres are very similar to the 5-years post treatment fuel model acres. The most noticeable differences are that Low Grass-Shrub (SH1) decreased from 7.82 acres to 5.10 acres, is an increase in SH9 (from 10.1 acres to 12.2 acres) and the shift of 5.21 acres to a Humid-Climate Shrub (SH4).

Table 17. ACRES by Fuel model within the Mt Sutro Open Space Reserve for the 10-year post treatments scenario.

Value	FBFM40	Description	Acres	Percent
91	NB1	URBAN	12.99	16%
101	GR1	SHORT GRASS	0.47	1%
121	GS1	LOW GRASS-SHRUB	5.10	6%
122	GS2	MODERATE GRASS-SHRUB	17.34	22%
142	SH2	LOW SHRUB	1.60	2%
143	SH3	MODERATE SHRUB	5.33	7%
144	SH4	HUMID-CLIMATE SHRUB	5.21	7%
147	SH7	VERY HIGH SHRUB	.12	0.2%
149	SH9	VERY HIGH LOAD SHRUB	9.30	12%
165	TU5	VERY HIGH LOAD, TIMBER	8.59	11%
182	TL2	TIMBER, LOW LOAD	10.50	13%
183	TL3	TIMBER, MODERATE LOAD	2.72	3%

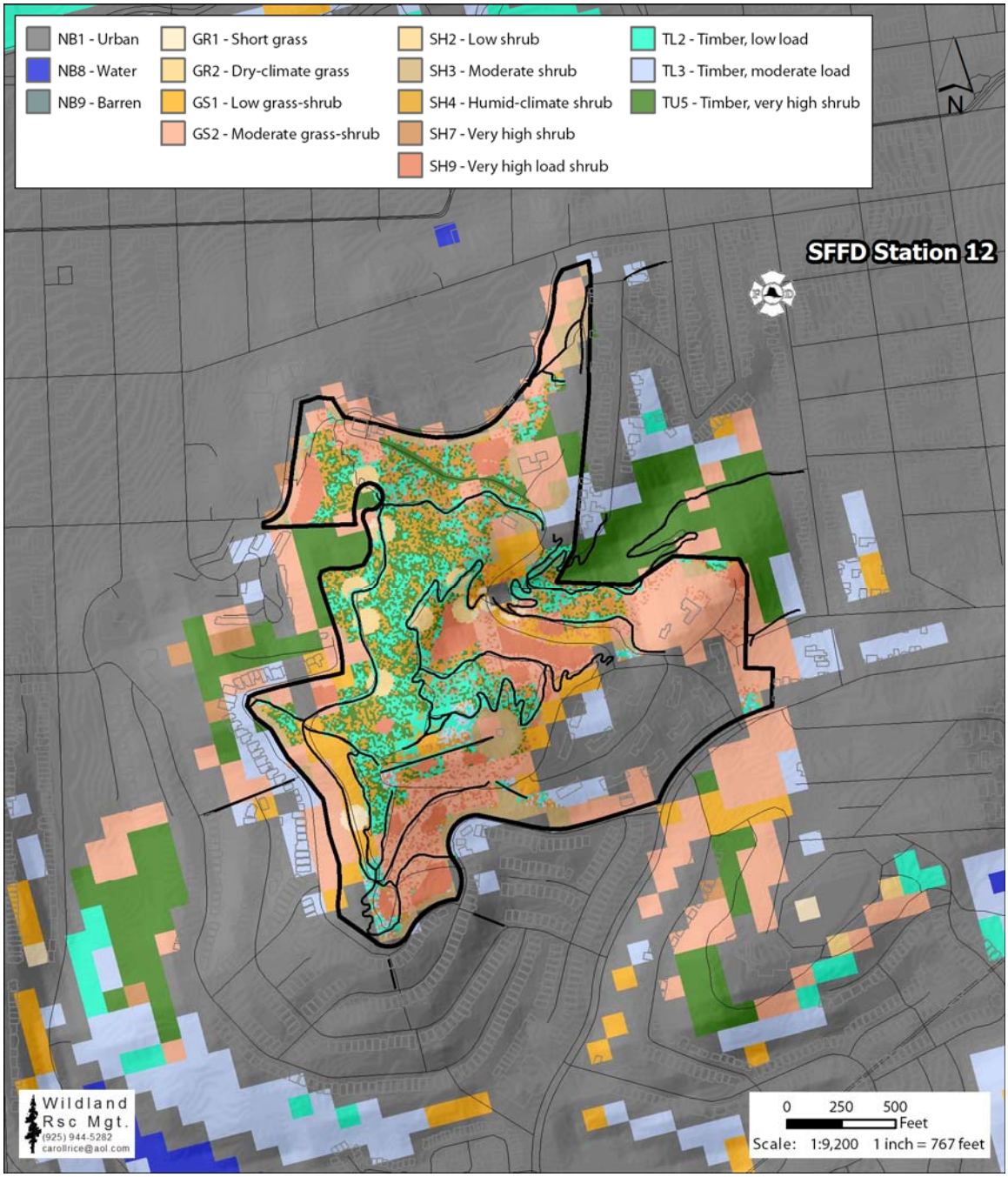


Figure 18. Fuel models used for the 10-year post treatment scenario

3.3.1 +10 Years Conditions – Flame Length

The slight benefits of the various fuel treatments are stable after 10 years. Fire is now predicted to occur on 32% of the reserve (one percentage point increase from the 5-year post treatment scenario, and a six percentage point from existing conditions). Roughly 4.5 more acres would not support fire due to fuel treatments.

While that is not a huge change, the increase is in the more extreme end of the fire behavior spectrum. Above 11 feet flame lengths are predicted on 14 acres (versus 17.5 acres in existing conditions and 11 acres in the 5-year post treatment scenario).

Table 18. Predicated Flame Length Acres for the 10-year post treatment scenario.

Value	Acres	Percent
No Fire	53.57	68%
Less than 4 feet	7.85	10%
4.1 - 8	1.84	2%
8.1 - 11	1.96	2%
11.1 - 20	6.29	8%
Greater than 20 feet	7.38	9%

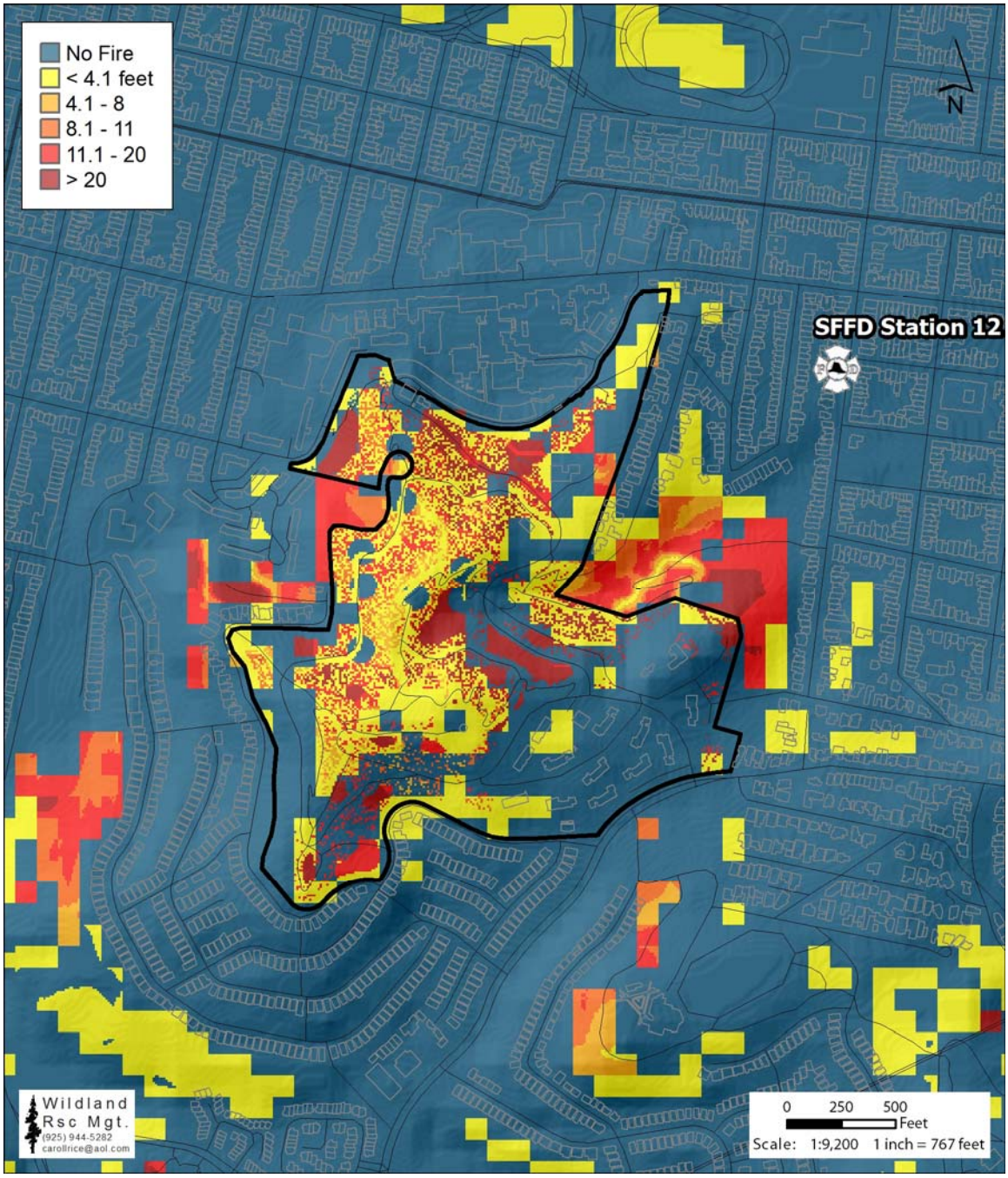


Figure 19. Predicted flame lengths for the 10-year post treatment scenario

The pattern of fire within the Reserve remains generally the same as the 5-year post treatment scenario, with a few important exceptions. The several areas, such as those closest to the campus, and at the top of the Reserve, is expected to burn with a less uniform intensity. Some areas, particularly those that were planted with trees during Phase II, have increased in flame lengths from five years previous. These areas are expected to burn intensely and uniformly in large patches.

3.3.2 +10 Years Conditions – Rate of Spread

The acres in which rate of spread is very high (over 20 ch/hr) increases after 10 years (from .9 acres to 5.8 acres).

Table 19. Predicted rate of spread Acres for the 10-year post treatment scenario.

Value	Acres	Percent
No Fire	53.21	67%
Less than 1.1 ch/hr	3.14	4%
1.1 - 5	6.69	8%
5.1 - 10	4.41	6%
10.1 - 20	5.63	7%
Greater than 20 ch/hr	5.8	7%

This occurs where the Tree Planting treatments are located. The increase may not be significant (only a 6% rise), but it does show a trend towards increasing extreme fire behavior.

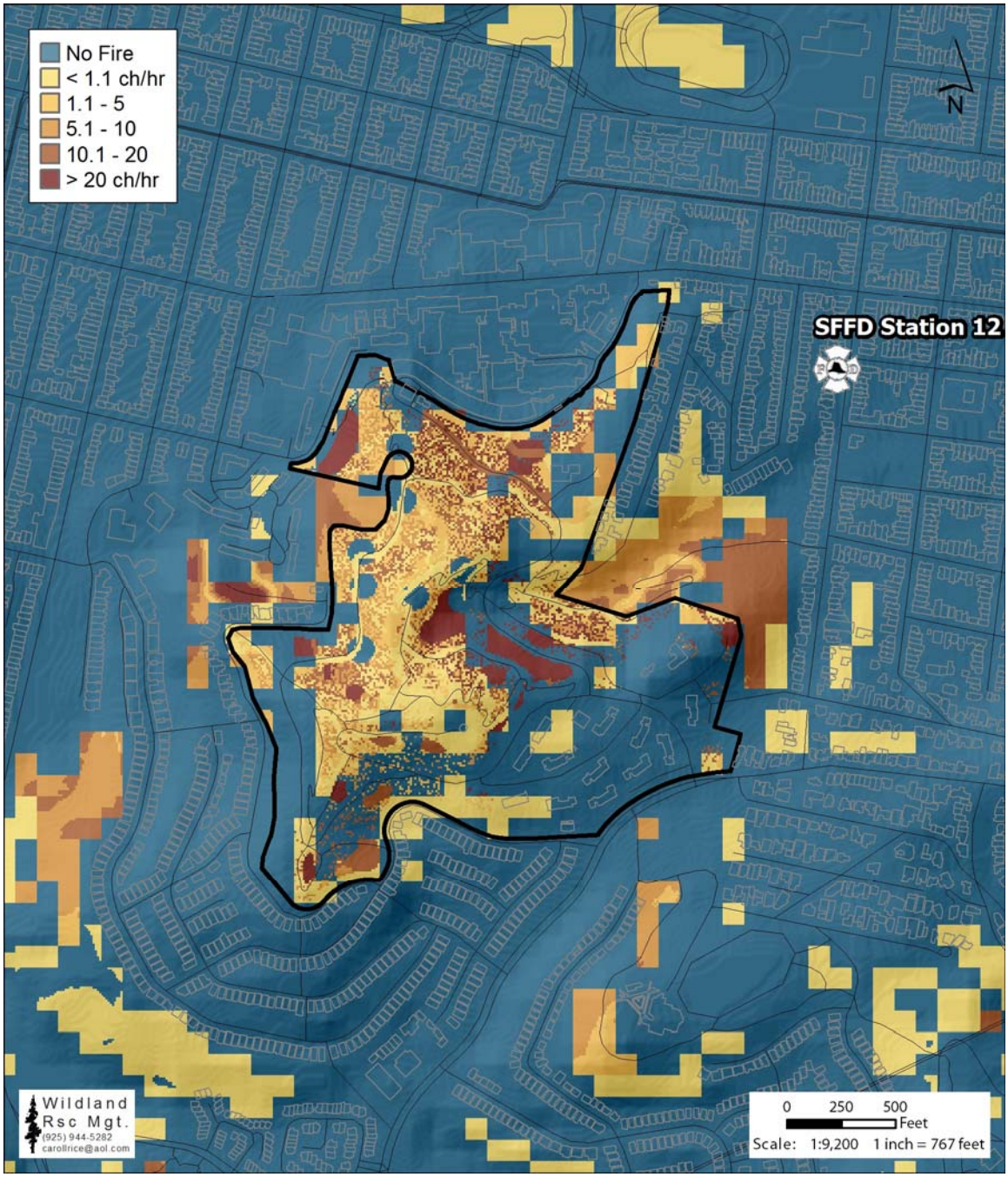


Figure 20. Predicted rate of spread for the 10-year post treatment scenario

Note the increase in fire spread in the Seed Tree and Group Selection treatment areas.

3.3.3 +10 Years Conditions – Crown Fire Activity

Overall, a hypothetical fire within the reserve remains a surface fire in a greater proportion of the reserve, however, fire climbs into tree canopy on one-fifth of the reserve 10-year post treatment.

Table 20. Predicated crown fire activity Acres for the 10-year post treatment scenario.

Value	Acres	Percent
No Fire	37.63	48%
Surface Fire	23.85	30%
Torching Fire	17.40	22%

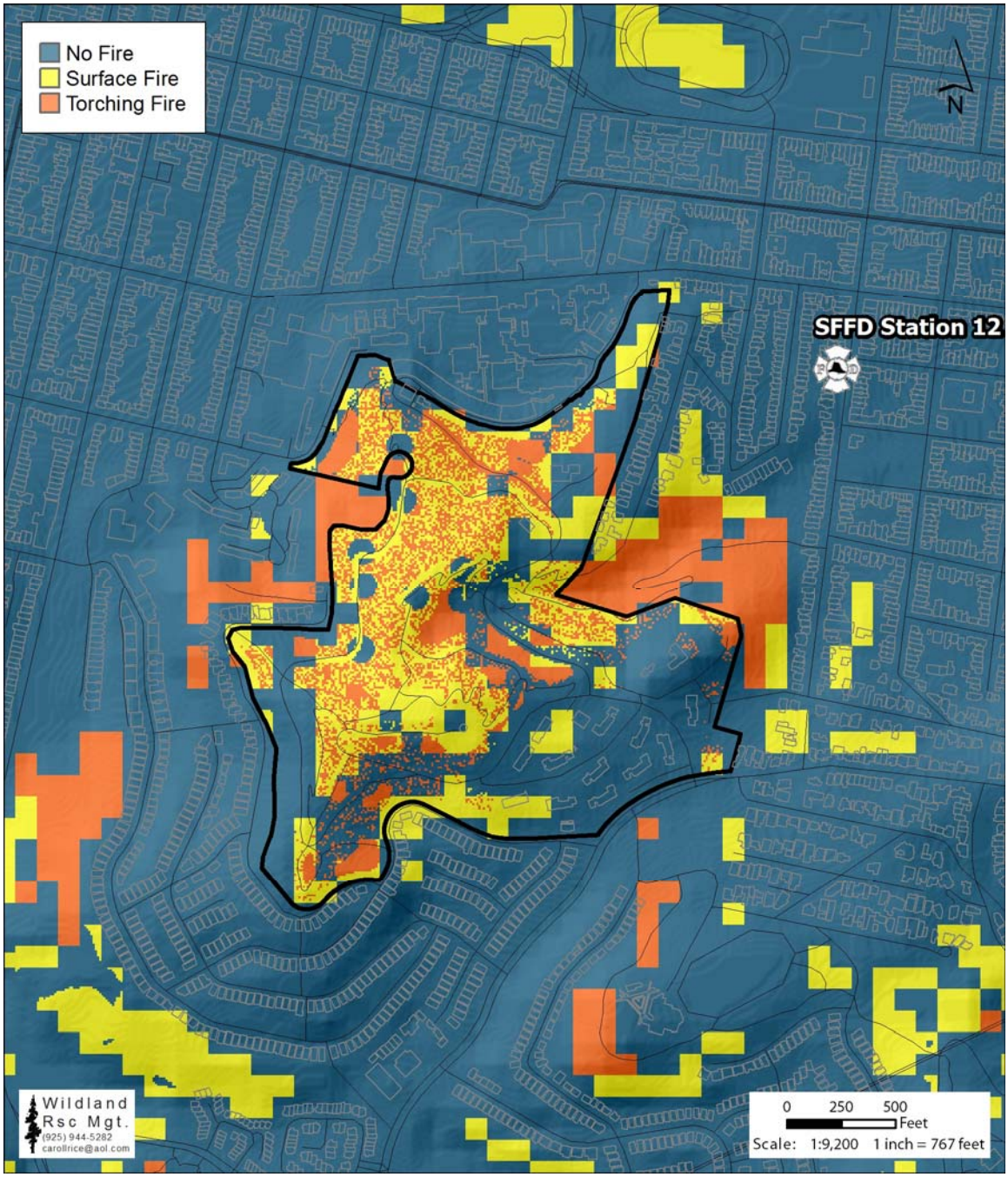


Figure 21. Predicted crown fire activity for the 10-year post treatment scenario

4 DISCUSSION

A comparison between all predicted fire behavior parameters over the three scenarios is presented in the table below.

Flame Lengths	Existing	5 Years Post	Percent	10 Years Post	Percent	Overall
Value	Acres	Acres	Change	Acres	Change	% Change
No Fire	48.98	53.06	8%	53.57	1%	9%
Less than 4 feet	1.53	3.85	152%	7.85	104%	414%
4.1 - 8	5.34	2.77	-48%	1.84	-34%	-66%
8.1 - 11	5.54	2.92	-47%	1.96	-33%	-65%
11.1 - 20	12.62	9.03	-28%	6.29	-30%	-50%
Greater than 20 feet	4.88	7.25	49%	7.38	2%	51%
Rate of Spread	Existing	5 Years Post	Percent	10 Years Post	Percent	Overall
Value	Acres	Acres	Change	Acres	Change	% Change
No Fire	48.98	53.56	9%	53.21	-1%	9%
Less than 1.1 ch/hr	0.50	2.23	344%	3.14	41%	525%
1.1 - 5	5.67	3.74	-34%	6.69	79%	18%
5.1 - 10	11.11	6.83	-38%	4.41	-36%	-60%
10.1 - 20	11.70	7.49	-36%	5.63	-25%	-52%
Greater than 20 ch/hr	0.91	5.03	450%	5.80	15%	535%
Crown Fire Activity	Existing	5 Years Post	Percent	10 Years Post	Percent	Overall
Value	Acres	Acres	Change	Acres	Change	% Change
No Fire	41.27	38.49	-7%	37.63	-2%	-9%
Surface Fire	7.82	18.43	136%	23.85	29%	205%
Torching Fire	29.79	21.97	-26%	17.40	-21%	-42%

*Does not include non-crowning fuel types.

Due to the vagaries of the functions used to calculate each fire behavior output and the clipping process of the layers, the acres reported for each No Fire value does not exactly match across all tables. As a result of treatment, five more acres will not carry fire. If we just look at the Flame Length numbers, The acreage that would burn with short flame lengths (less than four feet) increased by 2.32 acres after five years, and 6.32 acres ten years after the project started. This is an increase of more than 400%. However, flames greater than 20 feet increased for approximately the same size area (2.37 acres) after 5 years and stayed constant at the project's

conclusion. Torching is decreased substantially, be 26% after five years and almost half (42%) ten years after project initiation.

Rate of spread shows a pattern of change to either quite slow spread rates or quite fast. More area is predicted to carry fire (8% and 9% after five and ten years, respectively), and the greatest percentage change was an increase in very fast fire spread rates (faster than 20 ch/hr), from 4.88 acres to 7.25 and 7.38 after five and ten years, respectively. In contrast, the area burning with moderate flame lengths decreased. The area predicted to burn between 1.1 and 10 chains per hour decreased slightly, from 16.78 acres at the start to 10.75 after 5 years and 11.1 acres after 10 years of treatments.

For the torching crown fire activity, it changed from 30 acres of the reserve under existing conditions to 22acres (a 26% decrease) 5 years post treatment and 17.4 acres (an 21% decrease) 10 years post treatment. Overall, areas that might experience a torching crown fire is reduced by 42%.

This analysis suggests that though the fuel treatments reduce the likelihood of fire within the reserve, what is left tends to burn with longer flame lengths and spreads faster and is still capable of generating embers that could spread fire into the adjacent neighborhoods.

When comparing the existing conditions flame length map with the 10-year post treatment flame length map, the heterogeneity introduced by the various fuel treatments is apparent. With the landscape broken up this way, one can expect fires would have a harder time spreading from one end of the reserve to another. In addition, with the relative low predicted fire behavior expected within the Line of Sight and the Defensible Space treatments, these fires could be put out quickly. Where eucalyptus trees are planted in the first five years, dramatic fire behavior is to be expected after a five-year growing period.

So, though planting eucalyptus trees would increase fire danger locally, this is offset by the other treatments. However, the benefits of such treatments would only last as long as they are maintained and the eucalyptus is not allowed to become dense and/or decadent.

Alternatively, if new tree plantings were not included, presumably the Line of Sight and Defensible Space treatments would have more of an impact.

ATTACHMENT 1 REPRESENTATIVE PHOTOGRAPHS OF THE RESERVE



Sign indicating hazardous conditions, with eucalyptus bark and branchlets (a high surface fuel load) next to bus stop.



Eucalyptus failure outside UC property, at western end of Belgrave. Illustrates falling hazard of eucalyptus. Tree damaged structure to right.

FOREST TYPE 1



Eucalyptus sprouts in Aldea Defensible Space area. Indicates potential for eucalyptus regeneration through sprouting where canopy openings are created.



Area behind Aldea Housing, south of East Ridge Trail. Photo indicates complete vertical continuity of fuel structure, with abundant dead material throughout the fuelbed.



Treated area along East Ridge Trail as part of Aldea Defensible Space Area. Shows less vertical fuel continuity, and reduced, but still plentiful surface fuels.



Shrubby surface fuels with high proportion of dead material in taller fuelbed. Brown color indicates dead material.



Defensible space area at water tanks near start of Historic Trail. Ladder fuels were removed. Abundant surface fuels in the form of bark strips and leaf litter. Healthy eucalytpus sprouts indicate potential for tall surface fuels in five years.



Close-up of surface fuels comprised of leaf litter, bark stips and branchlets



Example of dense canopy in Forest Type 1. A fire in this location would be likely to torch due to abundant ladder fuels.



Locations where fallen trees are not removed. This creates ladder fuels, and increased torching potential, and prevents movement through the forest by firefighters or emergency responders.

FOREST TYPE 2



Trees in Forest Type 2 have self-pruned lower branches. Abundant ivy growth on tree trunks. Because of their moist condition, ivy is less of a hazardous ladder fuel than most fuels. However, torching is possible in locations with a high proportion of dead in the vines, or under very dry weather conditions.



Surface fuels in Forest Type 2. This indicates a large volume of dead, downed material under the green covering of nasturtiums and other live surface fuels.



Forest conditions as seen from stairs and rooftop of campus structure. Example of the lack of lower branches on eucalyptus trees

FOREST TYPE 3



Proximity of campus structures to Forest Type 3. Patches of the forest have no ladder fuels, while other locations support shrubby fuels that form a mid-story fuel layer.



Shrubs comprise the ladder fuels in Forest Type 3. Eucalyptus bark, branchlets are draped and elevated over the shrubs and vines on the forest floor.



Example of a mixture of shrubs and dead eucalyptus fuels.



Roadside treatments that cut shrubs on Medical Center Way

FOREST TYPE 4



Example of line of sight treatments. At junction of Nike Rd. and South Ridge Trail. Trees are limbed of lower branches and shrubs removed on both sides of the road.



Multi-storied forest on Christopher Dr., south of Oakhurst Stairs. Vertical continuity would promote torching under dry conditions due to ladder fuels comprised of shrubs and small trees. This location is within the "South Defensible Space" treatment area.



Accumulated eucalyptus debris and acacia shrubs adjacent to Christopher Dr. This location is within the "South Defensible Space" treatment area.



Proximity of structures to Forest Type 4, and view of Marin through forest.



Multi-storied characteristic of Forest Type 4. Monterey pines, and French broom constitute a ladder fuel.



Multi-storied characteristic of Forest Type 4. Monterey pines, small eucalyptus trees, and French broom constitute a ladder fuel. Eucalyptus bark and branchlets are draped and elevated over shrubby fuels. This characteristic provides greater drying opportunity and promotes longer flame lengths.

STRUCTURES AND NEIGHBORHOODS ADJACENT TO THE RESERVE



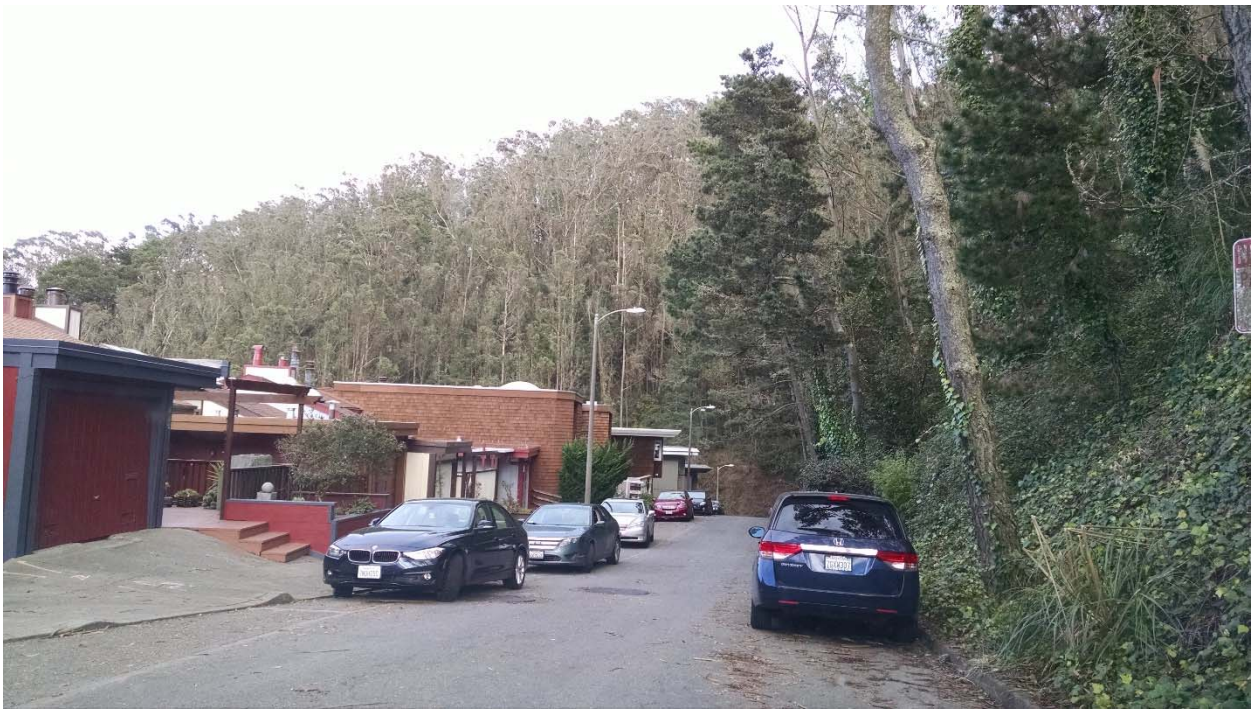
Aldea Housing. Adequate defensible space, however exterior siding is ignition-prone



Aldea Housing. Example of a wildland-urban interface, with flammable forests and combustible construction (wooden shake siding and open decks).



Western portion of Christopher Dr. showing limited road width, and proximity of homes to forest.



Example of wildland urban interface on western boundary of Mt. Sutro.



Wildland Urban Interface near and in Mt. Sutro. Elementary school in foreground.

4.9 HYDROLOGY, WATER QUALITY, AND WATER SUPPLY

4.9.1 Introduction

This section discusses the existing hydrology and water quality on the site and evaluates the potential impacts on hydrology and water quality from implementation of the proposed vegetation management activities. The section also provides discussion of the applicable federal, state, regional, and local regulations that pertain to hydrology and water quality. The impacts associated with the proposed plan are compared with the thresholds of significance used by UCSF pursuant to CEQA.

Comments related to hydrology and water quality received during the public scoping process included concerns about the following:

- Concern that activities could cause alteration of Woodland Creek and associated effects downstream of the Reserve within the Interior Greenbelt

4.9.2 Existing Environment

Surface Water Hydrology

Climate and Precipitation

Mean annual rainfall for north central San Francisco (Richmond District gage) is 19.99 inches (WRCC 2016). Local orographic influences in the uplands of Mount Sutro elevate this total to 21 to 22 inches. The rainy season for San Francisco's Mediterranean-type climate normally extends from October through March; however, the Reserve maintains relatively moist soil conditions during those summer months when fog and related fog drip are persistent wherever dense stands of vegetation occur. The highest temperatures (and therefore the driest conditions) tend to occur from late August through early October. In San Francisco, substantial floods may occur in low-lying areas in response to Pacific frontal-system storms of three to five days in duration with nested bursts of high-intensity rainfall. For the higher elevation zones of San Francisco, such as the Reserve, flooding is localized and occurs periodically due to obstructed storm drains, plugged catch basin inlets, or undersized drain segments.

Drainage

City of San Francisco Sewer System

The City of San Francisco has a combined sewer system (CSS) that is comprised of a network of pipes and tunnels that convey combined stormwater and sanitary sewage flows, referred to as combined sewer discharge, to City water treatment plants. The San Francisco Public Utilities Commission (SFPUC) monitors and maintains the CSS facilities within City limits; oversees system operation, system component upgrades (i.e., replacement) to major force main, and transport/storage structures; and oversees the operation of the principal water treatment plants including the Oceanside and Southeast Water Treatment Plans.

Cumulatively, during non-storm conditions, the City's CSS collects and treats up to 80 million gallons per day (mgd) of wastewater, primarily municipal sewage. During rainstorms, these facilities can collect and treat more than 500 mgd. The treatment plants normally employ a minimum of secondary treatment to the combined inflows before discharging the effluent to the San Francisco Bay or the Pacific Ocean. Depending on individual storm characteristics as well as the timing between storms, the treatment plant capacities can be overwhelmed, resulting in the discharge of minimally treated flows to the San Francisco Bay and/or the Pacific Ocean. Since 1987, SFPUC has had three overflow events that warranted enforcement action by the SFBRWQCB, the most recent of which occurred in 2007 (SFBRWQCB 2014).

Stormwater Flows from the Reserve

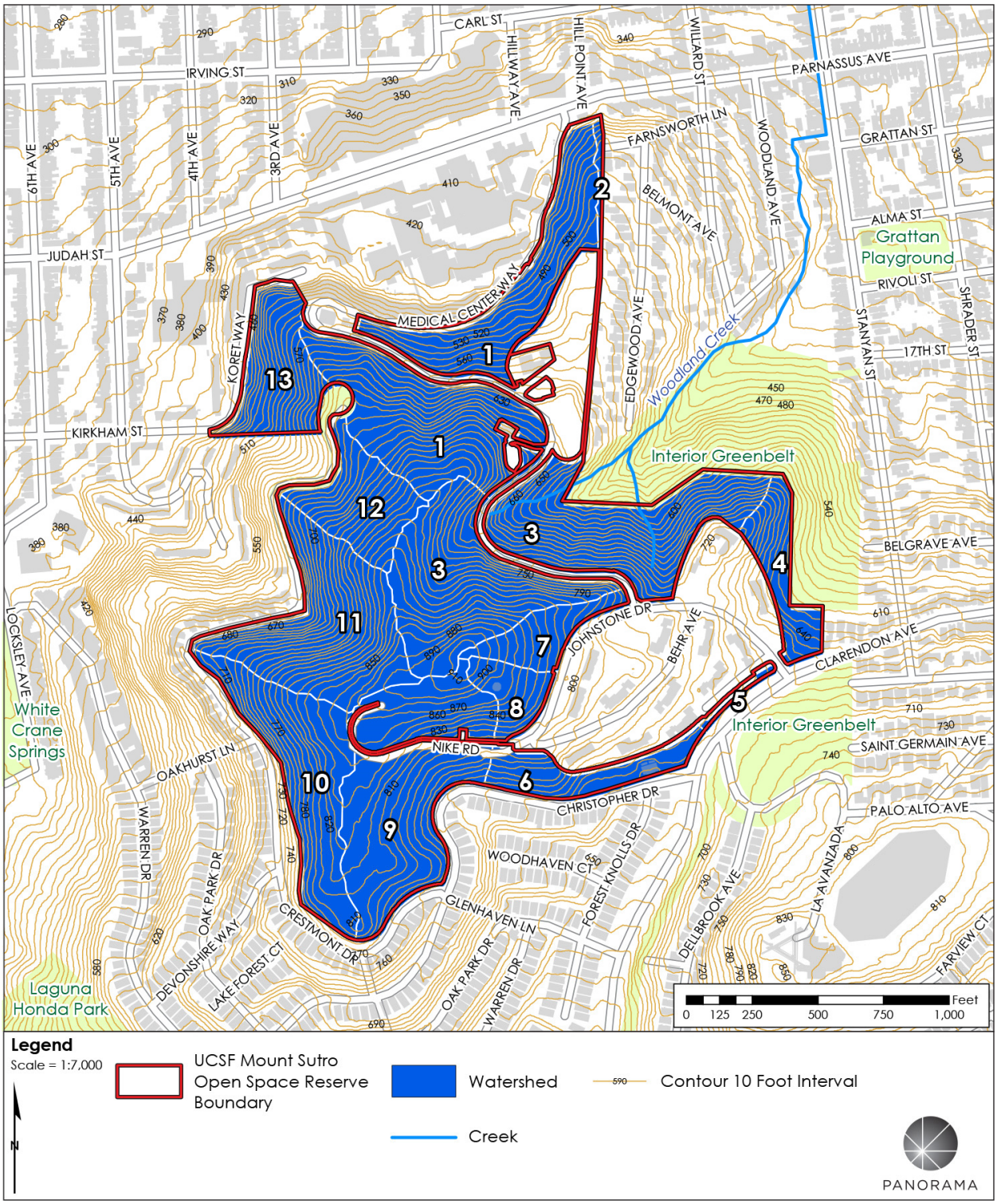
The Reserve occupies 61 acres (59 of which are in the plan area) of ridgeline and hillslopes adjoining the drainage divide that forms the boundary between the San Francisco Bay and the Pacific Ocean watersheds in the city. Accordingly, runoff in the Reserve derived from rainfall ultimately drains to storm drain inlets in the headwaters of either the Channel Basin or the Sunset Basin. Runoff is conveyed east or west, respectively, into the City's CSS to either the Southeast or Oceanside Water Treatment Plants, where it is treated prior to being discharged to Central San Francisco Bay or to the Pacific Ocean.

The Reserve can be divided into 13 smaller watersheds, based on the mapped topography and the location of local storm drainage outlets, typically storm drain catch basins (including curbside and drainage inlets on roads in the Reserve itself). These watersheds in the Reserve are shown on Figure 4.9-1. Elevations of Reserve area watersheds range from 915 feet along the ridgeline to 450 feet on Koret Way. Aside from the principal ridgeline and several contiguous spur ridges, watershed slopes typically exceed grades of 20 percent and reach as high as 60 percent. Watersheds 1, 5, and 6 are partially located within the Reserve as shown on Figure 4.9-1; however, the majority of these watersheds are located on developed areas that drain to three of the established watershed outlets that are not shown as mapped because since they lie outside of the Reserve boundary and would not be subject to modification as part of the plan. The locations of catch basins and/or storm drain inlets or outlets were determined by reviewing maps provided by UCSF, discussions with the principal on-site facilities engineer at the Reserve, and on-site inspections of the watershed and adjoining perimeter lands. Of the 13 delineated watersheds, 8 (Watersheds 1, 6, and 8 through 13) are contained within the Sunset Basin and 5 (Watersheds 2 through 5, and 7) within the Channel Basin.

Surface runoff typically encompasses overland flow, shallow concentrated flow and channel or storm drain flow components. Overland flow occurs in the zones along and immediately adjacent to ridgelines. Runoff then concentrates into swales or other small channels and eventually reaches roadways either within or contiguous to the Reserve. Runoff is typically directed to storm drain catch basins and conveyed in the CSS to the Oceanside or Southeast Water Treatment Plans.

The exception is Watershed 3, which ultimately discharges to an intermittent swale known as Woodland Creek, via either overland flow or a storm drain outfall structure. This outfall

Figure 4.9-1 Watersheds in the Proposed Plan Area



Sources: (ESRI 2017, UCSF 2017, City and County of San Francisco 2011a)

structure collects upslope and roadway runoff that enters a roadside catch basin along Medical Center Way. Field inspection of the outfall structure indicated that it was either completely filled

with sediment or, more likely, was intended to infiltrate the collected runoff into the coarser substrate underlying the base of Woodland Creek. During more significant runoff-producing storms, the infiltration capacity of this coarse sediment within the outfall pipe is overwhelmed by the incoming stormwater discharge, and runoff overflows onto the adjoining vegetated slope and drains overland to the channel. Woodland Creek flows through the Interior Greenbelt and eventually discharges to the CSS in the vicinity of Stanyan Street. Woodland Creek is shown in Figure 4.9-1. No other permanent surface water bodies are found in the Reserve.

Flooding Potential

The Reserve primarily occupies ridgeline lands and steep adjoining uplands at elevations well above the 100- and 500-year flood zones[1]. However, roadway catch basins obstructed by sediment or debris (e.g., eucalyptus bark or trash) may cause localized ponding of stormwater and nuisance flooding. Such localized flooding is typically not considered or depicted in regional flood mapping; as such, the Reserve lands are not shown as areas subject to flooding on maps prepared by the City of San Francisco Department of Emergency Management.

Erosion and Sedimentation

Soils in the Reserve are mapped by the Natural Resources Conservation Service (NRCS) under a single map unit: Candlestick-Kron-Buriburi complex, 30 to 75 percent slopes. These soils are typically fine to gravelly loams and belong to the "D" hydrologic soil group, which indicates rapid runoff generation and a high erosion hazard. A prior slope stability risk assessment prepared for the UCSF Parnassus Heights campus site noted that on-site soils were thin over primarily chert bedrock of the Franciscan formation and typically measured a few feet or less in thickness.

The Reserve's predominantly fine to coarse-grained loam soils are relatively shallow and occupy moderate to steep slopes. These soils are susceptible to erosion, particularly when exposed to concentrated surface flow or when established vegetation is disturbed or removed. Under existing land use conditions, infrequent mass wasting processes pose the greatest risk for erosion and downstream sedimentation, although erosion along steeper hiking trail segments within the Reserve can occur during more intense rainstorms. The March 2017 field inspection of site drainageways and culvert inlets and outlets suggested the prevalence of relatively stable swales in the bulk of the Reserve's watersheds. No evidence was observed of any significant instability within the on-site portion of Woodland Creek. The more mildly sloping terraces adjoining the Woodland Creek channel provide some opportunities for deposition of sediments transported by upslope surface runoff. The March 2017 inspection showed some minor sedimentation along roadway gutters, but all catch basin inlets were clear of obstructing debris.

[1] Flood zones are geographic areas defined by FEMA according to varying levels of flood risk. A 100-year flood zone would experience a flood once every 100 years.

Sediment yield from the Reserve is variable and corresponds in magnitude to the intensity of rainfall and antecedent soil moisture conditions in the site watersheds, as well as to local slope steepness and geomorphic features. Vegetation in the Reserve is a mix of native and non-native woodland and coastal scrub. The nearly continuous vegetal cover maintains relatively low rates of soil loss from the Reserve; however, there are some localized areas where frequent erosion occurs.

Water Quality

Section 303(d) of the 1972 federal Clean Water Act requires states to identify water bodies that do not meet water quality objectives and are not supporting their beneficial uses. Each state must submit a list of waters that are not meeting water quality objectives (303[d] list) to the USEPA every two years. In addition to identifying the water bodies that are not supporting beneficial uses, the list also identifies the pollutant(s) causing impairment and establishes a priority for developing a control plan known as Total Maximum Daily Load (TMDL) to address the impairment. The TMDL process provides a quantitative assessment of water quality problems, contributing sources of pollution, and the pollutant load reductions or control actions needed to restore and protect the beneficial uses of an individual waterbody impaired from loading of a pollutant. The San Francisco Bay RWQCB (SFBRWQCB) is responsible for defining beneficial uses of surface waters and groundwater and identifying impaired water bodies (identified on the 303[d] list) in the study area.

The 2007 303(d) list of impaired water bodies cites the Central San Francisco Bay as impaired for pesticides chlordane, DDT, and dieldrin, and for dioxins, mercury (dissolved and sediment), furan compounds, exotic species, PCBs and selenium. Amendments to the 303(d) list in April 2017 apply a generalized "Toxicity" impairment listing for the Central San Francisco Bay. The Toxicity impairment covers all forms of pesticide and herbicide toxicity. The SFBRWQCB currently defines TMDLs for mercury, PCBs, and urban creeks pesticide toxicity. These TMDLs are not applicable to the proposed plan.

The quality of stormwater runoff under existing watershed conditions is likely excellent over most the Reserve, although no actual field data were available for review. Vehicle operation in the Reserve is limited and generally restricted to secondary roadway and driveway segments. Consequently, the Reserve is relatively free of automotive pollutants. Developed areas adjoining the Reserve include moderate- to high-density residential and campus land uses that typically yield elevated levels of stormwater contaminants, including heavy metals and pesticides.

Water Supply

Water is not currently supplied to the Reserve except for the residential and building uses, including the Aldea San Miguel Housing Complex, the Surge and Woods buildings, and the Chancellor's residence. No water is supplied for irrigation or vegetation management uses at this time. The SFPUC maintains a water tank within the Reserve.

Existing and Planned Water Supply

The SFPUC supplies water to the entire City and County of San Francisco, including UCSF campuses, as well as customers in Santa Clara, Alameda, San Mateo, and Tuolumne Counties. San Francisco owns and operates the Hetch Hetchy Regional Water System, which provides the delivery system for much of the drinking water SFPUC customers use. About 85 percent of the water delivered to SFPUC customers comes from Tuolumne River water stored in Hetch Hetchy Reservoir in the Sierra Nevada, and the remaining 15 percent comes from runoff in the Alameda and Peninsula watersheds captured in reservoirs located in San Mateo and Alameda Counties, supplemented with local groundwater and recycled water.

SFPUC serves water to both retail and wholesale customers, with about one third of its water supplies for retail customers (primarily located in San Francisco). The average annual supply of Regional Water System water available for retail customers through 2018 is 81 mgd. By the end of 2018, SFPUC will need to reevaluate water supply needs and supply options. Groundwater and recycled water accounts for a small portion of SFPUC water supplies as shown in Table 4.9-1.

Table 4.9-1 Retail Supplies

Retail Supply	Actual Supply (mgd)	Projected Supply (mgd)	
	2015	2020	2030
Regional Water System	67.7	70.5	73.2
Groundwater	2.2	5.0	5.0
Recycled Water	0.2	1.9	3.9
TOTAL	**70.1**	**77.4**	**82.1**

Source: (SFPUC 2016)

Existing and Projected Water Demand

Total water consumption and per capita water use has generally been declining since the mid-1970s. Retail demand in 2015 reached a historic low compared to previous years, as shown in Table 4.9-2. Water demand projections for 2015 were 15 percent higher than real demand. The decrease in demand was likely due to water conservation measures implemented during the multi-year drought.

Table 4.9-2 Retail Demands

Retail Sector	Actual Demand (mgd)			Projected Demand (mgd)	
	2005	2010	2015	2020	2030
In-City	81.5 [a]	73.6 [a]	65.6	72.5	77.3
Suburban	5.2	4.1	4.5	5.0	5.0
TOTAL	**86.7**	**77.7**	**70.1**	**77.5**	**82.3**

Note:

[a] Includes groundwater customers.

Sources: (SFPUC 2011, SFPUC 2016)

4.9.3 Regulatory Considerations

University of California

Sustainable Practices Policy

The Sustainable Practices Policy is a system-wide commitment to minimize the University's impact on the environment and reduce the University's dependence on non-renewable energy sources. The Policy promotes the principles of energy efficiency and sustainability in nine areas, including sustainable water systems. The applicable goal in the Policy, which is stated in the Annual Report on Sustainable Practices 2016, is (University of California 2016):

- Locations within the UC system will reduce growth-adjusted potable water consumption 20 percent by 2020 and 36 percent by 2025, when compared to a three-year average baseline of FY2005/06, FY2006/07, and FY2007/08.

UCSF

UCSF 2014 LRDP

The 2014 LRDP does not include goals, policies, or objectives that are applicable to hydrology and water quality impacts for the proposed plan.

Water Action Plan

The UCSF 2014 Water Action Plan is the blueprint for attaining the Policy's goal of 20 percent reduction in potable water consumption per capita by 2020. The Water Action Plan identifies projects, such as reducing potable water consumption for irrigation, and projected water reductions associated with projects (UCSF 2014a).

Federal

The federal Water Pollution Control Act (commonly referred to as the Clean Water Act) of 1972, as amended in 1987, prohibits the discharge of pollutants into waters of the U.S. unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. Section 402(p) of the 1987 amendments established a framework for regulating municipal, industrial and construction stormwater discharges under the NPDES program. In San Francisco, NPDES permits are issued through the State Water Resources Control Board (SWRCB) and the SFBRWQCB.

Section 404 of the Clean Water Act regulates the discharge of fill into Waters of the U.S., including adjacent wetlands. Filling and/or disturbing wetlands requires a Fill Permit issued by the USACE. Channel maintenance activities such as streambank protection and construction of outfall structures are routinely covered by Nationwide Permits, while more significant disturbance typically requires more substantial regulatory involvement and oversight, including approval of adequate impact mitigation.

As described under Water Quality above, Section 303(d) of the Clean Water Act requires states to identify water bodies that do not meet water quality objectives and are not supporting the beneficial uses of the water body. Each state must submit an updated list, called the 303(d) list, to the USEPA every two years. In addition to identifying the water bodies that are not

supporting beneficial uses, the list also identifies the pollutant or stressor causing impairment and establishes a schedule for developing a control plan to address the impairment. States are required to prioritize impaired water bodies for development of TMDLs. TMDLs are defined for the Central San Francisco Bay as previously described. Discharge into impaired water bodies generally can require additional permitting and mitigation procedures.

State

Porter-Cologne Water Quality Control Act

The quality of surface waters in San Francisco Bay and the territorial waters of the Pacific Ocean, as well as groundwater, are also regulated under provisions of California's Porter-Cologne Water Quality Control Act, which was enacted in 1969 to maintain water quality in California. The Porter-Cologne Water Quality Control Act, Water Code Section 13260, requires that "any person discharging waste, or proposing to discharge waste, within any region that could affect the 'waters of the State' file a report of discharge" with the appropriate Regional Water Quality Control Board. Waters of the State, as defined in the Porter-Cologne Act (Water Code Section 13050(e)), are "any surface water or groundwater, including saline waters, within the boundaries of the state."

In California, the SWRCB and the nine RWQCBs issue NPDES permits. Communities with populations over 100,000, high-risk industries identified by the USEPA, and construction projects of one or more acre must obtain an NPDES permit under NPDES Phase I regulations. Consequently, developments, redevelopments or construction disturbance of one acre or more require the filing of a Notice of Intent, Stowmwater Pollution Prevention Plan (SWPPP), and other compliance-related documents with the SWRCB, as well as the appropriate permit fee.

Section 1602 of the State Fish and Game Code vests permitting authority to CDFW for any activity that will divert or obstruct the natural flow or change the bed, channel, or bank of any river, stream, or lake or proposing to use any material from a streambed. Typically, CDFW will take jurisdiction over small creeks and drainageways with defined bed and banks. The notification requirement generally applies to any work undertaken within the annual high water mark of a wash, stream, or lake that contains or once contained fish and wildlife, or supports riparian vegetation.

Local

Regional Water Quality Control Plans

The Reserve is within the jurisdictional drainage area boundaries referenced in the Water Quality Control Plan for both the San Francisco Bay Basin (Basin Plan) and the Water Quality Control Plan for Ocean Waters of California (Ocean Plan) (SFBRWQCB 2015, SWRCB and Cal EPA 2012). The San Francisco Bay Basin includes all watershed lands that drain directly to San Francisco, San Pablo, and Suisun Bays, as well as substantial portions of coastal Marin, San Francisco, and San Mateo counties. The Basin Plan is intended to protect and enhance water quality and the beneficial uses identified for the significant water bodies that receive

stormwater runoff from the Basin. The Ocean Plan applies to point source discharges to the territorial waters of the State outside of enclosed bays, estuaries, and coastal lagoons.

Control of Construction Site Runoff Ordinance and San Francisco Municipal Code
To reduce the discharge of pollution to the local storm drain system, the City adopted the Construction Site Runoff Ordinance in 2013. The SFPUC now manages the Construction Site Runoff Control Program to ensure that all construction sites implement BMPs to control construction site runoff.

Article 4.2 of the San Francisco Municipal Code, entitled "Sewer System Management," defines a development project as any activity that cumulatively disturbs 5,000 square feet or more of land (City and County of San Francisco 2011b). Additionally, projects that create and/or replace 5,000 square feet or more of impervious surface are required to prepare a Stormwater Control Plan (SCP) for on-site and off-site water quality maintenance that adheres to guidelines adopted by the SFPUC and the San Francisco Port Commission. These guidelines specify requirements pertinent to the selection, design, and maintenance of post-construction stormwater BMPs. While the stormwater ordinance would generally be applicable to the plan, an SCP would not be required because the plan does not include any increases in impervious surfaces.

A land-disturbing activity is considered in violation of Sections 146 – 146.11 of Article 4.2 if eroded sediment has been deposited onto adjacent properties, a public right-of-way, a publicly controlled wetland, or the sewage system.

4.9.4 Significance Standards and Methodology

Significance Criteria

Impacts of the proposed plan on hydrology and water quality would be considered significant if implementation of the plan would exceed the following standards of significance, in accordance with Appendix G of the State CEQA Guidelines:

1. Violate any water quality standards or waste discharge requirements;
2. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted);
3. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on or off site;
4. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site;

5. Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
6. Otherwise substantially degrade water quality;
7. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
8. Place within a 100-year flood hazard area structures that would impede or redirect flood flows;
9. Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam; or
10. Cause inundation by seiche, tsunami, or mudflow.

One additional criteria from Utilities and Service Systems is addressed here:

11. Have sufficient water supplies available to serve the plan from existing entitlements and resources, or are new or expanded entitlements needed.

The Initial Study for the proposed plan determined that the plan's effect on erosion and surface runoff from the alteration of drainage patterns on the Reserve as well as the potential for proposed activities to create or contribute runoff or polluted runoff should be evaluated in the EIR. These topics are analyzed in this section. Water supply for future irrigation, if needed, is also addressed in this section.

Issues Adequately Addressed in the Initial Study

The IS for the proposed plan found that implementation of the plan would have (1) no impact on water quality standards; waste discharge requirements; housing or structures within a 100-year floodplain; or flooding or inundation by seiche, tsunami, or mudflow; and (2) a less than significant impact on groundwater supplies and other impacts on water quality. The IS also found that the proposed plan would have no or a less than significant impact on all significance criteria under Utilities and Service Systems, except for those related to water supplies available to serve the plan from existing entitlements and resources. These issues are not discussed further in this section.

Analysis Methodology

Overview

Impacts addressed in this section cover changes in stormwater runoff flow and volume within and off the Reserve, as well as changes in mobilized sediment amounts (known as sediment yield) that could impact downstream uses and the storm drain system surrounding the Reserve. Modeling methods were used to reasonably estimate these changes in stormwater flow and volume and sediment yield. The impact assessment first includes a description of how vegetation management activities could affect drainage patterns and sediment yields, followed by a discussion of the modeling results for Phase I and relative results for the remaining phases of plan implementation.

Assumptions and Modeling Limitations

Several assumptions were made to conduct the modeling. Assumptions were based on knowledge of the proposed vegetation management activities, the areas of disturbance, the type of cover that would remain after vegetation management treatments are implemented, and the regrowth of treatment areas. The parameters values assigned in the modeling were watershed-specific and approximated the vegetation types, densities and treatment conditions identified in the Plan. Post-plan soil and cover complexes, including prescribed erosion control actions, were simulated using similar descriptors referenced in the hydrograph and sediment yield models. The interpretation of the existing and treated site conditions, and the hydrologic and sediment yield modeling were conducted by expert hydrologist Bill Vandivere of Clearwater Hydrology. The modeling represents the worst-case scenario, which would occur at approximately the end of Year 2 of plan implementation when the most areas would be disturbed and before that disturbance is countered by regrowth. The assumptions and limitations of the modeling effort are described in Appendix 4.9 of this EIR.

Hydrograph Modeling

For this analysis, pre- and post-plan peak flow rates and runoff volumes for the delineated Reserve watersheds were assessed. Due to the suite of vegetation management actions that could be employed, the flood hydrograph package HEC-HMS, developed by USACE, was chosen for the simulation of rainfall and runoff characteristics. HEC-HMS includes a Soil Conservation Service (now NRCS) unit hydrograph rainfall-runoff option, which allows for the modeling of different soil and land use types, vegetation condition, and land management actions, such as land clearing, mulch application, and grading practice, where applicable.

The vegetation management activities described in the plan do not constitute a typical "construction project." All activities would occur in an unbuilt environment and the plan would not include, nor would it be subject to provisions of, new drainage. Of primary concern are any increases in stormwater flows and increases in drainage that could impact downstream (i.e., at the base of Mount Sutro) stormdrains, streets, and residences on a regular basis. A 5-year, 24-hour rainstorm event was modeled. The City's drainage design guidelines require that this storm event be modeled for projects that entail new development. While not directly applicable because the plan would not include the creation of any new drainage systems or development, this storm event was modeled to give a sense of a maximum impacts. The 5-year, 24-hour storm event could reasonably occur during Phase I of the plan, which is five years long. Detailed modeling assumptions, input parameter values, and computed peak flows and runoff volumes are included in Appendix 4.9.

Sediment Yield Calculations

Implementation of the plan would alter the areal coverage and condition of a significant portion of the Reserve, potentially increasing the sediment yield at the downslope watershed outlets. The Modified Universal Soil Loss Equation (MUSLE) was used to compute the pre- and post-Year 2 watershed sediment yields. The MUSLE is an event-based equation, utilizing the parameters of the general Universal Soil Loss Equation and watershed peak flow rate and runoff volume to compute sediment eroded from the landscape and delivered to the watershed

outlet. Use of the MUSLE allowed the assessment to be linked directly to the peak flow and runoff volume results of the event-based HEC-HMS hydrograph modeling. The detailed parameters and equations used for the modeling are provided in Appendix 4.9.

4.9.5 Impacts

Impact Hydrology-1: The proposed plan could substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on or off site.	Significance Determination
	Less than significant with mitigation

Vegetation Management Activities

Overview

Vegetation management activities would result in modification to the hydrologic condition of the 13 Reserve watersheds. The impacts would accrue primarily from the activities associated with forest treatments, non-native brush and vine removal, and low branch pruning and plantings for stand regeneration. No physical alteration of the one existing drainageway in the Reserve, Woodland Creek, is proposed under any of the forest treatment activities, except for potential planting of native riparian vegetation in or near the creek bed. Woodland Creek may be subject to the CDFW 1602 Lake and Streambed Alteration requirements if vegetation management activities impact the flow, bed, bank, or riparian vegetation. All treatment activities would involve targeted at-ground and above-ground disturbance and would not result in any topographic modification, except potentially for landing areas. Two existing trail segments would be widened to a minor extent to allow for safe equipment passage. However, these trail segments are positioned along existing ridgelines and would not create any significant changes in local drainage patterns. No ground disturbing activities would occur during significant storm events in order to minimize sedimentation of stormwater runoff. General impacts on erosion and generation of sediment yield for each of the vegetation management activities are described here. The following section describes the composite impacts of these activities per phase.

Forest Treatments

Forest treatments could result in changes to existing drainage patterns, which could in turn result in erosion and siltation or sedimentation off-site. Forest treatments involving land-altering activities include the creation of landing areas and widening of trails. These areas would remain tree- and brush-free, but would be covered with chip and slash. These areas would remain in the same un-vegetated condition for the duration of the plan. Table 4.9-3 provides a summary of the results of the flood hydrograph modeling conducted for the plan area for the 5-year, 24-hour storm event under the pre- and post-Year 2 conditions. As shown in the table, the post-Year 2 condition would result in reductions in both peak flow rates and runoff volumes for each of the Reserve watersheds. The reductions range from 0 to 13 percent for peak flows and 0 to 7 percent for runoff volumes. Reductions were primarily seen because, in the model, the mulch and small tree/brush condition of the cleared areas more effectively

slowed water flow than trees because the mulch and seedlings are closer to the ground than a tree canopy for a woodland condition.

Table 4.9-3 Pre-Plan and Post-Year 2 Watershed Conditions

Watershed	Area (square miles)	Pre-Plan Peak Runoff (cubic feet per second)	Post-Year 2 Peak Runoff (cubic feet per second)	Pre-Plan Runoff Volume (acre-feet)	Post-Year 2 Runoff Volume (acre-feet)
1	0.021	3.34	3.31	1.44	1.43
2	0.001	0.12	0.11	0.05	0.05
3	0.022	2.94	2.87	1.44	1.42
4	0.004	0.59	0.51	0.25	0.25
5	0.000	0.07	0.06	0.03	0.02
6	0.003	0.46	0.43	0.20	0.19
7	0.003	0.42	0.36	0.20	0.18
8	0.002	0.32	0.31	0.15	0.15
9	0.014	1.72	1.66	0.89	0.87
10	0.008	1.03	1.01	0.49	0.48
11	0.010	1.41	1.35	0.65	0.63
12	0.005	0.68	0.66	0.30	0.30
13	0.005	0.80	0.78	0.35	0.35

Although peak runoff and runoff volumes would be reduced after Year 2 of plan implementation, sediments loads would increase as shown in Table 4.9-4. The worst-case increase in the total sediment yield for the 5-year, 24-hour storm event was computed to be 19.4 tons, or a 29 percent increase. While the modeling generally accounts for variations in the topography and negates the need to apply a sediment delivery factor (i.e., efficiency of delivery), small undulations in the topography, particularly along the mildly sloping ridgeline areas, are likely to trap some of the sediment entrained in runoff. This condition would reduce the computed sediment yields from the Reserve watersheds for both the pre- and post-Year 2 conditions by 10 to 20 percent.

Sediment transport would likely increase after forest treatments because more areas of bare ground (e.g., landing areas) would be present than before implementation of forest treatments. Storm events could mobilize sediment in landing areas, although landing areas would be fairly level. Seed tree and group selection areas could vary in number and size over the life of the plan. Seed tree and group selection activities would involve removal of most trees and understory in areas up to 1 acre in size. The treated areas would be covered in a few inches of mulch or chip and replanted with small seedlings of eucalyptus and potentially native or other plants. Seed tree and group selection areas would be mainly located on slopes. Trees would be removed but the trunk base and roots would be left in place, acting as a soil binder for several

years until the roots decay. Leaving root systems in place would provide some protection from erosion and sedimentation, but since the treatment areas are on slopes and would generally be

Table 4.9-4 Sediment Yields for the 5-year, 24-hour Storm Event at the End of Year 2

Watershed	Area (acres)	Pre-Plan Y (tons)	Post-Plan Y (tons)	Difference Y (tons)
1	13.36	15.63	17.92	2.29
2	0.47	0.10	0.13	0.03
3	14.21	19.90	25.55	5.65
4	2.49	1.61	1.68	0.07
5	0.26	0.04	0.06	0.02
6	1.93	0.60	0.96	0.36
7	1.94	0.97	2.09	1.12
8	1.50	0.85	1.13	0.28
9	8.87	6.16	9.00	2.84
10	4.83	3.70	4.61	0.91
11	6.44	8.86	12.43	3.57
12	2.99	2.89	3.62	0.73
13	3.46	4.96	6.44	1.48
Total		**66.27**	**85.64**	**19.37**

open to undampened rainfall, erosion and sediment loss could still occur at a higher rate than currently experienced. The creation of landing areas and access roads, and the implementation seed tree and group selection treatments could have a significant impact on sedimentation during storm events.

A SWPPP would be required because, as a whole, the plan would impact more than 1 acre of land. Specific additional measures would need to be taken, however, to ensure that sediment mobilized off the Reserve from landing areas and forest treatment areas would not be greater than current conditions. **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** requires the design and implementation of sediment control and retention BMPs to reduce the amount of mobilized sediment or entrap sediment before it leaves the Reserve and ensure no net increase in sediment reaching stormdrains surrounding the Reserve due to plan activities. Approximately 19 tons of sediment would need to be entrained using BMPs to not cause an increase in downstream siltation or sedimentation during a 5-year, 24-hour storm event (refer to Table 4.9-4). BMPs could include use of straw waddles below seed tree and group selection treatment areas; creating sediment collection basins in the treatment areas and landing areas, if feasible; and/or increasing mulch or other soil cover to reduce soil exposure. With implementation of BMPs identified in the SWPPP and as specified by

MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection, impacts would be less than significant.

Management of Tree Risk and Defensible Space
Removal of hazard trees would not generate any substantial impacts associated with erosion and off-site siltation. Hazard trees may be removed but would generally be removed individually and would be cut, leaving the stump and roots in place. Since this activity only creates very small open areas, not unlike when an individual tree dies and falls, erosion and sedimentation is not anticipated to substantially increase as a result of this activity. Impacts from management of tree risks and defensible space on erosion and sedimentation would be less than significant.

Native Plant Restoration
Native plant restoration areas could occur throughout the Reserve and would involve minimal ground disturbance since restoration would generally involve planting by hand. The planting of new trees and shrubs would have a positive effect on soil binding and soil protection and would not increase erosion or off-site siltation. Impacts would be less than significant.

Maintenance of Trails and Public Access
Trail corridors are already maintained within 5 feet to 10 feet to either side of existing trails, and this practice would be continued under the plan. Felled logs would be used where necessary to shore-up trail margins to control runoff. Impacts related to changes in drainage patterns from trail maintenance would be less than significant.

Comparison of Impacts Across Phases

Phase I
Table 4.9-4 shows the rates of sediment yield computed for Phase I treatments applied to the Reserve during the modeled 5-year, 24-hour storm event. The post-Year 2 estimates show an increase of up to 29 percent in Reserve sediment yield for that storm event; this level of increase is less than typical post-Year 2 conditions at residential and development sites. The MUSLE-predicted sediment yields would likely overstate the actual yields during the modeled event by 10 to 20 percent due to local microtopographic variations along the broad ridgeline areas. Also, the 5-year, 24-hour storm event is expected to only occur once during Phase I, which is five years long. Most normal storms would generate much less sediment yield.

Phase I treatments applied to the steeper slopes adjoining drainageways, including Woodland Creek, could trigger hillslope/creekbank instability if insufficient care is taken to minimize disturbance of the soil surface within the immediate drainage area, or if cut pieces of trunk roll downslope into a flow path and are not retrieved. While the sediment yields modeled for Phase I, Year 2, represented worst-case conditions, the potential impact on creek stability and on-site and downstream sedimentation could be significant. Development and implementation of a SWPPP and specifically designed BMPs for sediment retention and containment, as specified in **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection**, would reduce impacts to less than significant levels. By Year 3 of the Phase

1 treatments, additional low canopy cover and rooting accompanying planted tree seedlings would begin to return the treated areas to an "undisturbed" hydrologic condition, which would further lower site sediment yields.

Phase II
Phase II forest treatments would include similar rates of dead/dying tree removal as Phase I over all forest types. The same gradual process of forest treatments and brush and vine removal would apply to Phase II as were conducted in Phase I. By Phase II, most of the seed tree and group selection treatment areas would be expected to have grown back a sufficient amount to provide protection against erosion in those areas. New areas cleared would be susceptible in the same way as described for Phase I. Impacts associated with Phase II sediment yield were not modeled, but for the reasons just discussed, are expected to be similar or less than those described for Phase I. Implementation of the SWPPP and **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** would still be required and would reduce impacts to less than significant.

Phase III
Phase III treatments would include similar rates of dead/dying tree removal as Phases I and II over all forest types. New areas would be defined for seed tree and group selection. Surface treatments (mulch, erosion control blankets) would be employed to minimize erosion and sediment risk in those seed tree and group selection areas. As for Phases I and II, the potential impact of Phase III treatments on drainage patterns and on-site and downstream sedimentation would be potentially significant. Implementation of the SWPPP and **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** would still be required and would reduce impacts to less than significant.

Impact Hydrology-2: The proposed plan could substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site.	**Significance Determination**
	Less than significant with mitigation

Vegetation Management Activities

Forest Treatments
Vegetation management activities would result in some changes in stormwater peak flow and runoff volumes. Flow rates and runoff volumes would be affected by the change in vegetation cover associated with the creation of landing areas and trail widening, and from seed tree and group selection treatments. These activities would result in most trees and understory removed in areas up to 1 acre in size. Seed tree and group selection treatment areas would be planted with seedlings and covered in chips or mulch, which would slow runoff flows in these areas to a greater extent than the existing tree and understory cover. Landing areas would similarly be covered in chip and would generally be level. Nuisance flooding could still occur in situations where organic material or other debris accumulated at culvert or storm drain inlets and obstructed stormwater evacuation. Cut trees would be felled and left in place, and chip or slash

would be left on-site. Given the slopes in the Reserve and in areas where seed tree and group selection treatments could occur, slash, logs, and chip could flow downstream and clog stormdrains. **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** would be implemented, which includes measures to ensure that larger materials and chip do not block stormdrains. Impacts from forest treatments would be less than significant with mitigation.

Management of Tree Risk and Defensible Space, Native Plant Restoration, and Maintenance of Vegetation along Trails and Public Access

Management of tree risks and defensible space, planting of native species, and maintenance of trails would not significantly affect the stormwater flow rates or volumes in drainages because these activities would be very localized. Restoration activities may include the planting of riparian native species in or near the banks of Woodland Creek. If planting would occur, a 1602 permit from CDFW may be required. The planting of more native riparian vegetation, however, would have a beneficial impact to slow and reduce stormwater flows and the sediment in those flows. Impacts would be less than significant.

Comparison of Impacts Across Phases of Work

Phase I

Table 4.9-3 provides a summary of the results of the flood hydrograph modeling conducted for the Reserve for the 5-year, 24-hour storm event under the pre- and post-Year 2 watershed conditions, which is the worst-case scenario condition during Phase I of the plan. As shown, the post-Year 2 condition would result in reductions in both stormwater peak flow rates and runoff volumes for each of the project watersheds. The reductions range from 0 to 13 percent for peak flows and 0 to 7 percent for runoff volumes. Reductions were primarily seen because, in the model, the mulch and small tree/brush condition of the cleared areas more effectively slowed water flow than trees because the mulch and seedlings are closer to the ground than a tree canopy in a woodland condition. The existing woodland understory may not be as accurately accounted for in the modeling and may further slow the stormwater flow for the existing conditions. Model limitations aside, the change in peak stormwater flows and runoff volumes would be insubstantial and less than significant.

Similarly, post-Year 2 runoff volumes would decrease by up to 7 percent compared to existing conditions. Lesser rainstorm events would yield reductions in post-project peak flows and runoff volumes, albeit proportionately lower due to the lower rainfall intensities typical of such storms.

The results of the modeling show a decrease in runoff volume and flow rates because, conceptually, woodland in good condition dampens flow rates and volumes less than brush in good condition. Since only a limited number of clearings (up to 1 acre in size) would be implemented for the Phase I seed tree and group selection method treatments, the bulk of the Reserve would remain in the same hydrologic condition. Individual tree removals would also result in minimal reduction in the overall tree canopy, given the height of the remaining Reserve trees. The combined effects of the treatments on the hydrologic character of drainage

and peak flows and runoff volumes would therefore be less than significant for Phase I implementation.

Flooding is not currently a significant issue within the Reserve and would remain at or below existing levels with implementation of activities identified in Phase I. Nuisance flooding would continue to occur only in situations where organic material or other debris accumulated at culvert or storm drain inlets to obstruct stormwater evacuation. **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** would reduce this impact to less than significant.

Phase II

Based on an extrapolation of the Phase I conditions and the rates of tree removals and plantings shown in Table 3.5-3 of Section 3: Project Description, Phase II impacts on peak flow rates, runoff volumes and flooding are expected to be similar to Phase I, albeit attended by reductions less than those computed for Phase I treatments. The gradual replacement of stressed forest stands by pockets of brush in good condition, including new eucalyptus trees and native tree and brush species, and mulch and chips applied to areas disturbed by forest treatment area would maintain post-project peak flows and runoff volumes at levels equal to or less than pre-plan conditions. A multi-story forest canopy would provide the maximum absorptive capacity for rainfall because the canopy and the litter/duff layer that develops atop the ground surface would mute the erosive energy of rainfall at the ground surface and would increase the surface moisture storage capacity (i.e., rainfall abstraction). Increasing these rainfall abstractions would reduce runoff volumes and peak flow rates. Thus, Phase II impacts on peak flow rates, runoff volumes and flooding would be even less than those in Phase I. Impacts would be less than significant.

Nuisance flooding would continue to occur in situations where organic material or other debris accumulated at culvert or storm drain inlets to obstruct stormwater evacuation and may result in a significant impact. **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** would reduce this impact to less than significant.

Phase III

Based on an extrapolation of the Phase I and Phase II conditions and the rates of tree removals and plantings cited in Table 2.5-3, Phase III impacts on peak flow rates, runoff volumes and flooding are expected to be similar to those described for Phase II. As indicated above for the developing conditions under Phase II, expansion of healthier, multi-story forest canopy through increasing portions of the Reserve would improve the storage of soil moisture in the watershed and reduce peak flow rates and runoff volumes in the Reserve watersheds. Phase III impacts on peak flow rates, runoff volumes and flooding would be less than those for Phase I and II and less than significant.

Nuisance flooding would continue to occur in situations where organic material or other debris accumulated at culvert or storm drain inlets to obstruct stormwater evacuation and may result

in a significant impact. **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** would reduce this impact to less than significant.

Impact Hydrology-3: The proposed plan could create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.	**Significance Determination**
	Less than significant with mitigation

Vegetation Management Activities

The soils in the plan area, which excludes the Nike SF-89 site, are not anticipated to contain contaminants since the Reserve has been, largely, an unmanaged natural area for over a century and has not experienced any development since the 1970s. All above-ground facilities associated with the Nike SF-89 site were removed in the 1970s. Potential contamination may remain on the Nike SF-89 site. The proposed plan would not involve ground-disturbing activities within the area where contamination could be found. Potentially polluted runoff from the Nike SF-89 site would not increase over existing conditions.

As described under Impact Hydrology-1 and Impact Hydrology-2, plan activities could increase sediment yields but the volume and peak flow of stormwater that could entrain this sediment would decrease compared to existing conditions. Sedimentation associated with plan activities is not expected to result in an increase in polluted runoff compared to existing conditions. The decrease in runoff as a result of plan activities could minimize sources of polluted runoff, if there is any on the Nike SF-89 site. The proposed plan could result in increased erosion of soil and off-site sedimentation, as described in greater detail above, and a potentially significant impact. Sediment in the form of total suspended solids can be considered a pollutant. Implementation of the SWPPP and **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection**, which would require implementing BMPs and other soil and sediment containment methods, would reduce total suspended solids that could reach the stormdrain systems to acceptable levels. Impacts would be less than significant with mitigation.

Comparison of Impacts Across Phases

Refer to the analysis of sediment and flows by phase under Impact Hydrology-1 and Impact Hydrology-2. Impacts on stormwater drainage systems would be minimized through the application of BMPs as defined in the SWPPP and **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection**. Impacts would be less than significant with mitigation.

Impact Hydrology-4: The proposed plan could require new or expanded water supply entitlements.	Significance Determination
	Less than significant

Vegetation Management Activities

Irrigation of seedlings and native understory plants would not occur as part of the proposed plan unless plants fail to thrive after the first few years of implementation. If needed, backpack sprayers would be used to provide plants with additional water to encourage survival. Other options for a water source may include the SFPUC's water tank in Rotary Meadow or other nearby potable water sources and distributing water using temporary, aboveground piping or a temporary water storage tank at the summit that could be used to fill watering trucks. No permanent storage structures would be built in association with the plan.

Water consumption for all UCSF facilities was calculated as 1.00 mgd for 2015, which comprises approximately 1 percent of retail demands for SFPUC (UCSF 2014b). Using a conservative assumption, the proposed plan could require up to 6,000 gallons[2] of water a year, or an average of 16 gpd, to water newly planted trees (Grant 2016). The amount of supplemental water that may be required would be minimal, comprising substantially less than a 1 percent increase in SFPUC's average daily consumption.

The potential requirement for supplemental water would not necessitate expanded water supply entitlements. The impact would be less than significant. As incorporated into the proposed plan by AIR-LRDP-1: Best Management Practices for Controlling Particulate Emissions, water would be applied twice a day for dust control during grading activities and on actively used unpaved areas, such as bare landing areas and access routes. Where visible mud or dirt track-out on public roads is visible, a wet power vacuum street sweeper would be used. These practices would increase the amount of water required by up to 132,000 gallons[3] a year during implementation of the 20-year plan. The total amount of supplemental water that may be required would still comprise substantially less than a 1 percent increase in SFPUC's daily consumption. The impact would remain less than significant.

The University of California Sustainable Practices Policy has a goal for all campuses, including UCSF, to reduce potable water consumption by 20 percent per capita by 2020. Water consumption per campus user[4] decreased over 4 percent from the 2007-2010 benchmark to 2013.

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2 Calculated assuming eucalyptus seedlings could require 2 gallons of water, once a week, during the dry months of May through October, for the first 2 years of life.

3 Calculated assuming a 2,000-gallon water truck used every work day for application only during the dry months of August through October.

4 Weighted campus user is defined as: Housing + (0.75 x (Students + Full-Time Campus Staff) + 0.5 x Part-Time Campus Staff)

Given that the 378 gpd[5] average required for the proposed plan comprises a 0.04 percent increase in UCSF's daily consumption, this demand for water would not considerably affect UCSF's attainment of this goal. Optionally, UCSF could investigate ways to use non-potable water such as through the use of temporary stormwater collection tanks kept on-site seasonally. No permanent structures are allowed within the Reserve.

Comparison of Impacts Across Phases

Water consumption would vary throughout plan implementation, depending upon the status of newly planted seedlings and drought conditions in the area. Water would not be applied for the first few years (Phase I). The seedlings planting during the first few years of Phase I, would be monitored to identify whether watering is necessary. An average of 16 gpd may be applied throughout plan implementation, after the first few years, if plants are not thriving. It is not possible to foretell whether watering would be necessary and by how much watering would vary during each phase. The impact on existing water supply entitlements; however, would be less than significant for all phases. As required by AIR-LRDP-1 Best Management Practices for Controlling Particulate Emissions, areas with exposed soils would be watered during active use for plan activities and a wet power vacuum street sweeper would be used as necessary. The water required to fulfill this measure would not appreciably vary between phases. The impact would remain less than significant.

	Significance Determination
Impact Hydrology-5: The proposed plan could result in significant impacts on water resources in combination with past, present, and probable future development in the cumulative analysis study area.	**Less than significant contribution with mitigation**

Geographic Scope

The geographic extent for this cumulative analysis is defined as the watersheds located within the Reserve. Thirteen watersheds were delineated and are identified in Figure 4.9-1. These watersheds represent both the hydrologic and administrative units for water quality control and protection of beneficial uses for water resources in the plan area.

Cumulative Analysis

Drainage Pattern Alterations

Construction and operation of several cumulative projects (Building Demolition [#1], Surge, Woods and EHS Open Space Restoration [#8], Mount Sutro Reserve Improvements [#9], Kirkham Project [#15], Overlook Project [#16], and SNRA Management Plan [#17]) would change the topography in the same watersheds and downstream areas that would be affected by the proposed plan. Ground-disturbing activities could temporarily or permanently change drainage patterns, affecting areas downstream from the plan area. Construction activities and

[5] Calculated assuming 138,000 gallons per year would be used for irrigation and dust suppression.

tree removal as part of the cumulative projects could expose bare soil and increase runoff as well as sediment load. Debris from construction and vegetation removal activities implemented as part of the cumulative projects could clog storm drainage features, leading to flooding downstream of the plan area. The cumulative impact on downstream flooding and sedimentation from implementation of cumulative projects could be significant.

Preparation of landing areas and access routes would change the topography and expose bare soil within the plan area. Forest treatments would temporarily expose bare soils. Stormwater runoff volume and flow rate would decrease with implementation of the plan; however, sediment yield and transport would increase. The proposed plan's contribution to a significant cumulative impact on siltation could be considerable if it were to increase the sediment amounts that reached storm drains around the Reserve. A SWPPP would be required and **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** requires the design and implementation of sediment control and retention BMPs to reduce the amount of mobilized sediment or to entrap sediment before it leaves the Reserve. Implementation of a SWPPP and **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection** would reduce sedimentation such that the plan activities would not increase the amount of sediment that reaches the storm drains beyond existing conditions. The proposed plan's contribution to potentially significant cumulative impact from sedimentation would be less than cumulatively considerable with mitigation.

Vegetation management activities of the plan would result in a decrease in stormwater flows and off-site flows; therefore, the plan would not contribute to cumulative impacts associated with flooding from increased stormwater flows.

Increased debris due to plan activities and construction activities of cumulative projects could clog storm drains and cause localized flooding, resulting in a significant cumulative impact. The proposed plan's impact would be mitigated from implementation of BMPs as part of the SWPPP and **MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection**, which would entrap debris before reaching the stormdrains. With mitigation, plan implementation would not contribute to an otherwise significant cumulative impact related to localized flooding.

Increased or Polluted Runoff

Use of vehicles and equipment during construction or operation of the cumulative projects could release hazardous materials due to leaks or spills. Other sources of contaminants are not anticipated from implementation of the cumulative projects and the proposed plan. The quantity of pollutants from use of equipment and vehicles would be minimal and would not result in a substantial source of polluted runoff. None of the cumulative projects would disturb the areas within the Nike SF-89 site where contamination could remain. The potential cumulative increase in polluted runoff would be less than significant.

Water Supply

The water supply demands for many of the cumulative projects, primarily projects analyzed in the 2014 LRDP, were incorporated into SFPUC's 2015 water demand and supply plan. As described previously, water use has been less than projected in recent years. Though irrigation is not currently proposed, seedlings may be irrigated if they show signs of water stress or are not growing. The proposed plan may require up to 138,000 gallons of water a year for irrigation and dust control throughout plan implementation. This increased demand for SFPUC water would comprise less than 1 percent, a comparatively small quantity of water. The proposed plan may implement stormwater catchment to supply irrigation demands. The small increase in demand for water, even assuming all water would come from SFPUC, would not require new or expanded water supply entitlements. The proposed plan would not have a considerable contribution to a cumulative impact on water supply.

4.9.6 Mitigation Measures

MM Hydrology-1: Best Management Practices for Erosion Control and Water Quality Protection

Best Management Practices (BMPs) for erosion control and water quality protection shall be applied wherever the soil surface is disturbed by vegetation management activities, including trail widening, landing preparation and use, tree removal, and invasive brush and vine removal. BMPs shall be implemented prior to, during, and after annual vegetation management activities for erosion control and water quality protection as specified here. These measures should be incorporated into the SWPPP, but these measures may be altered, supplemented, or deleted during the San Francisco Bay RWQCB's review process, as it has final authority over the terms of the SWPPP.

Pre-Activity BMPs:

- For trail widening and landing preparation, install devices or structures to control runoff, which could include but are not limited to silt fencing, French drains or waterbars
- For seed tree and group selection treatment areas, install flagging to delineate treatment areas to minimize vegetation disturbance outside of the areas designated for treatment. As needed, such as on very steep slopes, install sediment transport barriers downstream (such as but not limited to coir logs) of the treatment areas to catch mobilized sediment and potentially chips or other slash and larger debris and maintain until seedlings have stabilized the area
- If coir logs are used, they should be embedded in the soil surface by 50 to 60 percent of their diameter and staked at close intervals to minimize slumping and localized failures
- For landing areas use gravel, logs, or other materials to prevent heavy equipment from settling down into forest soils and to reduce runoff

Activity BMPs:

- Sweep up loose soil and other debris tracked in on any paved areas at the end of each work day. Dispose of removed material at an approved off-site location
- Clean-up any spills immediately. If spills occur on earthen treatment sides or access trails, segregate the spill and remove both the spill material and the contaminated surface soil and dispose of at an approved off-site landfill for such material
- For downed trees, remove any large, loose slash material (such as loose limbs and branches or bark), as feasible, that could become mobilized in a big storm event
- After major storms, check sediment retention BMPs and clean and restore as needed

Post-Activity BMPs:

- For individual tree removal on steeper slopes, install coir logs or other equivalent methods, along the downslope grading perimeter to trap sediment, if erosion is observed post-removal
- Disturbed soil surfaces should be covered with 3 to 4 inches of wood mulch or weed-free straw

- Remove water bars or other water diversion structures and fill ruts; clear landing areas of excess debris once vegetation is established or it is determined that erosion and sedimentation is no longer occurring, and seed landing areas (per MM Aesthetics-1)

Woodland Creek

- Prohibit the removal of trees or other ground disturbance within 20 feet of Woodland Creek when the creek has flow
- Require directional felling away from the stream
- Immediately remove any logging debris from the stream and away from the banks
- Maintain sufficient ground cover along the stream to trap sediment

Locations: Areas of ground disturbance across the Reserve

Performance Standards:

- **Before Activities:** BMPs are designed
- **During Activities:** BMPs are installed, inspected, and maintained
- **After Activities:** N/A

4.9.7 References

City and County of San Francisco. 2011a. "Building Footprints - City and County of San Francisco GIS dataset." San Francisco Enterprise GIS Program, Department of Technology and Pictometry, Inc.

—. 2011b. "Public Works Code." Article 4.2. Sewer System Managment. August 31. https://law.resource.org/pub/us/code/city/ca/SanFrancisco/0-snapshots/S-38/PublicWorks.html.

ESRI. 2017. "Online GIS Vector and Raster Data."

Grant, Bonnie L. 2016. Eucalyptus Tree Watering: Information on Irrigating Eucalyptus Trees. Accessed April 27, 2017. https://www.gardeningknowhow.com/ornamental/trees/eucalyptus/eucalyptus-tree-watering.htm.

San Francisco Bay Regional Water Quality Control Board (SFBRWQCB). 2014. "Sanitary Sewer Improvement Program -- Status Report."

—. 2015. "Water Quality Control Plan (Basin Plan) for the San Francisco Bay Basin." March. http://www.waterboards.ca.gov/sanfranciscobay/basin_planning.shtml#basinplan.

San Francisco Public Utilities Commission (SFPUC). 2011. "2010 Urban Water Management Plan for the City and County of San Francisco." June.

—. 2016. "2015 Urban Water Management Plan for the City and County of San Francisco." June.

State Water Resources Control Board (SWRCB) and California Environmental Protection Agency (Cal EPA). 2012. "Water Quality Control Plan, Ocean Waters of California." California Ocean Plan. http://www.swrcb.ca.gov/water_issues/programs/ocean/docs/cop2015.pdf.

University of California, San Francisco (UCSF). 2017. "Mt Sutro Open Space Preserve GIS data."

—. 2014a. "Water Action Plan FY2013/2014."

—. 2014b. "Water Supply Assessment for the UCSF Long Range Development Plan." November.

University of California. 2016. "Policy Sustainable Practices." September 6.

Western Regional Climate Center (WRCC). 2016. San Francisco OceanSD, California -- Climate Summary. May 19. Accessed January 16, 2017. http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7767.

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APPENDIX 4.10

Noise Support Information

COMMUNITY NOISE SURVEY DATA

OVERVIEW

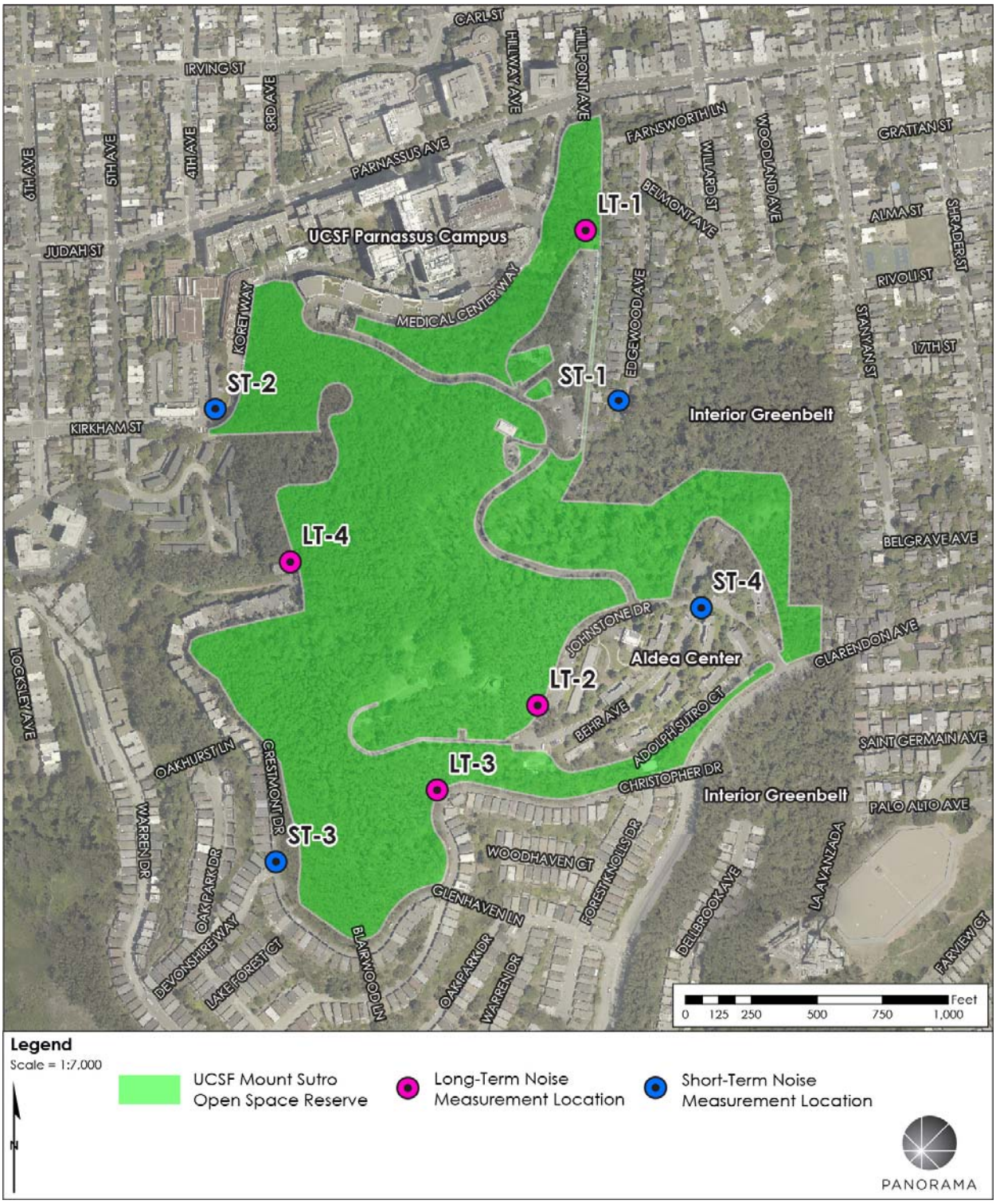
Table 4.10-1 Outdoor Ambient Noise Measurement Locations

Site ID	Location	Duration
Long-Term		
LT-1	Unnamed trail between Farnsworth Lane and Surge parking lot	49 hours
LT-2	Johnston Drive (West)	
LT-3	Crestmont Drive (East)	
LT-4	Crestmont Drive (North)	
Short-Term		
ST-1	Edgewood Tail Head	10 minutes
ST-2	Johnston Drive at Behr Ave (East)	
ST-3	Crestmont Drive at Devonshire Way (West)	
ST-4	Koret Way	

Sources: (Illingworth & Rodkin, Inc. 2017a)

APPENDIX 4.10
COMMUNITY NOISE SURVEY DATA

Figure 4.10-1 Noise Measurement Locations



Source: (Illingworth & Rodkin, Inc. 2017a)

APPENDIX 4.10
COMMUNITY NOISE SURVEY DATA

LONG-TERM MEASUREMENTS

Table 4.10-1 LT-1 Data

Date	Time	L_{max}	L_{01}	L_{10}	L_{eq}	L_{50}	L_{90}	L_{min}
27-Feb-17	12:00:00	59.2	55.6	54.0	53.2	53.1	52.3	52.1
27-Feb-17	13:00:00	58.2	55.4	54.1	53.4	53.3	52.4	52.1
27-Feb-17	14:00:00	63.1	58.6	56.1	54.7	54.1	53.2	52.6
27-Feb-17	15:00:00	58.0	55.8	54.8	54.0	53.9	53.2	52.6
27-Feb-17	16:00:00	60.3	56.8	55.0	54.2	54.0	53.2	52.9
27-Feb-17	17:00:00	61.0	56.2	54.7	53.9	53.7	53.1	52.8
27-Feb-17	18:00:00	69.5	60.9	55.7	54.7	53.8	53.1	52.6
27-Feb-17	19:00:00	61.4	56.7	54.7	53.8	53.6	53.0	52.4
27-Feb-17	20:00:00	58.1	55.2	54.3	53.4	53.3	52.8	52.2
27-Feb-17	21:00:00	57.5	54.2	53.5	52.8	52.7	52.2	52.0
27-Feb-17	22:00:00	58.5	54.3	53.2	52.6	52.6	52.1	51.8
27-Feb-17	23:00:00	57.6	53.7	53.2	52.4	52.5	52.0	51.6
28-Feb-17	0:00:00	54.9	53.1	52.9	52.2	52.4	51.9	51.6
28-Feb-17	1:00:00	64.5	54.9	53.4	52.8	52.6	52.1	51.6
28-Feb-17	2:00:00	60.9	55.3	53.6	52.9	52.8	52.2	51.6
28-Feb-17	3:00:00	58.8	55.2	54.1	53.1	53.0	52.3	51.8
28-Feb-17	4:00:00	62.1	55.9	53.7	52.7	52.6	51.9	51.4
28-Feb-17	5:00:00	62.0	58.0	55.9	54.8	54.7	54.0	51.8
28-Feb-17	6:00:00	80.5	60.1	55.2	55.0	53.5	52.6	52.2
28-Feb-17	7:00:00	75.9	60.6	54.8	54.6	53.3	52.4	52.2
28-Feb-17	8:00:00	59.3	55.4	54.1	53.2	53.2	52.3	52.1
28-Feb-17	9:00:00	64.9	58.0	54.8	53.6	53.0	52.2	51.9
28-Feb-17	10:00:00	62.5	55.7	54.2	53.2	53.0	52.3	51.8
28-Feb-17	11:00:00	60.5	55.4	53.8	52.9	52.8	52.1	51.8
28-Feb-17	12:00:00	70.9	57.3	53.8	53.4	52.8	52.2	51.9
28-Feb-17	13:00:00	66.3	56.8	54.5	53.8	53.6	52.9	52.2
28-Feb-17	14:00:00	64.9	58.2	55.4	54.6	54.3	53.3	53.0
28-Feb-17	15:00:00	67.0	58.7	56.3	55.1	54.8	53.6	53.1
28-Feb-17	16:00:00	73.5	60.6	55.9	55.0	54.3	53.4	52.8
28-Feb-17	17:00:00	59.1	55.2	54.2	53.5	53.6	53.0	52.2

Date	Time	L_{max}	L_{01}	L_{10}	L_{eq}	L_{50}	L_{90}	L_{min}
28-Feb-17	18:00:00	59.7	55.1	53.9	53.2	53.0	52.4	52.4
28-Feb-17	19:00:00	60.1	55.1	53.8	53.1	52.7	52.3	52.2
28-Feb-17	20:00:00	60.3	55.1	53.4	52.9	52.7	52.2	52.0
28-Feb-17	21:00:00	63.4	55.4	53.4	52.9	52.6	52.2	52.0
28-Feb-17	22:00:00	56.8	53.5	52.9	52.2	52.2	51.7	51.3
28-Feb-17	23:00:00	58.2	53.7	52.3	51.9	51.6	51.3	51.2
1-Mar-17	0:00:00	55.1	52.6	52.0	51.7	51.5	51.2	51.2
1-Mar-17	1:00:00	52.7	52.4	51.9	51.7	51.5	51.2	51.0
1-Mar-17	2:00:00	56.2	53.3	52.5	51.9	51.6	51.2	51.0
1-Mar-17	3:00:00	59.8	54.0	53.0	52.2	52.1	51.6	51.2
1-Mar-17	4:00:00	63.0	56.1	53.9	52.8	52.4	51.6	51.2
1-Mar-17	5:00:00	60.0	55.2	53.2	52.5	52.5	51.8	51.4
1-Mar-17	6:00:00	65.5	58.5	55.6	54.3	53.7	53.0	51.9
1-Mar-17	7:00:00	73.0	59.7	55.7	54.5	53.8	53.0	52.3
1-Mar-17	8:00:00	63.3	58.8	55.8	54.6	54.1	52.9	52.1
1-Mar-17	9:00:00	62.2	57.3	54.1	53.2	52.9	52.2	51.7
1-Mar-17	10:00:00	68.0	62.8	59.7	57.6	56.7	55.6	52.0
1-Mar-17	11:00:00	66.7	62.6	59.6	57.7	57.1	54.8	51.9
1-Mar-17	12:00:00	76.4	59.8	56.1	55.1	54.2	53.1	52.1

Source: (Illingworth & Rodkin, Inc. 2017a)

Table 4.10-2 LT-2 Data

Date	Time	L_{max}	L_{01}	L_{10}	L_{eq}	L_{50}	L_{90}	L_{min}
27-Feb-17	12:00:00	67.2	59.6	51.0	49.2	45.3	42.4	37.4
27-Feb-17	13:00:00	70.3	59.6	48.6	48.6	44.5	42.4	39.2
27-Feb-17	14:00:00	69.6	58.8	49.8	48.7	45.2	42.7	39.7
27-Feb-17	15:00:00	71.8	58.9	49.0	48.9	45.2	42.9	40.3
27-Feb-17	16:00:00	77.2	63.7	50.6	51.6	45.4	43.0	40.6
27-Feb-17	17:00:00	71.8	59.8	50.6	50.1	46.3	44.1	41.6
27-Feb-17	18:00:00	72.3	61.9	49.9	50.1	45.1	42.8	39.6
27-Feb-17	19:00:00	73.5	57.9	48.7	47.9	43.6	41.3	39.1
27-Feb-17	20:00:00	75.4	56.6	47.1	47.5	42.9	40.4	38.0

APPENDIX 4.10
COMMUNITY NOISE SURVEY DATA

Date	Time	L_{max}	L_{01}	L_{10}	L_{eq}	L_{50}	L_{90}	L_{min}
27-Feb-17	21:00:00	76.7	55.5	46.3	47.1	41.5	39.2	36.6
27-Feb-17	22:00:00	66.7	52.1	44.3	43.5	40.6	38.3	36.3
27-Feb-17	23:00:00	61.8	48.3	43.3	41.1	39.2	36.6	34.5
28-Feb-17	0:00:00	63.4	47.6	40.9	39.4	36.7	34.9	33.3
28-Feb-17	1:00:00	60.4	49.3	41.2	40.6	37.7	36.1	33.1
28-Feb-17	2:00:00	50.4	43.1	39.8	38.1	37.5	36.5	35.0
28-Feb-17	3:00:00	62.6	44.9	40.4	39.5	37.8	36.6	34.9
28-Feb-17	4:00:00	77.4	47.1	40.5	41.0	37.2	36.2	35.1
28-Feb-17	5:00:00	86.5	51.4	45.1	44.0	40.0	37.8	35.5
28-Feb-17	6:00:00	68.1	53.5	49.5	47.8	46.6	43.5	38.0
28-Feb-17	7:00:00	80.6	65.1	55.1	54.4	48.3	45.3	40.7
28-Feb-17	8:00:00	73.8	62.3	52.5	52.0	48.7	45.5	39.9
28-Feb-17	9:00:00	77.7	63.7	54.6	52.6	47.0	43.3	40.0
28-Feb-17	10:00:00	91.4	66.2	54.5	55.5	49.7	47.4	39.7
28-Feb-17	11:00:00	74.3	63.9	51.0	51.7	46.1	43.2	39.3
28-Feb-17	12:00:00	75.3	61.7	51.9	50.8	45.9	42.7	39.2
28-Feb-17	13:00:00	67.8	59.7	52.0	50.7	48.3	45.3	41.4
28-Feb-17	14:00:00	87.1	64.8	51.1	52.3	45.8	43.5	41.6
28-Feb-17	15:00:00	77.5	62.2	50.3	50.9	45.7	44.0	42.2
28-Feb-17	16:00:00	82.6	59.7	49.7	50.7	45.1	43.0	40.4
28-Feb-17	17:00:00	73.0	59.7	48.7	49.5	45.3	43.0	39.7
28-Feb-17	18:00:00	73.8	59.7	48.2	49.4	44.3	42.3	39.6
28-Feb-17	19:00:00	76.7	57.1	48.2	47.7	43.9	41.8	39.5
28-Feb-17	20:00:00	73.7	56.9	46.3	47.6	42.9	40.9	38.6
28-Feb-17	21:00:00	68.7	53.0	46.9	45.8	43.0	40.9	38.7
28-Feb-17	22:00:00	68.6	55.4	45.9	45.8	42.8	41.2	38.5
28-Feb-17	23:00:00	60.1	46.7	42.7	41.4	40.6	39.1	37.9
1-Mar-17	0:00:00	61.9	47.3	41.3	40.7	39.3	38.1	36.1
1-Mar-17	1:00:00	58.6	45.2	40.6	39.8	38.9	37.8	36.6
1-Mar-17	2:00:00	56.8	44.3	40.3	39.4	38.7	37.6	37.0
1-Mar-17	3:00:00	54.0	43.9	40.7	39.3	38.7	37.6	36.2
1-Mar-17	4:00:00	55.4	45.8	42.5	41.4	40.8	40.0	38.3

Date	Time	L_{max}	L_{01}	L_{10}	L_{eq}	L_{50}	L_{90}	L_{min}
1-Mar-17	5:00:00	65.4	50.6	46.7	46.2	45.6	44.6	41.6
1-Mar-17	6:00:00	68.9	57.5	52.0	51.2	50.1	48.9	46.6
1-Mar-17	7:00:00	70.8	62.7	54.5	53.2	50.2	49.1	47.6
1-Mar-17	8:00:00	94.4	75.1	62.2	63.6	55.5	49.9	48.1
1-Mar-17	9:00:00	98.7	78.5	68.6	67.5	59.6	54.9	45.3
1-Mar-17	10:00:00	87.9	72.6	62.9	61.1	53.9	47.8	43.7
1-Mar-17	11:00:00	75.4	65.9	54.9	54.4	47.8	44.5	41.4
1-Mar-17	12:00:00	74.1	63.7	51.1	51.6	45.2	43.1	40.6

Source: (Illingworth & Rodkin, Inc. 2017a)

Table 4.10-3 LT-3 Data

Date	Time	L_{max}	L_{01}	L_{10}	L_{eq}	L_{50}	L_{90}	L_{min}
27-Feb-17	12:00:00	72.5	64.2	44.7	50.8	39.2	36.2	33.1
27-Feb-17	13:00:00	72.2	65.3	52.1	51.8	41.9	37.9	34.5
27-Feb-17	14:00:00	78.1	66.9	51.4	53.0	42.0	38.7	35.7
27-Feb-17	15:00:00	72.3	66.2	51.7	52.4	42.8	39.5	36.4
27-Feb-17	16:00:00	75.6	66.6	49.5	52.7	41.7	39.1	35.5
27-Feb-17	17:00:00	71.9	67.0	54.0	53.5	43.2	40.7	38.3
27-Feb-17	18:00:00	85.4	67.7	53.1	54.4	42.1	39.4	35.4
27-Feb-17	19:00:00	73.0	65.4	51.3	52.0	40.9	37.8	34.7
27-Feb-17	20:00:00	77.3	65.5	50.0	51.9	39.3	36.6	33.0
27-Feb-17	21:00:00	71.4	60.7	47.1	48.0	37.4	34.4	32.3
27-Feb-17	22:00:00	71.7	52.6	41.0	42.1	34.8	32.2	30.0
27-Feb-17	23:00:00	72.4	56.8	41.2	44.7	33.1	30.6	29.3
28-Feb-17	0:00:00	73.6	47.2	34.4	37.8	31.1	29.7	28.7
28-Feb-17	1:00:00	57.0	40.6	36.8	35.6	34.3	32.6	28.8
28-Feb-17	2:00:00	64.9	45.7	36.6	38.0	34.6	33.5	32.3
28-Feb-17	3:00:00	62.2	42.0	38.1	37.0	35.1	33.9	30.6
28-Feb-17	4:00:00	63.9	41.9	34.7	34.9	32.0	30.7	29.4
28-Feb-17	5:00:00	69.6	46.6	38.9	38.7	35.1	32.9	30.5
28-Feb-17	6:00:00	86.3	65.9	47.8	51.9	40.8	37.7	32.3
28-Feb-17	7:00:00	70.6	65.2	52.6	52.1	43.1	40.1	36.3

APPENDIX 4.10
COMMUNITY NOISE SURVEY DATA

Date	Time	L_{max}	L_{01}	L_{10}	L_{eq}	L_{50}	L_{90}	L_{min}
28-Feb-17	8:00:00	86.0	75.0	64.3	63.8	53.9	45.5	35.5
28-Feb-17	9:00:00	75.3	64.9	52.3	52.3	42.2	38.5	34.4
28-Feb-17	10:00:00	86.7	67.2	58.1	55.8	49.1	43.6	34.0
28-Feb-17	11:00:00	79.1	65.4	51.8	52.3	41.6	37.9	34.5
28-Feb-17	12:00:00	87.2	65.2	53.7	52.8	43.7	38.1	34.2
28-Feb-17	13:00:00	79.8	69.6	61.9	60.0	52.9	47.3	37.5
28-Feb-17	14:00:00	74.8	66.8	55.2	54.2	44.1	40.7	36.7
28-Feb-17	15:00:00	72.0	65.6	52.0	52.0	42.6	40.5	38.1
28-Feb-17	16:00:00	71.5	66.9	53.1	52.9	41.9	39.3	36.5
28-Feb-17	17:00:00	76.8	64.5	51.8	52.0	41.2	38.7	35.3
28-Feb-17	18:00:00	84.3	68.3	54.3	54.8	41.1	37.7	33.2
28-Feb-17	19:00:00	72.3	66.7	52.6	52.5	39.4	36.0	33.1
28-Feb-17	20:00:00	72.0	64.8	45.7	50.6	37.5	34.7	32.7
28-Feb-17	21:00:00	75.2	66.0	49.4	52.3	37.5	34.4	31.8
28-Feb-17	22:00:00	71.0	55.7	41.2	44.8	36.5	34.7	33.1
28-Feb-17	23:00:00	69.3	49.5	37.1	40.2	34.4	32.9	31.7
1-Mar-17	0:00:00	70.5	55.5	36.1	43.8	33.3	32.2	31.2
1-Mar-17	1:00:00	69.8	41.1	35.1	36.2	33.6	32.6	31.2
1-Mar-17	2:00:00	66.4	42.7	35.8	36.8	34.2	33.2	32.0
1-Mar-17	3:00:00	45.8	39.7	35.8	34.6	34.0	33.0	31.6
1-Mar-17	4:00:00	67.7	46.0	37.6	39.2	36.0	35.2	33.9
1-Mar-17	5:00:00	68.7	46.3	42.2	42.0	40.9	39.9	36.2
1-Mar-17	6:00:00	72.2	65.6	50.7	52.1	46.2	45.0	42.5
1-Mar-17	7:00:00	73.4	67.0	53.8	53.9	46.0	44.8	43.0
1-Mar-17	8:00:00	83.5	67.6	54.1	54.7	46.3	44.9	43.6
1-Mar-17	9:00:00	74.5	65.0	54.5	53.2	46.7	44.9	41.0
1-Mar-17	10:00:00	76.8	64.2	51.3	52.6	46.0	41.4	36.7
1-Mar-17	11:00:00	81.0	66.9	55.8	54.8	47.9	41.6	35.8
1-Mar-17	12:00:00	70.8	64.8	52.8	51.7	41.2	38.1	34.8

Source: (Illingworth & Rodkin, Inc. 2017a)

Table 4.10-4 LT-4 Data

Date	Time	L_{max}	L_{01}	L_{10}	L_{eq}	L_{50}	L_{90}	L_{min}
27-Feb-17	12:00:00	53.9	52.1	48.9	47.7	47.4	46.2	45.2
27-Feb-17	13:00:00	59.3	54.7	50.8	49.0	48.2	46.6	44.9
27-Feb-17	14:00:00	63.5	56.5	52.4	50.4	49.3	47.7	45.8
27-Feb-17	15:00:00	66.2	56.2	52.5	51.0	50.3	48.7	46.6
27-Feb-17	16:00:00	64.3	57.0	53.7	51.9	51.3	49.4	47.5
27-Feb-17	17:00:00	87.7	60.9	56.7	54.9	51.4	49.5	47.1
27-Feb-17	18:00:00	70.2	60.0	53.9	52.3	50.0	48.4	46.6
27-Feb-17	19:00:00	65.1	53.6	50.3	48.9	48.4	47.0	45.4
27-Feb-17	20:00:00	63.4	51.4	49.1	47.8	47.5	46.1	44.2
27-Feb-17	21:00:00	60.6	50.6	47.7	46.3	45.8	44.5	43.3
27-Feb-17	22:00:00	54.5	49.3	46.4	44.9	44.5	43.1	40.9
27-Feb-17	23:00:00	60.4	48.8	45.0	43.2	42.5	40.8	38.9
28-Feb-17	0:00:00	53.1	47.3	43.3	41.5	40.7	39.0	37.3
28-Feb-17	1:00:00	55.6	48.4	45.1	43.1	42.2	40.2	36.7
28-Feb-17	2:00:00	54.2	46.1	43.7	42.1	41.5	40.1	37.5
28-Feb-17	3:00:00	58.2	50.4	46.1	44.4	43.5	41.9	39.2
28-Feb-17	4:00:00	56.5	49.3	44.5	42.5	41.3	39.4	37.0
28-Feb-17	5:00:00	52.7	49.0	46.2	44.5	44.0	42.4	40.6
28-Feb-17	6:00:00	68.2	56.9	51.1	49.7	48.1	46.4	42.5
28-Feb-17	7:00:00	75.8	58.7	50.7	50.8	48.6	47.5	45.3
28-Feb-17	8:00:00	67.0	54.7	50.3	48.7	47.5	46.2	45.0
28-Feb-17	9:00:00	63.5	56.2	52.1	49.3	47.2	45.4	43.3
28-Feb-17	10:00:00	59.4	54.2	50.0	47.8	46.6	44.9	42.5
28-Feb-17	11:00:00	64.4	58.3	55.6	52.9	52.1	47.4	43.6
28-Feb-17	12:00:00	70.0	58.5	52.5	50.0	46.9	45.3	43.0
28-Feb-17	13:00:00	73.9	59.7	52.6	51.3	49.4	47.7	45.1
28-Feb-17	14:00:00	65.1	57.9	54.2	52.3	51.7	49.8	47.3
28-Feb-17	15:00:00	72.3	61.7	56.3	54.6	53.3	51.3	49.6
28-Feb-17	16:00:00	61.7	57.2	54.0	52.2	51.6	49.7	47.9
28-Feb-17	17:00:00	65.0	56.3	51.7	50.3	49.6	48.1	46.8
28-Feb-17	18:00:00	67.7	53.9	50.0	48.7	47.9	46.6	45.2

APPENDIX 4.10
COMMUNITY NOISE SURVEY DATA

Date	Time	L_{max}	L_{01}	L_{10}	L_{eq}	L_{50}	L_{90}	L_{min}
28-Feb-17	19:00:00	61.8	54.2	49.6	48.1	47.3	46.0	44.7
28-Feb-17	20:00:00	65.6	54.5	48.9	47.7	46.5	45.1	43.7
28-Feb-17	21:00:00	63.8	53.7	49.0	47.4	46.3	44.9	43.7
28-Feb-17	22:00:00	62.2	50.7	45.4	44.2	43.4	41.9	39.9
28-Feb-17	23:00:00	57.7	48.3	44.5	42.9	42.3	41.0	39.5
1-Mar-17	0:00:00	61.9	50.4	43.2	42.5	40.4	39.0	35.5
1-Mar-17	1:00:00	55.7	45.4	40.5	39.0	38.0	36.4	35.0
1-Mar-17	2:00:00	48.0	41.3	38.9	37.6	37.3	36.3	35.3
1-Mar-17	3:00:00	52.4	43.5	40.4	39.0	38.5	37.4	35.1
1-Mar-17	4:00:00	62.5	49.1	42.6	42.7	41.3	40.1	38.4
1-Mar-17	5:00:00	49.1	44.8	42.6	41.2	40.8	39.6	38.2
1-Mar-17	6:00:00	66.5	53.8	47.9	46.6	45.1	43.6	40.7
1-Mar-17	7:00:00	69.0	57.3	51.8	49.6	47.3	45.6	44.2
1-Mar-17	8:00:00	85.7	67.2	59.1	56.8	50.7	46.8	43.2
1-Mar-17	9:00:00	64.9	58.0	51.1	49.7	48.0	46.6	44.1
1-Mar-17	10:00:00	69.4	61.8	58.0	54.7	50.5	47.8	42.0
1-Mar-17	11:00:00	74.0	63.2	56.1	53.6	49.1	44.8	42.8
1-Mar-17	12:00:00	70.3	61.0	56.9	52.9	49.3	45.8	42.7

Source: (Illingworth & Rodkin, Inc. 2017a)

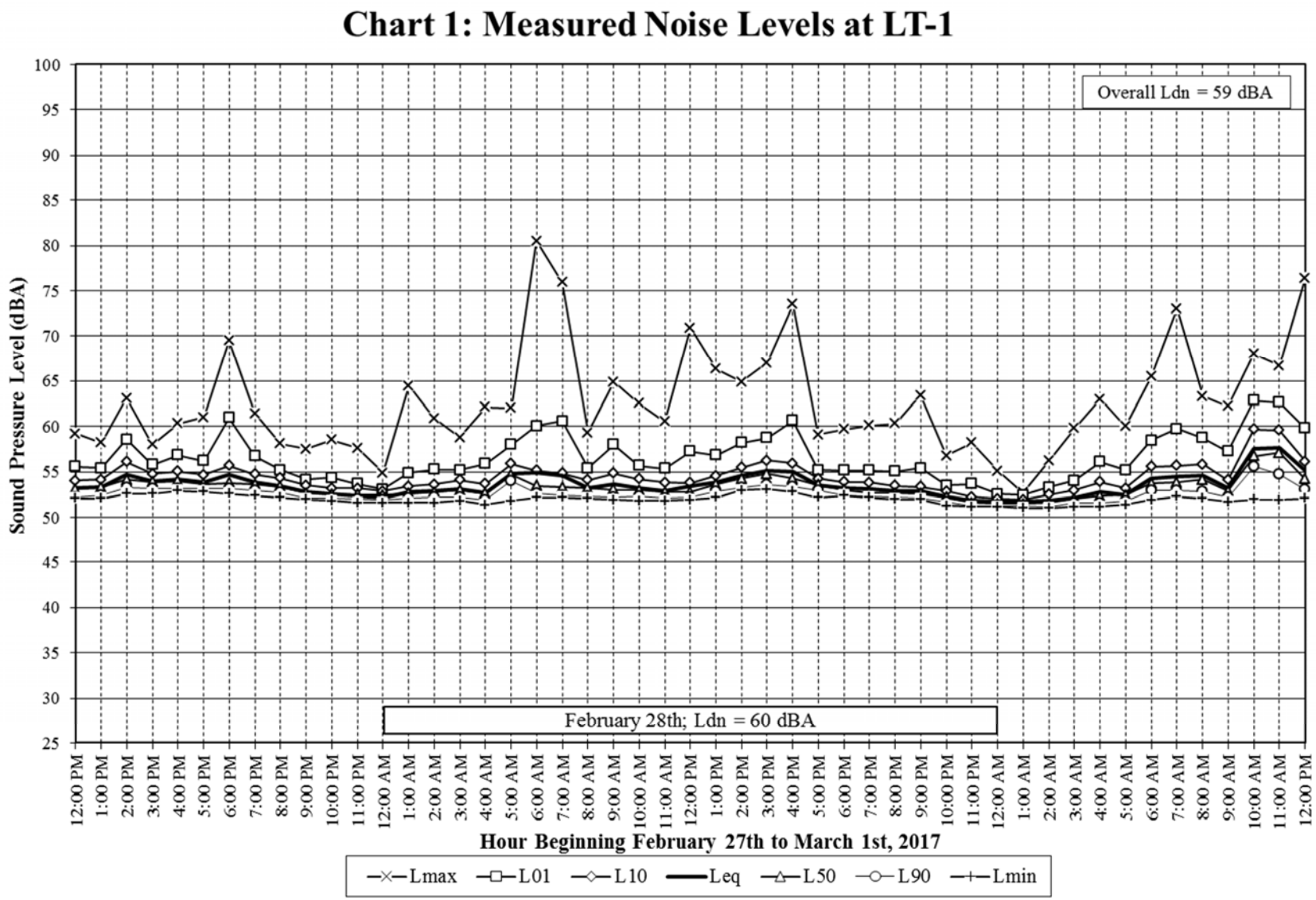

Chart 1: Measured Noise Levels at LT-1
Overall Ldn = 59 dBA
February 28th; Ldn = 60 dBA
Sound Pressure Level (dBA)
Hour Beginning February 27th to March 1st, 2017
Lmax
L01
L10
Leq
L50
L90
Lmin

Chart 2: Measured Noise Levels at LT-2

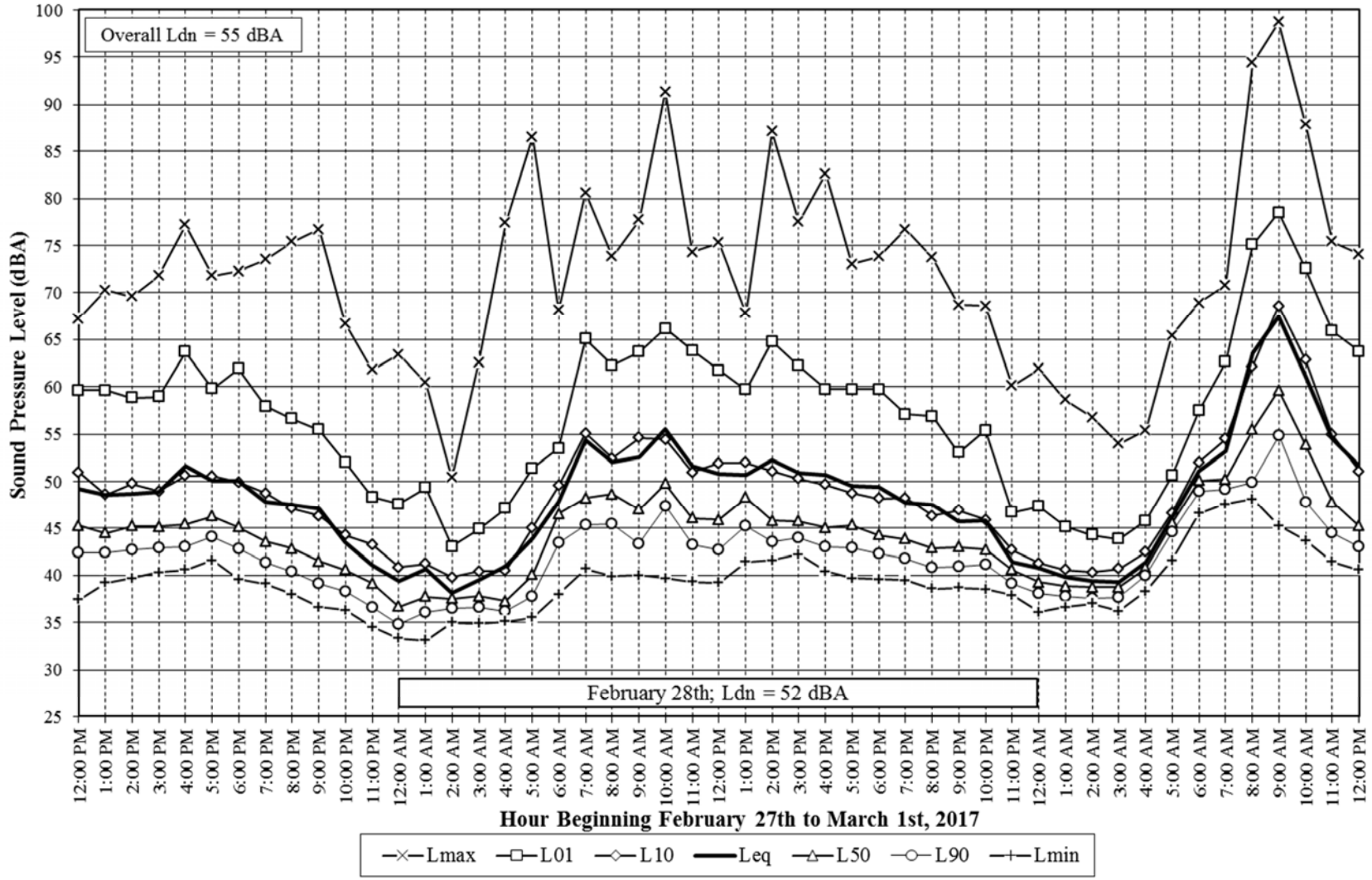


Chart 3: Measured Noise Levels at LT-3

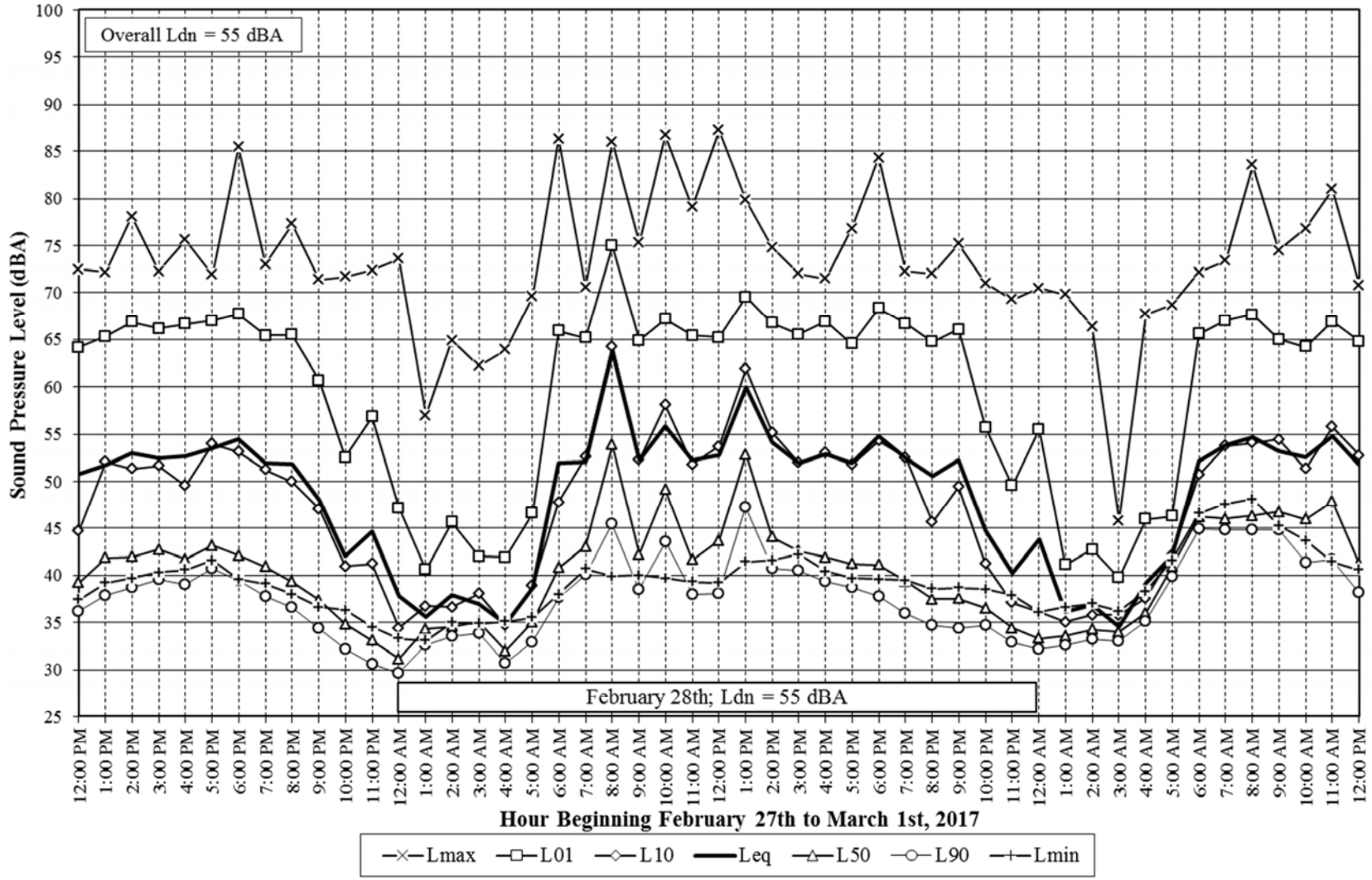
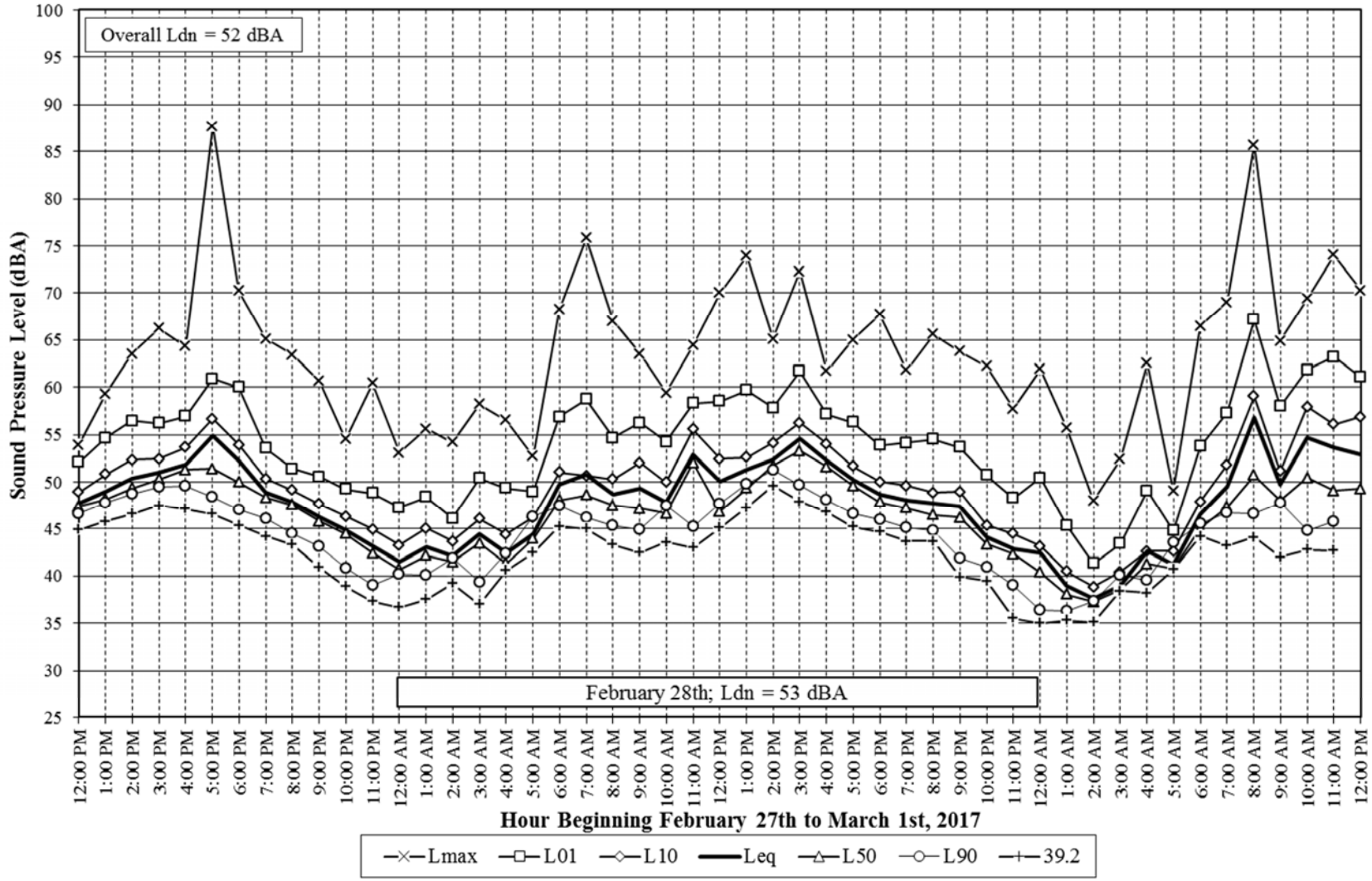


Chart 4: Measured Noise Levels at LT-4



SHORT-TERM MEASUREMENTS

Table 4.10-1 Short-Term Data Summary

Location	Date	Time	L_{max}	L_{01}	L_{10}	L_{eq}	L_{50}	L_{90}	L_{min}	Estimated L_{dn}
ST-1	1-Mar-17	11:00:00	64	61	54	52	49	47	45	52
ST-2	1-Mar-17	11:20:00	64	60	55	52	50	48	46	47
ST-3	1-Mar-17	11:50:00	56	53	50	46	44	41	40	48
ST-4	1-Mar-17	12:10:00	61	54	50	47	46	43	41	50

Source: (Illingworth & Rodkin, Inc. 2017a)

REFERENCES

Illingworth & Rodkin, Inc. 2017a. "Community Noise Survey." *Noise measurements collected between Monday, Februrary 27 and Wednesday, March 1, 2017.* April 20.

APPENDIX 4.12

Traffic Hazards Report

TRANSPORTATION AND TRAFFIC SUPPORT INFORMATION

POTENTIAL INBOUND AND OUTBOUND TRUCK ROUTES

Table 4.12-1 lists potential inbound and outbound truck routes for Access Points 1 and 2.

Table 4.12-1 Potential Truck Routes

Roadway	Access Point 1 [a]		Access Point 2 [b]	
	Inbound	Outbound	Inbound	Outbound
Regional Freeways				
I-80	●	●	●	●
I-280	●	●	●	●
SR-1/19th Avenue	●	●	●	●
US 101	●	●	●	●
City Streets				
7th Avenue		●	●	●
Brotherhood Way			●	
Clarendon Avenue	●	●		
Clayton Street			●	●
Fell Street			●	
Junipero Serra Boulevard	●		●	
Kirkham Street/Koret Way (east of 5th Avenue)		●		
Laguna Honda Boulevard	●	●	●	
Market Street	●			
Monterey Boulevard		●		
O'Shaughnessy Boulevard/Bosworth Street (South of Malta Drive)		●		
Oak Street				●
Octavia Street			●	●
Olympia Way		●		
Panorama Drive		●		

Roadway	Access Point 1 [a]		Access Point 2 [b]	
	Inbound	Outbound	Inbound	Outbound
Parnassus Avenue (east of 5th Avenue/Judah Street (west of 5th Avenue)			●	●
Portola Drive	●	●	●	
Sagamore Street			●	
Sloat Boulevard	●		●	
Stanyan Street			●	●
Twin Peaks Boulevard	●	●		
Woodside Avenue	●		●	
Campus Streets				
Behr Avenue	●	●	●	●
Johnson Drive	●	●	●	●
Medical Center Way	●	●	●	●
Nike Road [c]	●	●	●	●

Notes:

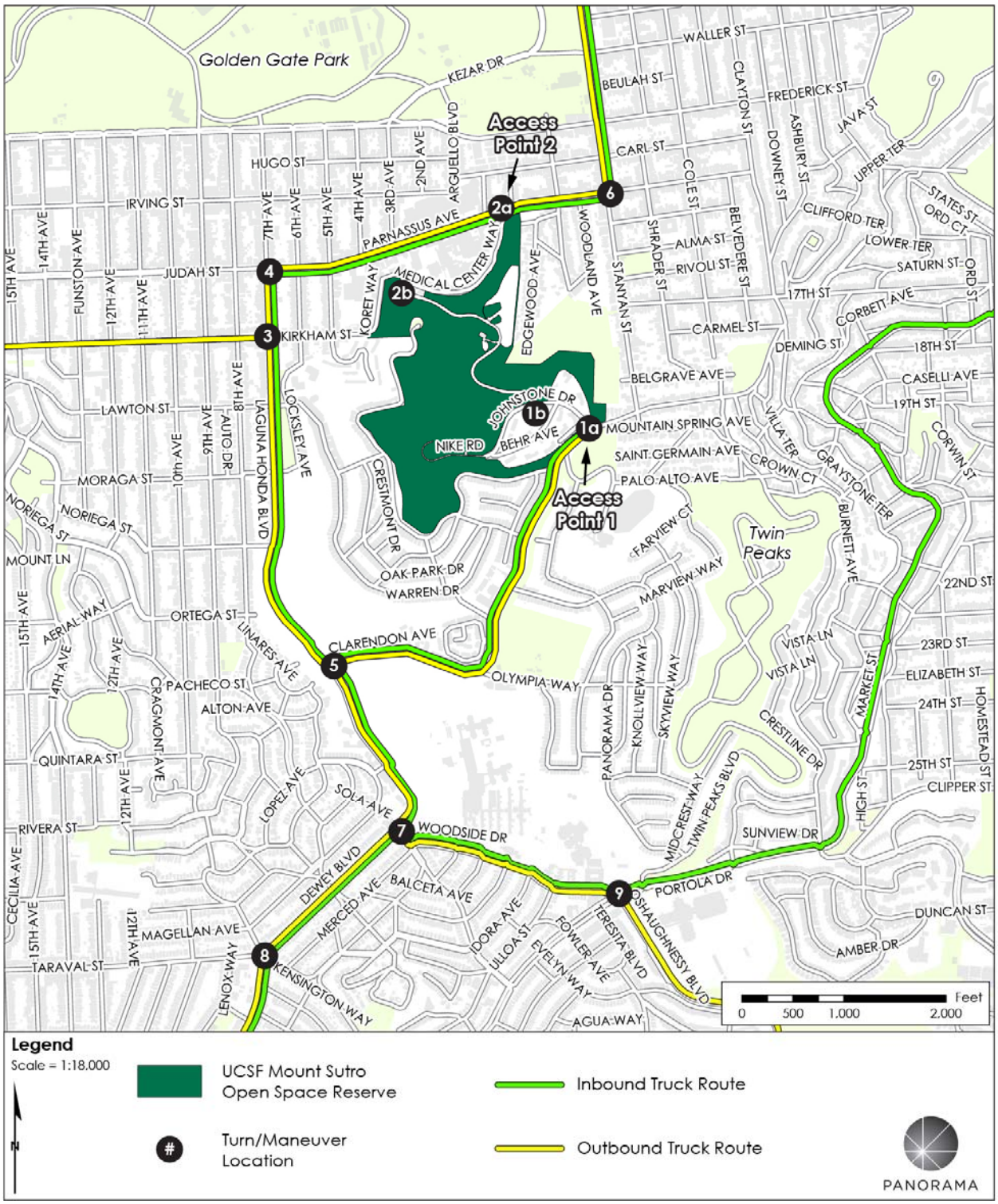
[a] Access Point 1 would be south of the Reserve at Johnstone Drive via Clarendon Avenue.

[b] Access Point 2 would be north of the Reserve at Medical Center Way via Parnassus Avenue.

[c] Nike Road is a paved single lane roadway that connects the western junction of Johnstone Drive and Behr Avenue and the summit of Mount Sutro. Nike Road serves as a restricted utility road and a pedestrian path.

Source: (CHS Consulting Group 2017b)

Figure 4.12-1 Turning Movement Analysis Locations



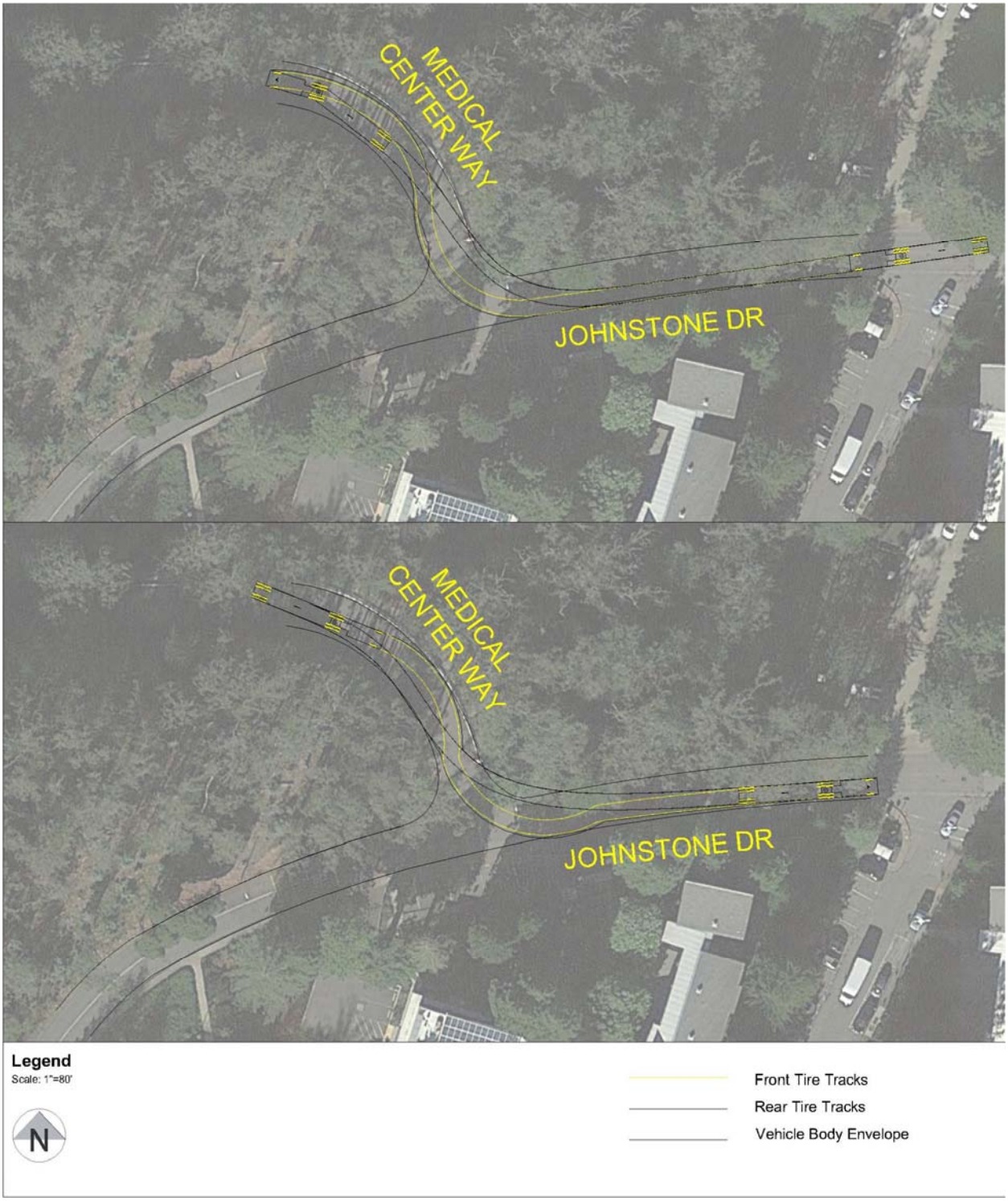
Sources: (CHS Consulting Group 2017a, CHS Consulting Group 2017b)

Figure 4.12-2 Location #1a (Access Point 1): Clarendon Avenue and Johnstone Drive



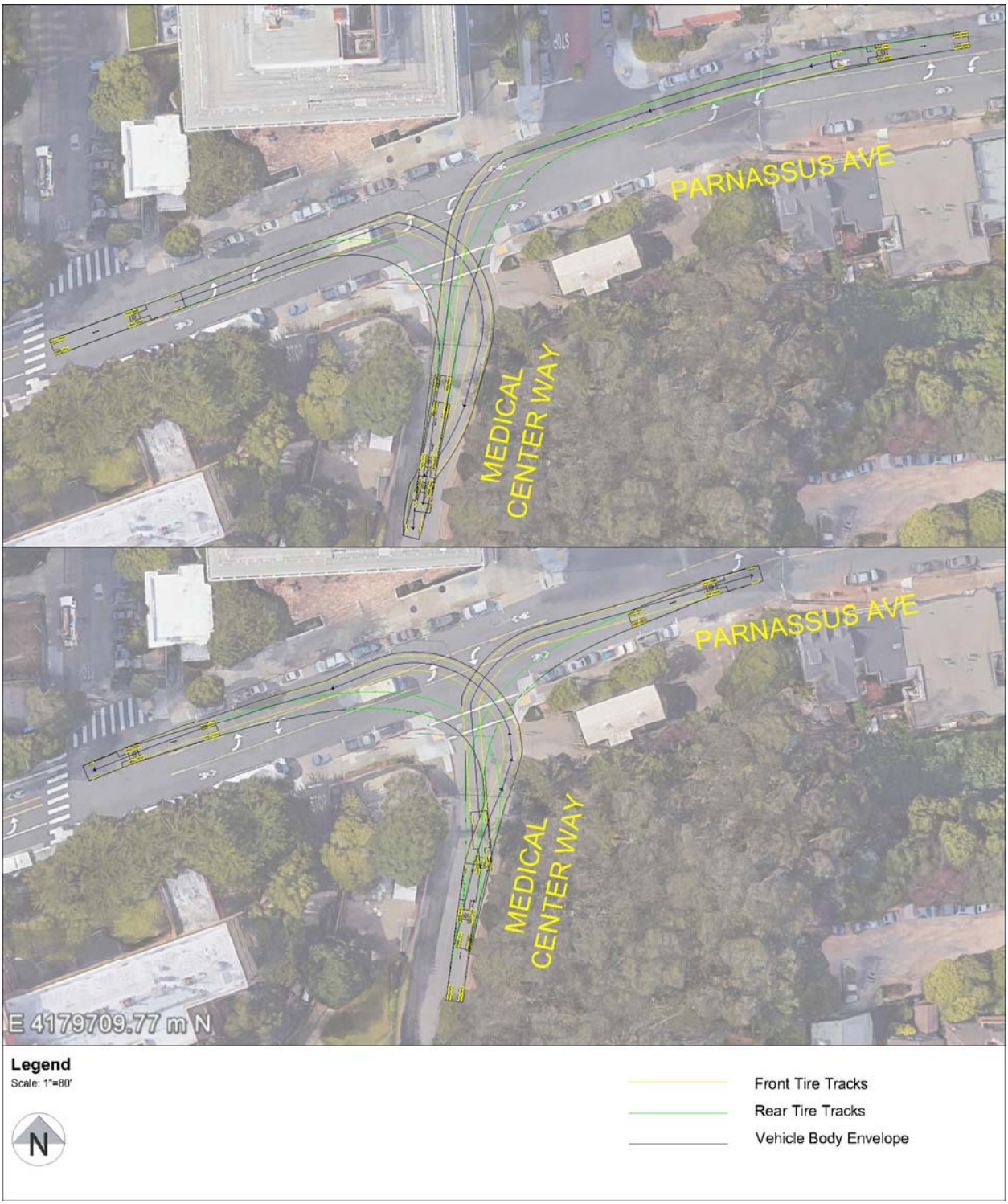
Sources: (CHS Consulting Group 2017a, CHS Consulting Group 2017b)

Figure 4.12-3 Location #1b: Medical Center Way and Johnstone Drive



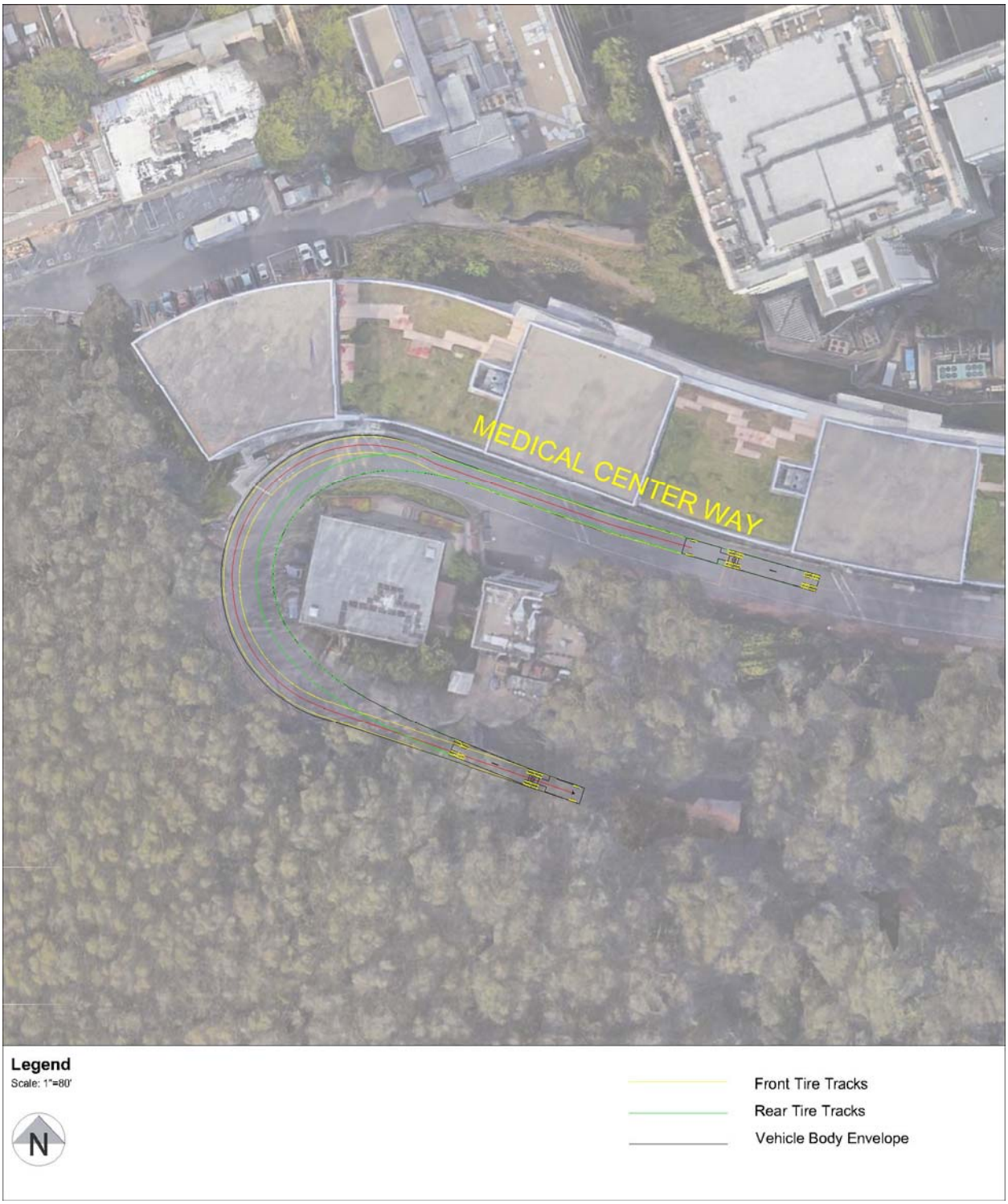
Sources: (CHS Consulting Group 2017a, CHS Consulting Group 2017b)

Figure 4.12-4 Location #2a (Access Point 2): Parnassus Avenue and Medical Center Way



Sources: (CHS Consulting Group 2017a, CHS Consulting Group 2017b)

Figure 4.12-5 Location #2b: Medical Center Way at the UCSF Environment, Health & Safety Building



Sources: (CHS Consulting Group 2017a, CHS Consulting Group 2017b)

Figure 4.12-6 Location #3: 7th Avenue and Kirkham Street



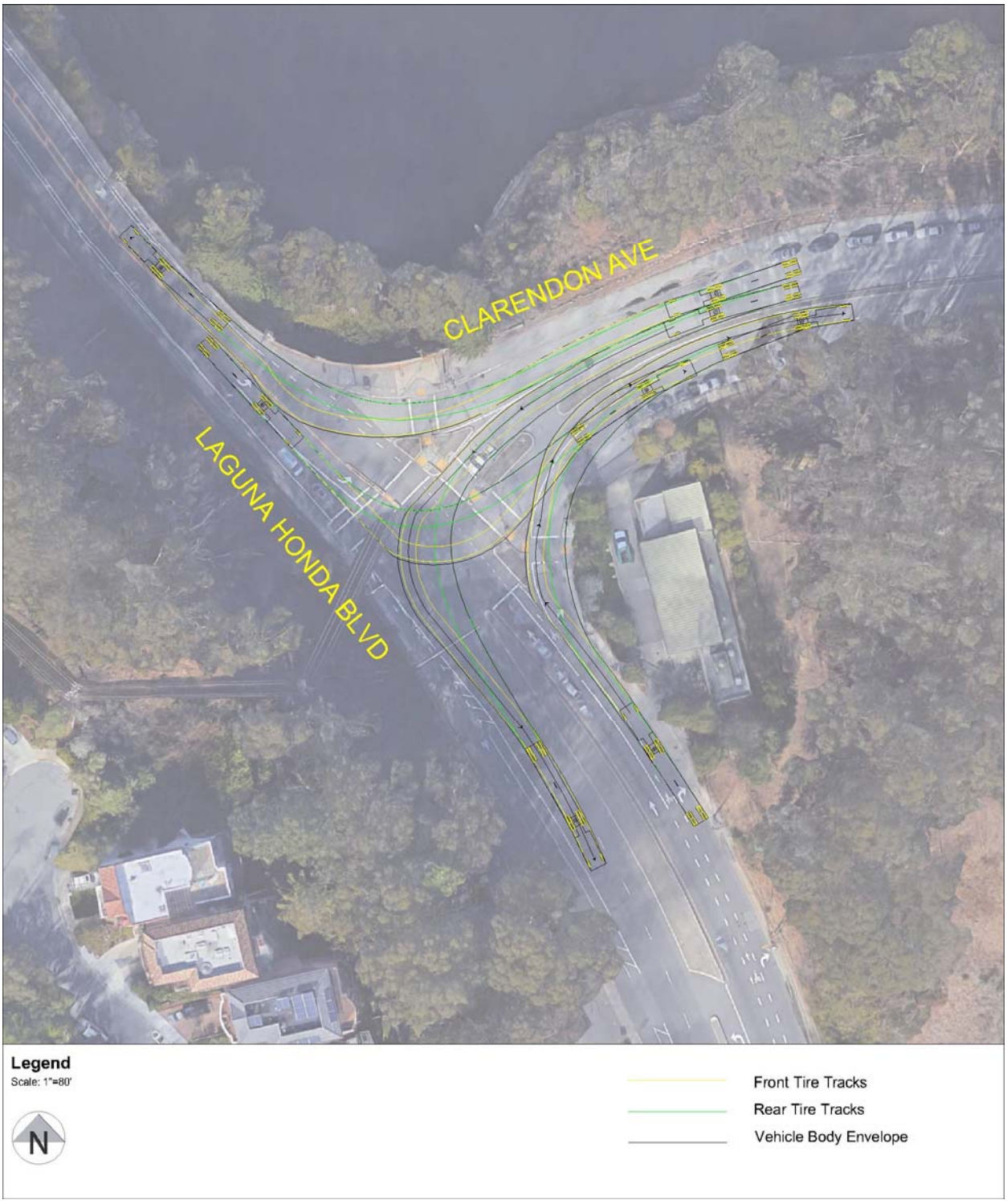
Sources: (CHS Consulting Group 2017a, CHS Consulting Group 2017b)

Figure 4.12-7 Location #4: 7th Avenue and Judah Street



Sources: (CHS Consulting Group 2017a, CHS Consulting Group 2017b)

Figure 4.12-8 Location #5: Laguna Honda Boulevard and Clarendon Avenue



Sources: (CHS Consulting Group 2017a, CHS Consulting Group 2017b)

Figure 4.12-9 Location #6: Parnassus Avenue and Stanyan Street



Sources: (CHS Consulting Group 2017a, CHS Consulting Group 2017b)

Figure 4.12-10 Location #7: Laguna Honda Boulevard, Dewey Boulevard, and Woodside Avenue



Sources: (CHS Consulting Group 2017a, CHS Consulting Group 2017b)

Figure 4.12-11 Location #8: Dewey Boulevard, Claremont Boulevard, Taraval Street, Kensington Way, and Montalvo Avenue



Sources: (CHS Consulting Group 2017a, CHS Consulting Group 2017b)

Figure 4.12-12 Location #9: Woodside Avenue, Portola Drive, and O'Shaughnessy Boulevard



Sources: (CHS Consulting Group 2017a, CHS Consulting Group 2017b)

REFERENCES

CHS Consulting Group. 2017a. "AutoTurn truck turning analysis for truck maneuvering hazards and transportation conflicts." March.

—. 2017b. "Potential Truck Route Review and Selection." March.